



Science for a Sustainable Future

**U.S. EPA's Office of Research and
Development**

Robert Kavlock, Ph.D.
Deputy Assistant Administrator for Science
June 24, 2014



Overview

- **Organizational Context**
- **Solving 21st Century Environmental Challenges**
- **EPA National Research Programs**
- **Cross-cutting Research**

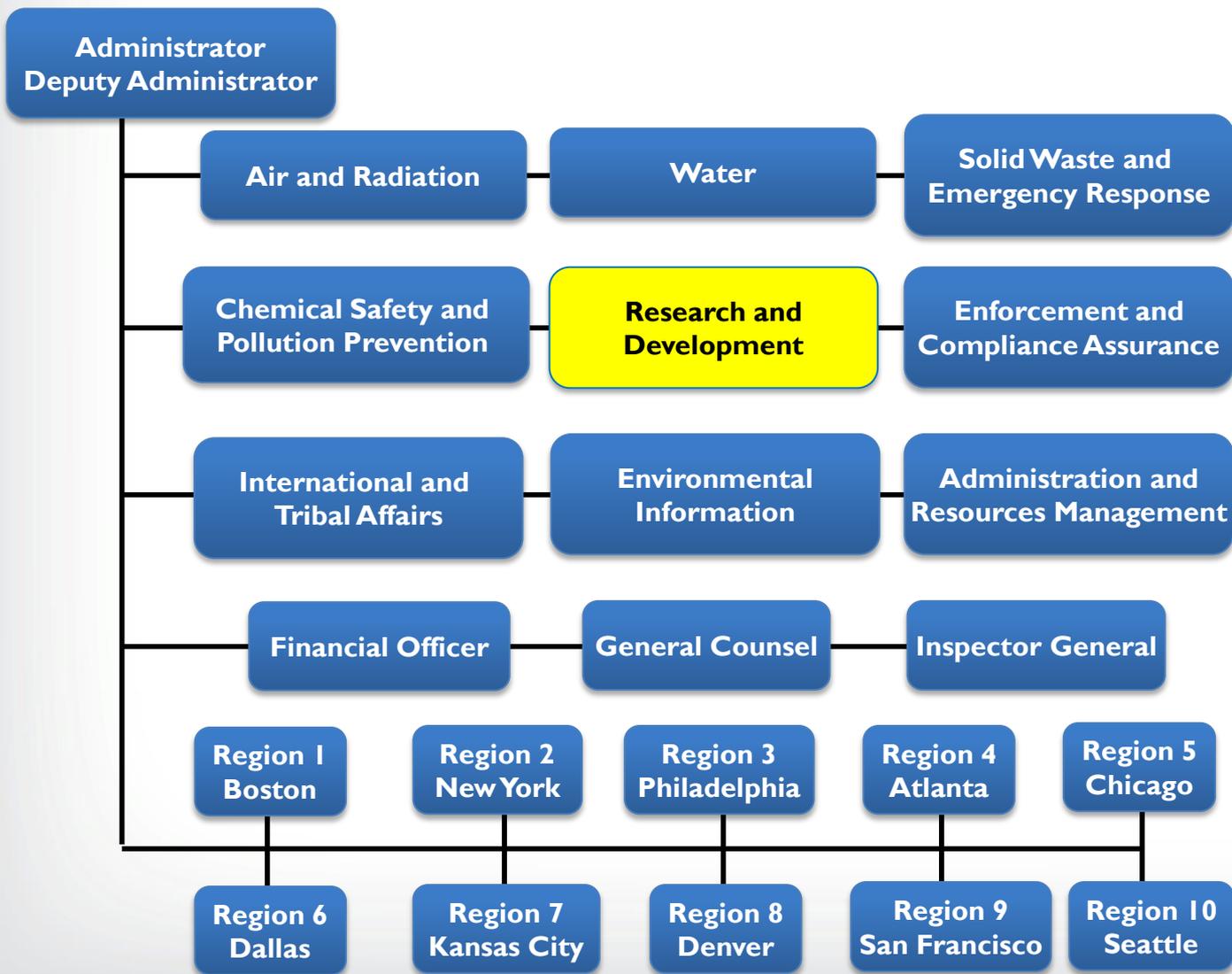
“Science continues to be the engine that drives America’s health, prosperity, and innovation – and pushes global progress.”

*Gina McCarthy - EPA Administrator
April 2014*





U.S. EPA Organizational Chart





Mission for Research & Development

Provide science and technology to support EPA's mission of protecting human health and the environment.

Gulf Oil Spill



Bristol Bay, Alaska





ORD Research Programs

Air, Climate & Energy



Sustainable & Healthy Communities



Homeland Security



Chemical Safety for Sustainability



Human Health Risk Assessment



Safe & Sustainable Water Resources





Aligning Research with EPA Strategic Goals

Cross-Agency Strategies

- Sustainable Future
- Visible Difference in Communities
- New Era of Partnerships
- High-Performing Organization

