

**Research: Air, Climate and Energy**

Program Area: Research: Air, Climate and Energy

Goal: Taking Action on Climate Change and Improving Air Quality

Objective(s): Address Climate Change; Improve Air Quality

(Dollars in Thousands)

	<b>FY 2010 Enacted</b>	<b>FY 2010 Actuals</b>	<b>FY 2011 Annualized CR</b>	<b>FY 2012 Pres Budget</b>	<b>FY 2012 Pres Budget v. FY 2010 Enacted</b>
<b><i>Science &amp; Technology</i></b>	<b><i>\$111,449.0</i></b>	<b><i>\$102,758.1</i></b>	<b><i>\$111,449.0</i></b>	<b><i>\$108,000.0</i></b>	<b><i>(\$3,449.0)</i></b>
Total Budget Authority / Obligations	\$111,449.0	\$102,758.1	\$111,449.0	\$108,000.0	(\$3,449.0)
Total Workyears	313.6	311.4	313.6	309.6	-4.0

**Program Project Description:**

EPA’s Office of Research and Development provides critical support to Agency environmental policy decisions and regulatory actions to protect human health and the environment. EPA research has provided effective solutions to high-priority environmental problems for the past 40 years. Research enabled the Agency to implement policies and regulations to minimize waste and reduce pollution in specific industries and at different scales (national, regional, and local). However, these solutions were accomplished using approaches based on the best science available at the time and typically focused on the risks posed by a single chemical to a single target organ or species.

Now, as science advances, EPA is working to address the increasing complexity of 21<sup>st</sup> century environmental challenges with solutions that are effective, efficient, and sustainable – solutions that are designed to meet current needs while minimizing potential human health and environmental risks in the future. Air quality decisions historically rested solely on the health and environmental consequences of individual pollutants. As many air pollutant levels decrease, however, concern grows for potential health and environmental effects from multipollutant exposures. Climate change may be affected by, and contribute to, particles in these multipollutant mixtures. A change in climate may cause changes in temperature, humidity, and cloud formation that can lead to the evolution of secondary pollutants (e.g., ozone and organic compounds) and changes in pollution-causing particles. An increase in secondary pollutants and particle changes may cause increased degradation of air and water quality. At the same time, community traffic plans and land use decisions also have impacts on climate and air quality. A comprehensive understanding of these processes is necessary to inform the models used to make air quality and community adaptation decisions and to avoid partial, disconnected information that undermines sound decision making.

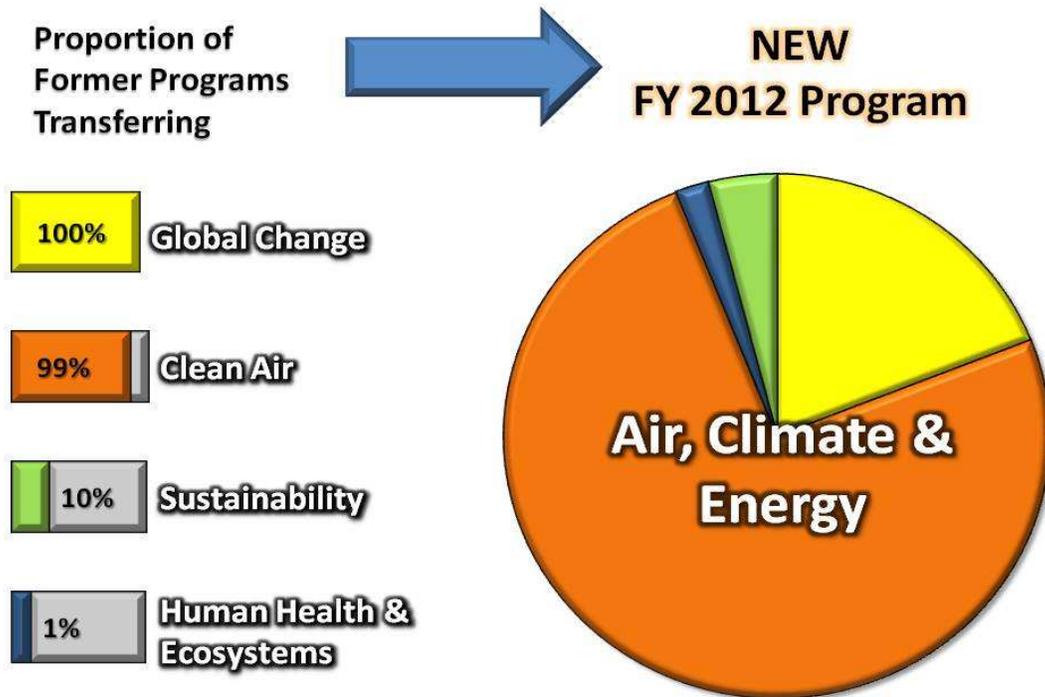
In FY 2012, EPA will strengthen its planning and delivery of science by implementing an integrated research approach that looks at problems from a systems perspective. This approach will create synergy and should produce more timely, efficient results than those possible from approaches that are more narrowly targeted to single chemicals or problem areas.

Consistent with the Administration's science and technology priorities for FY 2012,<sup>1</sup> the new integrated research approach will help develop sustainable solutions by adding a transformative component to EPA's existing research portfolio. The Agency will plan, develop and conduct research leveraging the diverse capabilities of in-house scientists and bridge traditional scientific disciplines. In addition, research plans will incorporate input from external stakeholders such as federal, state and local government agencies, non-governmental organizations, industry, and communities affected by environmental problems.

The Air, Climate and Energy (ACE) Research Program's integrated research approach will provide models and tools necessary for policy makers at all levels of community and government to make the best decisions. In coordination with other Research Programs, EPA will extend its research to include impacts to disadvantaged or otherwise compromised communities. The new research approach integrates multiple science disciplines and includes multiple users to promote sound policy decisions as we move forward in the 21<sup>st</sup> century.

EPA will use the integrated research framework to develop a deeper understanding of our environmental challenges and inform sustainable solutions to meet our strategic goals. In FY 2012, EPA is realigning and integrating the work of twelve of its base Research Programs into four new Research Programs:

- Air, Climate and Energy
- Safe and Sustainable Water Resources
- Sustainable and Healthy Communities
- Chemical Safety and Sustainability



<sup>1</sup> For more information, see the Executive Office of the President memorandum: <http://www.whitehouse.gov/sites/default/files/microsites/ostp/fy12-budget-guidance-memo.pdf>.

This integration capitalizes on existing capabilities and promotes the innovative use of multiple disciplines to further EPA's mission. Research to address targeted, existing problems and provide technical support will also continue, with a focus on sustainable applications and outcomes.

This program realignment will strengthen EPA's ability to leverage its partnerships to ensure its research is addressing the highest Agency priorities. The following Research Programs will be integrated into the Air, Climate and Energy Research Program:

- Clean Air Research
- Global Change Research
- Biofuels Research (within the Sustainability Program)
- Mercury Research (within the Human Health and Ecosystems Program)

The following are descriptions of current FY 2012 Air, Climate and Energy (ACE) activities categorized under the key program areas:

*Clean Air Research (\$83.1 million)*—Clean Air research provides the scientific foundation for review and implementation of the National Ambient Air Quality Standards (NAAQS). In order to better address the true atmospheric complexities of air pollution, EPA conducts research using a multi-pollutant source to health outcome approach. This air quality approach will link health and environmental impacts to their dominant sources and will provide information for a more effective and efficient air quality management strategy.

*Global Change Research (\$20.8 million)*—Global Change research provides scientific information to enable decision makers and stakeholders to develop the most effective policies and strategies to respond to global change. Research will continue to improve understanding of how climate change affects the Agency's ability to fulfill its statutory, regulatory and programmatic requirements, and identifies opportunities within the provisions of the statutes (e.g., the Clean Air Act, Clean Water Act, and Safe Drinking Water Act) to address the anticipated impacts of a changing climate.

The Air, Climate and Energy Program will continue to provide the underlying research to support the Agency's implementation of the Clean Air Act, which mandates scientific review of the NAAQS as well as the evaluation of risks associated with HAPs. The ACE program will also continue to be an active participant in the U.S. Global Change Research Program (USGCRP), the interagency Federal effort to improve scientific understanding of climate change and global change.<sup>2</sup> EPA will continue to participate in USGCRP's programmatic, assessment, and planning activities, including the development of the National Climate Assessments.

### **FY 2012 Activities and Performance Plan:**

Protecting human health and the environment from the effects of air pollution and developing a better understanding of climate change impacts on natural systems, while meeting the demands of a growing population and economy, is critical to the well-being of the nation. As we

---

<sup>2</sup> For more information, see <http://www.globalchange.gov/>

investigate solutions to reduce and prevent emissions and investigate potential environmental implications of a changing climate, we are challenged by uncertainties surrounding the complex interplay between air quality, the changing climate, and a changing energy landscape, and the subsequent human health and environmental risks from exposure to an evolving array of air pollutants.

By integrating air, climate and energy research, and in working with the other Research Programs, EPA will conduct research to understand the complexity of these interactions. The ACE Program will provide cutting-edge scientific information and tools to support EPA's strategic goals to protect and improve air quality. New knowledge will investigate environmental implications of strategies to reduce emissions and sustainably adapt to climate change.

EPA's ACE Research Program is designed to promote innovative, sustainable, and integrated solutions to air pollution and climate change to minimize adverse impacts on public health and the environment. The ACE Program also will continue to provide responsive, robust, and dynamic research in support of EPA's programs to improve public health and the environment, increase life expectancy, and protect the most susceptible populations.

Following are overarching research themes to be addressed by the program based on ongoing input from EPA's partners. These research themes and questions will be independently reviewed by EPA's Science Advisory Board and Board of Scientific Counselors during the spring and summer of 2011.

*Theme 1:* Develop and evaluate multi-pollutant, regional, and sector-based approaches and advance more cost-effective and innovative strategies to reduce air emissions that adversely affect atmospheric integrity.

Air pollution sources emit mixtures of pollutants, including greenhouse gases. Individuals are therefore exposed to multiple air pollutants at any one time. Multi-pollutant and sector-based pollutant reduction approaches will be developed to simultaneously reduce greenhouse gas emissions and account for the evolution and transformation of these mixtures in the atmosphere and the effects of a changing climate. Integrated pollution reduction approaches will enable EPA to develop and implement sustainable solutions to effectively meet its goal to ensure a clean and healthy environment. The ACE Research Program will:

- Work with experts in industry, academic and research communities, and with other federal, state and local partners to develop integrated strategies that reduce and prevent atmospheric pollution from key economic sectors.
- Assess the full life-cycle health, environmental and social impacts of alternative sector-specific strategies, such as biofuels for transportation.
- Develop, evaluate, and adapt innovative technologies for both monitoring multi-pollutant mixtures in the atmosphere and assessing source emissions for a range of needs, including community information, compliance and enforcement, regional and national assessments and air quality planning.

- Develop research tools that can evaluate the effectiveness of air pollution strategies at the local, regional and national levels.

*Theme 2:* Assess the impacts of atmospheric pollution, accounting for interactions between climate change, air quality, and water quality.

Understanding the concurrent impacts of atmospheric pollution and climate change is a critical step in evaluating the benefits and sustainability of environmental policies. Many of the environmental outcomes EPA is seeking to improve are sensitive to weather and climate change. Research is needed to explain how changes in climate will affect achieving and maintaining air pollution and other environmental goals. Adding to the complexity is the need to understand how air pollutants, acting in combination with each other and with stressors impacted by climate change (e.g., temperature, aeroallergens), impact human health and ecosystems. The ACE Research Program will:

- Develop methods to assess health and ecosystem impacts of exposure to multiple air pollutants in different environments including polluted urban areas, indoor environments, and affected ecosystems.
- Develop tools and methods to assess impacts of air pollution and climate change at community, regional, national and international scales.
- Link economic, technology, air quality, water quality, land use, ecosystem, and other models to enable integrated analyses of atmospheric pollution impacts.
- Gather, synthesize and report data on past changes in relevant environmental endpoints and climate-related metrics.

*Theme 3:* Provide environmental modeling, monitoring, metrics, and information needed by communities to adapt to the impacts of climate change.

Documented changes to environment and human health due to climate change are challenging the ability of federal, state, and local agencies to meet their responsibilities to protect public health and the environment. EPA has an important role to play in providing information that will help communities adapt to the environmental consequences of climate change. The ACE Research Program will:

- Assess the characteristics of populations and ecosystems that are at greatest risk to the adverse effects of air pollution and climate change.
- Develop integrated approaches to assess how social and economic factors affect vulnerability to air pollution and climate change.
- Develop tools and methods that enable evaluation of adaptation efforts and inform coordinated, sustainable responses to the impacts of climate change, in partnership with other federal agencies and research institutions.
- Develop tools to assess behavioral, social and economic responses to mitigation or adaptation policies addressing climate change that can affect vulnerability to air pollution or climate change impacts.
- Support Agency efforts to develop and maintain a next generation monitoring network for ambient air pollutants, including both the NAAQS and HAPs. In particular, it will

provide field validation of available, untested and undeployed monitoring methods, refinement of outdated techniques and methods, and innovative new technologies.

Within these integrated themes, EPA will continue its research to understand air pollution near roads, attempting to link roadway emissions with health outcomes.<sup>3</sup> EPA is conducting studies in Detroit from September 2010 through 2012, in collaboration with the Federal Highway Administration, to measure and characterize emissions and to understand potential exposures associated with roadway emissions. This research is being coordinated by EPA with a cooperative study conducted by the University of Michigan focusing on the links between emissions, ambient concentrations, exposure metrics and health outcomes in asthmatic children residing near roadways. Through 2012, EPA will be publishing and reporting study data. Based on this near roads research, EPA will refine pollution models to provide regulators, community planners and decision makers with the tools needed to assess land-use and future land-use planning. These tools will inform key decisions such as school building locations and renovations. This research includes an assessment of the use of passive road barriers in mitigating air pollution effects.

Because the 2010 Report to Congress is complete, EPA will reduce funding for research on the impacts of biofuel production in FY 2012. The decrease will reduce EPA research on filling gaps identified in the Report to Congress, while still enabling EPA planning for the 2013 Report to Congress as required by the Energy Independence and Security Act (EISA). EPA also will reduce funding for the Mercury Research Program and discontinue research examining mercury “hot spots” evaluating mercury emission measurement/control technologies, and assessing the impact of different coals and technology configurations on coal combustion residues. The program will use data already generated to produce final products and reports.

During 2012, each of the six NAAQS will be at some phase within the review cycle: Science Assessment, Risk and Exposure Assessment, Policy Assessment, external review (e.g., Clean Air Scientific Advisory Committee review or public review), or Proposed Rulemaking leading to Final Rule Making. Currently, Particulate Matter and Ozone are in the final phases of review. The NAAQS reviews focus on individual pollutants as statutorily mandated in five-year cycles of review. The Air, Climate and Energy research program will continue to provide the critical science to support the review process and the development of models and tools to support implementation of the NAAQS.

EPA will support the Global Alliance for Clean Cookstoves<sup>4</sup> to inform investments to develop and deploy improved stoves. The goal of the alliance is to reduce the health risks of people exposed to the emissions from cookstoves used by the world’s poor to cook and heat. Clean cookstoves can save lives, enhance livelihoods, empower women and combat climate change. By utilizing EPA’s unique expertise in characterizing emission generation, quantifying exposures and assessing human health effects, ACE will address the health, environmental, economic, and gender risks associated with the use of solid fuels in traditional cookstoves.

### **Performance Targets:**

---

<sup>3</sup> For more information, see [Near Roads](http://www.epa.gov/nerl/goals/air/linkages.html): <http://www.epa.gov/nerl/goals/air/linkages.html>

<sup>4</sup> For more information, see the [Global Alliance for Clean Cookstoves](http://cleancookstoves.org/overview/): <http://cleancookstoves.org/overview/>.

To be accountable to the American taxpayers, EPA plans to support the interagency Science and Technology in America's Reinvestment – Measuring the Effect of Research on Innovation, Competitiveness and Science (STAR METRICS) Program, currently a pilot program for the National Institutes of Health. This program is a collaboration of multiple science agencies, the Office of Science and Technology Policy, and the research community. STAR METRICS will use “science of science policy” approaches to assessing the impact that federal science and technology investments have on society, the environment, and the economy.

**FY 2012 Change from FY 2010 Enacted (Dollars in Thousands):**

The following policy changes are based on a comparison of the new FY 2012 budget structure to the 2010 enacted budget and are included in the transfers from the source programs following this section:

- (+\$3,000.0) This reflects an increase to help the Agency develop efficient, high-performing, and cost-effective monitors for ambient air pollutants, including both the NAAQS and HAPs. In particular, it will provide field validation of available, untested and undeployed monitoring methods, refinement of outdated techniques and methods, and innovative new technologies. With this investment, the Agency will seek lowest-cost, automated monitoring technologies to minimize future monitoring burdens felt by state and local agencies. This investment in a next generation air monitoring network supports the Agency's priority of improving air quality across the nation by helping modernize monitoring methods and monitors.
- (-\$36.0) This reflects a reduction as part of the Administrative Efficiency Initiative. This initiative targets certain categories of spending for efficiencies and reductions, including advisory contracts, travel, general services, printing and supplies. EPA will continue its work to redesign processes and streamline activities in both administrative and programmatic areas to achieve these savings.
- (-\$150.0) This reflects a decrease to the Clean Air Research Program and will reduce source receptor and dose-effect research that investigates human exposure to air pollutants and the resulting health effects. This decrease could reduce the level of detail in risk estimates that support NAAQS regulations. This decrease will also delay reporting for the Detroit Exposure and Aerosol Research Study.
- (-\$625.0) This reflects a reduction to research investigating the impacts of climate change on estuarine ecosystems.
- (-\$762.0) This reduction to the Clean Air Research Program will reduce research activities that support the development and application of models and technologies used to understand the relationships between air pollution, ambient concentration and exposures, and assist in the development of state implementation strategies. This decrease will result in a delay to possible model improvements that could aid state and regional air quality implementation plans.

- (-\$2,200.0) This reflects a disinvestment of research in biofuels due to the completion of the 2010 Report to Congress. The decrease will reduce EPA research on filling gaps identified in the Report to Congress, while still enabling EPA planning for the 2013 Report to Congress as required by the Energy Independence and Security Act (EISA).
- (-\$2,429.0 / -3.1 FTE) This reflects a reduction to the Mercury Research Program and includes a reduction of 3.1 FTE and decreased associated payroll of -\$412.0. The program will discontinue research examining mercury “hot spots” evaluating mercury emission measurement/control technologies, and assessing the impact of different coals and technology configurations on coal combustion residues. The program will use data already generated to produce final products and reports.
- (-\$247.0 / -.9 FTE) This decrease represents the net effect of all other payroll and technical adjustments including Information Technology reductions, Small Business Renovation Research (SBIR) realignments and administrative and programmatic support realignments and reductions. It includes an increase of \$820.0 for FTE changes as well as a recalculation of base costs for existing FTE in this program. For more information on these adjustments, refer to the programs integrating into the Air, Climate and Energy Program.

The following transfers will integrate Clean Air, Global Climate Change, Mercury and Biofuels Programs into the transdisciplinary Air, Climate and Energy (ACE) Research Program that better aligns with the Administration and Agency priorities. This effort will improve the ability to deliver science more effectively and efficiently, with catalyzing innovative sustainable solutions as the overall goal. This integration reflects EPA’s efforts to collaborate across traditional program boundaries to support national and regional decision-making, thereby strengthening the Agency’s ability to respond to environmental and public health.

