

**ENVIRONMENTAL PROTECTION AGENCY
2010 Annual Performance Plan and Congressional Justification**

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**Environmental Protection Agency
FY 2010 Annual Performance Plan and Congressional Justification**

**APPROPRIATION: Science & Technology
Resource Summary Table
(Dollars in Thousands)**

	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
Science & Technology				
Budget Authority	\$763,442.3	\$790,051.0	\$842,349.0	\$52,298.0
Total Workyears	2,407.9	2,432.5	2,442.5	10.0

**Program Projects in S&T
(Dollars in Thousands)**

Program Project	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
Air Toxics and Quality				
Clean Air Allowance Trading Programs	\$9,253.9	\$9,152.0	\$9,979.0	\$827.0
Federal Support for Air Quality Management	\$12,676.0	\$11,133.0	\$11,542.0	\$409.0
Federal Support for Air Toxics Program	\$2,907.9	\$2,279.0	\$2,339.0	\$60.0
Federal Vehicle and Fuels Standards and Certification	\$70,463.2	\$76,445.0	\$91,990.0	\$15,545.0
Radiation: Protection	\$2,069.1	\$2,156.0	\$2,242.0	\$86.0
Radiation: Response Preparedness	\$3,780.3	\$3,967.0	\$4,164.0	\$197.0
Subtotal, Air Toxics and Quality	\$101,150.4	\$105,132.0	\$122,256.0	\$17,124.0
Climate Protection Program				
Climate Protection Program	\$17,156.3	\$16,828.0	\$18,975.0	\$2,147.0
Enforcement				
Forensics Support	\$14,042.7	\$15,087.0	\$15,946.0	\$859.0
Homeland Security				
Homeland Security: Critical Infrastructure Protection				
Water Sentinel	\$26,547.5	\$14,982.0	\$23,726.0	\$8,744.0
Homeland Security: Critical Infrastructure Protection (other activities)	\$6,109.2	\$4,478.0	\$4,603.0	\$125.0
Subtotal, Homeland Security: Critical Infrastructure Protection	\$32,656.7	\$19,460.0	\$28,329.0	\$8,869.0

Program Project	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
Homeland Security: Preparedness, Response, and Recovery				
Decontamination	\$19,964.2	\$26,407.0	\$25,430.0	(\$977.0)
Laboratory Preparedness and Response	\$507.9	\$494.0	\$500.0	\$6.0
Safe Building	\$2,794.4	\$1,976.0	\$2,000.0	\$24.0
Homeland Security: Preparedness, Response, and Recovery (other activities)	\$17,540.8	\$14,794.0	\$14,479.0	(\$315.0)
Subtotal, Homeland Security: Preparedness, Response, and Recovery	\$40,807.3	\$43,671.0	\$42,409.0	(\$1,262.0)
Homeland Security: Protection of EPA Personnel and Infrastructure	\$1,428.1	\$587.0	\$594.0	\$7.0
Subtotal, Homeland Security	\$74,892.1	\$63,718.0	\$71,332.0	\$7,614.0
Indoor Air				
Indoor Air: Radon Program	\$437.8	\$403.0	\$422.0	\$19.0
Reduce Risks from Indoor Air	\$702.9	\$717.0	\$735.0	\$18.0
Subtotal, Indoor Air	\$1,140.7	\$1,120.0	\$1,157.0	\$37.0
IT / Data Management / Security				
IT / Data Management	\$3,762.6	\$3,969.0	\$4,073.0	\$104.0
Operations and Administration				
Facilities Infrastructure and Operations				
Rent	\$35,398.9	\$34,521.0	\$33,947.0	(\$574.0)
Utilities	\$17,894.3	\$18,547.0	\$19,177.0	\$630.0
Security	\$9,609.6	\$11,989.0	\$10,260.0	(\$1,729.0)
Facilities Infrastructure and Operations (other activities)	\$6,336.4	\$8,778.0	\$9,498.0	\$720.0
Subtotal, Facilities Infrastructure and Operations	\$69,239.2	\$73,835.0	\$72,882.0	(\$953.0)
Subtotal, Operations and Administration	\$69,239.2	\$73,835.0	\$72,882.0	(\$953.0)
Pesticides Licensing				
Pesticides: Protect Human Health from Pesticide Risk	\$3,346.9	\$3,215.0	\$3,663.0	\$448.0
Pesticides: Protect the Environment from Pesticide Risk	\$1,998.2	\$2,011.0	\$2,292.0	\$281.0
Pesticides: Realize the Value of Pesticide Availability	\$442.4	\$445.0	\$508.0	\$63.0
Pesticides: Registration of New Pesticides	\$222.6	\$0.0	\$0.0	\$0.0
Pesticides: Review / Reregistration of Existing Pesticides	\$169.1	\$0.0	\$0.0	\$0.0

Program Project	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
Subtotal, Pesticides Licensing	\$6,179.2	\$5,671.0	\$6,463.0	\$792.0
Research: Clean Air				
Research: Air Toxics	\$1,192.3	\$0.0	\$0.0	\$0.0
Research: Clean Air	\$57,575.5	\$80,541.0	\$83,164.0	\$2,623.0
Research: Global Change	\$17,423.9	\$17,886.0	\$20,909.0	\$3,023.0
Research: NAAQS	\$17,428.3	\$0.0	\$0.0	\$0.0
Subtotal, Research: Clean Air	\$93,620.0	\$98,427.0	\$104,073.0	\$5,646.0
Research: Clean Water				
Research: Drinking Water	\$48,228.2	\$46,873.0	\$47,909.0	\$1,036.0
Research: Water Quality	\$53,343.0	\$59,291.0	\$62,454.0	\$3,163.0
Subtotal, Research: Clean Water	\$101,571.2	\$106,164.0	\$110,363.0	\$4,199.0
Research / Congressional Priorities				
Congressionally Mandated Projects	\$1,034.0	\$5,450.0	\$0.0	(\$5,450.0)
Research: Human Health and Ecosystems				
Human Health Risk Assessment	\$34,569.9	\$39,350.0	\$45,133.0	\$5,783.0
Research: Computational Toxicology	\$13,987.1	\$15,156.0	\$19,602.0	\$4,446.0
Research: Endocrine Disruptor	\$11,158.9	\$11,486.0	\$11,442.0	(\$44.0)
Research: Fellowships	\$9,721.8	\$9,651.0	\$10,894.0	\$1,243.0
Research: Human Health and Ecosystems				
Human Health	\$45,199.1	\$77,942.0	\$82,071.0	\$4,129.0
Ecosystems	\$57,965.6	\$75,818.0	\$76,239.0	\$421.0
Research: Human Health and Ecosystems (other activities)	\$43,706.5	\$0.0	\$0.0	\$0.0
Subtotal, Research: Human Health and Ecosystems	\$146,871.2	\$153,760.0	\$158,310.0	\$4,550.0
Subtotal, Research: Human Health and Ecosystems	\$216,308.9	\$229,403.0	\$245,381.0	\$15,978.0
Research: Land Protection				
Research: Land Protection and Restoration	\$11,212.5	\$13,586.0	\$13,782.0	\$196.0
Research: Sustainability				
Research: Economics and Decision Science(EDS)	\$1,877.3	\$0.0	\$0.0	\$0.0
Research: Sustainability	\$22,346.0	\$21,157.0	\$24,107.0	\$2,950.0
Subtotal, Research: Sustainability	\$24,223.3	\$21,157.0	\$24,107.0	\$2,950.0

Program Project	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
Toxic Research and Prevention				
Research: Pesticides and Toxics	\$24,616.7	\$26,949.0	\$27,839.0	\$890.0
Water: Human Health Protection				
Drinking Water Programs	\$3,292.5	\$3,555.0	\$3,720.0	\$165.0
Subtotal, Drinking Water Programs	\$3,292.5	\$3,555.0	\$3,720.0	\$165.0
TOTAL, EPA	\$763,442.3	\$790,051.0	\$842,349.0	\$52,298.0

Program Area: Air Toxics And Quality

Clean Air Allowance Trading Programs

Program Area: Air Toxics and Quality

Goal: Clean Air and Global Climate Change

Objective(s): Healthier Outdoor Air

(Dollars in Thousands)

	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
Environmental Program & Management	\$19,774.8	\$19,993.0	\$20,548.0	\$555.0
<i>Science & Technology</i>	<i>\$9,253.9</i>	<i>\$9,152.0</i>	<i>\$9,979.0</i>	<i>\$827.0</i>
Total Budget Authority / Obligations	\$29,028.7	\$29,145.0	\$30,527.0	\$1,382.0
Total Workyears	88.9	88.6	88.6	0.0

Program/Project Description:

The Clean Air Interstate Rule (CAIR), promulgated in May 2005, must be revised, but may remain in operation in the interim, according to the U.S. Court of Appeals for the District of Columbia Circuit Court's decision in December 2008 to "allow CAIR to remain in effect until it is replaced by a rule consistent with [the Court's July 11, 2008] opinion" so as to "at least temporarily preserve the environmental values covered by CAIR."¹ CAIR uses a multi-pollutant control approach to provide states with a solution to the problem of transported ozone and fine particulate matter (PM_{2.5}) -- pollution that drifts into one state from sources in downwind states. Using a market-based approach, CAIR is projected to achieve significant cuts in sulfur dioxide (SO₂) and nitrogen oxide (NO_x) emissions.

CAIR is a component of EPA's plan to help over 450 counties in the eastern U.S. meet and maintain health-based protective air quality standards for ozone and PM_{2.5}. All the affected states are achieving the mandated reductions primarily by controlling power plant emissions through an EPA-administered interstate cap-and-trade program. Under CAIR, Phase 1, annual SO₂ and NO_x emissions are capped and there is an additional seasonal NO_x cap for states that contribute significantly to transported ozone pollution. The CAIR annual NO_x trading program began on schedule on January 1, 2009. The CAIR ozone-season NO_x trading program will start on May 1, 2009. For additional information on CAIR, please visit <http://www.epa.gov/oar/interstateairquality/>.

EPA is responsible for managing the Clean Air Status and Trends Network (CASTNET), a national long-term atmospheric deposition monitoring network established in 1987 that serves as the nation's primary source for atmospheric data on the dry deposition component of total acid deposition, rural ground-level ozone, and other forms of atmospheric pollution that enter the environment as particles and gases. Used in conjunction with the National Atmospheric Deposition Program (NADP) and other networks, CASTNET's long-term datasets and data products are used to determine the efficacy of national emission control programs through monitoring geographic patterns and temporal trends in ambient air quality and atmospheric

¹ U.S. Court of Appeals for the D.C. Circuit, No. 05-1244, page 3 (decided December 23, 2008).

deposition in rural areas of the country. Maintaining a robust long-term atmospheric deposition monitoring network is critical for the accountability of the Acid Rain Program, CAIR, and other programs for controlling transported air pollutants.

Surface water chemistry is a direct indicator of the environmental effects of acid deposition and enables assessment of how water bodies and aquatic ecosystems are responding to reductions in sulfur and nitrogen emissions. Two EPA-administered programs, the Temporally Integrated Monitoring of Ecosystems (TIME) program and the Long-Term Monitoring (LTM) program, were specifically designed to assess whether the 1990 Clean Air Act Amendments have been effective in reducing the acidity of surface waters in sensitive areas. Both programs are operated cooperatively with numerous partners in state agencies, academic institutions, and other Federal agencies.

FY 2010 Activities and Performance Plan:

In FY 2010, EPA will:

- Develop and propose the CAIR replacement rule: Conduct legal, technical, and economic analyses to support the new CAIR proposal; continue assessing regulatory impacts on the U.S. economy, environment, small businesses, and local communities. Review and evaluate public comment.
- Continue implementation and operation of the CAIR annual and seasonal programs: This will be consistent with the decision made by the U.S. Court of Appeals for the District of Columbia Circuit in December 2008. The CAIR annual SO₂ trading program is expected to commence January 1, 2010, as intended.
- Continue to assist states with CAIR implementation: Provide technical assistance to states in implementing state plans and rules for CAIR annual and seasonal programs. Assist states in resolving issues related to source applicability, emissions monitoring and reporting, and the compliance supplement pool as well as provide technical support. Operate the CAIR annual NO_x control program.
- Continue operating infrastructure for CAIR: Effective and efficient operation of CAIR depends critically upon further development of the e-GOV infrastructure supporting the Acid Rain electronic allowance trading and emissions reporting systems.
- Ensure accurate and consistent results for the program: Successful air pollution control and trading programs require accurate and consistent monitoring of emissions from affected sources. Work will continue on performance specifications and investigating monitoring alternatives and methods to improve the efficiency of monitor certification and emissions data reporting.
- Assist states with considering Regional programs for Electric Generating Units (EGUs) outside of the CAIR Region: EPA will work with states to create cap-and-trade programs where they potentially could be more cost-effective than application of Best Available Retrofit Technology (BART).

In FY 2010, the program will continue to provide analytical support for the interagency National Acid Precipitation Assessment Program (NAPAP). NAPAP coordinates Federal acid deposition

research and monitoring of emissions, acidic deposition, and their effects, including assessing the costs and benefits of Title IV.

In FY 2010, the program will continue to manage the Clean Air Status and Trends Network (CASTNET), a deposition monitoring network. The FY 2010 request level for CASTNET is \$3.95M. For additional information on CASTNET, please visit <http://www.epa.gov/CASTNET/>. In addition, the program will begin managing the TIME and LTM programs for monitoring surface water chemistry and aquatic ecosystem response in sensitive areas of the U.S. In FY 2010, the responsibility for managing the TIME and LTM programs will be transferred from the Research and Development program to the Air and Radiation program. The FY 2010 request level for TIME/LTM is \$0.72M.

Performance Targets:

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Outcome	Tons of sulfur dioxide emissions from electric power generation sources	Avail. 2009	8,000,000	8,000,000	8,450,000	Tons Reduced

Reducing emissions of SO₂ remains a crucial component of EPA's strategy for cleaner air. Particulate matter can be formed from direct sources (such as diesel exhaust or smoke), but can also be formed through chemical reactions in the air. Emissions of SO₂ can be chemically transformed into sulfates that are very tiny particles which, when inhaled, can cause serious respiratory problems and may lead to premature mortality. Sulfates can be carried, by winds, hundreds of miles from the emitting source. These same small particles also are a main pollutant that impairs visibility across large areas of the country, particularly damaging in national parks that are known for their scenic views.

EPA tracks the change in nitrogen deposition and sulfur deposition with performance targets set for every three years; the next report date is planned for FY 2010.

FY 2010 Change from FY 2009 Enacted Budget (Dollars in Thousands):

- (+\$720.0) This increase supports the additional responsibilities the Air and Radiation program will be undertaking due to having the financial responsibility for maintaining the TIME-LTM network beginning in FY 2010. This activity was previously funded through the Research: Human Health and Ecosystems program. The focus of the research in the TIME/LTM programs was on the design of the monitoring program, development of indicators to measure changes, and reporting on those changes as a means of verifying the intended results. The defined goal for both of these research programs has been completed. In FY 2010, the Air and Radiation program will assume monitoring responsibility for the programs.
- (+\$107.0) This increase provides support for implementation of monitoring networks.

Statutory Authority:

CAA (42 U.S.C. 7401-7661f).

Federal Support for Air Quality Management

Program Area: Air Toxics and Quality
Goal: Clean Air and Global Climate Change
Objective(s): Healthier Outdoor Air

(Dollars in Thousands)

	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
Environmental Program & Management	\$94,556.0	\$96,480.0	\$100,510.0	\$4,030.0
<i>Science & Technology</i>	<i>\$12,676.0</i>	<i>\$11,133.0</i>	<i>\$11,542.0</i>	<i>\$409.0</i>
Total Budget Authority / Obligations	\$107,232.0	\$107,613.0	\$112,052.0	\$4,439.0
Total Workyears	691.5	709.7	714.7	5.0

Program Project Description:

This program supports state development of the clean air plans through developing modeling and other tools. EPA works with states and local governments to ensure the technical integrity of the mobile source controls in the State Implementation Plans (SIPs) and transportation conformity determinations. Also, EPA assists states and local governments to identify the most cost-effective control options available.

FY 2010 Activities and Performance Plan:

As part of implementing the 8-hour ozone and fine particulate matter (PM_{2.5}) standards, EPA will continue to provide state and local governments with substantial assistance in developing SIPs and implementing the conformity rule during this period. In FY 2010, EPA will continue to ensure national consistency in how conformity determinations are conducted across the United States. EPA will continue to ensure consistency in adequacy findings for motor vehicle emissions budgets in air quality plans, which are used in conformity determinations. EPA will continue to work with state and local transportation and air quality agencies to ensure that PM_{2.5} hot-spot analyses are conducted in a manner consistent with the transportation conformity regulation and guidance. In addition, EPA will work with states and local governments to ensure the technical integrity of the mobile source controls in the SIPs for the 8-hour ozone and PM_{2.5} air quality. EPA also will assist areas in identifying the most cost-effective control options available and provide guidance, as needed, for areas that implement conformity.

EPA will partner with states, tribes, and local governments to create a comprehensive compliance program to ensure that vehicles and engines pollute less. EPA will use advanced in-use measurement techniques and other sources of in-use data to monitor the performance of On-board Diagnostics (OBD) systems on vehicle models to make sure that OBD is a reliable check on the emissions systems. In FY 2008, basic and/or enhanced vehicle Inspection/Maintenance testing was being performed in over 30 states with technical and programmatic guidance from EPA. In FY 2010, EPA will continue to assist states in enhancing operating programs to deal with new fuel, vehicle, and technology requirements.

EPA will continue to assist state, Tribal, and local agencies in implementing and assessing the effectiveness of national clean air programs via a broad suite of analytical tools. For more information visit: <http://www.epa.gov/ttn/>.

EPA is working to implement improvements to the National Ambient Air Quality Standards (NAAQS) Federal program, within current statutory limitations, that address deficiencies in design and implementation and identify and evaluate needed improvements that are beyond current statutory authority. The Air Quality Grants and Permitting Program will be improved by working to update current grant allocation processes to ensure resources are properly targeted and developing program efficiency measures.

Performance Targets:

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Outcome	Cumulative percent reduction in population-weighted ambient concentration of fine particulate matter (PM-2.5) in all monitored counties from 2003 baseline.	Avail. 2009	4	5	6	Percentage

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Outcome	Cumulative percent reduction in population-weighted ambient concentration of ozone in monitored counties from 2003 baseline.	Avail. 2009	8	10	11	Percentage

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Efficiency	Cumulative percent reduction in the number of days to process State Implementation Plan revisions, weighted by complexity.	Avail. Spring 2009	-1.2	-2.4	-2.9	Percentage

EPA, collaborating with the states, will be implementing Federal measures and assisting with the development of clean air plans to continue to improve air quality as measured by the air quality index and other measures.

FY 2010 Change from FY 2009 Enacted Budget (Dollars in Thousands):

- (+\$358.0) This reflects an increase for payroll and cost of living for existing FTE.
- (+\$51.0) This increase supports additional analytical support needed to update air modeling capabilities to assist states with the development of clean air plans.

Statutory Authority:

CAA (42 U.S.C. 7401-7661f); Motor Vehicle Information Cost Savings Act; Alternative Motor Fuels Act of 1988; National Highway System Designation Act; NEP Act, SAFETEA-LU of 2005.

Federal Support for Air Toxics Program

Program Area: Air Toxics and Quality

Goal: Clean Air and Global Climate Change

Objective(s): Healthier Outdoor Air

(Dollars in Thousands)

	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
Environmental Program & Management	\$25,208.5	\$22,836.0	\$24,960.0	\$2,124.0
Science & Technology	\$2,907.9	\$2,279.0	\$2,339.0	\$60.0
Total Budget Authority / Obligations	\$28,116.4	\$25,115.0	\$27,299.0	\$2,184.0
Total Workyears	135.9	141.8	146.8	5.0

Program Project Description:

Federal support for the air toxics program includes a variety of tools to help characterize the level of risk to the public from toxics in the air and measure the Agency’s progress in reducing this risk. The program will develop and provide information and tools to assist state, local, and Tribal agencies as well as communities to reduce air toxics emissions and risk specific to their local areas.

Reductions in emissions of mobile source air toxics, such as diesel particulate matter (PM), are achieved through innovative and voluntary approaches working with state, local, and Tribal governments as well as a variety of stakeholder groups. This program also includes activities related to the Stationary Source Residual Risk Program.²

FY 2010 Activities and Performance Plan:

In FY 2010, EPA will continue to work with a broad range of stakeholders to develop incentives for different economic sectors (construction, ports, freight, and agriculture) to address the emissions from existing diesel engines. Work is being done across these sectors at the national and regional level to clean up the existing fleet. Reducing emissions from diesel engines will help localities meet the Agency’s Ambient Air Quality Goals and reduce exposure to air toxics from diesel engines. EPA also has developed several emissions testing protocols that will provide potential purchasers of emission control technology a consistent, third party evaluation of emission control products. EPA has developed partnerships with state and local governments, industry, and private companies to create project teams to help fleet owners create the most cost-effective retrofit programs.

EPA also will continue to provide technical expertise and support to state, local, and Tribal air toxics programs in assessing and reducing mobile source air toxics. This support includes models and other assessment tools, guidance on the application of such tools for evaluating impacts of proposed transportation facilities, guidance on the benefits of voluntary mobile source control programs, and other education and outreach materials.

² More information available at: <http://www.epa.gov/ttn/atw/risk/residriskpg.html>

EPA will work with partners to develop improved emission factors and inventories, including a better automated, higher-quality 2008 National Emissions Inventory (NEI) with an expected completion date of December 2010. This effort will include gathering improved activity databases and using geographic information systems (GIS) and satellite remote sensing, where possible, for key point, area, mobile and fugitive source categories and global emission events.

The Air Toxics program is working on improving monitoring systems to fill data gaps and get a better assessment of actual population exposure to toxic air pollution.

Performance Targets:

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Outcome	Cumulative percentage reduction in tons of toxicity-weighted (for cancer risk) emissions of air toxics from 1993 baseline.	Data Avail 2011	35	36	36	Percentage

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Outcome	Cumulative percentage reduction in tons of toxicity-weighted (for noncancer risk) emissions of air toxics from 1993 baseline.	Avail. 2011	59	59	59	Percentage

Performance targets for reduction of toxicity weighted emissions also are supported by work under the Federal Stationary Source Regulations program project.

FY 2010 Change from FY 2009 Enacted Budget (Dollars in Thousands):

- (+\$39.0) This reflects an increase for payroll and cost of living for existing FTE.
- (+\$21.0) Funding is requested for increased analytical support to help states address air toxics issues.

Statutory Authority:

CAA (42 U.S.C. 7401-7661f).

Federal Vehicle and Fuels Standards and Certification

Program Area: Air Toxics and Quality

Goal: Clean Air and Global Climate Change

Objective(s): Healthier Outdoor Air

(Dollars in Thousands)

	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
<i>Science & Technology</i>	<i>\$70,463.2</i>	<i>\$76,445.0</i>	<i>\$91,990.0</i>	<i>\$15,545.0</i>
Total Budget Authority / Obligations	\$70,463.2	\$76,445.0	\$91,990.0	\$15,545.0
Total Workyears	288.1	306.2	306.2	0.0

Program Project Description:

The most common mobile sources of air pollution are highway motor vehicles and their fuels. Other mobile sources, such as airplanes, ships, construction equipment and lawn mowers also produce significant amounts of pollutants. EPA regulates all of these sources to reduce the production of air pollution. The Agency also provides emissions and fuel economy information for new cars, and educates consumers on the ways their actions affect the environment.

Primary responsibilities include: developing and implementing national regulatory programs to reduce mobile source-related air pollution from light-duty cars and trucks, heavy-duty trucks and buses, nonroad engines and vehicles and their fuels; evaluating emission control technology; and providing state and local air quality regulators and transportation planners with access to information on transportation programs and incentive-based programs. Other activities include testing vehicles, engines and fuels, and establishing test procedures for and determining compliance with Federal emissions and fuel economy standards.

FY 2010 Activities and Performance Plan:

In FY 2010, EPA plans to promulgate a final rule establishing new Renewable Fuel Standards (RFS2) and implement several other actions required by the Energy Policy Act (EPAAct) of 2005 and the Energy Independence and Security Act (EISA) of 2007. EISA dramatically expanded the renewable fuels provisions of EPAAct and requires additional EPA studies in various areas of renewable fuel use. In FY 2010, EPA will complete a multi-year testing program started in late 2007 aimed at evaluating the environmental impacts of renewable fuels. The results from this program will be used to update the Agency’s fuel effects model used to support regulations.

In FY 2010, in support of its proposed RFS2 regulations, EPA is requesting increased resources to upgrade its vehicle and fuel testing capability at the National Vehicle and Fuel Emissions Laboratory (NVFEL) to certify and assess the emissions and fuel economy performance of vehicles and engines using increased volumes of renewable fuel. The expected increase in new renewable fuels introduced into commerce also will require additional effort by NVFEL personnel to measure and monitor critical properties and compounds to assure these new fuels will not cause detrimental emissions or vehicle performance impacts. In FY 2010, the Agency also will continue to implement its real-time reporting system to ensure compliance with

proposed RFS2 provisions. In addition, the Agency will continue to develop and update lifecycle models to allow assessment of new biofuel technologies and to evaluate feedstocks and fuel pathways for future fuels and processes.

In FY 2010, the Agency also expects to be engaged in work to address greenhouse gas emissions from the transportation sector for light-duty and heavy-duty vehicles. In addition, the Agency will be evaluating several petitions filed with the Agency in 2007 and 2008 requesting that EPA propose and adopt GHG emission standards for aircraft, ocean-going marine vessels, and nonroad engines and equipment.

In FY 2010, EPA will promulgate more stringent nitrogen oxide (NO_x) and particulate matter (PM) emission standards for ocean-going vessels. The designation of U.S. coastal areas as Emission Control Areas (ECA) pursuant to the International Convention for the Prevention of Pollution from Ships (MARPOL) Annex VI fuel sulfur provisions also will be critical to achieving PM reductions from ocean-going vessels, most of which are foreign flagged. In 2010, EPA will establish standards for U.S. emissions control areas while working with the International Maritime Organization (IMO). This effort will include analysis of air quality data and estimation of benefits and economic impact.

To meet the new nonroad diesel standards, engine manufacturers will produce engines that are going to be more complex and dependent on electronic controls, similar to highway engines. Nonroad On-Board Diagnostics (OBD) requirements are needed to ensure that engines are properly maintained and compliant, ensuring that the full benefits of the emission standards are realized in-use. A nonroad OBD rule will be promulgated in 2010. In addition, EPA will promulgate a rule establishing an in-use compliance testing program for nonroad diesel engines to be conducted by diesel engine manufacturers per a consent decree. This program is vital to ensuring that new engine standards are actually met in-use under real-world conditions. Other new regulatory programs include: a proposal for a new harmonized test cycle for highway motorcycles; a rulemaking (in response to court remand) justifying and updating the 2012 model year standards for snowmobiles; and the promulgation of new jet aircraft engine emission standards that would align Federal rules with international standards and propose other controls and program upgrades under Clean Air Act (CAA) authority. In addition, the Agency will evaluate the need to control lead in aviation gasoline and its use in piston engines.

EPA will continue to support implementation of existing vehicle, engine, and fuel regulations including the Tier II light-duty (LD) vehicle program, the Mobile Sources Air Toxics (MSAT) programs, the 2007-2010 Heavy-Duty (HD) Diesel standards, and the Non-Road Diesel Tier 4 standards (and earlier nonroad standards) in order to ensure the successful delivery of cleaner vehicles, equipment, and fuel. In-use compliance is an essential element of EPA's regulatory programs ensuring that emission standards are actually met under real-world conditions. EPA will continue implementation of a manufacturer-run in-use compliance surveillance program for highway heavy-duty diesel, locomotive, marine spark ignition (SI) and large SI engines.

Other FY 2010 implementation activities include continued evaluation and development of the Agency's new fuel economy labelling program and ongoing assessment and analysis of emissions and fuel economy compliance data. EPA also will be conducting follow-up

implementation work related to the mobile source air toxics rulemaking in preparation for the 2011 program start date (work includes the assessment of refineries' pre-compliance reports and early credit generation, in order to monitor the viability of the benzene credit market). The Agency also will continue implementation activities for the Locomotives/Marine rule finalized in 2008, as well as for small gasoline engine standards that began with model year 2009.

EPA's emission models provide the overarching architecture that supports EPA's regulatory programs, generating emission factors and inventories needed to quantify emission reductions. EPA continues to improve in this area with the development of the new mobile source emission model, MOVES. MOVES is greatly improving the Agency's ability to support the development of emission control programs, as well as provide support to states in their determination of program needs to meet air quality standards. In 2010, EPA will finalize the highway component and incorporate nonroad sources into MOVES.

EPA's National Vehicle and Fuel Emissions Laboratory (NVFEL) will continue to conduct testing operations on motor vehicles, heavy-duty engines, nonroad engines, and fuels to certify that all vehicles, engines, and fuels that enter the US market comply with all Federal clean air and fuel economy standards. The NVFEL lab will continue to conduct vehicle emission tests as part of pre-production tests, certification audits, in-use assessments, and recall programs to support mobile source clean air programs. Tests are conducted on a spot check basis on motor vehicles, heavy-duty engines, non-road engines, and fuels to: 1) certify that vehicles and engines meet Federal air emission and fuel economy standards; 2) ensure engines comply with in-use requirements; and 3) ensure fuels, fuel additives, and exhaust compounds meet Federal standards. In FY 2010, EPA will continue to conduct testing activities for fuel economy, Tier II testing, reformulated gasoline, future fleets, alternative fuel vehicle conversion certifications, OBD evaluations, certification audits, and recall programs. In addition to these testing activities, EPA also will be expanding its compliance testing of heavy-duty and non-road engines.

In FY 2010, EPA anticipates reviewing and approving approximately 5,000 vehicle and engine emissions certification requests, including light-duty vehicles, heavy-duty diesel engines, nonroad engines, marine engines, locomotives and others. This represents a significant expansion in EPA's certification burden over previous years, due in part to the addition of certification requirements for stationary engines and for marine and small spark-ignited engines. Certification and compliance of advanced technologies such as plug-in hybrid electric vehicles, light-duty diesel applications, and advanced after-treatment for heavy-duty highway compliance to meet standards taking effect for 2010 models also will be a major focus in FY 2010. The Agency also will continue to review the in-use verification program data submitted by vehicle manufacturers to determine whether there are any emissions compliance issues. In addition, EPA will continue to expand its web-based compliance information system to be used by manufacturers and EPA staff to house compliance data for all regulated vehicles and engines. EPA will continue to be responsible for vehicle CAFE and gas guzzler fuel economy testing and for providing the fuel economy data to the Department of Transportation, Department of Energy, and Internal Revenue Service.

In FY 2010, EPA expects to expend significant resources on ensuring compliance with certification as well as in-use requirements for foreign-built engines and equipment. EPA also

will continue the implementation of fuels regulatory requirements such as Reformulated Fuel Standards (RFS), Ultra Low Sulfur Diesel (ULSD), Gasoline Sulfur, and Air Toxics.