EPA Goals 2014-2018

Addressing Climate Change and Improving Air Quality

Protecting America's Waters

Cleaning Up Communities and Advancing Sustainable Development

Ensuring the Safety of Chemicals and Preventing Pollution

Research Programs

Air, Climate & Energy

Safe and Sustainable Water Resources

Sustainable and Healthy Communities

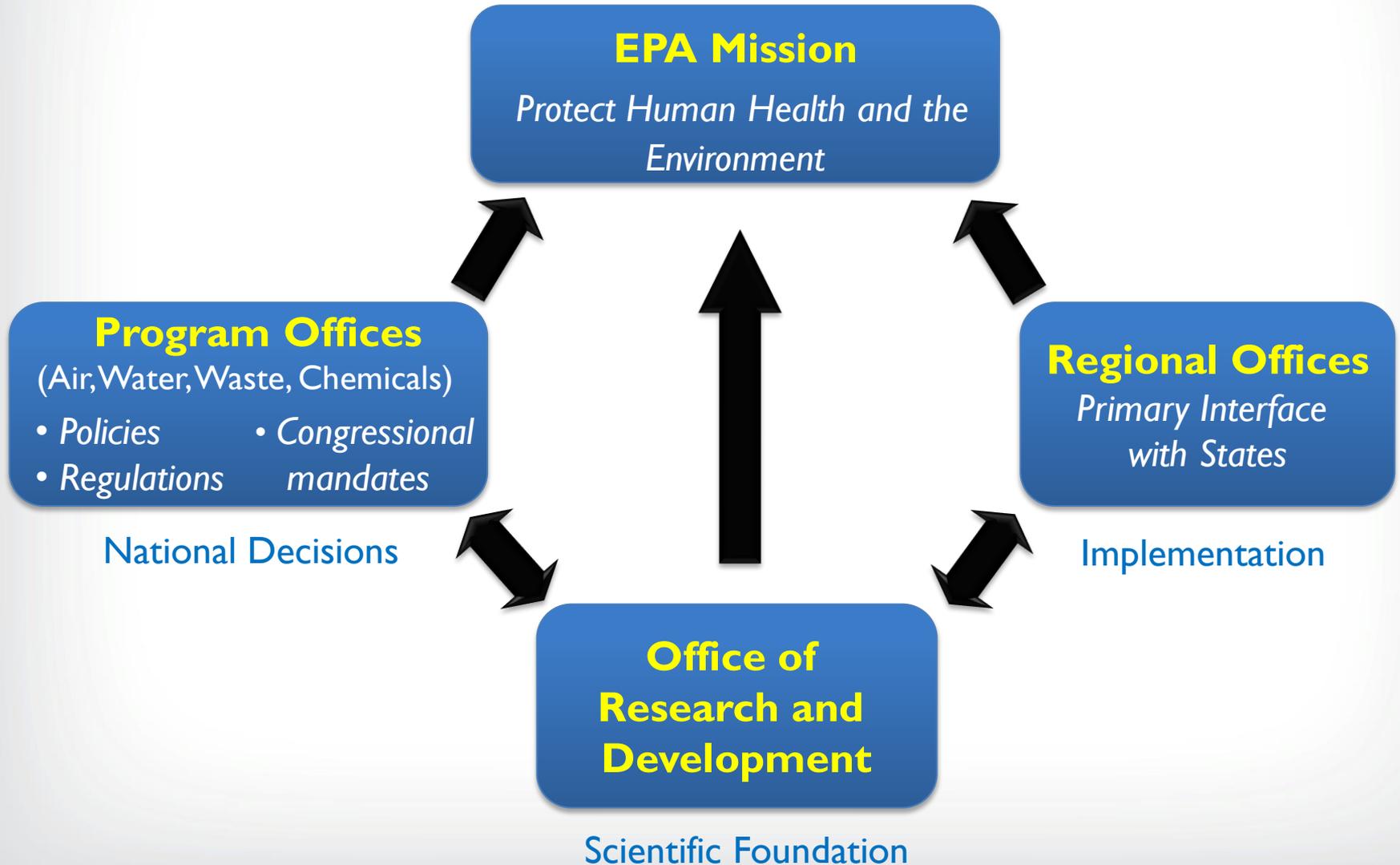
Chemical Safety for Sustainability

Human Health Risk Assessment

Homeland Security



Science to Support EPA's Mission





Research Planning to Research Results

Advisors and Stakeholders

EPA Programs and Regions

EPA Strategic Strategic Plan

Congressional Mandates

States, Tribes, Local governments Other stakeholders

External Science Advisors

Needs & Priorities

Strategic Research Action Plans

Research Priorities & Schedule

Feedback & Evaluation

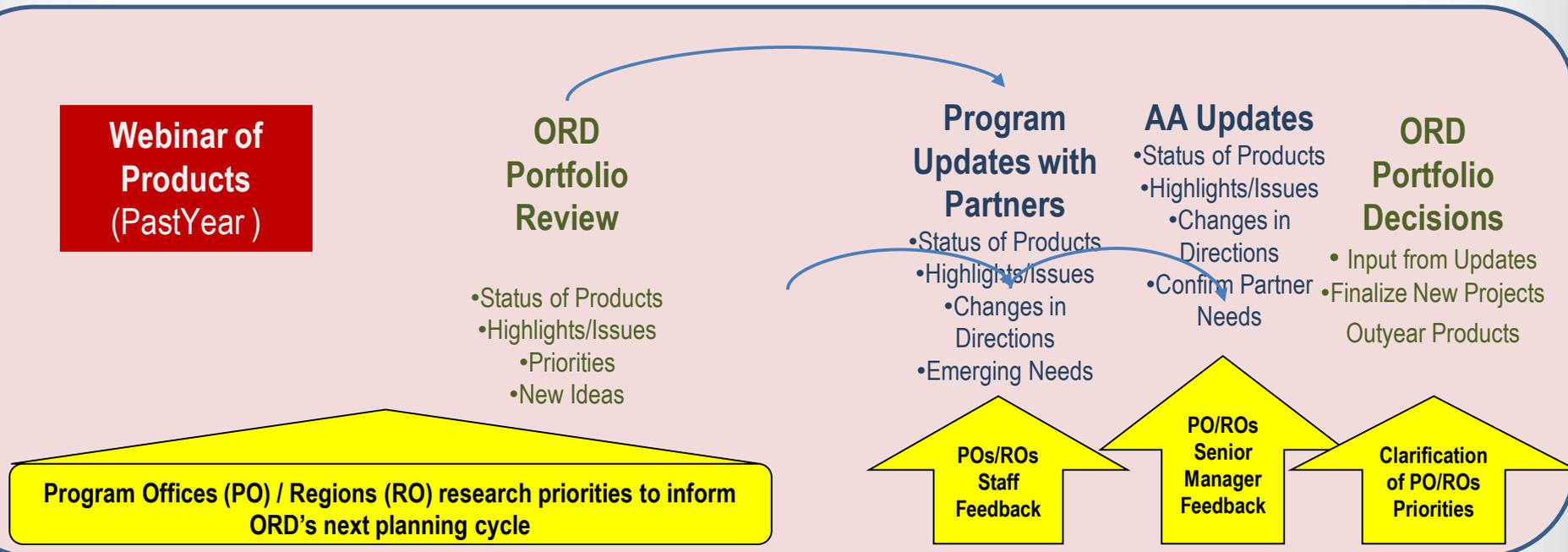
Deliver Products

Conduct Research and Develop Products

Feedback



Extensive Interaction with EPA Partners



← Regular Meetings/Updates, Targeted Discussions →
The developing role of Project Advocates



