

FY 2009 President's Budget

Presentation to EPA's Science Advisory Board

*Kevin Y. Teichman, Ph.D.
Deputy Assistant Administrator for Science*



Office of Research and Development

February 28th, 2008

Presentation Overview

- Recent Accomplishments
- Planning and Budgeting Activities
- FY 2009 President's Budget
- Strategic Planning Activity
- Performance Evaluation
- Conclusions

Office of Research and Development

1

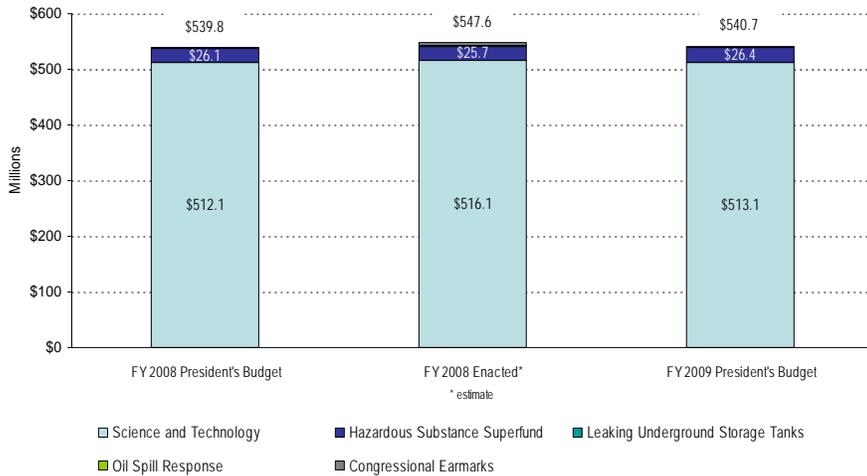
Recent Accomplishments

- **Computational Toxicology:** Announced 340 chemicals to be evaluated in Phase I of EPA's ToxCast project, which is developing the ability to forecast toxicity using high-throughput screening. In September, the identified chemicals were shipped from the chemical management contractor to high-throughput screening contractors, and full analysis of Phase I is expected in early 2008.
- **Homeland Security:** Completed development of the Threat Ensemble Vulnerability Assessment (TEVA) suite of software tools, which aids water utility operators in optimally placing sensors, detecting contamination events, and managing the resulting consequences. Recently, the Institute for Operations Research and Management Science (INFORMS) nominated TEVA as a finalist for its prestigious Edelman Award.
- **Human Health Risk Assessment:** Began transition to Integrated Science Assessment (ISA) in support of National Ambient Air Quality Standard (NAAQS) with Pb. The program has also just released external review drafts on the health effects ISAs for NOx and SOx.
- **Endocrine Disruptors:** Nearing completion of the external peer review of 12 Tier 1 assays that support the Endocrine Disruptors Screening Program. EPA will begin issuing orders this year for industry to conduct chemical screening using a combination of these assays.