Through the World Summit on Sustainable Development (WSSD) partnerships with developing countries EPA will continue addressing the impact to human health and the environment from motor vehicles in developing countries. EPA will continue to focus its efforts on two priorities: completing the global elimination of lead from gasoline; and reducing sulfur in diesel and gasoline, while concurrently introducing cleaner vehicle technologies. These emissions reductions will reduce pollution that is transported across our borders and the northern hemisphere into the United States, providing important air quality and public health benefits to the United States.

The Agency's Mobile Sources program is collecting data to better monitor efficiency improvements, and is systematically analyzing and evaluating regulations to ensure it is effectively achieving the greatest benefits.

Performance Targets:

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Outcome	Tons of particulate matter (PM-10) Reduced since 2000 from Mobile Sources	Avail. 2009	99,458	111,890	124,322	Tons

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Outcome	Tons of fine particulate matter (PM-2.5) Reduced since 2000 from Mobile Sources	Avail. 2009	97,947	110,190	122,434	Tons

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Outcome	Limit the increase of CO emissions (in tons) from mobile sources compared to a 2000 baseline.	Avail. 2009	1.35M	1.52M	1.69M	Tons

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Outcome	Millions of Tons of Volatile Organic Compounds (VOCs) Reduced since 2000 from Mobile Sources	Avail. 2009	1.37M	1.54M	1.71M	Tons

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Outcome	Millions of Tons of Nitrogen Oxides (NOx) Reduced since 2000 Reduced from Mobile Sources	Avail. 2009	2.71M	3.05M	3.39M	Tons

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Efficiency	Tons of pollutants (VOC, NOx, PM, CO) reduced per total emission reduction dollars spent (both EPA and private industry).	Avail. 2009	0.010M	0.011M	0.011M	Tons

EPA will continue to achieve results in reducing pollution from mobile sources, especially NOx emissions. The Tier 2 Vehicle program, which took effect in 2004, will make new cars, SUVs, and pickup trucks 77 to 95 percent cleaner than 2003 models. The Clean Trucks and Buses program, which began in 2007, will make new highway diesel engines as much as 95 percent cleaner than current models. Under the Non-road Diesel Program, new fuel and engine requirements will reduce sulfur in off-highway diesel by more than 99 percent by 2010. Combined, these measures will prevent over 22,000 premature deaths each year, reduce millions of tons of pollution a year, and prevent hundreds of thousands of respiratory illnesses.

FY 2010 Change from FY 2009 Enacted Budget (Dollars in Thousands):

- (+\$13,227.0) This increase is to upgrade the Agency’s vehicle and fuel testing capability at the National Vehicle and Fuel Emissions Laboratory (NVFEL). These upgrades enhance EPA’s ability to certify and assess the emissions and fuel economy performance of vehicles and engines using increased volumes of renewable fuel. This funding request is linked to EPA’s proposed RFS2 program, which seeks to implement provisions of the Energy Independence and Security Act of 2007. This increase also will support increased NVFEL capabilities to measure and monitor critical properties and compounds to assure that these new fuels will not cause detrimental emissions or vehicle performance impacts.
- (+\$2,318.0) This reflects an increase for payroll and cost of living for existing FTE.

Statutory Authority:

CAA (42 U.S.C. 7401-7661f); MVICSA; AMFA of 1988; NHSDA; NEPA; EPC Act; and EPA of 2005; EISA of 2007.

Radiation: Protection

Program Area: Air Toxics and Quality

Goal: Clean Air and Global Climate Change

Objective(s): Healthier Outdoor Air; Radiation

(Dollars in Thousands)

	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
Environmental Program & Management	\$10,820.8	\$10,957.0	\$11,272.0	\$315.0
<i>Science & Technology</i>	<i>\$2,069.1</i>	<i>\$2,156.0</i>	<i>\$2,242.0</i>	<i>\$86.0</i>
Hazardous Substance Superfund	\$2,165.0	\$2,295.0	\$2,596.0	\$301.0
Total Budget Authority / Obligations	\$15,054.9	\$15,408.0	\$16,110.0	\$702.0
Total Workyears	85.8	88.6	88.6	0.0

Program Project Description:

This program supports the on-going radiation protection capability at the National Air and Radiation Environmental Laboratory (NAREL) located in Montgomery, Alabama, and the Radiation and Indoor Environments National Laboratory (R&IE) located in Las Vegas, Nevada. These laboratories provide radioanalytical and mixed waste testing and analysis of environmental samples to support site assessment, clean-up, and response activities.

Both labs provide technical support for conducting site specific radiological characterizations and clean-ups, using the best available science to develop risk assessment tools. The labs also develop guidance for cleaning up sites that are contaminated with radioactive materials in collaboration with the public, industry, states, tribes, and other governments.

FY 2010 Activities and Performance Plan:

In FY 2010, EPA, in cooperation with states, tribes, and other Federal agencies, will provide ongoing site characterization and analytical support for site assessment activities, remediation technologies, and measurement and information systems. EPA also will provide training and direct site assistance including: field survey and monitoring, laboratory analysis, health and safety, and risk assessment support at sites with actual or suspected radioactive contamination.

EPA's laboratories will continue to support EPA Regional Superfund Remedial Project Managers (RPMs) and On-Scene Coordinators (OSCs), providing laboratory and field-based radioanalytical and mixed waste analyses, technical services, guidance, and standardized procedures.

EPA recently developed several outcome-oriented strategic and annual performance measures for this program in response to OMB recommendations. The measures all have baseline data and some historical data which provide a benchmark to assist in the development of the outyear targets.

Performance Targets:

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Ouput	Percentage of most populous US cities with a RadNet ambient radiation air monitoring system, which will provide data to assist in protective action determinations.	92	85	90	95	Percentage

EPA expects to be on track through its ongoing work to accomplish its FY 2011 strategic plan goal of protecting public health and the environment from unwanted releases of EPA regulated radioactive waste and to minimize impacts to public health from radiation exposure.

FY 2010 Change from FY 2009 Enacted Budget (Dollars in Thousands):

- (+\$80.0) This reflects an increase for payroll and cost of living for existing FTE.
- (+\$6.0) This reflects additional resources to support site assessment activities.

Statutory Authority:

Atomic Energy Act (AEA) of 1954, as amended, 42 U.S.C 2011 et seq. (1970), and Reorganization Plan #3 of 1970; Clean Air Act (CAA) Amendments of 1990; Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the SARA of 1986 ; EPA of 1992, P.L. 102-486; Executive Order 12241 of September 1980, National Contingency Plan, 3 CFR, 1980; National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR 300; Nuclear Waste Policy Act (NWPA) of 1982; Public Health Service Act (PHSA), as amended, 42 U.S.C 201 et seq.; Safe Drinking Water Act (SDWA); Uranium Mill Tailings Radiation Control Act (UMTRCA) of 1978; Waste Isolation Pilot Plant (WIPP) Land Withdrawal Act. of 1992.

Radiation: Response Preparedness
 Program Area: Air Toxics and Quality
 Goal: Clean Air and Global Climate Change
 Objective(s): Radiation

(Dollars in Thousands)

	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
Environmental Program & Management	\$2,899.4	\$2,997.0	\$3,087.0	\$90.0
<i>Science & Technology</i>	<i>\$3,780.3</i>	<i>\$3,967.0</i>	<i>\$4,164.0</i>	<i>\$197.0</i>
Total Budget Authority / Obligations	\$6,679.7	\$6,964.0	\$7,251.0	\$287.0
Total Workyears	39.7	42.3	42.3	0.0

Program Project Description:

The National Air and Radiation Environmental Laboratory (NAREL) in Montgomery, Alabama, and the Radiation and Indoor Environments National Laboratory (R&IE) in Las Vegas, Nevada, provide field sampling and analyses, laboratory analyses, and direct scientific support to respond to radiological and nuclear incidents. This includes measuring and monitoring radioactive materials and assessing radioactive contamination in the environment. This program comprises direct scientific field and laboratory activities to support preparedness, planning, training, and procedures development. In addition, selected staff are members of EPA's Radiological Emergency Response Team (RERT) and are trained to provide direct expert assistance in the field.

FY 2010 Activities and Performance Plan:

In FY 2010, EPA's RERT, a component of the Agency's emergency response program, will continue to improve the level of readiness to support Federal radiological emergency response and recovery operations under the National Response Framework (NRF) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The laboratory RERT members will conduct training and exercises to enhance and demonstrate their ability to fulfill EPA responsibilities in the field, using mobile analytical systems. Laboratory staff also will support field operations with fixed laboratory analyses and provide rapid and accurate radionuclide analyses in environmental matrices.³

Also in FY 2010, the labs will continue to develop rapid-deployment capabilities to ensure that field teams are ready to provide scientific data, analyses and updated analytical techniques for radiation emergency response programs across the Agency. The labs will maintain readiness for radiological emergency responses; participate in emergency exercises; provide on-site scientific support to state radiation, solid waste, and health programs that regulate radiation remediation; participate in the Protective Action Guidance (PAG) development and application; and respond, as required, to radiological incidents.

³ Additional information can be accessed at: <http://www.epa.gov/radiation/rert/>

EPA recently developed several outcome-oriented strategic and annual performance measures for this program in response to OMB recommendations. The measures all have baseline data and some historical data which provide a benchmark to assist in the development of the outyear targets.

Performance Targets:

EPA expects to be on track through its ongoing work to accomplish its FY2011 strategic plan goal of protecting public health and the environment from unwanted releases of EPA regulated radioactive material and to minimize impacts to public health from radiation exposure. Measures can be seen in the EPM Appropriation for same program project.

FY 2010 Change from FY 2009 Enacted Budget (Dollars in Thousands):

- (+\$175.0) This reflects an increase for payroll and cost of living for existing FTE.
- (+\$22.0) This increase is associated with increased programmatic laboratory fixed costs.

Statutory Authority:

Atomic Energy Act (AEA) of 1954, as amended, 42 U.S.C 2011 et seq. (1970), and Reorganization Plan #3 of 1970; Clean Air Act (CAA) Amendments of 1990; Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR 300; 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; Homeland Security Act of 2002; Post-Katrina Emergency Management Reform Act of 2006 (PKEMRA); Public Health Service Act (PHSA), as amended, 42 U.S.C 201 et seq.; Robert T. Stafford Disaster Relief and EAA, as amended, 42 U.S.C 5121 et seq.; Safe Drinking Water Act (SDWA); and Title XIV of the Natural Disaster Assistance Act (NDAA) of 1997, PL 104-201 (Nunn-Lugar II).

Program Area: Climate Protection Program

Climate Protection Program

Program Area: Climate Protection Program
Goal: Clean Air and Global Climate Change
Objective(s): Reduce Greenhouse Gas Intensity

(Dollars in Thousands)

	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
Environmental Program & Management	\$97,364.3	\$94,271.0	\$111,634.0	\$17,363.0
<i>Science & Technology</i>	<i>\$17,156.3</i>	<i>\$16,828.0</i>	<i>\$18,975.0</i>	<i>\$2,147.0</i>
Total Budget Authority / Obligations	\$114,520.6	\$111,099.0	\$130,609.0	\$19,510.0
Total Workyears	217.2	213.0	223.0	10.0

Program Project Description:

EPA manages the Clean Automotive Technology (CAT) and the Fuel Cell and Hydrogen programs, which develop advanced clean and fuel-efficient automotive technology to better protect the environment and save energy. These programs are designed to help recognize and remove barriers in the marketplace and to more rapidly deploy cost-effective low greenhouse gas technologies into the transportation sector of the economy. (For more information visit: <http://www.epa.gov/otaq/technology>).

The emphasis of CAT program work is research and collaboration with the automotive, trucking, and fleet industries. Through cooperative research and development agreements (CRADA), EPA plans to continue demonstrating its unique hydraulic hybrid technology and advanced clean-engine technologies in vehicles, such as large SUVs, pickup trucks, urban delivery trucks, school buses, shuttle buses, and refuse trucks.

EPA has installed its unique hydraulic hybrid technology in 5 different types of demonstration chassis/vehicles (for different vocations) which are being used by EPA to lead technology transfer efforts necessary to bring about the initial commercial introduction of significant elements of EPA's cost-effective low greenhouse gas technologies by vehicle manufacturers. EPA's goal is to achieve initial commercialization of urban delivery trucks in 2010.

FY 2010 Activities and Performance Plan:

In FY 2010, the Clean Automotive Technology Program will:

- Continue the transfer of EPA's advances in hydraulic hybrid technologies (promote adoption of technology and technical assistance), providing continuity in EPA's commitments to the truck and fleet industry for development and deployment. In addition, the program will continue the transfer of EPA's advances in clean diesel combustion technologies and promote the adoption of technology and technical assistance by providing continuity in EPA's commitments to the automotive and truck industry for development and deployment.

- Continue field tests currently underway and planned for hydraulic-hybrid and clean engine technologies achieving better fuel economy than the typical baseline vehicles.
- Continue demonstration of the effectiveness of the Clean Automotive Technology Program’s high-efficiency, low GHG, clean combustion E-85/M-85 alcohol engine in a series hydraulic hybrid vehicle.
- Demonstrate the effectiveness of the Clean Automotive Technology Program’s high-efficiency, clean combustion gasoline homogeneous-charge compression ignition (HCCI) engine when used with a series hydraulic hybrid vehicle.

In FY 2010, the Fuel Cell and Hydrogen Program will:

- Continue to coordinate with key stakeholders through the public/private California Fuel Cell Partnership to facilitate the commercialization of innovative technologies.

Performance Targets:

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Output	Million metric tons of carbon equivalent (mmtce) of greenhouse gas reductions in the transportation sector.	1.6	1.5	2.6	4.3	MMTCE

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Output	Million metric tons of carbon equivalent (mmtce) of greenhouse gas reductions in the buildings sector.	Data Avail. 2009	32.4	35.5	39.0	MMTCE

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Output	Million metric tons of carbon equivalent (mmtce) of greenhouse gas reductions in the industry sector.	Data Avail. 2009	67.7	72.9	82.9	MMCTE

EPA is working through its technology transfer demonstration projects with industry to develop performance data which definitively quantifies the “real-world” greenhouse gas reduction potential of these clean automotive technologies. Initial “real-world” test data will begin coming in from the various demonstration programs with industry in 2009. The Agency will use the data to develop performance measures for the Clean Automotive Technologies program.

FY 2010 Change from FY 2009 Enacted Budget (Dollars in Thousands):

- (+\$272.0) This reflects an increase for payroll and cost of living for existing FTE.
- (+\$1,875.0) The increase will be used in the next phase of our hydraulic hybrid / clean engine demonstration partnership with the California South Coast Air Quality Management District. The work will demonstrate the low greenhouse gas potential possible from a shuttle bus equipped with series hydraulic hybrid technology and powered by the world's first gasoline homogeneous-charge, compression-ignition (HCCI) engine which gets diesel efficiency from gasoline fuel without the need for costly diesel aftertreatment. The partnership will also begin its initial work on ways to demonstrate the use of clean low greenhouse gas renewable fuel with hydraulic hybrid vehicles.

Statutory Authority:

CAA Amendments, 42 U.S.C. 7401 et seq. - Sections 102, 103, 104, and 108; Pollution Prevention Act, 42 U.S.C. 13101 et seq. - Sections 6602, 6603, 6604, and 6605; NEPA, 42 U.S.C. 4321 et seq. - Section 102; Global Climate Protection Act, 15 U.S.C. 2901 - Section 1103; FTTA, 15 U.S.C. - Section 3701a.

Program Area: Enforcement

Forensics Support

Program Area: Enforcement

Goal: Compliance and Environmental Stewardship

Objective(s): Enhance Societies Capacity for Sustainability through Science and Research

(Dollars in Thousands)

	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
<i>Science & Technology</i>	<i>\$14,042.7</i>	<i>\$15,087.0</i>	<i>\$15,946.0</i>	<i>\$859.0</i>
Hazardous Substance Superfund	\$2,629.1	\$2,378.0	\$2,471.0	\$93.0
Total Budget Authority / Obligations	\$16,671.8	\$17,465.0	\$18,417.0	\$952.0
Total Workyears	96.8	105.8	105.2	-0.6

Program Project Description:

The Forensics Support program provides specialized scientific and technical support for the nation's most complex civil and criminal enforcement cases as well as technical expertise for Agency compliance efforts. This work is key to establishing non-compliance and building viable enforcement cases and is carried out by EPA's National Enforcement Investigations Center (NEIC). NEIC is a fully accredited environmental forensics center under International Standards Organization (ISO) 17025, the main standard used by testing and calibration laboratories. NEIC's Accreditation Standard has been customized to cover both laboratory and field activities.

NEIC collaborates with other Federal, state, local, and Tribal enforcement organizations to provide technical assistance, consultation, on-site inspection, investigation, and case resolution activities in support of the Agency's civil enforcement program. The program coordinates with the Department of Justice and other Federal, state, and local law enforcement organizations to provide this type of science and technology support for criminal investigations.⁴

FY 2010 Activities and Performance Plan:

Efforts to stay at the forefront of environmental enforcement in FY 2010 include focusing on the refinement of single and multi-media compliance monitoring investigation approaches, use of customized laboratory methods to solve unusual enforcement case challenges, and applied research and development in both laboratory and field applications. In response to case needs, the NEIC will conduct applied research and development to identify, develop, and deploy new capabilities, test and/or enhance existing methods and techniques, and provide technology transfer to other enforcement personnel involving environmental measurement and forensic applications. As part of this activity, NEIC also will evaluate the scientific basis and/or technical enforceability of select EPA regulations that may impact program activities. Additionally, NEIC will apply its technical resources in support of the Agency's national enforcement priorities.

⁴ For more information, refer to: <http://www.epa.gov/compliance/neic/index.html>.

In FY 2010, NEIC will continue to function under stringent ISO requirements for environmental data measurements to maintain its accreditation. The program also will continue development of emerging technologies in field measurement and laboratory analytical techniques.

Performance Targets:

Currently, there are no specific performance measures for this program project.

FY 2010 Change from FY 2009 Enacted Budget (Dollars in Thousands):

- (+\$790.0) This reflects an increase for payroll and cost of living for existing FTE.
- (+\$69.0) This change reflects an increase in support cost for the forensics laboratory at the National Enforcement Investigations Center.

Statutory Authority:

RCRA; CWA; SDWA; CAA; TSCA; Residential Lead-Based Paint Hazard Reduction Act (RLBPHRA); FIFRA; Ocean Dumping Act (i.e., MPRSA); EPCRA.

Program Area: Homeland Security

Homeland Security: Critical Infrastructure Protection

Program Area: Homeland Security

Goal: Clean and Safe Water

Objective(s): Protect Human Health

(Dollars in Thousands)

	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
Environmental Program & Management	\$4,814.4	\$6,837.0	\$7,014.0	\$177.0
<i>Science & Technology</i>	<i>\$32,656.7</i>	<i>\$19,460.0</i>	<i>\$28,329.0</i>	<i>\$8,869.0</i>
Hazardous Substance Superfund	\$1,766.3	\$1,736.0	\$1,824.0	\$88.0
Total Budget Authority / Obligations	\$39,237.4	\$28,033.0	\$37,167.0	\$9,134.0
Total Workyears	47.3	49.0	49.0	0.0

Program Project Description:

This program provides resources to coordinate and support protection of the nation’s critical water infrastructure from terrorist threats and all-hazard events. Reducing risk in the water sector requires a multi-step approach to: determine risk through vulnerability, threat, and consequence assessments; reduce risk through security enhancements; prepare to effectively respond to and recover from incidents; and measure the water sector’s progress in risk reduction. The Public Health Security and Bioterrorism Response and Preparedness Act of 2002 (Bioterrorism Act) also provides that EPA support the water sector in such activities. See <http://www.epa.gov/safewater/watersecurity> for more information.

FY 2010 Activities and Performance Plan:

EPA will continue to support the Water Security Initiative (WSI) pilot program and water sector-specific agency responsibilities, including the Water Alliance for Threat Reduction (WATR), to protect the nation’s critical water infrastructure. The Agency also will continue progress to integrate the Regional laboratory networks and the WSI pilot laboratories into a national, consistent program. All of these efforts support the Agency’s responsibilities and commitments under the National Infrastructure Protection Plan (NIPP), as defined within the Water Sector Specific Plan, which includes, for example, specific milestones for work related to the WSI, the Water Laboratory Alliance, and metric development.

The FY 2010 request includes \$22.4 million for WSI and \$1.3 million for WATR. The FY 2010 requested increase will allow EPA to complete funding for cooperative agreements to support pilots four and five. The request also will support technical assistance for the existing pilots, research efforts on evaluating chemical, biological, and radiological (CBR) analytical methods and event detection software, and assist in conducting outreach efforts to migrate lessons learned from the pilots to the water sector. In the out-years, EPA will focus on calibrating the contaminant warning systems and conducting extensive and thorough evaluations of each pilot. The Agency also will continue to prepare and refine a series of guidance documents for water

utilities on designing, deploying, and testing contamination warning systems based on additional lessons learned from the pilots.

Water Security Initiative

EPA's goal is to develop a "robust, comprehensive, and fully coordinated surveillance and monitoring system" for drinking water and a water laboratory network that would support water surveillance and emergency response activities. The overall goal of the initiative is to design and demonstrate an effective system for timely detection and appropriate response to drinking water contamination threats and incidents through a pilot program that would have broad application to the nation's drinking water utilities in high threat cities.

Water Security Initiative (WSI) consists of five general components: (1) enhanced physical security monitoring, (2) water quality monitoring, (3) routine and triggered sampling for high priority contaminants, (4) public health surveillance, and (5) consumer complaint surveillance. Recent simulation analyses underscore the importance of a contaminant warning system that integrates all five components of event detection, as different contaminants are detected by different sequences of triggers or "alarms."

WSI is intended to demonstrate the concept of an effective contamination warning system that drinking water utilities in high threat cities of all sizes and characteristics could adopt. Resources appropriated to date have enabled EPA to award a total of five pilots for the WSI as outlined below:

- The first pilot was funded in FY 2006 and was operational in FY 2007. It is the first comprehensive and integrated drinking water contamination warning system at a public water system in the world.
- Pilots two and three were awarded in FY 2007 and fully funded in the second quarter of FY 2008.
- Pilots four and five were awarded in FY 2008. Phased funding was provided for pilots four and five during FY 2008 and FY 2009.

Each of the pilots will be subjected to extensive validation in the field. In the absence of an actual contamination event, much of the evaluation of the pilots will occur through reviewing, for example, the success of conducting sample analysis in response to a trigger. EPA will quickly share information learned from the pilots with other water utilities, rather than waiting for the pilots' conclusion before disseminating key results. For example, EPA has published several documents which address designing a contamination warning system, operating the system, and developing consequence management plans. Evaluation efforts will be carried out in collaboration with other Federal agencies and a users group consisting of the pilots and other progressive utilities.

Water Laboratory Alliance

In a contamination event, the sheer volume or unconventional type of samples will quickly overwhelm the capacity or capability of a single laboratory. To address this deficiency, EPA has

established a national alliance of laboratories harnessed from the range of existing lab resources from the local (e.g., water utility) to the Federal levels (e.g., CDC's Laboratory Response Network) into a Water Laboratory Alliance (WLA). The WLA will reduce the time necessary for confirming an intentional contamination event in drinking water and speed response and decontamination efforts. Implementation of the WLA is progressing through the establishment of 11 Regional networks consisting of state public health and environmental laboratories, drinking water utilities, and EPA Regional laboratories that collectively compose Regional laboratory response preparedness systems. By FY 2010, EPA will have integrated the 11 Regional Laboratory Response Plans into a single National Plan. In addition, EPA will continue to support the Regional laboratory networks by providing laboratories and utilities with access to supplemental analytical capability and capacity, improved preparedness for analytical support to an emergency situation, and coordinated and standardized data reporting systems and analytical methods.

Under the WLA, EPA also will validate methods for contaminants of high concern in drinking water, about 90 percent of which currently lack validated methods. EPA has established Regional laboratory response plans and networks focused on drinking water contamination response for each of EPA's ten Regions. In FY 2010, the Agency will continue to build these Regional alliances to provide laboratories and utilities with access to supplemental analytical capability and capacity, improved preparedness for analytical support to an emergency situation, and coordinated and standardized data reporting systems and analytical methods.

Water Sector-Specific Agency Responsibilities

EPA is the sector-specific Agency "responsible for infrastructure protection activities" for the water sector (drinking water and wastewater utilities). EPA is responsible for developing and providing tools and training on improving security to the 52,000 community water systems and 16,000 publicly-owned treatment works.

In FY 2010, EPA will work to ensure that water sector utilities have tools and information to prevent, detect, respond to, and recover from terrorist attacks, other intentional acts, and natural disasters. The following preventive and preparedness activities will be implemented for the water sector in collaboration with the Department of Homeland Security (DHS) and states' homeland security and water sector officials:

- Continue to develop and conduct exercises to prepare utilities, emergency responders, and decision-makers to evaluate and respond to physical, cyber, and contamination threats and events;
- Disseminate tools and provide technical assistance to ensure that water and wastewater utilities and emergency responders react rapidly and effectively to intentional contamination and other incidents. Tools include: information on high priority contaminants, incident command protocols, sampling and detection protocols and methods, and treatment options;
- Support WATR through continuing to conduct additional training sessions for drinking water systems serving over 100,000 people;
- Support the establishment of mutual aid agreements among utilities to improve recovery times;

- Develop consequence management guidance in coordination with stakeholders to enable water utilities to respond to all-hazards;
- Create a consequence analysis tool to estimate the public health and economic costs which could be incurred as a result of a contamination event, natural disaster, or other type of significant incident;
- Develop guidance for water utilities on how to dispose of large amounts of contaminated water; and
- Develop annual assessments, as required under the National Infrastructure Protection Plan, to describe existing water security efforts and progress in achieving the sector's key metrics.

Performance Targets:

Work under this program supports EPA's Protect Human Health objective. Currently, there are no performance measures for this specific Program.

FY 2010 Change from FY 2009 Enacted Budget (Dollars in Thousands):

- (+\$185.0) This reflects an increase for payroll and cost of living for existing FTE.
- (+\$8,000.0) This increase completes funding for all Water Security Initiative pilot cooperative agreements begun in response to the Bioterrorism Act of 2002.
- (+\$684.0) This increase will assist the Agency in fulfilling its responsibilities and commitments under the National Infrastructure Protection Plan (NIPP), which includes the Water Laboratory Alliance and metric development.

Statutory Authority:

SDWA; CWA; Public Health Security and Bioterrorism Emergency and Response Act of 2002; EPCRA.

Homeland Security: Preparedness, Response, and Recovery

Program Area: Homeland Security

Goal: Clean Air and Global Climate Change

Objective(s): Radiation

Goal: Healthy Communities and Ecosystems

Objective(s): Chemical and Pesticide Risks; Enhance Science and Research

(Dollars in Thousands)

	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
Environmental Program & Management	\$4,105.3	\$3,378.0	\$3,443.0	\$65.0
<i>Science & Technology</i>	<i>\$40,807.3</i>	<i>\$43,671.0</i>	<i>\$42,409.0</i>	<i>(\$1,262.0)</i>
Hazardous Substance Superfund	\$45,283.2	\$53,641.0	\$53,543.0	(\$98.0)
Total Budget Authority / Obligations	\$90,195.8	\$100,690.0	\$99,395.0	(\$1,295.0)
Total Workyears	176.5	174.2	174.2	0.0

Program Project Description:

Through research, development, and technical support activities, EPA’s Homeland Security Research Program enhances the Nation’s preparedness, response, and recovery capabilities for homeland security large-scale catastrophic incidents involving chemical, biological, or radiological threats and attacks. EPA continues to evaluate tools and capabilities so that cost effective response and recovery approaches can be identified for future use by the response community, elected and appointed decision makers, and risk managers. Research will further state-of-the-art approaches to address all phases of emergency response and recovery to ensure public and worker safety, protect property, and facilitate recovery. The Agency also continues to work with other Federal agencies and organizations, through collaborative research efforts, to strengthen remediation capabilities.

FY 2010 Activities and Performance Plan:

EPA homeland security research on chemical, biological, and radiological (CBR) contaminants will continue to fill critical gaps in our ability to effectively respond to and recover from threats, attacks, and large-scale catastrophic incidents. EPA has unique knowledge and expertise related to decontamination and disposal of contaminated materials. Additionally, the Agency has demonstrated results meeting the needs of decision makers and emergency responders across government and industry.

FY 2010 Homeland Security Research Program funds will be used to deliver science and engineering research results to the program’s customers to better facilitate and enable their ability to carry out their homeland security missions. Customer needs, identified jointly, are the primary consideration used in prioritizing research activities. Key customers include EPA’s Water, Solid Waste and Emergency Response, and Air and Radiation programs, among others. EPA’s research program provides support and assistance in interactions with water utilities to

help ensure the nation's water systems are secure and drinking water is acceptable. The Agency's research program also is increasing its responsiveness to the science needs of the EPA emergency response community (National Decontamination Team, Environmental Response Team, Radiological Emergency Response Team, Removal Managers, and On-Scene Coordinators). Research will focus on providing tools and support to facilitate response to and recovery from large-scale catastrophic incidents. Along with this customer focus, the program has enhanced communication throughout EPA's Homeland Security program and the Regional offices to improve collaboration and to ensure that needs are met.

Decontamination Research: EPA's decontamination research program directly supports the Agency's National Response Plan (NRP) as well as its homeland security responsibilities. In many cases, the research program also supports the Department of Homeland Security's requirements for EPA expertise in a number of key areas including water infrastructure, materials decontamination and disposal, threat assessment, sampling, and analytical methods. Activities in FY 2010 include the following:

- Threat and consequence assessment research will continue to focus on products and information to aid decision-makers in assessing risks to human health from biological and chemical agents and to further identify research gaps. The information to be collected, generated, and evaluated includes data on the toxicity, infectivity, mechanism of action, fate, transport, and exposure consequences for Chemical, Biological, and Radiological (CBR) contaminants. It also will be used to develop relationships of human response to varying doses of biological organisms to assist in the development of cleanup goals. Research will continue to identify risks during incidents and to develop improved methods to communicate those risks to decision-makers and the public.
- Technology testing and evaluation research will continue to develop innovative methods and test commercially-available technologies. These efforts will enhance the Nation's ability to detect and decontaminate CBR contaminants resulting from terrorist attacks on infrastructure and outdoor areas such as urban centers.
- Response capability enhancement research will continue to support the development of the Environmental Response Laboratory Network (ERLN). EPA will continue to expand the Standardized Analytical Methods (SAM) and create Reference Laboratory capability. SAM identifies high risk chemical, biological, and radiological agents and analytical methods for the ERLN that are required to document safe restoration exposure levels. Reference Laboratories serve as an authoritative source in the ERLN for method development, verification, and validation.
- Decontamination and consequence management research will continue to develop and improve decontamination and disposal techniques and technologies for CBR contaminants. This research includes the remediation and clean-up of building exteriors and infrastructure (e.g., subways, bridges, stadiums, airports, train stations, rail lines, highways, drinking water and wastewater systems). It also involves the clean-up of various outdoor areas (e.g., walks, streets, parks) in both urban and non-urban areas, as well as the safe disposal of contaminated materials and decontamination residue.