Partnerships with EPA Regions

- **Regional Applied Research Effort (RARE) program**
 - Near-term research to address high-priority regional applied science needs
- **Regional Methods Program (RM)**
 - High-priority, near-term methods development needs (e.g., protocols, toxicity evaluation, sampling methods)
- **Regional Research Partner Program (RRPP)**
 - Short-term training opportunities in ORD labs
- **Regional Sustainable Environmental Sciences (RESES)**
 - Integrated, sustainable solutions for communities

- <http://www.epa.gov/ordntrnt/ORD/priorities/docs/rare-factsheet.pdf>
- <http://www.epa.gov/ordntrnt/ORD/priorities/docs/rm-factsheet.pdf>
- <http://www.epa.gov/ordntrnt/ORD/priorities/docs/r2p2-factsheet.pdf>



ORD Organizational Chart

Immediate Office of the Assistant Administrator

Office of the
Science Advisor

Headquarters Offices
Policy and Administration

National Program Directors

- Air, Climate & Energy
- Chemical Safety for Sustainability
- Safe and Sustainable Water Resources
- Sustainable and Healthy Communities
- Human Health Risk Assessment
- Homeland Security

National Research Laboratories and Centers

Health and
Environmental
Effects Lab

Exposure
Research
Lab

Risk
Management
Lab

Environmental
Assessment
Center

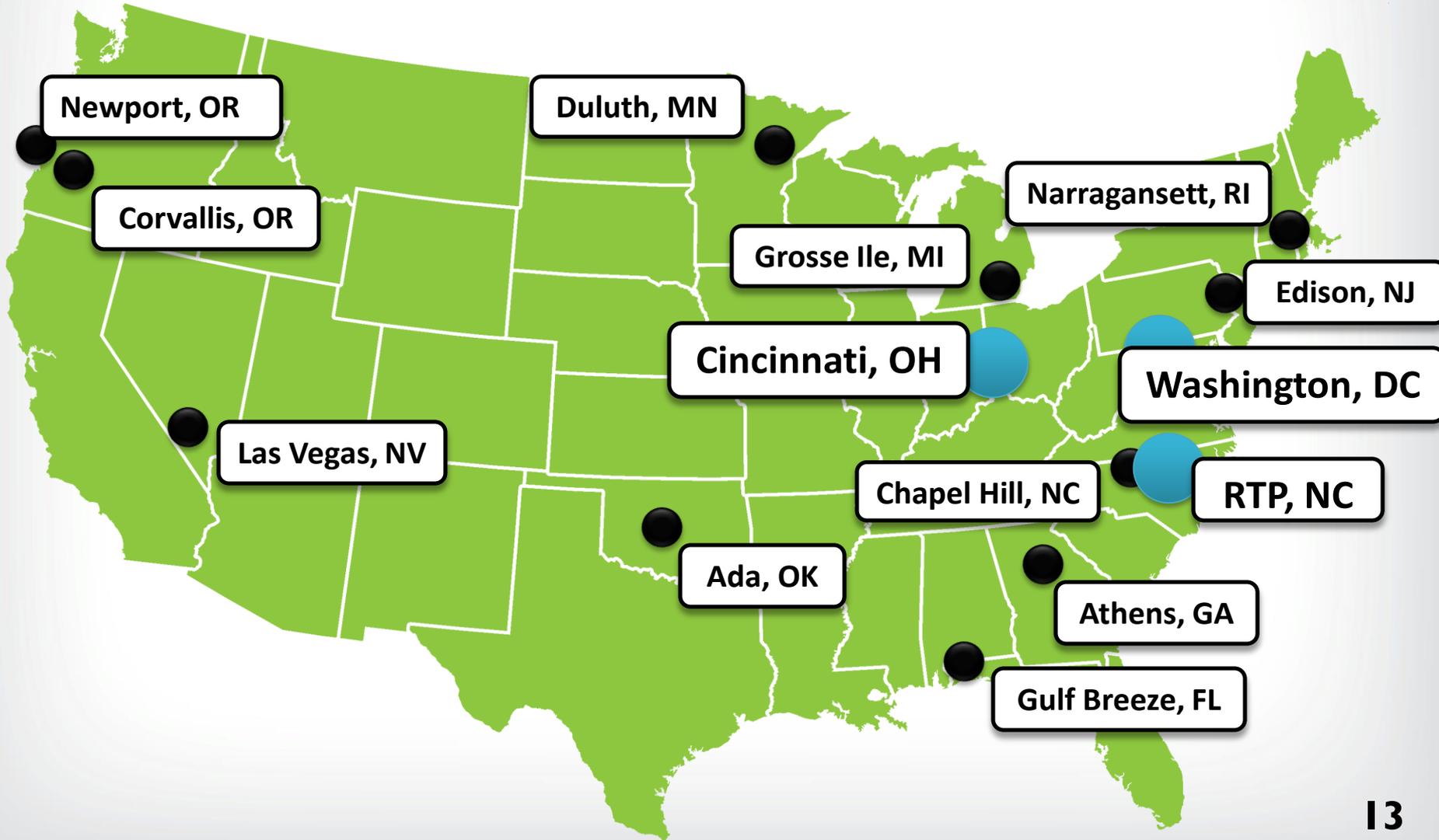
Computational
Toxicology
Center

Homeland
Security
Center

Environmental
Research
Center



ORD Research Facilities





EPA Research Grants to Universities

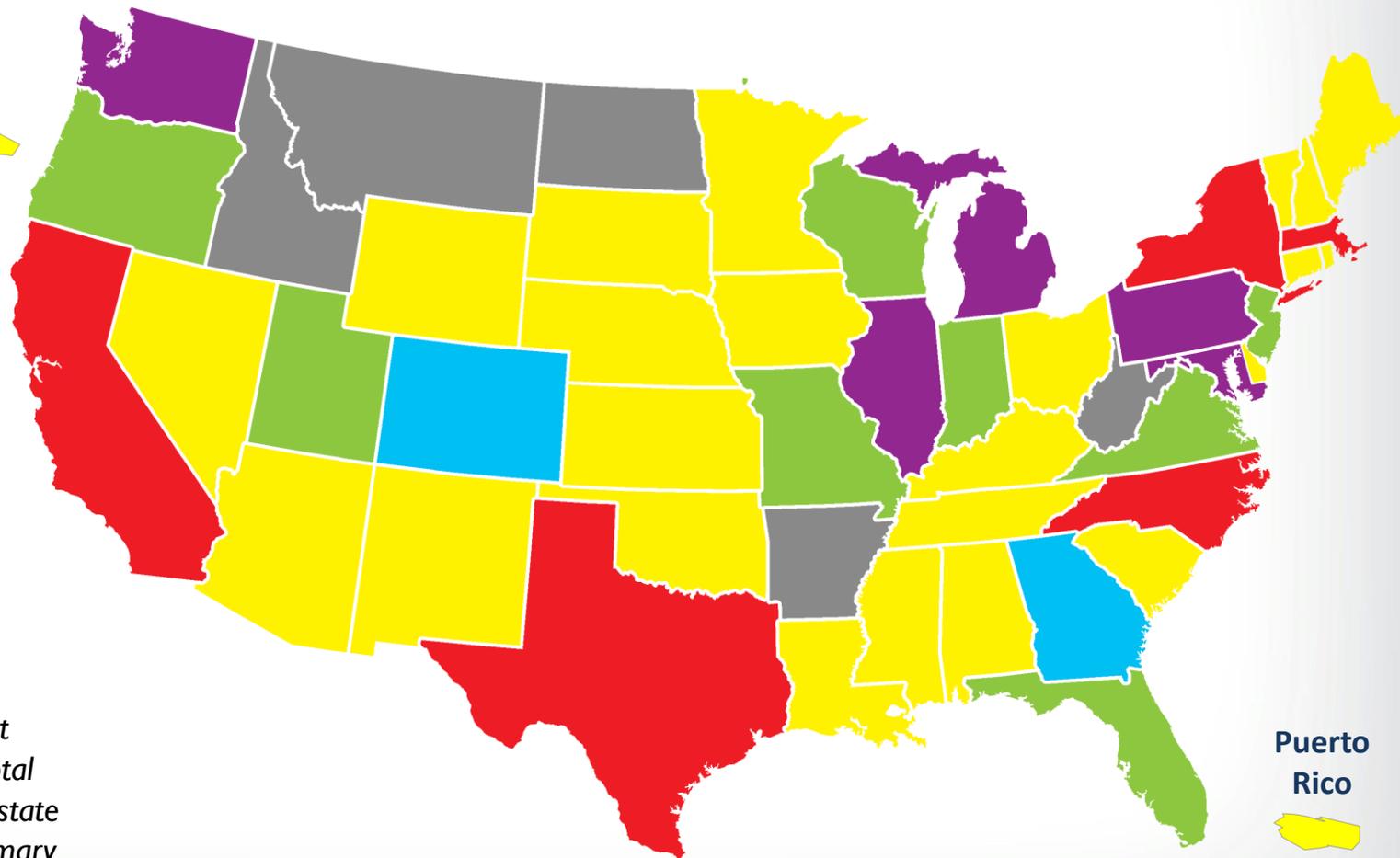
 *STAR Research Grants by State*



Alaska



Hawaii



- 1-5
- 6-10
- 11-15
- 16-20
- 20+

266 current grants in total (counts by state include primary and secondary Institutions)

\$52 million extramural research grants + \$9 million fellowships (FY 2014 Enacted Budget)

Puerto Rico





Planning and Budgeting

Feb 2014	April 2014	June 2014	August 2014	Oct 2014	Dec 2014
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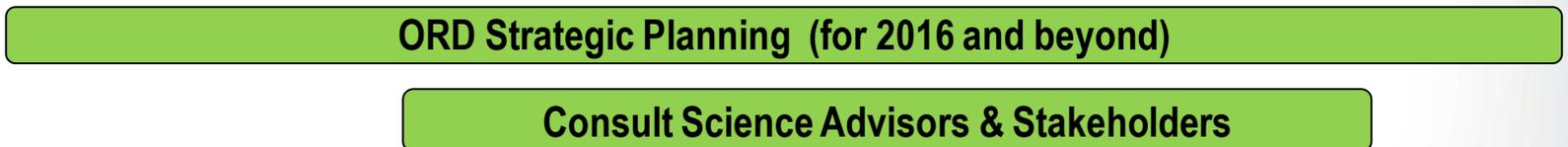
**FY 2015
Budget
Activities**



