EPA
United States
Environmental Protection
Agency

Office of Research and Development
FY 2013 President's Budget

Robert Kavlock, Ph.D
Deputy Assistant Administrator for Science (Acting)

March 1, 2012

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United States
Environmental Protection
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"Science must once again be the determining factor in EPA decision making. When we make a decision that will affect the health and welfare of a community, we must have an unwavering commitment to the very best scientific analysis."

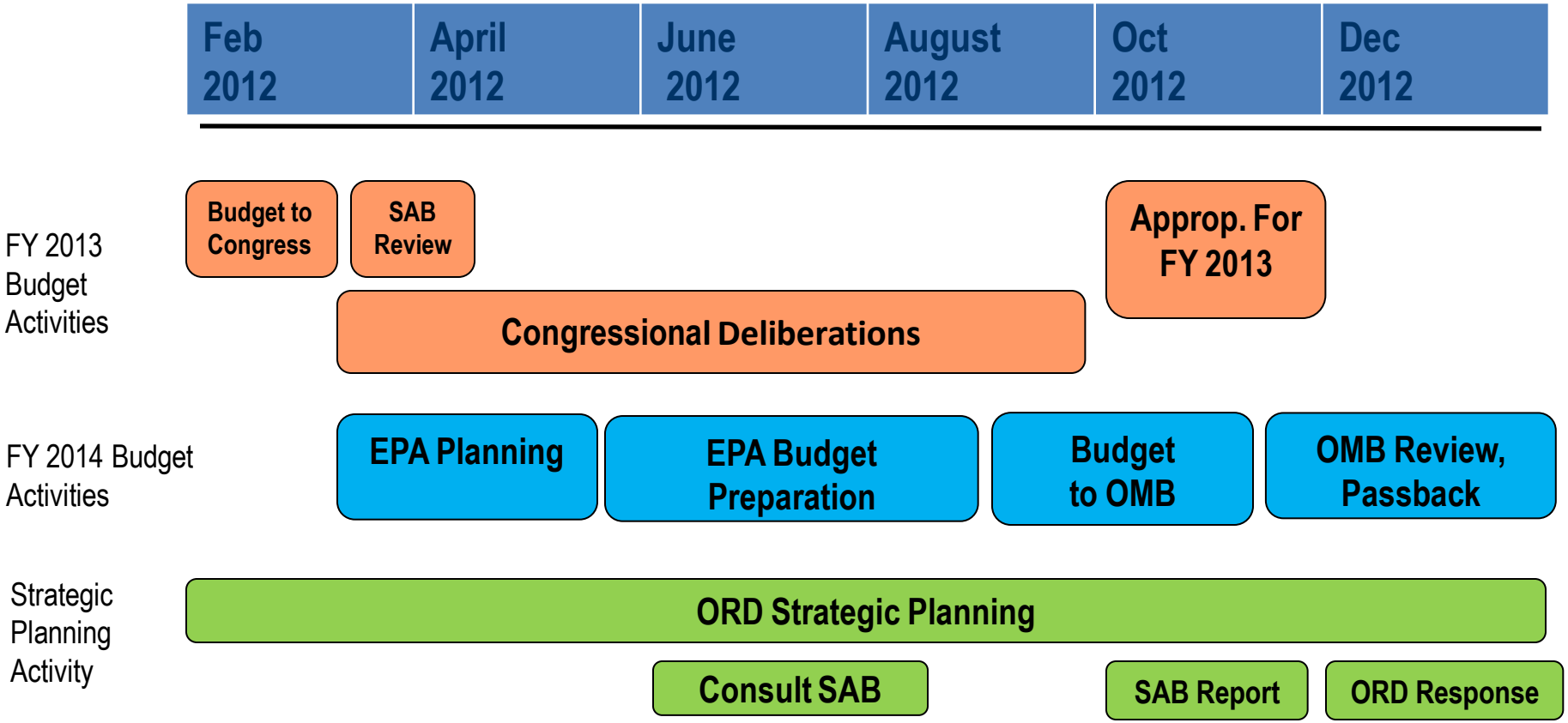
EPA Administrator Lisa Jackson
(March 11, 2009)

ORD Mission

Provide the scientific foundation to support EPA's mission by:

- Conducting research and development to identify, understand, and solve current and future environmental problems.
- Providing responsive technical support to EPA's Programs and Regions.
- Collaborating with our scientific partners in other agencies, academia, private-sector organizations, state and tribal governments, and other nations.
- Exercising leadership in addressing emerging environmental issues and advancing the science and technology of risk assessment and risk management.

Planning and Budgeting Activities February 2012-December 2012



FY 2013 President's Budget for ORD

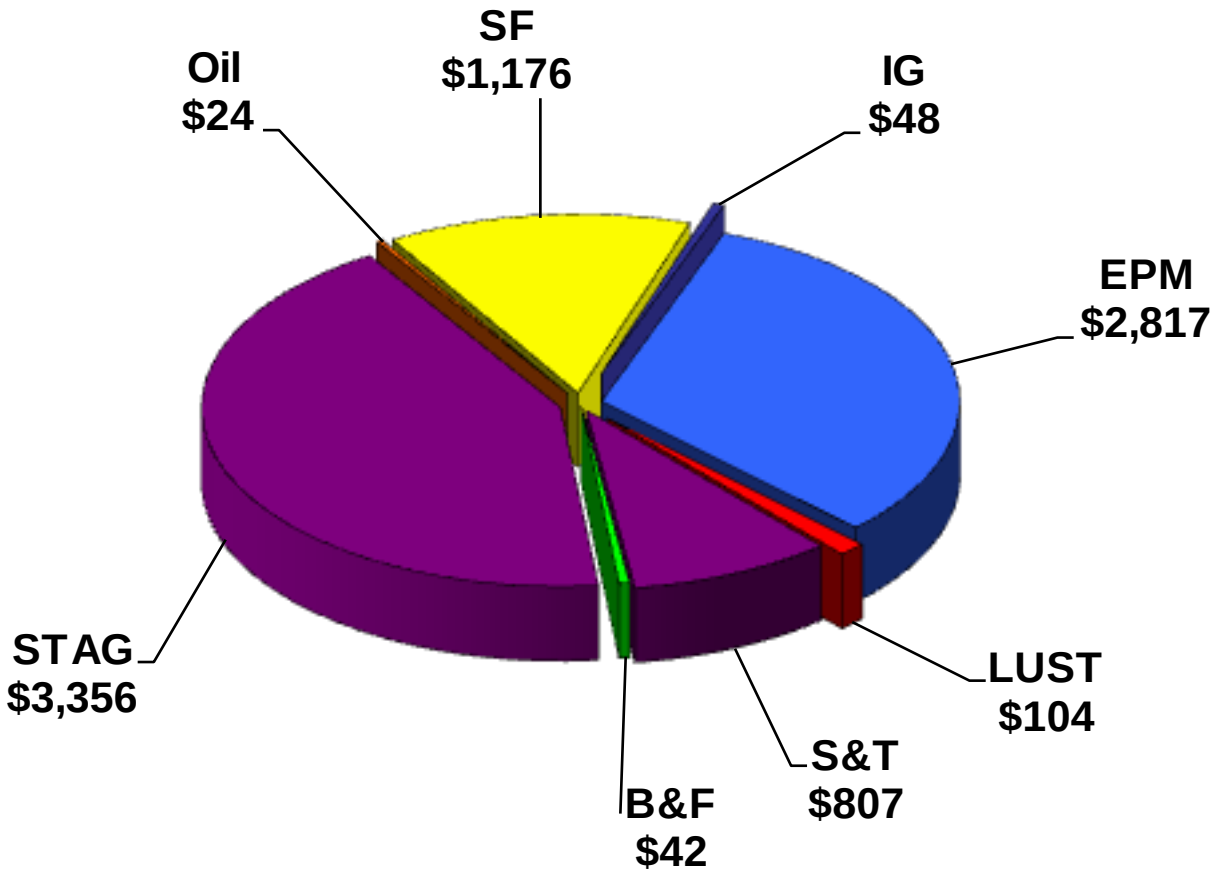
- FY 2013 President's Budget requests $576 million for ORD, an increase of $8.2 million from the FY 2012 enacted budget.
- Research budget reflects the difficult choices made in this challenging fiscal climate in order to address the Nation's highest priorities.
- ORD FY 2013 budget emphasizes developing of innovative solutions for 21st century environmental challenges and generating the tools and information needed by decision-makers.
- Important areas of emphasis are
  - Hydraulic fracturing – investigating potential impacts on air, water, and ecosystems, and innovative approaches to solving wastewater management issues.
  - Tox21 program – working with Federal partners on new technology for testing the toxicity of thousands of chemicals.
  - Partnering with DoD – developing and testing cutting-edge "net zero" environmental technologies and transferring successes to US communities.