Decontamination research will produce many science and engineering products in FY 2010 to support EPA's National Response Plan and first responders in carrying out their homeland security missions. The following are several key products to be completed in FY 2010:

- Methods for rapid determination of CBR contaminant viability on surfaces and in environmental media;
- Improved understanding of the ability of anthrax to re-aerosolize from various indoor and outdoor surfaces;
- Methods to combine infectivity and exposure assessments into a scientifically defensible characterization of risk of humans exposed to anthrax;
- Data on the persistence of CB contaminants in the indoor and outdoor environments and in landfills;
- Evaluations of and improvements to methods for removal of radioactive contaminants from outdoor urban surfaces;
- Improvements in methods for decontamination of CB contaminants, including low-tech methods for clean-up after wide-area releases;
- Data on materials compatibility for various decontamination methods;
- Demonstration of scaled-up decontamination technologies shown to be efficacious in laboratory studies;
- Provisional Advisory Levels (PALs) for 15 chemicals to guide responders on human health risk of exposure to toxic industrial chemicals and chemical warfare agents. PALs apply to exposure durations ranging from 24 hours to two years. They complement the Acute Exposure Guideline Levels (AEGLs) program, which derives limits for exposure durations of up to eight hours; and
- Expanded *Disposal Decision Support Tool* to include additional options for the disposal of radioactive wastes and wastes from agroterrorism.

Water Infrastructure Protection Research: Water Infrastructure Protection Research will focus on developing, testing, demonstrating, communicating, and implementing enhanced methods for detection, treatment, and containment of CBR agents and bulk industrial chemicals intentionally introduced into drinking water and wastewater systems. This is consistent with the Critical Infrastructure Protection Plan (CIPP) developed for water infrastructure and with the Water Security Research and Technical Support Action Plan. The program will produce many science and engineering products in FY 2010 to support EPA's Water Program and water utilities in carrying out their homeland security missions. The following are several key products to be completed in FY 2010:

- Computer tools to assess water utility vulnerabilities, to optimally place sensors, and to manage consequences of both terror and non-terror events;
- Cost-effective online water quality monitors (i.e. pH, TOC, chlorine, etc) essential to real-time monitoring of distribution systems;
- Decontamination approaches for water distribution systems;
- Distribution system flushing options for reducing spread of contaminants;
- Treatment approaches for dealing with contaminated water; and
- Validated chemical Standard Analytical Protocols (SAP) for water.

Safe Buildings Research: EPA's Safe Buildings research focuses on identifying, developing, and testing better, less expensive, and safer decontamination methods to facilitate building reoccupancy after a terrorist attack involving CBR contaminants. This research also involves developing procedures to use before and after an attack that would minimize the spread of contaminants inside a building, protect building occupants, and limit the area needing decontamination. An indoor contamination event typically results in a significant quantity of building decontamination residue, and this research also addresses safe disposal of these residues. The program will produce science and engineering products in FY 2010 to support EPA's National Response Plan and first responders in carrying out their homeland security missions, including:

- Performance information on commercially-available biological decontamination technologies to assist decision making on clean-up following an attack.
- Strategies to contain fumigants used in the decontamination of buildings.

Radiation Monitoring: Maintenance and enhancement 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.

The Agency will continue to upgrade and expand the RadNet air monitoring network. These near real-time monitors will replace or augment the pre-existing system of 60 conventional air samplers. Fixed stations will operate routinely and in conjunction with as many as 40 deployable monitors following a radiological incident. Through FY 2010, EPA expects to install at least 130 monitors providing near real-time radiation monitoring coverage for over 95 of the 100 most populous U.S. cities. As the RadNet air monitoring network is upgraded and expanded, average response time and data dissemination will be reduced from days to hours and will provide the Agency and first responders with greater access to data, improving officials' ability to make decisions about protecting public health and the environment during and/or after an incident. Additionally, the data will be used by scientists to better characterize the effect of a radiological incident.

Improve National Radiological Laboratory Capacity and Capability: In FY 2010, EPA will continue to augment EPA's existing radiological laboratory to meet emerging homeland security needs and serve as the Agency's radiological reference laboratory. EPA will continue to upgrade the Agency's laboratory response capability which will include a network of "go-to" state laboratories to ensure a minimal level of surge capacity for radiological terrorism incidents; enhance the existing capability to conduct chemical and radiological analysis simultaneously; and coordinate the Radiological Emergency Response Team's sample handling protocols with the mobile triage units. Additionally, EPA will align and integrate related radiological activities with existing National Lab Networks. The Agency will continue a pilot project, begun in FY 2007, to improve state radiological laboratory capacity through provision of additional laboratory instruments, training, quality assurance testing, and audits of the selected state laboratories. Recently, EPA awarded grants to state laboratories in Connecticut, Texas, and Washington. EPA will continue to do audits and performance evaluation studies to assess and continually improve laboratory competency. As additional laboratories are audited, the number of available core

laboratories that can support the Agency will increase. In addition, a template for a common radiological electronic data deliverable will be developed. This will help to ensure that the laboratories report the data in a common format, making the compilation of data from various laboratories more efficient.

Biodefense: EPA will continue work to develop and validate methods to evaluate the efficacy of antimicrobial products against bioterrorism agents, expanding this work to address unique formulations, additional surface types, and additional bioterrorism agents and emerging pathogens. The Agency will continue to address critical gaps in efficacy test methodology and knowledge of microbial resistance. In addition to vegetative bacteria, EPA also will continue efforts to address threatening viruses and other emerging pathogens in environmental media. EPA will invest in the development and evaluation of efficacy test protocols for products designed to control viruses in the environment during decontamination. The development of “decon toolboxes” for specific bioterrorism agents or classes of bacteria/viruses will remain a priority in FY 2010. Finally, EPA will continue to work with the USDA to evaluate the efficacy of disinfectants against highly pathogenic Foreign Animal Disease (FAD) agents that pose a significant threat to U.S. agriculture and the human food production system.

In order to improve the Agency’s ability to respond to events involving biothreat agents, EPA will increase the number of standardized and validated methods for evaluating the efficacy of decontamination agents. EPA will continue to seek independent third-party analysis for method validation efforts through recognized standard setting organizations. As new methods are developed, statistical modeling for various biodefense scenarios will be critical to the development of science-based performance standards. Microbial persistence, resistance to antimicrobial agents, and an understanding of biofilm environments are also key factors in evaluating the efficacy of decontamination tools.

Performance Targets:

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Output	Percentage of planned outputs delivered in support of water security initiatives.	83	100	100	100	Percent

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Output	Percentage of planned outputs delivered in support of efficient and effective clean-ups and safe disposal of contamination wastes.	92	100	100	100	Percent

Work under this program supports multiple strategic objectives. In FY 2010, the program plans to meet its targets of completing and delivering 100 percent of its planned outputs in support of: 1) the efficient and effective clean-up and safe disposal of decontamination wastes, 2) the Water

Security Initiative, 3) the rapid assessment of risk and the determination of clean-up goals and procedures following contamination, 4) the establishment of the National Laboratory Response Network, and 5) validated standardized methods for evaluating efficacy of antimicrobial products against a variety of biological pathogens. In achieving these targets, the program will contribute to EPA's goal of providing scientifically sound guidance and policy decisions related to the health of people, communities, and ecosystems.

EPA is on track through its ongoing work to meet its FY 2011 strategic plan goal of protecting public health and the environment from unwanted releases of EPA regulated radioactive waste and to minimize impacts to public health from radiation exposure. EPA has developed new outcome-oriented strategic and annual performance measures for this program. In addition, the program developed an efficiency measure that demonstrates that the program utilizes total resources efficiently.

FY 2010 Change from FY 2009 Enacted Budget (Dollars in Thousands):

- (+\$1,000.0) This reflects an increase for payroll and cost of living for existing FTE.
- (-\$683.0) This represents a realignment of funds associated with equipment purchases and repairs across Agency research programs.
- (+\$89.0) This increase will support efforts related to increasing the Agency's radiological laboratory capability/capacity and evaluating the efficacy of antimicrobial products.
- (-\$1,668.0) This change reflects a shift in priorities from the evaluation and testing of decontamination and disposal techniques and the assessment of human health risks associated with CBR agents to focus on performing decontamination and water security research. This research will address gaps in the Agency's ability to effectively respond to and recover from threats, attacks, and large-scale catastrophic incidents.

Statutory Authority:

Atomic Energy Act of 1954, as amended, 42 U.S.C. 2011 et seq. (1970), and Reorganization Plan #3 of 1970; CAA; CERCLA; SARA; 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; Public Health Service Act, as amended, 42 U.S.C. 201 et seq.; Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended, 42 U.S.C. 5121 et seq.; SDWA; Title XIV of the National Defense Authorization Act of 1997, PL 104-201 (Nunn-Lugar II) National Response Plan; Public Health Security and Bioterrorism Emergency and Response Act of 2002; TSCA; Oil Pollution Act; Pollution Prevention Act; RCRA; EPCRA; CWA; FIFRA; Federal Food, Drug and Cosmetic Act; FQPA; Ocean Dumping Act; Public Health Service Act, as amended; 42 U.S.C. 201 et seq.; Executive Order 10831 (1970); Public Law 86-373; PRIA.

Homeland Security: Protection of EPA Personnel and Infrastructure

Program Area: Homeland Security

Goal: Provide Agency-wide support for multiple goals to achieve their objectives. This support involves Agency-wide activities primarily provided by EPA's six (6) support offices - the Office of Administration and Resources Management (OARM), Office of the Chief Financial Officer (OCFO), Office of Environmental Information (OEI), Office of General Counsel (OGC), Office of the Administrator (OA), and the Office of Inspector General (OIG).

(Dollars in Thousands)

	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
Environmental Program & Management	\$5,462.5	\$6,292.0	\$6,414.0	\$122.0
<i>Science & Technology</i>	<i>\$1,428.1</i>	<i>\$587.0</i>	<i>\$594.0</i>	<i>\$7.0</i>
Building and Facilities	\$8,225.9	\$8,070.0	\$8,070.0	\$0.0
Hazardous Substance Superfund	\$585.0	\$1,194.0	\$1,194.0	\$0.0
Total Budget Authority / Obligations	\$15,701.5	\$16,143.0	\$16,272.0	\$129.0
Total Workyears	2.9	3.0	3.0	0.0

Program Project Description:

This program involves activities to ensure that EPA's physical structures and assets are secure and operational and that certain physical security measures are in place to help safeguard staff in the event of an emergency. These efforts also protect the capability of EPA's vital laboratory infrastructure assets. Specifically, funds within this appropriation support security needs for the National Vehicle and Fuel Emissions Laboratory (NVFEL).

FY 2010 Activities and Performance Plan:

In FY 2010, the Agency will continue to provide enhanced physical security for the NVFEL and its employees. This funding supports the incremental cost of security enhancements required as part of an Agency security assessment review.

Performance Targets:

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

FY 2010 Change from FY 2009 Enacted Budget (Dollars in Thousands):

- (+\$7.0) This increase supports security for EPA's NVFEL.

Statutory Authority:

Public Health Security and Bioterrorism Emergency and Response Act of 2002; Secure Embassy Construction and Counterterrorism Act (Sections 604 and 629).

Program Area: Indoor Air

Indoor Air: Radon Program

Program Area: Indoor Air

Goal: Clean Air and Global Climate Change

Objective(s): Healthier Indoor Air

(Dollars in Thousands)

	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
Environmental Program & Management	\$5,269.5	\$5,383.0	\$5,576.0	\$193.0
<i>Science & Technology</i>	<i>\$437.8</i>	<i>\$403.0</i>	<i>\$422.0</i>	<i>\$19.0</i>
Total Budget Authority / Obligations	\$5,707.3	\$5,786.0	\$5,998.0	\$212.0
Total Workyears	38.8	39.4	39.4	0.0

Program Project Description:

The Radiation and Indoor Environments National Laboratory (R&IE) in Las Vegas, NV is the only Federal National Institute of Standards and Technology radon laboratory. The R&IE radon laboratory supports EPA’s radon program by providing exposure services to local, state, and Federal radon programs and to privatized radon proficiency programs. The R&IE radon laboratory also distributes and analyzes radon test kits for community-based environmental justice partners with a focus on tribes.

FY 2010 Activities and Performance Plan:

In FY 2010, EPA will target its radon laboratory resources to several key areas: radon exposure services to support local, state, and Federal radon programs; radon laboratory inter-comparisons and device verification exposures to support privatized radon proficiency programs; and test kits and analyses for community-based environmental justice partners. As part of its environmental justice efforts, EPA will distribute 2,000 radon kits to our network of partner organizations and community-based environmental justice partners and analyze 100 percent of returned radon kits. EPA’s radon technical assistance and environmental justice work are relatively low cost and provide a proven benefit to radon professionals and organizations as well as to the underserved community.

The Indoor Air program is not regulatory; instead, EPA works toward its goal by conducting research and promoting appropriate risk reduction actions through voluntary education and outreach programs. The Agency will continue to focus on making efficiency improvements and plans to improve transparency by making all aspects of the State Indoor Radon Grant (SIRG) program performance/results data available to the public via our website or other easily accessible means. Please see <http://www.epa.gov/radon> for further information on indoor air and radon.

Performance Targets:

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Outcome	Number of additional homes (new and existing) with radon reducing features	Avail. 2010	225,000	265,000	280,000	Homes

In FY 2010, EPA's goal is to add 280,000 homes with radon reducing features, bringing the cumulative number of U.S. homes with radon reducing features to over two million. EPA estimates that this cumulative number will prevent over 900 future premature cancer deaths (each year these radon reducing features are in place). EPA will track progress against the efficiency measure, in the table above, triennially with the next report date in FY 2010.

FY 2010 Change from FY 2009 Enacted Budget (Dollars in Thousands):

- (+\$17.0) This reflects an increase for payroll and cost of living for existing FTE.
- (+\$2.0) This reflects an increase to support radon test kit analysis and distribution efforts.

Statutory Authority:

CAA Amendments of 1990; IRAA, Section 306; Title IV of the SARA of 1986; TSCA, section 6, Titles II and Title III (15 U.S.C. 2605 and 2641-2671), and Section 10.

Reduce Risks from Indoor Air

Program Area: Indoor Air

Goal: Clean Air and Global Climate Change

Objective(s): Healthier Indoor Air

(Dollars in Thousands)

	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
Environmental Program & Management	\$24,009.8	\$20,512.0	\$21,073.0	\$561.0
Science & Technology	\$702.9	\$717.0	\$735.0	\$18.0
Total Budget Authority / Obligations	\$24,712.7	\$21,229.0	\$21,808.0	\$579.0
Total Workyears	63.9	63.8	63.8	0.0

Project Description:

The Radiation and Indoor Environments National Laboratory (R&IE) maintains the capacity to conduct field measurements, assessments and technical support for indoor air quality remediations. R&IE also conducts training and provides technical support for development of Tribal capacity for indoor air quality programs, such as mold remediation, assessment and characterization of sources of volatiles and intruding vapors, and monitoring and measurement techniques.

FY 2010 Activities and Performance Plan:

In FY 2010, EPA will conduct Indoor Air Quality (IAQ) intervention and remediation training courses, which will continue to support development of Tribal capacity for indoor air quality programs. When requested, EPA will conduct field measurements and assessments and provide technical support for indoor air quality remediations. EPA's indoor air quality technical assistance and training work is primarily focused toward Tribal communities and meets an identified need at a relatively low cost.

Performance Targets:

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Outcome	Estimated annual number of schools establishing indoor air quality programs based on EPA's Tools for Schools guidance.	Avail. 2009	1,100	1,000	1,000	Number

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Outcome	Percentage of public that is aware of the asthma program's media campaign.	Avail. 2009	>20	>20	>30	Percentage

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Output	Additional health care professionals trained annually by EPA and its partner on the environmental management of asthma triggers.	Avail. 2009	2,000	2,000	2,000	Number

EPA will continue to work towards its long term 2014 goal to educate 7.2 million people with asthma in how to take the actions essential to reduce their exposure to the environmental triggers of asthma, including environmental tobacco smoke. EPA’s goal is to have an additional 400,000 people with asthma take these actions in 2010, bringing the total number to approximately 5.7 million people who have been exposed to EPA’s outreach and education programs. As part of this goal, EPA will continue to work to reduce existing disparities between disproportionately impacted populations and the overall population. EPA also will continue to work toward its long term 2012 goal that 40,000 primary and secondary schools (35% of schools) will be implementing effective indoor air quality management programs consistent with EPA guidance.

EPA will continue to focus on making efficiency improvements and track progress against the efficiency measures included in the tables above triennially with the next planned report date in FY 2009.

FY 2010 Change from FY 2009 Enacted Budget (Dollars in Thousands):

- (+\$14.0) This reflects an increase for payroll and cost of living for existing FTE.
- (+\$4.0) This reflects additional resources to support IAQ intervention and remediation training courses.

Statutory Authority:

CAA Amendments of 1990; Title IV of the SARA of 1986.

Program Area: IT / Data Management / Security

IT / Data Management

Program Area: IT / Data Management / Security

Goal: Provide Agency-wide support for multiple goals to achieve their objectives. This support involves Agency-wide activities primarily provided by EPA's six (6) support offices - the Office of Administration and Resources Management (OARM), Office of the Chief Financial Officer (OCFO), Office of Environmental Information (OEI), Office of General Counsel (OGC), Office of the Administrator (OA), and the Office of Inspector General (OIG).

(Dollars in Thousands)

	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
Environmental Program & Management	\$91,928.2	\$93,171.0	\$103,305.0	\$10,134.0
<i>Science & Technology</i>	<i>\$3,762.6</i>	<i>\$3,969.0</i>	<i>\$4,073.0</i>	<i>\$104.0</i>
Leaking Underground Storage Tanks	\$178.0	\$162.0	\$162.0	\$0.0
Oil Spill Response	\$15.0	\$24.0	\$24.0	\$0.0
Hazardous Substance Superfund	\$15,929.7	\$16,896.0	\$17,124.0	\$228.0
Total Budget Authority / Obligations	\$111,813.5	\$114,222.0	\$124,688.0	\$10,466.0
Total Workyears	492.2	503.1	503.1	0.0

Program Project Description:

The Information Technology/Data Management (IT/DM) program supports the development, collection, management, and analysis of environmental data (to include both point source and ambient data) to manage statutory programs and to support the Agency in strategic planning at the national, program, and regional levels. IT/DM provides a secure, reliable, and capable information infrastructure based on a sound enterprise architecture which includes data standardization, integration, and public access. IT/DM manages the Agency's Quality System ensuring EPA's processes and data are of quality and adhere to Federal guidelines. IT/DM supports regional information technology infrastructure, administrative and environmental programs, and telecommunications.

The work performed under IT/DM encompasses more than 30 distinct activities. For descriptive purposes activities can be categorized into the following major functional areas: information access; geospatial information and analysis; Envirofacts; IT/information management (IT/IM) policy and planning; electronic records and content management; internet operations and maintenance (IOME); information reliability and privacy; and IT/IM infrastructure. IT/IM and IOME activities are provided to the programs funded under Science and Technology (S&T).

Resources under this program also fund the Agency-wide Quality Program. The Quality Program is a key management system that ensures the quality of all services provided by EPA, including, for example, all of the science and technology underpinning all of EPA's environmental work, all of EPA's data, and all of EPA's documents for public distribution.

FY 2010 Activities and Performance Plan:

For FY 2010, the following IT/DM activities will continue to be provided for the S&T funded programs:

- **Internet Operations and Maintenance (IOME)** – FY 2010 activities in this area implement and maintain the EPA Home Page (www.EPA.gov) and over 200 top-level pages that facilitate access to the many information resources available on the EPA Web site. In addition, IOME provides the funding to support Web hosting for all of the Agency's Web sites and pages. The EPA Web site is the primary delivery mechanism for environmental information to EPA staff, partners, stakeholders and the public, and is becoming a resource for emergency planning and response. (In FY 2010, IOME activities will be funded at \$0.49 million, under the S&T appropriation)
- **IT/IM Infrastructure** – FY 2010 activities in this area support the information technology infrastructure, administrative and environmental programs, and telecommunications for all EPA employees and other on-site workers at over 100 locations, including EPA Headquarters, all ten regions, and the various labs and ancillary offices. More specifically, these activities provide what is known as “workforce support,” which includes desktop equipment, network connectivity, e-mail, application hosting, remote access, telephone services and maintenance, web and network servers, IT related maintenance, IT security, and electronic records and data. (In FY 2010, funding for IT/IM Infrastructure will be funded at \$0.13 million, under the S&T appropriation)
- **Policy and Planning** - FY 2010 activities will ensure that all due steps are taken to reduce redundancy among information systems and data bases, streamline and systematize the planning and budgeting for all IT/IM activities, and monitor the progress and performance of all IT/IM activities and systems. EPA’s Quality Program has consistently played a major role in each of these areas. In FY 2010, the Quality Program will initiate a number of revisions to comply with the new Quality Policy (CIO Policy 2106, issued October 1, 2009). (In FY 2010, Quality Program activities will be funded at \$3.45 million under the S&T appropriation, \$2.5 million of which is allotted to payroll.)

Performance Targets:

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

FY 2010 Change from FY 2009 Enacted Budget (Dollars in Thousands):

- (+\$89.0) This reflects an increase for payroll and cost of living for existing FTE.
- (+\$15.0) This reflects an increase for IT, telecommunications and other support costs.

Statutory Authority:

FACA; GISRA; CERCLA; CAAA; CWA and amendments; ERD and DAA; TSCA; FIFRA; FQPA; SDWA and amendments; FFDCA; EPCRA; RCRA; SARA; GPRA; GMRA; CCA; PRA; FOIA; CSA; PR; EFOIA.

Program Area: Operations and Administration

Facilities Infrastructure and Operations
Program Area: Operations and Administration

Goal: Provide Agency-wide support for multiple goals to achieve their objectives. This support involves Agency-wide activities primarily provided by EPA's six (6) support offices - the Office of Administration and Resources Management (OARM), Office of the Chief Financial Officer (OCFO), Office of Environmental Information (OEI), Office of General Counsel (OGC), Office of the Administrator (OA), and the Office of Inspector General (OIG).

(Dollars in Thousands)

	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
Environmental Program & Management	\$296,235.0	\$303,884.0	\$320,612.0	\$16,728.0
<i>Science & Technology</i>	<i>\$69,239.2</i>	<i>\$73,835.0</i>	<i>\$72,882.0</i>	<i>(\$953.0)</i>
Building and Facilities	\$28,081.5	\$26,931.0	\$28,931.0	\$2,000.0
Leaking Underground Storage Tanks	\$890.3	\$902.0	\$903.0	\$1.0
Oil Spill Response	\$498.6	\$596.0	\$498.0	(\$98.0)
Hazardous Substance Superfund	\$72,243.9	\$76,250.0	\$78,597.0	\$2,347.0
Total Budget Authority / Obligations	\$467,188.5	\$482,398.0	\$502,423.0	\$20,025.0
Total Workyears	400.4	410.6	411.1	0.5

Program Project Description:

Science & Technology (S&T) resources in the Facilities Infrastructure and Operations Program are used to fund rent, utilities, security, and also to manage activities and support services in many centralized administrative areas such as health and safety, environmental compliance, occupational health, medical monitoring, fitness, wellness, safety, and environmental management functions at EPA. Resources for this program also support a full range of ongoing facilities management services including facilities maintenance and operations, energy conservation, greenhouse gas reduction, sustainable buildings programs, Headquarters security, space planning, shipping and receiving, property management, printing and reproduction, mail management, and transportation services.

FY 2010 Activities and Performance Plan:

The Agency will also continue to manage its lease agreements with GSA and other private landlords by conducting rent reviews and verifying that monthly billing statements are correct. The Agency also reviews space needs on a regular basis. (For FY 2010, the Agency is requesting a total in the S&T appropriation of \$33.95 million for rent; \$19.18 million for utilities; \$10.26 million for security; \$.93 million for transit subsidy; and \$.25 million for Regional moves.)

These resources also help to improve building and transportation operating efficiency and encourage the use of new, advanced technologies and energy sources. EPA will continue to direct resources towards acquiring alternative fuel vehicles and more fuel-efficient passenger

cars and light trucks. EPA will also continue with energy audits, commissioning, renewable energy, water conservation, and green buildings. Work in both these areas is required under EO 13423⁵, *Greening the Government through Efficient Energy Management*.

Lastly, EPA will provide transit subsidy to eligible applicants as directed by Executive Order (EO) 13150⁶ *Federal Workforce Transportation*. EPA will continue the implementation of the Safety and Health Management Systems to ensure a safe working environment.

Performance Targets:

Work under this program supports multiple strategic objectives. Performance information is included in the Program Performance and Assessment section.

FY 2010 Change from FY 2009 Enacted Budget (Dollars in Thousands):

- (-\$574.0) This decrease in rent reflects the rebalancing of cost allocation methodologies between the S&T, Environmental Program Management, Superfund, and Oil Spill appropriations.
- (+\$630.0) This change reflects an increase in utility costs.
- (-\$1,729.0) This decrease in security costs reflects the rebalancing of cost allocation methodologies between the S&T and EPM appropriations.
- (+\$671.0) This change reflects an increase in transit subsidy.
- (+\$49.0) This change reflects an increase in Facility Operations contracts that support Research Triangle Park facilities.

Statutory Authority:

FPASA; PBA; Annual Appropriations Act; CWA; CAA; D.C. Recycling Act of 1988; Executive Orders 10577 and 12598; United States Marshals Service, Vulnerability Assessment of Federal Facilities Report; Presidential Decision Directive 63 (Critical Infrastructure Protection); Energy Policy Act of 2005; Energy Independence and Security Act of 2007.

⁵ Information available at <http://www.epa.gov/fedsite/eo13123.htm>

⁶ Additional information available at <http://ceq.eh.doe.gov/nepa/regs/eos/eo13150.html>

Program Area: Pesticides Licensing

Pesticides: Protect Human Health from Pesticide Risk

Program Area: Pesticides Licensing
Goal: Healthy Communities and Ecosystems
Objective(s): Chemical and Pesticide Risks

(Dollars in Thousands)

	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
Environmental Program & Management	\$59,536.1	\$60,103.0	\$61,747.0	\$1,644.0
<i>Science & Technology</i>	<i>\$3,346.9</i>	<i>\$3,215.0</i>	<i>\$3,663.0</i>	<i>\$448.0</i>
Total Budget Authority / Obligations	\$62,883.0	\$63,318.0	\$65,410.0	\$2,092.0
Total Workyears	497.4	467.9	467.9	0.0

Program Project Description:

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), section 3(c)(5), states that the Administrator shall register a pesticide if it is determined that, when used in accordance with labeling and common practices, the product “will not generally cause unreasonable adverse effects on the environment.” Further, FIFRA defines “unreasonable adverse effects on the environment” as “any unreasonable risk to man or the environment.”

EPA’s Pesticides program screens new pesticides before they reach the market and ensures that pesticides already in commerce are safe. As directed by FIFRA, the Federal Food, Drug, and Cosmetic Act (FFDCA), and the Food Quality Act of 1996 that amended FIFRA and FFDCA, EPA is responsible for registering and re-evaluating pesticides to protect consumers, pesticide users, workers who may be exposed to pesticides, children, and other sensitive populations. To make regulatory decisions and establish tolerances for the maximum allowable pesticide residues on food and feed, EPA must balance the risks and benefits of using the pesticide, consider cumulative and aggregate risks, and ensure extra protection for children.

Laboratory activity for the Pesticide program supports the goal of protecting human health through efforts at three laboratories: an analytical chemistry laboratory and a microbiology laboratory at the Environmental Science Center at Fort Meade, MD, and an environmental chemistry laboratory at Stennis Space Center, Bay St. Louis, MS. These laboratories develop and validate environmental chemistry, analytical chemistry, and genetically modified organism plant incorporated protectant (PIP) methods to ensure the United States Department of Agriculture (USDA), the United States Geological Survey (USGS), EPA offices, and states have reliable methods to measure and monitor pesticide residues in food and in the environment. The pesticide laboratories, in cooperation with industry, state and other EPA laboratories, develop multi-residue analytical methods to allow enforcement agencies to test for several different chemicals using one test. For additional information, visit <http://www.epa.gov/oppbead1/labs/index.htm>.

FY 2010 Activities and Performance Plan:

In 2010, the Agency will protect human health by evaluating residue analytical methods for detecting pesticide residues in food and feed, ensuring suitability for monitoring pesticide residues, and enforcing tolerances. This will be accomplished by developing and validating multi-residue pesticide analytical methods for food, feed, and water for use by other Federal (USDA Pesticide Data Program and the Food and Drug Administration) and state laboratories, and subsequently the program office. Laboratories further support the estimation of human health risks from pesticide use by operating the National Pesticide Standard Repository and by conducting chemistry and efficacy testing for antimicrobials.

EPA's laboratories provide quality assurance and technical support and training to EPA regional offices, state laboratories, and other Federal agencies that implement FIFRA. The laboratories will evaluate registered products that are most crucial to infection control (sterilants, tuberculocides, and hospital-level disinfectants). Under the PIP method validation program, work will continue on evaluating several novel molecular-based methods.

Performance Targets:

Work under this program supports multiple performance objectives. Some of this program's performance measures are program outputs which represent statutory requirements to ensure that pesticides entering the marketplace are safe for human health and the environment and when used in accordance with the packaging label present a reasonable certainty of no harm. While program outputs are not the best measures of risk reduction, they do provide a means for realizing benefits in that the program's safety review prevents dangerous pesticides from entering the marketplace.

FY 2010 Change from FY 2009 Enacted Budget (Dollars in Thousands):

- (+\$419.0) This reflects an increase for payroll and cost of living for existing FTE.
- (+\$29.0) This reflects an increase for laboratory support costs.

Statutory Authority:

PRIA 2; FIFRA; FFDCA; FQPA.

Pesticides: Protect the Environment from Pesticide Risk

Program Area: Pesticides Licensing

Goal: Healthy Communities and Ecosystems

Objective(s): Chemical and Pesticide Risks

(Dollars in Thousands)

	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
Environmental Program & Management	\$37,443.3	\$41,236.0	\$42,318.0	\$1,082.0
<i>Science & Technology</i>	<i>\$1,998.2</i>	<i>\$2,011.0</i>	<i>\$2,292.0</i>	<i>\$281.0</i>
Total Budget Authority / Obligations	\$39,441.5	\$43,247.0	\$44,610.0	\$1,363.0
Total Workyears	316.4	301.4	301.4	0.0

Program Project Description:

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), section 3(c)(5), states that the Administrator shall register a pesticide if it is determined that, when used in accordance with labeling and common practices, the product “will not generally cause unreasonable adverse effects on the environment.” Further, FIFRA defines “unreasonable adverse effects on the environment” as “any unreasonable risk to man or the environment.”

Along with assessing the risks that pesticides pose to human health, EPA conducts ecological risk assessments to determine potential effects on plants, animals, and ecosystems. EPA works to protect ecosystems, particularly the plants and animals that are not targets of the pesticide, and satisfies additional responsibilities under the Endangered Species Act (ESA).⁷ As directed by FIFRA, EPA must determine that a pesticide is not likely to harm the environment, and may impose risk mitigation measures such as restricting uses, denying uses, or requiring monitoring of environmental conditions, such as effects on water sources.⁸ In making its regulatory decisions, the Agency considers both the risks and the benefits derived from the use of the pesticide.