Planning and Budgeting Activities Oct. 2007 – Oct. 2008

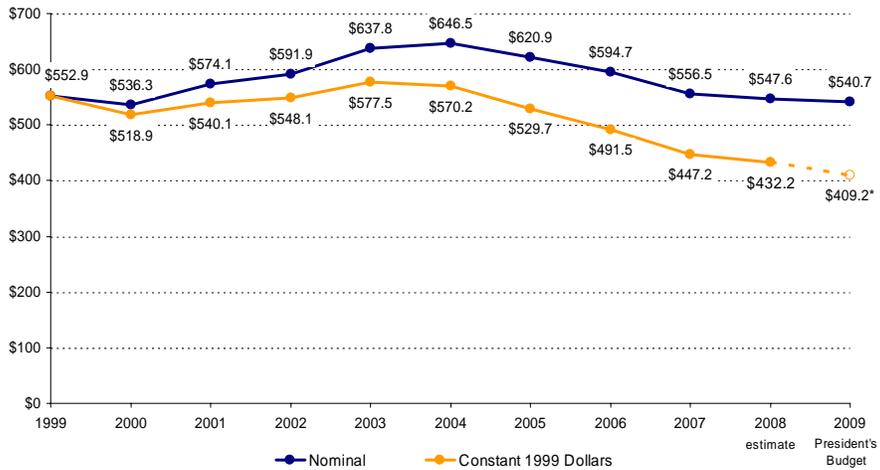


ORD Budget by Appropriation Account



ORD Budget Trend

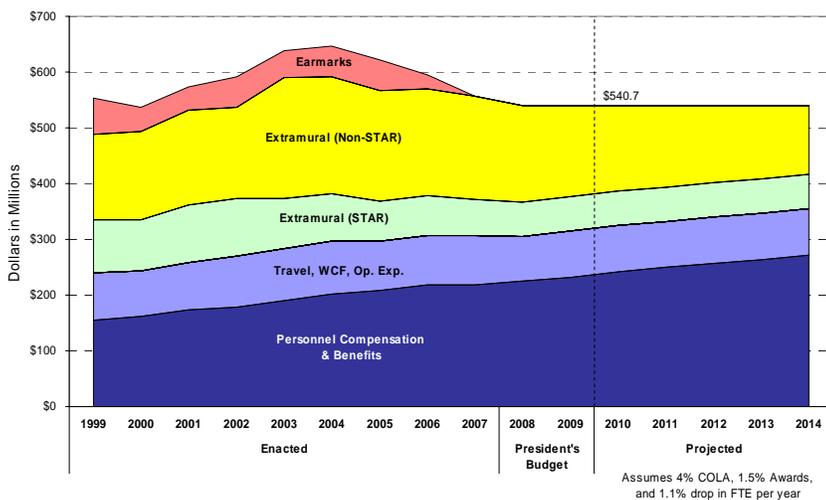
(enacted budget, includes earmarks, dollars in millions)



Source: Department of Labor

* FY 2009 estimate assumes January 2008 twelve month inflation rate of 4.3%.

ORD Budget by Type of Spending



Comparison of FY 2009 President's Request to FY 2008 Enacted Budget (Omnibus)

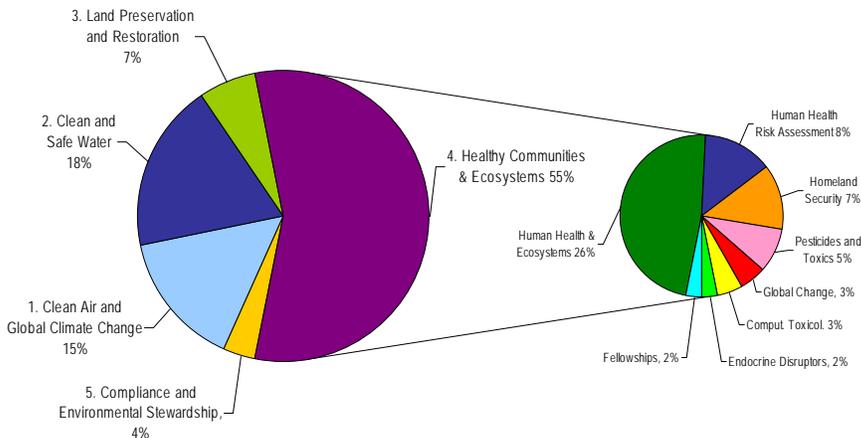
EPA Program/Project	FY 2008 President's Budget		FY 2008 Enacted*		FY 2009 President's Budget		Change from FY 08 En. to FY 09 PB	
	\$M	FTE	\$M	FTE	\$M	FTE	\$M	FTE
Research: Clean Air	\$81.1	236.2	\$80.0	236.2	\$80.6	236.4	+\$0.6	+0.2
Research: Drinking Water	\$48.5	207.2	\$48.8	207.2	\$45.3	190.2	-\$3.5	-17.0
Research: Water Quality	\$56.5	239.4	\$55.6	239.4	\$56.2	236.8	+\$0.6	-2.6
Research: Land Preservation and Restoration	\$32.4	141.3	\$31.9	141.3	\$35.5	154.7	+\$3.6	+13.4
Homeland Security: Preparedness, Response, and Recovery	\$35.7	50.9	\$33.3	50.9	\$39.6	57.5	+\$6.3	+6.6
Human Health Risk Assessment	\$42.8	182.1	\$42.2	182.1	\$42.6	178.6	+\$0.4	-3.5
Research: Computational Toxicology	\$15.1	34.3	\$12.1	34.3	\$14.9	32.7	+\$2.8	-1.6
Research: Endocrine Disruptors	\$10.1	54.4	\$10.3	54.4	\$9.5	50.1	-\$0.9	-4.3
Research: Global Change	\$16.9	32.6	\$19.7	32.6	\$16.4	32.2	-\$3.3	-0.4
Research: Human Health & Ecosystems	\$145.0	497.0	\$153.0	497.0	\$144.7	478.3	-\$8.3	-18.7
Research: Pesticides and Toxics	\$24.8	126.3	\$24.5	126.3	\$26.6	137.4	+\$2.1	+11.1
Research: Fellowships	\$8.4	2.7	\$9.8	2.7	\$8.9	2.6	-\$1.0	-0.1
Research: Sustainability	\$22.5	76.2	\$22.1	76.2	\$20.0	70.8	-\$2.2	-5.4
Congressional Earmarks	N.A.	N.A.	\$4.3	0.0	N.A.	N.A.	-\$4.3	0.0
Total	\$539.8	1,880.6	\$547.6	1,880.6	\$540.7	1,858.3	-\$7.0	-22.3