FY 2013 Appropriation Totals for EPA

(Dollars in Millions)

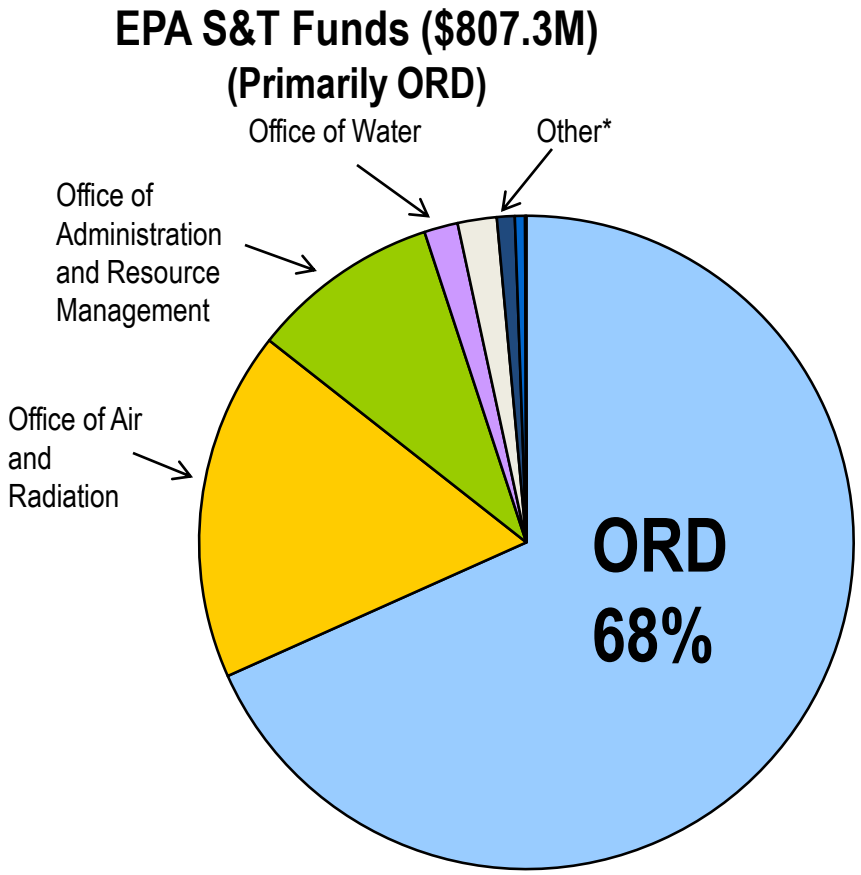
United States Environmental Protection Agency

FY 2013 President's Budget for EPA: $8.3 Billion	FY 2013 President's Budget for ORD: $576 Million



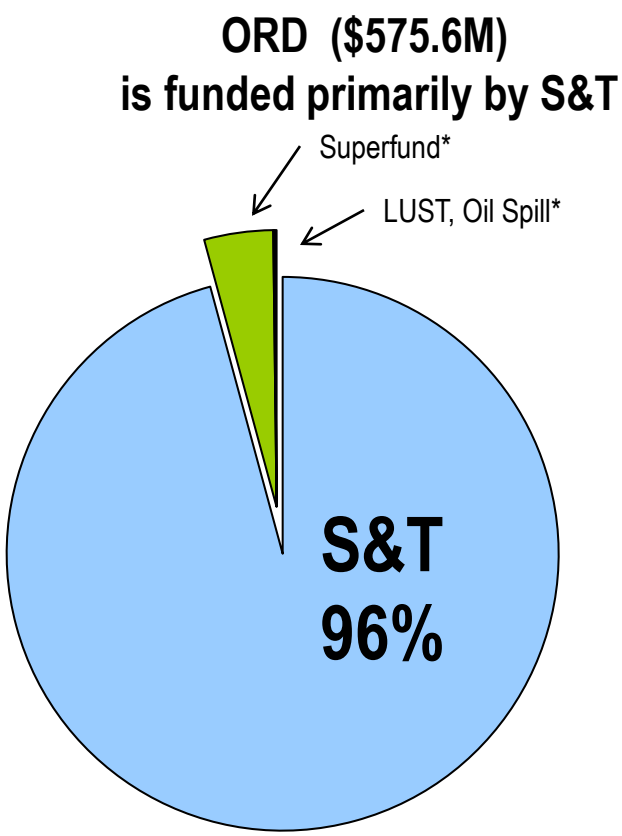
* Totals may not add due to rounding; percentages are calculated on underlying non-rounded values.

