

FY 2013 President's Budget for ORD

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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)

	FY 2011 Actuals	FY 2012 Enacted	FY 2013 Pres Budget	FY 2013 Pres Budget v. FY 2012 Enacted
<i>Science & Technology</i>	<i>\$119,756.0</i>	<i>\$98,845.0</i>	<i>\$105,894.0</i>	<i>\$7,049.0</i>
Total Budget Authority / Obligations	\$119,756.0	\$98,845.0	\$105,894.0	\$7,049.0
Total Workyears	320.5	306.6	308.4	1.8

Program Project Description:

American communities face serious health and environmental challenges from air pollution and the growing effects of climate change. Both air pollution and climate change are intricately linked with the production and use of energy. Improving air quality and developing strategies to address climate change are central to the Agency’s mission to protect public health and the environment.

The EPA’s Air, Climate, and Energy (ACE) research program conducts research to inform policy and regulatory action. The EPA relies on this scientific and technical information to understand the interplay between air quality, climate change, and the changing energy landscape. ACE’s research outputs and data are fundamental in making accurate and defensible policy decisions. With ACE research, the EPA can effectively enforce the Clean Air Act and other statutory and regulatory obligations.

The ACE program engages with EPA partners and stakeholders to provide research to inform policy and regulatory action that considers the impacts beyond the stack or tailpipe. For example, with the Safe and Sustainable Water Resource (SSWR) and the Sustainable and Healthy Communities Research Programs (SHCRP), ACE will collaborate on nutrient management research as well as community exposure and vulnerability from nitrogen sources analyses. To address these and other issues, ACE is focusing on the following key challenges:

- Understanding the multi-pollutant nature of air pollution;
- Developing guidance on most cost-effective approaches to reducing air pollution;
- Informing strategies to adapt to and minimize the impacts of climate change on air quality and water quality;
- Assessing the human health and environmental impacts of energy production and use; and
- Understanding the social, behavioral, and economic factors that influence the effectiveness of air quality and climate policies.

Environmental challenges in the 21st century are more complex than ever before. Stressors such as climate change, urbanization, and water quality and quantity have become universal and

require more innovative thinking and collaborative solutions. Effectively addressing these types of challenges will require systems-based solutions that seek to optimize and balance environmental, social and economic objectives. These solutions will require research that transcends disciplinary lines and includes all stakeholders in the process of defining the research to be done and how the solutions are to be integrated. Such new integrated, transdisciplinary approaches, in order to be effective in the real world, require innovation at all steps of the process; from conceptualizing the issue at hand, to technological innovation that allows for development of entirely new, environmentally responsible solutions and fosters new economic development.

FY 2013 Activities and Performance Plan:

Innovative research and development is crucial to improving air quality. In FY 2013, the EPA will continue to address critical science questions on air quality and climate change. To address the needs of decision-makers and other stakeholders, the ACE research program is organized around separate yet interlinked themes:

- *Assess Air Quality Impacts:* The ACE research program will develop and apply methods to assess the impacts and effects of air pollution exposure at individual, community, regional, and global scales. Specifically, ACE scientists will examine exposures to air pollutant mixtures and the associated effects on individuals, ecosystems, communities, and regions, including effects on those most susceptible or vulnerable.
- *Prevent and Reduce Emissions:* The ACE research program will provide the science needed to develop and evaluate approaches to preventing and reducing harmful air emissions. The data and methods resulting from this research can be used to analyze the full life-cycle impacts of new and existing energy technologies and determine whether certain energy choices are sustainable.
- *Respond to Changes in Climate and Air Quality:* The ACE research program will provide modeling and monitoring tools, metrics, and information on air pollution exposure that can be used by individuals, communities, and governmental agencies as they make public health decisions related to air quality.

While these themes guide the research, many of the research projects crosscut the themes. Below are several of the major research efforts planned for FY 2013.

Supporting NAAQS through a Multi-Pollutant Assessment of Emissions, Exposures, and Effects

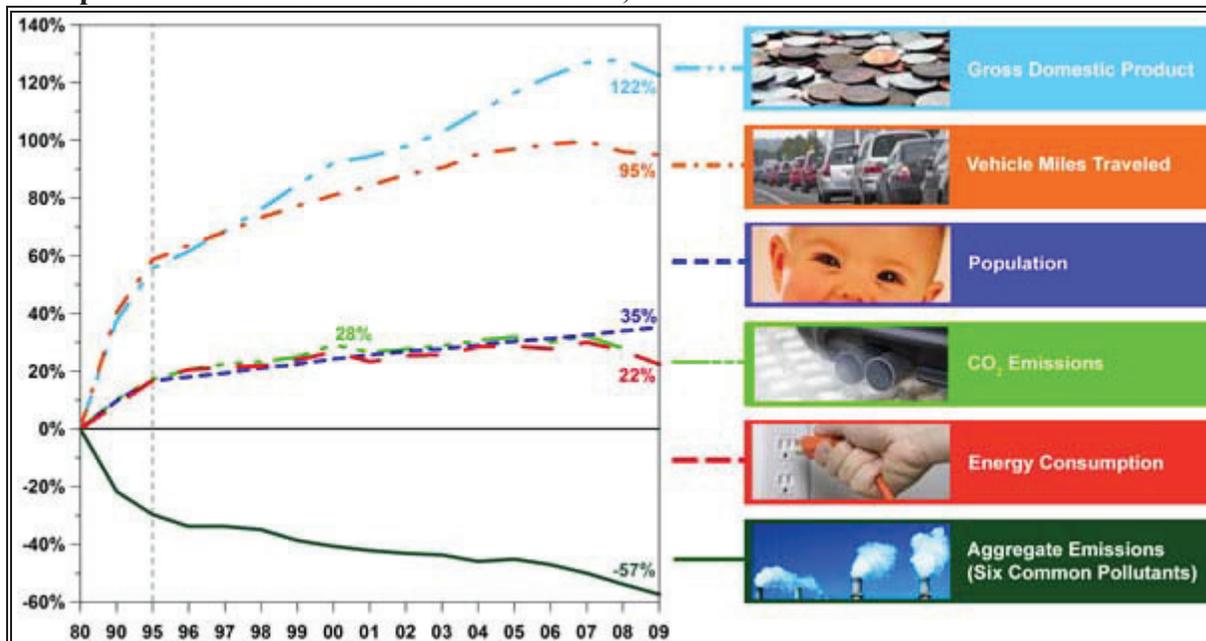
The EPA research program has provided the scientific basis for air quality standards and management practices that have yielded billions of dollars of net economic benefit.³⁵ ACE will continue to provide the underlying research to support the Agency's implementation of the Clean Air Act, which mandates the review of the National Ambient Air Quality Standards (NAAQS). The EPA research currently provides 40% of the fundamental cited data used to develop the

³⁵ http://www.whitehouse.gov/sites/default/files/omb/legislative/reports/2010_Benefit_Cost_Report.pdf

NAAQS levels.³⁶ The EPA also provides the primary tool that states and local governments use to develop implementation strategies. The figure below graphically depicts that since 1980, the NAAQS have led to emissions reductions to improve air quality while during that time period population, vehicle miles traveled and gross domestic product have increased.

³⁶ <http://www.epa.gov/ncea/isa/>

Comparison of Growth Areas and Emissions, 1980-2009³⁷



Note: CO₂ emissions estimate through 2008 (Source: [2009 US Greenhouse Gas Inventory Report](#))

Gross Domestic Product: [Bureau of Economic Analysis](#)

Vehicle Miles Traveled: [Federal Highway Administration](#)

Population: [Census Bureau](#)

Energy Consumption: [Dept. of Energy, Energy Information Administration](#)

Aggregate Emissions: [EPA Clearinghouse for Inventories and Emissions Factors](#)

Moving forward, the ACE research program is laying the foundation for new air quality management approaches. These approaches more effectively address the actual complexities of air pollution. In FY 2013, the EPA will conduct research that evaluates the multi-pollutant nature of air pollution. The EPA will examine the effects from exposures to air pollutant *mixtures* rather than single contaminants. Single pollutant approaches have been effective to date. However, our nation needs a more realistic approach – one that reflects real-life exposure -- to protect the public and the environment. This research will consider the sources of air pollution (automobile exhaust, coal-fired power plants) and the effects of different exposures (near roadways) of air pollution.

The ACE research program will examine specific health endpoints. For example, the EPA will examine the cardiovascular effects associated with exposures to single and multiple pollutants. The EPA scientists will study the health impacts of “fresh” and “atmospherically aged” emissions. This and related research, including the Human Health Risk Assessment program’s shift from single science assessments to multi-pollutant assessments and EPA-supported research

³⁷ <http://www.epa.gov/airtrends/aqtrends.html#comparison>

at numerous universities, will inform the EPA on the causes of air pollution related health effects. This multi-pollutant approach builds upon our past success and will allow for more effective use of resources in evaluations of criteria air pollutants as well as more comprehensive and effective evaluation of health effects of exposures than has been possible before. It provides a mechanism for developing scientifically sound strategies for air quality management. Multi-pollutant research will allow the EPA to account for additive, synergistic, or antagonistic effects of contaminant mixtures on individuals and ecosystems.

Near Road Emissions, Exposures, and Health Effects

The EPA will apply the multi-pollutant approach to evaluate the impacts of air pollution near roadways. “Near roadways” research examines the health impacts due to emissions from roadways. This research includes a series of studies that consider emissions, pollutant transport and transformation, exposure, and health impacts. The final study in Raleigh, NC concludes in FY 2014. The results from this near roadway research program will provide information to inform the location of roads, schools, and other infrastructure. The research program also will evaluate potential mitigation approaches (vegetation barriers, improved air handling systems in buildings) to reduce risks from exposure to air pollution near roads. This research has been coordinated with the Federal Highway Administration as well as state and local transportation officials in Nevada and Michigan.

Tools to Support Air Quality Management

The ACE research program in FY 2013 will continue to develop models and methods to support effective air quality management. State and local agencies and the EPA rely on such tools to implement NAAQS. The NAAQS levels are set by the EPA and based on the Human Health Risk Assessment program’s Integrated Science Assessments of criteria air pollutants (particulate matter, ozone, lead, sulfur dioxide, nitrogen oxides, and carbon monoxide). Improvements to the widely used Community Multiscale Air Quality (CMAQ) modeling system will increase users’ capability to accurately model changes in ozone, particulate matter, and hazardous air pollutant concentrations. The CMAQ is used by nations, states, and communities to model how air pollution levels change when different emission reduction alternatives are used allowing them to test a range of strategies and determine what approach best fits their situation. The CMAQ model has over 1,500 users in the U.S. and about 1,000 more around the world.

In FY 2013, the EPA will improve techniques for measuring and monitoring organic emissions (benzene, toluene, ethylene, and xylene) and greenhouse gas emissions (methane, carbon dioxide). These results will support improved emission inventories and be input into the CMAQ and other models. This will improve the models’ results and give air quality managers a better understanding of how their decisions will affect air quality.

In FY 2013, the EPA will also improve methods for monitoring concentrations of pollutants in the air, including monitoring methods for ozone and acrolein. Improved monitoring methods are intended for eventual deployment in national air monitoring networks to support compliance with air pollution standards and to inform community exposure assessments important to local decision making. Exposure assessment tools and data will no longer be a stand-alone effort.

Instead, the EPA will conduct research on multipollutant decision support tools and approaches to support the NAAQS reviews.

Changing the Paradigm for Air Pollution Monitoring

A robust monitoring network is vital to the nation's air quality because it measures and tracks pollutants, identifies pollutant sources, and provides information on how Americans are exposed to air pollutants.

Declining budgets strain already struggling national, state, and local air pollution monitoring resources. Furthermore, governments face growing demands for information to address complex environmental problems. Our nation cannot effectively continue to address air pollution using current monitoring methods and approaches. The U.S. needs more cost-effective and innovative strategies.

To respond to these needs, in FY 2013, the EPA will develop and evaluate innovative approaches for monitoring and characterizing air pollution. For example, the EPA is working with the National Aeronautics and Space Administration (NASA) to examine how to use satellite data to improve air quality management activities. EPA is also developing and evaluating approaches to integrate data collected from monitors at specific places and times with results from models to understand how air pollution changes between the monitored sites and times. In addition, the EPA will also be evaluating the potential application of small low cost sensor technologies to improve air pollution exposure information and to characterize emissions. As these new approaches are developed, the EPA will evaluate and demonstrate the application of these approaches. Such approaches will support community monitoring, provide public information, inform health research, and address the NAAQS compliance and enforcement.

Assessing the Impacts of Climate Change

Climate change is now affecting, and will continue to impact, the health and quality of our environment. The National Academy of Sciences (NAS) report, *Adapting to the Impacts of Climate Change*³⁸ highlights the impacts to environmental systems that are crucial to our social and economic well-being. Increased flooding, prolonged drought, more severe heat waves, and changes in wetland, forest, and grassland habitats are resulting in contamination of drinking water resources, impaired air and water quality, reduced water quantity, including related socio-economic factors, as well as increased stress on fisheries, wildlife, forestry, and recreational areas. In FY 2013, EPA's researchers will continue work with other federal and state agencies through the U.S. Global Change Research Program (USGCRP). Together they will develop a coordinated national picture of how climate change is impacting human and environmental health. The ACE program researchers and activities will continue to play an important role in the development of the 2013 USGCRP National Climate Assessment.

³⁸ http://dels.nas.edu/resources/static-assets/materials-based-on-reports/reports-in-brief/Adapting_Report_Brief_final.pdf

Assessing How Weather Patterns Impact Climate Change and the Environment

The EPA will support research on the relationship between climate change, weather patterns, and the environment. Specifically, the EPA will improve global, regional, and local models. The EPA and other government groups rely on models to understand how climate change impacts air pollutants, water runoff, and sewage overflows. The National Oceanic and Atmospheric Administration (NOAA) and the NASA are developing models that can simulate weather extremes and meteorological impacts. The EPA will use the NASA and the NOAA models as a basis to build models that project environmental impacts.

Developing Information to Support Responses to Climate Change

The two key policy responses to climate change are adaptation and mitigation. Communities, states, and businesses are already making efforts to revise design guidelines for water treatment systems. They are also modifying existing systems to adapt to climate-driven changes in the frequency and intensity of precipitation events that can overwhelm treatment systems and degrade water quality. The ACE research program will provide expanded and improved information and tools to support such activities, which allow these communities to adapt to the impacts of climate change on air and water quality. Coordinated with the EPA efforts from the SHCRP and the SSWR research programs, the ACE program's adaptation research will focus on understanding how climate change is affecting the most vulnerable populations and ecosystems. The EPA is working with NOAA, the U.S. Geological Survey, and the Army Corps of Engineers to study the impacts of climate change on estuarine ecosystems. This research will provide needed information for watershed and coastal resource managers to protect productive fisheries and habitats as climatic conditions change. More generally, the EPA will identify the most important individual stressor or combination of stressors for specific subpopulations, species, or habitats within a geographical location. While the EPA will generate new data from experiments and field surveys, considerable effort will be devoted to synthesizing existing information into summary products or populate decision support tools. The EPA will develop web sites as decision support tools to inform decisions on impacts of the changing climate landscape.