Comparison of FY 2008 President's Request to FY 2008 Enacted Budget (Omnibus)

EPA Program/Project	FY 2008 President's Budget		FY 2008 Enacted*		Change from FY 08 P.B. to FY 08 En.	
	\$M	FTE	\$M	FTE	\$M	FTE
Research: Clean Air	\$81.1	236.2	\$80.0	236.2	-\$1.1	0.0
Research: Drinking Water	\$48.5	207.2	\$48.8	207.2	+\$0.3	0.0
Research: Water Quality	\$56.5	239.4	\$55.6	239.4	-\$0.9	0.0
Research: Land Preservation and Restoration	\$32.4	141.3	\$31.9	141.3	-\$0.5	0.0
Homeland Security: Preparedness, Response, and Recovery	\$35.7	50.9	\$33.3	50.9	-\$2.4	0.0
Human Health Risk Assessment	\$42.8	182.1	\$42.2	182.1	-\$0.6	0.0
Research: Computational Toxicology	\$15.1	34.3	\$12.1	34.3	-\$3.0	0.0
Research: Endocrine Disruptors	\$10.1	54.4	\$10.3	54.4	+\$0.2	0.0
Research: Global Change	\$16.9	32.6	\$19.7	32.6	+\$2.8	0.0
Research: Human Health & Ecosystems	\$145.0	497.0	\$153.0	497.0	+\$8.0	0.0
Research: Pesticides and Toxics	\$24.8	126.3	\$24.5	126.3	-\$0.3	0.0
Research: Fellowships	\$8.4	2.7	\$9.8	2.7	+\$1.4	0.0
Research: Sustainability	\$22.5	76.2	\$22.1	76.2	-\$0.4	0.0
Congressional Earmarks	N.A.	N.A.	\$4.3	0.0	+\$4.3	0.0
Total	\$539.8	1,880.6	\$547.6	1,880.6	+\$7.8	0.0

President's FY 2009 Budget for ORD by EPA Strategic Goal (dollars in millions, all appropriation accounts)





Clean Air **+\$0.6M** (from \$80.0M)*

- In FY 2009, the program will continue research to support the setting and implementation of the National Ambient Air Quality Standards (NAAQS), especially the standard for particulate matter.
 - The program will continue research to measure and characterize sources' emissions, track and model the fate and transport of those emissions, study exposure to air pollution, and continue epidemiological, clinical, and toxicological studies of air pollution's effects.
 - The program will also study methods to control emissions and develop techniques to evaluate past rulemakings' efficacy.
- Reduction in research that supports air quality standard setting and links sources of emissions to human exposure and health endpoints.
 - The reduction includes reduced support for Science to Achieve Results (STAR) grants on the mechanisms in the body by which particulate matter influences cardiopulmonary health.
- Offsetting increase for payroll and cost of living for FTE.

* All amounts on slides are FY09 President's Budget totals; all changes on slides are from the FY 2008 Enacted Budget.