- (+\$83,186.0 / +261.8 FTE) This reflects a transfer of dollar and FTE resources from the Clean Air Research Program into the new, integrated Air, Climate and Energy Research Program, including \$35,373.0 in associated payroll. This transfer includes the net effect of all technical adjustments such as Information Technology (IT) reductions, Small Business Innovation Research (SBIR) realignments and administrative and programmatic support realignments and reductions. For additional details on this net effect, please refer to the Research: Clean Air Program narrative.
- (+\$20,810.0 / +41.2 FTE) This reflects a transfer of dollar and FTE resources from the Global Change Research Program into the new, integrated Air, Climate and Energy Research Program, and includes \$5,521.0 in associated payroll. This transfer includes the net effect of all technical adjustments such as IT reductions, SBIR realignments and administrative and programmatic support realignments and reductions. For additional details on this net effect, please refer to the Research: Global Change Program narrative.
- (+\$1,204.0 / +6.6 FTE) This reflects a transfer of dollar and FTE resources from the Human Health and Ecosystems Research Program for mercury research and includes

\$886.0 in associated payroll. This transfer includes the net effect of all technical adjustments such as IT reductions, SBIR realignments and administrative and programmatic support realignments and reductions. For additional details on this net effect, please refer to the Research: Human Health and Ecosystems Program narrative.

- (+\$2,800.0) This reflects a transfer of resources from the Sustainability Research Program for biofuels research. This transfer includes the net effect of all technical adjustments such as IT reductions, SBIR realignments and administrative and programmatic support realignments and reductions. For additional details on this net effect, please refer to the Research: Sustainability Program narrative.

**Statutory Authority:**

CAA 42 U.S.C. 7401 et seq. Title 1, Part A – Sec. 103 (a) and (d) and Sec. 104 (c); CAA 42 U.S.C 7402(b) Section 102; CAA 42 U.S.C 7403(b)(2) Section 103(b)(2); Clinger Cohen Act, 40 U.S.C 11318; Economy Act, 31 U.S.C 1535; EISA, Title II Subtitle B; ERDDA, 33 U.S.C. 1251 – Section 2(a); Intergovernmental Cooperation Act, 31 U.S.C. 6502; NCPA; NEPA, Section 102; PPA; USGCRA 15 U.S.C. 2921.

**Research: Safe and Sustainable Water Resources**

Program Area: Research: Safe and Sustainable Water Resources

Goal: Protecting America's Waters

Objective(s): Protect Human Health; Protect and Restore Watersheds and Aquatic Ecosystems

(Dollars in Thousands)

	<b>FY 2010 Enacted</b>	<b>FY 2010 Actuals</b>	<b>FY 2011 Annualized CR</b>	<b>FY 2012 Pres Budget</b>	<b>FY 2012 Pres Budget v. FY 2010 Enacted</b>
<b>Science &amp; Technology</b>	<b>\$111,073.0</b>	<b>\$108,932.9</b>	<b>\$111,073.0</b>	<b>\$118,776.0</b>	<b>\$7,703.0</b>
Total Budget Authority / Obligations	\$111,073.0	\$108,932.9	\$111,073.0	\$118,776.0	\$7,703.0
Total Workyears	427.0	407.5	427.0	439.6	12.6

**Program Project Description:**

EPA's Office of Research and Development provides critical support to Agency environmental policy decisions and regulatory actions to protect human health and the environment. EPA research has provided effective solutions to high-priority environmental problems for the past 40 years. Research enabled the Agency to implement policies and regulations to reduce pollution and minimize waste in specific industries. However, these solutions were accomplished approaches based on the best science available at the time for very specific problems, for example, focusing on the risks posed by a single chemical to a single target organ or species.

Now, as science advances, EPA is working to address the increasing complexity of 21<sup>st</sup> century environmental challenges with solutions that are effective, efficient, and sustainable – solutions that are designed to meet current needs while minimizing potential health and environmental detriment in the future.

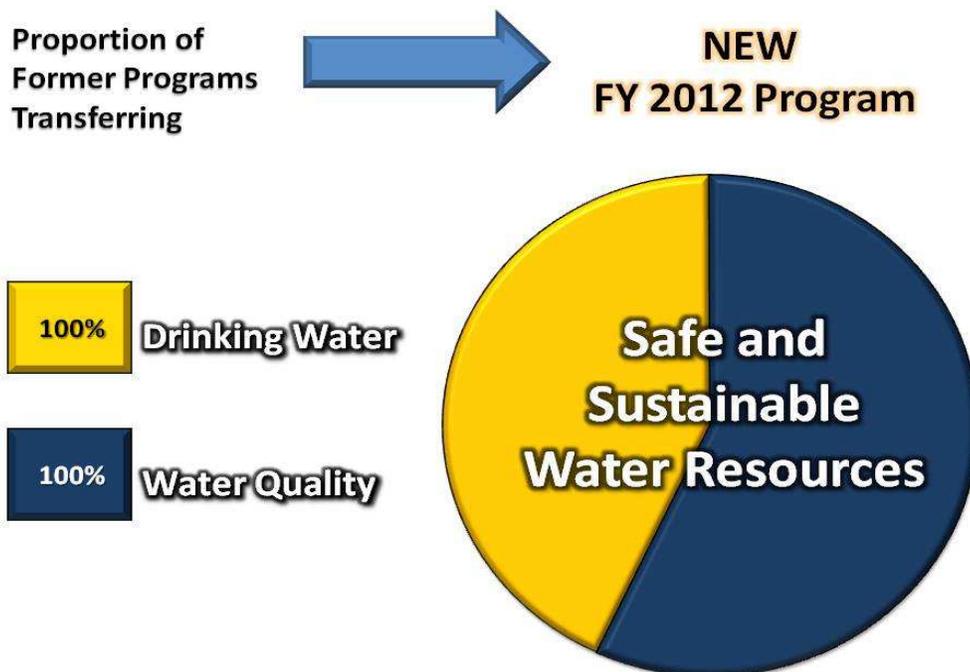
One such novel challenge is nutrient pollution (nitrogen and phosphorus). The problem of nutrient loading and the events that cascade from it are not just a pervasive problem for aquatic ecosystems, but also may create public health problems, both of which could be exacerbated by climate change and changes in water quantity. Nutrients enter and impact every step of the hydrologic cycle from air to land to fresh surface water to groundwater to estuaries to marine systems. Excessive nutrient loads are currently responsible for poor biological condition in over 30 percent of the nation's stream miles and about 20 percent of the nation's lakes and reservoirs. In addition, these loads raise public health concerns associated with cyanobacterial blooms, nitrate and nitrite pollution, and the formation of disinfection by-products in drinking water supplies. Solving the nutrient pollution problem and ensuring sustainable, safe water resources, will require engaging expertise across many sectors and across traditional scientific disciplines. Integrated, research is needed to help develop improved management practices for nutrients and other novel water challenges in the face of competing demands for water resources.

To address these challenges, in FY 2012 EPA will strengthen its planning and delivery of science by implementing an integrated research approach that looks at problems from a systems perspective. This approach will create synergy and produce more timely, efficient results than

those possible from approaches that are more narrowly targeted to single chemicals or problem areas.

Consistent with the Administration’s science and technology priorities for FY 2012,<sup>1</sup> the new integrated research approach will help develop sustainable solutions by adding a transformative component to EPA’s existing water research portfolio. The Agency will plan, develop and conduct research leveraging the diverse capabilities of in-house scientists and engineers, and bridge traditional scientific disciplines. In addition, research for scientific, technological, and behavioral innovations will help ensure clean, abundant and equitable supplies of water that support human health and resilient aquatic ecosystems. Research plans will incorporate input from external stakeholders such as federal, state and local government agencies, non-governmental organizations, industry, and communities affected by environmental problems.

EPA will use the integrated research framework to develop a deeper understanding of our environmental challenges and inform sustainable solutions to meet our strategic goals. In FY 2012, EPA is realigning and combining the Drinking Water and Water Quality base Research Programs into one Safe and Sustainable Water Resources Research Program. This integration capitalizes on existing capabilities and promotes the use of an approach to further EPA’s mission. Research to address targeted, existing problems and provide technical support will also continue, but with an emphasis on applications and outcomes. This program realignment will strengthen EPA’s ability to leverage partnerships to ensure research is addressing the highest Agency priorities.



The

<sup>1</sup> For more information, see the Executive Office of the President memorandum: <http://www.whitehouse.gov/sites/default/files/microsites/ostp/fy12-budget-guidance-memo.pdf>.

following are descriptions of FY 2012 Safe and Sustainable Water Resources Research Program activities categorized under each program area:

EPA's Drinking Water Research Program (FY 2012 request: \$52.5 million) conducts comprehensive integrated research in support of EPA's Water Program and regional offices' implementation of the Safe Drinking Water Act (SDWA). The program focuses on characterization and management of human health risks across the water continuum with an emphasis on sound scientific approaches for ensuring safe and sustainable drinking water.

The Water Quality Research Program (FY 2012 request: \$66.2 million) is designed to support the Clean Water Act (CWA), providing scientific information and tools to the Agency and others to help protect and restore the designated uses of water bodies that sustain human health and aquatic life. Research focuses on the development and application of water quality criteria, the implementation of effective watershed management approaches, and the application of technological options to restore and protect water bodies using information on effective identification, treatment and management alternatives.

#### **FY 2012 Activities and Performance Plan:**

Following are descriptions of problem areas to be addressed by the program based on ongoing input from EPA's partners. These research themes and questions, as well as the Agency's FY 2012 research plan, will be independently reviewed by EPA's Science Advisory Board and Board of Scientific Counselors.

Increasing demands for sources of clean water-combined with poor land use practices, growth, aging infrastructure, and climate variability threaten to our nation's water resources. Research is needed to inform management of our nation's waters in an integrated, sustainable manner that will promote economic prosperity and human and aquatic ecosystem health.

In FY 2012, the Safe and Sustainable Water Resources Research Program will begin addressing the critical science questions impacting the development and maintenance of safe, sustainable waters. It will begin to address key issues such as comprehensive water resource management, water sustainability metrics, infrastructure life-cycle assessments, and economical and effective management of stressors (e.g., nutrients, sediments, pathogens other contaminants). Safe and Sustainable Water Resources efforts will address existing high priority water research needs, such as recreational water protection, water-energy interdependencies, geologic sequestration, green infrastructure, and hydraulic fracturing.

The Safe and Sustainable Water Resources Research Program seeks safe, resilient and sustainable solutions to the increasingly complex water challenges facing the nation's regions, states, tribes, cities, and rural areas. Research areas that may be investigated in FY 2012 include potential impacts of a changing climate on water resources, existing infrastructure problems associated with built urban environments and sprawl, potential consequences of increased energy demand and mineral extraction on water quality, and maintaining and using natural and engineered aquatic systems to fully ensure the needed capacity and quality of water that supports the nation's range of growing demands and uses. Safe and Sustainable Water Resources research

will guide the national implementation of EPA's regulatory and non-regulatory efforts by providing information on new approaches to enable the following:

- Systematic protection and restoration of watersheds to provide safe and sustainable water quality necessary for human and ecosystem health;
- Sustainable water quality and availability to support the needs of healthy humans, ecosystems, and economies; and
- Water infrastructure capable of the sustained delivery of safe water, providing for the removal and treatment of wastewater consistent with its sustainable and safe reuse, and management of stormwater in a manner that values it as a resource and a component of sustainable water resources.
- Research that informs assessing the potential public health and environmental risks posed by hydraulic fracturing. In particular, EPA's Science Advisory Board recommends that EPA undertake five to ten case studies in order to provide an understanding of how potential risks may vary in the key geologic and geographic situations where hydraulic fracturing is or may be used.

The new Safe and Sustainable Water Resources Program will take a systems approach to protecting human and aquatic ecosystem health and protecting and restoring watersheds for the sustainability of the nation's water resources. This approach will continue to include targeted research on key priorities.

For example, in FY 2010, the Agency began outreach and investigation into a study designed to determine whether hydraulic fracturing has adverse effects on drinking water resources in response to a FY 2010 request from Congress. Work in FY 2012 will continue to assess the potential impacts of hydraulic fracturing.

Beaches work in FY 2012 will continue to support criteria development and implementation guidance regarding the applicability and use of new molecular tools. The molecular tools provide a more sensitive measure of waterborne pathogens that can cause disease and allow public health officials to determine more quickly if water is safe for swimming. While immediate needs for the 2012 criteria are being met, work to support an expected five year revision will focus on new and unanswered questions. Large scale epidemiology studies will be more difficult to support with the proposed reduction, but continued development of measures of waterborne pathogen occurrence and tools for assessing illnesses related to pathogens will remain a priority. There will not be large scale health studies in FY 2012, but work on tools to use in future health studies will continue.

Aging Water Infrastructure research, which began as a FY 2007 initiative, will wrap up efforts to provide new tools for infrastructure condition assessment, repair, replacement, and rehabilitation. This research also will provide improved tools for decision-support and asset management. Green infrastructure work will continue to support several regional projects. This work will provide better predictive tools and guidance for selecting and implementing appropriate green technologies. Supporting work also will seek to link green technologies to improving watershed health at various scales and locations. This information is important to municipal governments for capital planning projects to meet both the current needs and future needs,

Finally, carbon sequestration research will continue in FY 2012 and will focus on mechanical well integrity, biogeochemical and hydrologic models of the fate and transport of carbon dioxide and displaced fluids in subsurface formations, and monitoring and modeling approaches for characterizing and managing sites in support of the SDWA underground injection control (UIC) program.

### **Performance Targets:**

As EPA scientists work closely with the program and regional offices to develop the Safe and Sustainable Water Resources' solution-oriented research portfolio, EPA also is developing FY 2012 measures for program managers to ensure the research is responsive to our partners' critical research needs. In addition, to be accountable to the American taxpayers, EPA plans to support the interagency Science and Technology in America's Reinvestment – Measuring the Effect of Research on Innovation, Competitiveness and Science (STAR METRICS) Program, currently a pilot program for the National Institutes of Health. This program is a collaboration of multiple science agencies, the Office of Science and Technology Policy, and the research community. STAR METRICS uses “science of science policy” approaches focusing on assessing the impact federal science and technology investments have on society, the environment, and the economy.

### **FY 2012 Change from FY 2010 Enacted (Dollars in Thousands):**

The following policy changes are based on a comparison of the new FY 2012 Budget structure to the 2010 enacted Budget and are included in the transfers from the source programs following this section:

- (+\$5,966.0 / +7.0 FTE) This reflects funding for green infrastructure research to improve watershed management practices and facilitate the nation's transition to more sustainable water infrastructure systems. The increase also includes 7.0 FTE with associated payroll of \$931.0. A significant portion of funds will leverage the innovative thinking by academia's scientists through Science to Achieve Results (STAR) grants.
- (+\$4,226.0 / +5.0 FTE) This reflects an increase for research on hydraulic fracturing which includes \$665.0 in associated payroll for 5.0 FTE. Research will provide policy relevant methods, models, monitoring tools, and data on potential risks associated with extracting gas from subsurface formations using vertical and horizontal fracturing technologies. Research will inform key areas lacking information to provide an adequate assessment of the potential public health and environmental risks posed by hydraulic fracturing. In particular, EPA's Science Advisory Board recommends that EPA undertake five to ten case studies in order to provide an understanding of how the risks may vary in the key geologic and geographic situations where hydraulic fracturing is or may be used. Evaluation of the chemicals conducted under this investment will provide a sound foundation upon which to base the choice of safer hydraulic fracturing chemicals. Congress has urged EPA to conduct this research, which supports the Agency's priority to protect the quality of the nation's waters by ensuring the protection of our aquifers.

- (-\$550.0) This reflects a reduction to the development of best management practices and informing decisions associated with control of pathogens in drinking water systems. This decrease will limit the extent to which the Agency can respond to the priorities defined by EPA's Distribution System Research and Information Collection Partnership (RICP).
- (-\$1,005.0) This reflects a reduction as part of the Administrative Efficiency Initiative. This initiative targets certain categories of spending for efficiencies and reductions, including advisory contracts, travel, general services, printing and supplies. EPA will continue its work to redesign processes and streamline activities in both administrative and programmatic areas to achieve these savings.
- (-\$2,000.0) This reflects a decrease in Beaches research due to continued progress in meeting the requirements of the consent decree and settlement agreement. Work to support implementation efforts through the Office of Water will receive a higher priority. In particular, as the Beaches work nears completion, human health effects efforts will transition to a technical support level. Research on methods and new molecular tools will continue. Large scale epidemiology studies will be more difficult to support with this reduction, but continued development of measures of waterborne pathogen occurrence and tools for assessing illnesses related to pathogens will remain a priority. There will not be large scale health studies in FY 2012, but work on tools to use in future health studies will continue. While immediate needs for the 2012 criteria are being met, work to support an expected five year revision will focus on new and unanswered questions.
- (+\$1,066.0 / +0.6 FTE) This increase represents the net effect of all other payroll and technical adjustments including Information Technology reductions, Small Business Renovation Research realignments and administrative and programmatic support realignments and reductions. It includes an increase of \$1579.0 for FTE changes as well as a recalculation of base costs for existing FTE in this program. For more information on these adjustments, refer to the programs integrating into the Safe and Sustainable Water Resources Program.

The following transfers will integrate Drinking Water and Water Quality Research Programs into the Safe and Sustainable Water Resources Research Program that better aligns with the Administration and Agency priorities. This effort will improve the ability to deliver science more effectively and efficiently, with catalyzing innovative sustainable solutions as the overall goal. This integration reflects EPA's efforts to collaborate across traditional program boundaries to support national and regional decision-making, thereby strengthening the Agency's ability to respond to environmental and public health issues.

- (+\$52,547.0 / +196.2 FTE) This reflects a transfer of dollar and FTE resources from the Drinking Water Research Program into the new, integrated Safe and Sustainable Water Resources Program, including \$25,050.0 in associated payroll. This transfer includes the net effect of all technical adjustments such as Information Technology (IT) reductions, Small Business Innovation Research (SBIR) realignments and administrative and programmatic

support realignments and reductions. For additional details on this net effect, please refer to the Research: Drinking Water Program narrative.

- (+\$66,229.0 / +243.4 FTE) This reflects a transfer of dollar and FTE resources from the Water Quality Research Program into the new, integrated Safe and Sustainable Water Resources Program and includes \$31,105.0 in associated payroll. This transfer includes the net effect of all technical adjustments such as IT reductions, SBIR realignments and administrative and programmatic support realignments and reductions. For additional details on this net effect, please refer to the Research: Water Quality Program narrative.

**Statutory Authority:**

SDWA Part E, Sec. 1442 (a)(1); CWA Title I, Sec. 101(a)(6) 33 U.S.C. 1254 – Sec 104 (a) and (c) and Sec. 105; ERDDA 33 U.S.C. 1251 – Section 2(a); MPRSA Sec. 203, 33 U.S.C. 1443; ODBA Title II; SPA; CVA; WRDA; WWWQA; MPPRCA; NISA; CZARA; CWPPRA; (ESA; NAWCA; FIFRA 7 U.S. C. 135 et seq; TSCA U.S. C. 136 et seq.