Laboratory activities for the pesticides program support the goal of protecting the environment from pesticide use through three pesticides laboratories: an analytical chemistry laboratory, a microbiology laboratory at the Environmental Science Center at Fort Meade, MD, and an environmental chemistry laboratory at Stennis Space Center, Bay St. Louis, MS. These laboratories develop and validate environmental and analytical chemistry methods and genetically modified organism plant-incorporated protectant (PIP) methods to ensure the United States Department of Agriculture, the United States Geological Survey, EPA offices, and states have reliable methods to measure and monitor pesticide residues in food and in the environment. The pesticide laboratories, in cooperation with industry, state and other EPA laboratories, develop multi-residue analytical methods to allow enforcement agencies to test for several different chemicals using one test.

7 The Endangered Species Act of 1973 sections 7(a)1 and 7 (a)2; Federal Agency Actions and Consultations, as amended (16 U.S.C. 1536(a)). Available at U.S. Fish and Wildlife Service, Endangered Species Act of 1973 internet site: <http://www.fws.gov/endangered/esa.htm#Lnk07>.

8 Federal Insecticide, Fungicide, and Rodenticide Act, as amended. January 23, 2004. Section 3(a), Requirement of Registration (7U.S.C. 136a). Available online at: www.epa.gov/opp00001/regulating/fifra.pdf.

FY 2010 Activities and Performance Plan:

In 2010, the Agency will support the protection of the environment by developing methods and conducting analyses to make more informed decisions regarding pesticide exposures and risk to the environment and by operating the National Pesticide Standard Repository (NPSR) to support Federal and state laboratories involved in enforcement activities. Under the PIP method validation program, work will continue on evaluating several novel molecular-based methods.

The laboratories will also support the protection of the environment by:

- 1) Evaluating residue analytical methods used for detecting pesticide residues in environmental matrices, such as water, soil and sediment. Evaluating residue analytical methods will give the program confidence in assessing the results generated by the registrant and submitted to the Agency, which is required by the pesticide registration guidelines of FIFRA. Evaluating residue analytical methods also will assist the Agency in developing and validating multi-residue pesticide analytical methods for environmental matrices for use by other Federal and state laboratories to estimate environmental risks;
- 2) Responding to urgent pesticide program needs for analytical chemistry support to address specific short-term, rapid turnaround issues of high priority. The labs cooperate with regional activities related to analysis of environmental samples for select pesticides or other environmental contaminants related to pesticide production or disposition and develop exposure data for dioxins, polychlorinated biphenyls and other persistent contaminants of environmental concern, to support Agency environmental risk assessments;
- 3) Conducting product performance evaluations of antimicrobials to remove inefficacious products from the market. The labs also provide data to support use of effective tools for remediation efforts and testing capacity for environmental monitoring of microbial populations (due to overt or unintentional contamination). Another activity involves conducting validation services on methods used to detect DNA and/or proteins for PIPs in major agricultural commodities such as corn, soybeans, potatoes, cotton, etc.

EPA's laboratories provide technical support and quality assurance support to regional, state and other Federal laboratories in numerous ways. The laboratories are responsible for the posting and upkeep of residue analytical methods and environmental chemistry methods for food, feed, soil and water on the EPA web site. These methods are frequently the only resource available to Regional offices, state laboratories and other Federal agencies for current methodology for the newest pesticides. The microbiology laboratory has also posted and maintains the methods used to determine the efficacy of microbiological products on the web where there are approximately 400 methods currently available. See <http://www.epa.gov/oppbead1/methods/>. Additionally, the Agency responds to approximately 90 requests per year for method information. These requests primarily come from state FIFRA laboratories.

The laboratories are involved in the development of multi-residue analytical methods (MRMs) – methods that are capable of measuring several similar pesticides simultaneously. These MRMs

are made available to state and Federal laboratories involved in residue monitoring and enforcement activities.

The pesticides program operates the EPA NPSR which provides pesticide reference materials to Federal and state laboratories for enforcement activities. The NPSR shipped approximately 6,000 analytical reference standards to enforcement laboratories in FY 2007 and approximately 6,500 in FY 2008. In FY 2009, the NPSR is expected to provide approximately 7,000 standards. As the project comes to an end in FY 2010, the annual rate will return to approximately 6,500.

The laboratories also participate in the American Association of Pest Control Officials and the State FIFRA Issues and Research Evaluation Group pesticide laboratory technical meetings with state and industry chemists, responding to issues raised by enforcement laboratories. Additionally, the laboratories are represented on and work through the Association of Analytical Chemists to develop and implement consensus methods for microbiology and chemistry.

In the area of quality assurance, the Agency's laboratories assist state and Federal partners in several ways. Examples include providing review of quality management plans for homeland security laboratory projects conducted under interagency agreements with the Food and Drug Administration (FDA) and the Department of Defense (DoD); providing technical assistance and oversight on quality assurance and technical questions from FDA and DoD laboratories for a variety of projects; providing quality assurance oversight to the FDA/White Oak facility for the Three Step Method (TSM) collaborative validation study (the FDA did not have a quality assurance unit in place at the time of the study); and conducting a readiness review at ten collaborating laboratories working on the validation of the TSM. The TSM quantitatively measures the efficacy of antimicrobials for inactivating anthrax spores.

Performance Targets:

Work under this program supports multiple performance measures. Some of the pesticide program's performance measures are program outputs which represent statutory requirements to ensure that pesticides entering the marketplace are safe for human health and the environment, and when used in accordance with the packaging label present a reasonable certainty of no harm.

FY 2010 Change from FY 2009 Enacted Budget (Dollars in Thousands):

- (+\$258.0) This reflects an increase for payroll and cost of living for existing FTE.
- (+\$23.0) This reflects an increase for laboratory support costs.

Statutory Authority:

PRIA 2; FIFRA; FFDCA; FQPA.

Pesticides: Realize the Value of Pesticide Availability

Program Area: Pesticides Licensing
 Goal: Healthy Communities and Ecosystems
 Objective(s): Chemical and Pesticide Risks

(Dollars in Thousands)

	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
Environmental Program & Management	\$11,529.6	\$12,984.0	\$13,372.0	\$388.0
<i>Science & Technology</i>	<i>\$442.4</i>	<i>\$445.0</i>	<i>\$508.0</i>	<i>\$63.0</i>
Total Budget Authority / Obligations	\$11,972.0	\$13,429.0	\$13,880.0	\$451.0
Total Workyears	87.7	89.7	89.7	0.0

Program Project Description:

Within the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), the definition of “unreasonable adverse effects on the environment” expands the concept of protecting against unreasonable risks to man or the environment, by adding “taking into account the economic, social and environmental costs and benefits of the use of any pesticide...”

EPA must ensure that such emergency uses will not present an unreasonable risk to human health or the environment. EPA’s timely review of emergency exemptions has avoided an estimated \$1.5 billion in crop losses per year,⁹ resulting from incidents of new pests on crops when exemptions are necessary while progress is made towards full registration. In such cases, EPA’s goal is to complete the more detailed and comprehensive risk review for pesticide registration within three years.

FIFRA clearly recognizes that there will be societal benefits beyond protection of human health and the environment from the pesticide registration process that it establishes. Section 3 of FIFRA also authorizes EPA to register “me-too” products – those that are identical or substantially similar to already-registered products. The entry of these new products, also known as “generics,” into the market can cause price reductions resulting from new competition and broader access to products. These price declines generate competition that provides benefits to farmers and consumers. For example, an estimated \$1.8 billion in termite damage is avoided each year through the availability of effective termiticides.¹⁰ While some effective termiticides have been removed from the market due to safety concerns, EPA continues to work with industry to register safe alternatives that meet or exceed all current safety standards and offer a high level of protection.

Three pesticide laboratories support the pesticide program by providing data that are used by EPA to inform regulatory decisions that recognize societal benefits: an analytical chemistry

⁹ Baseline data on crop market prices, crop production, and total acres grown are from United States Department of Agriculture (USDA) databases, while the percentage of potential yield loss without pesticides is estimated by Biological and Economic Analysis Division (BEAD) scientists based on published and unpublished studies. The number of acres treated with the pesticides are based on data submitted by State Departments of Agriculture.

¹⁰ U.S. Census Bureau data (www.census.gov/compendia/statab/files/house.html); University of Georgia Entomology Dept. (www.ent.uga.edu/IPM/s100/household.htm); National Pest Management Association (www.pestworld.org/Database/Article.asp?ArticleID=34&UserType).

laboratory and a microbiology laboratory at the Environmental Science Center at Fort Meade, MD, and an environmental chemistry laboratory at Stennis Space Center, Bay St. Louis, MS. These laboratories support program activities by validating environmental and analytical chemistry methods to ensure that the Food and Drug Administration (FDA), the United States Department of Agriculture (USDA), EPA offices, and states have reliable methods to measure and monitor pesticide residues in food and in the environment. Additionally, the laboratories provide support to ensure that certain pesticide products are efficacious. The laboratories, in cooperation with industry, state and other EPA laboratories, develop multi-residue analytical methods to allow enforcement agencies to test for several different chemicals using one test.

FY 2010 Activities and Performance Plan:

In FY 2010, the Agency will realize the benefits of pesticides by operating the National Pesticide Standard Repository (NPSR) and conducting chemistry and efficacy testing for antimicrobials. EPA's laboratories will continue to provide quality assurance and technical support and training to EPA regions, state laboratories, and other Federal agencies that implement FIFRA. The laboratories will evaluate registered products that are most crucial to infection control (sterilants, tuberculocides, and hospital-level disinfectants). Under the Plant-Incorporated Protectants (PIP) method validation program, work will continue on evaluating several novel molecular-based methods.

The pesticide laboratories support the program by evaluating analytical methods for detecting pesticide residues in food and feed ensuring suitability for monitoring pesticide residues and enforcement of tolerances. The NPSR also distributes analytical standards to Federal and state laboratories involved in enforcement activities. The laboratories develop and validate multi-residue pesticide analytical methods for food, feed and water for use by other Federal (USDA Pesticide Data Program and FDA) and state laboratories. These laboratories generate residue data that are then used by the program office to estimate human health risks. The laboratories are prepared to respond to urgent program needs for analytical chemistry support and special studies to address specific short-term, rapid turnaround priority issues.

In addition to residue methods, the labs provide method validation services for genetically modified organism products. They also develop data to support FIFRA section 18 uses for new chemicals where efficacy data are non-existent (particularly biothreat agents, including *B. anthracis*, or emerging hospital pathogens) and evaluate the product performance of antimicrobials used to control infectious pathogens in hospital environments. The laboratories develop new test methods for novel uses or emerging pathogens, including biothreat agents, in order to provide guidelines for efficacy data for public health claims, guidance for registration, and to provide technical support and training on testing methods and procedures.

Performance Targets:

Work under this program supports multiple performance objectives. Some of this program's performance measures are program outputs which represent statutory requirements to ensure that pesticides entering the marketplace are safe for human health and the environment and, when used in accordance with the packaging label, present a reasonable certainty of no harm. While

program outputs are not the best measures of risk reduction, they do provide a means for realizing benefits in that the program's safety review prevents dangerous pesticides from entering the marketplace.

FY 2010 Change from FY 2009 Enacted Budget (Dollars in Thousands):

- (+\$59.0) This reflects an increase for payroll and cost of living for existing FTE.
- (+\$4.0) This reflects an increase for laboratory support costs.

Statutory Authority:

PRIA 2; FIFRA; FFDCA; FQPA.

Program Area: Research: Clean Air

Research: Clean Air

Program Area: Research: Clean Air

Goal: Clean Air and Global Climate Change

Objective(s): Radiation; Enhance Science and Research

(Dollars in Thousands)

	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
Science & Technology	\$57,575.5	\$80,541.0	\$83,164.0	\$2,623.0
Total Budget Authority / Obligations	\$57,575.5	\$80,541.0	\$83,164.0	\$2,623.0
Total Workyears	239.4	269.5	269.5	0.0

Program Project Description:

EPA’s Clean Air Research Program provides the scientific foundation for the Agency’s actions to protect the air Americans breathe. The program provides the underlying research to support the Agency’s implementation of the Clean Air Act (CAA), which mandates promulgation and enforcement of the National Ambient Air Quality Standards (NAAQS)¹¹ as well as the evaluation of risks associated with Hazardous Air Pollutants (HAPs).¹²

The program is primarily focused on particulate matter (PM),¹³ but in FY 2008, EPA integrated its air research activities around a multi-pollutant approach. Thus, the research addresses ozone and other criteria as well as HAPs. This reorganization was guided by recommendations from the National Academy of Sciences and the Board of Scientific Counselors (BOSC)—a Federal advisory committee comprised of independent expert scientists and engineers— as well as the emerging research needs of EPA’s Air and Radiation program. In moving toward the multi-pollutant theme, the program will increasingly focus on how to address specific source sectors contributing to air pollution, a holistic approach that will result in more effective and efficient air quality management strategies. The program currently is guided by a series of NAS reports¹⁴ and a multi-year plan¹⁵ that outlines research needs and plans to meet those needs, and establishes milestones for evaluating the program’s progress. However, Climate – Air Quality interactions will very likely play a larger role in the context of ambient air health assessments in the future, emphasizing the importance of a multi-pollutant perspective in addressing the possible change to air pollution profiles and effects. To meet this challenge, the program is working closely with the Global Change Research Program to develop a framework for research that will be useful to stakeholders charged with public and environmental health.

The scientific findings from EPA’s air research inform the development of Integrated Science Assessments, formerly known as Air Quality Criteria Documents, which are periodic reports that

11 The NAAQS set limits for criteria pollutants regulating levels of tropospheric ozone, particulate matter, carbon monoxide, sulfur dioxide, nitrogen oxides, and lead. For more information, see <http://www.epa.gov/air/criteria.html>.

12 For more information, see <http://www.epa.gov/ttn/atw/188polls.html>

13 For more information, see <http://www.epa.gov/pmresearch/>.

14 2004 reports is: NRC, *Research Priorities for Airborne Particulate Matter: IV. Continuing Research Progress*. Washington, DC: <http://books.nap.edu/catalog/10957.html> and *Air Quality Management in the United States*, http://www.nap.edu/catalog.php?record_id=10728 National Academies Press (2004).

15 For more information, see <http://www.epa.gov/ord/npd/pdfs/Air-MYP-narrative-final.pdf>

synthesize the science relevant to setting the NAAQS. These assessments are prepared by the Human Health Risk Assessment program and used by EPA's Air and Radiation program to develop and propose revisions to the NAAQS. The program also provides the science necessary to support EPA Regional Offices and state regulatory agencies in identifying and designing effective strategies to meet the NAAQS. The research program is integrated with complementary research on the impacts of climate change and mercury conducted under the Research: Global Change and Research: Human Health and Ecosystems programs respectively.

A subcommittee of EPA's BOSC conducted an evaluation of the PM and tropospheric ozone research programs in calendar year 2005. A subcommittee also conducted a mid-cycle review of the program in September 2007, and noted in their final report that "the quality of the science was high, [and] that it was relevant to Agency and user clients." The BOSC also found that the science was highly informative to the science community itself, and that there was evident progress and program evolution with the advancement of the respective science fields.¹⁶

FY 2010 Activities and Performance Plan:

In FY 2010, EPA's Clean Air Research program will continue to study Americans' exposure to air pollution, and the links between sources of pollution and health outcomes.¹⁷ The program will develop computer models of emissions and the atmosphere, which are used to forecast air quality at local and national scales; predict public exposure to air pollutants; and assist states in developing and validating plans to meet the requirements of the Clean Air Act. The program also will study atmospheric chemistry, such as emission mixtures and the formation of secondary pollutants through in-atmosphere reactions. In addition, the program will develop ambient air sampling techniques; and conduct research to correlate ambient measurements of emissions with both their sources and with levels of human exposure.

EPA will continue its research to understand air pollution near roads attempting to link roadway emissions with health outcomes.¹⁸ EPA has selected Near-Roadway (FY 2010 Request, \$3.1M) as a model of how EPA can best approach source-based studies to draw direct relationships between the source and atmospheric concentrations of pollution; and how these ambient levels relate to exposure and ultimately health outcomes. EPA is conducting studies in Las Vegas and Detroit through 2010 in collaboration with the Federal Highways Administration, to measure and characterize emissions near roads and to understand potential exposures associated with vehicle and roadway "emissions." Exposure models will be developed for individual and multiple pollutants and will be used to develop risk estimates of health effects. The effectiveness of prevention and mitigation options (e.g., natural and man-made barriers) will be evaluated. Research addressing other sectors (e.g., pulp and paper, petroleum refineries, cement kilns), will also employ, like Near-Roadway, a holistic and integrated approach.

FY 2010 funding will continue support for research to inform Agency, state and Tribal air quality managers about the sources of air pollution and methods for managing emissions.¹⁹ The

¹⁶ The final report is available at: <http://www.epa.gov/osp/bosc/pdf/pmmc080331rpt.pdf>

¹⁷ For more information, see <http://www.epa.gov/nerl/goals/air/>.

¹⁸ For more information, see <http://www.epa.gov/nerl/goals/air/linkages.html>.

¹⁹ For more information, see <http://www.epa.gov/appcdwww/>.

program will investigate and apply advanced methods to measure the quantity and chemical composition of airborne toxics and particulate matter emissions from man-made and natural sources. These data support development of improved emission inventories, which provide essential data for trend analysis; Regional, and local scale air quality modeling; regulatory strategies and impact assessments; and human exposure modeling.²⁰ These methods also support source apportionment, which traces pollutants measured in ambient air to specific sources based on the unique chemical or structural markers in the pollutants. In addition, the program will generate emission samples from various sources for use in exposure and toxicology studies to understand how health effects vary by source, and develop and evaluate the cost and performance of technologies capable of reducing emissions.

EPA will continue to develop advanced air quality models, such as the Community Multi-scale Air Quality (CMAQ) model (FY 2010 Request, \$4.6M), that simulate transport and fate of pollutants in the atmosphere. These models are used by EPA and National Oceanic and Atmospheric Administration, state and local governments, and the general air pollution research and monitoring community to understand and forecast the location, composition and magnitude of air pollutants, and to develop effective emission control policies and regulations. In the BOSC evaluation, the program was commended for the strong relationships it has established with other funding organizations. The research collaboration and coordination supported by the FY 2010 budget request will ensure that the scientific and technical needs of the Air Research Program continue to be met with minimal duplication of effort.

Further, the Agency will continue epidemiological, clinical, and toxicological studies of air pollution's health effects.²¹ In FY 2010, a priority area for the program's health effects research will be improving scientific understanding of how particle size and composition as related to specific sources influences particulate matter-associated health effects. Research will focus on determining how the toxicity of particles differs by particle size and chemical composition; understanding how emissions from different sources affect health; the degree to which genes, lifestyle, age, and diseases like diabetes and asthma affect susceptibility to air pollution; and understanding the mechanisms inside the human body by which air pollution causes harm. EPA also will investigate air pollution's effects on cardiopulmonary, nervous, reproductive, and immune systems and on development during pregnancy and infancy. The program also will conduct epidemiological studies of communities with single emission sources or industrial sectors to improve understanding of how health endpoints are connected to distinct sources of air pollution.

The program makes extensive use of the Science to Achieve Results (STAR) program's competitive, peer-reviewed grants.²² In FY 2010, to reflect the shift towards a multi-pollutant program, the program will hold a new competition for Air Pollution Research Centers (previously Particulate Matter Centers). The new centers (FY 2010 funding, \$8.2 million) will address multi-pollutant air problems such as health effects of air pollution mixtures.²³ The program also will continue to fund a ten-year grant (the largest in EPA's history) to the Multi-

20 For more information, see <http://www.epa.gov/ttn/chief/eiinformation.html>.

21 For more information, see <http://www.epa.gov/nheerl/research/cleanair.html>.

22 For more information, see: <http://es.epa.gov/ncer/science/pm/>.

23 For more information, see http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/outlinks.centers/centerGroup/19/.

Ethnic Study of Atherosclerosis (MESA)–Air Pollution Study.²⁴ In FY 2010, MESA will report interim findings on cardiovascular disease associations with PM and co-pollutants. STAR also will continue to fund a five-year grant to the Health Effects Institute (HEI),²⁵ a nonprofit research organization cosponsored by EPA and the automotive industry to conduct independent research on the health effects of air pollution. In addition, the program will fund grants to develop “dynamic” air quality management tools so that local and state air quality managers can adapt emission control plans to changing circumstances in near-real time. These studies link to climate-air quality relationships and interactions to develop realistic and forward-thinking models.

Finally, the program’s exposure research, done in collaboration with EPA’s Human Health research program and HEI, will emphasize development of a framework for assessing the effectiveness of air pollution regulations and control strategies. The framework will be especially important in assessing loss of benefits associated with air quality changes due to changes in climate.

EPA has finalized two long-term goals toward which the program commits to work: (1) reducing uncertainty in the science that supports standard-setting and air quality management decisions and (2) assessing the links between sources of air pollution and health outcomes. The program continues working to improve integration of its financial and performance data, developing and finalizing methods for measuring progress toward the program’s annual and long-term measures, and implementing annual program reviews.

Performance Targets:

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Output	Percentage of NAAQS program publications rated as highly cited papers		No Target Established (Biennial)	33.9	No Target Established (Biennial)	Percent

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Output	Percent planned actions accomplished toward the long-term goal of reducing uncertainty in the science that support standard setting and air quality management decisions.	100%	100	100	100	Percent

The research conducted under this program supports EPA Strategic Objective 1.6. Specifically, the program provides sound science to support EPA’s goal of clean air by conducting leading-edge research and developing a better understanding and characterization of human health and environmental outcomes.

²⁴ For more information, see <http://depts.washington.edu/mesaair/>.

²⁵ For more information, see <http://www.healtheffects.org/>.

The program gauges its annual and long-term success by assessing its progress on several key measures. In FY 2010, the program strives to complete 100 percent of its planned actions related to the long-term goal of reducing uncertainty in the science that supports standard setting and air quality management decisions. Additionally, the program plans to complete additional work toward a hierarchy of pollutant sources based on the linkages between source emissions and the concentration of pollutants in ambient air, and the risk they pose to human health. Feedback from the ongoing BOSC review is being used to refine this approach heading into FY 2010.

The program's bibliometric measure, which assesses the quality and impact of its scientific publications compared to other publications in the same field, demonstrates that the programs' publications are "highly cited" 3.3 times more than similar publications. In FY 2010, the program aims to further increase its percentage of "highly cited" publications, with a target of 34.9% in FY 2011. Achieving these ambitious targets will ensure EPA continues to make significant progress toward providing the research needed to meet its long-term clean air goals.

FY 2010 Change from FY 2009 Enacted Budget (Dollars in Thousands):

- (+\$645.0) This represents a restoration of resources transferred in FY 2009 to the Research: Sustainability Program to support the Small Business Innovation Research Program (SBIR). For that program, EPA is required to set aside 2.5 percent of funding for contracts to small businesses to develop and commercialize new environmental technologies. After the FY 2010 budget is enacted, when the exact amount of the mandated requirement is known, FY 2010 funds will be transferred to the SBIR program.
- (+\$206.0) These resources would fund work in the air research program, such as studying emission sources and investigating air pollutants health effects.
- (+\$104.0) This represents a realignment of funds associated with equipment purchases and repairs across Agency research programs.
- (+\$50.0) This is an increase in laboratory fixed costs, including maintenance, operations, utilities, and security costs.
- (+\$1,618.0) This reflects an increase for payroll and cost of living for all FTE.

Statutory Authority:

CAA; ERDDA.

Research: Global Change

Program Area: Research: Clean Air
Goal: Healthy Communities and Ecosystems
Objective(s): Enhance Science and Research

(Dollars in Thousands)

	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
Science & Technology	\$17,423.9	\$17,886.0	\$20,909.0	\$3,023.0
Total Budget Authority / Obligations	\$17,423.9	\$17,886.0	\$20,909.0	\$3,023.0
Total Workyears	31.7	35.5	35.5	0.0

Program Project Description:

EPA’s Global Change research program is assessment-oriented, with primary focus on understanding the effects of global change—particularly climate variability and change—on air quality, water quality, aquatic ecosystems, human health and social well-being in the United States. The Agency strives to produce timely and useful information, decision support tools and adaptation strategies that will enable resource managers, policymakers, and other stakeholders to account for global change when making decisions. EPA also has begun to develop decision support tools to help decision-makers evaluate alternative strategies for reducing greenhouse gas emissions and the environmental implications of those strategies.

The program also partners with Program and Regional Offices to understand how climate change affects the Agency’s ability to fulfill its statutory, regulatory, and programmatic requirements, and identifies opportunities within the provisions of the statutes to address the anticipated impacts of a changing climate. Climate – Air Quality interactions will likely play a larger role in the context of ambient air health assessments in the future. To meet this challenge, the Clean Air Research Program is working closely with the Global Program to envision a framework for the research that will be most useful to stakeholders charged with public and environmental health.

The program is also an active participant in the U.S. Climate Change Science Program (CCSP), the interagency Federal effort to improve scientific understanding of climate change.²⁶ EPA’s program priorities are consistent with those of the CCSP, which coordinates and integrates climate change research among thirteen Federal departments and agencies, and CCSP’s Strategic Plan²⁷. The program also is guided by a multi-year research plan developed by EPA, which is currently under revision.

A subcommittee of EPA’s Board of Scientific Counselors (BOSC)—a Federal advisory committee comprised of qualified, independent scientists and engineers—conducted a peer review of the program in 2005, and reported that the program “has provided substantial benefits

²⁶ For more information, see <http://www.climate-science.gov/>.

²⁷ National Science and Technology Council, *Strategic Plan for the U.S. Climate Change Science Program* (Washington: NSTC, 2003). Available at: <http://climate-science.gov/Library/stratplan2003/>

to the nation and that it is on course to make significant further contributions.”²⁸ The subcommittee completed a mid-cycle review of the program in 2008 and reaffirmed its assessment of the program.

FY 2010 Activities and Performance Plan:

In FY 2010, EPA research will focus on four areas: (1) understanding how climate change will affect air quality in the United States, (2) understanding how climate change will affect water quality and aquatic ecosystems, (3) evaluating alternative strategies for reducing greenhouse gas emissions and the environmental implications of those strategies, and (4) supporting the statutory mandates of the CCSP to produce periodic assessments of the effects of climate change. Research and assessments will continue to improve understanding of the implications of climate change for human health, and the human health impacts of alternative adaptation and mitigation strategies in all four areas.

The Global Change research program will continue to provide support to decision makers with areas of responsibility likely to be affected by climate change, such as air quality district managers, state environmental agencies, watershed managers, and operators of waste and drinking water systems. FY 2010 funding will continue research to: 1) develop, in collaboration with EPA’s Water program, detailed watershed-based, stakeholder-driven studies focused on local issues and specific management solutions for addressing global change, and 2) in collaboration with EPA’s Air and Radiation program, assess the linkages between global climate change, regional air quality and health effects. This research will be the basis for key comprehensive assessments of how climate change will affect U.S. air quality and water quality and particular areas of vulnerability. These assessments will help EPA’s Air and Water programs, respectively, understand how climate change will affect their ability to meet statutory, regulatory, and programmatic requirements and account for climate change’s effects in their future actions.

As recommended in a recently released National Research Council report,²⁹ the program will continue decision support efforts by inventorying and assessing the climate-sensitive decisions made by local and state decision makers to identify which decisions are most impacted by climate change and which decisions can benefit most from EPA’s scientific findings. In FY 2009, EPA supported the stakeholder-oriented process by the Alaska Department of Environmental Conservation to develop a Climate Change Strategy. EPA will continue to assist the State of Alaska as it implements its adaptation strategy and expects that this will serve as a model for future state strategies. This research responds to the BOSC recommendation that the program develop a new strategy for place-based adaptation decision support activities that recognizes the importance of engaging local stakeholders while ensuring that the results of the investment have extended applicability of national significance.

28 U.S. EPA, Board of Scientific Counselors, Subcommittee on Global Change Research, *Review of the Office of Research and Development’s Global Change Research Program at the U.S. Environmental Protection Agency, Final Report*. Washington, D.C.: EPA (2006), 6. See <http://www.epa.gov/osp/bosc/pdf/glob0603rpt.pdf>.

29 For more information, see http://www.nap.edu/catalog.php?record_id=12626

In FY 2010, the program will continue to develop computer models that simulate how global change may affect U.S. air quality,³⁰ continuing progress toward the program goal to complete a framework linking global change to air quality. The program will model and evaluate potential adaptive responses to climate change, such as changes in energy, pollution control, and transportation technologies, and behavior in various regions and sectors of the U.S.³¹ These efforts will help air quality resource managers make informed decisions about how to respond to the effects of global change on air quality. They are also a critical component of the Assessment of the Implications of Global Change for Air Quality in the U.S, planned for release in 2012.

In FY 2009, the program began to shift its environmental and health effects research emphasis to support a comprehensive assessment of the effects of climate change on water quality, including aquatic ecosystems. In FY 2010, EPA will begin research on the effects of land use practices and climate change on water systems. This information will assist in determining climate change impacts on water resources in different regions and in the development of decision support tools needed to protect water quality and aquatic ecosystems.

In FY 2010, the program will also perform research, in collaboration with other programs, to provide information that will inform efforts to mitigate greenhouse gases and other radiative forcing compounds. The research will address environmental implications of mitigation technologies, support EPA Air and Water programs rulemaking activities, and identify potential mitigation options that could reduce both traditional air pollutants (e.g., Ozone and PM) and green house gases. Research on geologic sequestration of carbon dioxide, in partnership with EPA's Drinking Water research program and the Department of Energy, will support the Office of Water's carbon sequestration rulemaking.

The U.S. Global Change Research Act of 1990 mandates periodic scientific assessments of the effects of global change.³² Section 106 of the act states that these assessments should integrate and interpret the findings of the Federal government's climate change research; analyze the effects of global change on the natural environment, agriculture, energy production and use, land and water resources, transportation, human health and welfare, human social systems, and biological diversity; analyze current trends in global change; and project major trends for the next 25 to 100 years. EPA, beginning in FY 2006, has participated in the development of CCSP's Synthesis and Assessments Products (SAPs), serving as lead-Agency for three of the 21 assessments.³³ Two EPA SAPs, Adaptation Options for Climate-Sensitive Ecosystems and Resources (SAP 4.4) and Analyses of the Effects of Global Change on Human Health and Welfare and Human Systems (SAP 4.6), were released in calendar year 2008. EPA will continue to participate in CCSP's programmatic, assessment, and planning activities.

The global change research program makes extensive use of the Science to Achieve Results (STAR) program's competitive, peer-reviewed grants. In FY 2010, STAR's global change component will focus on two research areas. First, new grants will be funded to develop effective strategies to both mitigate climate change and reduce air pollution while accounting for future

30 For more information, see <http://www.epa.gov/nerl/goals/global/>.

31 For more information, see <http://www.epa.gov/appcdwww/apb/greengas.htm>.

32 See 15 USC §2936.

33 For more information, see <http://www.climatescience.gov/Library/sap/sap-summary.php>.

changes in climate, land use, and technology. Second, STAR funding will enable investigation of the sensitivity of U.S. water systems to global change by developing models to quantitatively assess the impacts of global change on water systems.

To improve the Research: Global Change program EPA has taken steps to (1) finalize independent, review-informed performance measures; (2) clarify the program’s framework and mission; (3) develop a means to measure the program’s efficiency; and (4) improve budget–performance integration. The program is finalizing long-term performance targets and will collect formal long-term measurement data during its comprehensive BOSC review scheduled for late 2009. Additionally, the program is revising its multi-year plan around a clearer framework, and has developed an approach for improving program efficiency.