Drinking Water **-\$3.5M** (from \$48.8M)

- In FY 2009, the program will conduct research to support EPA's Office of Water and implementation of the Safe Drinking Water Act, including revision of the Total Coliform Rule (TCR), study of the chemicals to be identified in the third generation of the Contaminate Candidate List (CCL3), and a proposed rule on underground injections such as geologic sequestration of carbon dioxide
- Research on the health effects of disinfection byproducts is approaching completion and publication.
- Resources are being redirected to support:
 - Development of provisional advisory levels within the homeland security program;
 - Research on contaminated sites and asbestos within the Land program; and
 - Studies to help develop recreational water quality criteria and evaluate emerging water contaminants in the water quality program.



Water Quality **+\$0.6M** (from \$55.6M)

- In FY 2009, the program will conduct research to support EPA's Office of Water and implementation of the Clean Water Act, including regulatory activities such as aquatic life guidelines, development of biocriteria, nutrient research, research on multiple stressors, and research to support recreational water quality criteria.
 - Increase due to technical changes including the realignment of IT, travel, and other support costs across programs.
 - These resources will support research related to criteria development, watershed management, and source control and management research.



Land Protection and Restoration **+\$3.6M** (from \$31.9M)

- In FY 2009, the program will conduct research to support cleanup of Superfund sites, including study of the transport of contaminants in ground water and the subsequent intrusion of contaminant vapors into buildings; mining and asbestos remediation; and the development of tools and techniques to accelerate site remediation.
- In support of the Resource Conservation and Recovery Act (RCRA), EPA will work with states to optimize operation and monitoring of several landfill bioreactors and determine their potential to provide alternative energy via landfill gas.
- Additional funding to:
 - Support research to determine the release points of engineered nanomaterials into the environment and the physical and chemical properties controlling the transport and transformation of nanomaterials in environmental media; and
 - Develop data to support dosimetric and toxicologic assessment of amphibole asbestos fiber-containing material from Libby, Montana.



Homeland Security **+\$6.3M (from \$33.3M)**

- In FY 2009, research will focus on developing and testing enhanced methods for detection, treatment, and containment of chemical, biological, and radiological agents intentionally introduced into drinking water and wastewater systems as well as indoor and outdoor areas.
- Increased funding to enhance biodefense research related to anthrax, including:
 - Development and adaptation of methods to test for anthrax;
 - Development of methods to effectively decontaminate anthrax in wide area environments while minimizing the generation of waste; and
 - Development and adaptation of methods and models for hazard and exposure assessments needed to determine risk-based clean-up goals for anthrax.
- Increased effort to develop provisional advisory levels (through the redirection of resources from the drinking water research program).



Human Health Risk Assessment **+\$0.4M (from \$42.2M)**

- In FY 2009, the program will support:
 - EPA's Integrated Risk Information System;
 - Development of risk assessment guidance, methods, and models; and
 - Integrated Science Assessments of criteria air pollutants to support the setting of the National Ambient Air Quality Standards.

Computational Toxicology **+\$2.8M** (from \$12.1M)

- In FY 2009, EPA will continue systems-modeling approaches for the latest biological, chemical, and exposure data for quantitative risk assessments and expects the first results from its Virtual Liver and Virtual Embryo projects.
- The program will also launch Phase II of the ToxCast program, which will evaluate up to 1,000 additional chemicals in those assays deemed most informative from the Phase I proof of concept.
- Additional funding includes support EPA's role in interagency efforts to implement recommendations in the NAS report "Toxicity Testing in the 21st Century: A Vision and a Strategy."
 - This report calls for the field of toxicology to be more efficient and predictive of chemical effects in humans, including the development of system-modeling approaches such as the Virtual Liver and Virtual Embryo projects
 - For more information, see <http://www.epa.gov/comptox/>.

Endocrine Disruptors **-\$0.9M** (from \$10.3M)

- In FY 2009, the program will continue research to assist EPA's program offices in reducing or preventing risks to humans and wildlife from exposures to chemicals that interfere with the function of the endocrine system.
 - Researchers will study mixtures of endocrine disrupting chemicals from concentrated animal feeding operations and water treatment plants, and finalize fish and amphibian life cycle assays for the Congressionally-mandated screening and testing program.
- Upon completing the development of validated Tiers I and II endocrine disruptor screening protocols at the end of FY 2008, resources will be redirected to support high priority investigations of the health effects of asbestos under the Land Protection and Restoration program

Global Change **-\$3.3M** (from \$19.7M)

- In FY 2009, the program will continue support for the interagency Climate Change Science Program, which will include beginning the next round of assessments mandated by the U.S. Global Change Research Act of 1990.
- The program will also continue research to understand the effects of global change on air and water quality, aquatic ecosystems, and human welfare; advance the science of global change decision support tools; and study adaptation strategies.