**Research: Sustainable and Healthy Communities**

Program Area: Research: Sustainable Communities

Goal: Cleaning Up Our Communities

Objective(s): Promote Sustainable and Livable Communities

(Dollars in Thousands)

	<b>FY 2010 Enacted</b>	<b>FY 2010 Actuals</b>	<b>FY 2011 Annualized CR</b>	<b>FY 2012 Pres Budget</b>	<b>FY 2012 Pres Budget v. FY 2010 Enacted</b>
<b><i>Science &amp; Technology</i></b>	<b><i>\$188,095.0</i></b>	<b><i>\$183,002.7</i></b>	<b><i>\$186,095.0</i></b>	<b><i>\$171,026.0</i></b>	<b><i>(\$17,069.0)</i></b>
Leaking Underground Storage Tanks	\$345.0	\$422.5	\$345.0	\$454.0	\$109.0
Inland Oil Spill Programs	\$639.0	\$549.7	\$639.0	\$614.0	(\$25.0)
Hazardous Substance Superfund	\$21,264.0	\$22,525.3	\$21,264.0	\$17,706.0	(\$3,558.0)
Total Budget Authority / Obligations	\$210,343.0	\$206,500.2	\$208,343.0	\$189,800.0	(\$20,543.0)
Total Workyears	647.0	625.3	647.0	621.7	-25.3

**Program Project Description:**

As the support to Agency environmental policy decisions and regulatory actions to protect human health and the environment, EPA's research has provided effective solutions to high-priority environmental problems for the past 40 years. Research has enabled the Agency to implement policies and regulations to minimize waste and reduce pollution in specific industries and at national, regional and local scales. While these solutions were effective in moving the Agency toward its goal of protecting human health and environment, they were accomplished using the best available science at the time and were occasionally more limited in scope, for example, focusing on the risks posed by a single chemical to a single target organ or species.

Now, as science has advanced, EPA is working to address the increasing complexity of 21<sup>st</sup> century environmental challenges with solutions that are effective, efficient, and sustainable – solutions that are designed to meet current needs while minimizing potential health and environmental risks in the future. To address this challenge, in FY 2012 EPA will strengthen its planning and delivery of science by implementing an integrated research approach that looks at problems from a systems perspective. This approach will create synergy and provide more timely and efficient benefits beyond those possible from approaches that are more narrowly targeted to single chemicals or problem areas.

Consistent with the Administration's science and technology priorities for FY 2012,<sup>1</sup> the new integrated research approach will help develop sustainable solutions by adding a transformative component to EPA's existing research portfolio. This research will leverage the diverse capabilities of in-house scientists and engineers and bridge traditional scientific disciplines. In addition, research plans will incorporate input from external stakeholders such as federal, state

<sup>1</sup> For more information, see the Executive Office of the President memorandum: <http://www.whitehouse.gov/sites/default/files/microsites/ostp/fy12-budget-guidance-memo.pdf>.

and local government agencies, non-governmental organizations, industry, and communities affected by environmental problems.

EPA will use the integrated research framework to develop a deeper understanding of our environmental challenges and inform sustainable solutions to meet our strategic goals. In FY 2012, EPA is realigning and integrating the following individual Research Programs into a new integrated, Sustainable and Healthy Communities (SHC) Research Program:

- Human Health research
- Ecosystems Services research
- Land Protection and Preservation research
- Pesticides and Toxics research
- Sustainability research
- Fellowships



The hallmark of this new SHC Research Program is a central focus on the integration, translation and coordinated communication of research on the many issues that impact the sustainability and health of communities.<sup>2</sup> Integrated research on these issues under the new SHC program will focus on addressing the specific health and environmental needs of local communities. The

<sup>2</sup> In the graphic above, the proportions of the former research programs transferring to the new Sustainable and Healthy Communities program reflect funds from all appropriations.

program will conduct research to address issues such as environmental justice concerns, waste reduction and site clean-up, and green development.

The SHCRP will focus primarily on environmental sustainability at the community scale. The SHC program aims to conduct research and development that will help communities assess their current health and environmental condition and identify strategies that increase ecosystem services while decreasing community health risks. Healthy communities will translate to healthy economies.

The following are descriptions of current SHC activities categorized under key program areas:  
*Human Health Research (FY 2012 request \$45.4 million)*—Human health research provides tools and models to evaluate and manage health risks from exposures to environmental chemicals. Human Health research can promote environmental justice by focusing on groups such as children and the elderly that may be more susceptible and perhaps disproportionately impacted; research models are developed in concert with stakeholders and applied in community-based participatory research projects to characterize communities at disproportionate risk. For example, the C-FERST (Community-Focused Exposure and Risk Screening Tool), will be pilot tested in EPA's CARE (Community Action for a Renewed Environment) program to identify key community exposures and evaluate risk mitigation strategies, and STAR grants will explore innovative methods for assessing potential interactions between pollution exposures and social stressors.

*Ecosystems Services Research (FY 2012 request \$60.9 million)*—Ecosystems Services research is focused on better understanding the implications of impacts on ecosystems and the services they provide. Research includes analyzing the effects of different environmental management scenarios in particular communities or regions over the intermediate to long term on the maintenance of critical ecosystem services that are expensive or impossible to replace: assessing regional scale vulnerability to ecosystem stressors. Research examines and quantifies the impacts of human behavior on an ecosystem's ability to produce natural benefits and services. This science generates scientific information tools for assessing risk management, informing impactful policy decisions, and creating long-term environmental solutions.

SHC research will also examine Oil Spill and Superfund topic areas that are explained in further detail in the Oil Spill and Superfund SHC programs.

### **FY 2012 Activities and Performance Plan:**

In FY 2012, EPA will conduct pilot projects that explore and address problems in an integrated manner by focusing specifically on an urban community, on multiple communities in the Gulf of Mexico region, a rural community, and on certain high-priority problems facing communities across the nation. The first phase of research in the SHC Research Program will be to identify the most significant problems that diminish community sustainability in terms of human and environmental health in a particular urban community. Examples include the ability to simultaneously meet air and water quality goals and standards, reduce and/or safely dispose of wastes and clean up contaminated sites, preserve or mitigate wetlands, reduce the burden of pollutant exposure to children and the elderly on health care delivery, and avoid solutions that

place a disproportionate burden on households with low socioeconomic status. The program will conduct extensive transdisciplinary, multi-stressor, multi-endpoint evaluations of the issues that communities are facing, relying heavily on state-of-the-art decision analysis with local officials and stakeholders. After gathering data, analyzing trends, and synthesizing findings, the SHC Research Program will develop an "optimal" portfolio of processes and initiatives that can be drawn from to maximize the sustainability and resilience of a community, including human, natural, and economic capital, which could be readily used by other communities across the nation.

Following are two representative examples focusing on human health protection. First, the C-FERST is being developed and applied with input from prospective users including regional decision-makers, CARE community projects, city planners, tribal groups, and NGOs. This user-friendly, web-based tool will enable users to access an array of exposure information from multiple databases. This one-stop tool will assist EPA and other users in characterizing communities as areas of disproportionate exposure, which could assist in identifying risk reduction and remediation strategies. Second, EPA will establish Research Centers of Excellence in Environmental Health Disparities. These Centers will conduct research that brings environmental, social and economic sciences together to focus on the best ways protect human health in sustainable communities without disproportionately impacting any subgroups or populations. This research will address goals articulated by EPA's Office of Environmental Justice Plan EJ 2014 and support decisions that incorporate equity into sustainable community development.

In a third component, the SHC Research Program will identify specific barriers to community sustainability in its core research areas (e.g. land, wastes, ecosystem services) that face a large number of communities across the nation. The program will then conduct R&D to identify effective strategies to reduce the barriers. Examples include substituting ecosystem services resulting from land restoration for expensive gray infrastructure upgrades; technology to reduce or recycle materials to avoid wastes; and smart growth tools that reduce air and water pollution while improving community health. The SHC Research Program also will address knowledge, methods and decision support gaps that communities face, by developing tools that can be used by local decision makers to address problems of human and environmental health. Following are key research questions to be addressed by the program based on ongoing input from EPA's partners. These research questions, as well as the SHC research plan, will be independently reviewed by EPA's Science Advisory Board and Board of Scientific Counselors:

- What computational and measurement tools (e.g., ecological footprint, return on investment, probabilistic analysis) are needed to support the application of sustainability indicators to community decision making?
- What types of systems analysis methods (e.g., material flow analysis, life cycle assessment, system dynamics modeling) can be effectively applied or modified to help communities develop plans to address their long term human health and environmental challenges?
- How can decision support systems best be designed so that they provide clearly understandable results to decision-makers and stakeholders and are usable by communities on a real-time, iterative basis?

Finally, EPA will be developing indicators and performance measures, so that communities will have measurement tools to characterize their current level of sustainability; develop meaningful goals and quantifiable objectives for the future, understand the consequences of alternative investment strategies, track their progress, and confirm that their investments in solutions to improve their sustainability are yielding the intended results. Key research questions include:

- What data are available at the national scale that could be useful to communities, and how can the numerous state and local datasets be collected and organized to facilitate sustainability analysis when a region spans multiple jurisdictional boundaries?
- What indicators are most appropriate for assessing the overall environmental sustainability of a community?
- What indicators are of most utility in diagnosing the causes of sustainability problems and identifying potential solutions?
- What indicators are most useful for setting environmental goals and communicating these goals to community stakeholders?

What are the most useful indicators for tracking the performance of projects intended to increase environmental sustainability of communities?

In FY 2012, the Agency is increasing funding in areas critical to support the Administration's science priorities. EPA is strengthening the future scientific workforce by increasing funding for fellowships to students in pursuit of careers and advanced degrees in environmental science, technology, engineering, and mathematics. In FY 2012, EPA will provide \$14 million for STAR Fellowships, including support for an estimated 243 continuing fellows and 105 new STAR fellows.

The FY 2012 budget also will support a study of the Agency's laboratory network focusing on current capability to address important strategic issues central to EPA's mission over the next 10 years. This investment responds to Congressional legislation and President Obama's direction, in Executive Order 13514, that all federal agencies implement an integrated strategy toward sustainability.

### **Performance Targets:**

To be accountable to the American taxpayers, EPA plans to support the interagency Science and Technology in America's Reinvestment – Measuring the Effect of Research on Innovation, Competitiveness and Science (STAR METRICS) Program, currently in a pilot phase for the National Institutes of Health. This program is a collaboration of multiple science agencies, the Office of Science and Technology Policy, and the research community. STAR METRICS will use "science of science policy" approaches to assess the impact of federal science and technology investments on society, the environment, and the economy.

### **FY 2012 Change from FY 2010 Enacted (Dollars in Thousands):**

The following policy changes are based on a comparison of the new FY 2012 budget structure to the 2010 enacted budget and are included in the transfers from the source programs following this section:

- (+\$6,000.0) This request reflects increased funding for training the next generation of environmental scientists and engineers under the Science to Achieve Results (STAR) Fellowship Program. The increase supports the Administration's science and technology priority for investing in a diverse science, technology, engineering, and mathematics workforce.
- (+\$2,000.0) This reflects an increase to support the plan for a long-term review of EPA's laboratory network. This cross-Agency integrated management approach reflects EPA labs, centers and program offices' aim to collaborate across traditional program boundaries to support national and regional decision-making. This investment will strengthen the Agency's ability to respond to environmental and public health issues.
- (-\$150.0) This reflects a reduction to human health research integrating health indicators with socio-economic indicators for the Environmental Quality Index (EQI). This reduction will slow the effort to provide comparison metrics for prioritization of research.
- (-\$667.0) This reflects a reduction as part of the Administrative Efficiency Initiative. This initiative targets certain categories of spending for efficiencies and reductions, including advisory contracts, travel, general services, printing and supplies. EPA will continue its work to redesign processes and streamline activities in both administrative and programmatic areas to achieve these savings.
- (-\$1,685.0) This reflects a reduction to ecosystems research for mapping and modeling current ecosystem services and future ecosystem services predicted under multiple scenarios. The reduction will reduce and delay a number of research projects including EMAP condition monitoring, site-specific demonstration projects in the southwest, a site-specific demonstration project and use of remote sensing technology in the Albermarle-Pamlico Watershed, and the Regional Vulnerability Assessment toolkit.
- (-\$2,000.0) This reduction is the result of a one-time supplemental appropriation included in FY 2010 for oil spills research. This increase is not included in the FY 2012 Budget request.
- (-\$3,000.0) This reduction is the result of an increase included in the Congressionally-directed FY 2010 Appropriation providing an additional \$3,000.0 for children's environmental health research in FY 2010. This increase is not included in the FY 2012 Budget request.
- (-\$3,500.0) This reduction reflects decreased funding for the Advanced Monitoring Initiative. Research with the Interagency Group on Earth Observations will focus only on those areas that are core EPA priorities; the remaining collaborative research with NASA will be integrated into the new Sustainable and Healthy Communities Research Program.

- (-\$14,067.0 / -21.4 FTE) This decrease represents the net effect of all other payroll and technical adjustments including Information Technology reductions, Small Business Renovation Research (SBIR) realignments and administrative and programmatic support realignments and reductions. It includes a decrease of \$6,868.0 for FTE changes as well as a recalculation of base costs for existing FTE in this program. For more information on these adjustments, refer to the programs integrating into the Sustainable and Healthy Communities Program.

The following transfers<sup>3</sup> will integrate the Human Health Research, Ecosystems Services Research, Land Protection and Preservation Research, Pesticides and Toxics Research, Sustainability Research Programs and Fellowships into the transdisciplinary Sustainable and Healthy Communities Research Program that better aligns with the Administration and Agency priorities. This effort is expected to improve the ability to deliver science more effectively and efficiently, with catalyzing innovative sustainable solutions as the overall goal. This integration reflects EPA's efforts to collaborate across traditional program boundaries to support national and regional decision-making, thereby strengthening the Agency's ability to respond to environmental and public health issues.

- (+\$113,217.0 / +367.9 FTE) This reflects a transfer of dollar and FTE resources from the Human Health and Ecosystems Research Program into the new, integrated Sustainable and Healthy Communities Program, including \$49,335.0 in associated payroll. This transfer includes the net effect of all technical adjustments such as Information Technology (IT) reductions, SBIR realignments and administrative and programmatic support realignments and reductions. For additional details on this net effect, please refer to the Research: Land Protection and Restoration program narrative.
- (+\$9,386.0 / +32.1FTE) This reflects a transfer of dollar and FTE resources from the Land Protection and Restoration Research Program into the new, integrated Sustainable and Healthy Communities Program, including \$4,216.0 in associated payroll. This transfer includes the net effect of all technical adjustments such as IT reductions, SBIR realignments and administrative and programmatic support realignments and reductions. For additional details on this net effect, please refer to the Research: Land Protection and Restoration Program narrative.
- (+\$18,548.0 / +65.1 FTE) This reflects a transfer of dollar and FTE resources from the Sustainability Research Program into the new, integrated Sustainable and Healthy Communities Program, including \$9,130.0 in associated payroll. This transfer includes the net effect of all technical adjustments such as IT reductions, SBIR realignments and administrative and programmatic support realignments and reductions. For additional details on this net effect, please refer to the Research: Land Protection and Restoration program narrative.

---

<sup>3</sup> The FY 2012 total for the Research: Sustainable and Healthy Communities includes an additional \$502 thousand in EPA Green Conferencing resources that are not included in EPA's Research Program.

- (+\$17,261.0 / +6.4 FTE) This reflects a transfer of dollar and FTE resources from the Fellowships Research Program into the new, integrated Sustainable and Healthy Communities Program, including a transfer of \$664.0 in associated payroll. This transfer includes the net effect of all technical adjustments such as IT reductions, SBIR realignments and administrative and programmatic support realignments and reductions. For additional details on this net effect, please refer to the Research: Land Protection and Restoration Program narrative.
- (+\$12,116.0 / +58.2 FTE) This reflects a transfer of dollar and FTE resources from the Pesticides and Toxics Research Program into the new, integrated Sustainable and Healthy Communities Program, including a transfer of \$7,666.0 in associated payroll. This transfer includes the net effect of all technical adjustments such as IT reductions, SBIR realignments and administrative and programmatic support realignments and reductions. For additional details on this net effect, please refer to the Research: Land Protection and Restoration Program narrative.

**Statutory Authority:**

CAA, Sections 103 and 104. 42 U.S.C. 7403, 42 U.S.C. 7404, 103; 104; CWA, Sections 101, 104 & 404, 33 U.S.C. 1254; CCA, 40 U.S.C. 11318; CZMA, 16 U.S.C. 1451 - Section 302; Executive Order 12866; ERDDAA; ESA, 16 U.S.C. 1531 - Section 2; FIFRA Sections 18 and 20; TSCA, Section 10. 15 U.S.C. 2609; WRRRA.

**Research: Sustainable and Healthy Communities**

Program Area: Research: Sustainable Communities

Goal: Cleaning Up Our Communities

Objective(s): Promote Sustainable and Livable Communities

(Dollars in Thousands)

	<b>FY 2010 Enacted</b>	<b>FY 2010 Actuals</b>	<b>FY 2011 Annualized CR</b>	<b>FY 2012 Pres Budget</b>	<b>FY 2012 Pres Budget v. FY 2010 Enacted</b>
Science & Technology	\$188,095.0	\$183,002.7	\$186,095.0	\$171,026.0	(\$17,069.0)
Leaking Underground Storage Tanks	\$345.0	\$422.5	\$345.0	\$454.0	\$109.0
Inland Oil Spill Programs	\$639.0	\$549.7	\$639.0	\$614.0	(\$25.0)
<b><i>Hazardous Substance Superfund</i></b>	<b><i>\$21,264.0</i></b>	<b><i>\$22,525.3</i></b>	<b><i>\$21,264.0</i></b>	<b><i>\$17,706.0</i></b>	<b><i>(\$3,558.0)</i></b>
Total Budget Authority / Obligations	\$210,343.0	\$206,500.2	\$208,343.0	\$189,800.0	(\$20,543.0)
Total Workyears	647.0	625.3	647.0	621.7	-25.3

**Program Project Description:**

The new Sustainable and Healthy Communities (SHC) Research Program under the Superfund appropriation seeks to be responsive to the Superfund Amendments and Reauthorization Act (SARA) requirements under Section 209(a), which calls for "...a comprehensive and coordinated federal program of research, development, demonstration, and training for the purpose of promoting the development of alternative and innovative treatment technologies that can be used in response actions under the CERCLA program." The SHC program provides essential research to the Agency's Superfund program to enable them to accelerate scientifically defensible and cost-effective decisions for cleanup at complex contaminated sites. Research themes include contaminated sediments, groundwater, and site characterization issues. The research program also provides site-specific technical support through EPA labs and centers, as well as liaisons in each Regional Office.

In FY 2012 EPA will strengthen its planning and delivery of science for the SHC program by implementing an integrated research approach that looks at contaminated site cleanup and remediation from a systems perspective. This approach will create synergy and provide more timely and efficient yield benefits beyond those possible from approaches that are more narrowly targeted to single chemicals or problem areas.

Consistent with the Administration's science and technology priorities for FY 2012,<sup>1</sup> the new integrated research approach will also help develop sustainable solutions by conducting research on green remediation technologies that may serve to benefit the community as a whole while removing contaminants or limiting their transport potential. This research will leverage the diverse capabilities of in-house scientists and engineers and bridge traditional scientific

<sup>1</sup> For more information, see the Executive Office of the President memorandum: <http://www.whitehouse.gov/sites/default/files/microsites/ostp/fy12-budget-guidance-memo.pdf>.

disciplines. In addition, research plans will incorporate input from external stakeholders such as federal, state and local government agencies, non-governmental organizations, industry, and communities affected by contaminated sites. EPA will use the integrated transdisciplinary research framework to develop a deeper understanding of our environmental challenges and inform sustainable solutions to meet our strategic goals.