Performance Targets:

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Output	Percentage of planned outputs delivered.	100%	100	100	100	Percent

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Output	Percentage of Global publications rated as highly cited publications	Available 2010	No Target Provided (biennial)	23	No Target Provided (biennial)	Percent

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Output	Percentage of Global publications in high-impact journals	Available 2010	No Target Provided (biennial)	24.6	No Target Provided (biennial)	Percent

The research conducted under this program supports EPA Objective 4.4. Specifically, the program identifies and synthesizes the best available scientific information, models, methods, and analyses to support Agency guidance and policy decisions related to the health of people, community, and ecosystems, with a focus on global change.

The program gauges its annual and long-term success in meeting this objective by assessing its progress on several key measures. In FY 2009, the program aims to further improve its bibliometric analysis results by (1) increasing the percentage of program publications rated as “highly cited” to 23 percent; and (2) increasing the percentage of program publications rated as “high impact” to 24.6 percent. Improvements in these measures demonstrate increased quality and utility of the program’s research. In addition, the program plans to meet 100 percent of its planned outputs, and complete additional work toward a framework linking global change to air quality. By meeting these targets, the research program will improve the Agency’s ability to make guidance and policy decisions related to global change.

FY 2010 Change from FY 2009 Enacted Budget (Dollars in Thousands):

- (+\$2,156.0) This increase supports global change research and will allow the program to expand its projections on the effects of climate change on air and water quality in the United States. The results will be used by air and water quality managers to evaluate how climate change influence will affect attainment of air and water quality standards. The increase also will be used to evaluate alternative strategies for reducing greenhouse gas emissions and the environmental implications of those strategies.
- (+\$368.0) This reflects an increase for payroll and cost of living for all FTE.
- (+\$253.0) This represents a realignment of funds associated with equipment purchases and repairs across the Agency's research programs.
- (+\$246.0) This represents a restoration of resources transferred in FY 2009 to the Research: Sustainability Program to support the Small Business Innovation Research Program (SBIR). For that program, EPA is required to set aside 2.5 percent of funding for contracts to small businesses to develop and commercialize new environmental technologies. After the FY 2010 budget is enacted, when the exact amount of the mandated requirement is known, FY 2010 funds will be transferred to the SBIR program.

Statutory Authority:

USGCRA; NCPA; ERDDA.

Program Area: Research: Clean Water

Research: Drinking Water

Program Area: Research: Clean Water

Goal: Clean and Safe Water

Objective(s): Enhance Science and Research

(Dollars in Thousands)

	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
Science & Technology	\$48,228.2	\$46,873.0	\$47,909.0	\$1,036.0
Total Budget Authority / Obligations	\$48,228.2	\$46,873.0	\$47,909.0	\$1,036.0
Total Workyears	200.9	190.2	190.2	0.0

Program Project Description:

EPA's Drinking Water Research Program provides sound scientific approaches for ensuring safe and sustainable drinking water through integrated, multidisciplinary applied research. This program provides methodologies, data, tools, models, and technologies in support of health risk assessments and other needs pertaining to regulatory decisions under the Safe Drinking Water Act's (SDWA) statutory requirements. Research also is targeted at implementation of regulatory decisions, addressing simultaneous compliance issues, promoting the sustainability of water resources, and the reliable delivery of safe drinking water, as well as developing approaches to improve water infrastructure. The program is designed around the water cycle and the research is organized around five theme areas (assessment tools, exposure/health effects, source water protection, treatment strategies, and distribution/storage/infrastructure). This structure provides opportunities for integrating method development with health effects research and applications in treatment technologies and water distribution systems. In addition, this structure provides an opportunity to integrate water availability, water efficiency and energy considerations into the risk characterization-risk management paradigm.

Research in the Drinking Water Research Program is coordinated with the Agency's regulatory activities and timelines and is responsive to EPA's water program and Regional offices. Current research topics include: the Revised Total Coliform Rule (R-TCR) and related research on distribution systems; implementation of recent regulatory decisions including the Ground Water Rule, the Stage 2 Disinfection Byproduct Rule (DBP2), and the Long-Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR); and research support for simultaneous compliance challenges, particularly co-compliance with the Lead and Copper Rule (LCR), Microbial and Disinfectant Byproduct (M/DBP) rules, and National Primary Drinking Water Regulations (NPDWR). Research also is targeted at supporting the proposed revisions to the Underground Injection Control (UIC) regulations that pertain to geologic sequestration of carbon. Another major component of the research program is addressing the information gaps associated with chemicals and microorganisms that are on the soon-to-be-released third Contaminant Candidate List (CCL3) and supporting the unregulated contaminant monitoring rule (UCMR).

Several peer-reviewed research strategies^{34,35} and guidance from external experts^{36,37,38,39} have provided input and guidance for charting the research directions. The Agency also maintains a Drinking Water Research Program (DWRP) Multi-Year Plan⁴⁰ (MYP) that outlines steps for meeting these needs and annual performance goals and measures for evaluating progress. The drinking water MYP has been revised to reflect anticipated science and regulatory needs in FY 2010 and beyond. These plans are subjected to rigorous peer review⁴¹ and address high priority research questions related to the safety of drinking water and the safety, reliability, and sustainability of drinking water infrastructure.

In 2007, the Drinking Water research program underwent a mid-cycle progress review by the Board of Scientific Counselors (BOSC), a Federal advisory committee comprised of qualified, independent scientists and engineers.⁴² The BOSC was “favorably impressed” with the program’s revised structure and concluded that the formation of five thematic areas (i.e. Assessment tools, Exposure/Health Effects, Source water/Water resources, Treatment/Residuals, and Distribution/Storage/Infrastructure) “allows focus on statutory requirements such as the 6-year review or the Contaminant Candidate List (CCL) with the flexibility to address emerging drinking water research issues such as nanotechnology”. The Drinking Water research program is adopting specific BOSC recommendations, including identifying opportunities for collaboration and resource leveraging while continuing to plan anticipatory drinking water research. A complete BOSC review is scheduled for FY 2010.

FY 2010 Activities and Performance Plan:

In FY 2010, the Drinking Water research program will focus on characterizing and managing health risks associated with the sources, production and distribution of drinking water for public water supplies. The research plan reflects a progressive shift from addressing single contaminants towards developing exposure and health effects information that can be applied to classes of contaminants. Efforts also are being directed at integrating concepts of water availability, energy-water interdependencies, and the sustainability of water systems in the context of the program’s long-term goals. The thematic areas of the program are: assessment tools, exposure/health effects, source water protection, treatment strategies, and water distribution/storage/infrastructure systems.

Assessment tools: Research is focused on developing tools for the analysis, monitoring, screening and prioritization of drinking water constituents. Research will continue to develop methods to measure CCL chemicals and pathogens to assist in assessing occurrence under

34 U.S. EPA, Office of Research and Development. *Research Plan for Microbial Pathogens and Disinfection By-Products in Drinking Water*. EPA 600-R-97-122, Washington, D.C.: U.S. Government Printing Office (1997).

35 U.S. EPA, Office of Research and Development. *Research Plan for Arsenic in Drinking Water*. EPA 600-R-98-042, Washington, D.C.: U.S. Government Printing Office (1998).

36 National Research Council. *Classifying Drinking Water Contaminants for Regulatory Consideration*. Washington, D.C.: The National Academies Press (2001).

37 National Academies of Science. *From Source Water to Drinking Water: Workshop Summary*. Washington, D.C.: The National Academies Press (2004).

38 National Research Council. *Indicators for Waterborne Pathogens*. Washington, D.C.: The National Academies Press (2004).

39 National Research Council. *Public Water Supply Distribution Systems: Assessing and Reducing Risks--First Report*. Washington, D.C.: The National Academies Press (2005).

40 U.S. EPA, Office of Research and Development, Drinking Water Research Program Multi-Year Plan. Washington, D.C. Available at: <http://www.epa.gov/osp/myrp.htm>.

41 Science Advisory Board. *Review of EPA's 2003 Draft Drinking Water Research Program Multi-Year Plan* (2005). Available at: <http://www.epa.gov/sab/pdf/sab-05-008.pdf>.

42 U.S. EPA, Board of Scientific Counselors. *Mid-Cycle Review Of The Office Of Research And Development's Drinking Water Research Program At The U.S. Environmental Protection Agency*. (Washington: EPA, 2007). Available at: <http://www.epa.gov/OSP/bose/pdf/dwmc082007rpt.pdf>

Unregulated Contaminant Monitoring Rules and for evaluating the effectiveness of treatment techniques. Exposure biomarkers for use in exposure and epidemiology studies, as well as measurement methods (recovery, viability, speciation) will be improved for compliance monitoring and Contaminant Candidate List (CCL) classification and prioritization. FY 2010 efforts will:

- Integrate sample collection, concentration, purification and detection for real-time quantitative detection methods for CCL related organisms.
- Characterize virulence and/or infectivity of potential CCL pathogens.
- Develop microarray methods to detect cyanobacteria and cyanotoxin genes in drinking water reservoirs.
- Develop and validate a virulence-factor Biochip for screening and identification of select CCL pathogens (E. Coli, Cryptosporidium, and Norovirus) and other waterborne microorganisms.
- Evaluate virulence factor activity relationships (VFARs) in characterizing CCL pathogens.

Exposure/Health Effects: A major research focus is clarifying potential health effects of CCL contaminants, waterborne disease outbreak analysis, and epidemiological studies, including the potential exposure and health significance of newly identified regulated disinfection byproducts (DBPs) and mixtures of DBPs, particularly from the use of alternatives to chlorine disinfection. Work in FY 2010 will focus on:

- Factors that influence the toxicity of Disinfection By-Product Mixtures.
- Health effects of select cyanobacterial toxins, nanoparticles.
- Results from a population-level study to assess the relationship between measured and modeled parameters of a metropolitan water distribution system and the incidence of gastrointestinal disease.
- Completing research on arsenic exposure and health effects; bioavailability of arsenicals associated with target foods biotransformation pathways due to gastrointestinal microflora.
- Characterizing biomarkers of virus exposure through drinking water consumption.

Source Water Protection: Protection of surface water and ground water sources of drinking water requires reliable monitoring methods coupled with implementation of best management practices (BMPs). In addition to watershed research, protection of ground water sources will be a focus in FY 2010 with increasing emphasis on underground injection control (UIC), aquifer storage and recovery (ASR), and ground water recharge. Research will continue toward answering key questions associated with minimizing risks of geologic sequestration of carbon on underground sources of drinking water (USDW). Studies are underway to develop models to assess risk associated with underground injection of carbon dioxide, field monitoring techniques to assess leakage of injected carbon dioxide into sources of drinking water, and tools to support implementation aspects of the proposed UIC rule on geological sequestration.

Treatment Strategies: The emphasis of the research will be on evaluating existing treatment strategies for control of CCL and other emerging contaminants, development of point-of-

use/point-of-entry systems for small systems, implementation issues for regulated contaminants, and preventing simultaneous compliance issues. Major focus areas include disinfection efficacy, control of emerging contaminants, corrosion control, and optimizing energy and water efficiency in producing and delivering potable water.

Distribution/Storage/Infrastructure: Research efforts will be directed at integrated research on water supply distribution systems and infrastructure. The Agency is participating in a “Distribution System Research and Information Collection Partnership” to develop a prioritized research agenda focused on decision relevant issues related to cross connections, back-flow, intrusion, main breaks and repairs, biofilms, nitrification, and solids accumulation. This work is in support of the revisions to the Total Coliform Rule (TCR) and the next round of 6-year review. Studies will be conducted to better understand the growth and colonization of viral, bacterial and protozoan pathogen in distribution systems including the role of free-living amoebae in fate, transport and infectivity; nitrification reactions that occur in distribution systems, accumulation and mobilization of contaminants from distribution systems including lead, arsenic, and vanadium, and disinfection. Research started in FY 2007 under the "Water Infrastructure for the 21st Century" Initiative, will continue in FY 2010 and will include focusing on field investigations and modeling of how distribution system characteristics (age, materials, capacity) and management/operation practices (flushing, pressure, hydrodynamics, storage, mixing of water sources, corrosion control) impact biofilms, water chemistry, corrosion, and drinking water quality. The Agency will explore integrated approaches for managing and assessing risks in the distribution system and the development of innovative, real-time condition assessment, technology, repair or rehabilitation techniques. Anticipated research products include:

- Advanced condition assessment for drinking water mains
- Microbial characterization of distribution systems
- Nitrification reactions in drinking water distribution systems.
- Evaluation of childhood febrile and gastrointestinal health effects associated with contaminated ground water and distribution system vulnerabilities

Within the five general thematic areas outlined above, the Drinking Water research program will continue to provide support for the SDWA-mandated 6-year review of regulated contaminants (e.g., draft revision of the Total Coliform Rule, potential revisions to the Lead and Copper rule, etc). Bench and pilot scale research on simultaneous compliance issues resulting from the Ground Water Rule and the Enhanced Surface Water Treatment Rule will be continued. Modeling and field studies will continue to address UIC research needs associated with geologic sequestration of carbon.

By conducting research in support of SDWA, this research program will assist the Agency in pursuing its strategic objective of providing, by 2011, drinking water that meets all applicable health-based drinking water standards to 91 percent of the population served by community water systems.

To improve program management efforts, the program is currently: 1) working to set targets for the remainder of its long-term and annual measures, and 2) improving its oversight of partners. The program collected initial long-term measurement data during its mid-cycle BOSC review in

May 2007, and will collect formal long-term measurement data during its comprehensive BOSC review scheduled for FY 2010.

Performance Targets:

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Output	Percentage of planned methodologies, data, and tools delivered in support of EPA's Office of Water and other key stakeholders needs for developing health risk assessments, producing regulatory decisions, implementing new and revised rules, and achieving simultaneous compliance under the Safe Drinking Water Act.	100	100	100	100	%

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Output	Percentage of planned risk management research products delivered to support EPA's Office of Water, Regions, water utilities, and other key stakeholders to manage public health risks associated with exposure to drinking water, implement effective safeguards on the quality and availability of surface and underground sources	100	100	100	100	%

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
	of drinking water, improve the water infrastructure, and establish health-based measures of program effectiveness.					

The research conducted under this program supports EPA Strategic Objective 2.3 – Enhance Science and Research. Specifically, the program conducts leading-edge, sound scientific research to support the protection of human health through the reduction of human exposure to contaminants in drinking water. The program gauges its annual and long-term success by assessing its progress on several key measures. In 2010, the program will strive to complete 100 percent of its planned outputs in support of its long-term goals. In achieving these targets, the program will contribute to EPA’s goal of protecting human health through the reduction of human exposure to contaminants in drinking water.

FY 2010 Change from FY 2009 Enacted Budget (Dollars in Thousands):

- (+\$412.0) This reflects an increase for payroll and cost of living for existing FTE.
- (+\$173.0) These resources will fund research to characterize and manage health risks associated with the sources, production and distribution of drinking water for public water supplies.
- (+\$246.0) This represents a realignment of funds associated with equipment purchases and repairs across Agency research programs.
- (+\$205.0) This represents a restoration of resources transferred in FY 2009 to the Research: Sustainability Program to support the Small Business Innovation Research Program (SBIR). For that program, EPA is required to set aside 2.5 percent of funding for contracts to small businesses to develop and commercialize new environmental technologies. After the FY 2010 budget is enacted, when the exact amount of the mandated requirement is known, FY 2010 funds will be transferred to the SBIR program.

Statutory Authority:

SDWA; CWA; ERDDA; MPRSA.

Research: Water Quality
 Program Area: Research: Clean Water
 Goal: Clean and Safe Water
 Objective(s): Enhance Science and Research

(Dollars in Thousands)

	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
<i>Science & Technology</i>	<i>\$53,343.0</i>	<i>\$59,291.0</i>	<i>\$62,454.0</i>	<i>\$3,163.0</i>
Total Budget Authority / Obligations	\$53,343.0	\$59,291.0	\$62,454.0	\$3,163.0
Total Workyears	237.7	236.8	236.8	0.0

Program Project Description:

The Water Quality research program is designed to support the Clean Water Act (CWA), providing scientific information and tools to the Agency and others to help protect and restore the designated uses of water bodies that sustain human health and aquatic life. The program conducts research on the development and application of water quality criteria; the implementation of effective watershed management approaches; and the application of technological options to restore and protect water bodies using information on effective treatment and management alternatives.

The Water Quality research program is responsive to the needs of EPA’s Water program and Regional Offices, which are the program’s primary clients in developing research priorities. The Agency maintains a Water Quality Research Program Multi-Year Plan⁴³ (MYP) that outlines steps and provides a timeline for meeting these needs along with related annual performance goals and measures for evaluating progress. EPA’s Board of Scientific Counselors (BOSC), a Federal advisory committee comprised of independent expert scientists and engineers, evaluated the Water Quality research program in January 2006. The BOSC review found “the Water Quality research program appropriately addresses EPA’s Strategic Goal 2 of Clean Water by creating the tools necessary for the Water program to establish water quality criteria and respond when those criteria are not being met, this includes using research results to comply with regulations and advance fundamental understanding. The program is responsive to EPA’s Water program, the program’s primary client, in developing their research priorities.”⁴⁴

FY 2010 Activities and Performance Plan:

Research efforts within the water quality research program are aligned with the Agency’s strategic objectives⁴⁴ under the CWA to:

- promulgate protective standards,
- identify contaminant contributions to impaired waters,

⁴³ U.S. EPA, Office of Research and Development, *Water Quality Research Program Multi-Year Plan*. Washington, D.C.: EPA. Available at: <http://www.epa.gov/osp/myrp.htm>.

² U.S. EPA, Board of Scientific Counselors, *Review of the Office of Research and Development’s Water Quality Research Program at the U.S. Environmental Protection Agency* (Washington: EPA, 2006). Available at: <http://www.epa.gov/osp/bosc/pdf/wq0605rpt.pdf>

⁴⁴ U.S. EPA, Office of the Chief Financial Officer, 2006-2011 EPA Strategic Plan, Washington, D.C.:EPA. Available at www.epa.gov/ocfo/plan/plan.html

- use tools to restore and protect the nation's waters with due consideration to minimizing impacts from point and non-point sources of contamination, and
- maintain and improve the nation's aging infrastructure.

In FY 2010 the Water Quality research program will support priorities set in consultation with EPA's Water program and Regional offices, taking into account such factors as pollutant/stressor type, water body types, and source of pollutants (e.g. agricultural versus urban). Research activities are categorized within three areas: 1) Water Quality Integrity Research; 2) Watershed Management Research; and, 3) Source Control and Management Research. Although the quality of the nation's waters has shown improvement, threats to water quality remain, and new threats continue to be identified.

Water Quality Integrity research priorities support regulatory driven needs related to revising aquatic life guidelines, recreational water criteria, and developing criteria for emerging contaminants [e.g., pharmaceuticals and personal care products (PPCPs) and invasive species], nutrients, toxics, sediments, and multiple stressor effects on stream biota, including research on biological condition gradients for Tiered Aquatic Life Uses (TALU). Specific stressors include habitat alteration, nutrients, pathogens, and emerging contaminants. EPA's water program is the major client for research products developed under this research and will use them in the development and application of water quality criteria. In FY 2010, research will continue to help provide the data and analysis to support revisions to recreational water criteria.

Research on diagnostic methods will enable EPA to continue its focus on the causes and sources of aquatic system impairment. Specifically, this research will provide the scientific foundation and information management scheme for an integrated process for assessing, listing, and reporting water quality conditions that meet or fail to meet statutory requirements, including a classification framework for surface waters, watersheds, and regions. As EPA directs and informs the efforts of the States to adopt nutrient criteria for individual water bodies, research is required to identify nutrient responses based on geographic region, water body type, and designated use. Research will continue toward linking stressor-response relationships to a biological condition gradient and TALU framework, while providing information on technical guidance for the development of nutrient water quality criteria for coastal wetlands and estuaries and Great Lakes.

The Water Quality program supports the adoption and implementation of *watershed management* approaches by States and Tribes as they require strong standards, monitoring, Total Maximum Daily Load (TMDL) determinations, and implementation programs, including best-management practices, restoration, and TMDL watershed plans. Watershed Management Research supports the TMDL allocation processes with the development of information and integrated water quality and quantity modeling and monitoring tools, including tools for targeting and prioritizing monitoring and restoration. This research supports assessing condition, diagnosis of impairment, mitigation, and achieving success, including support for CWA Section 305(b) reporting, use attainability analyses identifying designated uses, and TMDL adaptive management. Research efforts in this area include Gulf of Mexico Hypoxia research aimed at developing risk-based forecasting capability to aid water resource managers in making scientifically defensible nutrient management decisions to reduce the hypoxia problem, restore

the natural habitats, and restore food web assemblages along the Gulf coast. Other research addresses identifying the locations and connectivity of headwater streams and wetlands (complementary research on how and what role headwater streams and isolated wetlands play in reducing pollutant loads, and their effect on downstream quality is being conducted under the Agency's Ecological Research program to enhance our understanding of the benefits and value of ecological services); and technical assistance for watershed modeling, decision support tools, and monitoring the biological condition of the nation's aquatic resources. Key users of these products will be at the regional, state, and local level.

Research will continue on the development of microbial source tracking (MST) indicators that can be used to distinguish human from non-human pathogens and amongst different sources of non-human pathogens (e.g., cows versus geese). Such work is generally important to supporting improved TMDLs that will more accurately identify the sources of pathogens that must be managed to meet water quality standards. In particular, the results of this research support the development of revisions to the ambient water criteria for recreational settings.

In addition, existing models of pollutant transport and fate will be expanded to allow the evaluation of alternative strategies for restoring and protecting local and state watersheds. Particular emphasis will be placed on strategies for nutrient control in rural/agrarian settings and on strategies for pollutant control in urban settings. Approaches will be studied for effectively monitoring the reduction in the water column pollutants and improvements in aquatic ecosystems and for demonstrating the effectiveness of protecting designated uses from future development or other impacts.

In FY 2010, EPA's research and development program will put increased focus on wet weather flow problems in urban areas, looking particularly at how green infrastructure options could improve efficiency. Many municipalities are faced with multi-million dollar costs associated with controlling wet weather flow and particularly combined sewer overflows (CSOs). Green infrastructure options have the potential to reduce costs of control compared to traditional "grey" infrastructure, but are less proven.

Green infrastructure has the potential to provide a number of other environmental and economic benefits in addition to improving the water quality outcomes. They include the recharge of ground water and surface water supplies; cleaner air; reduced urban temperatures; reduced energy demand; carbon sequestration; reduced flooding; community benefits such as improved aesthetics, improved human health, recreational and wildlife areas; new jobs creation; and potential cost savings associated with lower capital costs for paving, curb and gutter, and building large stormwater collection and conveyance systems.⁴⁵ However, design criteria and guidance information is lacking for the placement installation, operation and maintenance for many of the green infrastructure alternatives. Additional research is also needed to collect information on measuring the environmental and economic improvements so that technical information can be provided to communities nationwide.

⁴⁵ Testimony of Michael Shapiro, Acting Assistant Administrator for Water, U.S. Environmental Protection Agency; before the Subcommittee on Water Resources and the Environment Committee on Transportation and Infrastructure; United States House of Representatives; March 19, 2009.

Research will be conducted on application of green BMPs in different urban settings, on incentives for private land owners to put such units on their sites, and on effective monitoring of the water quality improvements that result.

The preservation and restoration of wetlands will be supported with research on how wetland processes assimilate nutrient contaminants. The water quality research that defines wetland performance is fundamental to the implementation of water quality trading programs. It will include a comparison of natural and constructed wetlands to determine how seasonal changes in hydrologic regime, stressor load, and upland land use affect the functioning of these systems and will inform the protection and restoration of wetlands. Economic assessments of the use of wetlands in water quality trading also will be conducted.

Research on the release of pathogens and pathogen indicator organisms from manure-treated farmlands is needed to ensure that environmentally responsible practices are available to the agricultural community, and will continue. Field studies at concentrated animal feed operations (CAFOs) will determine the magnitude of releases to ground waters and surface waters and evaluate control options with emphasis on pathogen and nutrient contaminants. This work will support the development of effective TMDLs and National Pollutant Discharge Elimination System (NPDES) permits.

Source Control and Management (SCM) research priorities will develop information and tools to characterize, control, and manage point and non-point sources of water quality impairment. Research addresses aging infrastructure, green infrastructure, wet weather flows and residuals management. Major users of these products will be the Agency, states, regional authorities and municipalities.

In FY 2010, research will continue on the development of innovative solutions to manage the Nation's aging wastewater infrastructure. Research started in FY 2007 under the "Water Infrastructure for the 21st Century" initiative will continue to develop the science and engineering to improve and evaluate promising innovative technologies and techniques to increase the effectiveness and reduce the cost of operation, maintenance, and replacement of aging and failing wastewater conveyance systems. Research efforts will demonstrate technologies and approaches for new and innovative condition assessment, rehabilitation, and design of wastewater collection systems and comprehensive asset management. This research will support EPA in developing policy and revolving funds allocation decisions to address this multi-billion dollar problem faced by the Nation, and will support utilities and other stakeholders involved in meeting community watershed management goals and in the cost-effective assessment, rehabilitation and management of their systems.

Research will continue on the public health and environmental risk posed by of microbial releases from publically owned treatment works (POTWs) during periods of significant wet weather events. During these events wastewater flow may exceed POTW treatment capacity, resulting in diversion of wastewater around secondary treatment units followed by recombination (i.e., "blending") with flows from the secondary treatment units or discharging it directly into waterways from the treatment plant.

Research on the performance of non-point source best management practices (BMPs) will be conducted in order to provide information to watershed managers and others for the more cost-effective reduction of pollutant loading to surface waters. Particular emphasis will be placed on green infrastructure (a subcomponent of aging water infrastructure research; below) and on the variation of BMP cost and performance with geographical and other major influencing variables. EPA will continue to support the Pathogens Equivalency Committee (PEC) which evaluates innovative approaches to sewage sludge treatment for the purposes of determining whether they meet requirement of Part 503 (biosolids) regulations.

The “Water Quality Research.” program has implemented several actions to improve management and performance. The program has established a process by which the BOSC will assign a progress rating to each program long-term goal as part of its reviews.

Performance Targets:

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Output	Percentage of planned outputs (in support of WQRP long-term goal #1) delivered	100	100	100	100	Percent

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Output	Percentage of planned outputs (in support of WQRP long-term goal #2) delivered	100	100	100	100	Percent

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Output	Percentage of WQRP publications rated as highly cited publications.	15.2	15.7	No Target Provided (biennial)	16.7	Percent

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Output	Percentage of WQRP publications in high impact journals.	13.8	14.7	No Target Provided (biennial)	15.7	Percent

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Output	Percentage of planned outputs (in support of	100	100	100	100	Percent

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
	WQRP long-term goal #3) delivered					

The research conducted under this program supports EPA Strategic Objective 2.3- Enhance Science and Research. Specifically, the program conducts leading-edge, sound scientific research to support the protection of human health through the reduction of human exposure to contaminants in fish and shellfish, and recreational waters, and to support the protection of aquatic ecosystems.

In FY 2010, the program plans to accomplish its goals of completing and delivering 100 percent of its planned outputs. In achieving these targets, the program will contribute to EPA’s goal of supporting the protection of human health through the reduction of human exposure to contaminants in fish, shellfish, and recreational waters, and to support the protection of aquatic resources. Additionally, the program strives to improve its number of publications per FTE to 82 percent. In achieving these targets, the program will better enable EPA to meet its goals.

FY 2010 Change from FY 2009 Enacted Budget (Dollars in Thousands):

- (+\$3,000.0) This increase will fund the expansion of green infrastructure research to assess, develop and compile scientifically rigorous tools and/or models that will be used by EPA’s Water program, States, and municipalities. This research will address region and climate-specific concerns and provide technical information that can be used to help quantitatively determine the benefits of green infrastructure and reduce the uncertainty involved in using it for compliance purposes. Research will also be conducted to advance the use of gray water, particularly in areas facing water shortages, to help reduce the burden on water supplies and infrastructure.
- (+\$328.0) This provides resources in the area of Criteria Development and Watershed Management and Source Control.
- (+\$152.0) This represents a restoration of resources transferred in FY 2009 to the Research: Sustainability Program to support the Small Business Innovation Research Program (SBIR). For that program, EPA is required to set aside 2.5 percent of funding for contracts to small businesses to develop and commercialize new environmental technologies. After the FY 2010 budget is enacted, when the exact amount of the mandated requirement is known, FY 2010 funds will be transferred to the SBIR program.
- (+\$98.0) This reflects an increase for payroll and cost of living for existing FTE.
- (-\$415.0) This represents a realignment of funds associated with critical equipment purchases and repairs across Agency research programs.

Statutory Authority:

CWA; ODBA; SPA; CVA; WRDA; WWWQA; MPPRCA; NISA; CZARA; CWPPRA; ESA; NAWCA; FIFRA; TSCA; ERDDA.

Program Area: Research: Human Health And Ecosystems

Human Health Risk Assessment

Program Area: Research: Human Health and Ecosystems

Goal: Healthy Communities and Ecosystems

Objective(s): Enhance Science and Research

(Dollars in Thousands)

	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
<i>Science & Technology</i>	<i>\$34,569.9</i>	<i>\$39,350.0</i>	<i>\$45,133.0</i>	<i>\$5,783.0</i>
Hazardous Substance Superfund	\$6,799.6	\$3,377.0	\$3,395.0	\$18.0
Total Budget Authority / Obligations	\$41,369.5	\$42,727.0	\$48,528.0	\$5,801.0
Total Workyears	187.9	178.6	188.6	10.0

Program Project Description:

Human health risk assessment is a process where information is analyzed to determine if an environmental hazard might cause harm to exposed persons (National Research Council, 1983). EPA's Human Health Risk Assessment (HHRA) program generates health assessments that are used extensively by EPA Program and Regional offices, and other parties to determine the potential risk to public health from exposure to environmental contaminants to develop regulatory standards, and to manage environmental cleanups. EPA's human health risk assessment program provides the scientific foundation for the Agency's actions to protect Americans' public health and the environment.

Three complementary areas comprise the Human Health Risk Assessment program:

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

IRIS and other health hazard assessments: Peer reviewed, qualitative and quantitative health hazard assessments are prepared on environmental pollutants of major relevance to EPA's regulatory mandates. These assessments are used by EPA's program and Regional offices to support their decision-making, and are also disseminated to the public on the IRIS internet database.⁴⁶ IRIS is widely used throughout EPA and the risk assessment/risk management community as the premier source of hazard and dose-response information for environmental pollutants. At the end of 2008, 548 health hazard assessments were available through IRIS.

Risk assessment guidance, methods and model development: Improved risk assessment guidance, methods, and models are developed to enhance the quality and objectivity of assessments through the incorporation of contemporary scientific advances for use in decision-making by EPA's program and Regional offices. These scientific products are externally peer reviewed and disseminated through the published literature as well as EPA web sites, and are used in the development of IRIS assessments.

⁴⁶ Available at: <http://www.epa.gov/iris>.

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

This research program is guided by the Human Health Risk Assessment Multi-Year Plan⁴⁷ (MYP), which details the products planned under this program. The MYP also outlines research needs and priorities for making decisions central to EPA’s implementation of its statutory responsibilities and to its mission to protect human health and the environment. Performance outputs and outcomes are documented in the MYP and are linked to the program’s annual and long-term performance measures. The MYP also outlines coordination efforts with a number of EPA research strategies and plans⁴⁸ (e.g., Human Health Research Strategy, Drinking Water MYP, Clean Air MYP) to obtain the information necessary to inform risk assessment outputs and programmatic decisions.