Human Health and Ecosystems **-\$8.3M** (from \$153.0M)

- In FY 2009, the human health research program will continue research to identify and characterize environment-related human health problems and determine exposures to and sources of agents responsible for these health concerns.
 - The program will transition from a primary focus on reducing uncertainties in risk assessment to developing and linking indicators of risk along the source-exposure-effects-disease continuum that can be used to demonstrate reductions in human risk.
- In FY 2009, the ecosystems research program will continue its gradual evolution from developing statistically-rigorous methods to assess ecological condition (EMAP) to identifying ways in which human activities impact ecosystem services and how ecosystem services benefit human well-being.
 - The results of this research will be tools that enable decision-makers who manage ecosystems to balance the protection and use of ecological resources, accounting for different geographies and time periods.

Human Health and Ecosystems (continued)

- Increase research devoted to:
 - Studying the health and ecological implications arising from new routes of exposure and/or toxicities associated with either direct or indirect exposure to nanomaterials;
 - Identifying and developing risk assessment methodologies that address the unique aspects of engineered nanomaterials; and
 - Advancing sensor-based technologies for real-time monitoring of critical chemical and biological parameters (to be developed through the Small Business Innovation Research (SBIR) program).
- Reduce research devoted to:
 - Science to Achieve Results (STAR) grants on susceptible populations not related to the children's environmental health centers;
 - Observational studies to collect exposure data and asthma research; and
 - Grants portion of the Greater Research Opportunities (GRO) program.

Pesticides and Toxics **+\$2.1M** (from \$24.5M)

- In FY 2009, the program will provide OPPTS scientific information to reduce or prevent unreasonable risks to humans, wildlife, and non-target plants from exposures to pesticides, toxic chemicals, and products of biotechnology.
- The program will develop screening and prioritization tools for major classes of pesticides and develop the scientific foundation for terrestrial ecological risk assessments.
- Additional funding will support research that moves towards an integrated, spatially-explicit risk assessment program for wildlife and plant populations and communities of concern that adds a new exposure component to existing ecological effects modeling efforts.
- Reduction in biotechnology research including efforts to develop crop management protocols to understand the impact of genetically modified crops on the environment.



Fellowships **-\$1.0** (from \$9.9M)

- In FY 2009, the program will fund fellowships through the Science to Achieve Results (STAR) program, the Greater Research Opportunities (GRO) program, and the EPA/Marshall Scholarship program.
- In addition, EPA will host post-doctoral students through programs affiliated with the American Association for the Advancement of Science (AAAS) and the Association of Schools of Public Health (ASPH).



Sustainability **-\$2.2M** (from \$22.1M)

- In FY 2009, the program will:
 - Develop decision-support tools that promote sustainable management practices;
 - Develop metrics to gauge sustainability and inform documents such as the ROE;
 - Conduct student competitions to identify sustainable technology solutions (P3); and
 - Support commercialization of new sustainable technologies (e.g., Small Business Innovation Research, Environmental Technology Verification).
- Reduction in support for:
 - Small Business Innovation Research (SBIR) program; and
 - Development of metrics and decision support tools and the ability to assess new technologies.

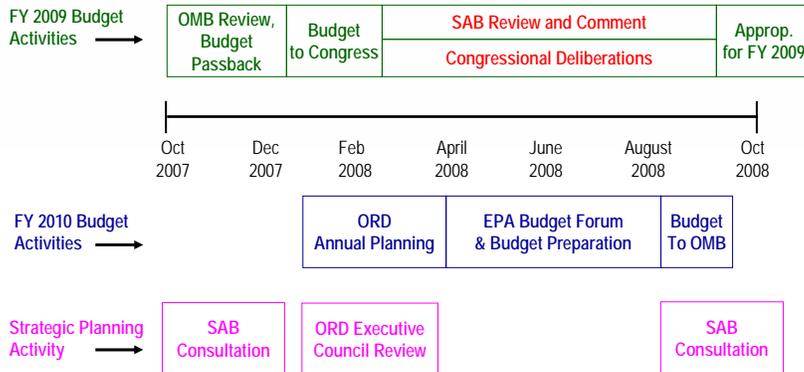
Major Increases in FY 2009

• Homeland Security	<i>+\$6.3M</i>
• Land Preservation and Restoration	<i>+\$3.6M</i>
• Computational Toxicology	<i>+\$2.8M</i>
• Pesticides and Toxics	<i>+\$2.1M</i>
• Human Health and Ecosystems	
– Nanotechnology	<i>+\$3.6M</i>
– Ecosystems	<i>+\$1.0M</i>