**FY 2016
Budget
Activities**



**Strategic
Planning
Activity**



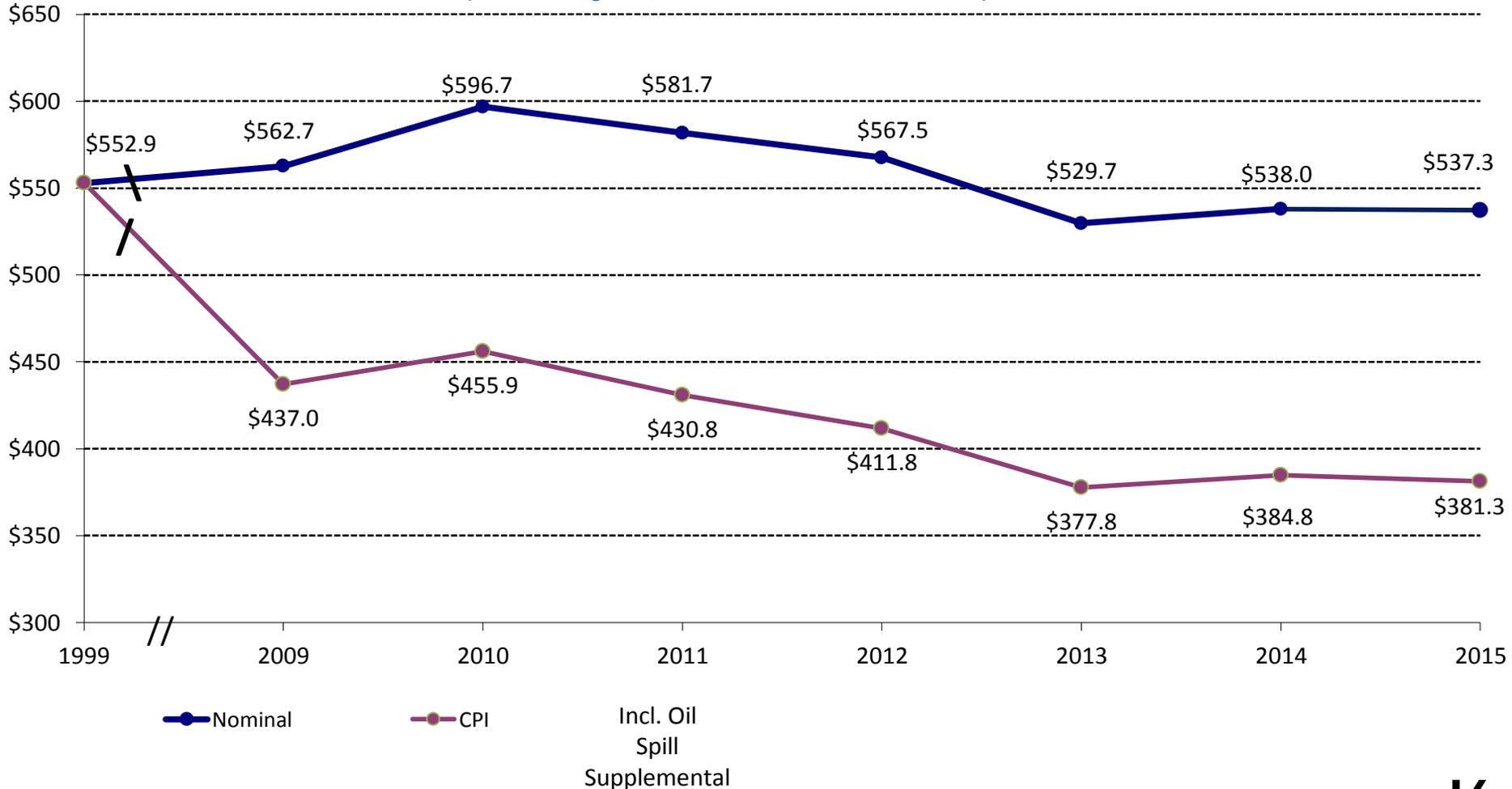
Note: Estimated timeframes



ORD Resource Trends

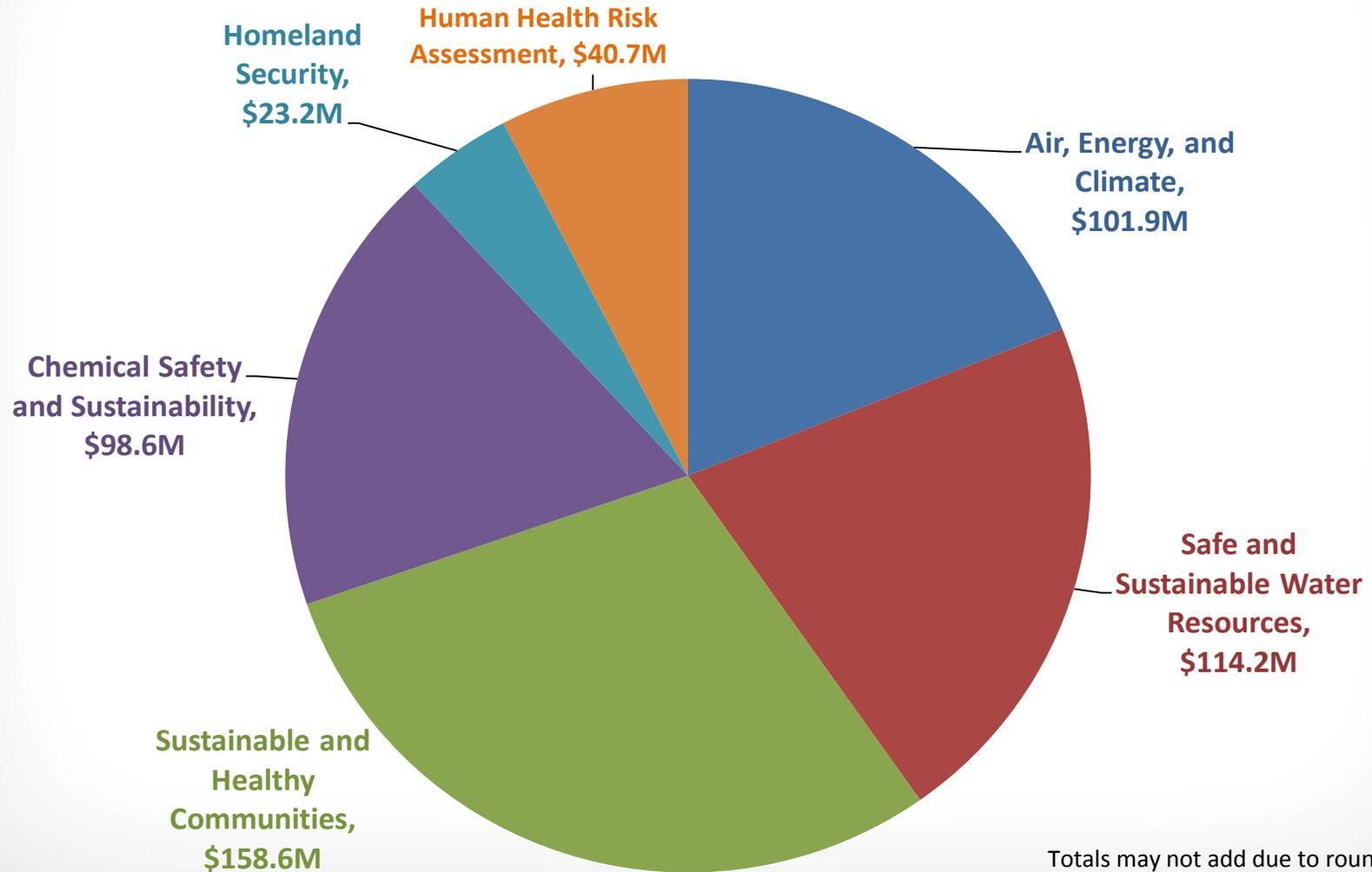
ORD Total Budget with Inflation Indices

(enacted budget, includes earmarks, dollars in millions)