In FY 2008, an evaluation by EPA’s Board of Scientific Counselors (BOSC)—a Federal advisory committee comprised of independent expert scientists and engineers—concluded that the Human Health Risk Assessment program “has been highly responsive to the needs of the program offices and regions,” producing products that are critical to EPA’s regulatory mission and form the foundation for regulatory decisions and policies. This prospective and retrospective review evaluated the program’s relevance, quality, performance, and scientific leadership. The evaluation found that the program is making substantial and satisfactory progress in each of the above areas based both on clearly defined milestones and by providing the additional support requested by EPA programs to respond to unscheduled emergency needs. The BOSC’s evaluation and recommendations are being used to help plan, implement, and strengthen the program over the next five years.

FY 2010 Activities and Performance Plan:

In FY 2010, EPA requests \$28.7 million for IRIS and other health hazard assessments, which includes an increase of \$5.0 million and ten work years to allow the IRIS program to increase the annual output of new IRIS assessments and updates of existing IRIS assessments. These additional resources are necessary to increase the number of completed critical risk assessments, in addition to decreasing the backlog of draft assessments and better meet the priority assessment needs of the Agency. EPA will continue to evaluate the process over time in response to the Government Accountability Office’s (GAO) High Risk Series report identifying weaknesses in the IRIS process to ensure that the program effectively meets the needs of EPA, the Federal government, and the American public.

In the area of risk assessment guidance, methods and models, the Agency requests \$9.4 million in FY 2010. This continued investment will make improvements in the following areas:

- Approaches for applying mode of action information in risk assessments;

⁴⁷ Available at: <http://www.epa.gov/ord/htm/multi-yearplans.htm>

⁴⁸ Available at: <http://www.epa.gov/ord/htm/researchstrategies.htm> and <http://www.epa.gov/ord/htm/multi-yearplans.htm>.

- Approaches for characterizing risks to susceptible populations;
- Approaches for characterizing environmental exposures for use in risk assessments;
- Approaches that improve quantification of health risks (e.g., PBPK and BBDR modeling, categorical regression, meta analysis approaches);
- Approaches that improve characterization of variability and uncertainty analysis in risk assessment;
- Approaches for applying cumulative risk assessment principles to health assessments (e.g., whole mixture and component based approaches).

In addition, EPA requests \$7.1 million in FY 2010 for the Human Health Risk Assessment program to conduct Integrated Science Assessments (ISA). These funds will support work on the following key assessments:

- Continuing to improve and implement a process to identify, compile, characterize, and prioritize new scientific studies for ISAs of criteria air pollutants, as a mandated prerequisite to EPA’s review of the NAAQS and effectively meet court ordered deadlines to provide these assessments; and
- Delivering final ISAs for Particulate Matter and Carbon Monoxide
- Delivering final ISAs for Particulate Matter and Carbon Monoxide and release *external review draft* ISAs for Ozone and Lead program to contribute to EPA’s Office of Air and Radiation’s review of the NAAQS and creation of state-of-the-science methods for continuous evaluation of assessments of new scientific information on criteria air pollutants.

These continued investments will allow the Human Health Risk Assessment program to make significant progress toward its long-term goals of providing state-of-the-science health hazard assessment information. The ISAs provide important scientific analytics in support of many of EPA’s important rulemakings.

The Human Health Risk Assessment program is taking a number of steps to further improve itself. The program is currently 1) revising its management controls to better incorporate both programmatic priorities and the level of effort required to increase the number of IRIS assessments completed; 2) revising its efficiency measure and using it to improve performance management; and 3) investigating alternative approaches for measuring progress related to providing timely, high quality scientific assessments. The program has taken action on each of these recommendations. For example, the program is examining how best to expand its efficiency measure to ensure consistency with other approaches being developed across EPA’s Research and Development program.

Performance Targets:

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Efficiency	Average cost to produce Air Quality Criteria/Science Assessment documents.	Available FY 2010	3,796K	4,253K	4,003K	Average Cost

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Output	Percentage of planned outputs delivered in support of HHRA Technical Support Documents.	89	90	90	90	Percent

The research conducted under this program supports EPA Strategic Objective 4.4. Specifically, the program identifies and synthesizes the best available scientific information, models, methods, and analyses to support Agency guidance and policy decisions related to the health of people and communities.

The program gauges its annual and long-term success in meeting this objective by assessing its progress on several key measures. The program continues to track the percent completion of key milestones. In response to GAO recommendations to streamline the current IRIS process, the program's newest measures, which are reported in EPA's quarterly *EPAstat* report, will be revised and the targets for outputs increased appropriately.

FY 2010 Change from FY 2009 Enacted Budget (Dollars in Thousands):

- (+\$5,000.0 / +10.0 FTE) This reflects an increase to support the Integrated Risk Information System (IRIS), including 10 FTE and associated payroll of \$1,390.0. The increment would allow the IRIS Program to better meet the priority assessment needs of the Agency by increasing the annual output of new IRIS assessments and updates of existing IRIS assessments. This would enable the IRIS program to focus on its large backlog of assessments for chemicals previously identified by EPA programs as priority needs. A further benefit would be the development and application of new approaches to human health risk assessment in collaboration with EPA's Prevention, Pesticides, and Toxic Substances program and the Agency's Computational Toxicology program.
- (+\$408.0) This reflects an increase for payroll and cost of living for all FTE.
- (+\$190.0) This reflects resources to fund research in the area of risk assessment guidance, methods and model development.
- (+\$185.0) This represents a restoration of resources transferred in FY 2009 to the Research: Sustainability Program to support the Small Business Innovation Research Program (SBIR). For that program, EPA is required to set aside 2.5 percent of funding for contracts to small businesses to develop and commercialize new environmental technologies. After the FY 2010 budget is enacted, when the exact amount of the mandated requirement is known, FY 2010 funds will be transferred to the SBIR program.

Statutory Authority:

CAA; SDWA; CWA; TSCA; FIFRA; CERCLA; SARA; FQPA; ERDDA.

Research: Computational Toxicology

Program Area: Research: Human Health and Ecosystems

Goal: Healthy Communities and Ecosystems

Objective(s): Enhance Science and Research

(Dollars in Thousands)

	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
Science & Technology	\$13,987.1	\$15,156.0	\$19,602.0	\$4,446.0
Total Budget Authority / Obligations	\$13,987.1	\$15,156.0	\$19,602.0	\$4,446.0
Total Workyears	37.8	32.7	32.7	0.0

Program Project Description:

Computational Toxicology is the application of mathematical and computer models to help assess the risk chemicals pose to human health and the environment. Supported by advances in informatics, high-throughput screening, and genomics, computational toxicology offers scientists the ability to develop a more detailed understanding of the risks posed by large numbers of chemicals, while at the same time reducing the use of animals for toxicological testing.

Established in 2003, EPA’s Computational Toxicology Research Program (CTRP) has the long-term goal of improving understanding about the relationship of source to outcomes (e.g. chemical to health effect) by providing tools for screening and prioritizing chemicals, and for improving the pace and quality of risk assessments. The National Center for Computational Toxicology (NCCT)⁴⁹ was established in FY 2005 to play a critical coordination and implementation role in these activities across the Agency. The strategic directions of the CTRP are highly consistent with the National Research Council report “Toxicity Testing in the Twenty-first Century: A Vision and a Strategy”⁵⁰, and includes several substantial and innovative projects in chemical screening and prioritization, informatics, and systems biology⁵¹.

The CTRP also includes three EPA-funded Science to Achieve Results (STAR) centers in bioinformatics and computational toxicology. In addition, the STAR Program has issued a solicitation to fund one additional center in FY 2009 that will integrate *in vitro* biochemical and cellular response data with computational models of core processes that drive embryonic development, including patterning, morphogenesis, selective growth and cell differentiation. This research will lead to a more detailed understanding of biological pathways that are critical to understanding environmental risk to human development.

All of these CTRP efforts are being coordinated with other Federal partners through the Tox21 initiative, in order to hasten this transformation in environmental health protection⁵². The CTRP efforts are at the core of *The U.S. Environmental Protection Agency’s Strategic Plan for*

⁴⁹National Center for Computational Toxicology <http://www.epa.gov/ncct/>

⁵⁰Toxicity Testing in the Twenty-first Century: A Vision and a Strategy http://dels.nas.edu/dels/rpt_briefs/Toxicity_Testing_final.pdf

⁵¹ http://www.epa.gov/ncct/pdf/ORD_NCCT_Imp_Plan.pdf

⁵² Collins et al., 2008, *Science*; <http://www.sciencemag.org/cgi/reprint/319/5865/906.pdf>

*Evaluating the Toxicity of Chemicals*⁵³. The *Strategic Plan* and the pending CTRP Implementation Plan for FY2009-2012 highlight the unique capabilities of EPA to provide the necessary science to transform how chemical and other risk assessments are performed, and thus support improved management of environmental contaminants and chemical risk.

Scientific review of the CTRP is conducted by EPA's Board of Scientific Counselors (BOSC), a Federal advisory committee comprised of independent expert scientists and engineers. The third review of the CTIRP by the BOSC subcommittee occurred in December 2007. This review focused specifically on the topics of information management, high-throughput screening, and systems biology. In its report⁵⁴ the BOSC expressed strong support for the ToxCast, ExpoCast, ACToR, and the Virtual Liver and Virtual Embryo research projects. These projects are discussed further in the following section. Together, these efforts are providing the foundation to advance high-throughput toxicology and risk assessment that will close the critical data gaps present for many chemicals of concern to the EPA.

FY 2010 Activities and Performance Plan:

Consistent with the *U.S. Environmental Protection Agency's Strategic Plan for Evaluating the Toxicity of Chemicals*, these funds will support the next CTRP Implementation Plan for FY 2009-2012, which will focus on three key areas in FY 2010: 1) chemical prioritization and categorization tools; 2) information technology; and 3) systems biology models. In addition, emphasis will be placed on transitioning these computational tools for use by EPA's regulatory program offices.

Chemical Prioritization and Categorization Tools

A key programmatic need for EPA is improving its capability to predict which chemicals are in greatest need of toxicology testing, and which endpoints would be the most important to examine. To address this need, in FY 2007, EPA launched its ToxCast research program, which employs new automated laboratory methods, developed by the pharmaceutical industry, to test chemicals for their impacts on cell function in less time and for less cost than animal studies. This "high-throughput screening" (HTS) will enable testing of a backlog of chemicals that have not previously been tested, or have not been thoroughly tested, to determine if they are toxic to humans or the environment.

In Phase I of ToxCast, the Agency obtained high-throughput screening data on 320 chemicals with known toxicological profiles. HTS techniques rapidly and efficiently test large batches of chemicals for bioactivity utilizing robotics and automation applied to both molecular biology and assay methods. To date, ToxCast has generated more than 600 endpoints on each chemical. ToxCast efforts have been expanded by EPA partnerships with NIH via the Tox21 collaboration. The Tox21 partnership brings together the hundreds of ToxCast assays, with the thousands of chemicals being tested at the NIH Chemical Genomics Center⁵⁵.

⁵³ National Service Center for Environmental Publications P.O. Box 42419 Cincinnati, OH 45242 # 100K09001

⁵⁴ <http://www.epa.gov/osp/bosc/pdf/ctox0809rpt.pdf>

⁵⁵ Collins et al., 2008, *Science*; <http://www.sciencemag.org/cgi/reprint/319/5865/906.pdf>

With the increase in the FY 2010 President's request, efforts will support Phase II of ToxCast to profile the activities of up to 500 additional compounds in order to broaden chemical diversity and evaluate the predictive nature of bioactivity signatures. With successful completion of Phase II (scheduled for FY 2012), ToxCast technologies can be applied to chemicals and other materials of concern to EPA program offices (e.g. nanomaterials and pharmaceuticals).

In FY 2010, a new effort, ExpoCast, will be launched. Whereas ToxCast provides information on the biological activity of various chemicals, ExpoCast will employ models that use data from ToxCast and other sources to predict the impacts of chemical exposure on the human body. ExpoCast will also be a high-throughput system capable of generating a great deal of information in a short period of time.

Information Technology

Advanced information management systems are needed to mine existing data for patterns, and to appropriately place new chemicals of unknown hazard within the context of data on existing chemicals. These advanced systems allow the integration of data from many different domains of toxicology, and allow for efficient expansion with information on new chemicals and other materials.

EPA has developed several advanced data management applications. The Aggregated Computational Toxicology Resource project (ACToR)⁵⁶, is a public, web-based resource that currently has information from over 200 sources on over 500,000 chemicals and other substances. ACToR organizes information from various data generation efforts including 1) NCCT's ToxCast and ExpoCast programs; 2) EPA's Toxicology Reference Database (ToxRefDB)⁵⁷ and 3) the Tox21 high-throughput screening collaboration of EPA and NIH. These data generation and management systems will be expanded throughout FY 2010.

Systems Biology Models

Modeling now plays a crucial role in practically all areas of biological research. Systems models integrate information at all levels of organization and aid in bridging the source-to-outcome gap and in conducting quantitative risk assessments. In FY 2010, this research will continue to: (1) provide standards for developing, documenting, archiving, and accessing quantitative mathematical models; (2) utilize systems-modeling approaches for the latest biological, chemical, and exposure data for quantitative risk assessment; (3) develop guidance on best practices for the construction, analysis and reporting of toxicological models that link pharmacokinetic information with the dynamic responses of target organs; and (4) implement the Virtual Liver and Virtual Embryo Projects. Collectively, these elements will provide a framework that integrates mechanistic information and data for predicting the risk of adverse outcomes in humans through dynamic simulation.

⁵⁶ <http://actor.epa.gov/actor/faces/ACToRHome.jsp>

⁵⁷ <http://www.epa.gov/ncct/toxrefdb/>

Performance Targets:

Work under this program supports EPA Strategic Objective 4.4. Specifically, the program identifies and synthesizes the best available scientific information, models, methods, and analyses to support Agency guidance and policy decisions with a focus on human, community, and ecosystem health. Currently, there are no formal performance measures for this specific Program. However, the NCCT develops annual research milestones as part of its multi-year implementation plans, and tracks and manages performance through the timely completion of those milestones.

FY 2010 Change from FY 2009 Enacted Budget (Dollars in Thousands):

- (+\$5,000.0) This increase would enhance modeling efforts to provide regulatory offices with detailed hazard assessment profiles on thousands of chemicals of concern, as well as information on human exposure potential, including chemical screening and prioritization, and toxicity pathway-based risk assessment (i.e., accelerate efforts to develop the virtual liver and the virtual embryo, and initiate planning for the virtual cardiopulmonary system). Specifically, this higher level of funding will provide for the high-throughput screening of up to 200 additional chemicals (i.e., a total of 500 instead of 300 chemicals in Phase II) in the ToxCast program, with complementary exposure predictions from ExpoCast for some of these chemicals, and the deployment of this information in databases with supporting analysis tools, via computer programs and Agency websites.
- (+\$133.0) This represents a restoration of resources transferred in FY 2009 to the Research: Sustainability Program to support the Small Business Innovation Research Program (SBIR). For that program, EPA is required to set aside 2.5 percent of funding for contracts to small businesses to develop and commercialize new environmental technologies. After the FY 2010 budget is enacted, when the exact amount of the mandated requirement is known, FY 2010 funds will be transferred to the SBIR program.
- (+\$121.0) These resources would fund research to provide predictive tools for risk assessment.
- (-\$59.0) This represents a realignment of funds associated with equipment purchases and repairs across the Agency's research programs.
- (-\$749.0) This decrease is the net effect of increases for payroll and cost of living for existing FTE, combined with a reduction based on the recalculation of base workforce costs.

Statutory Authority:

TSCA; FIFRA; FQPA; SDWA; ERDA.

Research: Endocrine Disruptor

Program Area: Research: Human Health and Ecosystems

Goal: Healthy Communities and Ecosystems

Objective(s): Enhance Science and Research

(Dollars in Thousands)

	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
Science & Technology	\$11,158.9	\$11,486.0	\$11,442.0	(\$44.0)
Total Budget Authority / Obligations	\$11,158.9	\$11,486.0	\$11,442.0	(\$44.0)
Total Workyears	53.3	50.1	50.1	0.0

Program Project Description:

The Endocrine Disruptors Research program provides direct support to EPA’s endocrine screening and testing programs (mandated under the Food Quality Protection Act of 1996 and the Safe Drinking Water Act Amendments⁵⁸ of 1996) by evaluating current testing protocols and developing new protocols to evaluate potential endocrine effects of environmental agents. The research program also develops and applies methods, models, and measures to evaluate real-world exposures to endocrine disruptors and characterize related effects resulting from these exposures for humans and wildlife. In addition, the program develops risk management tools to prevent or mitigate exposures to endocrine disrupting chemicals (EDCs). Research assists decision-makers in reducing and preventing exposure of humans and ecosystems to endocrine disruptors. EPA’s Endocrine Disruptors Research program provides the scientific foundation for the Agency’s actions to protect Americans against unreasonable risk from exposure to toxics.

Research is guided by the Endocrine Disruptors Research Plan, which was developed with participation from major research clients and outlines research needs and priorities.⁵⁹ The Agency also maintains a multi-year plan (MYP)⁶⁰ for Endocrine Disruptors research that outlines steps for meeting these needs, as well as annual performance goals and key research outputs for evaluating progress.

Scientific review of the Endocrine Disruptors Research Program (EDRP) is conducted by EPA’s Board of Scientific Counselors (BOSC), a Federal advisory committee comprised of independent expert scientists and engineers. A BOSC subcommittee conducted an evaluation of the EDRP from September to November 2007 and commended the progress and direction of the research.⁶¹ The subcommittee rated the overall progress of the EDRP program as “*exceeds expectations.*”

58 SDWA Section 1457.

59 U.S. EPA, Office of Research and Development, *Research Plan for Endocrine Disruptors*. Washington, D.C.: EPA (1998).

Available at: <http://www.epa.gov/ord/htm/documents/ORD-EDR-Feb1998.pdf>

60 U.S. EPA, Office of Research and Development, *Multi-Year Plan for Endocrine Disruptors (draft)*. Washington, D.C.: EPA (2007). Available at: <http://www.epa.gov/ord/npd/pdfs/Draft-EDCs-MYP-091407.pdf>.

61 U.S. EPA, Office of Research and Development, *EDC Research Program Review*. Washington, D.C. (2008)

Available at: <http://www.epa.gov/osp/bosc/pdf/edcmc0804rpt.pdf>.

The subcommittee noted that “this program has established itself as a leader in several areas of EDCs research. It has leveraged expertise across the Agency and with other federal and academic scientists; it has been quick to respond and adapt its focus and research questions to the rapidly changing research landscape of EDCs; and it has developed an excellent new MYP. The EDRP has accomplished a remarkable amount in the face of diminishing financial resources.” In reviewing EPA’s response to the recommendations⁶² from the previous BOSC review, the subcommittee acknowledged that the research program “partnered extensively with other agencies with interests in EDCs.” The subcommittee remarked that “EPA has been a leader in the development of genomics, proteomics, metabolomics, computational modeling, and whole animal endpoints to identify biomarkers of exposure to EDCs.”

FY 2010 Activities and Performance Plan:

In FY 2010, resources will continue to be used to develop, evaluate, and apply innovative DNA microarray and other state-of-the-art analytical methods for endocrine disrupting chemicals. EPA’s Endocrine Disruptors research program has developed and refined assays and improved other screening tools using genomics and high-speed computing capabilities so that the Agency has the necessary protocols for use in the Endocrine Disruptors Screening Program. Using genomics and related approaches to continue developing improved molecular and computational tools can help prioritize chemicals for screening and testing that will lead to a reduction of animal testing. This work has been highlighted as a priority for cross government investment. It is also consistent with the National Research Council’s 2007 report on “Toxicity Testing in the Twenty-first Century: A Vision and a Strategy,” which recommends that the Agency move toward using new technologies to prioritize and screen for chemicals.⁶³

Other important areas of research to be continued in FY 2010 include:

- Developing and improving the final two Tier 2 screening assays, the fish life-cycle and the amphibian growth and reproduction assays – a high priority for the Agency in implementing the Endocrine Disruptor Screening Program (EDSP);
- Developing the next generation of EDSP assays by applying newer computational and molecular approaches to develop models that predict a chemical’s ability to cause endocrine disruption;
- Determining classes and potencies of chemicals that act as endocrine disruptors, characterizing modes of action and the shape of the dose-response curve, developing approaches for assessing cumulative risk, and developing methods for extrapolating results across species, which would lead to reduced animal testing;
- Developing molecular indicators of exposure and analytical methods for detecting certain EDCs, identifying the key factors that influence human exposures to EDCs; and identifying sources of EDCs entering the environment, focusing on: wastewater treatment plants, concentrated animal feeding operations (CAFOs), and drinking water treatment plants; developing tools for risk reduction and mitigation strategies; and

⁶² U.S. EPA, Office of Research and Development, EDC Research Program Review. Washington, D.C. (2005).

Available at: <http://www.epa.gov/osp/bosc/pdf/edc0504rpt.pdf>.

⁶³ National Academies Press (2007). Available at: http://www.nap.edu/catalog.php?record_id=11970#toc.

- Applying methods, models, and tools developed by EPA and other research organizations to characterize the impact of environmental mixtures of EDCs on environmental media and aquatic organisms. Sources of EDCs to be examined include wastewater treatment plants, CAFOs, and drinking water plants.

The program has worked to articulate its research and development priorities to ensure compelling, merit-based justifications for funding allocations in response to assessments of its purpose, performance planning and management.

Performance Targets:

The research conducted under this program supports EPA Strategic Objective 4.4. Specifically, the program identifies and synthesizes the best available scientific information, models, methods, and analyses to support Agency guidance and policy decisions related to the health of people, community, and ecosystems, with a focus on endocrine-active pesticides and toxic chemicals.

The program's long-term performance measures are: (1) to provide OPPTS with improved screening and testing protocols for use in implementing the Agency's Endocrine Disruptors Screening Program; (2) to determine the extent of the impact of endocrine disruptors on humans, wildlife, and the environment to better inform the Federal and scientific communities; and (3) to reduce the uncertainty regarding the effects, exposure, assessment, and management of endocrine disruptors so that EPA has a sound scientific foundation for environmental decision-making. The research program also has developed performance indicators that monitor research activities and outputs. Targets for these include screening and testing protocols that EPA's Office of Prevention, Pesticides and Toxic Substances (OPPTS) will validate for use in evaluating the potential for chemicals to cause endocrine-mediated effects.

In 2008, the National Academy of Sciences (NAS) completed a study commissioned by EPA's Research and Development program to address OMB's recommendation to establish outcome-oriented efficiency measures.⁶⁴ According to the NAS study, "efficiency" in federal R&D programs is best assessed by using an external expert-review panel to evaluate the relevance, quality, and performance of the research. Considering these findings, the Office of Research and Development (ORD) is engaging its BOSC to evaluate if ORD's research programs are "doing the right research and doing it well."

FY 2010 Change from FY 2009 Enacted Budget (Dollars in Thousands):

- (+\$71.0) This represents a restoration of resources transferred in FY 2009 to the Research: Sustainability Program to support the Small Business Innovation Research Program (SBIR). For that program, EPA is required to set aside 2.5 percent of funding for contracts to small businesses to develop and commercialize new environmental technologies. After the FY 2010 budget is enacted, when the exact amount of the mandated requirement is known, FY 2010 funds will be transferred to the SBIR program.

64 National Academies Press. (2008) Evaluating Research Efficiency at the U.S. Environmental Protection Agency. Available at: http://www.nap.edu/catalog.php?record_id=12150.

- (+\$53.0) This provides resources to research in the area of providing a better understanding of science underlying the effects, exposure, assessment, and management of endocrine disruptors.
- (+\$29.0) This represents a realignment of funds associated with equipment purchases and repairs across the Agency's research programs.
- (-\$197.0) This decrease is the net effect of increases for payroll and cost of living for existing FTE, combined with a reduction based on the recalculation of base workforce costs.

Statutory Authority:

CAA; ERDDA; FIFRA; TSCA; FQPA; SDWA; CWA; RCRA; CERCLA; PPA.

Research: Fellowships

Program Area: Research: Human Health and Ecosystems

Goal: Healthy Communities and Ecosystems

Objective(s): Enhance Science and Research

(Dollars in Thousands)

	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
<i>Science & Technology</i>	\$9,721.8	\$9,651.0	\$10,894.0	\$1,243.0
Total Budget Authority / Obligations	\$9,721.8	\$9,651.0	\$10,894.0	\$1,243.0
Total Workyears	5.6	2.6	2.6	0.0

Program Project Description:

EPA places a high priority on ensuring that our nation has a large and well-trained scientific and engineering workforce that can address complex environmental issues. To help achieve excellence in science and technology education, EPA offers five programs that encourage promising students to obtain advanced degrees and pursue careers in environmentally related fields. According to a July 2004 publication by the National Science and Technology Council titled *Science for the 21st Century*, beginning in 1998, the U.S. experienced a significant decline in science and engineering doctorates. EPA’s fellowships programs help address this decline by educating new academic researchers, government scientists, science teachers, and environmental engineers. They also play a key role in developing a talent pool from which EPA can recruit and hire scientists. EPA fellowships programs are:

*Science to Achieve Results (STAR) Fellowship Program:*⁶⁵ EPA’s STAR Fellowship program supports master’s and doctoral candidates in environmental studies. Students in the U.S. compete for STAR fellowships through a rigorous review process. The review process is merit based and takes into consideration whether the proposed area of the applicant’s research and study will:

- Strengthen the scientific basis for environmental management decisions and practices;
- Produce data, methods, or practices to help the scientific or regulated community to better understand and/or manage complex environmental problems; or
- Provide a focus for future research and technology development in science, engineering, or modeling approaches for assessing and managing environmental risks.

On average, approximately 10 percent of STAR program applicants receive a fellowship. Students can pursue degrees in traditionally recognized environmental disciplines, as well as other fields such as social anthropology, urban and regional planning, and decision sciences. To support these advanced degree-seeking students, EPA provides assistance for up to three years in the form of a stipend (\$20,000/year), a research budget (\$5,000/year) and tuition assistance (up to \$12,000/year). The program has provided new environmental research in physical, biological,

⁶⁵ For more information, see <http://es.epa.gov/ncer/fellow>.

health and social sciences, and engineering. At least one student from each of the fifty states, the District of Columbia, and Puerto Rico has received an EPA STAR Fellowship.

*Greater Research Opportunities (GRO) Fellowship Program:*¹ EPA's GRO Fellowship program helps build capacity in universities that receive limited funding for research and development by awarding fellowships to undergraduate students in environmental fields. These institutions receive less than \$35 million annually in Federal science and engineering funds. Eligible students receive support for their junior and senior years of undergraduate study and complete an internship at an EPA facility during the summer between their junior and senior years. EPA provides up to \$19,250 a year for academic support and \$8,000 of support for the three-month summer internship with EPA. In addition to conducting quality environmental research, fellows agree to maintain contact with EPA for at least five years after graduation. EPA uses the information gathered from its fellows to track their success in pursuing advanced degrees in environmental studies and finding a career in science and engineering. Of the fellows who received fellowships between FY 2003 and FY 2006 and reported information to EPA, 78 percent reported that they were working or studying in an environmentally-related field.

*Environmental Science and Technology Policy Fellowship Program:*⁶⁶ In conjunction with the American Association for the Advancement of Science, EPA places qualified technical professionals with a Ph.D. degree or equivalent in EPA headquarters for up to two years to design and work on projects at the interface of science and policy. In this way, fellows develop a better understanding of the needs of policy-makers and how to make their research more meaningful to those who depend on it. EPA's interests are wide ranging, and fellows can work on any environmentally relevant issue within EPA's jurisdiction. Fellows are awarded annual stipends ranging between \$70,000 and \$95,000. Since the program began in 2005, EPA has hosted 263 fellows, and these fellows have been placed in every program office within EPA. Currently, EPA hosts roughly a dozen fellows each year.

*Environmental Public Health Fellowship Program:*⁶⁷ To enhance the training of highly qualified and motivated public health professionals, EPA, in conjunction with the Association of Schools of Public Health, offers professional development opportunities to graduates of accredited U.S. schools of public health who have received at least a Master of Public Health or equivalent degree within the last five years. The goal of the program is to provide real-world experience in environmental public health issues to complement participants' academic training. These fellows are placed in EPA laboratory, regional, program or research management offices across the country. Fellows are awarded annual stipends of up to \$50,000 and funding to defray health insurance costs and a travel and professional development budget. EPA's goal is to place 32 fellows in EPA headquarters, regional offices, and laboratories each year.

*EPA Marshall Scholarship Program:*⁶⁸ In FY 2005, EPA began a partnership with the government of the United Kingdom under the auspices of the highly regarded Marshall Scholarship program. Since 1953, the Marshall Scholarship program has provided opportunities for highly motivated students to receive support for two years of graduate study in Great Britain,

66 For more information, see http://fellowships.aaas.org/01_About/01_Partners.shtml#EPA.

67 For more information, see http://www.asph.org/document.cfm?page=751&JobProg_ID=1.

68 For more information, see <http://www.marshallscholarship.org/applications/epa>.

culminating in a Master's Degree. The EPA Marshall Scholarship program extends that opportunity for students who are interested in environmental careers, particularly those fields that address environmental problems of a global nature or benefit multi-lateral efforts. Under this program, eligible students who successfully complete the first two years as a Marshall Scholar may receive up to three more years of support towards the award of a doctoral degree in an environmentally related technical discipline. Marshall Scholars receive approximately \$40,000 a year to cover university tuition and fees, a stipend, program-related expenses, and travel to and from the United States.

These five fellowship programs represent a long-term investment aimed at:

- enhancing environmental research and development,
- improving the nation's promotion of green principles, and
- increasing the nation's environmental workforce, post secondary environmentally-related educational opportunities, and environmental literacy.

A subcommittee of EPA's Board of Scientific Counselors (BOSC)—a Federal advisory committee comprised of qualified, independent scientists and engineers—conducted a review of the STAR and GRO fellowship programs in March 2006. The subcommittee reported that “the fellows funded by the STAR and GRO programs have made excellent contributions in environmental science and engineering, and a number of them continue to be employed in the environmental field...the EPA programs clearly are of value to the Agency and the nation in helping to educate the next generation of environmental scientists and engineers.”⁶⁹

FY 2010 Activities and Performance Plan:

The Agency proposes \$10.9 million for the Fellowships program in FY 2010 which will allow EPA to award approximately 131 new fellowships. It also will provide support for approximately 48 current fellows who received awards in earlier fiscal years. Fellowship recipients will complete progress and exit reports, and the Agency will maintain contact information and follow-up data on former fellows. The program also will select and arrange hosting for AAAS and ASPH recipients and support a portion of eligible Marshall Scholarship recipients.

EPA has incorporated “Broader Impact Criteria” into its GRO Undergraduate Fellowship program. Broader Impact Criteria also will be incorporated into the next solicitation under the STAR Fellowship program. Broader Impact Criteria require the applicant to address issues other than the intellectual merit of their research proposal. These criteria require an applicant to address, among other things, what broader impacts the applicant may have as a fellow, such as furthering environmental awareness, stewardship, equity, and broadening participation of underrepresented groups in science, technology, engineering, and mathematics (STEM). Incorporating Broader Impact Criteria into EPA's fellowship programs not only strives to enhance the diversity found in the country's scientific community, but also supports EPA's immediate human capital goal to attract and retain a diverse and talented workforce by nurturing the “pipeline” of diverse persons going into environmentally-related fields.