Major Decreases in FY 2009

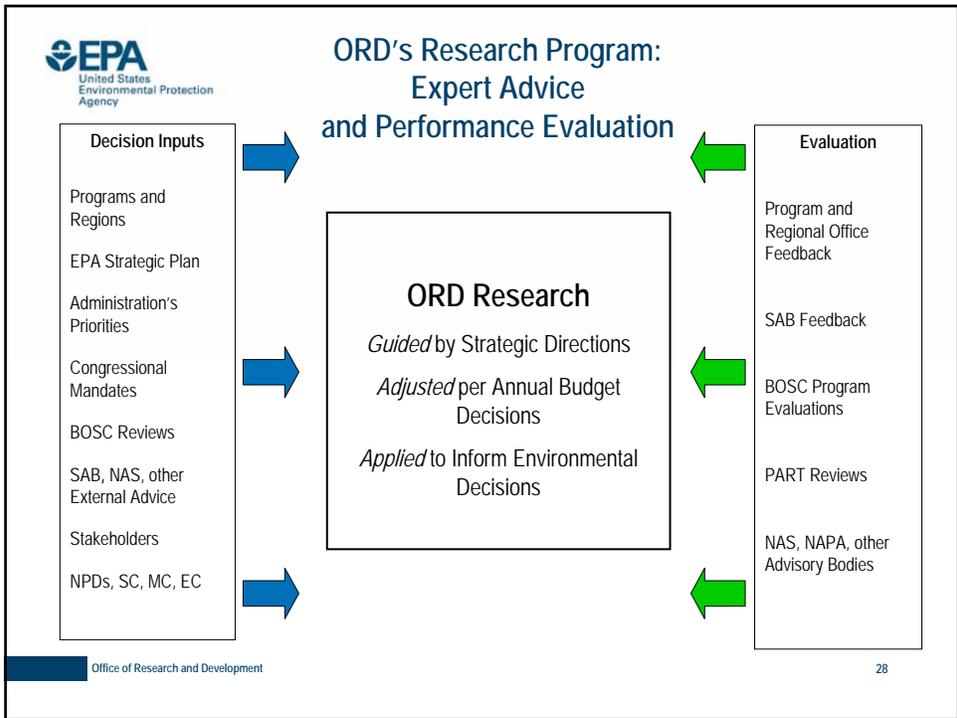
• Congressional Earmarks	<i>-\$4.3M</i>
• Human Health and Ecosystems	<i>-\$8.3M</i>
• Drinking Water	<i>-\$3.5M</i>
• Global Change	<i>-\$3.3M</i>
• Sustainability	<i>-\$2.2M</i>
• Fellowships	<i>-\$1.0M</i>
• Pesticides and Toxics	
– Biotechnology	<i>-\$1.0M</i>

Planning and Budgeting Activities Oct. 2007 – Oct. 2008



ORD's Strategic Planning Activity

- In addition to developing annual plans, ORD's National Program Directors have developed short write-ups of the strategic research directions they propose for their research programs.
 - These write-ups identify areas of growing, as well as decreasing, research emphasis – independent of annual budget constraints.
 - These strategic directions were presented to the SAB in October, 2007, and the comments that were provided are informing ORD's FY 2010 annual planning efforts.
- Examples of key strategic directions for ORD include:
 - Studying potential environmental impacts of geologic sequestration
 - Performing life cycle analysis of biofuels
 - Building upon our research on the transport and fate of nanomaterials to develop test methods and risk assessments for these materials
 - Evaluating the benefits of ecosystem services to human well-being
 - Increasing computational toxicology research to provide predictive models that improve our understanding of source-to-outcome linkages of chemicals