This integration capitalizes on existing capabilities and promotes the use of a transdisciplinary perspective to further EPA's mission. Research to address targeted, existing problems and provide technical support will also continue, with an emphasized focus on sustainable applications and outcomes. All or portions of the following Research Programs will be integrated into the SHC Research Program:

- Human Health Research
- Ecosystems Services Research
- Land Protection and Preservation Research
- Pesticides and Toxics Research
- Sustainability Research
- Fellowships Research

### **FY 2012 Activities and Performance Plan**

Communities are increasingly challenged to sustain the well-being of their residents and the benefits of nature upon which they depend. Changing demographics; urbanization; growing waste streams; and tighter budgets have added to the issues that must be faced when remediating Superfund sites. A more systems-oriented and synergistic approach is needed. As one recipient of an EPA Sustainability Partnership grant put it, "*Communities need better tools to help them make more pro-active and strategic land conservation, land development, and investment decisions.*"

The following are descriptions of research topics that the Agency plans to explore in FY 2012 based on on-going input from EPA's partners. These research themes and questions will be independently reviewed by EPA's Science Advisory Board and Board of Scientific Counselors. Resources transferred from the Superfund appropriation will be used within these themes consistent with relevant authorization.

#### *Theme 1: Strategies, Policies, and Practices for Sustainable Communities*

Communities are increasingly challenged to improve and protect the health and well-being of their residents and the ecosystem services upon which they depend, in the face of increasing resource demands and changing demographics, economic, social, and climate patterns.

This research area will focus on:

- Evaluating the performance of remedies for contaminated sediments; and
- Evaluating on-site chemical oxidation and permeable reactive barriers at existing field sites.

Key Research Questions:

- What are the problems that pose the greatest threat to communities across the U.S. with Superfund sites? What approaches to site remediation would best protect and enhance the ecosystem services that contribute to human well-being, while potentially providing valuable co-benefits to the community itself or to a larger region? What approaches to land use and management would have the greatest benefits in terms of protecting natural capital and reducing the adverse impacts of municipal and industrial wastes?
- What approaches would best reduce community exposures to toxics from multiple sources at Superfund sites, especially for the most sensitive residents?
- What remedial options and approaches can be developed to facilitate cleanup of contaminated sites in order to expedite the reuse of those sites in a protective manner, effectively returning those sites to the status of a community asset as opposed to a blight?

### Theme 2: Sustainability Indicators and Performance Measures

In the complex arena of sustainability, where the costs of failure can be high and stakeholders have multiple and sometimes conflicting interests, communities need measurement tools to characterize their current state, develop meaningful goals and quantifiable objectives for the future, understand the consequences of alternative investment strategies, track their progress, and confirm that their investments are yielding the intended results.

This research will focus on:

- Developing indicators, indices, and performance measures that help communities to assess their overall sustainability;
- Diagnosing the areas that are (or will be) in greatest need of improvement; and
- Tracking progress toward sustainability goals and targets.

Key Research Questions:

- What indicators of sustainability are most appropriate for assessing a community after a site remediation has been completed, or in establishing remediation goals? What indicators of sustainability are of most utility in diagnosing the problems and identifying potential solutions?
- What indicators of sustainability are most useful for setting environmental remediation goals and communicating these goals to community stakeholders? What are the most useful indicators of sustainability for tracking the performance of projects intended to clean up or remediate Superfund sites and communicating the results to community stakeholders? What data are available at the national scale that could be useful to communities with contaminated sites, and how can the numerous state and local datasets be collected and organized to facilitate sustainability analysis when a region spans multiple jurisdictional boundaries?

### Theme 3: Decision Analysis and Support

While communities often have creative and well-trained government staff, NGOs, and citizen groups, they usually do not have the capacity to rapidly develop and/or customize advanced decision tools and supporting data sets that will enable effective, real-time community investment decisions.

This research will focus on developing practical decision support tools and analytic methods that enable communities to effectively use information developed by the SHC Research Program and other programs to support community decision making related to environmental sustainability.

**Key Research Questions:**

- What computational and measurement tools can support community decision making regarding contaminated site cleanup and sustained improvements?
- What types of systems analysis methods (e.g., material flow analysis, life cycle assessment, and system dynamics modeling) can be effectively applied or modified to help communities develop a clear vision for their future and understand which steps will achieve the best outcomes in the face of uncertainty regarding sustained benefits of site remediation? How can decision support systems best be designed so that they provide clearly understandable results to decision-makers and stakeholders and are usable by communities on a real-time, iterative basis?

**Performance Targets:**

Performance results for this program are discussed in the S&T: Sustainable and Healthy Communities Research Program Project.

**FY 2012 Change from FY 2010 Enacted (Dollars in Thousands):**

As noted in the table above, EPA is transitioning from the former “Land Protection and Restoration Research Program: Superfund” structure to the newly integrated “Sustainable and Healthy Communities Research Program: Superfund” structure. For FY 2012, the Administration is requesting \$17,706.0 and 89.5 FTE for this program, including \$12,149.0 in associated payroll. The following policy changes are based on a comparison of the new FY 2012 budget structure to the 2010 enacted budget and are included in the transfers from the source programs following this section:

- (-\$2,927.0 / -2.5 FTE) This reduction reflects a decrease in scope for planned research in groundwater remediation and contaminated sediments, and includes a reduction of 2.5 FTE with decreased associated payroll of \$333.0. This change reflects EPA's workforce management strategy that will help the agency better align resources, skills, and Agency priorities.
- (-\$115.0) This reflects a reduction as part of the Administrative Efficiency Initiative. This initiative targets certain categories of spending for efficiencies and reductions, including advisory contracts, travel, general services, printing and supplies. EPA will continue its work

to redesign processes and streamline activities in both administrative and programmatic areas to achieve these savings.

- (-\$516.0 / -1.1 FTE) This decrease represents the net effect of all other payroll and technical adjustments including Information Technology reductions, Small Business Renovation Research realignments and administrative and programmatic support realignments and reductions. It includes an increase in associated payroll of \$333.0 for FTE changes as well as a recalculation of base costs for existing FTE in this program. For more information on these adjustments, refer to the programs integrating into the Sustainable and Healthy Communities Research Program.

Following are transfers into the new transdisciplinary Sustainable and Healthy Communities Research Program:

- (+\$17,706.0 / +89.5 FTE) This reflects a transfer of dollar and FTE resources to the new Sustainable and Healthy Communities Program. This transfer includes the net effect of all technical adjustments such as IT reductions, SBIR realignments and administrative and programmatic support realignments and reductions. For additional details on this net effect, please refer to the Research: Land Protection and Restoration Program narrative.

**Statutory Authority:**

BRERA; CERCLA 104(i), Section 105(a) (4), Section 115, Section 311, 42 U.S.C 9604 (i) (1); SARA 42 U.S.C. 7401 – Sec. 209 (a) and Sec. 403 (a,b).

**Research: Sustainable and Healthy Communities**

Program Area: Research: Sustainable Communities

Goal: Cleaning Up Our Communities

Objective(s): Promote Sustainable and Livable Communities

(Dollars in Thousands)

	<b>FY 2010 Enacted</b>	<b>FY 2010 Actuals</b>	<b>FY 2011 Annualized CR</b>	<b>FY 2012 Pres Budget</b>	<b>FY 2012 Pres Budget v. FY 2010 Enacted</b>
Science & Technology	\$188,095.0	\$183,002.7	\$186,095.0	\$171,026.0	(\$17,069.0)
Leaking Underground Storage Tanks	\$345.0	\$422.5	\$345.0	\$454.0	\$109.0
<b><i>Inland Oil Spill Programs</i></b>	<b><i>\$639.0</i></b>	<b><i>\$549.7</i></b>	<b><i>\$639.0</i></b>	<b><i>\$614.0</i></b>	<b><i>(\$25.0)</i></b>
Hazardous Substance Superfund	\$21,264.0	\$22,525.3	\$21,264.0	\$17,706.0	(\$3,558.0)
Total Budget Authority / Obligations	\$210,343.0	\$206,500.2	\$208,343.0	\$189,800.0	(\$20,543.0)
Total Workyears	647.0	625.3	647.0	621.7	-25.3

**Program Project Description:**

The new Sustainable and Healthy Communities Research Program in the Inland Oil Spill Programs appropriation seeks to protect human and ecosystem health from the negative impacts of oil spills. Given recent events, EPA is committing to a more proactive approach and stepping up our research efforts to focus on understanding more of the system-wide impacts of oil spills including:

- Protocol development/revision for testing oil spill control agents and products for listing on the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) Product Schedule and other activities deemed necessary by Office of Emergency Management (OEM);
- Bioremediation studies for freshly spilled oil and aged residuals of petroleum based oil, vegetable oil, biodiesel, and biodiesel blends;
- Dispersant performance in deep water and at different concentrations;
- Toxicity of dispersants and dispersants mixed with oil and oil residuals;
- Biodegradation of dispersants.

In FY 2012 EPA will strengthen its planning and delivery of science for the SHC Program by implementing an integrated research approach that looks at problems from a systems perspective. This approach will create synergy and provide more timely and efficient benefits beyond those possible from approaches that are more narrowly targeted to single chemicals or problem areas.

The new integrated research approach will help develop sustainable solutions by adding a transformative component to EPA's existing research portfolio. This research will leverage the diverse capabilities of in-house scientists and engineers and bridge traditional scientific disciplines. In addition, research plans will incorporate input from external stakeholders such as federal, state and local government agencies, non-governmental organizations, industry, and communities affected by environmental problems. This type of integrated research is expected to be a more efficient path to developing long-term environmentally sustainable solutions.

All or portions of the following Research Programs will be integrated into the Sustainable and Healthy Communities (SHC) Research Program:

- Human Health Research
- Ecosystems Services Research
- Land Protection and Preservation Research
- Pesticides and Toxics Research
- Sustainability Research
- Fellowships

The Sustainable and Healthy Communities Research Program will provide innovative and creative management approaches and decision support tools for communities, regions, states and tribes to inform improved management practices to protect and ensure a sustainable balance between human health and the environment.<sup>1</sup>

### **FY 2012 Activities and Performance Plan:**

Communities are increasingly challenged to sustain the well-being of their residents and the benefits of nature upon which they depend. Increasing demands for energy have an impact on the potential for inland oil spills. As oil spills have multi-faceted impacts on communities, local officials are finding that more systems-oriented and synergistic solutions are needed. SHC research uses an integrated, systems approach to help communities across the United States be better able to respond to oil spills.

Specifically, there are two main research topics that the program will address in FY 2012 to help communities deal with oil spills. First, EPA will develop protocols to revise or test oil spill control agents or products for listing on the NCP Product Schedule and other activities deemed necessary by EPA's Office of Emergency Management (OEM). Second, the Agency will conduct studies on the effectiveness of bioremediation for freshly spilled oil and aged residuals of petroleum-based oil, biodiesel, and biodiesel blends, and the performance of dispersants for deep water applications.

### **Performance Targets:**

Performance results for this program are discussed in the S&T: Sustainable and Healthy Communities Research Program Project.

### **FY 2012 Change from FY 2010 Enacted (Dollars in Thousands):**

The following policy changes are based on a comparison of the new FY 2012 Budget structure to the 2010 enacted Budget and are included in the transfer from the source programs following this section:

- (-\$88.0) This reflects a reduction as part of the Administrative Efficiency Initiative. This initiative targets certain categories of spending for efficiencies and reductions, including advisory contracts, travel, general services, printing and supplies. EPA will continue its

work to redesign processes and streamline activities in both administrative and programmatic areas to achieve these savings.

- (+\$63.0) This increase represents the net effect of all other payroll and technical adjustments including Information Technology reductions, Small Business Renovation Research realignments and administrative and programmatic support realignments and reductions. For more information on these adjustments, refer to the programs integrating into the Sustainable and Healthy Communities Research Program.

Transfer from source program:

- (+\$614.0 / +0.9 FTE) This reflects a transfer of dollar and FTE resources from the Oil Spill portion of the Land Protection and Restoration Research Program including \$123.0 in associated payroll. This transfer includes the net effect of all technical adjustments such as IT reductions. For additional details on this net effect, please refer to the Research: Land Protection and Restoration program narrative.

**Statutory Authority:**

OPA, 33 U.S.C. Chapter 40; CWA, Section 311, 33 U.S.C. §1321.

**Research: Sustainable and Healthy Communities**

Program Area: Research: Sustainable Communities

Goal: Cleaning Up Our Communities

Objective(s): Promote Sustainable and Livable Communities

(Dollars in Thousands)

	<b>FY 2010 Enacted</b>	<b>FY 2010 Actuals</b>	<b>FY 2011 Annualized CR</b>	<b>FY 2012 Pres Budget</b>	<b>FY 2012 Pres Budget v. FY 2010 Enacted</b>
Science & Technology	\$188,095.0	\$183,002.7	\$186,095.0	\$171,026.0	(\$17,069.0)
<b><i>Leaking Underground Storage Tanks</i></b>	<b>\$345.0</b>	<b>\$422.5</b>	<b>\$345.0</b>	<b>\$454.0</b>	<b>\$109.0</b>
Inland Oil Spill Programs	\$639.0	\$549.7	\$639.0	\$614.0	(\$25.0)
Hazardous Substance Superfund	\$21,264.0	\$22,525.3	\$21,264.0	\$17,706.0	(\$3,558.0)
Total Budget Authority / Obligations	\$210,343.0	\$206,500.2	\$208,343.0	\$189,800.0	(\$20,543.0)
Total Workyears	647.0	625.3	647.0	621.7	-25.3

**Program Project Description:**

Research in the Sustainable and Healthy Communities (SHC) Program under the Leaking Underground Storage Tanks (LUST) appropriation focuses on the assessment and cleanup of leaks at fueling stations, and especially on identifying the environmental impacts of existing and new biofuels coming into the marketplace (including unintended consequences). EPA research provides the scientific foundation for the Agency's actions to protect America's land and groundwater resources that could be impacted by the nation's over 600 thousand underground storage tanks for fuels. The purpose of the LUST component of EPA research is the prevention and control of pollution at LUST sites, and is of high importance to state environmental programs.

In FY 2012 EPA will strengthen its planning and delivery of science for the SHC Program by implementing an integrated research approach that looks at problems from a systems perspective. This approach will create synergy and yield benefits beyond those possible from approaches that are more narrowly targeted to single chemicals or problem areas.

The new integrated research approach will help develop sustainable solutions by adding a transformative component to EPA's existing research portfolio. This research will leverage the diverse capabilities of in-house scientists and engineers and bridge traditional scientific disciplines. In addition, research plans will incorporate input from external stakeholders such as federal, state and local government agencies, non-governmental organizations, industry, and communities affected by environmental problems. This type of integrated research is expected to be a more efficient path to developing long-term environmentally sustainable solutions.

All or portions of the following Research Programs will be integrated into the SHC Research Program:

- Human Health Research
- Ecosystems Services Research
- Land Protection and Preservation Research
- Pesticides and Toxics Research
- Sustainability Research
- Fellowships Research

Research that will be conducted under the new Sustainable and Healthy Communities Research Program LUST appropriation will be used by federal, state and local officials to:

- Support remediating contaminated land and groundwater after a leak occurs;
- Restore previously contaminated land and groundwater so that it can become a functional part of a sustainable community without adversely affecting human health.

Research on leaking underground storage tanks focuses on modeling and remediation of spilled fuels. This research will include both current types of fuel and alternative fuels as they are adopted. Studies are now extending to fuel blends with higher ethanol content to address the needs of the Office of Underground Storage Tanks (OUST) funded jointly with the Office of Research and Development through a Cooperative Agreement.

#### **FY 2012 Activities and Performance Plan:**

Communities are increasingly challenged to sustain the well-being of their residents and the benefits of nature upon which they depend. Leaking underground storage tanks remain a risk to the health and ecosystems of many communities. In FY 2012, EPA's research on leaking underground storage tanks will extend to fuel blends with higher ethanol content to address the needs of OUST as well as community stakeholders. Increased ethanol content influences biodegradation of spilled fuel and can elongate plumes, yielding a higher potential for contaminants to impact drinking water supplies and to intrude into breathing air in buildings. The effects of ethanol on pipes, tanks, pumps, and other distribution system hardware are a concern, owing to the corrosive nature of ethanol. OUST will support a study in FY 2011 and into FY 2012 to evaluate how tank gauges perform in the presence of ethanol fuel blends. SHC researchers will communicate with partners in OUST to ensure integration of results in future research, and in communication to community stakeholders. In FY 2012, the SHC Research Program will continue working with partners from across EPA, in particular the Solid Waste and Emergency Response Program and the Ground Water and Drinking Water Programs, as well as applicable external stakeholders.

#### **Performance Targets:**

Performance results for this program are discussed in the S&T: Sustainable and Healthy Communities Research Program Project.

#### **FY 2012 Change from FY 2010 Enacted (Dollars in Thousands):**

The following policy changes are based on a comparison of the new FY 2012 budget structure to the 2010 enacted budget and are included in the transfer from the source programs following this section:

- (-\$3.0) This reflects a reduction as part of the Administrative Efficiency Initiative. This initiative targets certain categories of spending for efficiencies and reductions, including advisory contracts, travel, general services, printing and supplies. EPA will continue its work to redesign processes and streamline activities in both administrative and programmatic areas to achieve these savings.
- (+\$112.0 / -.3 FTE) This increase represents the net effect of all other payroll and technical adjustments including Information Technology reductions, Small Business Renovation Research realignments and administrative and programmatic support realignments and reductions. It includes an increase of \$112.0 for FTE changes as well as a recalculation of base costs for existing FTE in this program. For more information on these adjustments, refer to the programs integrating into the Sustainable and Healthy Communities Research Program.

Transfer from source program:

- (+\$454.0 / +1.6 FTE) This reflects a transfer of dollar and FTE resources from the Land Protection and Restoration Research Program into the new, integrated Sustainable and Healthy Communities Program, including \$277.0 in associated payroll. This transfer includes the net effect of all adjustments. For additional details on this net effect, please refer to the Research: Land Protection and Restoration program narrative.

**Statutory Authority:**

HSWA; RCRA Subtitle I; LUST; Energy Policy Act of 2005; SDWA Section 1442. 42 U.S.C. 300j-1; SWDA Section 8001, as amended; RCRA, 42 U.S.C. 6901; SWDA, 42 U.S.C. 6901 - Section 1002, 42 U.S.C. 6905 - Section 1006; SWDA Section 8001. 42 U.S.C. 6981.

**Research: Chemical Safety and Sustainability**

Program Area: Research: Chemical Safety and Sustainability

Goal: Cleaning Up Our Communities

Objective(s): Promote Sustainable and Livable Communities

Goal: Ensuring the Safety of Chemicals and Preventing Pollution

Objective(s): Ensure Chemical Safety

(Dollars in Thousands)

	<b>FY 2010 Enacted</b>	<b>FY 2010 Actuals</b>	<b>FY 2011 Annualized CR</b>	<b>FY 2012 Pres Budget</b>	<b>FY 2012 Pres Budget v. FY 2010 Enacted</b>
<b><i>Science &amp; Technology</i></b>	<b><i>\$77,831.0</i></b>	<b><i>\$75,221.1</i></b>	<b><i>\$77,831.0</i></b>	<b><i>\$95,657.0</i></b>	<b><i>\$17,826.0</i></b>
Total Budget Authority / Obligations	\$77,831.0	\$75,221.1	\$77,831.0	\$95,657.0	\$17,826.0
Total Workyears	283.7	276.5	283.7	292.7	9.0

**Program Project Description:**

As primary support for environmental policy decisions and regulatory actions to protect human health and the environment, EPA’s research has provided effective solutions to high-priority environmental problems for the past 40 years. Research enabled the Agency to implement policies and regulations to minimize waste and reduce pollution in specific industries. However, these solutions were accomplished using approaches based on the best science available at the time, which often focused on more narrow issues such as on the risks posed by a single chemical to a single target organ or species.