69 EPA, Board of Scientific Counselors, *Review of the Office of Research and Development's Science To Achieve Results (STAR) and Greater Research Opportunities (GRO) Fellowship Programs at the U.S. Environmental Protection Agency*. Washington, D.C.: EPA (2006), 1–2. See <http://epa.gov/osp/bosc/pdf/star0609rpt.pdf>.

Performance Targets:

Work under this program supports EPA's Objective 5.4: Enhance Science and Research. Currently, there are no OMB assessment performance measures for this specific program project, as the program has not been subject to OMB assessment review. However, EPA's Research and Development program will begin an external evaluation of the Fellowships program in FY 2009.

FY 2010 Change from FY 2009 Enacted Budget (Dollars in Thousands):

- (+\$1,114.0) This reflects an increase to the STAR Fellowships and other research fellowships. The increase will enable EPA to award approximately 20 additional STAR fellowships to students performing environmental research in physical, biological, health and social sciences, and engineering, which will serve to increase the nation's environmental work force and environmental literacy.
- (+\$7.0) This reflects an increase for payroll and cost of living for existing FTE.
- (+\$122.0) This represents a restoration of resources transferred in FY 2009 to the Research: Sustainability Program to support the Small Business Innovation Research Program (SBIR). For that program, EPA is required to set aside 2.5 percent of funding for contracts to small businesses to develop and commercialize new environmental technologies. After the FY 2010 budget is enacted, when the exact amount of the mandated requirement is known, FY 2010 funds will be transferred to the SBIR program.

Statutory Authority:

CAA; CWA; FIFRA; NCA; RCRA; SDWA; TSCA; ERDDA.

Research: Human Health and Ecosystems

Program Area: Research: Human Health and Ecosystems

Goal: Healthy Communities and Ecosystems

Objective(s): Enhance Science and Research

(Dollars in Thousands)

	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
<i>Science & Technology</i>	<i>\$146,871.2</i>	<i>\$153,760.0</i>	<i>\$158,310.0</i>	<i>\$4,550.0</i>
Total Budget Authority / Obligations	\$146,871.2	\$153,760.0	\$158,310.0	\$4,550.0
Total Workyears	500.8	484.9	484.9	0.0

Program Project Description:

EPA's health and ecological research programs provide the scientific foundation for the Agency's actions to protect Americans' public health and environment. The Agency conducts human health and ecosystems research to: 1) identify and characterize environment-related human health problems, determine exposures to and sources of agents responsible for these health concerns, and use public health indicators to evaluate the effectiveness of risk management decisions, and 2) quantify the impacts of human activities on the benefits and services provided by ecosystems, measure the relationship between human well-being and ecosystem services, and provide tools for policy makers and managers to protect and restore ecosystem services through informed decision making at multiple spatial and temporal scales. The program also supports mercury research, advanced monitoring research, nanotechnology research, exploratory research, and the Agency's Report on the Environment (ROE).

Both the Human Health Research program and Ecosystem Services Research Program (ESRP) are continually evolving. The Human Health Research program is working to continue its success in "characterizing and reducing uncertainties in risk assessment" while orienting the program toward "developing and linking indicators of risk" along the source-exposure-effects-disease continuum. This information, in turn, is used to demonstrate and measure reductions in human, environmental-related disease incidence or severity resulting from risk management decisions. The program is designed to include research that addresses limitations, gaps, and challenges articulated in EPA's Report on the Environment (2008) and the National Research Council's 2007 report "Toxicity Testing in the 21st Century: A Vision and a Strategy" and 2008 report "Science and Decisions: Advancing Risk Assessment."

In FY 2009, the Ecosystem Services Research Program fully transitioned to its new focus on conserving and protecting ecosystem services through proactive decision-making. This focus synthesizes and builds upon the program's previous accomplishments in quantifying the ecological condition of the nation's aquatic resources, as well as in developing ecological stressor-response models, methods to forecast alternative future scenarios, and methods to restore ecological functions and ecosystem services within degraded systems. By integrating these tools within a common framework to assess ecosystem services, the program can better

investigate and advance opportunities for more quickly achieving desired environmental outcomes at lower cost and with fewer unintended consequences.

Research is guided by the “Human Health Research Strategy”⁷⁰ and the “Ecological Research Strategy,”⁷¹ which were developed in collaboration with major clients (e.g., EPA’s program and Regional offices). These strategies outline research needs and priorities. In addition, several multi-year plans (MYPs)⁷² (e.g., human health, ecological research, and mercury) convey research priorities and approaches for achieving the goals and objectives of protecting communities. MYPs outline the steps for meeting client research needs, as well as annual performance goals and key research outputs for evaluating progress.

The Human Health Research program and the ESRP have both received successful evaluations from EPA’s research advisory committee, the Board of Scientific Counselors (BOSC). In March 2005, the BOSC stated, “The research of the human health research program is of high quality and appropriately focused, it is multidisciplinary, yet coherent and coordinated, and the research benefits from managerial excellence across all aspects of the program.”⁷³ The BOSC also commented that planned actions and initiatives provide “great potential for significant impacts in the future.” In 2007, mid-cycle reviews of each program resulted in a rating of “Meets Expectations” for work completed.⁷⁴ The Human Health Research program was reviewed again in January 2009 and received a preliminary rating of “Meets Expectations” (report expected June 2009).

During its BOSC reviews, the ESRP was recognized as holding a unique position within the federal government for its research to establish and communicate a greater understanding of the value of ecosystem services and their interdependent relationship to human activities and well being (BOSC 2005, 2007)⁷⁵. In 2007, the mid-cycle BOSC review of the ESRP resulted in a rating of “Meets Expectations” for work completed to date.⁷⁶ The ESRP name came from a recommendation by the SAB EPEC to adopt a name that better reflects the program’s role as the Agency’s first integrated research program to address the difficult topic of maintaining, enhancing, and restoring the services provided by the natural environment.

In 2008, EPA’s Science Advisory Board’s (SAB) Ecological Processes and Effects Committee (EPEC) stated in its review of the Program that the “draft Plan articulates a new strategic direction that focuses on quantifying ecosystem services and their contribution to human health and well-being. The SAB strongly supports this strategic direction and commends the Agency for developing a research program that, if properly funded and executed, has the potential to be transformative for environmental decision making as well as for ecological science. The SAB finds that the research focus on ecosystem services represents a suitable approach to integrate ecological processes and human welfare. The ESRP’s focus on ecosystem services can provide a

70 U.S. EPA, Office of Research and Development. *Human Health Research Strategy*. Washington, DC: EPA. Available at: http://www.epa.gov/nheerl/humanhealth/HHRS_final_web.pdf

71 For more information, see <http://www.epa.gov/ord/htm/documents/eco.pdf>.

72 For more information, see <http://www.epa.gov/ord/htm/multi-yearplans.htm>.

73 *Report of the Subcommittee on Health*, revised July 27, 2005, Board of Scientific Counselors, pg 9. For more information, see <http://www.epa.gov/osp/bosc/pdf/hh0507rpt.pdf>.

74 U.S. EPA, Board of Scientific Counselors. *Mid-Cycle Review of the Office of Research and Development’s Human Health Research at the U.S. Environmental Protection Agency*. (Washington: EPA, 2007). Available at: <http://www.epa.gov/osp/bosc/pdf/hhmc0707rpt.pdf>.

75 BOSC 2007 <http://www.epa.gov/osp/bosc/pdf/ecomc082307.rpt.pdf>

76 U.S. EPA, Board of Scientific Counselors. *Mid-Cycle Review of the Office of Research and Development’s Human Health Research at the U.S. Environmental Protection Agency*. (Washington: EPA, 2007). Available at: <http://epa.gov/osp/bosc/pdf/hhmc072307rpt.pdf>

sound foundation for environmental decisions and regulation based on the dependence of humans on ecological conditions and processes.”⁷⁷

FY 2010 Activities and Performance Plan:

Human Health Research

In FY 2010, EPA’s research under this program is designed to identify indicators of risk (effects, susceptibility, and exposure indicators) that can be used to demonstrate reductions in human health risks (i.e., evaluate effectiveness of risk management or regulatory decisions). Of the total \$82 million requested in FY 2010 for Human Health research, \$63 million is requested for research in this area. This research will focus on the development of sensitive and predictive methods and models to identify reliable bioindicators of exposure, susceptibility, and effect that could be used to evaluate public health impacts at various geospatial and temporal scales. Research also will focus on developing models to predict biological effects based on internal dose methodologies.

EPA will continue to support research on mode of action information that can be used to reduce reliance on default assumptions in risk assessments for individual and related families of chemicals, particularly as related to selection of appropriate dose-response and cumulative risk models and to protection of vulnerable and susceptible populations. Such research will inform the re-evaluation of acceptable levels of arsenic and its metabolites in drinking water, the risk assessments of cancer and non-cancer effects of conazoles and structurally related fungicides, and risks of cumulative exposures to classes of pesticides and to multiple species of water disinfection byproducts. Additional research efforts guided by the National Research Council’s report, “Toxicity Testing in the 21st Century: A Vision and a Strategy (2007)”⁷⁸, will develop emerging molecular and genomic methods, and use “systems biology” approaches to identify critical toxicity pathways, e.g., oxidative stress pathways and receptor-based and signaling pathways (such as those involved in endocrine and neuroendocrine signaling) for characterizing the potential health effects of chemicals (such as particulate matter, metals, pesticides, and chemical contaminants in drinking water).

In addition, FY 2010 research will focus on developing tools for identifying communities (e.g., localities, populations, groups) at greatest risk from exposure to multiple chemicals, identifying and quantifying the factors influencing these exposures, and developing and implementing appropriate risk reduction strategies. Research on intervention and prevention strategies will ultimately be used make decisions which would reduce human risk associated with exposures to single and multiple environmental stressors. Cumulative risk research will develop models and approaches for reconstructing exposures based upon biomarker data generated in large-scale exposure and epidemiological studies and linking these exposures to their primary sources, and for using exposure, biomarker, and pharmacokinetic data in cumulative risk assessments. For example, in 2007, EPA’s Human Health Research program discovered a biomarker that can predict the severity of an asthmatic response in susceptible persons, resulting in new protocols

⁷⁷ EPA-SAB-08-011

⁷⁸ National Academies Press (2007). Available at: http://www.nap.edu/catalog.php?record_id=11970#toc.

for improving indoor air quality and providing the scientific basis for public education policies and risk management strategies involving exposure to molds.

Other human health research will continue to focus on exposures to environmental contaminants and subsequent effects during critical life-stages, such as early development, childhood, or aging. Efforts related to children's health include identification of the key factors influencing children's exposures to environmental toxicants (including chemical exposure in schools) and the production of high quality children's exposure data to reduce current uncertainties in risk assessment. Human health research focused on physiological and biochemical changes during critical life-stages will be used as a basis for understanding susceptibility and the role of environmental stressors, including non-chemical stressors, in the exacerbation or pathogenesis of diseases such as asthma that disproportionately impact children and the aging. Emerging risks of long term health effects resulting from early life exposures (e.g., during pregnancy and early childhood) will be examined in laboratory animal models and children's cohort studies.

To this end, EPA will continue to support and collaborate with the EPA/National Institute of Environmental Health Sciences (NIEHS)-sponsored Centers for Children's Environmental Health and Disease Prevention Research. This FY 2010 request includes \$6 million for EPA to support advanced epidemiological research on the impact of environmental factors on children's health. Beginning in FY 2010, the Science to Achieve Results (STAR) grants program will fund both traditional and formative centers.⁷⁹ These centers were highlighted in the 2009 BOSC subcommittee review, which judged EPA's children's health program to "Exceed Expectations."

These unique Children's Centers perform targeted research in children's environmental health and translate their scientific findings into intervention and prevention strategies by working with communities. The Children's Centers have established long-term birth and school age cohorts that follow participants over many years to consider the full range of health effects resulting from exposure to environmental chemicals, as summarized recently in the EPA report "A Decade of Children's Environmental Health" (2007). Additionally, the Children's Centers are tracking a wide range of environmental exposures at multiple stages of development to evaluate relationships between these exposures and observed health effects. Additional and related research supported by STAR grants and within EPA's in-house research program is developing methods and models for community based risk assessment, including the impacts of non-chemical stressors.

Finally, in FY 2010, research on public health outcomes will continue to assess the cumulative impact of a suite of air pollution reduction programs on environmental public health indicators, especially those relevant to children and older populations. Research on new tools to measure the effectiveness of regulatory decisions, such as upgrades to water treatment facilities based on the incidence of infectious disease from waterborne pathogens, will continue. In response to gaps identified in EPA's Report on the Environment (2008), EPA will move toward integrating a range of valid and predictive bioindicators of exposure, susceptibility and effects to develop approaches to assess public health impacts of regulatory decisions. These efforts include developing and validating novel environmental health outcome indicators in community settings through the STAR grant program. This aspect of the Human Health Research program received

⁷⁹ For more information, see <http://grants.nih.gov/grants/guide/efa-files/FEA-ES-08-002.html>.

a preliminary rating of “Exceeds Expectations” from the 2009 Human Health BOSC subcommittee review.

EPA’s Human Health Research program is greatly enhanced by the STAR program’s competitive, peer-reviewed grants program. The STAR program has funded and will continue to fund an array of outstanding grantees that fill unique needs for exposures science, epidemiologic, and community-based participatory research on environmental public health outcomes of great concern, especially for vulnerable lifestages and populations like children and Tribal communities. For example, the program will continue to fund research to develop and validate predictive bioindicators of exposure, susceptibility, and effects that are needed to develop approaches to assess public health impacts of regulatory decisions, including developing environmental health outcome indicators. In addition, given the heightened interest in documenting the benefits of green building practices, the program will create opportunities to examine the impact of green schools on the health and performance of students and teachers.

A 2005 performance review of the “Human Health Research” program found that it had a focused design, meaningful performance measures, and that the program’s research results were being used to reduce uncertainty in risk assessment. Since then, and in response to key recommendations, the program has implemented all follow-up recommendations resulting from its 2005 BOSC review; has established preliminary targets for its long-term measures based on BOSC mid-cycle review feedback; and has worked to improve its budget and performance integration.

Ecosystem Services Research

In FY 2010, the total level of funding requested for Ecosystems research is \$76 million. Within this is the ESRP multi-media program (FY 2010 Request, \$71 million). The ESRP responds directly to numerous scientific and policy reports over the last decade that document the need to conserve irreplaceable services provided by ecosystems (e.g., NAS, 1997⁸⁰; MA, 2005⁸¹; BOSC, 2005⁸²; EPA Stewardship Initiative, 2006⁸³; EBASP, 2006⁸⁴; SAB C-VPESS 2007⁸⁵; Restoring Nature’s Capital, 2007⁸⁶). The Millennium Assessment (MA) is one of the most comprehensive reports to date, and documented declines in 15 of 24 ecosystem services worldwide.⁸⁷

In FY 2010, the ESRP will provide research critical to improving the policy and management decisions that affect the type, amount, and quality of benefits and services provided by ecosystem functions- including services derived from wetlands and coral reefs, two important ecosystems in which the Agency has regulatory responsibilities or other ongoing activities. The program will initially focus on methods development for a suite of ten ecosystem services. This

80 “NAS 1997” = [Building a Foundation for Sound Environmental Decisions](http://www.nap.edu/openbook/0309057957/html/49.html), Chapter 4: EPA’s Position in the Broader Research Enterprise, National Academy of Sciences, 1997. available at <http://www.nap.edu/openbook/0309057957/html/49.html>

81 <http://www.millenniumassessment.org>

82 BOSC 2005 <http://www.epa.gov/osp/bosc/pdf/eco0508rpt.pdf>

83 www.epa.gov/epainnov/pdf/rpt2admin.pdf

84 US EPA. 2006. Ecological Benefits Assessment Strategic Plan. EPA-240-R-06-001. U.S. Environmental Protection Agency, Office of the Administrator, Washington, DC.

85 http://www.epa.gov/sab/07minutes/c-vpess_06-12-07_minutes.pdf

86 Restoring Nature’s Capital: An Action Agenda to Sustain Ecosystem Services, 2007” available at http://pdf.wri.org/restoring_natures_capital.pdf.

87 We define ecosystem services as the products of ecological functions or processes that directly or indirectly contribute to human well-being, or have the potential to do so in the future. This definition provides a broad interpretation of ecosystem services to characterize services that may or may not be quantifiable.

systems-based approach will create ways to examine how a suite of ecosystem services responds to multiple stressors, using both prospective scenario analyses as well as monitoring frameworks to empirically assess changes in ecosystem services over time.

The ultimate goal for the ESRP is that decision-makers routinely use information and methods developed by this program to make proactive policy and management decisions that protect the environment and human well-being by conserving and enhancing ecosystem services at local, regional, and national scales. To accomplish this, the ESRP will conduct research using several complementary research themes:

1. defining ecosystem services and their implications for human well-being and economic valuation;
2. measuring, monitoring, and mapping ecosystem services at multiple scales over time;
3. developing predictive models for quantifying and forecasting the changes in ecosystem services under alternative management scenarios; and
4. developing a decision support framework that enables decision-makers to integrate, visualize, and maximize diverse data, models and tools so they can anticipate and understand the likely consequences of management decisions on the sustainability of ecosystem services, their economic and non-monetary value, and their role in maintaining human well-being.

In addition, in FY 2010 the ESRP will examine ecosystem services from three distinct perspectives:

- (a) *Pollutant based*: examining the effects of pollutants on ecosystem services; in this case, reactive nitrogen, which has implications for several nationally important issues, including upcoming rules for air emissions of NOx/Sox, and NAAQS; hypoxia in the Gulf of Mexico; contribution to greenhouse gases; and management of non-point pollution sources from agricultural and other lands.
- (b) *Ecosystem based*: examining how stressors affect the suite of ecosystem services derived from wetlands and coral reefs, two important ecosystems for which the Agency has regulatory responsibilities.
- (c) *Place-based* assessments at five locations: the Willamette River Basin, OR; Tampa Bay, FL; the Coastal Carolinas; the upper Midwest U.S., and an arid-land Southwest U.S. study. These place-based studies are done in collaboration with stakeholders and illustrate how local, state, and Regional decision-makers can use alternative future scenarios to proactively conserve and enhance ecosystem services. These study locations represent a spectrum of physiographic and socioeconomic characteristics with a variety of drivers of ecosystem change operating at local, regional, and national scales, as well as different types and magnitudes of potential impacts resulting from resource management decisions.

There will be greatly expanded opportunities in FY 2010 to collaborate with non-traditional partners within and outside of EPA because the ESRP incorporates both natural and social sciences. The ESRP has already spurred significant advances in creating a unique, cross-disciplinary, broadly applicable research program. In collaboration with Agency partners, the ESRP has identified five immediate uses for information on ecosystem services:

- Provide technical support for agency policies, including voluntary measures such as environmental stewardship;
- Provide improved techniques for estimating the benefits and costs related to national rule-making;
- Develop metrics on ecosystem services (e.g., for use in the Report on the Environment);
- Create credible scientific foundations for market incentives (e.g., for ecosystem services trading or for investments in conservation); and
- Identify the “art of the possible;” that is, to explore how policy makers and managers can use this information to simultaneously address multiple environmental issues, identify trade-offs, and reduce conflict in strategies to achieve desired environmental outcomes.

The ESRP research also supports the *EPA Ecological Benefits Assessment Strategic Plan* and Executive Order 12866 which require assessing the costs and benefits of alternative strategies for environmental protection. As a result, the program will improve the scientific basis for performing more comprehensive valuations of ecosystem services than is currently possible by clarifying the economic, social and ecological ramifications of various management options.

Exploratory Grants and Nanotechnology Research

EPA’s Nanomaterials Research Program (FY 2010 Request, \$17.8 million, including \$3.4 million in the Land research program; \$13.9 million within the Human Health and Ecosystem research program; and \$0.2 million in both the Air and Sustainability research programs) generates information to ensure the safe development, use, recycling and disposal of products that contain nano-scale materials (“nanomaterials”). This research is necessary to support and inform future health and environmental safety decisions. The EPA research program currently focuses on five nanomaterials: carbon tubes and fullerenes, cerium oxide, iron, silver, and titanium dioxide. These nanomaterials, based on analyses by the Organization for Economic Cooperation and Development (OECD) and EPA, are most likely to be found in products and, therefore, potentially be present in the environment. EPA research will determine whether these materials present a potential hazard or exposure over their life cycles, and how these materials, when used in products, may be modified or managed to avoid or mitigate potential human health or ecological impacts. The research program is coordinated through the National Nanotechnology Initiative⁸⁸ and the OECD’s Working Party on Manufactured Nanomaterials.

In FY 2010, guided by EPA’s Nanomaterial Research Strategy⁸⁹, funds will support research on all five materials that characterizes source-to-dose, including releases and emissions; fate, transport, and transformation; and exposure. This research will identify material types that are found in biological systems at concentrations of potential concern. Targeted effects research will be prioritized based on greatest probability of exposure. Targeted human health and ecological effects research will identify the properties of these materials that are associated with adverse effects. Decision analysis research will be used to evaluate the application of traditional and new

⁸⁸ For more information, see <http://www.nano.gov/>.

⁸⁹ For more information, see http://es.epa.gov/ncer/nano/publications/nano_strategy_012408.pdf

risk assessment methods to nanomaterials, as well as develop approaches for making near- to medium-term decisions on nanomaterial safety in the absence of adequate information for formal risk assessment methodologies.

Green nanotechnology research will link exposure to associated adverse effects and develop prevention and mitigation methods using green chemistry and life-cycle analysis. This research will identify nanomaterial properties that may be modified or develop exposure controls to minimize potential risk from products containing nanomaterials, minimize inputs, and decrease energy usage during production. Also, the Agency's Science to Achieve Results (STAR) exploratory extramural grants program will provide continued support for the joint National Science Foundation-EPA funded Centers for the Environmental Implications of Nanotechnology.⁹⁰ In collaboration with other Federal agencies,⁹¹ STAR grants will be solicited for research on the Agency's five priority material types.

Report on the Environment

EPA's Report on the Environment (ROE) plays a critical role in the Agency's strategic planning activities as the Agency develops and implements more transparent and outcome-oriented measures and indicators. This program is based on strong intragency and interagency partnerships with active participation from headquarters and regional offices to ensure that the ROE provides credible and defensible indicators that can best inform planning and decision-making at the Agency. The ROE has a steering committee comprised of Agency Senior managers and representatives from other agencies (USDA, CDC, DoI) who aid in research, preparation and review of indicators. More than 50 percent of the ROE indicators are from other Federal agencies. *EPA's 2008 Report on the Environment* was released in May 2008 as a science-based document that presents trends in the nation's environment and human health. To provide greater transparency on how EPA can improve its ability to assess the nation's environmental quality and human health, and how we use that knowledge to better manage measureable environmental results, EPA released an interactive public website (the "eROE") that is updated quarterly with the most recent environmental indicator data and enhancements (www.epa.gov/roe). The next complete revision and hard copy release of the ROE is planned for FY 2012.

Advanced Monitoring Initiative

In FY 2010 the Advanced Monitoring Initiative (AMI) will work with EPA programs, offices, and regions to bring the best monitoring data and modeling results to improve decisions made by EPA and its partners. It will benefit fully from the interagency U.S. Group on Earth Observations (USGEO) Initiative and with the international community through the "Global Earth Observing System of Systems (GEOSS)," primarily as a user of data and information, through partnerships with Federal agencies. The GEOSS architecture integrates environmental observation, monitoring, and measurements with modeling that directly support health, climate change, air quality, and other social benefit areas. AMI will augment ongoing efforts on data

⁹⁰ For more information, see http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503124&org=BIO&from=home.

⁹¹ For more information, see <http://es.epa.gov/ncer/nano/>.

collection and management with an Agency-wide effort to provide a "knowledge base," and the tools to access and utilize it effectively.

In FY 2010, AMI will support EPA’s three-to-five year cross-agency science priorities, particularly in the areas of climate and energy, environmental contaminants, and modernization of infrastructure. For each priority the AMI initiative will focus primarily on the development of decision support tools needed for implementation.

In addition, to respond to U.S. environmental technology needs, EPA USGEO’s approach is to leverage environmental observation, monitoring, measurements, modeling, green technology development, commercialization and verification of development, technology transfer and applications of data, and information collected for decision making and tools. The GEOSS AMI will support environmental technology activities and integrated multi disciplinary research that aligns with the Agency’s science priorities.

Mercury Research

EPA has developed a multi-year plan for studying mercury (FY 2010 Request, \$4.6 million), including its sources, control and treatment, environmental fate and behavior, impacts on ecological resources, and potential effects on human health.⁹² In FY 2010, the program will continue research to evaluate the transport of mercury from power plant stacks, including plume transport and ultimate deposition (e.g. mercury “hot spots”) analyses. Although this research began to support the Agency’s recently vacated Clean Air Mercury Rule (CAMR),⁹³ the research will still be needed to inform future mercury regulations. EPA also will study the aquatic fate and transport of mercury in order to better understand the relationship between emissions and mercury concentrations in fish tissue, an important pathway to human exposure.

In collaboration with the Department of Energy and others, research will focus on emissions monitors to determine the amount and characteristics of mercury emitted by sources such as coal-fired utilities. The program also will develop and evaluate emissions control technologies, with an emphasis on technologies that can simultaneously control mercury and other air pollutants, and investigate whether mercury removed from coal-fired power plant emissions remains stably trapped in combustion and scrubber residues.

Performance Targets:

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Output	Percentage of planned outputs delivered in support of the public health outcomes long term goal	100	100	100	100	Percentage

⁹² EPA, Office of Research and Development, *Mercury Research Multi-Year Plan* (Washington: EPA, 2003). See <http://www.epa.gov/osp/myr/mercury.pdf>.

⁹³ For more information, see <http://www.epa.gov/air/mercuryrule/>.

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Output	Percentage of planned outputs delivered in support of the aggregate and cumulative risk long term goal	100	100	100	100	Percentage

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Output	Percentage of planned outputs delivered in support of mechanistic data long term goal	100	100	100	100	Percentage

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Output	Percentage of planned outputs delivered in support of the susceptible subpopulations long term goal	100	100	100	100	Percentage

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Outcome	Percentage of Human Health program publications rated as highly cited papers (top 10% in field) in research journals	25.6%	25.5%	No Target Established (Biennial)	26.5%	Percentage

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Efficiency	Average time (in days) to process research grant proposals from RFA closure to submittal to EPA's Grants Administration Division, while	250	292	277	250	Days

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
	maintaining a credible and efficient competitive merit review system (as evaluated by external expert review)					

The research conducted under these programs supports EPA Strategic Objective 4.4. Specifically, these programs identify and synthesize the best available scientific information, models, methods, and analyses to support Agency guidance and policy decisions with a focus on human, community, and ecosystem health.

The programs gauge their annual and long-term success by assessing progress on several key measures. In FY 2010, the Human Health Research program plans to accomplish its goals of completing and delivering 100% of its planned outputs. The program is also targeting increases in the percentage of its peer reviewed risk assessments which are cited as supporting a decision to move away from or to apply default risk assessment assumptions, as was encouraged in the 2005 BOSC review, and in determining the extent to which key research products are cited in EPA decision documents.

In preparation for the FY 2007 mid-cycle and FY 2009 full BOSC reviews of the Human Health program, advanced computer programs were used to search EPA dockets and determine the extent to which scientific publications from this program were used in risk assessments, decision and policy documents, and guidance reports by EPA and other government regulators. Bibliometric analyses also were applied to measure the quality and stature of the journals in which Human Health papers were published and the extent to which these papers were cited in other scientific journals. Thus quantitative measures of both scientific quality and program relevance were incorporated into the BOSC review process.

In FY 2010, the ESRP intends to meet 100% of its planned outputs in support of each long-term goal while increasing program efficiency. As evidence of the utility of its research, the ESRP strives for continued improvements in its bibliometric measures for “highly cited” and “high impact” publications. In addition, based on research previously completed under this program, EPA plans to have forty-five states use a common monitoring design and appropriate indicators to determine the status and trends of ecological resources and the effectiveness of programs and policies. In its ongoing efforts to improve the ecosystem research program, ORD is engaging its BOSC to evaluate if the Agency’s research and development programs are “doing the right research and doing it well.”

FY 2010 Change from FY 2009 Enacted Budget (Dollars in Thousands):

- (+\$2,188.0) This reflects an increase for payroll and cost of living for existing FTE.
- (+\$1,257.0) These resources will provide research to inform policy and regulatory decisions for managing chemical risks to human health, including protecting children and other vulnerable groups and achieving environmental justice in American communities, and that affect the type, amount, and quality of benefits and services provided by ecosystem functions which will create ways to examine how a suite of ecosystem services responds to multiple stressors.
- (+\$867.0) This represents a restoration of resources transferred in FY 2009 to the Research: Sustainability Program/Project to support the Small Business Innovation Research Program (SBIR). For that program, EPA is required to set aside 2.5 percent of funding for contracts to small businesses to develop and commercialize new environmental technologies. After the FY 2010 budget is enacted, when the exact amount of the mandated requirement is known, FY 2010 funds will be transferred to the SBIR program.
- (+\$639.0) This represents a realignment of funds associated with equipment purchases and repairs across Agency research programs.
- (+\$319.0) This is an increase in laboratory fixed costs, including maintenance, operations, utilities, and security costs.
- (-\$720.0) This reflects a reassignment of resources to the Office of Air and Radiation (OAR) to continue funding of Temporally Integrated Monitoring of Ecosystems/Long Term Monitoring (TIME/LTM) Programs. The focus of the research in the TIME/LTM programs was on the design of the monitoring program, development of indicators to measure changes, and reporting on those changes as a means of verifying the intended results. The defined goal for both of these research programs has been completed. In FY 2010, the resources are being transferred to the Clean Air Allowance Trading Program within the Air and Radiation program to assume monitoring responsibility for the programs.

Statutory Authority:

CAA; SDWA; ERDDA; CWA; FIFRA; FFDCA; RCRA; FQPA; TSCA; USGCRA.

Program Area: Research: Land Protection

Research: Land Protection and Restoration

Program Area: Research: Land Protection

Goal: Land Preservation and Restoration

Objective(s): Enhance Science and Research

(Dollars in Thousands)

	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
Science & Technology	\$11,212.5	\$13,586.0	\$13,782.0	\$196.0
Leaking Underground Storage Tanks	\$567.7	\$475.0	\$484.0	\$9.0
Oil Spill Response	\$794.6	\$720.0	\$737.0	\$17.0
Hazardous Substance Superfund	\$19,392.9	\$20,905.0	\$21,401.0	\$496.0
Total Budget Authority / Obligations	\$31,967.7	\$35,686.0	\$36,404.0	\$718.0
Total Workyears	132.9	154.7	154.7	0.0

Program Project Description:

Research performed under the Land Research program supports scientifically defensible and consistent decision-making for Resource Conservation and Recovery Act (RCRA) material management, corrective action, and emerging materials topics. EPA’s Land Research Program provides the scientific foundation for the Agency’s actions to protect America’s land. Research under this program has been evolving from waste treatment to beneficial re-use, avoidance of more toxic materials, and operation of waste management facilities to conserve capacity and produce energy. To address emerging material management issues, the program made a strategic shift to focus on nanomaterial fate and transport. Research within this program addresses resource conservation and material reuse issues, the application of models and tools to support the Brownfield program, application of alternative landfill covers and the benefits of landfill bioreactors.