-
- ## Science Advisory Board Reviews
- FY 2007**

 - All-Ages Lead Biokinetic Model
 - Ethylene Oxide Carcinogenicity Assessment
 - Report on the Environment 2006
 - Report on the Environment 2007
 - Acute Inhalation Exposure-Acute Reference
 - Health-Based Provisional Advisory Levels for Homeland Security
 - Various IRIS Assessments
 - Scientific and Technological Achievement Awards STAA (2007)

FY 2008

 - Science and Technology Budget Review FY09
 - Strategic Directions of EPA's Research
 - Ecological Risk Assessment Approach
 - Acute Reference Concentration from Inhalation Exposure (ongoing)
 - Ecological Research Program Strategy and Multi-year Plan
 - Anthrax Technical Assistance Document
 - Health-Based Provisional Advisory Levels for Homeland Security
 - Scientific and Technological Achievement Awards (STAA) 2008
 - Acrylamide IRIS Assessment
 - Expert Elicitation White Paper
 - Use of PM Research Centers
- Office of Research and Development
29

Board of Scientific Counselors Reviews

FY 2007

- Safe Pesticides/Safe Products Program Review
- Human Health Mid-Cycle Review
- Ecological Mid-Cycle Review
- Drinking Water Mid-Cycle Review
- 2006 National Center for Computational Toxicology Review
- Sustainability Program Review (began)
- Endocrine Disrupting Chemicals Mid-Cycle Review (began)
- Air Mid-Cycle Review (began)
- National Center for Environmental Research Communications (began)

FY 2008

- Sustainability Program Review (completed)
- Endocrine Disrupting Chemicals Mid-Cycle Review (completed)
- Air Mid-Cycle Review (completed)
- National Center for Environmental Research, Communications (completed)
- Human Health Risk Assessment Program Review
- National Exposure Research Lab, Strategic Directions
- 2007 National Center for Computational Toxicology Review
- Global Change Mid-Cycle Review
- Homeland Security Program Review
- Land Mid-Cycle Review
- Water Quality Mid-Cycle Review (begin)

OMB PART Reviews of ORD Programs

- 2003
 - Pollution Prevention / New Technologies – Results Not Demonstrated
 - National Ambient Air Quality Standards – Results Not Demonstrated
 - Ecological Research – Results Not Demonstrated
- 2004
 - Endocrine Disruptors Research (Joint PART with OPPTS) – Adequate
- 2005
 - Human Health Research – Adequate
 - Drinking Water Research – Adequate
 - National Ambient Air Quality Standards (re-PART) – Adequate
 - Ecological Research (re-PART) – Ineffective
- 2006
 - Global Change Research – Adequate
 - Land Protection and Restoration Research – Adequate
 - Water Quality Research – Adequate
 - Human Health Risk Assessment Program – Moderately Effective
- 2007
 - Pesticides and Toxics Research – Moderately Effective
 - Ecological Research – Moderately Effective

ORD Progress in Accountability

- “Moderately Effective” Ratings on 2007 PART Reviews
 - Strong improvement from previous years
 - Agreement on BOSC rating process
 - Better standardized process within ORD for demonstrating program structure and results
- Success in Addressing the President’s Management Agenda
 - ORD’s adoption of efficiency measures instrumental in Agency receiving “Green” rating
- EPA-Sponsored NAS Study on Efficiency Measurement for Research Programs
 - For meaningful assessment of research efficiency, NAS recommends dual approach:
 - Develop “process” efficiency measures linked to outputs
 - Incorporate “investment” efficiency into independent reviews of program quality, relevance, and performance

Comments from Last Year’s SAB Review

- Concern over ORD’s declining budget, in particular funding for ecosystems research.
 - EPA believes that the FY 2009 proposed budget addresses the Agency’s highest priority environmental research needs given available resources.
 - EPA’s Ecosystems Research Program is focusing on tools that enable decision-makers who manage ecosystems to consider the value of ecosystem services and thereby balance the protection and use of ecological resources.
- Concern over the potential for erosion in staff morale.
 - In March, 2007, *The Scientist* ranked EPA’s RTP campus the third best place for postdoctoral fellows to work, according to survey data.¹
 - OPM’s *2006 Federal Human Capital Survey* found slight increases in employees’ overall satisfaction with their jobs (Question 60).²
- Concerns that inflating personnel costs may eat into research budgets.
 - ORD is restructuring its administrative functions to recoup valuable resources while maintaining or improving levels of service.