Understanding the Environmental Impacts of Energy Production and Use

Hydraulic fracturing (HF) is a widespread practice with significant potential economic benefits, yet significant public and environmental health questions remain. In FY 2013, the EPA will begin to study the impacts of HF on air, water quality, and ecosystems. This research will complement the EPA's current study on potential impacts of HF on drinking water. The EPA's study plan includes coordination between the ACE research program and the Safe and Sustainable Water Resources research program. The EPA is also collaborating with the Department of Energy (DOE) and the Department of the Interior. This collaboration sponsors research that: 1) improves our understanding of the impacts of developing our nation's unconventional oil and gas resources, and 2) ensures the safe and prudent development of these resources. The ACE research program will examine the air quality impacts from natural gas drilling and HF operations. Research could include ambient air monitoring, emissions measurements from fugitive points, air quality and exposure modeling, and associated health

effects assessment. This research will inform national and state policies as well as the design and implementation of more sustainable approaches.

The United States strives to meet the demands of a growing economy by relying on more clean energy. In FY 2013, the ACE research program will evaluate how changes in national policy and energy technology may affect air pollutants and greenhouse gas (GHG) emissions and other environmental and human health endpoints. This work also will help the EPA understand how clean energy technologies impact water quality. The results of this research will guide policy makers at federal, state, and local levels. Guidance, such as the *Biofuel Report to Congress*, will inform policy makers in implementing legislative requirements (state renewable portfolio standards). The ACE research program broadly considers the environmental impacts of energy production and use across the full life cycle, such as how increased use of residential wood boilers for home heating can reduce GHG emissions but cause local air pollution problems. This research also will inform policies and strategies developed by the DOE, the United States Department of Agriculture (USDA), and others to build an economically and environmentally sustainable energy system for the United States.

Research Partnerships

In all these efforts, the ACE program will continue to build on successful research partnerships across academic and private sector research organizations, including its Clean Air Research Centers and support of the Health Effects Institute. Approaching air pollution and climate change from a perspective of sustainability requires the EPA to strengthen its existing interactions with other state and federal agencies, including the NOAA, the DOE, the USDA, the National Institutes of Health, the Federal Highway Administration, and the National Association of Clean Air Agencies. These partnerships have made the ACE research program more relevant to decision makers; in turn, having a more lasting benefit, while also achieving multiple goals in less time and with less resources than would otherwise have been possible.

The EPA also partners with utilities. For example, the EPA collects mercury emissions data directly from utilities. This partnership allows the EPA to assess the effectiveness of existing technologies in meeting current mercury reduction requirements. In FY 2013, the EPA will study mercury emissions and control characterization as part of a multi-pollutant research effort.

Performance Targets:

Measure	(AC1) Percentage of products completed on time by Air, Climate, and Energy research program.								Units
	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	
Target							100	100	Percent
Actual									

Measure	(AC2) Percentage of planned research outputs delivered to clients for use in taking action on climate change or improving air quality.								Units
	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	
Target							100	100	Percent
Actual									

The table reflects the ACE program’s annual performance measures. EPA uses these measures to assess our effectiveness in delivering needed products and outputs to clients (decision-makers, states, and local governments).

The EPA collaborates with several science agencies and the research community. We also work with the White House’s Office of Science and Technology Policy. The EPA supports the interagency Science and Technology in America’s Reinvestment – Measuring the Effect of Research on Innovation, Competitiveness and Science (STAR METRICS) effort. STAR METRICS strives to measure the impact federal science investments have on society, the environment, and the economy.

FY 2013 Change from FY 2012 Enacted Budget (Dollars in Thousands):

- (+\$575.0) This increase reflects the recalculation of base workforce costs and a cost of living adjustment for existing FTE.
- (+\$3,755.0 / +4.5 FTE) This increase to support hydraulic fracturing within the Air, Climate and Energy (ACE) research program, along with the increase in the Safe and Sustainable Water Resources research program, reflects an EPA investment of \$14.1 million. Increased resources will address questions regarding the potential impacts of hydraulic fracturing (HF) on air quality. The additional resources include \$612.0 associated payroll for 4.5 FTE. (Please refer to the Research: Safe and Sustainable Water Resources program/project description for an explanation of the water quality and ecosystems portion of this research investment.)
- (+\$3,280.0) In FY 2013, the EPA will support climate change research originally planned for 2012. This increase will support research to understand the impacts of climate change on human health and vulnerable ecosystems. The research will accelerate efforts to: evaluate the interactions between climate change and air quality; initiate development of methods to measure carbon dioxide from geological sequestration sites; and increase efforts to develop approaches to adapt to a changing climate. This research will provide regions, tribes, states, and cities with more tools and technologies to support their climate change programs.
- (+\$1,766.0) In FY 2013, the EPA will support biofuels research originally planned for 2012. This effort expands our understanding of the potential impacts to human health and ecosystems related to the increased production and use of second-generation biofuels, which are required by the Energy Independence and Security Act (EISA). This research will focus on emerging feedstocks such as corn stover and other cellulosic materials.

This science will support development of the Report to Congress (mandated in Section 204 of EISA).

- (+\$1,500.0) In FY 2013, the EPA will support air monitor research originally planned for 2012. This increase will support the development of efficient, high-performing, and cost-effective monitors for ambient air pollutants. This effort is designed to provide innovative approaches for monitoring air pollution. Such monitors will replace outdated techniques, produce more detailed information, and reduce the cost of monitoring for the EPA, states, and local agencies.
- (+\$185.0 / +2.8 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. The increase to resources includes 2.8 FTE and associated payroll of \$381.0.
- (-\$214.0) This decrease eliminates the EPA's fluid modeling research facility, used to study the effect of roadway configuration and wind direction on near-road dispersion.
- (-\$914.0 / -1.3 FTE) This reduction reflects administrative savings from continued efforts to streamline operational expenses and activities, including information technology (IT) support activities. The reduced resources include 1.3 FTE and associated payroll of \$177.0.
- (-\$971.0 / -4.2 FTE) This reduction eliminates the Mercury Research Program. The EPA will no longer study mercury characterization or evaluate mercury emission control technologies as a separate research effort. Mercury emission and control characterization will be conducted as one of several co-emitted pollutants. Currently, the Agency collects mercury emissions data directly from utilities, which show the effectiveness of existing technologies to meet current reduction requirements, thereby reducing the need for technology research. This includes a decrease of 4.2 FTE and associated payroll of \$571.0 aligned with mercury research.
- (-\$1,913.0) This reflects a reduction to resources for the development of exposure assessment tools. This research will be incorporated into larger integrated efforts, such as studies on the effects of air pollution from roadway traffic. It also reflects a decrease in funding for particulate matter (PM) decision support tools and efforts to assess residential and personal exposure to air pollution. This reduction scales back the development of decision support tools related to managing PM and its precursors. The EPA will conduct research on multipollutant decision support tools and approaches to support the NAAQS reviews.

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)

	FY 2011 Actuals	FY 2012 Enacted	FY 2013 Pres Budget	FY 2013 Pres Budget v. FY 2012 Enacted
<i>Science & Technology</i>	<i>\$117,458.3</i>	<i>\$113,476.0</i>	<i>\$121,190.0</i>	<i>\$7,714.0</i>
Total Budget Authority / Obligations	\$117,458.3	\$113,476.0	\$121,190.0	\$7,714.0
Total Workyears	423.2	436.3	443.5	7.2

Program Project Description:

The EPA's research programs produce the scientific information and tools that the EPA needs to meet its legal, statutory, and policy guidelines. Specifically, the Safe and Sustainable Water Resources (SSWR) research program assists the EPA's National Water Program and regional offices to achieve their statutory and regulatory obligations to include implementation of the Safe Drinking Water Act (SDWA) and the Clean Water Act (CWA) by:

- Characterizing and managing human health and environmental risks across the water continuum;
- Providing data, tools, and technical support for the development of drinking water and water quality criteria;
- Developing effective systems-based watershed management approaches;
- Applying technological options to restore and protect water bodies by providing information on effective identification, treatment, and management alternatives; and
- Developing and demonstrating new integrated approaches for water and wastewater treatment.

Increasing demands for sources of clean water, combined with changing land use practices, population growth, aging infrastructure, and climate change and variability, pose significant threats to the Nation's water resources. Adequate and safe water underpins the nation's health, economy, security, and ecology (NRC, 2004).³⁹ Failure to manage our nation's waters in an integrated and sustainable manner will limit economic prosperity and jeopardize both human and aquatic ecosystem health. To ensure our nation's water resources are safe for use and can be preserved for future generations, the EPA's Research and Development program is developing innovative solutions to these complex 21st Century water challenges.

For the most part, people, industry, and government are turning to solutions that enhance economic growth and social well-being as well as public health and the environment. These solutions will require research that transcends disciplinary lines and includes all stakeholders in

³⁹ For more information, please see *Confronting the Nation's Water Problems: the Role of Research* http://www.nap.edu/catalog.php?record_id=11031.

the process of defining the research to be done and how the solutions are to be integrated. Such new integrated, transdisciplinary approaches, in order to be effective in the real world, require innovation at all steps of the process; from conceptualizing the issue to be addressed, to technological innovation that allows for creation of entirely new environmentally responsible solutions and fosters new economic development.

The SSWR research program successfully integrates both drinking water and water quality research to address these complex water resource issues more effectively. In addition, the SSWR research program is partnering with other EPA research programs. For example, the Sustainable and Healthy Communities (SHC) research program's National Atlas Project provides national land cover data and watershed delineation for use in the SSWR program's development of watershed integrity indices. The SSWR research program results then feed back to users through National Atlas. The results of collaborative research improve decision-makers' ability to make better informed and more complete choices.

Furthermore, in an effort to maximize use of the EPA's Research and Development program workforce and expertise, the EPA will develop research "communities of practice." One such community of practice will focus on modeling approaches across media and disciplines. This approach will improve effectiveness by establishing standardized protocols for models developed and used by all of Research and Development program models from one discipline can be easily modified for use on problems that require more than a single disciplinary focus. The EPA also intends to build "communities of practice" around hydrology and decision support.

America's water resources are vast and although the EPA provides much of the scientific foundation for protecting the environmental and public health of this resource; it does not act alone. The SSWR research program is working with states and federal agencies including the National Aeronautics and Space Administration, the Department of Energy (DOE), the United States Department of Agriculture, the United States Geologic Survey, the Centers for Disease Control and Prevention, and the Department of Defense. In addition, the SSWR program and other EPA programs and offices, will partner with the Army. As a part of their Net Zero Initiative, the SSWR program will assist the Army's effort to develop and demonstrate innovative water technologies to accomplish the Army's goal of net zero energy, water, and waste by 2020.

FY 2013 Activities and Performance Plan:

In FY 2013, the Safe and Sustainable Water Resources research program will continue addressing critical science questions related to the development and maintenance of safe water resources and preservation of water resources for future generations. The SSWR research program is organized around two interrelated themes: Sustainable Water Resources and Sustainable Water Infrastructure Systems.

Sustainable Water Resources

Research conducted under the sustainable water resources theme integrates social, economic, and environmental sciences to provide innovative approaches for safe and sustainable water quality. Research is focused primarily on the water quality to meet designated uses (e.g., drinking water,

aquatic life, recreation, industrial processes) and sustain healthy people, ecosystems, and economies.

Watersheds, and their associated aquatic resources, provide critical services that support our economy and society. Stressors (e.g., climate change, habitat alteration, invasive species, toxic pollutants) acting in these watersheds result in a large number of degraded watersheds across the nation. The SSWR program's research focuses on better understanding:

- Resiliency of watersheds to stressors;
- Which watersheds require enhanced protection to sustain water resources; and
- Factors affecting successful watershed restoration to better prioritize restoration efforts.

In FY 2013, the EPA will support this effort by:

- Developing approaches to assess watershed integrity, resilience, and restoration potential by establishing key watershed indicators;
- Using a systems approach to investigate approaches to sustain water quality in watersheds;
- Beginning to characterize the social, economic, human health, and environmental impacts of water quality degradation; and
- Evaluating cost-effective watershed management strategies.

Naturally occurring contaminants and land use practices (e.g., energy production, mineral extraction, deep well injection activities, agriculture, urbanization) can impair watershed integrity, lead to loss of wetland and riparian habitats, harm estuarine and coastal ecosystems, contaminate drinking water supplies, and deplete groundwater resources. Decision-makers and environmental managers need tools to assess the sustainability of watersheds and the services they provide under current and future land use and management practices. Current regulatory and non-regulatory efforts are often piecemeal and fail to fully protect watersheds from the cumulative effects of many land use related stressors.

The SSWR research program will develop resource management tools to allow decision-makers to systematically consider complex tradeoffs occurring on a watershed, regional, or national scale. For example, research conducted by the SSWR program, including the development of wetland health indicators and the interpretation of the national wetlands survey data, is informing the EPA's first National Wetlands Condition Report.⁴⁰ This report will form the baseline for analyzing future wetland changes and trends in response to programs and policies.

Protection of surface and subsurface water, necessary for human and ecological use, is compromised by the inability to adequately assess and mitigate risks posed by waterborne chemical and microbial contaminants. In FY 2013, the Research and Development program's researchers will begin developing tools for better detection and assessment of groups of waterborne chemicals and microbial contaminants with the most potential to negatively impact human and ecosystem health. In FY 2013, the SSWR program will report on the production of

⁴⁰ For more information, see:

<http://www.fws.gov/wetlands/documents/gSandT/OtherInformation/EPANationalWetlandConditionAssessmentFS.pdf>

Nitrosodimethylamine (NDMA) in drinking water; NDMA is a compound of concern because of its carcinogenic potential. These assessments and tools could allow decision makers to more effectively reduce risks, improve cost-effective treatment options, and develop guidance for the use of less hazardous products.

Excess loading of nutrients is among the most prevalent causes of surface water quality impairment. States use existing nutrient criteria, which are inadequate to remedy water resource impairments. There is a need for more effective nutrient criteria, specifically numeric nutrient criteria, and a need for public understanding of the benefits of such criteria to society, the economy, and human and ecological health. In support of the Agency's Recommended Elements of a State Nutrients Framework,⁴¹ the EPA will conduct research to improve, demonstrate and apply numeric nutrient criteria approaches across different scales and water body types. The SSWR researchers, working with stakeholders, will continue collecting data and developing systems models to assist decision-makers with nutrient management approaches to preserve water resources for future generations. Nutrient management research will be highly integrated with the Sustainable and Healthy Communities and the Air, Climate, and Energy research programs and leveraged through collaboration with the EPA regions and the states.