Such an approach that focuses on a single chemical at a time using expensive and time consuming methodologies is not adequate for providing the information needed to assess the hazards and exposure of the large numbers of chemicals in commerce. As science advances, EPA is working to develop more efficient and effective tools for evaluating the effects of chemicals as function of species, gender, genetics and lifestage. EPA needs the research capability to fully understand complex interactions and in order to inform policy choices to develop more sustainable solutions.

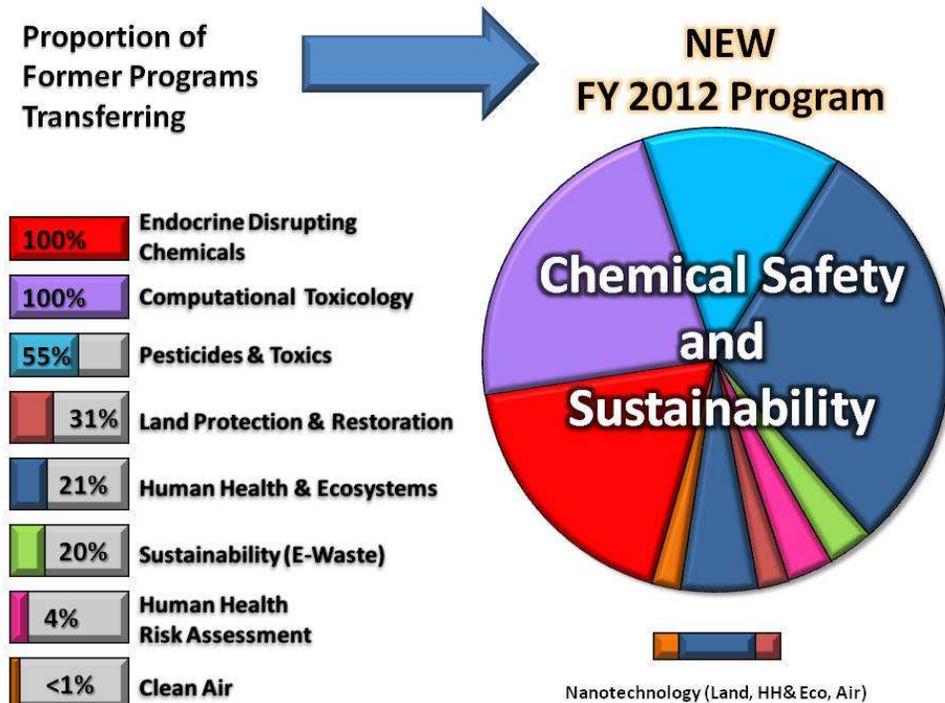
In FY 2012, EPA will strengthen its planning, conduct and delivery of science by implementing an integrated research approach that looks at problems from a systems perspective. This approach will create synergy and lead to the generation of environmental science information that is more responsive to more modern public health and environmental challenges and hence will be of greater use to decision makers.

Consistent with the Administration's science and technology priorities for FY 2012,<sup>1</sup> the new

<sup>1</sup> For more information, see the Executive Office of the President memorandum: <http://www.whitehouse.gov/sites/default/files/microsites/ostp/fy12-budget-guidance-memo.pdf>.

integrated research approach will help develop sustainable solutions by adding a transformative component to EPA’s existing research portfolio. The Agency will plan, develop and conduct research in ways that bring together the expertise of a wide range of disciplines in the biological, chemical, physical, computational and social sciences. Additionally, EPA will assess the needs and priorities of the Research Program’s partners in the program offices and regions, to provide more effective and efficient tools for evaluating chemical exposures, hazards and risks. In addition, research action plans will incorporate input from external stakeholders such as federal, state and local government agencies, non-governmental organizations, industry, and communities.

EPA will use the integrated research framework to develop a deeper understanding of our environmental challenges and inform sustainable solutions to meet our strategic goals. In FY 2012, EPA is integrating Computational Toxicology, Endocrine Disrupting Chemicals (EDCs), and Nanotechnology research, as well as portions of Human Health, Human Health Risk Assessment, Pesticides and Toxics, and Sustainability research, into a new Chemical Safety and Sustainability Research Program.



This integration capitalizes on existing capabilities and promotes the use of a systems perspective to achieve EPA’s mission. Research to address targeted, existing problems and provide technical support will also continue, with an emphasis on utilizing the integrated approaches developed by the core Research Program. The Research Program realignments will strengthen EPA’s ability to leverage partnerships to ensure EPA research is addressing the highest Agency priorities.

**FY 2012 Activities and Performance Plan:**

We need chemicals to clean everything from industrial equipment to our clothes to the water we drink and to help us provide an abundant food supply for our growing population. While chemicals contribute to our economic well-being and our quality of life, some may also adversely affect our health, society, and the environment. We need new ways to evaluate and reduce the effects of harmful chemicals on society and the environment while maintaining our economic well-being. To this end, EPA has been working to reshape its research on chemicals to ensure that we develop timely innovative, systematic, effective, and efficient approaches and tools to inform decisions that will reduce such impacts of chemicals.

The CSS Research Program has been working with partners from across EPA as well as external stakeholders to identify the critical science questions that will be addressed under the CSS Research Program in 2012. These research themes and questions, as well as the final research action plan, will be independently reviewed by EPA's Science Advisory Board and Board of Scientific Counselors. Research under CSS will support the development and applications of tools that would contribute to the design of safer chemicals. The Administration's science and technology priorities for FY 2012 stress the need for more multidisciplinary research that transforms the approaches used to address the nation's problems. This funding will combine the unique capabilities and expertise in EPA to address the national challenge associated with the large number of chemicals and products used and introduced annually in the United States. Funds will support a range of science activities, in coordination with EPA policy activities that will help address this issue in a systemic, integrated manner and provide for more sustainable solutions to environmental issues.

CSS will build on existing research on cost-efficient, energy-efficient, generic, and green pathways for synthesizing chemicals that are constituents of products that pose potential exposures to humans and ecosystems. In addition, the program will develop approaches, such as life-cycle assessment (LCA) methodologies, that will demonstrate the benefits of green pathways when evaluated from life cycle impacts and cost bases. The CSS Research Program also will develop innovative approaches and tools that inform more sustainable solutions to the design of chemicals. For example, EPA is developing approaches to identify and assess the environmental impacts of specific properties of nanomaterials contained in next-generation batteries. These assessment tools will be invaluable to manufacturers and will allow them to create next-generation batteries that are both economically viable and environmentally friendly.

With the use of nanotechnology in the consumer and industrial sectors expected to increase significantly in the future, nanotechnology offers society the promise of major benefits. The challenge for environmental protection is to ensure that, as nanomaterials are developed and used, unintended adverse consequences of exposures to humans and ecosystems are identified and prevented or minimized.

In FY 2012, the CSS Program will conduct research on the environmental impacts of nanomaterials and other chemicals from a life cycle perspective. Impacts to people or the environment from chemicals can occur at any point from the extraction of raw materials to make the chemical; to processes to create the chemical and incorporate it into products; through the chemical's use; and at its end of life, when it is disposed of or recycled. In addition, research conducted within the CSS Program will inform chemical evaluation strategies that integrate

specific decision needs into tiered approaches for developing the scientific information used for risk assessments and risk management decisions. CSS will support the development and application of improved and new:

- Strategies and approaches for the efficient assessment and management of the thousands of existing and emerging chemicals (including pesticides, toxic substances, endocrine disruptors, nanomaterials) in commerce (i.e., knowing what to test, when to test it, and how);
- Advanced computational tools for improving existing methods to understand inherent properties and predict behaviors and impacts of chemicals and their related products throughout their life-cycle;
- Approaches for alternative product formulations using green chemistry and engineering principles throughout their life-cycle that lead to greater sustainability;
- Multidisciplinary approaches to better characterize the impact on environmental media and aquatic organisms of real world releases of endocrine active compounds (including natural hormones, pesticides, industrial chemicals and pharmaceuticals) from wastewater treatment plants, concentrated animal feeding operations (CAFOs), and drinking water plants, and to develop risk management and mitigation strategies.
- Approaches to address issues of cumulative risk, chemical mixtures in the environment, vulnerability of populations, and environmental equity; and
- Methods to translate research findings into decision support tools that are useful and usable to regulators and risk managers, as well as the other Agency Research Programs: Air, Climate, and Energy; Sustainable Water and Water Resources; Sustainable and Healthy Communities; Human Health Risk Assessment; and Homeland Security.

As part of EPA's sustained support for fundamental research and the vitality and productivity of research universities and laboratories, CSS will support new Science To Achieve Results (STAR) grants for:

- A Center for Life Cycle Chemical Safety,
- A Center for Sustainable Molecular Design focused on the safer design of chemicals without endocrine activity,
- Innovative treatment designs and technologies approaches for mitigating EDCs and other emerging chemical contaminants from drinking water and wastewater treatment systems, and,
- High throughput screens that would improve our understanding of the pathways of toxicity relevant to endocrine-mediated endpoints in mammalian and ecological organisms.

EPA is developing performance measures for this program to ensure the research meets the critical needs of partners. The key performance foci will be:

- Identifying and synthesizing the best available scientific information, models, methods, and analyses to support Agency guidance and policy decisions, with a focus on human and ecosystem health
- Supporting the screening and testing protocols that EPA's Chemical Safety and Pollution Prevention Program will validate for use in evaluating the potential for chemicals to cause endocrine-mediated effects
- Developing the scientific underpinning related to the effects, exposures, and risk management of specific individual or classes of both pesticides and toxic substances that are of high priority to the Agency to inform Agency risk assessment and management decisions. ORD is collaborating with EPA's Office of Chemical Safety and Pollution Prevention (OCSPP) to develop a workplan that will allow OCSPP to incorporate efficient toxicological assessment approaches into its prioritization of chemical action plans and other decision-making processes. ORD meets with OCSPP periodically to help identify their highest priority science needs and ensure that the research program is addressing these needs in an efficient and timely manner.

The following are descriptions of FY 2012 Chemical Safety and Sustainability activities categorized under key program areas:

*Computational Toxicology (\$21.2 million)*

Computational toxicology is the application of mathematical and computer models to help assess the hazards and risk chemicals pose to human health and the environment. Supported by advances in informatics, high-throughput screening, and genomics, computational toxicology offers scientists the ability to develop a more detailed understanding of the hazards posed by large numbers of chemicals, while at the same time reducing the use of animals for toxicological testing. EPA is developing robust and flexible computational tools that can be applied to the thousands of contaminants and contaminant mixtures found in America's air, water, and hazardous-waste sites.

**ToxCast™:** EPA's Toxicity Forecaster (ToxCast™) is a state-of-the-art chemical screening approach that builds statistical and computational models that identify and forecast toxicity pathways relevant to human health effects. EPA uses ToxCast™ data to develop prioritization tools for regulatory decision making in Agency program offices. EPA has an existing partnership with Pfizer, as well as pending partnerships with several large pharmaceutical companies including Merck, GlaxoSmithKline (GSK) and Sanofi-Aventis. During Phase II of ToxCast™, these partnerships will allow EPA to directly compare ToxCast™ results with data on chemicals already clinically proven to be toxic to humans. Completion of Phase II is planned for FY 2012. EPA will continue to use ToxCast™ data to refine toxicological prediction models for developmental toxicity, reproductive toxicity, and cancer causing chemicals. The goal is to transition to the use of ToxCast for regulation determination beginning in FY 2013. In FY 2012, EPA will continue to assess appropriate reference substances for assessing estrogen, androgen,

and thyroid systems and expand its collaborations on proof of concept investigations of toxicological pathways in the ToxCast program. EPA expects to award four additional ToxCast™ contracts that will become operational in FY 2012. These contracts, as well as new STAR research grants, will accelerate and sustain EPA's activity in this area of science.

- **Tox21:** The Tox21 effort unites the Agency's capabilities with those of the National Institute of Environmental Health Sciences (NIEHS), the National Institutes of Health (NIH)'s Chemical Genomics Center (NCGC) and the U.S. Food and Drug Administration (FDA). Tox21 integrates EPA's ToxCast™ assays with the thousands of chemicals being tested at the NIH NCGC.<sup>2</sup> The Tox21 library contains data on roughly 10,000 chemicals; a public online database (PubChem) houses the results of high throughput screening of the nuclear receptors and stress pathways of these chemicals.

EPA is making long-range efforts to leverage data from ToxCast™ and Tox21 and other supporting knowledge bases to develop virtual first generation models of the liver and embryo. In addition, the "e1k" study, launched in FY 2011, will provide endocrine activity profiles on an additional 1000 chemicals for use by the Chemical Safety and Pollution Prevention (CSPP) program.

#### Endocrine Disrupting Chemicals (\$16.9 million)

The EPA research program provides direct support to CSPP's endocrine screening and testing efforts by evaluating current testing protocols and developing new protocols to evaluate potential endocrine effects of environmental agents. EPA's research in this area also includes developing and applying methods, models, and measures to evaluate real-world exposures to endocrine disruptors and characterize related effects resulting from these exposures for humans and wildlife. In addition, EPA develops risk management tools to prevent or mitigate exposures to EDCs.

In FY 2012 the Agency will conduct research to:

- Define toxicity pathways by which endocrine disruptors adversely affect the health of mammalian and aquatic organisms;
- Characterize the shape of the "dose-response" curve and its implications for risk assessment, and;
- Develop approaches for assessing cumulative risk and methods for extrapolating results across species, ultimately reducing animal testing.

Additional research in FY 2012 will identify sources of EDCs entering the environment, focusing on wastewater and drinking water treatment plants and concentrated animal feeding operations (CAFOs). This research will explore the extent to which these sources contribute to environmental releases of endocrine active compounds, examine the impact of these compounds on aquatic organisms, and develop improved technologies that can be applied to reduce harmful endocrine active compound levels. For example, technological advances in the field of green

---

<sup>2</sup> Collins et al., 2008, *Science*; <http://www.sciencemag.org/cgi/reprint/319/5865/906.pdf>

engineering will enable chemicals to be manufactured without endocrine activity. Innovative and cost-effective technologies will advance the assessment and management of environmental endocrine disruptors and other emerging contaminants of concern and strengthen the Agency's ability to protect human health and wildlife. Science to Achieve Results (STAR) grants will complement these FY 2012 intramural research activities.

The limitations of current tools and approaches—and the number of chemicals to assess—challenge the nation's efforts to make chemicals use environmentally sustainable (i.e., "greener"). As a modern society, the United States produces tens of thousands of chemicals and millions of products to enhance our productivity, comfort, and well-being. EPA's mission is to safeguard human health and the environment, including responsibility for assessing and managing risks from chemicals over their life cycle. Current regulatory decisions to control the use of specific chemicals are based on a wide range of tools and information that represent the best available science; however, these tools are unable to handle the large number of chemicals currently in commerce. Additionally, the available tools have failed to fully address complex aspects of risk, such as the impact of life-stage vulnerability, genetic susceptibility, disproportionate exposures, and cumulative risk. New computational, physico-chemical, and biological science tools are rapidly developing that will transform the way risks of chemical products are evaluated. Broadly applicable, predictive, high-throughput tools will be combined using a systems approach to integrate toxicity and exposure pathways in the context of the life cycle of the chemical, as well as addressing the long standing need to assess environmentally relevant mixtures.

By formally integrating its chemicals research, EPA will advance the science in the sustainable development, use, and assessment of chemicals by developing and applying integrated chemical evaluation strategies and decision-support tools. Such new scientific approaches are needed for the safer use, assessment, and management of chemicals. Currently, there are nearly 150,000 chemicals registered in the European REACH Program and over 84,000 chemicals on the Toxic Substances Control Act (TSCA) inventory, and each year about 1,000 new chemicals are introduced into commerce. EPA is developing innovative, high-throughput tools that are capable of screening thousands of chemicals in a day. By developing this technology, EPA will have the science and tools needed to make evaluations more quickly and cost-effectively.

In 2012, additional funding will support grants to academia through the Agency's STAR Program, complementing the intramural research effort on EDCs. This research will allow for an acceleration of the latest state-of-the-art technologies and innovations to advance the assessment and management of environmental endocrine disruptors and other emerging contaminants of concern.

EPA also will continue its ongoing investment in next-generation computational toxicology tools to speed and facilitate implementation of the Agency's Endocrine Disruptor Screening Program (EDSP). The application of these tools will introduce a more efficient approach to identifying potential endocrine disruptors and apply this information across the life cycle of a chemical. This research is critical to help the Agency meet its priority of strengthening chemicals management and risk assessment, as well as bolstering ongoing efforts to quickly screen the large universe of known chemicals in commerce today for potential to interact with the endocrine system.

There are three distinct drivers for ORD's Chemical Safety and Sustainability Program:

The need to tailor data generation and evaluation approaches to support varying decisions. Rapid and efficient risk assessment requires intelligent testing approaches that apply broad, predictive approaches, including those that use high-throughput tools, to integrate toxicity and exposure pathways using systems approaches and consideration of the entire chemical life cycle. The goal of this Research Area of CSS is to develop and provide Integrated Evaluation tools and approaches for providing context relevant answers to issues of chemical safety assessment. For example, some decisions only need screening-level assessments to identify within a large number of chemicals a small number which may cause concern. Using the experience gained in the ToxCast™ program, the CSS program will develop non-animal and high-throughput tests targeted at common adverse health effects induced by chemicals, including birth defects, reproductive impairment, immunological and neurological disorders, cancers and impacts on wildlife population structures. Research in these areas will inform assessments and decision making on impacts to humans and wildlife at the individual and population levels. Although the emphasis of this research area is on developing the scientific knowledge required to develop and refine tools and models, the testing and evaluation of these tools will be an integral component of the research.

- The need to more efficiently and effectively assess chemical risks and identify what to do about them.

In support of Goal 4 of the EPA Strategic Plan, which calls for reducing chemical risks, EPA research must integrate efforts to improve the next-generation of risk assessment and risk management approaches. New approaches will ensure faster, more efficient, and more sustainable decisions with reduced uncertainty for both legacy and new chemicals. New assessment and management methods will support a broad array of decisions, ranging from screening and prioritization to major regulatory decisions for humans and wildlife. Using tools and approaches from the first activity area--such as toxicogenomic methods, structure-activity relationships that are better-informed by inherent properties information, and LCA methods--the new assessment and management methods developed in this activity will incorporate data on chemical inherency, exposure, and hazard. These new assessment and management methods also will incorporate information from life cycle assessment and other methodologies that can provide more realistic and environmentally relevant assessments than simply focusing on a single chemical without considering its environmental context. These new methods must incorporate the means to assess vulnerabilities from inherent and extrinsic factors that lead to differential susceptibilities, and, therefore, can inform community and environmental justice mandates being planned in the Sustainable and Healthy Communities Program for assessing and mitigating environmental impacts.

- The need to focus on the highest-priority chemicals-related problems facing EPA and the nation, so that research remains relevant to the Agency's mission.