Research efforts are guided by the Land Research Program Multi-Year Plan (MYP),⁹⁴ developed with input from across the Agency, which outlines steps for meeting the needs of the Research and Development program’s clients and for evaluating progress through annual performance goals and measures. To enhance communication with customers, EPA has developed a Land Research Program web site.⁹⁵ The site includes a description of the program; fact sheets (science issues, research activities, and research impacts); research publications and accomplishments; and links to tools and models. Specific human health risk and exposure assessments and methods are discussed and conducted under the Human Health Risk Assessment program.

The Land Protection and Restoration research program underwent an external process evaluation by a subcommittee of EPA’s Board of Scientific Counselors (BOSC)—a Federal advisory committee comprised of independent, expert scientists and engineers—and the BOSC delivered their report to EPA in FY 2009 (December 2008). The BOSC found that, building on the full evaluation in FY 2006, the Land program has an MYP that articulates research goals for meeting

94 EPA, Office of Research and Development, *Land Research Program MYP*. Washington, D.C.: EPA. For more information, see <http://www.epa.gov/ord/htm/multi-yearplans.htm#land>.

95 For more information, see www.epa.gov/ord/landscience.

the critical needs of the program. The BOSC also indicated that the Land Research program is responsive to recommendations for the implementation of research activities, and as a result of the review, the program received a rating of “exceeds expectations.”⁹⁶

FY 2010 Activities and Performance Plan:

In FY 2010, resources will continue to support research to address material management, land reuse and revitalization issues, and emerging research topics. Under land reuse, the program works with states to optimize operations and monitor several landfill bioreactors to determine their potential to provide alternative energy in the form of landfill gas while increasing the nation’s landfill capacity. This research directly contributes to Land Restoration long-term goals and will aid states and facility owners in pursuing permits for research and development of alternative options for disposal. The Agency works with the Association of State and Tribal Solid Waste Management Officials (ASTSWMO) to assist in the communication of research results on landfill bioreactors to the states.

Continuing support of Brownfields and land revitalization issues will include technology transfer of the decision support tool (SMARTe) to interested communities and countries. SMARTe is a joint effort of the U.S.-German Bilateral Working Group, the EPA, and the Interstate Technology Regulatory Council (ITRC) Brownfields Team for use by Brownfield project stakeholders for assessing both market and non-market costs and benefits of redevelopment options, clarifying both private and public financing options, evaluating and communicating environmental risks, and easing access to pertinent state-specific information related to specific projects. The Land research program also plans to initiate methamphetamine lab clean-up studies in response to the Methamphetamine Remediation Research Act,⁹⁷ which requires EPA to evaluate clean-up techniques and exposure risks.

Material management research areas in FY 2010 include coal combustion residue (CCR) disposal and reuse. Planned research products will address CCR leaching potential to support risk assessments, including the development of a decision support tool to evaluate options for coal ash disposal or beneficial reuse. The bioavailability of metals is an important issue in material reuse and research products will provide critical information to support risk assessments.

Under EPA’s nanomaterial research program (FY 2010 Request, \$17.7 million, including \$3.4 million in the Land research program, \$13.9 million in the Human Health and Ecosystem research program, and \$0.2 million in both the Air and Sustainability research programs), described in more detail in Research: Human Health and Ecosystems, the Land Research program addresses the fate and transport research theme, with a goal to lead the Federal government in addressing key science questions on the persistence and movement of nanomaterials in the environment. In FY 2010, continuing into FY 2011, the program will:

- Develop a state of the art simulation model for nanoparticle transport in groundwater.
- Publish a report on relation of surface chemistry factors to transport and fate of nanomaterials in soils and sediments.

⁹⁶ BOSC Land Restoration and Preservation Research Mid-Cycle Subcommittee Report. For more information, see <http://www.epa.gov/osp/bosc/pdf/landmc0901rpt.pdf>.

⁹⁷ For more information, see <http://thomas.loc.gov/cgi-bin/query/D?c110:5:/temp/~c110O7oMUL:>

- Publish a report on the state-of-the-science for sampling and measurement of nanomaterials in environmental media.
- Publish studies on the fate and transformation of fullerenes in environmental systems.
- Assess ecological exposure to nanomaterials in support of risk characterization.
- Model nanomaterial chemical fate & transport in the air medium.

To improve performance management, the program established a process by which the BOSC rates each program long-term performance as part of its reviews. In addition, the National Academy of Sciences (NAS) completed a study commissioned by EPA's Research and Development program to address OMB's recommendation to establish outcome-oriented efficiency measures. According to the NAS study, efficiency in federal research and development programs is best assessed by using an external expert-review panel to evaluate the relevance, quality, and performance of the research. Considering these findings, the program is engaging the BOSC to better evaluate investment efficiency and the extent to which the program is "doing the right research and doing it well." The program is also exploring a measure that tracks the percentage of its budget allocated to direct science activities.

Performance Targets:

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Efficiency	Avg. time (in days) for technical support centers to process and respond to requests for technical document review, statistical analysis and evaluation of characterization and treatability study plans	Available 2010	29.0	28	27	Days

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Output	Percentage of planned outputs delivered in support of the manage material streams, conserve resources and appropriately manage waste long-term goal.	100	100	100	100	Percent

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Output	Percentage of planned outputs delivered in support of the mitigation, management and long-term stewardship of	100	100	100	100	Percent

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
	contaminated sites long-term goal.					

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Output	Percentage of Land publications in high impact journals.	26.2	25.7	No Target Established (Biennial)	26.7	Percent

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Output	Percentage of Land publications rated as highly cited publications.	18.0	26.8	No Target Established (biennial)	27.8	Percent

Work under this program supports EPA's Objective 3.3: Enhance Science and Research. Specifically, the program provides and applies sound science for protecting and restoring land by conducting leading-edge research, which, through collaboration, leads to preferred environmental outcomes. Performance measures for this specific program project are included under the Superfund Land Protection and Restoration program.

FY 2010 Change from FY 2009 Enacted Budget (Dollars in Thousands):

- (+\$146.0) This reflects an increase for payroll and cost of living for existing FTE.
- (+\$66.0) These resources will fund research in the area of materials management.
- (+\$56.0) This represents a restoration of resources transferred in FY 2009 to the Research: Sustainability Program to support the Small Business Innovation Research Program (SBIR). For that program, EPA is required to set aside 2.5 percent of funding for contracts to small businesses to develop and commercialize new environmental technologies. After the FY 2010 budget is enacted, when the exact amount of the mandated requirement is known, FY 2010 funds will be transferred to the SBIR program.
- (-\$72.0) This represents a realignment of funds associated with equipment purchases and repairs across the Agency's research programs.

Statutory Authority:

SWDA; HSWA; ERDDA; SARA; CERCLA; RCRA; OPA; BRERA; MRRA.

Program Area: Research: Sustainability

Research: Sustainability

Program Area: Research: Sustainability
Goal: Healthy Communities and Ecosystems
Objective(s): Enhance Science and Research

Goal: Compliance and Environmental Stewardship
Objective(s): Enhance Societies Capacity for Sustainability through Science and Research

(Dollars in Thousands)

	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
Science & Technology	\$22,346.0	\$21,157.0	\$24,107.0	\$2,950.0
Hazardous Substance Superfund	\$99.7	\$79.0	\$0.0	(\$79.0)
Total Budget Authority / Obligations	\$22,445.7	\$21,236.0	\$24,107.0	\$2,871.0
Total Workyears	74.2	70.8	70.8	0.0

Program Project Description:

EPA’s Science and Technology for Sustainability (STS) research program provides information and tools to Agency Program and Regional offices and external stakeholders to aid them in taking more sustainable and preventive approaches to health and environmental problems. EPA’s focus on sustainability stems largely from the Pollution Prevention Act of 1990. EPA is committed to promoting sustainability—achieving economic prosperity while protecting natural systems and quality of life for the long-term. EPA’s Science and Technology for Sustainability Research program provides the scientific foundation for the Agency’s actions for the integrated management of air, water, and land resources, as well as changes in traditional methods of creating and distributing goods and services.

The STS program is designed to provide technologies, tool, and metrics to inform decision-makers. Adoption of sustainability concepts in environmental management requires a new way of thinking and depends heavily on scientific advances that provide technologies and decision tools needed to inform future risk management decisions. As decision-makers adopt these new sustainable approaches, they will need metrics to assist them in measuring the impacts of actions in the context of sustainability.

The Science Advisory Board’s (SAB) Environmental Engineering Committee reviewed EPA’s Sustainability Research Strategy⁹⁸ and the STS Multi-Year Plan in June 2006.⁹⁹ The SAB stated that it “strongly endorses the Agency’s proposal to establish a research program focused on sustainability because the results from such a program will improve the scientific foundation for a sustainable environment.”¹⁰⁰ In addition, EPA’s Board of Scientific Counselors (BOSC) completed a review of the STS research program in FY 2008.¹⁰¹ In its report, the BOSC notes

98 For more information, see http://www.epa.gov/sustainability/pdfs/EPA-12057_SRS_R4-1.pdf

99 For more information, see http://www.epa.gov/osp/bosc/subcomm-sust_mid-2009.htm

100 For more information, see [http://yosemite.epa.gov/sab/sabproduct.nsf/D24960CAEE6ECCAB852572FE00704EC0/\\$File/sab-07-007.pdf](http://yosemite.epa.gov/sab/sabproduct.nsf/D24960CAEE6ECCAB852572FE00704EC0/$File/sab-07-007.pdf)

101 For more information see, <http://www.epa.gov/osp/bosc/pdf/sust0803rpt.pdf>

that the STS program “meets or exceeds expectations” in achieving long-term goals for the adoption of technology and tools.

The STS research program is designed to position EPA’s Research and Development program to provide scientific and technical support to regional and national sustainability policies and initiatives. To this end, the STS research program has established the following areas of emphasis:

- *Sustainability Metrics:* As sustainable solutions to environmental problems are developed and implemented, there is a need to measure the progress and impact of these efforts. The research in this area provides the underlying science needed to develop, apply, and implement these metrics. Efforts are focused on developing scientifically-based sustainability metrics and indices that will support understanding of the implications of different technology and risk management pathways, evaluation of regional ecosystem sustainability over time, and assessment of how various management strategies move a region towards sustainability. A related area of focus is developing national sustainability metrics suitable for use in the Agency’s Report on the Environment.
- *Decision Support Tools:*¹⁰² This research creates tools and methods that provide information to decision-makers in the public and private sectors on ways to evaluate environmental management issues in a holistic manner in order to achieve sustainable outcomes. This effort is built on the foundation of Life Cycle Analysis (LCA) and supply chain analysis techniques. These techniques address the sustainability of alternative policy options, production pathways, and product usage by describing the full environmental impact and sustainability implications of each alternative. Such methods and techniques are applied to specific problems of interest including consumer products, municipal solid waste management, and chemical production.
- *Technologies:* This research emphasizes the role that technologies have in facilitating sustainable outcomes. Through programs such as the Small Business Innovation Research (SBIR) program and the People, Prosperity, and Planet (P3) student design competition, emphasis is placed on finding solutions to client-driven problems while promoting sustainable design and implementation practices generate research *outputs* in the form of innovative, inherently benign, integrated, and interdisciplinary designs that will advance the scientific, technical, and policy knowledge necessary to further the goals of sustainability.

Over the long term, the STS program promotes and supports national and regional sustainability policies and initiatives. The program ensures that decision-makers within the EPA and at the local, regional and national levels have a scientifically sound set of scientific principles and management tools that promote stewardship and sustainability outcomes.

¹⁰² For more information, see <http://www.epa.gov/ord/NRMRL/std/sab>.

FY 2010 Activities and Performance Plan:

In FY 2010, the Agency requests \$24.1 million for the STS research program to continue its focus on sustainability metrics, decision support tools, and systems research. This includes a \$5 million increase for a biofuels research initiative to help decision-makers better understand the risk tradeoffs associated with biofuels use and production and to help identify options to maximize climate benefits and minimize unintended impacts. The initiative will focus on the life cycle environmental impacts of biofuels and the environmental challenges that occur in each of the four major phases of the biofuel supply chain—feedstock production, biofuel production, biofuel distribution, and biofuel end use. The work will inform the biofuels life-cycle analysis (LCA) and mandatory reporting requirements contained in the Energy Independence and Security Act (EISA).

In FY 2010, the STS program will continue development of systems metrics, which represent the measurement of energetic resources, human health, ecological burden (i.e., water, biota, air), and overall system function and health on a broad regional scale. For example, the San Luis Valley Project will complete the development and application of a set of four sustainability metrics (ecological and economic) to be used by environmental managers in supporting sustainable outcomes in San Luis Valley, Colorado. This will be followed by the launch of a new research project to apply sustainability metrics to management of regional ecosystems in Puerto Rico. Additionally as discussed, new research has begun in the area of sustainable production, distribution, and use of biofuels. The increase to the STS program will enable EPA's Research and Development program to implement and track sustainability metrics across the biofuels system.

Funding also will enable research in the area of decision support tools, including efforts to further develop a streamlined in-house Life Cycle Assessment methodology and incorporate material flow concepts into existing tools. The program will complete an environmental impact assessment model for land use and continue work on a water use model. Work will continue on extending an auction-based management approach to wet weather flow management in urban watersheds using the Cincinnati and Cleveland metropolitan areas as case studies.

The EPA also will continue to fund the development of new innovative technologies through the People, Prosperity and Planet (P3) program. This program not only advances the development of national and international environmental technology testing protocols and a global environmental technology network, but also encourages innovation in environmental stewardship.

EPA has taken steps to improve this program's performance through the development of the Science and Technology for Sustainability Multi-Year Plan (MYP). In addition, the program developed and finalized several annual output and long-term outcome measures. As noted previously, EPA's Board of Scientific Counselors (BOSC) completed a review of the STS research program in FY 2008.¹⁰³ The review identified that the STS program "meets or exceeds expectations" in achieving long-term goals for the adoption of technology and tools. The STS research program will continue to implement recommendations of the BOSC.

¹⁰³ For more information see, <http://www.epa.gov/osp/bosc/pdf/sust0803rpt.pdf>.

The program has also taken steps to measure efficiency. In 2008, the National Academy of Sciences (NAS) completed a study commissioned by EPA's Research and Development program to address OMB's recommendation to establish more outcome-oriented efficiency measures. According to the NAS study, efficiency in federal research and development programs is best assessed by using an external expert-review panel to evaluate the relevance, quality, and performance of the research. Considering these findings, EPA is engaging its Board of Scientific Counselors to evaluate whether the program is "doing the right research and doing it well." The program is also exploring a measure that tracks the percentage of its budget allocated to direct science activities.

Performance Targets:

Work under this program supports EPA's Strategic Plan Objective 5.4: Enhance Science and Research. The program manages performance through the timely completion of research milestones and the citation rates of research publications.

The program's bibliometric measure, which assesses the quality and impact of its scientific publications compared to other publications in the same field, demonstrates that the program's publications are "highly cited" 2.8 times more than other publications. At the close of FY 2009, the program aims to further increase its percentage of "highly cited" publications to 29.2 percent from 28.2 percent in FY 2007. Achieving these biennial bibliometric targets will ensure EPA continues to make significant progress toward providing the research needed to meet its long-term sustainability goals.

Additionally, in FY 2010 the STS program intends to deliver several tools, models, guidance, and reports to inform state and federal regulatory decision makers. In order to evaluate the sustainability of biofuels production, the STS program will expand the suite of environmental impact assessment models to include sustainable land use. The program also will provide decision makers at a local level with recommendations on the effectiveness of a small-parcel, best management practice approach to managing urban watersheds.

FY 2010 Change from FY 2009 Enacted Budget (Dollars in Thousands):

- (+\$5,000.0) This increase provides resources for a biofuels research initiative to aid decision-makers in better understanding the risk tradeoffs associated with biofuels use and production. The work will inform the life-cycle analysis and mandatory reporting requirements contained in the Energy Independence and Security Act (EISA). Additionally, the program will further develop and test the application of criteria and metrics to assess sustainable biofuel production.
- (+\$907.0) This reflects an increase for payroll and cost of living for existing FTE.
- (+\$75.0) These resources would fund research in the area of sustainable technologies.
- (-\$297.0) This represents a realignment of funds associated with equipment purchases and repairs across the Agency's research programs.

- (-\$2,735.0) This reflects an adjustment for Small Business Innovation Research (SBIR). Enacted funding levels for this program project include the amount EPA is required to set aside for contracts to small businesses to develop and commercialize new environmental technologies. This adjustment is necessary because the SBIR set aside, at this point in the budget cycle, is redistributed to other research programs in the President's Budget request. After the budget is enacted, when the exact amount of the mandated requirement is known, the funds will be transferred to the SBIR program in this program project.

Statutory Authority:

CAA; CWA; FIFRA; PPA; RCRA; SDWA; SBA; SARA; TSCA; ERDDA; EISA.

Program Area: Toxic Research and Prevention

Research: Pesticides and Toxics

Program Area: Toxic Research and Prevention

Goal: Healthy Communities and Ecosystems

Objective(s): Enhance Science and Research

(Dollars in Thousands)

	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
Science & Technology	\$24,616.7	\$26,949.0	\$27,839.0	\$890.0
Total Budget Authority / Obligations	\$24,616.7	\$26,949.0	\$27,839.0	\$890.0
Total Workyears	128.9	137.4	137.4	0.0

Program Project Description:

The Pesticides and Toxics Research program is a multidisciplinary program that conducts research and development related to risks resulting from exposure to pesticides and toxic chemicals. The research supports the Agency's efforts to reduce current and future risks to the environment and to humans by preventing and/or controlling the production of new chemicals and products of biotechnology that pose unreasonable risk, as well as assessing and reducing the risks of chemicals and products of biotechnology already in commerce. This research complements work conducted under the Human Health and Ecosystem Research, the Human Health Risk Assessment, and the Endocrine Disruptors Research programs. Research to develop and validate methods and models and assessments for predicting risks from pesticides, toxic substances, and products of biotechnology to human health and ecosystems is conducted under the Pesticides and Toxics research program. EPA's Pesticides and Toxics Research program provides the scientific foundation for the Agency's actions to protect against unreasonable risk from exposure to toxics.

Research is guided by the Biotechnology Research Strategy¹⁰⁴ and the Wildlife Research Strategy,¹⁰⁵ both of which were developed with broad participation from major clients (e.g. EPA's Prevention, Pesticides and Toxic Substances program and Regional offices). The strategies outline the Agency's research needs and priorities. The Safe Pesticides/Safe Products (SP2) multi-year plan (MYP)¹⁰⁶ outlines specific steps for meeting these needs, as well as annual performance goals and measures for evaluating progress.

The program's focus is to develop methods, models, and data for use in decision making by EPA's Office of Prevention, Pesticides and Toxic Substances (OPPTS) and other organizations. The research program's three major goals are: (1) to provide predictive tools to prioritize testing requirements; enhance interpretation of data to improve human health and ecological risk assessments; and inform decision-making regarding high priority pesticides and toxic substances;

104 U.S. EPA, Office of Research and Development. *Biotechnology Research Strategy*. Washington, DC: EPA.

Available at: http://www.epa.gov/nheerl/publications/files/biotechnology_research_program_4_8_05.pdf

105 U.S. EPA, Office of Research and Development. *Wildlife Research Strategy*. Washington, D.C.: EPA. Available at: http://www.epa.gov/nheerl/publications/files/wildlife_research_strategy_2_2_05.pdf

106 U.S. EPA, Office of Research and Development. *Safe Pesticides/Safe Products Multi-Year Plan*. Washington, D.C.: EPA (2006). Available at: <http://epa.gov/ord/npd/pdfs/SP2+MYP+120106final.pdf>

(2) to develop probabilistic risk assessment methods and models to better protect natural populations of birds, fish, other wildlife, and non-target plants; and (3) to provide the tools necessary to make decisions related to products of biotechnology.

In February 2007, the Pesticides and Toxics research program underwent an external peer review by EPA's research advisory committee, the Board of Scientific Counselors (BOSC), which commended the progress and direction of the research and provided recommendations for improvement.¹⁰⁷ The BOSC stated that "SP2 is a very successful program. The research is of high quality and is focused on well-articulated goals. Its relevance to the Agency's mission is clear and apparent, and the SP2 Program fills a unique niche within the Agency, and serves the needs of OPPTS, its major client, very well." The BOSC also noted that, "the scientists involved in these projects are internationally recognized and their findings and organized panels serve to establish regulatory guidance around the world."

FY 2010 Activities and Performance Plan:

In FY 2010, the resources for Pesticides and Toxics research will continue to support the scientific foundation for addressing risks from human and wildlife exposure to pesticides and toxic chemicals. EPA will provide research on methods, models, and data to support prioritization of testing requirements, enhanced interpretation of data to improve human health and ecological risk assessments, and decision-making regarding specific individual or classes of pesticides and toxic substances that are of high priority. This research will continue to focus on:

- developing predictive biomarkers of neurotoxic effects for major classes of pesticides;
- developing alternative test methods for the hazard identification of developmental neurotoxicants;
- developing virtual chemical screening methods for risk-based prioritization and ranking needs for chronic non-cancer effects;
- developing quantitative structure activity relationships (QSARs) to relate various structural descriptions of molecules to toxicity endpoints;
- characterizing the toxicity and pharmacokinetics of certain perfluorinated chemicals (PFCs);
- evaluating the fate and transport of certain PFCs in soil; and
- evaluating the emissions of certain PFCs into the indoor environment from articles of commerce.

Research conducted in FY 2010 also will support the development of probabilistic risk assessments to protect natural populations of birds, fish, other wildlife, and non-target plants. This research directly supports Agency efforts to assure that endangered species are protected from pesticides while making sure farmers and communities have the pest control tools they need. Four key components of this research are:

- extrapolation among wildlife species and exposure scenarios of concern;
- population biology to improve population dynamics in spatially-explicit habitats;

107 U.S. EPA, Office of Research and Development, SP2 Research Program Review. Washington, D.C. (2007). Available at: <http://www.epa.gov/osp/bosc/pdf/sp2070723rpt.pdf>.

- models for assessing the relative risk of chemical and non-chemical stressors; and
- models to define geographical regional/spatial scales for risk assessment.

The program will develop methods for characterizing population-level risks of toxic substances to aquatic life and wildlife. Results of this research will help the Agency meet the long-term goal of developing scientifically valid approaches for assessing spatially-explicit, population-level risks to wildlife populations and non-target plants and plant communities from pesticides, toxic chemicals and multiple stressors while advancing the development of probabilistic risk assessment. This supports the Agency's obligation under the Endangered Species Act.

Additionally, FY 2010 resources will maintain a limited investment in biotechnology research to support decision-making related to products of biotechnology. Through its Science to Achieve Results (STAR) program, methods are being developed to assess the potential allergenicity of genetically engineered plants and to determine what factors influence allergenicity. As a result of a joint solicitation of proposals with the National Institute for Allergenicity and Infectious Diseases, EPA will continue to support grants that examine the genetic, developmental, or other determinants and mechanisms, and the influence of route, duration, and timing of dietary exposure that underlay the onset of food allergies. Together, the two Agencies are funding 16 grants.

The Pesticides and Toxics Research program continues to implement key improvement steps: it 1) developed a formal response to the BOSC report and is addressing action items and making progress toward long-term and annual targets; 2) is assessing the current efficiency measure to determine how best to capture the cost effectiveness of research activities, in light of the National Academy of Sciences' study (see below); and 3) is developing a process to better use performance information to improve program performance.

Performance Targets:

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Efficiency	Percent variance from planned cost and schedule	Available 2010	-8	-6	-5	Percent

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Output	Percentage of planned outputs delivered in support of the SP2 program's long-term goal one.	100	100	100	100	Percent

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Output	Percentage of planned outputs delivered in support of the SP2	100	100	100	100	Percent

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
	program's long-term goal three.					

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Output	Percentage of planned outputs delivered in support of the SP2 program's long-term goal two.	100	100	100	100	Percent

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Output	Percentage of SP2 publications rated in highly cited publications	Available 2010	23.2	No Target Established (biennial)	24.2	Percent

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Output	Percentage of SP2 publications in high impact journals	Available 2010	36.2	No Target Established (biennial)	37.2	Percent

The research conducted under this program supports EPA Strategic Objective 4.4. Specifically, the program identifies and synthesizes the best available scientific information, models, methods, and analyses to support Agency guidance and policy decisions related to the health of people, community, and ecosystems, with a focus on pesticides and toxic chemicals. A key focus for FY 2010 will be to develop the scientific underpinning related to the effects, exposures, and risk management of specific individual or classes of pesticides and toxic substances that are of high priority to the Agency to inform Agency risk assessment/management decisions.

In 2008, the National Academy of Sciences (NAS) completed a study commissioned by EPA's Research and Development program to address OMB's recommendation to establish outcome-oriented efficiency measures.⁶ According to the NAS study, "efficiency" in federal R&D programs is best assessed by using an external expert-review panel to evaluate the relevance, quality, and performance of the research. Considering these findings, ORD is engaging its BOSC to evaluate if ORD's research programs are "doing the right research and doing it well."

FY 2010 Change from FY 2009 Enacted Budget (Dollars in Thousands):

- (+\$571.0) This reflects an increase for payroll and cost of living for all FTE.
- (+\$255.0) This represents a realignment of funds associated with equipment purchases and repairs across the Agency's research programs.

- (+\$11.0) These resources would fund research in the area of prioritizing testing requirements, enhancing interpretation of data to improve human health and ecological risk assessments.
- (+\$53.0) This represents a restoration of resources transferred in FY 2009 to the Research: Sustainability Program/Project to support the Small Business Innovation Research Program (SBIR). For that program, EPA is required to set aside 2.5 percent of funding for contracts to small businesses to develop and commercialize new environmental technologies. After the FY 2010 budget is enacted, when the exact amount of the mandated requirement is known, FY 2010 funds will be transferred to the SBIR program.

Statutory Authority:

FQPA; FIFRA; TSCA; CWA; CAA; ERDDA.

Program Area: Water: Human Health Protection

Drinking Water Programs

Program Area: Water: Human Health Protection

Goal: Clean and Safe Water

Objective(s): Protect Human Health

(Dollars in Thousands)

	FY 2008 Actuals	FY 2009 Enacted	FY 2010 Pres Bud	FY 2010 Pres Bud v. FY 2009 Enacted
Environmental Program & Management	\$107,454.8	\$98,779.0	\$102,856.0	\$4,077.0
<i>Science & Technology</i>	<i>\$3,292.5</i>	<i>\$3,555.0</i>	<i>\$3,720.0</i>	<i>\$165.0</i>
Total Budget Authority / Obligations	\$110,747.3	\$102,334.0	\$106,576.0	\$4,242.0
Total Workyears	561.7	583.4	589.4	6.0

Program Project Description:

This program provides technical support to drinking water programs through the Technical Support Center (TSC), which evaluates engineering and scientific data (including treatment technology information) to establish its applicability to the drinking water program's needs; develops and implements regulations to support national occurrence surveys and assists in the assessment of the contaminant occurrence data resulting from those surveys; develops and evaluates monitoring approaches and analytical methods, including assessing data provided by others to demonstrate the effectiveness of new/alternate analytical methods; trains Regional and State Certification Officers and develops guidelines for the drinking water laboratory certification program; works with Regions and states to help drinking water utilities better understand their treatment and distribution systems and implement improvements to optimize performance; and provides other technical support to develop and implement National Primary Drinking Water Regulations (NPDWRs). The Center also provides external technical assistance in support of EPA Regional and state drinking water programs.

(See <http://www.epa.gov/safewater/> for more information.)

FY 2010 Activities and Performance Plan:

In FY 2010, the drinking water technical support program will:

- Provide technical and scientific support for the development and implementation of drinking water regulations. This includes the development of methods for updating rules and implementing the Unregulated Contaminant Monitoring Rule (UCMR); and responding to technical implementation questions regarding the entire range of NPDWRs.
- Continue to implement EPA's Drinking Water Laboratory Certification Program. This program sets standards and establishes methods for EPA, state, and privately-owned labs that analyze drinking water samples. Through this program, EPA also will conduct three Regional program reviews during FY 2010. TSC visits each Regional Office on a triennial basis and evaluates their oversight of the state labs and the state laboratory certification programs within their purview.

- Support small drinking water systems' efforts to optimize their treatment technology under the drinking water treatment Area Wide Optimization Program (AWOP). AWOP is a highly successful technical assistance and training program that enhances the ability of small systems to meet existing and future microbial, disinfectant, and disinfection byproducts standards. By FY 2010, EPA will have worked with 4 Regions and 22 states to facilitate the transfer of specific skills using the performance-based training approach targeted towards optimizing key groundwater system and distribution system integrity. The performance-based training brings together a group of public water supply operators from different localities for a series of sessions where they learn key operational and problem solving skills. Each skill is needed to enable operators to address the factors limiting optimized performance of their plant.
- Continue to manage contaminant monitoring for the second round of the UCMR implementation. The monitoring period for UCMR2 is January 2008 to December 2010. Once public water system monitoring of the selected unregulated contaminants is completed first quarter FY 2010, analysis of the resulting data can begin. This data, used in concert with health effects, and other occurrence information, contributes significantly to the regulatory determination process. Data reporting by public water systems will continue through mid- FY 2011. Key activities for EPA include management of all aspects of small-system monitoring, oversight of approved laboratories, troubleshooting and technical assistance, and review and validation of data.
- Support the Partnership for Safe Water, a national voluntary collaborative effort between the water industry and EPA to pursue optimization of the drinking water treatment infrastructure to maximize public health protection.
- Provide analytical method development/validation to enable implementation of the nation's drinking water compliance-monitoring and occurrence data gathering.

Performance Targets:

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Outcome	Percent of community water systems that meet all applicable health-based standards through approaches that include effective treatment and source water protection.	89	89.5	90	90	Percent Systems

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Outcome	Percent of population served by community water systems that will receive drinking water that meets all	92	90	90	90	Percent Population

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
	applicable health-based drinking water standards through approaches incl. effective treatment & source water protection.					

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Outcome	Percent of community water systems that meet all applicable health-based standards through approaches that include effective treatment and source water protection.	89	89.5	90	90	Percent Systems

Measure Type	Measure	FY 2008 Actual	FY 2008 Target	FY 2009 Target	FY 2010 Target	Units
Outcome	Percent of population served by community water systems that will receive drinking water that meets all applicable health-based drinking water standards through approaches incl. effective treatment & source water protection.	92	90	90	90	Percent Population

The two performance measures displayed above are representative of the work carried out under this program. These measures were developed in OMB assessments for the following related programs: the Drinking Water State Revolving Fund, Public Water System Supervision Grant program and Underground Injection Control Grant program.

FY 2010 Change from FY 2009 Enacted Budget (Dollars in Thousands):

- (+\$162.0) This reflects an increase for payroll and cost of living for existing FTE.
- (+3.0) This reflects an increase to support evaluation for engineering and scientific data (including treatment technology information)

Statutory Authority:

SDWA.