Energy and mineral extraction and production may impact surface and subsurface water resources. The SSWR program is developing assessment techniques to assist our policy and decision makers in the selection of a more socio-economically and environmentally responsible energy future. The FY 2013 energy and minerals extraction and injection research will focus on understanding and preventing the impacts of subsurface land use practices on water resources, including hydraulic fracturing (HF).

Hydraulic fracturing is a widespread practice with significant potential economic benefits. The EPA seeks to understand the public and environmental health questions while maximizing the benefits of HF practices. The EPA will continue conducting research to determine whether HF has adverse effects on drinking water resources. As part of our FY 2013 research activities, the EPA will release an Interim Report on the Impacts of Hydraulic Fracturing on Drinking Water Resources in calendar year 2012. In addition, the EPA will begin studying the impacts of HF on air, water quality, and ecosystems. This research will complement the EPA's current study on potential impacts of HF on drinking water.

The EPA's study plan includes coordination between the SSWR research program and the EPA's Air, Climate and Energy research program. The EPA is also collaborating with the DOE and the Department of the Interior under a developing Memorandum of Understanding. This collaboration: 1) improves our understanding of the impacts of developing our nation's unconventional oil and gas resources, and 2) minimizes potential risks in developing these resources. The SSWR research program, in collaboration with the EPA's Office of Water and other EPA programs, will examine the potential impacts of HF practices, such as HF fluids and waste, on ecosystems and water quality. EPA's scientists will examine human and environmental health issues associated with hydraulic fracturing including changes in aquatic and terrestrial ecosystems, potential benefits of reduced HF wastewater volume and toxicity, and potential

⁴¹ For more information, please see:

http://water.epa.gov/scitech/swguidance/standards/criteria/nutrients/upload/memo_nitrogen_framework.pdf

screening for seismic risks from HF. This research will inform national and state policies as well as the design and implementation of more sustainable approaches to oil and natural gas extraction that minimize impacts to the environment.

Sustainable Water Infrastructure Systems

Research conducted under the sustainable water infrastructure theme focuses on developing innovative water infrastructure management approaches and techniques for reducing institutional and behavioral barriers to developing improved water resources management. A systems approach to water management might include water conservation, considering wastewater and grey water as a resource, water reuse, groundwater recharge, use of green infrastructure, and energy conservation and recovery. Research will encompass system design, treatment alternatives and their potential health impacts, life-cycle analysis, best management practices (BMP), resiliency, and viability of water resources.

Storm events, and the resulting runoff of water in developed areas, can cause combined sewer overflows, excessive stormwater discharges, and a loss of permit compliance under the Clean Water Act. Green infrastructure projects are a more cost-effective way to manage storm related flows. Green infrastructure BMPs retain and infiltrate stormwater and provide the co-benefits of recreational opportunities, jobs, and increased property values. For example, the EPA collaborated with the city of Cleveland to propose an approach for incorporating green infrastructure projects into their stormwater consent decree. The proposal was accepted by the court.

In FY 2013, the SSWR program will continue developing and evaluating green infrastructure in several regional projects and will release a report on the effectiveness of green infrastructure BMPs. Research will provide guidance to assist with selection and implementation of appropriate green infrastructure technologies at various scales and locations. This information is important to municipal governments facing stormwater consent decrees and for capital planning projects to meet both the current and future needs. The EPA will provide technical guidance to municipalities across the country such as Philadelphia, Omaha, Louisville, Cleveland, and Kansas City to improve water quality by incorporating green infrastructure with gray infrastructure into plans to better control water pollution during storm events.

In addition, the SSWR research program will continue developing complete life-cycle assessments of several types of water systems (e.g., different sizes, conditions, costs) to aid water managers in making decisions that result in sustainable infrastructure to provide safe water. Integration of public health, socio-economic, and ecological factors is important for stakeholder comparisons between the *status quo* and novel/alternative scenarios for water services.

The SSWR research program also will continue to develop, evaluate, and demonstrate new water infrastructure technologies to improve cost-effectiveness and efficiency in water systems through research at the EPA Research and Development program's Technology Cluster in Cincinnati. The SSWR researchers will continue working with metropolitan partners to demonstrate treatment technologies for drinking water and wastewater treatment at the cluster facilities and

elsewhere. Results of this research will be provided to communities and regions to assist in future planning.

Breaches in aging drinking water distribution systems, between the treatment plant and the consumer's tap, can result in exposure to detrimental amounts of contaminants (both chemicals and pathogens). These contaminants are an important source of adverse waterborne health impacts. In FY 2013, the EPA will conduct research to develop innovative approaches to monitor aging water distribution and collection systems and mitigate those impacts.

The EPA is conducting research on the use of systems-based approaches to identify and manage nutrient degraded water resources and to promote protection and recovery. In FY 2013, the SSWR research program will continue developing approaches to demonstrate integrated nutrient management for estuarine ecosystems and watersheds to develop solutions that can be broadly applied to our nation's coastal watersheds. The EPA is refocusing resources to support a Center for Innovative Estuarine Approaches. The work of the Center will develop scientific and technical solutions to inform policies, environmental management structures, and business approaches to ensure the sustainability of our coastal watersheds and estuaries. Research from across the SSWR program is being used to identify and develop the scientific, technological, and behavioral innovations needed to manage nutrients in estuarine ecosystems and watersheds.

Performance Targets:

Measure	(SW1) Percentage of planned research products completed on time by the Safe and Sustainable Water Resources research program.								Units
	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	
Target							100	100	Percent
Actual									

Measure	(SW2) Percentage of planned research outputs delivered to clients and partners to improve the Agency's capability to ensure clean and adequate supplies of water that support human well-being and resilient aquatic ecosystems.								Units
	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	
Target							100	100	Percent
Actual									

The table reflects the SSWR research program's annual performance measures. The EPA uses these measures to assess our effectiveness in delivering needed products and outputs to clients (decision makers, states, and local governments).

The EPA collaborates with several science agencies and the research community. The EPA also works with the White House's Office of Science and Technology Policy. The EPA supports the

interagency Science and Technology in America's Reinvestment – Measuring the Effect of Research on Innovation, Competitiveness and Science (STAR METRICS) effort. The STAR METRICS strives to measure the impact federal science investments have on society, the environment, and the economy.

FY 2013 Change from FY 2012 Enacted Budget: (Dollars in Thousands)

- (+\$3,774.0) This increase reflects the recalculation of base workforce costs and a cost of living adjustment for existing FTE.
- (+\$4,250.0 / +5.5 FTE) This increase to support hydraulic fracturing (HF) research within the Safe and Sustainable Water Resources research program, along with the increase to support HF in the Air, Climate and Energy research program, reflects a total EPA investment of \$14.1 million. Increased resources will address additional questions regarding the safety of HF. This investment will complement current research to study the potential impacts of HF on drinking water. Research will address the potential impacts of HF on air quality, water quality, and ecosystems and will be conducted in collaboration with the Department of Interior and the Department of Energy.

In coordination with the Sustainable and Healthy Communities research program, the SSWR program will assess the impacts of reduced HF Wastewater discharge on aquatic indicators and ecosystems, including toxicity testing. The EPA Research and Development program will work with the EPA Water program to screen for HF induced seismic risks. In addition, the SSWR program will conduct research to understand the impacts of disposal of HF fluids and materials. The additional resources include \$721.0 associated payroll for 5.5 FTE. (Please refer to the Research: Air, Climate and Energy program description for an explanation of the air quality portion of this research investment.)

- (+\$2,000.0) This reflects a refocusing of resources to support a Center for Innovative Estuarine Approaches. The changing human landscape is placing ever increasing pressure on our coastal systems, as existing infrastructure ages and proves ineffective to support the changing demographics. The center will work with industrial, city and state partners to develop innovative scientific and technical solutions to protect estuarine ecosystems. Innovative scientific and technical solutions generated through this work will inform policies, environmental management structures, and business approaches to ensure the sustainability of our coastal watersheds and estuaries.
- (+\$1,800.0) The EPA will conduct research to integrate both natural and built water infrastructure to reduce combined sewer overflow impacts. Resources will support development of regional projects that integrate natural and built water infrastructure as well as research to monitor and understand the benefits of existing integrated natural, built and green infrastructure. Projects will result in savings for states and communities through avoidance of combined sewer overflow impacts.

- (+\$465.0 / +3.4 FTE) This reflects the net result of realignments of infrastructure FTE and resources such as equipment purchases and repairs, fixed costs, contracts, and general expenses that are proportionately allocated across programs to better align with programmatic priorities. The additional resources include 3.4 FTE and associated payroll of \$445.
- (-\$1,098.0 / -1.5 FTE) This reduction reflects an elimination of research to model and track human exposure to pathogens at beaches. The EPA expects to have met requirements set forth in the court settlement agreement and consent decree. The reduced resources include 1.5 FTE and associated payroll of \$197.0.
- (-\$1,151.0 / -0.2 FTE) This reduction reflects administrative savings from continued efforts to streamline operational expenses and activities, including information technology (IT) support activities. The reduced resources include 0.2 FTE and associated payroll of \$26.0.
- (-\$2,326.0) This reflects a reduction of funding from innovative drinking water technology research, including a competitively awarded center for research on small drinking water systems, with additional reductions to drinking water and water quality research for technical support activities.

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 Communities and Advancing Sustainable Development

Objective(s): Promote Sustainable and Livable Communities

(Dollars in Thousands)

	FY 2011 Actuals	FY 2012 Enacted	FY 2013 Pres Budget	FY 2013 Pres Budget v. FY 2012 Enacted
<i>Science & Technology</i>	<i>\$192,436.1</i>	<i>\$170,741.0</i>	<i>\$165,730.0</i>	<i>(\$5,011.0)</i>
Leaking Underground Storage Tanks	\$501.6	\$396.0	\$490.0	\$94.0
Oil Spill Response	\$1,204.3	\$613.0	\$618.0	\$5.0
Hazardous Substance Superfund	\$21,347.9	\$17,677.0	\$17,798.0	\$121.0
Total Budget Authority / Obligations	\$215,489.9	\$189,427.0	\$184,636.0	(\$4,791.0)
Total Workyears	627.9	612.7	620.9	8.2

Program Project Description:

Our nation’s communities make social, economic, and environmental trade-offs in a resource-constrained world. These trade-offs are often not well-characterized in terms of the implications and interactions between human health, ecosystem services, economic vitality, and social equity. In turn, conventional decision-making often does not adequately characterize these complex interactions and can result in unanticipated consequences. To address this dilemma, the Sustainable and Healthy Communities Research Program (SHCRP) will inform and empower decision-makers in communities, as well as across EPA and in federal, state and tribal governments, to effectively and equitably weigh and integrate human health, socio-economic, environmental, and ecological factors into their decisions.

Community decisions that impact human health and environmental quality in the 21st Century are more complex than ever before. Stressors such as climate change and urbanization, for example, have become universal, and require different thinking and solutions than in the past. People, industry, and government are turning increasingly to solutions that enhance economic growth and social well-being, as well as public health and the environment. These solutions will require research that transcends disciplinary lines and includes all stakeholders in the process of defining the research to be done and how the solutions are to be integrated.

In order for the SHCRP to become more socio-economically and environmentally integrated, future approaches to protecting human health and the environment must:

- Consider the inextricable link between the natural environment and human well-being;
- Focus on proactive, preventative strategies that optimize management of multiple chemical, material and energy streams; and
- Apply systems analysis to avoid unintended consequences and maximize valuable co-benefits.

The goal of the SHCRP is to utilize a systems-based approach to research that will enable community leaders and other decision makers to understand the linkages and weigh trade-offs among human health, socio-economic, environmental, and ecological factors to foster community sustainability. The EPA seeks to inform community leaders to weigh factors including pressures on community infrastructure, provision of a safe and sustainable water supply, waste management, and clean air as they make local decisions.

The beneficiaries from the SHCRP research include state and local governments, the EPA program and regional offices, tribes, various community groups, and individuals. The SHCRP will conduct integrated, transdisciplinary research to provide tools, methods, and information to:

- 1) Assess the current human and ecological health of communities;
- 2) Evaluate the implications of alternative policies and management actions;
- 3) Identify/develop indicators to measure results and track changes; and
- 4) Facilitate the decision-making process such that full value accounting routinely factors into decisions along with consideration of the full suite of a community's values.

The two most important outcomes of the program for communities who utilize the SHCRP research will be: 1) providing tools to improve communities' ability to proactively make policy and management choices based on a full accounting of the costs, benefits and tradeoffs among social, economic, and ecological outcomes of alternative management actions; and 2) to identify creative and equitable solutions to community environmental problems that provide multiple environmental, social and economic benefits while avoiding unintended consequences of poorly informed decisions and actions. To facilitate these outcomes, the SHCRP will develop a method to more comprehensively account for the full costs and benefits of community decisions. This method called Total Resource Impacts and Outcomes (TRIO) accounting, considers economy, society, and environment.

There are important outcomes for the EPA program and regional offices as well. One of the premises of the SHCRP is that the best way to meet the long term goals of the EPA's program offices is to help communities find better and more efficient ways to meet federal requirements. This will be accomplished by providing information that helps the EPA, state and local governments develop regulations that are less expensive and where possible, that help avoid the need for regulation altogether through innovative and effective non-regulatory approaches. Most broadly, the Research and Development program's transdisciplinary, systems based research will assist the EPA in recognizing synergies in the protection of human and ecosystem health, and incorporate this understanding to improve the quality of regulatory decisions. More specifically, the SHCRP will continue to address targeted research needs of the EPA's program and regional offices that support critical regulatory and policy needs, such as waste and materials management, and contaminated site remediation. The SHCRP will also focus research on the EPA's cross-cutting strategic goals of protecting children's health, ensuring environmental justice (decreasing environmental and health disparities), and providing essential information and insights for the EPA's Report on the Environment (ROE).

The work of the SHCRP falls into four inter-related themes:

- *Data and Tools to Support Sustainable Community Decisions* uses interactive social media and other innovative means to enable communities and stakeholders to actively engage in the planning, design, and implementation of the SHCRP research to meet their desired sustainability goals.
- *Forecasting and Assessing Ecological and Community Health* conducts innovative research that will enable communities to ensure the sustainable provision of ecosystem services and to assess how the natural and built environment affects the health and well-being of their residents.
- *Near-term Approaches for Sustainable Solutions* builds upon EPA program experience in order to improve the efficiency and effectiveness of methods to address existing sources of land and groundwater contamination while moving to innovative approaches that reduce new sources of contamination and enable recovery of energy, materials, and nutrients from waste.
- *Integrated Solutions for Sustainable Outcomes* assesses the state of the art of sustainable practices for four high-priority community decision areas: waste and materials management; infrastructure, including energy and water; transportation; and, planning and zoning for buildings and land use. It will use whole-system modeling to integrate these four areas to better achieve outcomes with multiple benefits and to develop and test TRIO accounting methods.