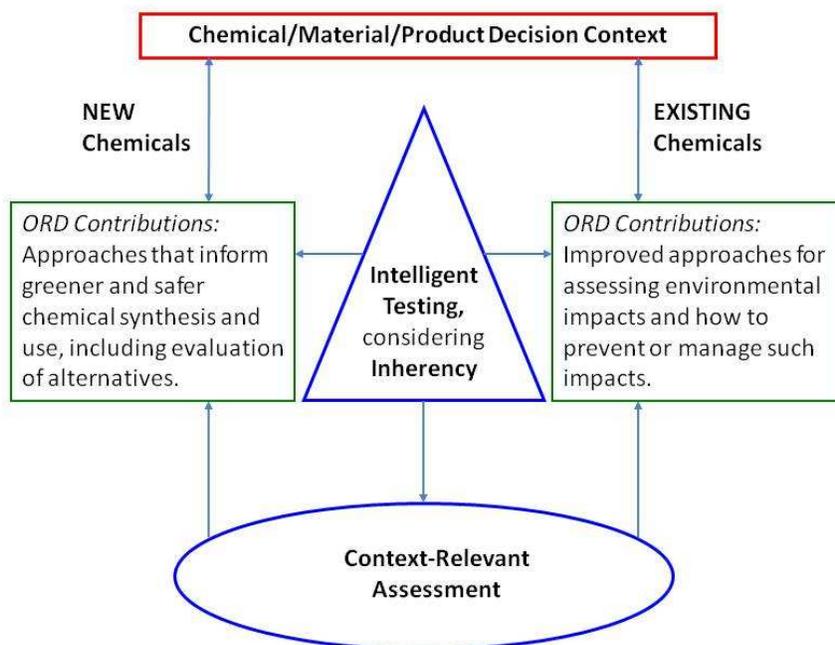
Even as the Chemicals Research Program provides the foundation for a transformation in the current business practices for chemical management, it is necessary to be

mindful that there will be time-critical research needs for fulfilling regulatory mandates. EPA researchers will engage Agency partners on an annual basis and determine the types of research needed to directly support key regulatory decisions. This year, for instance EPA is working in the key area of assessing cumulative risks of children's exposure to insecticides and polychlorinated biphenyls (PCBs) in schools. This activity will, therefore, be focused on how to incorporate into the integrated evaluation strategy those methods, models, and data that address the highest priority needs as determined by regular discussions between the senior managers of the Chemicals Research Program and those of the EPA partner offices and other stakeholders. By developing approaches to generating and using data that are fit to particular decision contexts (some decisions require more data, others less), EPA program offices will be better able to meet their deadlines.

The research and development products from EPA's new Chemical Safety and Sustainability (CSS) Research Program will benefit the regulation and use of existing pesticides and industrial chemicals and enhance green chemistry and engineering opportunities for the design, production, and use of both new and existing chemicals. CSS' research products also will be used by EPA programs and other decision makers to support community level decisions by providing tools and data used by EPA's Sustainable and Healthy Communities Research Program for those contaminants of highest priority and concern to the community, considering susceptibilities and exposures of the most vulnerable populations. Better approaches to chemical testing and assessment also will inform air toxics- and drinking water-related national, regional and local decision making, as well as decisions on waste management, remediation, and emergency response. Decision makers need targeted, credible, and usable information to inform their decisions, and the CSS Research Program is focused on developing approaches that can provide such information in a timely manner.

CSS will build upon existing EPA research in chemical management and extend efforts to develop innovative, approaches and tools that inform more sustainable solutions to the design and management of chemicals throughout their life cycle. The following illustrates the key elements of the program and demonstrates our central focus on developing intelligent and integrated evaluation strategies that support context-relevant assessments.

## CSS Linkages



*Schematic of linkages between integrated evaluation strategies, context-relevant assessments, and decision support.*

Under the CSS Program, development of enhanced chemical screening and prioritizing testing approaches for smarter context-relevant chemical assessment and management will not only directly support regulation of existing pesticide and industrial chemicals, but also enhance green chemistry opportunities for the design and use of new chemicals. This program also will support community-level decision making specific to those contaminants of highest priority and concern to individual localities and communities. For example, better approaches to chemical testing and assessment also will lead to better air toxics and drinking water-related regional and local decision making.

Importantly, these tools can be used by EPA Program and regional offices and stakeholders to significantly increase risk information available for individual chemicals and environmentally relevant mixtures and provide a practical context for effective risk prevention through safer product development and management for those chemical uses that pose unacceptably high risks.

The need for green chemistry research and ensuring safer chemicals in products also has been highlighted in recent chemicals legislation under consideration by Congress, such as the “Safe Chemicals Act of 2010.” Proposals include a revised policy to assist in renewing the manufacturing sector of the United States by spurring innovations in green chemistry; the development of a scientifically and technically trained green chemistry workforce in the United States; approaches to inform and engage communities about green chemistry; and a network of EPA-funded green chemistry and engineering centers, some funded by EPA, which would support the development and adoption of safer alternatives to harmful chemical substances.

Additional funding also will support E-waste/E-design research to improve the sustainability of electronic materials. EPA research in this area analyzes the factors that drive a chemical effects and exposures, over the chemical's life cycle; knowledge gained through this research will allow those who design, use, and regulate chemicals to develop assessments and management methods that reduce negative impacts from the manufacture, use, and disposal or recycling of chemicals and products that contain them. .

In planning and implementing the new CSS Program, EPA program and regional offices have worked with EPA's Office of Research and Development to identify and address critical science questions in order to formulate the CSS Research Program. In addition, EPA will collaborate with multiple federal and non-government stakeholders, particularly those interested in chemical safety.

### **Performance Targets:**

To be accountable to the American taxpayers, EPA will support the interagency Science and Technology in America's Reinvestment – Measuring the Effect of Research on Innovation, Competitiveness and Science (STAR METRICS) Program, currently in a pilot phase for the National Institutes of Health. This program is a collaboration of multiple science agencies, the Office of Science and Technology Policy, and the research community. STAR METRICS will use "science of science policy" approaches to assess the impact Federal science and technology investments have on society, the environment, and the economy.

### **FY 2012 Change from FY 2010 Enacted (Dollars in Thousands):**

The following policy changes are based on a comparison of the new FY 2012 Budget structure to the 2010 enacted budget and are included in the transfers from the source programs following this section:

- (+\$7,000.0) Additional funding will support grants to academia through the Agency's STAR Program, complementing the intramural research effort on endocrine disrupting chemicals (EDCs). This research will allow for an acceleration of the latest state-of-the-art technologies and innovations to advance the assessment and management of environmental endocrine disruptors and other emerging contaminants of concern.
- (+\$5,434.0 / +0.9 FTE) This reflects an increase for a new green chemistry and design for the environment initiative and includes associated payroll of \$120.0. It includes \$1,000.0 for E-waste/E-design research to improve the sustainability of electronic materials. The proposed research would develop new scientific information and tools that will lead to the development of safer chemicals, including nanomaterials. Funds will be used to integrate data from multiple scientific disciplines and sources into innovative user friendly decision tools, databases, and models for use by environmental decision-makers. This research will spur innovations in green chemistry as well as to help develop a scientifically and technically trained green chemistry workforce, approaches to inform and engage communities about green chemistry, and a network of green chemistry and

engineering centers to support the development and adoption of safer alternatives to chemical substances.

- (+\$2,000.0) This reflects an increase for next-generation computational toxicology tools to speed and facilitate implementation of the Agency's Endocrine Disruptor Screening Program (EDSP). The application of these tools will introduce a more efficient approach to identifying potential endocrine disruptors and apply this information across the life cycle of a chemical. This research is critical to help the Agency meet its priority of strengthening chemicals management and risk assessment.
- (-\$750.0) This reflects a reduction to the nanotechnology research that would result in a delay of material properties and life-cycle assessment research in using new energy applications, such as next-generation lithium-ion batteries, as case studies for developing LCA approaches for nanomaterials. This reduction also will delay FY 2012 commitments made to the international Organization for Economic Co-operation and Development to support development of non-animal test methods for nanomaterials, in particular for carbon nanotubes and silver nanoparticles.
- (-\$1,032.0) This reflects a reduction as part of the Administrative Efficiency Initiative. This initiative targets certain categories of spending for efficiencies and reductions, including advisory contracts, travel, general services, printing and supplies. EPA will continue its work to redesign processes and streamline activities in both administrative and programmatic areas to achieve these savings.
- (-\$1,377.0 / -0.9 FTE) This reflects a reduction to research supporting the development of scientific tools for biotechnology and includes a reduction of 0.9 FTE with decreased associated payroll of -\$120.0. The program will reduce research into refining the use of remote sensing as a tool for the management of insect resistance in genetically modified crops, also known as Plant Incorporated Pesticides (PIP) crops. The program has completed research on decision support systems to identify insect infestations that would indicate the development of insect resistance.
- (-\$1,500.0) This reflects a reduction to human health research on screening assays and predictive toxicology approaches.
- (+\$8,051.0 / +9.0 FTE) This increase represents the net effect of all other payroll and technical adjustments including Information Technology reductions, Small Business Renovation Research realignments and administrative and programmatic support realignments and reductions. It includes an increase of \$4,815.0 for FTE changes as well as a recalculation of base costs for existing FTE in this program. For more information on these adjustments, refer to the programs integrating into the Chemical Safety and Sustainability Program.

The following transfers will integrate Computational Toxicology, Endocrine Disrupting Chemicals, and Nanotechnology research, as well as portions of Human Health, Human Health Risk Assessment, Pesticides and Toxics, and Sustainability research, into a effort that better

aligns with the Administration and Agency priorities. EPA expects this effort will improve the ability to deliver science more effectively and efficiently, with catalyzing innovative, sustainable solutions as the overall goal. This integration reflects EPA's efforts to collaborate across traditional program boundaries to support national and regional decision-making, thereby strengthening the Agency's ability to respond to environmental and public health issues.

- (+\$31,025.0 / +100.5 FTE) This reflects a transfer of dollar and FTE resources from the Human Health and Ecosystems Research Program into the new, integrated Chemical Safety and Sustainability Research Program, including \$12,606.0 in associated payroll. This transfer includes the net effect of all technical adjustments such as Information Technology (IT) reductions, SBIR realignments and administrative and programmatic support realignments and reductions. For additional details on this net effect, please refer to the Research: Human Health and Ecosystems program narrative.
- (+\$21,211.0 / 34.4 FTE) This reflects a transfer of dollar and FTE resources from the Computational Toxicology Research Program into the new, integrated Chemical Safety and Sustainability Research Program, including \$4363.0 in associated payroll. This transfer includes the net effect of all technical adjustments such as IT reductions, SBIR realignments and administrative and programmatic support realignments and reductions. For additional details on this net effect, please refer to the Research: Computational Toxicology program narrative.
- (+\$16,888.0 / +46.1 FTE) This reflects a transfer of dollar and FTE resources from the Endocrine Disruptors Research Program into the new, integrated Chemical Safety and Sustainability Research Program, including \$5,847.0 in associated payroll. This transfer includes the net effect of all technical adjustments such as IT reductions, SBIR realignments and administrative and programmatic support realignments and reductions. For additional details on this net effect, please refer to the Research: Endocrine Disruptors program narrative.
- (+\$15,043.0 / +77.1FTE) This reflects a transfer of dollar and FTE resources from the Pesticides and Toxics Research Program into the new, integrated Chemical Safety and Sustainability Research Program, including \$10,023.0 in associated payroll. This transfer includes the net effect of all technical adjustments such as IT reductions, SBIR realignments and administrative and programmatic support realignments and reductions. For additional details on this net effect, please refer to the Research: Pesticides and Toxics program narrative.
- (+\$5,440.0 / +1.9 FTE) This reflects a transfer of dollar and FTE resources associated with nanotechnology and E-waste/E-design research from the Sustainability Research Program into the new, integrated Chemical Safety and Sustainability Research Program, including \$126.0 in associated payroll. This transfer includes the net effect of all technical adjustments such as IT reductions, SBIR realignments and administrative and programmatic support realignments and reductions. For additional details on this net effect, please refer to the Research: Sustainability program narrative.

- (+\$4,215.0 / +25.2 FTE) This reflects a transfer of dollar and FTE resources from the Land Preservation and Restoration Research Program into the new, integrated Chemical Safety and Sustainability Research Program, including \$3,324.0 in associated payroll. This transfer includes the net effect of all technical adjustments such as IT reductions, SBIR realignments and administrative and programmatic support realignments and reductions. For additional details on this net effect, please refer to the Research: Land Preservation and Restoration Program narrative.
- (+\$1,708.0 / +6.5 FTE) This reflects a transfer of dollar and FTE resources from the Human Health Risk Assessment Research Program into the new, integrated Chemical Safety and Sustainability Research Program, including \$808.0 in associated payroll. This transfer includes the net effect of all technical adjustments such as IT reductions, SBIR realignments and administrative and programmatic support realignments and reductions. For additional details on this net effect, please refer to the Research: Human Health Risk Assessment program narrative.
- (+\$127.0 / +1.0 FTE) This reflects a transfer of dollar and FTE resources from the Clean Air Research Program into the new, integrated Chemical Safety and Sustainability Research Program, including \$127.0 in associated payroll. This transfer includes the net effect of all technical adjustments such as IT reductions, SBIR realignments and administrative and programmatic support realignments and reductions. For additional details on this net effect, please refer to the Research: Clean Air program narrative.

**Statutory Authority:**

CAA, Sec. 103, 104 & 154; CCA, 40 U.S.C 11318; CERCLA; Children’s Health Act; 21st Century Nanotechnology Research and Development Act, 15 U.S.C. 750; CWA, Sec. 101 - 121; Economy Act, 31 U.S.C 1535; ERDDAA, 42 U.S.C. 4361-4370; FFDCA, 21 U.S.C. Sec. 346; FIFRA; FQPA; Intergovernmental Cooperation Act, 31 U.S.C. 6502; National Environmental Policy Act of 1969, Section 102; PPA, 42 U.S.C. 13103; RCRA; SDWA, 42 U.S.C.; TSCA, Section 10, 15, 26 U.S.C.

**Human Health Risk Assessment**

Program Area: Research: Chemical Safety and Sustainability  
 Goal: Ensuring the Safety of Chemicals and Preventing Pollution  
 Objective(s): Ensure Chemical Safety

(Dollars in Thousands)

	<b>FY 2010 Enacted</b>	<b>FY 2010 Actuals</b>	<b>FY 2011 Annualized CR</b>	<b>FY 2012 Pres Budget</b>	<b>FY 2012 Pres Budget v. FY 2010 Enacted</b>
<b><i>Science &amp; Technology</i></b>	<b><i>\$42,899.0</i></b>	<b><i>\$41,516.4</i></b>	<b><i>\$42,899.0</i></b>	<b><i>\$42,400.0</i></b>	<b><i>(\$499.0)</i></b>
Hazardous Substance Superfund	\$3,404.0	\$3,169.1	\$3,404.0	\$3,342.0	(\$62.0)
Total Budget Authority / Obligations	\$46,303.0	\$44,685.5	\$46,303.0	\$45,742.0	(\$561.0)
Total Workyears	182.5	216.2	182.5	195.8	13.3

**Program Project Description:**

EPA's Research and Development program provides critical support to Agency environmental policy decisions and regulatory actions to protect human health and the environment. EPA research has provided effective solutions to high-priority environmental problems for the past 40 years. Research enabled the Agency to implement policies and regulations to minimize waste and reduce pollution in specific industries. However, these solutions were accomplished using approaches based on the best science available at the time. In some cases, this resulted in a more limited focus, for example, focusing on the risks posed by a single chemical to a single target organ or species.

Now, as science advances, EPA is working to address the increasing complexity of 21st century environmental challenges with solutions that are effective, efficient, and sustainable – designed to meet current needs while minimizing potential health and environmental detriment in the future. The Human Health Risk Assessment (HHRA) Program will continue to provide the risk assessments necessary to guide EPA's actions to protect public health and the environment. The program generates health assessments that are used extensively by EPA program and regional offices, and other parties to develop regulatory standards for environmental contaminants and to manage cleanups. The HHRA Program will continue to evolve to meet today's complex environmental challenges, developing multi-pollutant science assessments for health and climate effects (as called for by the Clean Air Scientific Advisory Committee (CASAC) and other scientific reviews such as the 2004 NAS report on Air Quality Management).

Three complementary areas comprise the HHRA Program:

- 1) The Integrated Risk Information System (IRIS) and other priority health assessments,
- 2) Risk assessment guidance, methods, model development, and
- 3) Integrated Science Assessments (ISA) of criteria air pollutants.

IRIS and other health hazard assessments: EPA's HHRA Program prepares peer reviewed, qualitative and quantitative health hazard assessments on environmental pollutants of major

relevance to EPA's regulatory mandates. EPA program and regional offices use these assessments to support their decision-making. The Agency disseminates the assessments to the public on the IRIS Internet database.<sup>1</sup> EPA and the risk assessment/risk management community consider IRIS the premier source of hazard and dose-response information for environmental pollutants. Currently there are more than 550 health hazard assessments available through IRIS.

Methods, Models and Approaches to Improve Risk Assessment Science: The risk assessment/risk management community needs approaches, methods, and models to enhance the quality and objectivity of assessments through the incorporation of contemporary scientific advances. The HHRA Program often uses these innovations in the development of IRIS assessments and ISAs. In addition, they often support decision-making by EPA's program and regional offices. These scientific products receive external peer review, and then EPA disseminates them through the published literature and EPA web sites.

Integrated Science Assessments: Congress requires that EPA regularly summarize the state-of-the-science for criteria air pollutants—ozone, particulate matter, sulfur and nitrous oxides, carbon monoxide, and lead—to assist EPA's Air and Radiation Program in determining the National Ambient Air Quality Standards (NAAQS). These ISAs (formerly Air Quality Criteria Documents) are major risk assessments that undergo rigorous external peer review by the CASAC.

In FY 2008, an evaluation by EPA's Board of Scientific Counselors (BOSC)—a federal advisory committee comprised of independent expert scientists and engineers—concluded that the HHRA Program “has been highly responsive to the needs of the program offices and regions,” producing products that are critical to EPA's regulatory mission and form the foundation for regulatory decisions and policies. This prospective and retrospective review evaluated the program's relevance, quality, performance, and scientific leadership. The evaluation found that the program is making substantial and satisfactory progress; has clearly defined milestones; and provides additional essential support to EPA programs to respond to unscheduled emergency needs. In July 2010, the BOSC reviewed the mid-cycle report on the progress of the HHRA program in implementing its previous recommendations. The BOSC affirmed its previous evaluation of the relevance of the program and noted significant progress on its previous recommendations. EPA is using the BOSC's evaluation and recommendations to help plan, implement, and strengthen the program over the next five years.

### **FY 2012 Activities and Performance Plan:**

In FY 2012, EPA requests \$27.1 million to continue to develop IRIS and other health hazard assessments. EPA will continue to implement and to ensure the program effectively meets the needs of EPA, the federal government and the American public. The program will make significant progress on health hazard assessments of high priority chemicals (e.g. dioxin, methanol, cumulative phthalate assessment, benzo-a-pyrene, Libby asbestos cancer assessment, and PCB non-cancer assessment), completing work for interagency science consultation, external

---

<sup>1</sup> Available at: <http://www.epa.gov/iris>.

review, or posting on the IRIS web page.<sup>2</sup> The IRIS program will expand intrinsic scientific knowledge and expertise in refinement of IRIS assessments.

EPA will continue to develop Provisional Peer Reviewed Toxicity Values (PPRTVs) and other health hazard assessments to support program and regional decision-making. EPA will respond with science assessment support on chemical contaminant issues requiring quick action and, ultimately, quick decisions and solutions (e.g., Katrina, the World Trade Center disaster and Deepwater Horizon oil spill). Responding to these types of issues is a key part of EPA's mission to protect human health and the environment and corresponds with a BOSC recommendation.