Appropriation Accounts, FY 2013 President's Budget



S&T Appropriation by EPA Office

*Note 1: Includes OCFO ($1M), OEI ($4M), OCSPP ($7M), and OECA ($16M)



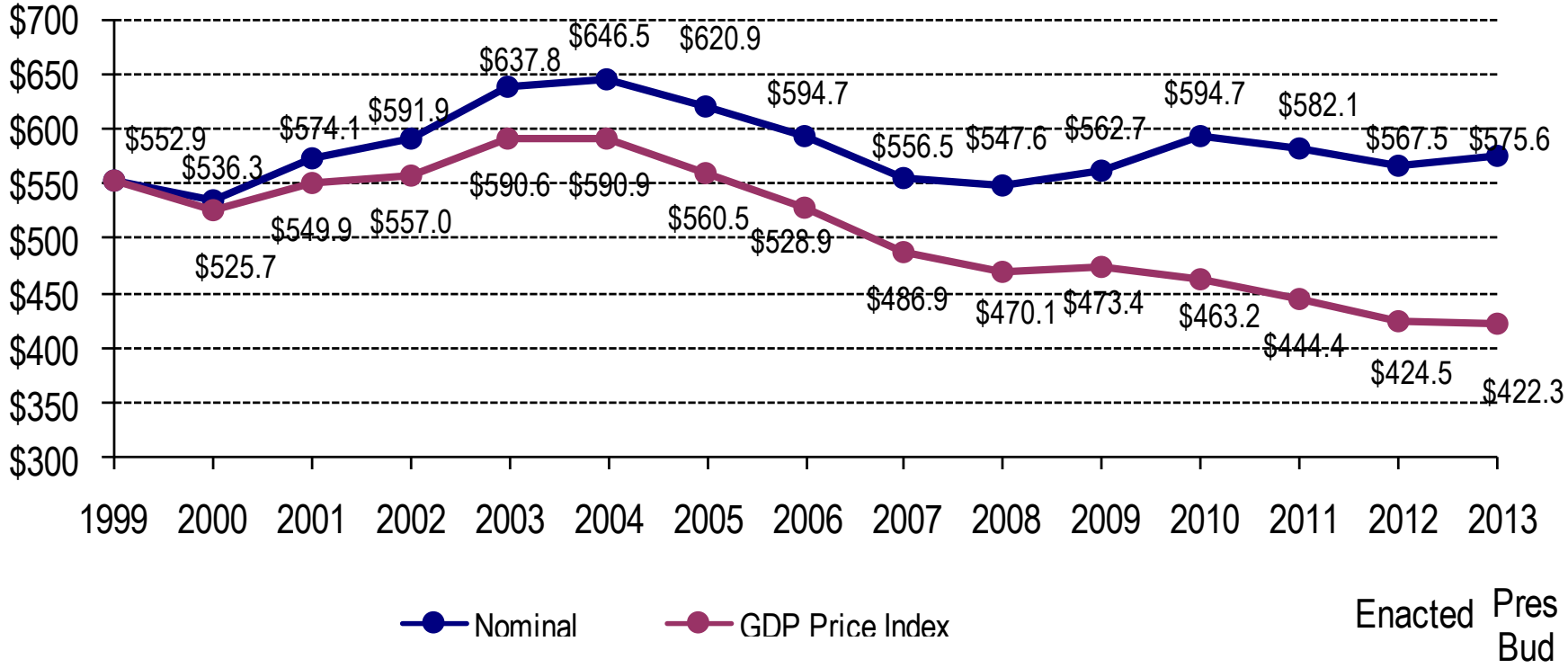
ORD by Appropriation

*Note 2: Includes Superfund ($23.2M)
Note 3: Includes LUST ($0.5M) and Oils Spills ($0.6M)

Resource Trends

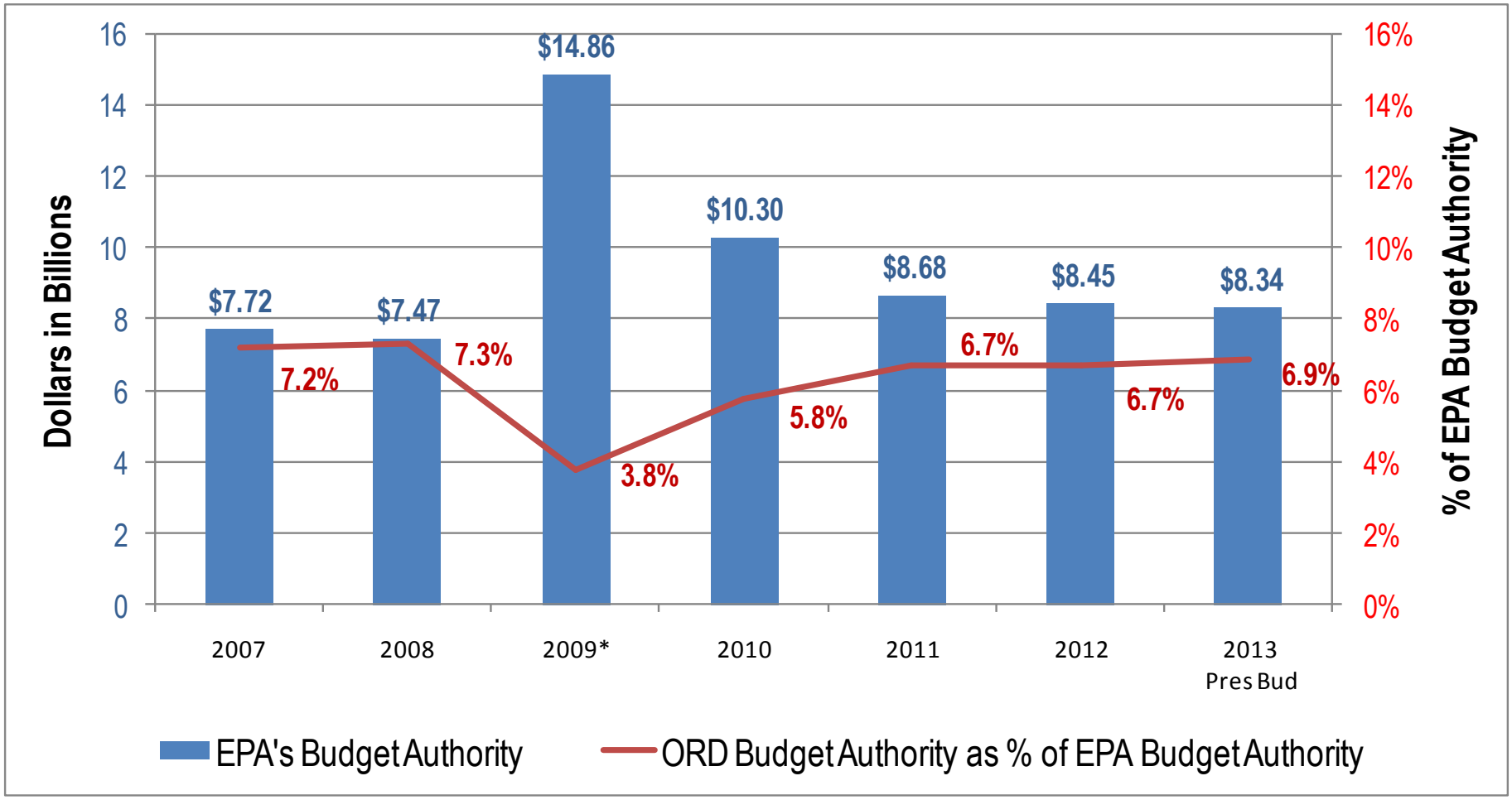
ORD Total Budget with Inflation Indices

(enacted budget, dollars in millions)