ORD's FY 2015 Budget by Research Program Projects

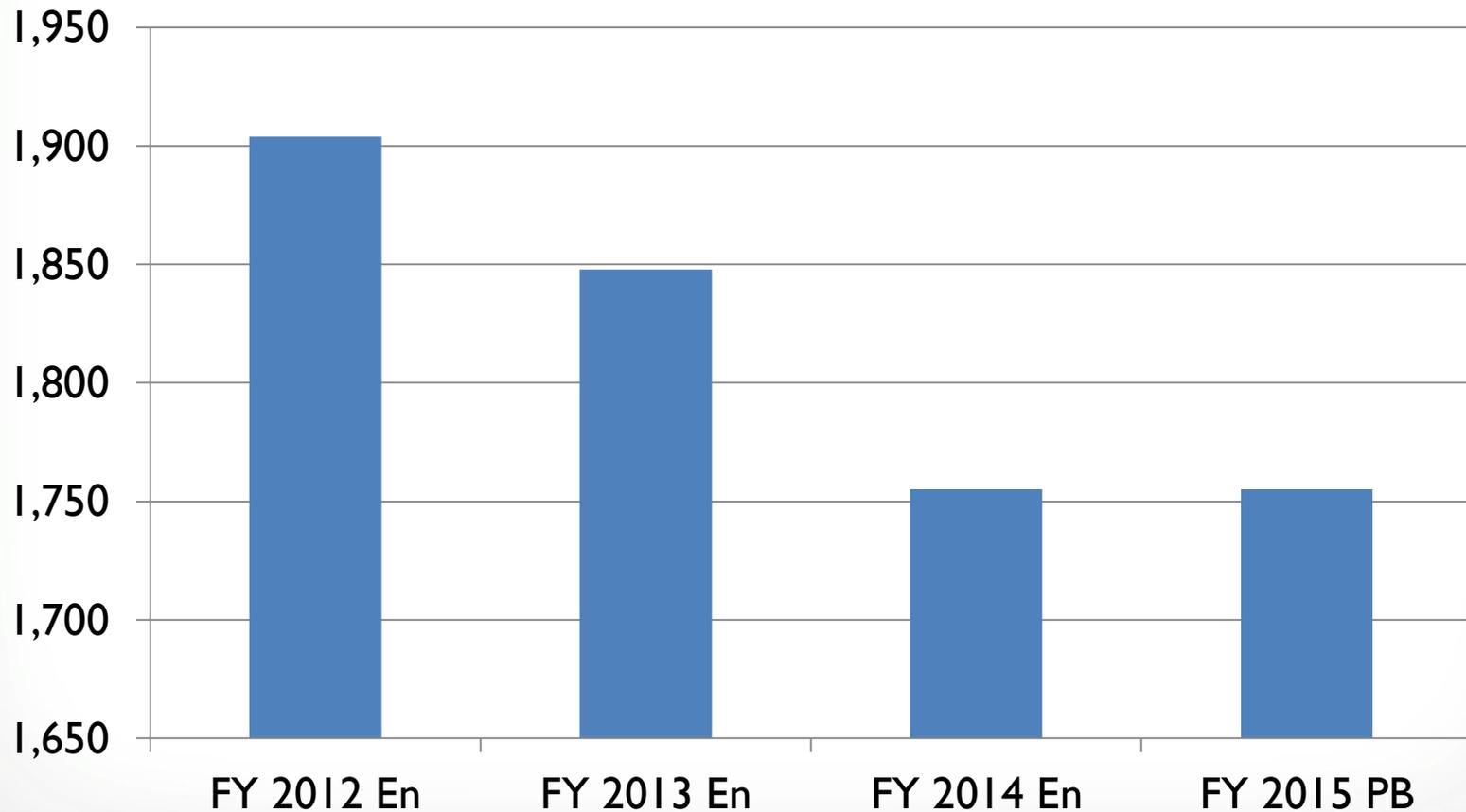


Totals may not add due to rounding



ORD's FTE Ceilings

Total FTE



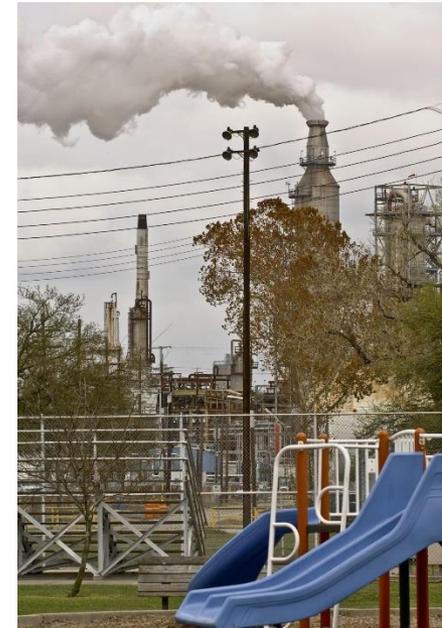


***Today's issues are broad in scope,
deep in complexity and widespread
in their impacts.***



21st Century Environmental Challenges

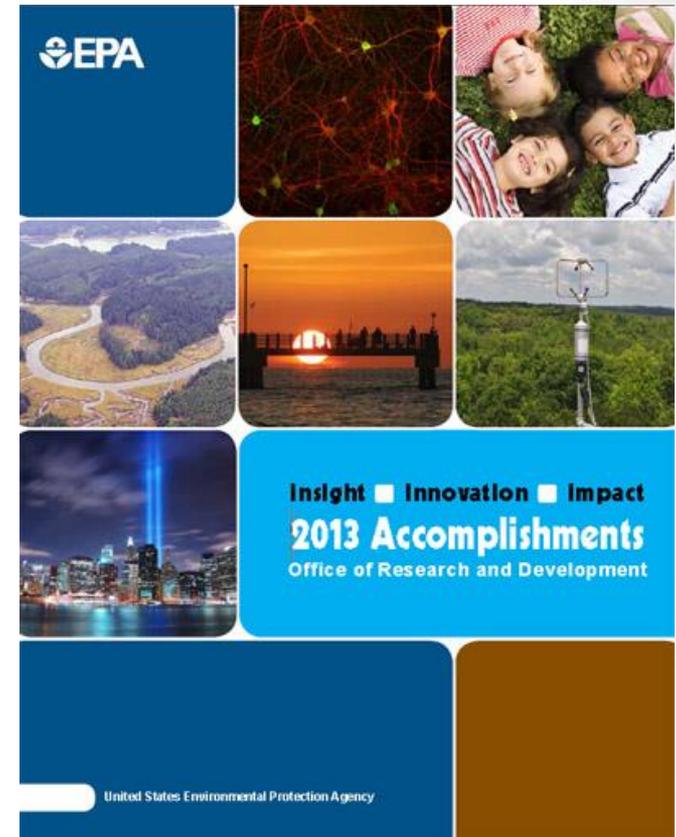
- **Climate change**
- **Changing energy landscape**
- **Multi-pollutant exposure**
- **Increasing nitrogen and phosphorous impair water quality**
- **Environmental justice**
- **Thousands of new industrial chemicals and pesticides each year**
- **Chemical, biological, radiological-based terrorism**





Research that prepares us for these Challenges

- **Innovative** – foster creativity and stimulate transformational change
- **Integrative** – work collaboratively across disciplines
 - Across ORD labs and centers
 - Engage EPA and outside stakeholders