EPA requests \$5.5 million in FY 2012 to continue to be a leader in the development of risk assessment approaches, methods, and models to enhance the quality and objectivity of assessments through the incorporation of contemporary scientific advances. EPA will continue to develop approaches for applying mode of action in risk assessment and improve quantification of health risks, such as Physiologically Based Pharmacokinetic and Biologically Based Dose Response modeling, as well as characterizing environmental exposure and risk to susceptible populations.

EPA will continue implementation of Health and Environmental Research Online (HERO) to support a more continuous process to identify, compile, characterize, and prioritize new scientific studies for human health and ecological assessment development. HERO lends transparency to the process of assessment development by allowing access to the data used for scientific decisions.

In addition, EPA requests \$9.8 million continue to develop ISAs of criteria air pollutants, as a mandated prerequisite to EPA's review of the NAAQS and effectively meet court ordered deadlines to provide these assessments. The ISAs provide important scientific analyses in support of many of EPA's important rulemakings. In FY 2012, the program will release final ISAs for ozone and lead to contribute to EPA's Air and Radiation Program's review of the NAAQS and creation of state-of-the-science methods for continuous evaluation of assessments of new scientific information on criteria air pollutants. The HHRA Program also will begin exploring multi-pollutant assessment approaches as called for by the 2008 CASAC consultation on EPA's draft plan for review of the Primary NAAQS for Carbon Monoxide and the 2004 NAS report on Air Quality Management.

As part of EPA's effort to integrate research efforts to deliver more innovative, sustainable solutions to environmental problems, HHRA's next generation risk assessment research is moving into the Chemical Safety and Sustainability Research Program. Within this integrated program, EPA will advance risk assessment approaches by incorporating knowledge derived from recent advances in molecular biology, systems biology and gene-environment interactions in human disease. EPA expects this effort will result in more comprehensive, timely approaches for assessing potential environmental impacts, and new approaches for preventing future risks resulting from chemical exposure.

---

<sup>2</sup> Available at: <http://www.epa.gov/IRIS/>

This new effort is complementary to HHRA and continued investments in FY 2012 will allow the program to make significant progress toward its long-term goals of providing state-of-the-science for health hazard assessments.

**Performance Targets:**

Measure Type	Measure	FY 2010 Target	FY 2010 Actual	FY 2011 CR Target	FY 2012 Target	Units
Output	(H83) Percentage of planned outputs delivered in support of HHRA Technical Support Documents.	90	100	90	90	Percent

EPA uses performance measures for this program to manage and improve the development of risk assessments to support EPA decision-making. These outcomes support the achievement of EPA's Strategic Plan goals. At the end of the fiscal year, the program reports on its success in meeting planned annual outputs (detailed in the program's research plan). In addition, to be accountable to the American taxpayers, EPA plans to support the interagency Science and Technology in America's Reinvestment—Measuring the Effect of Research on Innovation, Competitiveness and Science (STAR METRICS) Program, currently in a pilot phase for the National Institutes of Health. This program is a collaboration of multiple science agencies, the Office of Science and Technology Policy, and the research community. STAR METRICS will use "science of science policy" approaches to assess the impact of federal science and technology investments on society, the environment, and the economy.

**FY 2012 Change from FY 2010 Enacted (Dollars in Thousands):**

- (+\$987.0 / +0.3 FTE) This reflects the net result of realignments of infrastructure FTE and resources such as equipment purchases and repairs, travel, contracts, and general expenses that are proportionately allocated across programs to better align with programmatic priorities.
- (+\$384.0) This increase reflects the recalculation of base workforce costs for existing FTE.
- (+\$255.0) This represents a restoration of resources transferred to the Research: Sustainability Program to support Small Business Innovation Research (SBIR). For SBIR, EPA is required to set aside 2.5 percent of funding for contracts to small businesses to develop and commercialize new environmental technologies. After the FY 2012 Budget is enacted, and the exact amount of the mandated requirements is known, FY 2012 funds will be transferred to the SBIR Program.
- (-\$70.0) This decrease in travel costs reflects an effort to reduce the Agency's travel footprint by promoting green travel and conferencing.

- (-\$104.0) This reduction reflects efficiencies from several agencywide Information Technology (IT) projects such as email optimization, consolidated IT procurement, helpdesk standardization, and others totaling \$10 million agencywide. Increased mandatory costs for telephone and Local Area Network (LAN) support for FTE may offset savings in individual areas.
- (-\$126.0 / +14.0 FTE) This net FTE increase supports development of Integrated Science Assessments (ISAs) and strengthens the Agency's work on addressing risk assessment methods and includes associated payroll of \$1,862.0. In addition, \$1,988.0 in extramural funds is redirected to payroll to support these risk assessment FTE.
- (-\$190.0 / -1.1 FTE) This reflects a reduction of programmatic support resources resulting from expected efficiencies in providing operational support to researchers in the HHRA Research Program. It also includes a reduction of programmatic FTE that reflects EPA's workforce management strategy that will help the Agency better align resources, skills and Agency priorities.
- (-\$311.0) This reflects a reduction as part of the government-wide Administrative Efficiency Initiative. This initiative targets certain categories of spending for efficiencies and reductions, including advisory contracts, travel, general services, printing and supplies. EPA will continue its work to redesign processes and streamline activities in both administrative and programmatic areas to achieve these savings.
- (-\$416.0 / -1.1 FTE) This reduction reflects savings from the Administrative Efficiencies Project (AEP), EPA's long-term effort to develop a corporate approach to delivering administrative services. This will not have programmatic impacts. This change includes a decrease of \$146.0 in associated payroll and reflects EPA's workforce management strategy that will help the agency better align resources, skills, and Agency priorities.
- (-\$418.0 / -0.9 FTE) This decrease reflects a reduction of resources in support of risk assessment research and includes decreased associated payroll of \$120.0. It will delay some work addressing benchmark dose software updates.
- (-\$490.0 / +2.1 FTE) This reflects a reduction to extramural resources for science associated with Physiologically Based Pharmacokinetic (PBPK) models and the statistics workgroup within the HHRA Program. This reduction will limit our capacity to contract out expert external support for PBPK and statistical support, but is partially offset by an increase of 2.1 FTE and associated payroll of \$279.0.

The following transfer is based on a comparison of the new FY 2012 budget structure to the source programs and is included in the 2010 enacted budget. The changes above, including the Accountable Government Initiative reduction, incorporate changes for the portion of the program being transferred.

- (-\$1,708.0 / -6.5 FTE) This reflects a transfer of dollar and FTE resources for NexGen risk assessment approaches to the new Chemical Safety and Sustainability Program including

\$808.0 in associated payroll. The integration of efforts under this new program will provide for more effective and efficient risk assessments and support the Agency priority for assuring the safety of chemicals.

**Statutory Authority:**

CAA Amendments, 42 U.S.C. 7403 et seq. - Sections 103, 108, 109, and 112; CERCLA (Superfund, 1980) Section 209(a) of Public Law 99-499; FIFRA (7 U.S.C. s/s 136 et seq. (1996), as amended), Sec. 3(c)(2)(A); FQPA PL 104-170; SDWA (1996) 42 U.S.C. Section 300j-18; TSCA (Public Law 94-469): 15 U.S.C. s/s 2601 et seq. (1976), Sec. 4(b)(1)(B), Sec. 4(b)(2)(B).

**Human Health Risk Assessment**

Program Area: Research: Chemical Safety and Sustainability

Goal: Ensuring the Safety of Chemicals and Preventing Pollution

Objective(s): Ensure Chemical Safety

(Dollars in Thousands)

	<b>FY 2010 Enacted</b>	<b>FY 2010 Actuals</b>	<b>FY 2011 Annualized CR</b>	<b>FY 2012 Pres Budget</b>	<b>FY 2012 Pres Budget v. FY 2010 Enacted</b>
Science & Technology	\$42,899.0	\$41,516.4	\$42,899.0	\$42,400.0	(\$499.0)
<b><i>Hazardous Substance Superfund</i></b>	<b>\$3,404.0</b>	<b>\$3,169.1</b>	<b>\$3,404.0</b>	<b>\$3,342.0</b>	<b>(\$62.0)</b>
Total Budget Authority / Obligations	\$46,303.0	\$44,685.5	\$46,303.0	\$45,742.0	(\$561.0)
Total Workyears	182.5	216.2	182.5	195.8	13.3

**Program Project Description:**

EPA's Office of Research and Development provides critical support to Agency environmental policy decisions and regulatory actions to protect human health and the environment. EPA research has provided effective solutions to high-priority environmental problems for the past 40 years. Research enabled the Agency to implement policies and regulations to minimize waste and reduce pollution in specific industries. However, these solutions were accomplished using approaches based on the best available science at the time, for very specific problems such as risks posed by a single chemical to a single target organ or species.

Now, as science advances, EPA is working to address the increasing complexity of 21st century environmental challenges with solutions that are effective, efficient, and sustainable – solutions that are designed to meet current needs while minimizing potential health and environmental detriment in the future. The Human Health Risk Assessment (HHRA) Program will continue to provide health hazard assessments and develop assessment methods. EPA's HHRA Program provides the scientific foundation for the Agency's actions to protect Americans' public health and environment. It receives resources under both the Science and Technology and the Superfund appropriations.

A subcommittee review from the Board of Scientific Counselors (BOSC)—a federal advisory committee comprised of qualified, independent scientists and engineers—noted that the HHRA Program has made several key advancements including completing a strategic plan, targeting cutting-edge risk assessments, enhancing communication, and improving capabilities to provide assessment resources in response to significant events. The BOSC reported that the HHRA Program is making substantial and satisfactory progress in each of the above areas based on clearly defined milestones as well as on providing the additional support requested by EPA programs including technical support in response to unscheduled emergency needs. In July 2010, the BOSC reviewed the mid-cycle report on the progress of the HHRA Program in implementing its previous recommendations. The BOSC affirmed its previous evaluation of the relevance of the program and noted significant progress on its previous recommendations. EPA is using the

BOSC's evaluation and recommendations to help plan, implement, and strengthen the program over the next five years.

The HHRA MYP<sup>1</sup> details risk assessments and methodologies used to support EPA's Superfund Program. Partners and stakeholders participate in planning work and help outline research needs and priorities. The Superfund portion of the HHRA Program includes the following:

- The Integrated Risk Information System (IRIS),<sup>2</sup> Provisional Peer-Reviewed Toxicity Values (PPRTVs), and other health hazard assessments: Based on the expressed needs of EPA's Solid Waste and Emergency Response Program, the HHRA Program prepares IRIS hazard characterization and dose-response profiles for environmental pollutants of specific relevance to superfund site assessments and remediation. As of January 2010, more than 550 health hazard assessments were available through IRIS, and the majority of these chemical assessments are relevant to Superfund's decision making. Where IRIS values are unavailable, the HHRA Program develops PPRTVs for evaluating chemical specific exposures at Superfund sites. EPA's Superfund Technical Support Centers provide support for these PPRTV assessments. As of January 2010, new or renewed PPRTVs were available for 236 chemicals.
- Risk assessment guidance, methods, and model development: The HHRA Program uses Superfund resources to improve risk assessment guidance, methods, and models for EPA's Superfund Program. This support includes the development of exposure-response data arrays, revised reference concentration (RfC) methodology and cumulative risk tools. These methods and tools will help staff in the Superfund Program better estimate potential effects of exposures at superfund sites on humans. The HHRA Program will provide the consultative support necessary for the application of these methods.

### **FY 2012 Activities and Performance Plan:**

In FY 2012, EPA will continue to develop IRIS assessments for environmental pollutants of specific relevance to superfund site assessments and remediation. The HHRA Program will develop PPRTVs for evaluating chemical specific exposures at Superfund sites. EPA's Superfund Technical Support Centers will provide consultative support for PPRTV assessment development.

### **Performance Targets:**

EPA uses performance measures for this program to manage and improve the development of risk assessment to support EPA decision-making. . These outcomes support the achievement of EPA's Strategic Plan goals. At the end of the fiscal year, the program reports on its success in meeting planned annual outputs (detailed in the program's research plan). . In addition, to be accountable to the American taxpayers, EPA plans to support the interagency Science and Technology in America's Reinvestment – Measuring the Effect of Research on Innovation, Competitiveness and Science (STAR METRICS) Program, currently in a pilot phase for the

<sup>1</sup> Available at: <http://www.epa.gov/osp/bosc/pdf/hhramypdraft.pdf>.

<sup>2</sup> Available at: <http://www.epa.gov/iris>.

National Institutes of Health. This program is a collaboration of multiple science agencies, the Office of Science and Technology Policy, and the research community. STAR METRICS will use “science of science policy” approaches to assess the impact that federal science and technology investments have on society, the environment, and the economy.

**FY 2012 Change from FY 2010 Enacted (Dollars in Thousands):**

- (+\$86.0) This increase reflects the recalculation of base workforce costs for existing FTE.
- (+\$12.0) This represents a restoration of resources transferred to the Research: Sustainability Program to support Small Business Innovation Research (SBIR). For SBIR, EPA is required to set aside 2.5 percent of funding for contracts to small businesses to develop and commercialize new environmental technologies. After the FY 2012 Budget is enacted, and the exact amount of the mandated requirement is known, FY 2012 funds will be transferred to the SBIR Program.
- (-\$5.0) This decrease in travel costs reflects an effort to reduce the Agency's travel footprint by promoting green travel and conferencing.
- (-\$40.0) This reflects the net result of realignments of infrastructure resources such as equipment purchases, repairs, travel, contracts, and general expenses that are proportionately allocated across programs to better align with programmatic priorities.
- (-\$42.0) This reduction reflects savings from EPA’s Administrative Efficiencies Project (AEP), a long-term effort to develop a corporate approach to delivering administrative services. This will not have programmatic impacts.
- (-\$47.0) This reflects a reduction as part of the government-wide Administrative Efficiency Initiative. This initiative targets certain categories of spending for efficiencies and reductions, including advisory contracts, travel, general services, printing and supplies. EPA will continue its work to redesign processes and streamline activities in both administrative and programmatic areas to achieve these savings.
- (-\$26.0) This reflects a reduction of programmatic support resources resulting from expected efficiencies in providing operational support to researchers in the HHRA Research Program.

**Statutory Authority:**

CAA Amendments, 42 U.S.C. 7403 et seq. - Sections 103, 108, 109, and 112; CERCLA (Superfund, 1980), Section 209(a) of Public Law 99-499; FIFRA (7 U.S.C. s/s 136 et seq. (1996), as amended), Sec. 3(c)(2)(A); FQPA PL 104-170; SDWA (1996) 42 U.S.C. Section 300j-18; TSCA (Public Law 94-469): 15 U.S.C. s/s 2601 et seq. (1976), Sec. 4(b)(1)(B), Sec. 4(b)(2)(B).



**Homeland Security: Preparedness, Response, and Recovery**

Program Area: Homeland Security

Goal: Taking Action on Climate Change and Improving Air Quality

Objective(s): Reduce Unnecessary Exposure to Radiation

Goal: Ensuring the Safety of Chemicals and Preventing Pollution

Objective(s): Ensure Chemical Safety

(Dollars in Thousands)

	<b>FY 2010 Enacted</b>	<b>FY 2010 Actuals</b>	<b>FY 2011 Annualized CR</b>	<b>FY 2012 Pres Budget</b>	<b>FY 2012 Pres Budget v. FY 2010 Enacted</b>
Environmental Program & Management	\$3,423.0	\$4,264.2	\$3,423.0	\$0.0	(\$3,423.0)
<b><i>Science &amp; Technology</i></b>	<b><i>\$41,657.0</i></b>	<b><i>\$37,697.9</i></b>	<b><i>\$41,657.0</i></b>	<b><i>\$30,078.0</i></b>	<b><i>(\$11,579.0)</i></b>
Hazardous Substance Superfund	\$53,580.0	\$51,558.9	\$53,580.0	\$40,662.0	(\$12,918.0)
Total Budget Authority / Obligations	\$98,660.0	\$93,521.0	\$98,660.0	\$70,740.0	(\$27,920.0)
Total Workyears	174.2	176.4	174.2	170.9	-3.3

**Program Project Description:**

EPA's Research and Development Program's research provides critical support to agency environmental policy decisions and regulatory actions to protect human health and the environment. EPA research has provided effective solutions to high-priority environmental problems for the past 40 years. Research enabled the Agency to implement policies and regulations to minimize waste and reduce pollution in specific industries and scales. However, these solutions were accomplished using 20th century approaches, focusing on the risks posed by a single chemical to a single target organ or species. Such an approach limits the Agency's ability to address the increasing complexity of 21st century environmental challenges with solutions that are effective, efficient, and sustainable – solutions that meet current needs without compromising the future.

The Homeland Security Research Program (HSRP) will continue to plan and implement a systems-based program. That approach will address scientific and technological gaps in a community's ability to prepare for and recover from large-scale catastrophic events including chemical, biological, or radiological (CBR) attacks. When terrorist attacks and even natural disasters occur, sustainable environmental approaches enhance the resiliency and speed the recovery of the communities that are affected. Communities that have a high degree of resiliency will be better prepared for and recover more quickly and completely from a disaster than communities that are not as resilient.

The HSRP will evaluate tools and develop capabilities so that cost effective response and recovery approaches can be identified for future use by the response community, elected and appointed decision makers, and risk managers. Research will further state-of-the-art approaches to address all phases of community response and recovery to ensure public and worker safety, protect property, and facilitate recovery. The Agency will continue to work with other federal

agencies and organizations, through collaborative research efforts, to strengthen remediation and decontamination capabilities.

EPA's Board of Scientific Counselors (BOSC)—a federal advisory committee comprised of independent expert scientists and engineers—recognizes that the HSRP is both expansive and complex as is the Agency's responsibility for responding to future terror events. The December 2008 BOSC report noted that "prior and recent reviews [by the National Academy of Sciences and Science Advisory Board] of the National Homeland Security Research Center (NHSRC) have recognized this and have helped shape the scope of the current research program. The NHSRC has done a commendable job in analyzing and delineating the scope of its research program relative to available resources." The BOSC reported that the program is successfully providing utility to NHSRC clients and downstream end users.

### **FY 2012 Activities and Performance Plan:**

EPA homeland security research on chemical, biological, and radiological (CBR) contaminants will continue to fill critical gaps in our ability to effectively respond to and recover from threats and attacks, including large-scale catastrophic incidents, thereby enhancing the resilience of our communities. EPA has unique knowledge and expertise related to decontamination and disposal of contaminated materials and in protecting the nation's drinking water and water infrastructure. FY 2012 Homeland Security Research Program funds will be used to deliver science and engineering research results to EPA's Water, Solid Waste and Emergency Response, and Air and Radiation programs, among others, to better facilitate and enable their ability to carry out the Agency's homeland security missions. These results include tools and techniques to facilitate response to and recovery from incidents involving CBR agents. Other applied science and technical support needs also will be provided to EPA's response community (National Decontamination Team, Environmental Response Team, Radiological Emergency Response Team, Removal Managers, and On-Scene Coordinators). For example, the program's experience and expertise were critical in supporting EPA's coordinated Deepwater Horizon Oil Spill response. EPA's HSRP also provides support and assistance in interactions with water utilities to help ensure the nation's water systems are secure and drinking water is safe.

The FY 2012 request for the HSRP includes a reduction of \$8.2 million from the FY 2010 enacted budget. This reflects a 75 percent reduction to methods development, the planned completion of decontamination research for the Safe Buildings Program, and the reduced need for water contamination detection tools as work reaches completion.