¹ Source: <http://www.the-scientist.com/2007/3/1/49/1/>

² Source: <http://www.fhcs.opm.gov/>

Cross-Program and Program-Targeted Research

Cross-Program Research

- Research with broad applications and implications for multiple offices
- Issue is persistent such that priorities remain fairly stable, but continually need to improve the science to address the priority
- Applies emerging approaches and tools
- Incubator for innovation ideas to addressing long-standing issues
- Double “bang for the buck” by selecting stressors to address a cross-program issue that will also inform a program-targeted effort

Program-Targeted Research

- Often a single or primary client
- Research may be legislatively mandated, with deadlines
- Priorities may shift based on changing program needs
- Often employs established methodologies

Computational Toxicology: Example of the Complementary Nature of Cross-Program and Program-Targeted Research

ORD is conducting research toward understanding the toxicity of the conazole class of pesticides. While this research is providing direct benefit to EPA’s Office of Pesticide Programs, it is also serving as a proof-of-concept activity in ORD’s ongoing effort to develop a generalizable capability to apply genomics-based computational approaches to environmental toxicology.

SAB Cross-Cutting Issues

- Global Change
- Sensitive Populations
- Urban Sprawl
- Environmental Disasters

- Others?

Global Change

In addition to the Global Change Research efforts,

- Drinking Water Research
 - Studying potential implications of geologic sequestration to control CO₂ emissions
 - Evaluating impacts of biofuels on sources of drinking water and water use practices (in collaboration with USDA)
 - Evaluating water quality/quantity changes and best management practices for protecting drinking water sources
- Ecological Research
 - Imposing climate change scenarios on alternative future management options
 - Conducting place-based projects in the Coastal Carolinas and Tampa Bay that consider climate change as a critical stressor for consideration in future management options

Sensitive Populations

- Human Health Research is evaluating susceptibility by life stage, particularly prenatal development and children's health.
- Air Research is performing studies that involve various ages (e.g., young children, elderly) and different conditions (e.g., asthma, cardiopulmonary disease).
- Drinking Water Research includes evaluating reaction of sensitive populations to contaminants (e.g., exposure of infants to nitrate, reproductive health effects of disinfection byproducts, exposure of children to viruses).
- Water Quality Research includes research to support recreational water criteria development, an analysis of childhood exposures, since they demonstrate higher swimming related illness rates.
- EDCs and SP2 Research includes participating in validation of 19 different in vitro and in vivo assays for the EDC screening program and developing assays to screen chemicals for their potential developmental neurotoxicity

Urban Sprawl

- Ecological Research is quantifying the impact of development on ecosystem services in place-based projects; Tampa Bay and the Carolinas are primary sites.
- Air Research is conducting near-roadway studies that provide exposure and health data relating to road and traffic densities.
 - The results of this research will be used in urban planning models and provide inform Green Community design.
- Both Drinking Water and Water Quality Research are evaluating approaches for sustainable infrastructure (asset management for water distribution systems; innovative techniques for managing water conveyance and storage systems), and studying watershed management approaches (e.g., geospatial analysis for smart growth, impacts of urban activities on ground water quality).
- Land program is shifting resources into brownfields research. Topics include a land-use decision support tools (SMARTe) and vapor intrusion into buildings.

Environmental Disasters

In addition to related Homeland Security Research efforts,

- Water Quality Research is conducting research on non-point source related health risks associated with wet weather events, with specific emphasis on the effectiveness of disinfecting blended effluents.
- Land Research is conducting research that addresses wastes from natural and anthropogenic disasters.
- Human Health Research is clarifying the relationship between exposure to mold and the exacerbation of asthma to inform responses to and recovery from flood and water damage.
- Ecological Research is considering natural vs. anthropogenic influence on ecosystem services.



Conclusions

- ORD research program plays a vital role in ensuring that EPA meets its mission to protect public health and the environment.
- Our research program has been evaluated and found effective by both independent, external experts and by OMB.
- The FY 2009 budget appropriation enables EPA to meet the President's highest environmental priorities.
- Through strategic planning, we are positioning our research program to anticipate and be responsive to future environmental challenges.