FY 2013 Activities and Performance Plan:

In FY 2013, the SHCRP will undertake specific research to develop decision analysis and support tools, and will use interactive social media to enable communities to directly participate in the design, planning and implementation of the SHCRP research. The SHCRP will develop tools and methods to fully account for the environmental (ecological and human health), economic, and social consequences and inter-relationships involved in making decisions at the community level. Some of these tools and methods will be designed to “value” ecosystems for their contribution to human well-being, and how that value will change or remain under various alternative future scenarios and decisions. Examples of the SHCRP’s continuing research activities and products in this area include:

- In collaboration with several other Federal agencies (United States Geological Survey, the United States Forest Service, the United States Department of Agriculture, and the National Oceanic and Atmospheric Administration), developing a system to classify ecosystems in terms of the services they provide (e.g. air or water purification, habitat, etc.) and also identify metrics and indicators that decision makers can use to determine how best to support that system;
- Developing a National Atlas of Sustainability which displays national, regional, and community-scale ecosystem services, and ecosystem production functions that can be used to forecast impacts of change and policy/management alternatives;

- Developing cost-effective methods to transfer measured ecosystem goods and services to ecologically similar, but currently unmonitored locations, so decision makers can utilize information about their landscape;
- Developing partnerships within the EPA and communities to demonstrate how to incorporate measured ecosystem goods and services in specific decision-making contexts; and
- Writing guidance on how to use integrative ecosystem goods and services, and system based models to help inform market decisions (e.g., how to estimate credits for markets).

This research will depend on collaboration with, and research outputs from, the Safe and Sustainable Water Resources (SSWR) research program (e.g. information on costs and benefits associated with green versus gray infrastructure) and the Air, Climate and Energy (ACE) research program (e.g. projections of energy supply and demand, deposition and distribution of air pollutants) to fully inform full value accounting of alternative decisions.

In FY 2013, the SHCRP will also conduct research to inform and assess decisions to improve community and public health. This research has two essential outcomes:

- 1) Enable communities to prevent exposures and adverse health impacts of environmental contaminants and other stressors; and
- 2) Enable communities to make development decisions that foster public health with special emphasis on vulnerable groups.

This research will provide decision-makers with approaches, data, guidance, and other tools to inform and assess options for public-health decisions related to priority community concerns. Examples of these concerns include how to make wise decisions regarding buildings and infrastructure, land use, transportation, and waste and materials. These are high-priority sectors that contribute to the complexity of exposures and effects within a given community. This research will rely upon and apply models, tools, and data developed by the Chemical Safety for Sustainability (CSS), the ACE, and the SSWR research programs related to cumulative risk of environmental contaminants and incorporate this information into systems models for community use to enable higher order consideration of social, cultural, and economic factors contributing to health and well-being.

In FY 2013, the SHCRP will also continue to support high-priority Agency research needs. These are research efforts that are largely underway, and that the EPA's program and regional offices are depending on to fulfill their statutory and regulatory requirements. For example, the SHCRP is developing materials management and sustainable technologies that reduce volume of contaminants, produce benefits or conserve resources, and minimize risks of exposure to people and ecosystems. The EPA's Solid Waste and Emergency Response program, states and tribes can apply this science to policy, regulations, and program implementation. The SHCRP and other research programs will partner with the Army. As part of their Net Zero Initiative, the SHCRP will assist the Army in their effort to develop and demonstrate innovative waste technologies to accomplish the Army's goal of net zero energy, water, and waste by 2020. This area of research is fully aligned with SHCRP research on waste and materials management.

The EPA's Air and Radiation and Water programs are working to develop standards and policies to deal with increasing levels of nitrogen pollution. The SHCRP is developing nitrogen management tools and information to provide a scientific foundation for nitrogen management approaches and policy across the EPA. It will provide information to the National Ambient Air Quality Standards (NAAQS) process, guiding the standards, and monitoring the response of ecosystems to changes in standards. It will also provide information to the EPA's Water and regional programs to improve nutrient management, provide information about sources of nitrogen, and the best ways to reduce it. This work will substantially benefit the EPA's Water program and will be carried out collaboratively with the SSWR research program. The SHCRP is also developing scenario analyses tools that assess regional vulnerabilities of communities to air and water quality exposure stemming from nitrogen sources, and local vulnerability of selected communities to air-sheds and water-sheds which may transport nitrogen pollution to them, versus self-generated pollution. The SHCRP will conduct this research collaboratively with the SSWR and ACE research programs.

One of the Administrator's priorities for the Agency is to work toward environmental justice⁴². The SHCRP is developing the science to support the EPA's efforts to bring environmental justice to our communities by providing methods for conducting disproportionate impact analysis, particularly for characterizing and assessing cumulative impacts. This research will be conducted collaboratively with the EPA's Environmental Justice program as well as the Department of Health and Human Service's National Institute for Minority Health and Health Disparities. Similarly, research is being conducted in an area known as "complex interactions." This research will assess interactions between social, natural and built environmental systems, and conditions/policies that result in unequal environmental health conditions or disproportionate impacts among diverse disadvantaged population groups, communities, neighborhoods, and individuals. This research will assess drivers of current and changing patterns of social inequalities in environmental health and develop strategies to alleviate systemic drivers of racial and socio-economic disparities.

In FY 2013, the SHCRP is conducting research to understand children's exposures, minimize risks, and inform decisions in community settings where they live, learn, play and work. While building upon challenges remaining in the EPA's Strategy for Research on Environmental Risks to Children,⁴³ this project is also responsive to the National Action Plans under development by the Federal Task Force to address Environmental Health and Safety Risks to Children⁴⁴ and other federal initiatives (e.g., National Prevention Strategy⁴⁵, President's Task Force on Childhood Obesity⁴⁶). This research will directly benefit regulatory and programmatic needs of four of the EPA program offices - Chemical Safety and Pollution Prevention, Solid Waste and Emergency Response, Water, Air and Radiation - with respect to life stage susceptibility and will be conducted collaboratively with the CSS (especially with systems models such as the Virtual Embryo), the ACE (especially with impacts of air pollution on childhood asthma) and the Human Health and Risk Assessment (child-specific exposure factors) research programs. It will

⁴² <http://blog.epa.gov/administrator/2010/01/12/seven-priorities-for-epas-future/>

⁴³ <http://www.epa.gov/ncea/pdfs/strat4resrch.pdf>

⁴⁴ http://yosemite.epa.gov/ochp/ochpweb.nsf/content/whatwe_tf_proj.htm

⁴⁵ <http://www.healthcare.gov/prevention/nphpphc/strategy/report.pdf>

⁴⁶ <http://www.whitehouse.gov/the-press-office/presidential-memorandum-establishing-a-task-force-childhood-obesity>

also benefit the Environmental Justice and Children's Health Protection programs' efforts to reduce children's health disparities in highly prevalent diseases and conditions such as asthma, obesity, and neurodevelopmental disorders. Implementation includes significant collaboration with the National Institute of Environmental Health Sciences (NIEHS) through the EPA-NIEHS co-funded Children's Environmental Health Centers Program.

The SHCRP will also provide the science to update EPA's ROE. The ROE is a comprehensive source of national-level scientific indicators describing the conditions and trends in human health and the environment. The indicators are based on data collected by the EPA, states, and other federal and non-federal organizations and meet high standards for data quality, objectivity, and utility. Activities include:

- Developing a new thematic area on sustainability/sustainable development, with relevant indicators of intensity;
- Updating graphics displaying quantified statistical uncertainty information where possible and appropriate; and
- Setting up a dynamic website interface that highlights interactive, customizable graphics and mapping capability, where appropriate.

In FY 2013, the SHCRP will continue to support Science to Achieve Results (STAR) Fellowships⁴⁷, which bolster support to the environmental generation of tomorrow, bridge to diverse communities, and boost excellent research and development that advance the protection of human health and the environment through education. The fellowships are the EPA's contribution to the national effort to ensure that the U.S. meets its current and projected human resource needs in the environmental science, engineering and policy fields.

The SHCRP will provide additional technical support to the EPA program and regions as needed to continue supporting the Agency's mission. While many of the Agency's research needs are known, and ongoing, new and urgent needs will inevitably arise outside of the process of multi-year planning. In these instances, the SHCRP will provide support to any of the EPA programs or regions where the SHCRP researchers' knowledge and skills can better enable development, implementation, or evaluation for the EPA programs and provide the scientific foundation for Agency decisions.

The SHCRP has identified a test community in which to provide community decision makers with tools to account for the full-cost of alternative policy and management approaches in FY 2013. The over-arching goal of this research is to integrate issue-specific tools and approaches with findings from other components of the SHCRP to:

- 1) Inform a proof of concept pilot study at the community level in Durham, North Carolina to incorporate the tools described above; and
- 2) Create a framework to assist communities in their efforts to achieve a more socio-economically and environmentally responsible state.

⁴⁷ <http://www.epa.gov/ncer/fellow/>

Performance Targets:

Measure	(HC1) Percentage of planned research products completed on time by the Sustainable and Healthy Communities research program.								Units
	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	
Target							100	100	Percent
Actual									

Measure	(HC2) Percentage of planned research outputs delivered to clients, partners, and stakeholders for use in pursuing their sustainability goals.								Units
	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	
Target							100	100	Percent
Actual									

The table reflects the SHCRP’s annual performance measures. The EPA uses these measures to assess our effectiveness in delivering needed products and outputs to clients (decision makers, states, and local governments).

The EPA collaborates with several science agencies and the research community. The EPA also works with the White House’s Office of Science and Technology Policy. The EPA supports the interagency Science and Technology in America’s Reinvestment – Measuring the Effect of Research on Innovation, Competitiveness and Science (STAR METRICS) effort. The STAR METRICS strives to measure the impact federal science investments have on society, the environment, and the economy.

FY 2013 Change from FY 2012 Enacted Budget (Dollars in Thousands):

- (-\$863.0) This reduction reflects the recalculation of base workforce costs and a cost of living adjustment for existing FTE.
- (+\$928.0 / +1.8 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. The resources include an increase of 1.8 FTE and associated payroll of \$247.0.
- (-\$335.0 / +5.5 FTE) This reflects a net adjustment in research on indicators for ecosystems services valuation, better management and decision tools for nitrogen, and advanced models to predict ecological impacts on community public and environmental health decisions which be complete in 2012. The increased resources include 5.5 FTE and associated payroll of \$753.0.
- (-\$1,000.0) This reflects a reduction in level funding to study the effects of cleaning materials and school settings on children’s health. Work to assess the impact of decisions on school siting, and building materials on children’s health will continue.

- (-\$1,687.0 / -1.0 FTE) This reduction reflects administrative savings from continued efforts to streamline operational expenses and activities, including information technology (IT) support activities. The reduced resources include 1.0 FTE and associated payroll of \$137.0.
- (-\$54.0 / +1.0 FTE) This reflects a net adjustment to discontinue research on denitrification, life span susceptibility, ecosystems modeling, and field studies in the Willamette Valley which will largely be completed by the end of 2012. The adjustment also delays place-based projects to demonstrate ecosystem valuation methods, and research to support clean-up at RCRA and Brownfield sites. Finally, this adjustment eliminates field research associated with ecosystems services provided by wetlands; the increased resources include 1.0 FTE and associated payroll of \$137.0.
- (-\$2,000.0) This reflects a discontinuation of the funds for the EPA Laboratory Study in anticipation that funding requested in FY 2012 will be sufficient to complete the study.

Statutory Authority:

Clean Air Act, Sections 103 and 104, 42 U.S.C. 7403, 42 U.S.C. 7404,103; 104; Clean Water Act, Sections 101, 104 & 404, 33 U.S.C. 1254; Clinger Cohen Act, 40 U.S.C. 11318; Coastal Zone Management Act (CZMA), 16 U.S.C. 1451 - Section 302; Executive Order 12898, Executive Order 13045; Executive Order 13508; Environmental Research, Development & Demonstration Authorization Act; Endangered Species Act (ESA), 16 U.S.C. 1531 - Section 2; Federal Insecticide, Fungicide and Rodenticide Act sections 18 and 20; Food Quality and Protection Act P.L. 104-170, 110 Stat. 1489, Intergovernmental Cooperation Act; 31 U.S.C. 6502 (provided specialized or technical services to state or local governments); Indoor Radon abatement sec 306; Marine Protection, Research and Sanctuaries Act, Section 203, 33 U.S.C. 1443; National Environmental Education Act, 20 U.S.C. 5503(b)(3) and (b) (11); National Environmental Policy Act of 1969, Section 102 and 4332; Toxic Substances Control Act, Section 10. 15 U.S.C. 2609; Water Resources Research Act.

Research: Sustainable and Healthy Communities

Program Area: Research: Sustainable Communities

Goal: Cleaning Up Communities and Advancing Sustainable Development

Objective(s): Promote Sustainable and Livable Communities

(Dollars in Thousands)

	FY 2011 Actuals	FY 2012 Enacted	FY 2013 Pres Budget	FY 2013 Pres Budget v. FY 2012 Enacted
Science & Technology	\$192,436.1	\$170,741.0	\$165,730.0	(\$5,011.0)
Leaking Underground Storage Tanks	\$501.6	\$396.0	\$490.0	\$94.0
Oil Spill Response	\$1,204.3	\$613.0	\$618.0	\$5.0
<i>Hazardous Substance Superfund</i>	<i>\$21,347.9</i>	<i>\$17,677.0</i>	<i>\$17,798.0</i>	<i>\$121.0</i>
Total Budget Authority / Obligations	\$215,489.9	\$189,427.0	\$184,636.0	(\$4,791.0)
Total Workyears	627.9	612.7	620.9	8.2

Program Project Description:

The Sustainable and Healthy Communities Research Program (SHCRP) will conduct integrated, transdisciplinary research to provide decision makers with tools, methods, and information to assess current conditions at Superfund sites, evaluate the implications of alternative remediation approaches and technologies, and implement the latest science in policies and implementation. In doing so, the SHCRP is responsive to the Superfund law requirements 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." ¹⁷ This research directly addresses the Administrator's priority of cleaning up our communities.

The EPA recognizes that efforts focused on assessing and reducing environmental risks, alone, do not fully address the needs of the United States in the increasingly complex 21st Century. As international organizations adapt to these social, environmental, and economic, issues, the EPA is simultaneously integrating these key factors into all aspects of the Agency's work. To this end, the EPA will use more sophisticated and transdisciplinary approaches to solve these crosscutting challenges.

FY 2013 Activities and Performance Plan:

The SHCRP will fund research projects related to groundwater, vapor intrusion, contaminated sediments, and restoring contaminated land.

Groundwater research will aid in the development and evaluation of methods, approaches, techniques, and models to assess and manage contaminated ground water at Superfund sites. Additionally, research will address source elimination and plume management to reduce

¹⁷ Section 209 (a) of Pub. L. 99-499

exposures via drinking water and vapor intrusion. Adoption of technologies from this research program has resulted in documented cost and time savings in cleaning up contaminated sites¹⁸.