### Decontamination Research

EPA's decontamination research directly supports the Agency's National Response Framework (NRF) as well as its homeland security responsibilities. In many cases, the research program also supports the Department of Homeland Security's needs for EPA expertise in a number of key areas including materials decontamination and disposal, threat assessment, and sampling and analytical methods. There are reductions in funding for some aspects of the homeland security Decontamination Research Program. Activities in FY 2012 will include the following:

- Risk analysis research will continue, at a reduced level, to provide information that aids decision-makers in managing risks associated with exposure to biological and chemical agents. This information includes the science required to develop exposure limits and clean-up goals. Much progress has been made in collecting and evaluating data on the toxicity, infectivity, mechanism of action, fate, transport, and exposure consequences associated with CBR contamination. In 2012 and beyond, these data will be extrapolated to predict human response from exposure to varying doses of biological organisms. This information will support the development of cleanup goals for sites contaminated with biological agents. Development of Provisional Advisory Levels (PALs) for additional chemicals will provide health effect information for intermediate durations of exposure (hours – days). Research will continue to identify and fill data gaps related to risk analysis and to develop improved methods to communicate risk information to decision-makers and the public.
- Testing and evaluation of commercially-available technologies will continue to support those in need of purchasing reliable equipment to detect and decontaminate CBR contaminants resulting from terrorist attacks on buildings and outdoor areas. Research will continue, at a significantly reduced level, which supports the development and capabilities of the Environmental Response Laboratory Network (ERLN). The program has made significant progress in the last several years on developing and verifying methods for the analysis of chemical, biological, and radiological warfare agents. The remaining methods development funding will be used to develop methods for newly identified, high priority contaminants. EPA will continue this support by updating the Selected Analytical Methods (SAM) manual, which identifies CBR agents and analytical methods that are needed to characterize the nature and extent of contamination and to document the completion of remediation.
- Decontamination and consequence management research will continue, at a reduced level, to develop and improve decontamination and disposal techniques for the clean-up of outdoor areas, buildings and infrastructure (e.g., subways, bridges, stadiums, and drinking water and wastewater systems) contaminated with CBR agents. The Safe Buildings portion of the program will be discontinued because the vast majority of research to support cleanup of the interior of buildings has been completed.
- EPA will, in partnership with several other government entities, collaborate on a large-scale field demonstration of decontamination methods for anthrax developed over the last few years. Also, EPA will work with other agencies to develop detection and analysis methods, and evaluate decontamination methods for outdoor areas, indoor areas and water infrastructure for new chemicals that may be used by terrorists. EPA will continue to develop methods to decontaminate structures and areas contaminated with radiological materials, as well as the safe disposal of radiologically-contaminated materials and decontamination residue. EPA also will provide a synthesis of its work on the impacts of decontamination activities on sensitive materials.

### Water Infrastructure Protection Research

Water Infrastructure Protection Research provides scientific data and tools for the Water Program and water utilities to improve the nation's ability to protect water systems from attack

and to detect and recover from an attack. This research directly supports the national Water Security Initiative while providing effective ways to detect CBR agents in drinking water and wastewater systems, to contain the contamination, and to treat the water and decontaminate the infrastructure. EPA has produced many award-winning products over the past few years designed to improve the water utilities' capabilities including the CANARY event detection software that won the prestigious 2010 R&D 100 Award<sup>1</sup>.

Since the Water Security Initiative (WSI) is maturing, some aspects of the research program are reduced.

Activities in FY 2012 will include the following:

- Support to provide technical assistance to water utilities regarding water contamination detection software tools will continue. These tools include the Threat Ensemble Vulnerability Assessment and Sensor Placement Optimization Tool (TEVA-SPOT) and the CANARY event detection software.
- Work will support implementation of WSI by water utilities with updates and improvement to software tools that help place detection systems in optimal locations within the water system, and to assist in detecting contamination.
- Research will be undertaken to support strategies that contain contamination (thus minimizing public exposure). This work includes the development of real-time distribution systems models to help decision makers isolate contaminated portions of the systems so that the water may be removed, and to locate the origin of the contamination.
- Methods will be developed to decontaminate water and wastewater treatment systems to rapidly restore function in a cost-effective manner. The program also will evaluate effective methods for treating and disposing of wastewater generated from decontamination activities.
- Testing and evaluation of commercially-available technologies will continue to support those in need of purchasing reliable equipment to detect and decontaminate CBR contaminants resulting from terrorist attacks on water and wastewater treatment systems.

### Radiation Monitoring

Maintenance of the RadNet air monitoring network supports EPA's responsibilities under the Nuclear/Radiological Incident Annex to the National Response Framework (NRF). The network includes deployable monitors and near real-time stationary monitors.

Through FY 2011, EPA expects to install all 134 purchased monitors providing near real-time radiation monitoring coverage for each of the 100 most populous U.S. cities as well as expanded geographic coverage. In FY 2012, the Agency will maintain the expanded RadNet air monitoring network. These near real-time monitors replaced or augmented the previous system

---

<sup>1</sup> <http://www.epa.gov/nhsrc/news/news122007.html>

of 60 conventional air samplers. Fixed stations will operate routinely and in conjunction with as many as 40 deployable monitors following a radiological incident. With the expanded RadNet air monitoring network, average response time and data dissemination will be reduced from days to hours and will provide the Agency and first responders with greater access to data, improving officials' ability to make decisions about protecting public health and the environment during and after an incident. EPA will continue to update its fixed and deployable monitoring systems including their communications capability across various media. Additionally, the data will be used by scientists to better characterize the effect of a radiological incident.

Biodefense

There is no request for this program in FY 2012.

**Performance Targets:**

Measure Type	Measure	FY 2010 Target	FY 2010 Actual	FY 2011 CR Target	FY 2012 Target	Units
Output	(H72) Percentage of planned outputs delivered in support of efficient and effective clean-ups and safe disposal of contamination wastes.	100	100	100	90	Percent

Measure Type	Measure	FY 2010 Target	FY 2010 Actual	FY 2011 CR Target	FY 2012 Target	Units
Output	(H73) Percentage of planned outputs delivered in support of water security initiatives.	100	100	100	90	Percent

Work under this program supports multiple strategic objectives. In FY 2012, the program plans to meet its targets of completing and delivering planned outputs in support of: 1) the efficient and effective clean-up and safe disposal of decontamination wastes, 2) the Water Security Initiative, 3) the rapid assessment of risk and the determination of clean-up goals and procedures following contamination, 4) supporting the Environmental Response Laboratory Network, and 5) the program's ability to provide timely quality assured ambient radiation monitoring during an emergency. In achieving these targets, the program will contribute to EPA's goal of providing

scientifically sound guidance and policy decisions related to the health of people, communities, and ecosystems.

At the end of the fiscal year, the program reports on its success in meeting its planned annual outputs (detailed in the program's Multi-Year Plan). The program strives to complete 100% of its planned outputs each year so that it can best meet EPA and stakeholders' needs. To ensure the ambitiousness of its annual output measures, EPA's Research and Development Program has better formalized the process for developing and modifying program outputs, including requiring that these programs engage partners when making modifications.

EPA is on track through its ongoing work to meet its FY 2012 strategic plan goal of protecting public health and the environment from unwanted releases of EPA-regulated radioactive waste and to minimize impacts to public health from radiation exposure.

**FY 2012 Change from FY 2010 Enacted (Dollars in Thousands):**

- (+\$585.0) This increase reflects the recalculation of base workforce costs for existing FTE.
- (-\$114.0/-0.5 FTE) This reflects the net result of infrastructure realignments of FTE and resources such as critical equipment purchases and repairs, travel, contracts, and general expenses that are proportionately allocated across programs to better align with programmatic priorities. This change includes a decrease of \$66.0K in associated payroll and reflects EPA's workforce management strategy that will help the agency better align resources, skills, and agency priorities.
- (-\$49.0) This reflects adjustments to IT and telecommunications resources. Realignment of these resources is based on FTE allocations.
- (-\$53.0/-0.4 FTE) This reflects a reduction of programmatic support resources resulting from expected efficiencies in providing operational support to researchers. It also includes a decrease of \$53.0K in associated payroll and reflects EPA's workforce management strategy that will help the agency better align resources, skills, and agency priorities.
- (-\$67.0) This decrease in travel costs reflects an effort to reduce the Agency's travel footprint by promoting green travel and conferencing.
- (-\$137.0/-0.3 FTE) This reduction reflects savings from the Administrative Efficiencies Project (AEP), a long-term effort to develop a corporate approach to delivering administrative services in the Research and Development program. This change includes a decrease of \$40.0K in associated payroll and reflects EPA's workforce management strategy that will help the Agency better align resources, skills, and agency priorities.
- (-\$133.0/-1.0 FTE) This reflects a shift from the Homeland Security Research Program to the Chemical Safety and Sustainability research program to better align resources,

skills, and agency priorities. This change includes a transfer of \$133.0K in associated payroll to reflect EPA's workforce management strategy that will help the agency better align resources, skills, and agency priorities.

- (-\$586.0) This reflects a reduction as part of the Administrative Efficiency Initiative. This initiative targets certain categories of spending for efficiencies and reductions, including advisory contracts, travel, general services, printing and supplies. EPA will continue its work to redesign processes and streamline activities in both administrative and programmatic areas to achieve these savings.
- (-\$119.0\+10.0 FTE) This change reflects a shift of resources for the Agency's water security and decontamination research activities. This also reflects the transfer of extramural funding in the amount of \$1,330.0K to payroll to cover the cost of the additional 10.0 FTE.
- (-\$3,500.0) This reflects a 75 percent reduction to the methods development research in FY 2012. The program has made significant progress in the last several years on developing and verifying methods for the analysis of chemical, biological, and radiological warfare agents. The remaining methods development funding will be used to develop methods for newly identified, high priority contaminants.
- (-\$4,089.0\ -0.6 FTE) This reduction reflects: (1) planned completion of decontamination research for contaminated buildings (the Safe Buildings Program) and (2) a reduced need for water contamination detection tools as the Water Security Initiative completes its mission and a large extramural grant to study microbial risk assessment reaches completion. This change includes a reduction of \$80.0K in associated payroll to reflect EPA's workforce management strategy that will help the agency better align resources, skills and agency priorities.
- (-\$2,225.0) This reflects a reduction of pesticide program resources. Affected areas include improvement of disinfection capabilities as applied to the food and agriculture sectors.
- (-\$596.0) This reflects a reduction of resources for EPA's RadNet national environmental radiation monitoring network.

- (-\$499.0) This reflects a reduction in resources for efforts to improve national radiological laboratory capacity and capability. This will result in the termination of laboratory capacity audits and proficiency testing of laboratories, a reduction in incident response radiological laboratory training, and a reduction in the publication of incident response radiological laboratory guidance documents. This disinvestment will lead to many of the nation's radiological laboratories being inadequately prepared for a major nuclear or radiological incident due to slower data generation and delay of consequence management activities aimed at protecting the public.
- (+\$3.0) This reflects additional resources to support efforts related to enhancing decontamination capability and capacity.

**Statutory Authority:**

AEA of 1954, as through P.L. 105–394, November 13, 1998, 42 U.S.C. 2011 et seq. - Section 275 Reorganization Plan #3 of 1970; CAA Amendments 42 U.S.C. 7401 et seq – Sections 102 and 103; CERCLA, as amended by the SARA 42 U.S.C. 9601 et seq., Sections 104, 105 and 106; Executive Order 12241 of September 1980, National Contingency Plan, 3 CFR, 1980; Executive Order 12656 of November 1988, Assignment of Emergency Preparedness Responsibilities, 3 CFR, 1988; PHS Act, as amended, 42 U.S.C. 201 et seq., Section 241; Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended, 42 U.S.C. 5121 et seq. – Sections 201, 204, 303, 402, 403, and 502; SDWA 42 U.S.C. 300 et seq. – Sections 1433, 1434 and 1442; NDAA of 1997, Public Law 104-201, Sections 1411 and 1412; PHSBPRA of 2002, Public Law 107–188, 42 U.S.C. 201 et seq., Sections 401 and 402 (amended the SDWA); TSCA, 15 U.S.C. 53 – Section 2609; OPA, 33 U.S.C 40; PPA, 42 U.S.C 133; RCRA 42 U.S.C. 6901 et seq; EPCRA 42 U.S.C. §11001 et seq.; CWA 33 U.S.C. 1251 et seq.; FIFRA 7 U.S.C. 136 et seq.; FFDCA, 21 U.S.C 9; FQPA 7 USC 136 et seq. Executive Order 10831 (1970); PRIA; FSMA, Sections 203 and 208; Executive Order 13486: Strengthening Laboratory Biosecurity in the United States (2009).

**Homeland Security: Preparedness, Response, and Recovery**

Program Area: Homeland Security

Goal: Cleaning Up Our Communities

Objective(s): Restore Land

Goal: Ensuring the Safety of Chemicals and Preventing Pollution

Objective(s): Ensure Chemical Safety

(Dollars in Thousands)

	<b>FY 2010 Enacted</b>	<b>FY 2010 Actuals</b>	<b>FY 2011 Annualized CR</b>	<b>FY 2012 Pres Budget</b>	<b>FY 2012 Pres Budget v. FY 2010 Enacted</b>
Environmental Program & Management	\$3,423.0	\$4,264.2	\$3,423.0	\$0.0	(\$3,423.0)
Science & Technology	\$41,657.0	\$37,697.9	\$41,657.0	\$30,078.0	(\$11,579.0)
<b><i>Hazardous Substance Superfund</i></b>	<b><i>\$53,580.0</i></b>	<b><i>\$51,558.9</i></b>	<b><i>\$53,580.0</i></b>	<b><i>\$40,662.0</i></b>	<b><i>(\$12,918.0)</i></b>
Total Budget Authority / Obligations	\$98,660.0	\$93,521.0	\$98,660.0	\$70,740.0	(\$27,920.0)
Total Workyears	174.2	176.4	174.2	170.9	-3.3

**Program Project Description:**

EPA's Homeland Security Emergency Preparedness and Response program develops and maintains an agencywide capability to respond to large-scale catastrophic incidents with an emphasis on those that may involve Weapons of Mass Destruction (WMD). The program builds upon EPA's long standing emergency response and removal program, which is responsible for responding to and cleaning up both oil and hazardous substance releases. EPA's homeland security effort expands these responsibilities to include threats associated with chemical, biological, and radiological (CBR) agents. To meet this challenge, EPA will continue to use a comprehensive approach that brings together all emergency response assets to implement efficient and effective responses.

Existing science and technology information and the current approaches for generating that information must evolve to address the increasing complexity of 21<sup>st</sup> century environmental challenges. In FY 2012, EPA will strengthen its planning and delivery of science by realigning its current research program projects into a new structure that will look at problems from a systems perspective to develop a deeper understanding of our environmental challenges and inform sustainable solutions to our strategic goals.

Within that structure, the Homeland Security Research Program will continue to improve research, development and technical support for potential threats and response protocols.

**FY 2012 Activities and Performance Plan:**

In FY 2012, efforts to strengthen the capability to respond to multiple incidents will concentrate on four core areas: 1) maintaining a highly skilled, well-trained, and equipped response

workforce that has the capacity to respond to simultaneous incidents as well as threats involving WMD substances; 2) developing decontamination options, methods, and protocols to ensure that the nation can quickly recover from nationally significant incidents; 3) ensuring that current laboratory equipment maintains the capability to analyze Chemical Warfare Agent (CWA) fixed and mobile samples while working to establish EPA biological agent laboratory analyses capability; and 4) implementing the EPA's National Approach to Response (NAR) to effectively manage EPA's emergency response assets during large-scale activations.

EPA activities in support of these efforts include the following:

- Maintain the skills of EPA's On-Scene Coordinators (OSCs) through specialized training, exercises, and equipment. In FY 2012, EPA and its federal, state, local, and tribal homeland response partners will continue to participate in exercises and trainings designed to test and improve EPA's response capabilities.
- Sustain the Agency's responder base during large-scale catastrophic incidents by training volunteers of the Response Support Corps (RSC) and members of Incident Management Teams (IMTs). These volunteers provide critical support to Headquarters and Regional Emergency Operations Centers and assist with operations in the field. To ensure technical proficiency, this cadre of response personnel requires initial training and yearly refresher training to include opportunities to participate in exercises. Depending upon the level and complexity of the assigned position, volunteers also may participate in workshops, health and safety training, medical monitoring, and equipment acquisition, as necessary. The focus is on their assigned responsibilities during a response, interactions with the emergency response program personnel, and understanding lines of communication within an IMT.
- Maintain and operate the Environmental Response Laboratory Network (ERLN) and existing fixed CWA labs and maintain the capability of two Portable High-Throughput Integrated Laboratory Identification Systems (PHILIS) units. The Agency will continue to participate with the Integrated Consortium of Laboratory Networks, maintaining a laboratory compendium of federal, state, and commercial capabilities, and maintain a chemical surety program.
- Operate the Environmental Response Laboratory Network (ERLN) in Headquarters and Regional offices to provide lab analysis for routine and emergency response and removal operations, including a terrorist attack.
- Continue to develop and validate environmental sampling, analysis, and human health risk assessment methods for known and emerging biological threat agents. These sampling and analysis methods are critical to ensuring appropriate response and recovery actions and developing necessary laboratory support capacity. The human health risk assessment methods also are extremely important to decision makers who are faced with determining when decontaminated facilities and equipment can be returned to service. This decontamination and consequence management research will produce data,

information, and technologies to assist EPA in developing standards, protocols, and capabilities to recover from and mitigate the risks associated with biological attacks.

- Implement the NAR to maximize regional interoperability and to ensure that EPA's OSCs will be able to respond to terrorist threats and large-scale catastrophic incidents in an effective and nationally consistent manner.
- Continue to maintain one Airborne Spectral Photometric Environmental Collection Technology (ASPECT) aircraft. The EPA ASPECT provides direct assistance to first responders by detecting chemical and radiological vapors, plumes, and clouds.
- Maintain the Emergency Management Portal (EMP) modules. EMP ties together prevention, preparedness, and response information to allow EPA's emergency management community access to information they need to respond to and efficiently store data from large and small sites. The Decontamination Portfolio resides in the EMP.
- Conduct WMD decontamination course for EPA OSCs, Special Teams, and RSC personnel to improve decontamination preparedness for CBR agents.
- Maintain Environmental Response Team (ERT) personnel and equipment in a state of readiness for response to potential homeland security incidents. It also will maintain capacity to provide required health and safety and response readiness training.

### **Performance Targets:**

Work under this program supports multiple strategic objectives. Currently, there are no performance measures for this specific Program Project.

### **FY 2012 Change from FY 2010 Enacted (Dollars in Thousands):**

- (+\$3.0) This increase reflects the recalculation of base workforce costs for existing FTE.
- (-\$11,999.0) This reflects a decrease to the Agency's homeland security emergency response and preparedness program. Existing agency preparedness will be maintained. Planned training and equipment upgrades may be delayed or modified.
- (-\$647.0) This reflects a reduction as part of the Administrative Efficiency Initiative. This initiative targets certain categories of spending for efficiencies and reductions, including advisory contracts, travel, general services, printing and supplies. EPA will continue its work to redesign processes and streamline activities in both administrative and programmatic areas to achieve these savings.
- (+\$14.0) This reflects the net result of realignments of infrastructure resources such as critical equipment purchases and repairs, travel, contracts, and general expenses that are proportionately allocated across programs to better align with programmatic priorities.

- (-\$289.0) This decrease in travel costs reflects an effort to reduce the Agency's travel footprint by promoting green travel and conferencing.
- (-7.5 FTE) This decrease reflects a realignment of total FTEs to better reflect utilization rates.

**Statutory Authority:**

Comprehensive Environmental Response, Compensation, and Liability Act, as amended by the Superfund Amendments and Reauthorization Act, 42 U.S.C. 9601 et seq. – Sections 104, 105, 106.