- **Solution-oriented** – emphasis on developing sustainable solutions
- **Responsive** – provide relevant and timely results to inform environmental policy decisions
- **Translational** – end users receive the necessary information to utilize ORD products



- **Re-orienting our research to sustainability: healthy environments v. acceptable risk**
- **Moving away from stove-pipes**
- **Promote systems thinking and innovation**
- **Aligning with EPA strategic goals**

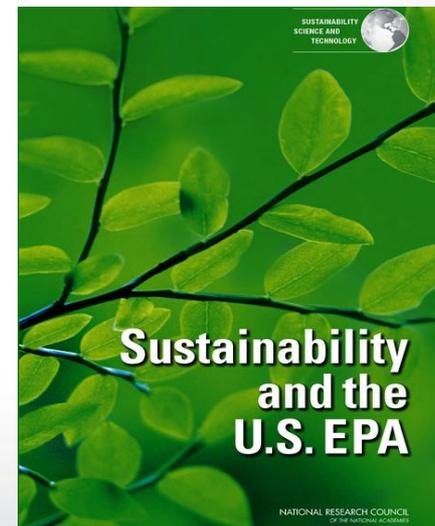
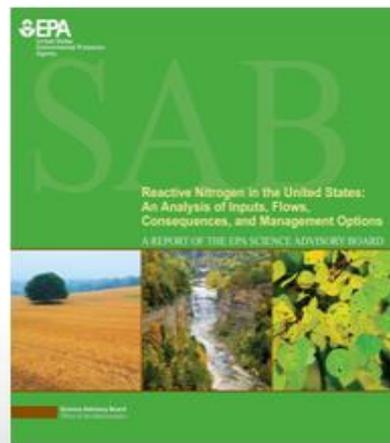
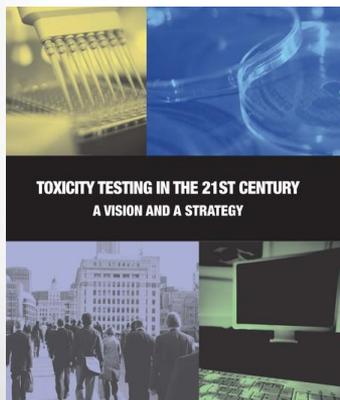




Strengthening Our Science

Strong commitment to quality science and peer review

- **EPA's Science Advisory Board**
 - Input on strategic directions for research; special topics
- **ORD's Board of Scientific Counselors**
 - Advice on program operations
 - Ongoing advice through new subcommittees for research programs
- **National Academy of Sciences**
 - Provides recommendations on special topics