Vapor intrusion research continues to develop screening, sampling, and modeling approaches to assess risks from contaminant migration and the need for mitigation in homes, schools, and places of employment. The program and regional offices will use this science in developing and implementing guidance for the vapor intrusion pathway in site ranking and in remedial investigations.

Contaminated sediment research will address characterization, including passive methods and biotic indicators, remediation options, and remedy performance to enhance cleanup of contaminated sediments, leading to restored ecological functioning and lifting of fish consumption advisories. The science developed in this research is applied by the EPA regions to improve the cost effectiveness of sediment remediation cleanups and achieve the human health, environmental, and economic benefits of a cleanup project on a lake or river.

Research in support of restoring contaminated land will provide site-specific and general technical support to the EPA program offices and regions evaluating options for remediation of Superfund sites. This work is request-driven as decision-makers encounter complex hydrogeologic settings, mixtures of contaminants, uncertain pathways of exposure, and performance issues with the tools and technologies available to Superfund policymakers and site managers. Data on the type of technical support requests provides feedback to the research program to evaluate and improve research products.

Performance Targets:

Work under this program also supports performance results in the SHCRP Science & Technology and can be found in the Performance in Tab 11.

FY 2013 Change from FY 2012 Enacted Budget (Dollars in Thousands):

- (+\$183.0) This increase reflects the recalculation of base workforce costs and a cost of living adjustment for existing FTE.
- (-\$62.0 / +0.9 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. Additional resources include 0.9 FTE and associated payroll of \$123.

Statutory Authority:

CERCLA, Section 105(a) (4) and Section 115 read together with Executive Order 12580, 42 U.S.C. 9605 (a) (4) and 9615; Comprehensive Environmental Response, Compensation, and

¹⁸ Land Research Program Science Applications Through Partnerships: A Progress Report 2005-2009
<http://www.epa.gov/landscience/partnerships/index.htm>

Liability Act (CERCLA) 104(i) and 42 U.S.C. 9660 – Sec. 311 (c) 42 U.S.C. 9602 - Section 102, Section 311, 42 U.S.C 9604 (i) (1); Superfund Amendments Reauthorization Act 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 Communities and Advancing Sustainable Development

Objective(s): Promote Sustainable and Livable Communities

(Dollars in Thousands)

	FY 2011 Actuals	FY 2012 Enacted	FY 2013 Pres Budget	FY 2013 Pres Budget v. FY 2012 Enacted
Science & Technology	\$192,436.1	\$170,741.0	\$165,730.0	(\$5,011.0)
<i>Leaking Underground Storage Tanks</i>	<i>\$501.6</i>	<i>\$396.0</i>	<i>\$490.0</i>	<i>\$94.0</i>
Oil Spill Response	\$1,204.3	\$613.0	\$618.0	\$5.0
Hazardous Substance Superfund	\$21,347.9	\$17,677.0	\$17,798.0	\$121.0
Total Budget Authority / Obligations	\$215,489.9	\$189,427.0	\$184,636.0	(\$4,791.0)
Total Workyears	627.9	612.7	620.9	8.2

Program Project Description:

The Sustainable and Healthy Communities Research Program (SHCRP) focuses on the assessment and cleanup of leaks at fueling stations. Research emphasizes identifying the environmental impacts of existing and new biofuels coming into the marketplace, including unintended consequences. The EPA’s research program provides the scientific foundation for Agency actions to protect America’s land and groundwater resources impacted by the nation’s over 600 thousand underground fuel storage tanks. The purpose of the Leaking Underground Storage Tank (LUST) component of EPA research is the prevention and control of pollution at LUST sites. This work is of high importance to state environmental programs.

The EPA recognizes that efforts focused on assessing and reducing environmental risks are not enough to address the needs of the United States in the increasingly complex 21st Century. As international organizations adapt to these social, environmental, and economic issues, the EPA is simultaneously integrating these key factors into all aspects of the Agency’s work. To this end, the EPA will use more sophisticated and transdisciplinary approaches to solve the crosscutting challenges that its current approaches cannot.

FY 2013 Activities and Performance Plan:

FY 2013 research under the SHCRP will continue to focus on providing decision makers with tools, methods, and information to assess and evaluate the implications of alternative remediation techniques, policies, and management actions, and to identify indicators to measure results. Specifically, the SHCRP will conduct research on contaminated sites under the LUST appropriation. This research will support improved characterization and remediation of contaminated sites with the intent of reducing human and ecological impacts at an accelerated pace, at lower cost, and with the intent of returning properties to productive use that enhances communities.

Working with the EPA's Underground Storage Tanks program, this research program will deliver improved characterization and remediation methods for fuels released from leaking underground storage tanks. Fuel component transport and biodegradation are influenced by today's higher ethanol content in automotive fuels. The research will address contaminant plume elongation and the attendant risks to communities from the many underground storage tanks at fueling stations located in close proximity to residences and residential water supplies. A tool will be developed to assist communities and states in assessing the remediation that needs to be conducted to protect local ground water resources. This will ultimately reduce costs to communities while ensuring future water resources.

Performance Targets:

Work under this program also supports performance results in SHCRP Science & Technology and can be found in the Performance Eight-Year Array in Tab 11.

FY 2013 Change from FY 2012 Enacted Budget (Dollars in Thousands):

- (+\$17.0) This increase reflects the recalculation of base workforce costs and a cost of living adjustment for existing FTE.
- (+\$77.0) This reflects the net result of realignments of infrastructure resources such as equipment purchases and repairs, travel, contracts, and general expenses to better align with programmatic priorities.

Statutory Authority:

Hazardous and Solid Waste Amendments of 1984; Resource Conservation and Recovery Act, Subtitle I, Leaking Underground Storage Tank (LUST) Trust Fund; Energy Policy Act of 2005; Safe Drinking Water Act, Section 1442. 42 U.S.C. 300j-1; Solid Waste and Disposal Act, Section 8001, as amended; Resource Conservation and Recovery Act of 1976, 42 U.S.C. 6901; Solid Waste Disposal Act (SWDA), 42 U.S.C. 6901 - Section 1002, 42 U.S.C. 6905 - Section 1006; Solid Waste Disposal Act, Section 8001. 42 U.S.C. 6981.

Research: Sustainable and Healthy Communities

Program Area: Research: Sustainable Communities

Goal: Cleaning Up Communities and Advancing Sustainable Development

Objective(s): Promote Sustainable and Livable Communities

(Dollars in Thousands)

	FY 2011 Actuals	FY 2012 Enacted	FY 2013 Pres Budget	FY 2013 Pres Budget v. FY 2012 Enacted
Science & Technology	\$192,436.1	\$170,741.0	\$165,730.0	(\$5,011.0)
Leaking Underground Storage Tanks	\$501.6	\$396.0	\$490.0	\$94.0
<i>Oil Spill Response</i>	<i>\$1,204.3</i>	<i>\$613.0</i>	<i>\$618.0</i>	<i>\$5.0</i>
Hazardous Substance Superfund	\$21,347.9	\$17,677.0	\$17,798.0	\$121.0
Total Budget Authority / Obligations	\$215,489.9	\$189,427.0	\$184,636.0	(\$4,791.0)
Total Workyears	627.9	612.7	620.9	8.2

Program Project Description:

The Sustainable and Healthy Communities Research Program (SHCRP) seeks to protect human and ecosystem health from the negative impacts of oil spills. The EPA is the lead Federal on-scene coordinator for inland oil spills with responsibilities for oil spill preparedness and response and associated research. The EPA's research, planned in concert with our sister agencies, supports the EPA's lead role in developing protocols for testing spill response products and agents, and develops and evaluates response approaches involving dispersants, bioremediation, and other additives. Other agencies address booms, skimmers, and other engineering responses.

The EPA recognizes that efforts focused on assessing and reducing environmental risks, alone, do not fully address the needs of the United States in the increasingly complex 21st Century. As international organizations adapt to these social, environmental, and economic issues, the EPA is simultaneously integrating these key factors into all aspects of the Agency's work. To this end, the EPA will use more sophisticated and transdisciplinary approaches to solve these crosscutting challenges.

FY 2013 Activities and Performance Plan:

In FY 2013, the EPA will continue to strengthen its planning and delivery of science for the SHCRP through implementation of integrated transdisciplinary research to assess oil spill issues from a systems perspective.

There are two main problem areas where this perspective will be applied in FY 2013. First, the EPA will continue to develop or revise protocols to test oil spill control agents or products for listing on the National Contingency Plan (NCP) Product Schedule and other activities deemed necessary by the EPA's Emergency Management program. Second, the Agency will continue to conduct studies on the effectiveness of bioremediation of petroleum-based oil, vegetable oil, and biodiesels. EPA anticipates conducting research on dispersants performance and behavior in deep water and arctic spills in collaboration with the Department of the Interior's Bureau of

Ocean Energy Management, Regulation and Enforcement (BOEMRE) and Canada's Department of Fisheries and Oceans.

Performance Targets:

Work under this program also supports performance results in SHCRP Science & Technology and can be found in the Performance Eight-Year Array in Tab 11.

FY 2013 Change from FY 2012 Enacted Budget (Dollars in Thousands):

- (+\$22.0) This increase reflects the recalculation of base workforce costs and a cost of living adjustment for existing FTE.
- (-\$17.0) This reflects the net result of realignments of infrastructure resources such as equipment purchases and repairs, travel, contracts, and general expenses to better align with programmatic priorities.

Statutory Authority:

Oil Pollution Act, 33 U.S.C. §2701 et seq.; Clean Water Act (CWA), §311, 33 U.S.C. §1321.

Research: Chemical Safety for Sustainability

Program Area: Research: Chemical Safety for Sustainability

Goal: Cleaning Up Communities and Advancing Sustainable Development

Objective(s): Promote Sustainable and Livable Communities

Goal: Ensuring the Safety of Chemicals and Preventing Pollution

Objective(s): Ensure Chemical Safety

(Dollars in Thousands)

	FY 2011 Actuals	FY 2012 Enacted	FY 2013 Pres Budget	FY 2013 Pres Budget v. FY 2012 Enacted
<i>Science & Technology</i>	\$85,213.6	\$91,735.0	\$94,241.0	\$2,506.0
Total Budget Authority / Obligations	\$85,213.6	\$91,735.0	\$94,241.0	\$2,506.0
Total Workyears	292.1	291.2	293.5	2.3

Program Project Description:

Environmental challenges in the 21st Century are increasingly complex. Environmental stressors, such as climate change, urbanization, and water quality and quantity, for example, have become universal and require different thinking and solutions than in the past; reducing risk can no longer be the only approach to environmental protection. Our nation needs new ways to ensure the safety of chemicals from the very beginning of their uses to prevent adverse effects of chemicals on society and the environment from being manifest while still strengthening our economic well-being.

To address this need, the EPA has reshaped its chemicals research with plans to develop innovative and cost-effective approaches and tools to better inform decisions to reduce harmful effects of chemicals on human health and the environment. In doing so, the EPA is increasing the quality, quantity and availability of information that informs decisions on chemical safety as well as the information available for data-poor chemicals.

Achieving an environmentally sustainable future demands that the EPA address today's environmental problems using a science-based approach while simultaneously preparing for future challenges. In FY 2013, EPA will continue to strengthen its planning, conduct, and delivery of science by looking at problems from a systems perspective. The EPA Science Advisory Board (SAB) advocates support for tackling environmental problems collectively rather than individually to lead to effective solutions. In a letter to EPA Administrator Lisa Jackson, the SAB states that "...a systems approach and transdisciplinary research for ORD... will strengthen the quality and relevance of research supporting EPA's mission now and well into the future¹."

¹ Office of Research and Development Strategic Research Directions and Integrated Transdisciplinary Research, July 8, 2010 - [http://yosemite.epa.gov/sab/sabproduct.nsf/E989ECFC125966428525775B0047BE1A/\\$File/EPA-SAB-10-010-unsigned.pdf](http://yosemite.epa.gov/sab/sabproduct.nsf/E989ECFC125966428525775B0047BE1A/$File/EPA-SAB-10-010-unsigned.pdf)

The EPA has designed a research program that incorporates principles and recommendations from a number of previous reports (e.g., the National Research Council 2007², U.S. EPA 2009³, U.S. EPA 2010⁴) and other advice from external stakeholders. The CSS research program will bring chemicals-related testing, evaluation, and management into the 21st Century and support the Administrator's *Essential Principles for Reforming Chemicals Management Legislation*.⁵

In planning and implementing the CSS research program, the EPA's program and regional offices have worked with the EPA's Research and Development program to identify the critical science questions that guide the CSS research program. The EPA will continue to collaborate with federal and non-government stakeholders in order to achieve its mission of evaluating the safety of chemicals and products. This kind of evaluation allows for simultaneous consideration of society's current demands and the needs of future generations.

The CSS research program will enhance our understanding of the properties of molecular structure, function, and formulation relevant to exposure and biological effects across chemical life cycles. The ultimate goal of the CSS research is to ensure safety in the design, manufacture, and use of new and existing chemicals. Three concepts are central to the CSS research program:

- *Life Cycle*: The cradle-to-grave life cycle perspective to chemical design, manufacture, use, and fate, with the aim to manage potential risk of exposure and impacts;
- *Inherency*: The physico-chemical and material properties of the chemical, and how those properties affect the behavior of chemicals in the environment; and
- *Sustainability*: The broad social, economic, and environmental impacts of chemical use.

The CSS program coordinates its research across the other EPA research programs. Complex interactions of chemicals in a community context require a systems approach to understand the links between exposure and toxicity pathways involved in disease. The CSS research program also evaluates the effects of chemicals at varying life stages along with other susceptibility factors, such as genetics and co-existing diseases, considerations that are important for understanding health and environmental impacts in communities. For example, the CSS research program supports community-level decisions by providing tools and data for use by the Sustainable and Healthy Communities research program. .

FY 2013 Activities and Performance Plan:

The Administration's science and technology priorities⁶ stress the need for multidisciplinary research that transforms the approaches used to address the nation's problems. To that end, the CSS research program will develop tools that contribute to the design of safer chemicals. The

² National Academy of Sciences - Toxicity Testing in the 21st Century: A Vision and a Strategy, 2007 - http://dels.nas.edu/resources/static-assets/materials-based-on-reports/reports-in-brief/Toxicity_Testing_final.pdf

³ U.S. EPA - Strategic Plan for Evaluating the Toxicity of Chemicals, 2009 - <http://www.epa.gov/stpc/toxicitytesting/index.htm>

⁴ U.S. EPA Administrator Lisa Jackson - Testimony Before the Senate Subcommittee on Superfund, Toxics and Environmental Health, October 26, 2010 -

<http://yosemite.epa.gov/opa/admpress.nsf/12a744ff56dbff8585257590004750b6/b8dc53af3572128a852577c80060a28d!OpenDocument>

⁵ <http://www.epa.gov/opptintr/existingchemicals/pubs/principles.html>

⁶ 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>

program will support a range of science activities that inform the EPA's policies. Additionally, the CSS program will develop research products to address chemical risk assessment and management problems identified collaboratively with key science advisors and senior staff from across the EPA.