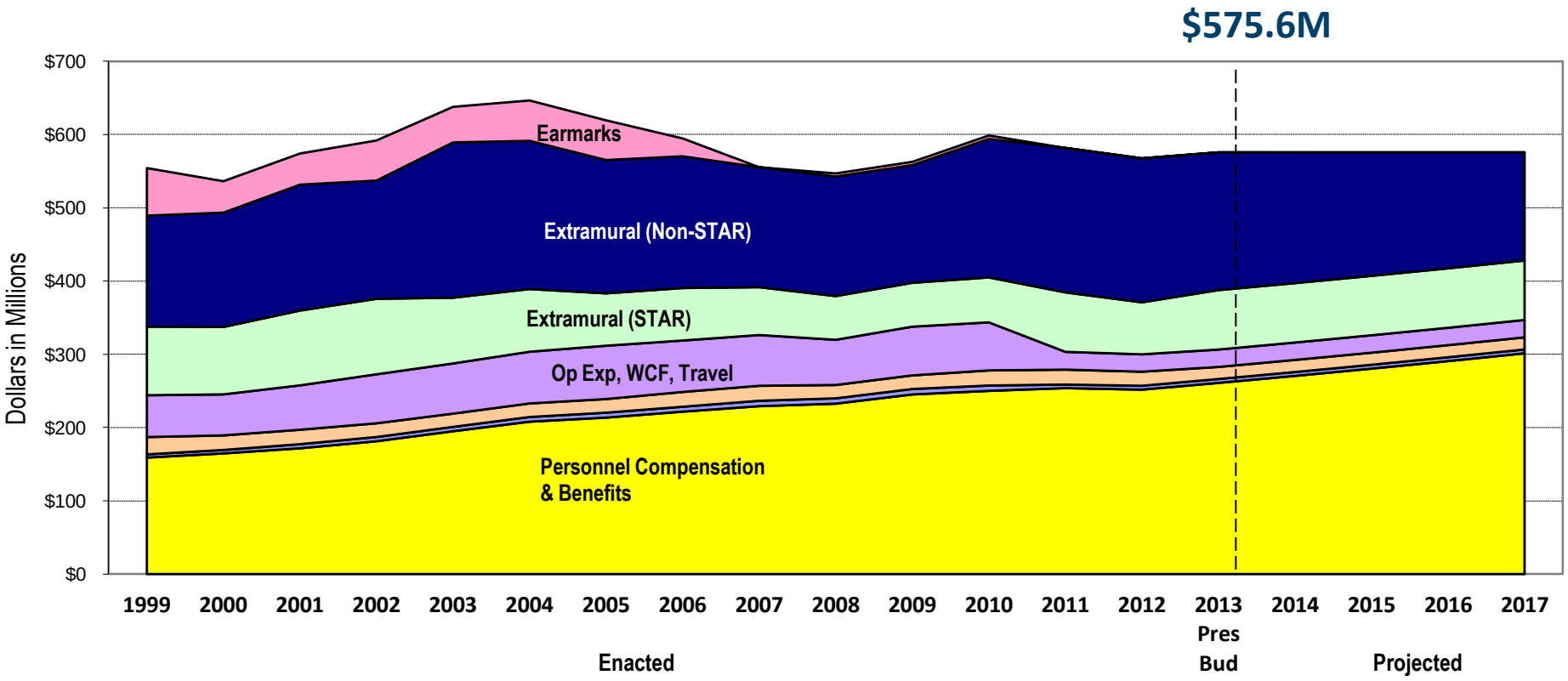
Budget Trends:

EPA and ORD's Relative Position



Resource Trends

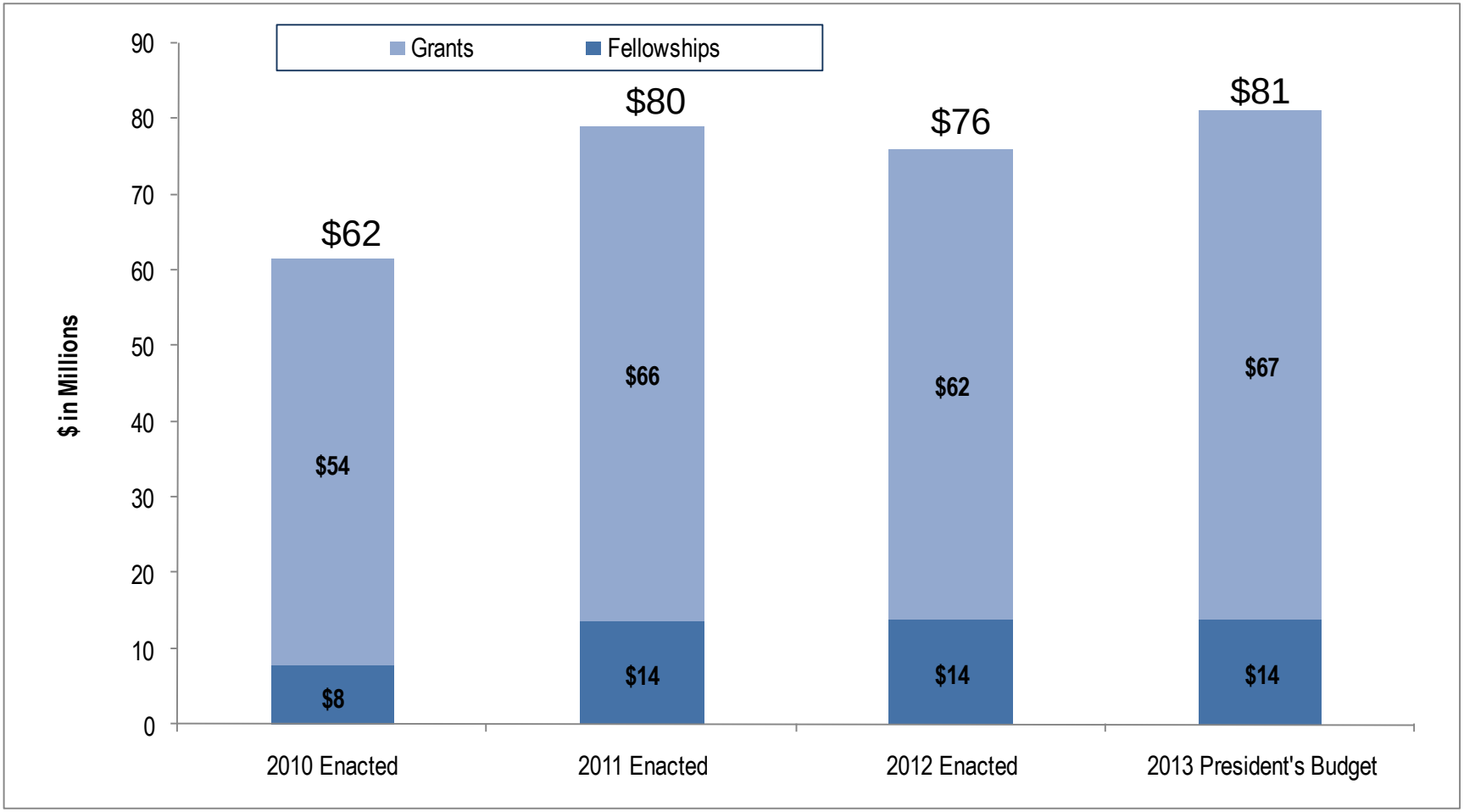
ORD Budget by Type of Spending



Science to Achieve Results (STAR)

Grants and Fellowships Funding

(Dollars in Millions)



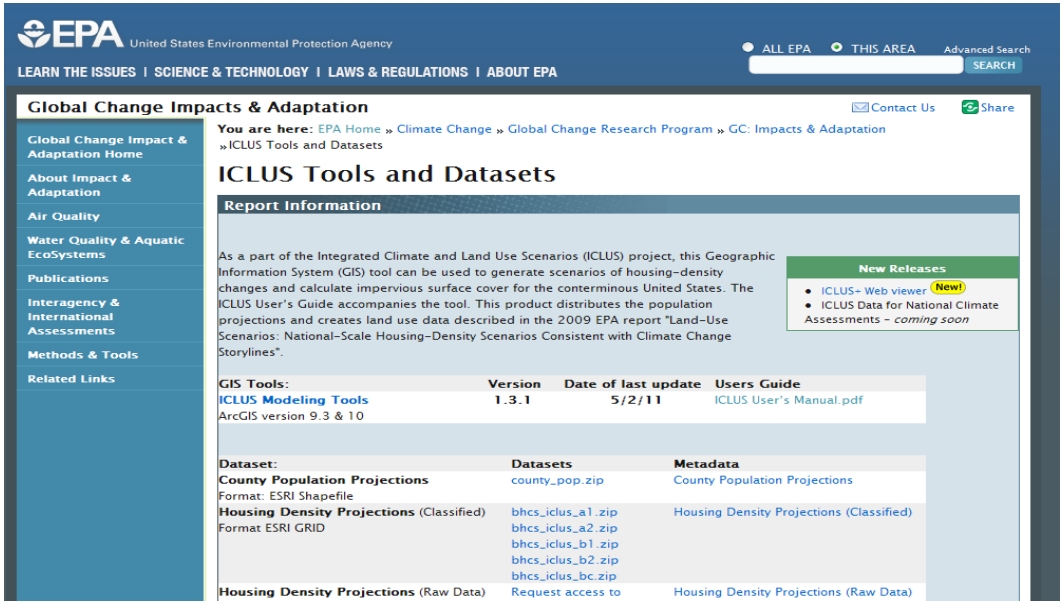
ORD Budget by Program/Project

Program/Project	FY 2011 Enacted		FY 2012 Enacted		FY 2013 Pres Bud		Change from 2012 to 2013	
	$M	FTE	$M	FTE	$M	FTE	$M	FTE
Air, Climate & Energy Research	$106.3	311.2	$98.8	306.6	$105.9	308.4	$7.0	1.8
Safe & Sustainable Water Resources Research	$117.3	435.7	$113.5	436.3	$121.2	443.5	$7.7	7.2
Sustainable & Healthy Communities Research	$195.1	633.4	$188.9	612.7	$184.1	620.9	-$4.8	8.2
Chemical Safety for Sustainability Research	$89.2	284.1	$91.7	291.2	$94.2	293.5	$2.5	2.3
Human Health Risk Assessment	$47.1	196.6	$42.9	193.4	$43.8	195.9	$0.9	2.5
Homeland Security Research	$26.7	64.3	$26.6	64.1	$26.4	64.7	-$0.2	0.6
National Priorities	$0.0	0.0	$5.0	0.0	$0.0	0.0	-$5.0	0.0
Total[1]	$581.7	1925.3	$567.5	1904.3	$575.6	1926.9	$8.1	22.6

1. Totals may not add exactly due to rounding

Highlights of ACE Recent Accomplishments

- Exposure to low concentrations of ozone
- Testing emissions for clean cookstoves
- New version of air quality modeling system
- Study of air pollution and the retina
- New GIS-based web tool available online - Integrated Climate and Land Use Scenarios (ICLUS)



Highlights of ACE FY2013 Research and Expected Future Accomplishments

Reporting on health effects of near road traffic exposures to susceptible populations and the effectiveness of potential solutions	Research supports planning decisions (e.g., school siting, roadway design) that reduce traffic exposures affecting susceptible populations (e.g., children with asthma).
Report on the vulnerability of near-coastal species and habitats to individual and multiple climate-altering pollutants in specific regions of the U.S.	New data help local and regional authorities to prepare for impacts of climate change.
Developing and using models to characterize environmental impacts of energy choices	Scientific tools are available to analyze sustainability of future energy scenarios and potential impacts on air and water quality and climate change.

Highlights of ACE FY2013 Research and Expected Future Accomplishments

Assessing cardiopulmonary health effects caused by air pollution mixtures in comparison to single pollutants	New scientific approaches with more realistic air pollution exposures are used for assessing health effects.
Demonstrating innovative sensor technologies and satellite data for air quality monitoring	New methods for characterizing air quality provide enhanced estimates at lower cost.
Measuring methane and VOC emissions from oil and gas production	Advanced source assessment technologies produce improved emission inventories from oil and gas production.

ACE FY 2013 Research – Major Changes

United States Environmental Protection Agency

FY 2013 Pres Bud $105.9M, Change +$7.1M

(+$3.8M) research on **Hydraulic Fracturing** will address potential public and environmental health impacts and how hydraulic fracturing practices may be effectively managed to prevent adverse impacts to people and ecosystems.

(+$3.3M) This increase will support research to understand the **impacts of climate change** on human health and vulnerable ecosystems.

(+$1.8M) This effort expands our understanding of the potential impacts to human health and ecosystems related to the increased production and use of second-generation **biofuels**, which are required by the Energy Independence and Security Act (EISA).