An efficient use of resources argues for risk assessments and risk management approaches that use only the amount and quality of scientific evidence needed and appropriate for the nature of the problem being addressed. This approach has several key advantages over current approaches:

- Thousands of chemicals can be assessed simultaneously using high-throughput and high content approaches;
- Reducing our reliance on animal testing will in turn reduce the resources needed for data generation; and
- Human disease processes, cell systems, and pathway targets can be studied directly.

The EPA's CSS research program is driven by the need to:

- Tailor data generation and evaluation approaches to support varying decisions;
- More efficiently and effectively assess chemical risks and identify what to do about them; and
- Focus on the highest-priority chemicals-related problems facing the EPA and the nation, so that research remains relevant to the Agency's mission.

Keeping this in mind, in FY 2013, the CSS research program will continue to support science outcomes through three research areas:

- *Developing the Scientific Knowledge, Tools, and Models for Integrated Evaluation Strategies:* The CSS researchers will apply enhanced testing with an integrated system of higher throughput decision support tools to develop these strategies, which will help focus and prioritize assessment of both existing and new chemicals.
- *Improving Assessment and Management Approaches for Chemical Safety for Sustainability:* The CSS researchers will assess the amount and quality of scientific evidence supporting a given assessment or management approach. Because the amount and quality of evidence vary with the nature of the problem and the intended decision to be addressed, this research area will develop approaches that are more responsive to varied specific decision contexts.
- *Targeting High Priority Research Needs for Immediate and Focused Attention:* The CSS researchers will apply integrated evaluation and context-relevant assessment approaches to specific, critical research needs that are required to fulfill regulatory mandates. In particular, this area will focus on addressing the Agency's highest priority, near-term needs.

The EPA will capture the complexities of exposure and dose using high-throughput assays to identify key linkages in the continuum between the production of a chemical, its release into the environment, the resulting exposures, and adverse outcomes for people and the natural

environment. Researchers will develop biomarkers of exposure that will enable the characterization of adverse outcomes pathways in exposed populations.

The EPA also will use advanced computational techniques such as multi-scale systems models of virtual tissues to improve quantitative risk assessment and improve confidence in extrapolation models. The CSS program plans to digitize and expand the availability of this research information and then translate and transfer it in ways most useful to decision makers.

The CSS program will generate chemical evaluation strategies that integrate decision makers' needs into approaches to improve the scientific basis for their risk assessments and risk management decisions. These efforts 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 in commerce;
- 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 sustainable product formulations found by assessing chemicals throughout their life-cycle;
- 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.

The CSS researchers will collaborate closely with program partners across the EPA to advance the use of high throughput screening and computational models to prioritize chemicals in the Endocrine Disruptor Screening Program (EDSP). These enhanced chemical screening and priority testing approaches will produce smarter, context-relevant chemical assessment and management.

The near-term goal of this effort is to use these tools to immediately prioritize thousands of chemicals for the current EDSP Tier 1 Screen (T1S) battery. The intermediate goal is to incorporate modern technologies directly into the EDSP T1S to increase the capacity to screen for endocrine disrupting chemicals; while the longer-term goal is to replace the T1S with a suite of assays based on non-whole animal methods.

In approaching this task, the CSS program will work with partners in the National Institutes of Health and the Food and Drug Administration through the "Tox21 Consortium" that is bringing the collective expertise of governmental scientists to bear on development and use of the new toxicological methods.⁷

⁷ <http://www.epa.gov/comptox/toxcast/>

Through the Organization for Economic Cooperation and Development (OECD), the EPA is conducting a collaborative research effort to investigate a core set of nanomaterials that are present in carbon, metal, and metal oxide-based commercial products. The CSS research program is investigating the inherent chemical properties that influence the fate, exposure and effects of these nanomaterials, with the aim of ascertaining behavioral trends and impacts.

In FY 2013, the EPA will focus a portion of the CSS research program's activities to build on existing research of cost-efficient and resource and energy-efficient methods for synthesizing chemicals and products. The CSS program will continue to evaluate life cycle impacts that demonstrate the benefits of more sustainable approaches, inform more effective solutions to the sustainable molecular design of chemicals, and illustrate the bases of cost for those solutions.

The CSS program's Systems Models research will develop models that predict or simulate the impacts of chemical exposure on complex biological or environmental systems. These models can be used to enhance the predictive power of information on the toxicity of a chemical or mixture. As part of this effort, the CSS program will investigate the entire process from chemical exposure to adverse outcome, including interactions at all levels of biological organization in humans and wildlife.

Determining chemical interactions from source to outcome at multiple levels and scales requires assembling the data, tools and expertise to integrate chemical exposure and adverse impacts data. Innovative chemical screening technologies, such as automated, rapid screening (i.e., high-throughput screening), will be used to generate chemical data on the adverse effects of large numbers of chemicals. The following examples of research products reflect the CSS program's integration with the internal EPA programs and collaboration with the external research partners to increase the efficiency and predictive power of chemical safety testing:

- A report that compares linkages between chemical exposure and reproductive and developmental outcomes in multiple species. This information will inform the chemical testing and risk assessment of endocrine disrupting chemicals (EDCs);
- High-throughput screening data sets on 2,000 chemicals for the Endocrine Disruptor Screening Program 21 (EDSP21); and
- User-friendly, interactive customized web tools (dashboards) that provide a graphical depiction of all available chemical data relevant to our partners' decision-making needs.

In addition, the CSS research program will assist the U.S. Army in their Net Zero Initiative to develop and demonstrate innovative water technologies. The Army, in cooperation with EPA and other partners, intends to accomplish their goal of net zero energy, water, and waste by 2020.

Performance Targets:

The table above reflects the CSS's annual performance measures. The EPA uses these measures to assess our effectiveness in delivering needed products and outputs to clients (decision-makers, states, and local governments).

The EPA collaborates with several science agencies and the research community. The EPA also works with the White House's Office of Science and Technology Policy. The EPA supports the interagency Science and Technology in America's Reinvestment – Measuring the Effect of Research on Innovation, Competitiveness and Science (STAR METRICS) effort. The STAR METRICS strives to measure the impact federal science investments have on society, the environment, and the economy.

FY 2013 Change from FY 2012 Enacted Budget: (Dollars in Thousands)

- (+\$324.0) This increase is the net effect of the recalculation of base workforce costs and a cost of living adjustment for existing FTE.
- (+\$4087.0 / +0.9 FTE) In 2013, the EPA will support sustainable molecular design research. This reflects an increase of research efforts in sustainable molecular design of chemicals. Sustainable molecular design research correlates a chemical's inherent properties with its adverse impacts. The EPA will use this program to generate the critical information needed by manufacturers to develop inherently safer processes and products that minimize or eliminate the associated adverse impacts on human health and the environment that could result from the manufacturing, use, and disposal of chemicals, including nanomaterials. This effort will provide new principles for alternative chemical designs that are more environmentally sustainable and reduce the likelihood of unwanted toxic effects of nanomaterials and other chemicals. The resources include 0.9 FTE and associated payroll of \$120.0.
- (+\$166.0 / +2.0 FTE) This reflects the net result of realignments of infrastructure FTE and resources such as equipment purchases and repairs, fixed costs, contracts, travel, and general expenses that are proportionately allocated across programs to better align with programmatic priorities. The additional resources include 2.0 FTE and associated payroll of \$266.0.
- (-\$642.0) This reflects a reduction of research on nanomaterial properties and life cycle assessment research to inform decisions on pesticides, TSCA chemicals, and fuel additives that contain nano-scale materials.
- (-\$741.0) This reflects a reduced effort to develop a broader understanding of risks associated with endocrine disrupting chemicals (EDCs), commodity chemicals, nanomaterials, and other chemical concerns. More specifically, there will be a reduced level of effort to develop and apply methods, models, and measures to evaluate real-world exposures to EDCs and characterize related effects resulting from these exposures for humans and wildlife.
- (-\$688.0 / -0.6 FTE) This reduction reflects administrative savings from continued efforts to streamline operational expenses and activities, including information technology (IT) support activities. The reduced resources include 0.6 FTE and associated payroll of \$80.

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)

	FY 2011 Actuals	FY 2012 Enacted	FY 2013 Pres Budget	FY 2013 Pres Budget v. FY 2012 Enacted
<i>Science & Technology</i>	<i>\$46,140.1</i>	<i>\$39,553.0</i>	<i>\$40,505.0</i>	<i>\$952.0</i>
Hazardous Substance Superfund	\$3,737.6	\$3,337.0	\$3,316.0	(\$21.0)
Total Budget Authority / Obligations	\$49,877.7	\$42,890.0	\$43,821.0	\$931.0
Total Workyears	200.6	193.4	195.9	2.5

Program Project Description:

The EPA's research informs Agency decisions and regulatory actions to protect human health and the environment more effectively. The research produces the scientific information and tools that the EPA needs to meet its legal, statutory, and policy requirements.

The Human Health Risk Assessment (HHRA) research program's vision is to generate timely, credible human health risk assessments that lay the foundation to support Agency risk management decisions. The HHRA program provides state-of-the-science, independently peer reviewed human health risk assessments for chemicals that find their way into our air, water, and soil. The HHRA program's singular position enables the Agency to better predict and prevent risk.

As the HHRA program continues to integrate to best align with other EPA research programs, its themes provide multidisciplinary, risk-based approaches for assessments and methods necessary to guide the EPA's actions to protect public health and the environment. These themes are designed to meet the complex challenges of the 21st Century through modernizing risk assessment, aligning with partner-identified needs, and crosscutting with other national research programs. For example, the Integrated Science Assessments (ISAs) constitute the scientific basis for review of the National Ambient Air Quality Standards (NAAQS) for criteria air pollutants, and directly informs the research needs for the Air, Climate, and Energy (ACE) research program. In conjunction with the Chemical Safety for Sustainability (CSS) research program, the HHRA program will translate research findings into decision support tools for use by regulators and risk managers. The HHRA program also works with the Sustainable and Healthy Communities Research Program (SHCRP) at contaminated Superfund sites by supporting the SHCRP's Superfund Technical Support Centers. These types of partnerships further the EPA's strategic goals to protect America's waters, advance sustainable development, and ensure the safety of chemicals.

Outside of the Agency, the HHRA program's benchmark products help build close relationships with federal, state, and international partners in both accessing data and through collaborative

risk assessment development activities and training. In addition, the program includes a sizable component of technical support to meet partner and stakeholder needs.

The HHRA Program is comprised of:

- Integrated Risk Information System (IRIS) health hazard and dose-response assessments;
- Integrated Science Assessments (ISAs) of criteria air pollutants;
- Community Risk and Technical Support; and
- Methods, models, and approaches to modernize risk assessment for the 21st Century.

Integrated Risk Information System (IRIS) health hazard and dose-response assessments: The HHRA program prepares peer reviewed, qualitative and quantitative health hazard assessments on environmental pollutants of major relevance to the EPA's regulatory mandates. The IRIS assessments range from the relatively simple assessment of a single chemical (e.g., beryllium, uranium) to complex assessments of chemicals of greater prominence (e.g., Libby asbestos, chromium VI, formaldehyde). In recent years, the IRIS program has begun assessments of mixtures of related chemicals in order to enhance the single chemical assessments. The IRIS program is unique as it is the only federal program that provides qualitative and quantitative assessments of both cancer and non-cancer risks. No other federal health assessment program has a similar mission and scope with numerous opportunities for public involvement and a rigorous peer review process. As of January 2011, the IRIS database contained information on more than 550 chemical substances. These assessments provide the scientific foundation for the Agency's risk assessment and risk management decisions. In addition, the assessments are available for other agencies and the public through the IRIS internet database.

Integrated Science Assessments (ISAs) of criteria air pollutants: Congress requires that the EPA periodically review the scientific evidence for criteria air pollutants (particulate matter, ozone, lead, sulfur oxides, nitrogen oxides, and carbon monoxide) to support rulemaking decisions on whether to retain or revise the NAAQS. The ISAs provide concise evaluation and synthesis of policy-relevant science and communicate critical science judgments that provide the scientific foundation for review of the NAAQS. These ISAs are major scientific assessments that undergo rigorous external peer review by the Clean Air Scientific Advisory Committee (CASAC).

Community Risk and Technical Support (CRTS): The HHRA scientists rapidly assess problems and formulate an approach for evaluating potential exposure and risk, estimate doses based on a variety of factors, and estimate risks. The HHRA scientists also provide timely and critical technical support for emerging risk problems. Traditionally, the EPA has used the risk assessment paradigm to assess exposures and risks to single chemicals. The EPA is now moving in the direction of community-based cumulative risk assessment approaches to more accurately assess risk to human health.

Methods, models, and approaches to modernize risk assessment for the 21st Century: Activities will focus on translating research, described in the Chemical Safety and Sustainability (CSS) Research Program and elsewhere, into practical application in developing the IRIS, the ISA, and the Provisional Peer Reviewed Toxicity Values (PPRTVs) assessments, and in assessing special problems. The HHRA scientists will take advantage of recent breakthroughs in computational

methods and molecular biology to begin to translate these findings into more robust risk assessments that are faster and less expensive to produce.

FY 2013 Activities and Performance Plan:

In FY 2013, the EPA will continue to develop the IRIS and other health hazard assessments. The IRIS database will continue to contain hazard and dose-response information on the chemicals of concern in the environment, meeting the needs of the EPA scientists and decision-makers. In FY 2013, the IRIS database also will provide streamlined documents to make information more transparent, accessible, and useful to other government agencies, industry, 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 polychlorinated biphenyl (PCB) non-cancer assessment), completing work for interagency science consultation, external review, or posting on the IRIS web page. The IRIS program will expand intrinsic scientific knowledge and expertise in refinement of the IRIS assessments.

In response to the recommendations made by the National Academy of Sciences' (NAS) April 2011 report,⁵⁵ the Agency will continue to strengthen the IRIS process and database. All new IRIS assessment documents will be shorter, clearer, more visual, and more transparent. For assessments begun prior to the NAS report, the EPA will incorporate the recommendations in a phased approach.

The EPA will continue to develop the ISAs of criteria air pollutants, as a mandated prerequisite to the EPA's review of the NAAQS. The ISAs provide important scientific analyses in support of many of the EPA's important rulemakings. In FY 2013, the program will release final ISAs evaluating the health effects of nitrogen oxides and sulfur oxides to contribute to the EPA's review of the primary NAAQS for these air pollutants and create 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 the EPA's draft plan for review of the Primary NAAQS for Carbon Monoxide and the 2004 NAS report on Air Quality Management.