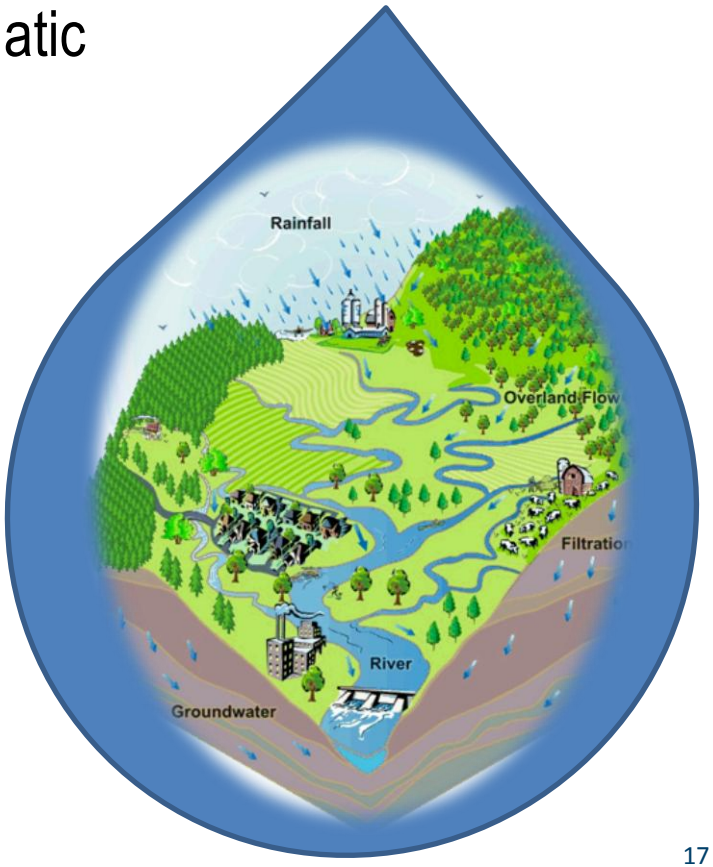
(+$1.5M) Increase for **Air Monitoring Research** to support the development of efficient, high-performing, and cost-effective monitors for ambient air pollutants

(-$1.0M) Elimination of the **Mercury Research Program**. Mercury emissions will be studied as one of several co-emitted pollutants.

(-$1.9M) Reduction of **exposure assessment tools** and particulate matter decision support tools and efforts to assess residential exposure to air pollution.

Highlights of SSWR Recent Accomplishments

- Research on green infrastructure
- Advanced the science on healthy watershed integrated assessments
- Effects of mountaintop mining on aquatic ecosystems
- Partnership with Army on “Net Zero”
- Integrated public health evaluation of pathogens



Highlights of SSWR FY2013 Research and Expected Future Accomplishments

Implementing Hydraulic Fracturing Study Plan	Potential impacts of hydraulic fracturing on drinking water resources are understood.
Developing guidance on innovative solutions for combined sewer overflows	Natural and green infrastructure are reliably incorporated into consent decree solutions to provide reduced cost solutions to CSOs.
Completing analytical tools for assessing, repairing, replacing and rehabilitating water infrastructure	Innovative, sustainable solutions for maintaining current water infrastructure are identified, and the next generation of optimized, sustainable water infrastructure is developed.

SSWR FY2013 Research and Expected Future Accomplishments (cont'd)

Developing comprehensive nutrients management strategy	A comprehensive approach to nutrient management is developed and demonstrably reduces excessive nutrient impacts to aquatic resources.
Developing methods, assessments and technologies to address *groups* of drinking water contaminants	Development of new approaches for evaluating and managing groups of chemicals and pathogens leads to better protection of public health.
Supporting a Southern New England Program for Innovative Estuarine Approaches to develop solutions to protect estuarine ecosystems	Research will inform policies, environmental management, and business approaches to ensure the sustainability of coastal watersheds and estuaries.

SSWR FY2013 Research – Major Changes

FY 2013 Pres Bud $121.2M, Change +$7.7M

(+$4.3M) Increase to support additional research on hydraulic fracturing, including the potential impacts of HF on air quality, water quality, and ecosystems.

(+$2.0M) Refocusing of resources to support a Southern New England Program to develop innovative scientific and technical solutions to protect estuarine ecosystems..

(+$1.8M) Development of regional projects and research to monitor and understand the benefits of existing integrated natural, green, and grey infrastructure.

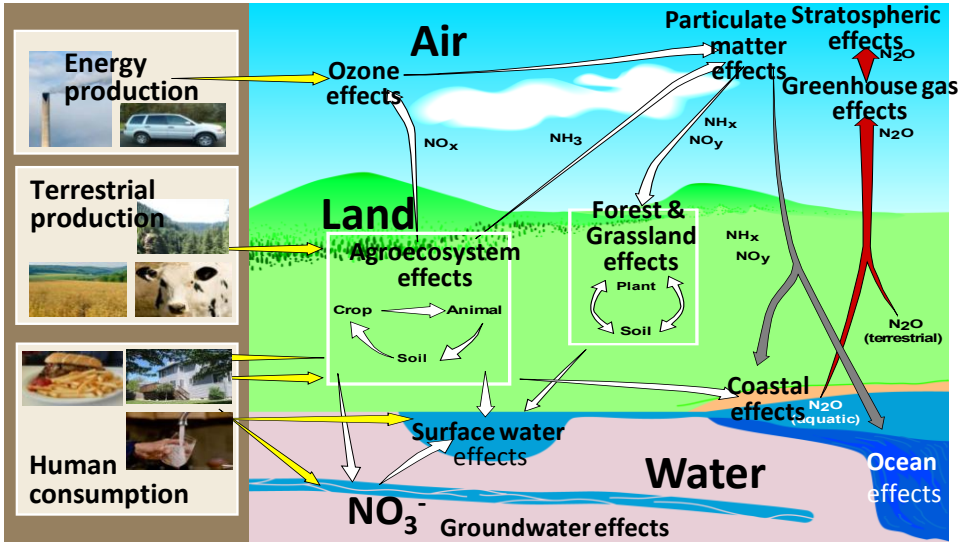
(-$1.1M) Elimination of research to model and track human exposure to pathogens at beaches.

(-$2.3M) Reduction of funding to drinking water technology research and technical support activities in both drinking water and water quality.

(+3.0 M) Net increase associated with payroll changes, administrative savings, and infrastructure realignments.

Highlights of SHC Recent Accomplishments

- Cleaning up contaminated sites
- Launching Community Focused Exposure and Risk Screening Tool (C-FERST)
- Identifying the association of prenatal exposure to organophosphate pesticides with IQ deficits
- Advancing knowledge needed for strategic management of the nitrogen cascade



The Nitrogen Cascade (Compton, et al 2011)

Highlights of SHC FY2013 Research and Expected Future Accomplishments

Producing a National Atlas of Sustainability	A web tool is available to broad variety of users for characterizing ecosystem services and sustainability measures for the U.S.
Researching materials management and sustainable technologies	Evaluation of processes and technologies enables industries to reduce the volume of contaminants, conserve resources, and minimize risks.
Identifying potential biomarkers of exposure and developing indicators of children's health	Research results inform decisions to promote children's health in home and school settings.

Highlights of SHC FY2013 Research and Expected Future Accomplishments

Investigating how social and economic factors can exacerbate the health impacts of environmental chemical exposures	Information and tools will help communities evaluate their specific problems, identify inequities and their causes, and evaluate potential solutions.
Developing Total Resource Impacts and Outcomes (TRIO) decision analysis tool	Model will be used for analyzing the likelihood of planning and policy decisions to achieve sustainable outcomes, including community health, environmental equity and ecosystem services.
Developing new methods to test soil bioavailability of metals and in-situ treatments	New in-situ soil treatments will be used to reduce metal availability and potentially reduce clean-up costs.
Researching design and operation of bioreactor landfills	New approach will be used for recovering energy from municipal solid waste; potential for more than $1billion/yr energy equivalent.

SHC FY 2013 Research – Major Changes

(FY 2013 Pres Bud $184.1M, Change: -$4.8M)

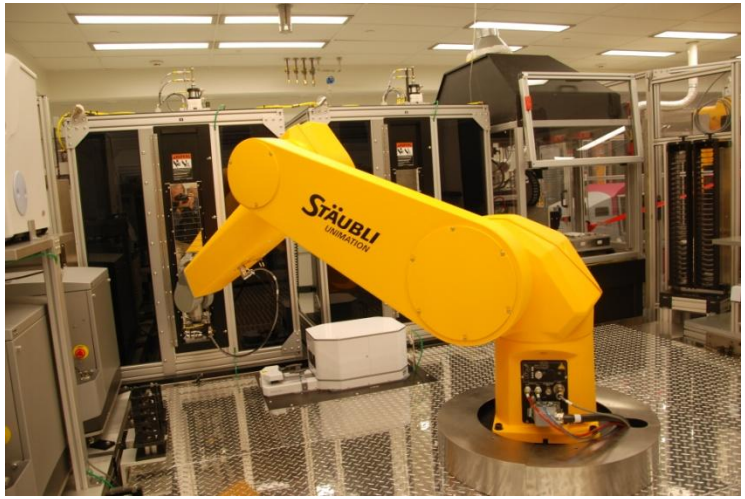
(-$2.0M) Laboratory Study

(-$1.0M) This reflects a reduction in level funding to study the effects of cleaning materials and school settings on children's health. Work to assess the impact of decisions on school siting, and building materials on children's health will continue.

(-$1.7M) Administrative savings from continued efforts to streamline operational expenses and activities.

Highlights of CSS Recent Accomplishments

- Developed new, more efficient testing methods to screen and prioritize chemicals
- Strategy to advance exposure science
- Research on the ecological effects and fate & transport of nanomaterials
- Improved Agency risk assessment tools
- Released two RFAs for STAR awards
  - Centers for Material Life Cycle Safety
  - Centers for Sustainable Molecular Design



Highlights of CSS FY2013 Research and Expected Future Accomplishments

Using rapid, automated chemical testing (high-throughput assays), the Tox21 program is screening 10,000 chemicals for potential toxicity	Faster, better assays for assessing chemical toxicity in humans and wildlife (e.g., chemical screening and prioritization).
Developing web-based interactive tools for presenting chemical safety information including exposure data, hazard data and predictive models	Tools will used by EPA's Office of Water and Office of Chemical Safety and Pollution Prevention to assess toxicity information and make decisions about drinking water contaminants, endocrine disruptors (EDCs), and other chemicals.
Using Tox 21 results to prioritize chemicals for EPA's Endocrine Disruption Screening Program's Tier 1 screening and for developmental toxicity testing	Tox21 assays have the potential to replace the EDSP Tier 1 screening battery, eliminating the use of whole animal toxicity tests. Also, appropriate Tox21 assay results will be incorporated into computer models to analyze effects of contaminants on the human liver and embryo.

Highlights of CSS FY2013 Research and Expected Future Accomplishments (cont'd)

Publicly releasing high quality chemical structure files from EPA's 21st century toxicity testing programs	Chemical manufacturers and others will understand what properties of chemicals can influence exposure and toxicity. Ultimately, safer and more sustainable chemicals can be designed.
Investigating which properties of nanomaterials influence the fate, exposure and effects of nanomaterials	EPA will develop alternative test methods, guidelines, and endpoints that predict toxicity of nanomaterials with high confidence.
Improving methods for estimating dietary and residential exposures to pesticides (e.g, pyrethroids), and linking these exposures to virtual tissue models to determine potential toxicities	EPA will develop and maintain a state of the art panel of biomarkers of effects for use by risk assessors and researchers.
New STAR Center and grants to develop criteria for designing safer, more sustainable chemicals, and investigate important toxicity pathways	Tools and guidance will facilitate the development of a new generation of less hazardous chemicals.

CSS FY 2013 Research – Major Changes

(FY 2013 Pres Bud $94.2M, Change: +$2.5M)

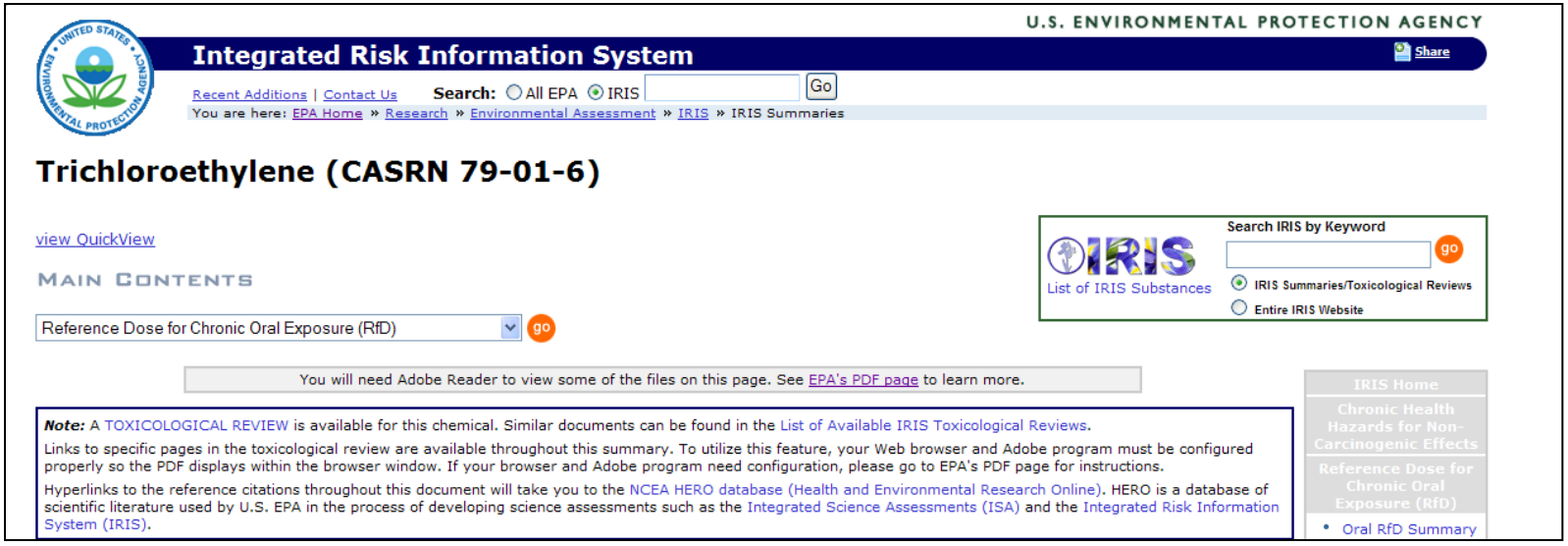
(+$4.1M) Innovative chemical design research to link chemicals' inherent properties with their adverse impacts and provide new sustainable principles for alternative chemical designs.