The EPA will continue to be a leader in the development of risk assessment methods, models, and approaches to enhance the quality and objectivity of assessments through the incorporation of contemporary scientific advances. The 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.

In recognition that people are not exposed to a single pollutant in isolation, the HHRA scientists and the ACE program will collaborate with other EPA parties to shift from single assessments to Multipollutant Science Assessments (MSAs) in evaluating air pollution-induced health effects. The MSAs will allow for more efficient use of resources in evaluations of criteria air pollutants as well as a more comprehensive and effective evaluation of health effects of exposures than has

⁵⁵ <http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=13142>

been possible using ISAs. The intention is that MSAs will serve as a companion to the individual pollutant ISAs.

In addition, the EPA will continue to develop health hazard assessments to support program and regional decision-making. The EPA will respond with science assessment support on chemical contaminant issues requiring quick action and, ultimately, quick decisions and solutions (e.g., Hurricane Katrina, the World Trade Center disaster, and Deepwater Horizon oil spill). Responding to these types of events is a key part of the EPA’s mission to protect human health and the environment and corresponds with a Board of Scientific Counselors (BOSC) recommendation⁵⁶.

The EPA will continue implementation of the 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. The HERO lends transparency to the process of assessment development by allowing access to the data used for scientific decisions. For the HHRA program to be effective in translating the risk assessment science into practice, training of staff inside and outside the program will be essential. The HERO and similar projects will provide consistent, transparent literature for searching, organization, and citation for all the HHRA assessment documents. Greater access to this information will benefit not only the EPA, but also industry and individual citizens.

The methods, models, and approaches to modernize risk assessment will focus on addressing high priority Agency needs as identified by risk managers. This will be accomplished by incorporating recent advances in molecular biology and computational sciences into risk assessments, and tracking specific scientific issues and using approaches informed by recommendations from a number of expert advisory bodies. More specifically, projects will include developing the Federated Repository of Science daTa (FROST),⁵⁷ which will integrate disparate data from across the Agency and make the information far more accessible to risk assessors.

Performance Targets:

Measure	(RA1) Percentage of planned research products completed on time by the Human Health Risk Assessment research program.								Units
	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	
Target							100	100	Percent
Actual									

⁵⁶ <http://www.epa.gov/osp/bosc/pdf/hhra1007rpt.pdf>

⁵⁷ <http://v26265ncay001.aa.ad.epa.gov/opencms/export/ord@work/ordtoday/hotspot/HHRARAP.pdf>

Measure	(RA2) Percentage of planned research outputs delivered to clients and partners for use in informing human health decisions.								Units
	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	
Target							100	100	Percent
Actual									

Measure	(RA7) Annual milestone progress score for completing draft IRIS health assessments.								Units
	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	
Target							50	50	Score
Actual									

Measure	(RA8) Annual progress score for finalizing IRIS health assessments.								Units
	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	
Target							20	20	Score
Actual									

Measure	(RA6) Number of regulatory decisions in which decision-makers used HHRA peer-reviewed assessments (IRIS, PPRTVs, exposure assessments and other assessments)								Units
	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	
Target							no target established	20	Number
Actual									

The table above reflects the HHRA program’s annual performance measures. The EPA uses these measures to assess our effectiveness in delivering needed products and outputs to clients (decision-makers, states, and local governments).

The EPA collaborates with several science agencies and the research community. The EPA also works with the White House’s Office of Science and Technology Policy. The EPA supports the interagency Science and Technology in America’s Reinvestment – Measuring the Effect of Research on Innovation, Competitiveness and Science (STAR METRICS) effort. STAR METRICS strives to measure the impact federal science investments have on society, the environment, and the economy.

FY 2013 Change from FY 2012 Enacted Budget (Dollars in Thousands):

- (+\$2,130.0) This increase reflects the recalculation of base workforce costs and a cost of living adjustment for existing FTE.

- (+290.0) This redirects resources to support IRIS assessments. This increase will enhance the Agency's effort to continually improve the IRIS program and also increase the release of assessments.
- (+\$383.0 / +2.8 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. The increased resources include 2.8 FTE and associated payroll of \$395.0.
- (-\$340.0) This reflects a reduction to resources for the Integrated Science Assessment (ISA) program and will impact the multipollutant assessment of ecological effects of deposition of nitrogen oxides (NO_x), sulfur oxides (SO_x), and other pollutants. Development of the ISA to support the review of secondary National Ambient Air Quality Standards (NAAQS) for NO_x and SO_x will occur, but the EPA's capacity to broaden the multipollutant focus of this assessment and conduct relevant critical loads analyses will be impacted. Some multipollutant analyses and work to assess criteria pollutant effects on welfare effects will be delayed.
- (-\$361.0 / -0.5 FTE) This reduction reflects administrative savings from continued efforts to streamline operational expenses and activities, including information technology (IT) support activities. The reduced resources include 0.5 FTE and associated payroll of \$71.0.
- (-\$400.0) This reflects a reduction of work on methods and model development for modernization of risk assessment and will have an impact on scientific advances incorporated in the development of IRIS assessments and ISAs.
- (-\$750.0) This reflects a redirection of resources to support the Chemical Assessment Advisory Committee under auspices of the EPA's Science Advisory Board.

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)

	FY 2011 Actuals	FY 2012 Enacted	FY 2013 Pres Budget	FY 2013 Pres Budget v. FY 2012 Enacted
Science & Technology	\$46,140.1	\$39,553.0	\$40,505.0	\$952.0
<i>Hazardous Substance Superfund</i>	\$3,737.6	\$3,337.0	\$3,316.0	(\$21.0)
Total Budget Authority / Obligations	\$49,877.7	\$42,890.0	\$43,821.0	\$931.0
Total Workyears	200.6	193.4	195.9	2.5

Program Project Description:

The EPA's research informs Agency decisions and regulatory actions to protect human health and the environment more effectively. The research produces the scientific information and tools that the EPA needs to meet its legal, statutory, and policy requirements.

The Human Health Risk Assessment (HHRA) research program's vision is to generate timely, credible human health risk assessments that lay the foundation to support priority Agency risk management decisions. Designed as the interface between the EPA's research program and Agency decision makers, the HHRA program provides state-of-the-science, independently peer reviewed human health risk assessments for chemicals that find their way into our air, water, and soil. The multidisciplinary HHRA program plays a unique and pivotal role within the EPA and, consequently, the HHRA program's singular position enables the Agency to better predict and prevent risk.

As the HHRA program continues to integrate to best align with other EPA research programs, it provides theme oriented risk-based approaches for assessments and methods necessary to guide the EPA's actions to protect public health and the environment. These multidisciplinary themes are designed to meet the complex challenges of the 21st Century through modernizing risk assessment, aligning with partner-identified needs, and crosscutting with other national research programs.

Outside of the Agency, the HHRA program's benchmark products help build close relationships with federal, state, and international partners in both accessing data and through collaborative risk assessment development activities and training. In addition, the program includes a sizable component of technical support to meet partner and stakeholder needs.

The HHRA's assessments directly support other facets of the Agency's strategic goals by integrating the science for media-specific chemical hazards and providing assessment methods to ensure air quality, protect America's waters, and clean up our communities. For example, the Provisional Peer Reviewed Toxicity Values (PPRTVs) are used at contaminated Superfund sites supporting Superfund Technical Support Centers within the Sustainable and Healthy

Communities Research Program. These efforts further the EPA's strategic goals to protect America's waters, advance sustainable development, and ensure the safety of chemicals.

The Superfund portion of the HHRA program is comprised of:

- Integrated Risk Information System (IRIS) health hazard and dose-response assessments; and
- Community Risk and Technical Support.

IRIS health hazard and dose-response assessments: Based on the expressed needs of the EPA's Solid Waste and Emergency Response program, the HHRA program prepares the IRIS hazard characterization and dose-response profiles for environmental pollutants of specific relevance to Superfund site assessments and remediation. As of January 2011, more than 550 health hazard assessments were available through the IRIS database and the majority of these chemical assessments are relevant to Superfund's decision making.

Community Risk and Technical Support (CRTS): The HHRA scientists rapidly assess problems and formulate an approach for evaluating potential exposure and risk, estimate doses based on a variety of factors, and estimate risks. A key component to community risk is the development of the PPRTVs, which enables the Solid Waste and Emergency Response Program to make clean up decisions at contaminated Superfund sites. Where the IRIS values are unavailable, the HHRA program develops the PPRTVs for evaluating chemical specific exposures at Superfund sites. The EPA's Superfund Technical Support Centers provide support for these PPRTV assessments. As of August 2011, new or renewed PPRTVs were available for 328 chemicals. The HHRA scientists also provide crucial technical support for emerging problems. Traditionally, the EPA has used the risk assessment paradigm to assess exposures and risks to single chemicals. However, the EPA is now moving in the direction of community-based cumulative risk assessment approaches to more accurately assess risk to human health.

FY 2013 Activities and Performance Plan:

In FY 2013, the EPA will continue to develop the IRIS assessments for environmental pollutants of specific relevance to Superfund site assessments and remediation.

In response to the recommendations made by the National Academy of Sciences April 2011 report,¹⁹ the Agency is working to strengthen the IRIS process and database. All new IRIS assessment documents will be shorter, clearer, more visual, and transparent. Documents will be rigorously edited to eliminate inconsistencies, address redundancies, and include more graphical and tabular representations. For assessments begun prior to the NAS report, the EPA will incorporate the recommendations in a phased approach.

Communities have an urgent need for coordinated assistance to assess and address issues of chemical and other environmental contamination. Through the CRTS activities, in FY 2013, the HHRA program will continue to provide essential technical assistance to the EPA's programs and regions. The HHRA program will provide rapid risk assessments, combining problem

¹⁹ <http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=13142>

formulation and state-of-the-art exposure information and tools with hazard information. Chief among these projects is the continuing development of the PPRTVs. The HHRA program will develop the PPRTVs for evaluating chemical specific exposures at Superfund sites. The EPA's Superfund Technical Support Centers will provide consultative support for the PPRTV assessment development. These values are derived for use in the EPA's Superfund Program when a value is not available in the IRIS database. This work will improve the EPA's ability to access critical applied expertise when dealing with environmental health problems.

Performance Targets:

Work under this program also supports performance results in HHRA Science & Technology and can be found in the Performance Eight-Year Array in Tab 11.

FY 2013 Change from FY 2012 Enacted Budget (Dollars in Thousands):

- (+\$96.0) This increase reflects the recalculation of base workforce costs and a cost of living adjustment for existing FTE.
- (-\$6.0 / +0.2 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. This includes an increase of 0.2 FTE and \$30.0 associated payroll.
- (-\$111.0) This reflects a reduction to development of the Provisional Peer Reviewed Toxicity Values (PPRTVs), which are used by the EPA's Superfund and Resource Conservation and Recovery Act (RCRA) hazardous waste programs when the more extensive Integrated Risk Information System (IRIS) assessments are unavailable.

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)

	FY 2011 Actuals	FY 2012 Enacted	FY 2013 Pres Budget	FY 2013 Pres Budget v. FY 2012 Enacted
Environmental Program & Management	\$1,272.8	\$0.0	\$0.0	\$0.0
<i>Science & Technology</i>	<i>\$41,536.8</i>	<i>\$30,034.0</i>	<i>\$29,708.0</i>	<i>(\$326.0)</i>
Hazardous Substance Superfund	\$44,304.2	\$40,599.0	\$40,769.0	\$170.0
Total Budget Authority / Obligations	\$87,113.8	\$70,633.0	\$70,477.0	(\$156.0)
Total Workyears	177.8	176.4	176.8	0.4

Program Project Description:

Through research, development, and technical support activities, EPA's Homeland Security Research Program (HSRP) enhances the nation's preparedness, response, and recovery capabilities for large-scale catastrophic incidents including chemical, biological, or radiological (CBR) terrorist threats and attacks and other disasters.

The HSRP evaluates tools and develops cost-effective response and recovery capabilities for use by the response community, decision-makers, and risk managers. Homeland Security research develops state-of-the-art approaches to address all phases of community response to ensure public safety, protect property, and facilitate recovery. In many cases, the research program also supports the Department of Homeland Security's (DHS') needs for EPA expertise in a number of key areas including materials decontamination and disposal, threat assessment, and sampling and analytical methods. The Agency continues to strengthen remediation of decontamination capabilities through collaborative research efforts with the DHS, the Department of Defense, the Centers for Disease Control and Prevention, and other federal and non-federal organizations.

FY 2013 Activities and Performance Plan:

Building resiliency in our communities requires that they are prepared for responding to all disasters, terrorism-based or as a result of accidents or natural causes. Presidential Policy Directive #8¹⁵ instructs federal agencies to take an integrated "all-hazards" approach in preparing the nation for disasters. Therefore, the HSRP, in concert with relevant EPA programs, will continue to re-envision research so that the science products have application to a broad set of disasters.

¹⁵ (2011)

In FY 2013, Homeland Security specific science and engineering research will improve the Agency's ability to carry out its increased homeland security missions. Through tools and techniques, developed by the HSRP, the Agency will be able to better facilitate response to and recovery from incidents involving CBR agents by providing regions and stakeholders with valuable detection and response analytics. The program will emphasize research needed to support response to and recovery from wide-area attacks using bio-threat agents such as anthrax or radiological/nuclear agents.

The HSRP will continue to provide applied science and technical support to EPA's response community including, but not limited to, the National Decontamination Team, Environmental Response Team, Radiological Emergency Response Team, Removal Managers, and On-Scene Coordinators. For example, HSRP's experts were critical in providing technical and scientific support to the Agency during the Deepwater Horizon Oil Spill and *Fukushima* Daiichi nuclear disaster responses. These experts augmented the first responders' knowledge base with EPA specific scientific data and tools. EPA's HSRP also will continue to provide technical support and advice that can be used by water utilities to help ensure the nation's water systems are secure and drinking water is safe.

In addition to these continuing efforts, emerging homeland security related issues and priorities will influence the activities of the HSRP in FY 2013. For example, the Food Safety Modernization Act (FSMA)¹⁶ authorized EPA to help communities prepare for and recover from food and agricultural emergencies. The HSRP will focus research to address EPA's new directives under the FSMA by determining best practices for managing large volumes of contaminated food and agricultural waste as well as addressing the associated need for sampling and analytical methods for waste characterization. Other priorities and homeland security related issues may also arise in 2013 that are not anticipated for this justification including the emergence of new chemical agents that require research to address scientific gaps. The HSRP maintains a certain level of flexibility to address the most needed research at the appropriate time, while continuing its longer-term consequence management focus.