(-$0.7M) Delays research on risk assessment associated with EDCs, commodity chemicals, nanomaterials, and other chemical concerns.

(-$0.6M) Delays research on nanomaterial properties and life cycle assessment research that inform decisions on pesticides, TSCA chemicals, and fuel additives.

Highlights of HHRA Recent Accomplishments

- Develop and complete IRIS chemical assessments
- Complete Integrated Science Assessments (ISAs) to support National Ambient Air Quality Standards
- Develop Community Risk and Technical Support
- Modernize risk assessment methods, models and approaches



Highlights of HHRA FY2013 Research and Expected Future Accomplishments

Submitting new assessments to SAB standing committee for peer review, and finalizing assessments for PCBs and Libby Amphibole Asbestos	Multiyear effort to comply with NAS recommendations is completed, further streamlining and increasing transparency of IRIS assessments.
Completing assessments of six individual phthalates and approaches for cumulative assessment	Cumulative assessments are developed for groups of chemicals that affect adverse common adverse outcomes.
Completing a Multipollutant Assessment Plan for criteria pollutants, after review by the Clean Air Scientific Advisory Committee	Multipollutant assessments for criteria air pollutants address the significant challenges of air pollution-induced impacts on health and welfare.

Highlights of HHRA FY2013 Research and Expected Future Accomplishments

Continuing ISA development for NOx and SOx, and providing technical support during NAAQS reviews for ozone and lead

Integrated Science Assessments evaluate, integrate, and synthesize evidence for use by policy decision makers and are timely in supporting the 5-year NAAQS review cycle.

Using computational and systems biology data displayed in graphical ways that enhance risk assessment, as recommended by the NAS

Risk assessments improved with the inclusion of new types of data that better characterize weight of evidence and increase understanding human susceptibility and variability.

HHRA FY2013 Research – Major Changes

FY 2013 Pres Bud $43.8M, Change: +$0.9M

(+$0.3M) Redirection to IRIS assessment support will enhance the Agency's effort to continually improve the IRIS program.

(-$0.8M) Reduction will shift resources to SAB for standing committees' review of IRIS assessments.

(-$0.4M) Reduction to the modernization of methods and models will reduce the incorporation of scientific advances in the development of IRIS assessments, Provisional Peer Reviewed Toxicity Values (PPRTVs) and Integrated Science Assessments (ISAs).

(-$0.3M) Reduction to the ISAs will impact multipollutant assessment of air pollutants as well as secondary review of NAAQS for Nitrous Oxides and Sulfur Oxides.

(+2.1 M) Net increase associated with payroll changes, administrative savings, and infrastructure realignments.

Highlights of HSRP Recent Accomplishments

- HSRP supported EPA Office of Water's Water Security Initiative
- HSRP partnered with DHS, CDC, and DOE on Bio Response Operational and Testing and Evaluation (BOTE)
- HSRP developed *Selected Analytical Methods*
- HSRP researchers developed health-based Provisional Advisory Levels

Highlights of HSRP FY2013 Research and Expected Future Accomplishments

Conducting studies on exposure and low-dose response for B. anthracis	New science facilitates risk-based decisions on cleaning up anthrax contaminated buildings, outdoor areas, and water infrastructure.
Testing and refinement of decontamination techniques for wide-area urban environments contaminated with chemical, biological, or radiological agents	EPA distributes Decon Selection Tool, a user friendly decision support tool that enables more effective, rapid, and cheaper wide-area remediation efforts.
Evaluating methods to inactivate bio-threat agents in drinking water	Comprehensive information from EPA supports water utility decisions on the treatment of water contaminated with biological agents or biotoxins.

HSRP FY2013 Research – Major Changes

FY 2013 Pres Bud $26.4M, Change: -$0.2M

(+$0.2M) Water security research to develop and test approaches to decontaminate water infrastructure and treat CBR contaminated water.

(-$0.3M) Reduction in decontamination research.

Coordinating across ORD Research Programs

Areas of emphasis for FY2012-13

Key Areas of Program Integration	ACE	CSS	SHC	SSWR	HHRA	HS
Children's Health			■			
Climate Change	■					
Emergency Response						■
Energy	■					
Environmental Justice			■			
Nitrogen				■		

■ Lead Program

Contributing Program

EPA Research Cooperation with Other Federal Agencies

- **Dept of Defense:** ORD is partnering with DoD to develop and test cutting-edge environmental technologies and transfer successes to US communities.
- **Climate Change Research:** ACE is partnering with NASA and the National Oceanic and Atmospheric Administration to develop models that simulate weather extremes and associated environmental impacts.
- **Air Monitoring:** ACE is working with NASA to examine how to use satellite data to improve air quality management activities.
- **New sources of oil and gas:** SSWR is collaborating with the Department of Energy and the Department of the Interior to improve our understanding of the impacts of developing unconventional oil and gas resources, and to ensure the prudent development of these resources.
- **Advanced toxicology:** CSS will work with partners in NIH and FDA through the "Tox21 Consortium," drawing on the collective expertise of governmental scientists to develop and use new toxicological methods.
- **Water security:** HS research projects on treatment and decontamination will be conducted in close collaboration with the Dept of Homeland Security, National Research Council, Water Sector Coordinating Council, and others.

Highlights on Innovation

- **Pathfinder Innovation Projects -- seed funding for ORD scientists**
  - External panels assess sustainability, innovation and scientific merit
  - 12 awards last year; second competition underway

- **Open Innovation – exploring the use of challenges and prizes**
  - Collaborations with HHS, DOD, and NASA
  - Posting challenges through Challenge.gov, Innocentive and TopCoder

- **Signature Projects -- that exemplify new ORD directions on sustainability**
  - Sensors & Apps - real-time monitoring technologies for air pollutants
  - Innovative Chemical Design - apply innovative chemistry principles to create alternative chemicals
  - Net Zero - achieve net zero energy and water consumption at Army bases

SAB Advice on EPA's Research Programs

- **SAB on 2012 Budget**
  - Endorsed of realignment into integrated programs
  - Concerned about cuts to homeland security, human health research ecosystems, climate change
  - Supported increase in STAR fellowship program and shifts of emphasis in CSS and SSWR
  - Underscored need for research in social, behavioral and decision sciences
- **SAB/BOSC on strategic directions**
  - Supported incorporating sustainability into research program frameworks
  - Provided specific recommendations for each program, these are reflected in each programs Strategic Research Action Plan
  - Emphasized importance of integrating human social, behavioral and decision sciences into ORD programs

United States Environmental Protection Agency

Conclusion

- EPA research is addressing the nation's most critical science and technology priorities to assure that policy and regulatory actions needed to protect public health and our natural environment are based on strong science.
- EPA research must evolve to effectively solve 21st century environmental challenges.
- EPA research has shifted towards an integrated, systems approach to develop innovative, sustainable solutions to these challenges.
- We look forward to continued collaboration with the SAB as we position our research program to anticipate and respond to increasingly complex environmental challenges.