Decontamination Research

Decontamination research fills scientific gaps associated with responding to and recovering from CBR attacks affecting wide areas such as urban centers, transportation hubs, and sports arenas. The HSRP conducts research on characterizing contamination in support of EPA's Environmental Response Laboratory Network (ERLN),¹⁷ determining risk and clean up goals, as well as decontamination and waste management approaches. The work product of HSRP touches on each phase of response and recovery from the usage of the program's Provisional Advisory Levels (PALs)¹⁸ for chemical agents to protect human health during recovery operations to the widely accepted and regularly updated Selected Analytical Methods for Environmental Restoration following homeland security events.¹⁹ Future cleanup decisions will be better informed with detailed knowledge such as the persistence of bio-threat agents (natural processes

¹⁶ (2010)

¹⁷ <http://www.epa.gov/oemerln/>

¹⁸ <http://www.epa.gov/nhsr/news/news121208.html>

¹⁹ <http://epa.gov/sam/>

may effectively inactivate some agents in short time periods)²⁰ and the ability of technologies to remove radiological contamination from urban surfaces following detonation of a radiological dispersion device.²¹

In FY 2013, decontamination research will focus its research on filling the most critical science gaps required by the Agency to improve its capability. To support determination of robust clean up goals following a wide area biological attack, a rapid, sensitive, molecular assay for viable anthrax spores will be developed and adapted to other bio-threat agents. PALs will be developed for additional, critical chemical agents increasing the ability to protect lives following an attack. Also, since the cost and time of cleanup is strongly dependent on clean up goals, research on microbial risk assessment methodologies and anthrax spore health effects will be conducted. Finally, strategies to remediate large-scale areas contaminated with CBR agents will be developed including understanding the fate and transport of agents, developing methods to clean urban surfaces, and approaches to manage contaminated waste.

Water Infrastructure Protection Research

Water Infrastructure Protection Research provides scientific data and tools to improve the nation's ability to protect water systems from attack as well as detect and recover from an attack once initiated.²²

This research area has made significant impacts. Through its Water Security Initiative pilot demonstrations, this research enabled several municipalities across the nation to employ data and tools produced by the HSRP including performance information on water quality sensors,²³ sensor placement software TEVA-SPOT, and award winning event detection software CANARY.²⁴ To confirm a contamination event, detectable samples often require large quantities of water and methods are needed for analysis. The 2009 R&D 100 award²⁵ Water Sample Concentrator, developed in collaboration with Idaho National Laboratory, facilitates and streamlines this process.

Moving forward into FY 2013, water infrastructure protection research will focus on efforts to develop and test approaches to decontaminate water infrastructure and treat water associated with CBR contamination caused by terrorist activities, natural disasters, or accidents. To enable water systems to return to service as quickly and affordably as possible, research is underway on methods to isolate and treat contaminated water as well as to clean distribution system infrastructure (pipes, towers, etc). EPA also is developing real-time distribution system models to aid utilities in locating the source and extent of contamination across the system to guide decisions on how to isolate contamination and redirect water. These models also can be used to build decontamination strategies where a dynamic view of cleanup agent delivery is required. In

²⁰ http://cfpub.epa.gov/si/si_public_record_report.cfm?address=nhsrc/&dirEntryId=235666

²¹ http://cfpub.epa.gov/si/si_public_record_report.cfm?address=nhsrc/&dirEntryId=234944

²² This research directly supports the national Water Security Initiative, in support of HSPD-9 which directed EPA, as the Sector Specific Lead Agency (SSA) for water, to “develop robust, comprehensive, and fully coordinated surveillance and monitoring systems . . . for . . . water quality that provide early detection and awareness of disease, pest, or poisonous agents.”

²³ http://cfpub.epa.gov/si/si_public_record_report.cfm?address=nhsrc/&dirEntryId=212368

²⁴ <http://www.epa.gov/nhsrc/water/teva.html>

²⁵ <http://epa.gov/nhsrc/news/news081409.html>

addition, the chemical, biological, and physical aspects of decontamination processes are being investigated to design and optimize the cleanup process to remove or mitigate CBR contamination.

Efforts to support the Water Security Initiative will continue to provide technical assistance to utilities as they use these models to bring their water contamination warning systems online. As new and improved water contamination sensors become commercially available, the HSRP will conduct performance testing to help utilities make informed decisions about the security of their drinking water.

Building upon previously completed work, efforts in FY 2013 will address the design of new or retrofitted distribution systems so that they are inherently safer with respect to all contamination scenarios. Modeling tools will be developed and applied to both model systems and real systems to support decisions, the design of new networks of pipes, or to retrofit existing networks.

In addition, the Homeland Security Research Program and other EPA programs and offices, will partner with the Army. As a part of their Net Zero Initiative, the HSRP will assist the Army's effort to develop and demonstrate innovative water technologies to accomplish the Army's goal of net zero energy, water, and waste by 2020.

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 2012, 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 2013, the Agency will maintain the expanded RadNet air monitoring network. Fixed stations will operate routinely and in conjunction with as many as 40 deployable monitors following a radiological incident. The expanded RadNet air monitoring network will provide the Agency, first responders, and the public 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.

Performance Targets:

Measure	(HS1) Percentage of planned research products completed on time by the Homeland Security research program.								Units
	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	
Target							100	100	Percent
Actual									

Measure	(HS2) Percentage of planned research outputs delivered to clients and partners to improve their capabilities to respond to contamination resulting from homeland security events and related disasters.								Units
	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	
Target							100	100	Percent
Actual									

The table above reflects the HSRP’s annual performance measures. EPA uses these measures to assess our effectiveness in delivering needed products and outputs to clients (rule makers, states, and local governments).

Additionally, EPA supports “science of science policy” approaches to assess our research. EPA collaborates with several science agencies, the research community, and the White House’s Office of Science and Technology Policy. EPA supports the interagency Science and Technology in America’s Reinvestment – Measuring the Effect of Research on Innovation, Competitiveness and Science (STAR METRICS) effort. STAR METRICS strives to measure the impact federal science investments have on society, the environment, and the economy.

The program also supports providing timely and quality assured ambient radiation monitoring during an emergency.

FY 2013 Change from FY 2012 Enacted Budget (Dollars in Thousands):

- (-\$42.0) This decrease is the net effect of the recalculation of base workforce costs and a cost of living adjustment for existing FTE.
- (-\$335.0) This represents a reduction in the area of decontamination research to focus resources on the most critical Agency priorities.
- (+\$162.0/ +1.1 FTE) This reflects the net result of an increase of 1.1 FTE and associated payroll of \$162.0 for the water security research program.
- (+\$52.0/-0.2 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. These resources include -0.2 FTE and decreased associated payroll of \$30.0.

- (-\$184.0/ -0.3 FTE) This reduction reflects administrative savings from continued efforts to streamline operational expenses and activities, including information technology (IT) support activities. The reduced resources include 0.3 FTE and associated payroll of \$44.0.
- (-\$29.0) This reflects a reduction to the RADNet monitoring program.
- (+\$3.0) This reflects an increase to the radiation decontamination program.
- (+\$47.0) This reflects an increase for laboratory security, operations and maintenance, and utilities fixed costs.
- (+ 0.1 FTE) This reflects an increase in FTE to support radiation preparedness activities.

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; PHSA, 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 Communities and Advancing Sustainable Development

Objective(s): Restore Land

Goal: Ensuring the Safety of Chemicals and Preventing Pollution

Objective(s): Ensure Chemical Safety

(Dollars in Thousands)

	FY 2011 Actuals	FY 2012 Enacted	FY 2013 Pres Budget	FY 2013 Pres Budget v. FY 2012 Enacted
Environmental Program & Management	\$1,272.8	\$0.0	\$0.0	\$0.0
Science & Technology	\$41,536.8	\$30,034.0	\$29,708.0	(\$326.0)
<i>Hazardous Substance Superfund</i>	<i>\$44,304.2</i>	<i>\$40,599.0</i>	<i>\$40,769.0</i>	<i>\$170.0</i>
Total Budget Authority / Obligations	\$87,113.8	\$70,633.0	\$70,477.0	(\$156.0)
Total Workyears	177.8	176.4	176.8	0.4

Program Project Description:

EPA's Homeland Security Preparedness, Response, and Recovery program develops and maintains an agency-wide capability to respond to large-scale catastrophic incidents with an emphasis on those involving chemical, biological, and radiological (CBR) agents. 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 builds upon these responsibilities by maintaining a level of expertise, training, and preparedness specifically focused on threats associated with CBR agents. This capability, implemented as a comprehensive all-hazards approach to emergency response, is a cornerstone of national preparedness and is an essential element of national resiliency.

The Agency Homeland Security program implements a broad range of activities for a variety of internal and multi-agency efforts that are consistent with the Department of Homeland Security's (DHS') National Response Framework. As mandated in Homeland Security Presidential Directives (HSPDs) #5, #8, #9, #10, and #22, the Agency leads or supports many aspects of preparing for and responding to a nationally significant incident which may contain CBR agents. Other Federal agencies, including DHS, the Department of Defense, and the Department of Health and Human Services, rely upon EPA's unique and critical environmental response capability and expertise for CBR agents, and look to EPA to:

- sustain and operate a national environmental laboratory for chemical warfare agents and biological threats;
- provide expertise on decontamination and waste disposal methods following the release of a CBR agent;
- provide technical support and expertise during a response in evaluating environmental and human health risks associated with the release of CBR agents; and

- strengthen the Agency's own internal response capabilities, as well as coordinated Federal, state, and local emergency response efforts through training, exercises, and the maintenance of specialized field equipment.

EPA Homeland Security assets; trained personnel, laboratory capabilities, and decontamination technical expertise, provide a safety net for CBR responses, as the EPA is solely responsible for environmental sampling and decontamination during a CBR response. The agency's Decontamination Team serves as an important federal technical resource for decontamination of building infrastructures and environmental media. The Homeland Security lab resources focus on improving national environmental laboratory capabilities and capacities to be better prepared to analyze the high volume of environmental CBR samples expected during national emergencies. This program helps EPA have the capacity for understanding and responding to complex CBR incidents in a reasonable time frame as well as have a basic level of institutional expertise for advising time critical and emergency cleanups. To meet this challenge, EPA will continue to use a comprehensive approach which includes internal partnerships on research priorities and brings together agency assets to implement efficient and effective responses.

In addition, through research, development, and technical support activities, EPA's Homeland Security Research Program (HSRP) enhances the nation's preparedness, response, and recovery capabilities for homeland security large-scale catastrophic incidents involving chemical, biological, or radiological threats and attacks. When terrorist attacks and natural disasters occur, sustainable environmental approaches enhance the resiliency and speed of recovery of the communities that are affected. The HSRP will continue to develop and validate environmental sampling, analysis, and human health risk assessment methods for known and emerging biological, chemical, and radiological threat agents.

FY 2013 Activities and Performance Plan:

In FY 2013, the Agency's homeland security emergency response and preparedness program will continue to concentrate on four core areas:

- 1) maintaining a highly skilled, well-trained, and well-equipped response workforce that has the capacity to respond to simultaneous incidents as well as threats involving CBR substances;
- 2) developing more effective site characterization, decontamination, and clearance options for site reoccupation, to ensure that the nation can quickly recover from nationally significant incidents;
- 3) ensuring maintenance of capability to analyze Chemical Warfare Agent (CWA) samples while working to build and maintain EPA biological agent laboratory analyses capability and capacity; 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. This professional development provides staff with information on new technologies and supports direction to optimize an efficient and cost effective response process. In FY 2013, EPA and its federal, state, and tribal homeland response partners will 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 routine refresher training.
- Operate the Environmental Response Laboratory Network (ERLN), sustain and operate consolidated CWA and biological labs, continue mobile capability through Portable High-Throughput Integrated Laboratory Identification Systems (PHILIS) units, and coordinate development of radio-analytical capability. The Agency will continue to participate with the DHS led Integrated Consortium of Laboratory Networks to leverage federal, state, and commercial capabilities.
- EPA is frequently responsible for the decontamination phase of a significant incident. Decontamination is not possible without sampling and lab analyses to delineate and characterize the site, to confirm successful decontamination, and for decisions on clearance to re-enter the site. To assist with site characterization, EPA fixed and mobile lab capabilities are needed; mobile labs, such as PHILIS, for deploying to sites for high volume analyses, and fixed labs for providing added capacity and quality assurance.
- 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. ASPECT provides direct assistance to first responders by detecting chemical and radiological vapors, plumes, and clouds with real time data delivery. ASPECT is especially needed when other assets cannot be deployed to a release (road and/or infrastructure damage, personnel concerns, etc.). ASPECT assistance is often requested by other agencies and is a rapid response resource, with sample data being available within five minutes.
- 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 decontamination related data and track field personnel, equipment, and reconnaissance data from large and small sites. During large-scale incidents, the public can view site related data on a daily basis.

- Maintain Environmental Response Team (ERT) personnel and equipment in a state of readiness for response to potential homeland security incidents. As the agency inland scientific support coordinator, the ERT also will maintain the capacity to provide required health and safety and response readiness training to federal, state, local, and tribal responders.
- Continue to develop and validate environmental sampling, analysis, and human health risk assessment methods for known and emerging chemical, biological, and radiological 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 further assist EPA in developing standards, protocols, and capabilities to recover from and mitigate the risks associated with biological attacks.

In FY 2013, EPA will begin to plan and implement a Regional Center of Expertise for CWA Laboratories to support response and recovery. The Agency will conduct an analysis to determine how to most effectively maintain this capability and capacity at selected Regional laboratories. EPA will be evaluating the most effective and efficient means of consolidating facilities and equipment and developing a highly skilled and mobile staff with the appropriate expertise. This consolidation is expected to result in better performance with the ability to work on response strategies for novel/non-traditional agents, the efficient maintenance of response capability during non-event periods, and the development of a viable, cost-effective surge strategy to sustain operations for extended response periods.

Performance Targets:

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

FY 2013 Change from FY 2012 Enacted Budget (Dollars in Thousands):

- (+ \$280.0) This increase reflects the recalculation of base workforce costs and a cost of living adjustment for existing FTE.
- (+\$128.0) This reflects an increase for research to develop and test cleanup technologies for radiological contamination that could result from terrorist attacks or nuclear disasters. This research will give the response community better information on performance and cost of remediation technologies, thereby supporting improved decision-making.
- (+\$23.0) 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.

- (+\$2,000.0) This increase is for planning and implementing a Regional Emergency Response Center of Expertise for CWA. This increase reflects funds needed to implement the selected approaches resulting from the review of options and requirements for Center(s) of Expertise for CWA laboratories.
- (-\$2,261.0 / -0.3 FTE) This reflects delays in planned training and participation in exercises and also reflects delays in equipment upgrades. The reduced resources include 0.3 FTE and associated payroll of \$45.0.

Statutory Authority:

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), 42 U.S.C. 9601 et seq. – Sections 104, 105, 106; Clean Water Act (CWA) 33 U.S.C. 1251 et seq.; Oil Pollution Act, 33 U.S.C. 40.