Catalyzing innovative research



Support innovation at the bench in ORD labs



Find new ways to conduct research



Demonstrate the power of transdisciplinary research



Broaden the network of environmental problem solvers

Innovation Strategy



Strategic Research Action Plans

- **What is a Strategic Research Action Plan (StRAP)?**
 - Describes our research program for internal and external audiences
 - Developed in consultation with advisors (SAB and BOSC), EPA partner offices, other stakeholders
 - Serves as our planning document; guides allocation resources (\$ and people)
- **Early Input from SAB and BOSC**
 - Preliminary Drafts: just beginning 2016-2019 StRAP updates
 - This kicks off the year long process with EPA partners and stakeholders
 - High level strategic plan; are we heading in the right directions?



Preliminary Draft StRAPs

Executive Summary - forthcoming

Introduction

Program Purpose

Problem Statement

Program Vision

Research Supports EPA Priorities and Mandates

Research Objectives

Science Challenges – For each objective, state the science challenges or questions presented by the objective.

Anticipated Research Accomplishments - examples

Program Design

Research Topics

Help us accomplish research objectives and answer science challenges

Conclusion - forthcoming

Appendix of Anticipated Outputs - forthcoming



ORD Research Programs

Air, Climate & Energy



Sustainable & Healthy Communities



Homeland Security



Chemical Safety for Sustainability



Human Health Risk Assessment



Safe & Sustainable Water Resources



- **Assess impacts of air pollution and climate change**
- **Prevent and reduce emissions**
- **Respond to changes in climate and air quality**



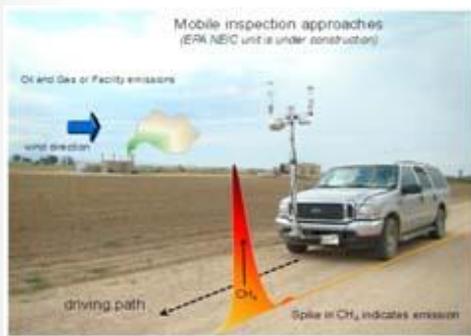
Dan Costa
National Program
Director





Next Generation Air Monitoring

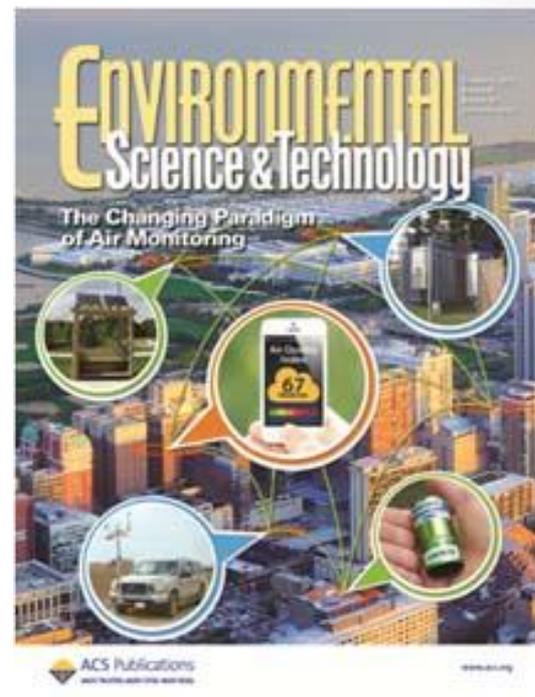
- Developing and stimulating new technology
- New innovations in facility fenceline monitoring
- Evaluating emerging sensor technology
- Promoting community participation in air monitoring
- Satellite-based air quality measurements



Mobile monitoring for geospatial mapping of pollutants (GMAP)



“Village Green” park bench monitors air quality



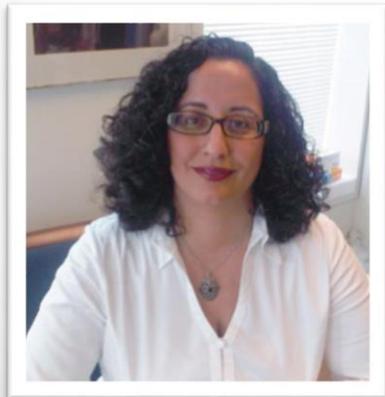
My Air
My Health

U.S. Department of Health and Human Services
U.S. Environmental Protection Agency



Chemical Safety for Sustainability

- **Chemical exposures → outcomes**
- **Accelerate chemical safety evaluation**
- **Evaluate high priority chemicals**
- **Provide accessible data**
- **Engage stakeholders**

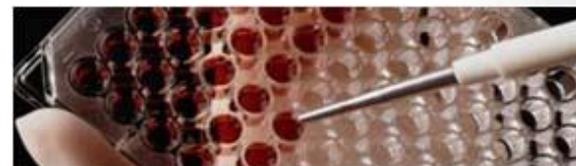


Tina Bahadori
National Program
Director



ToxCast: new methods for toxicity testing

- Used ToxCast to screen more than 2,000 chemicals
- Validation of results underway
- Publicly released new chemical data online in December 2013.
- Announced “open challenges” to use ToxCast data





Safe and Sustainable Water Resources

- **Water resources**
 - Watershed protection
 - Condition and trends of water resources
 - Improved management of water resources
- **Water infrastructure systems**
 - Safe drinking water
 - Green infrastructure
 - Wastewater treatment → energy efficient resource



Suzanne van Drunick
National Program
Director



Supporting Small Water Systems

- **New biological treatment approaches**
- **UV treatment**
- **VOC treatment**
- **Disinfection byproducts**
- **Grant support: National Center for Innovation in Small Drinking Water Systems**
- **New affordable technologies for small community waste water treatment**





Human Health Risk Assessment

Develop assessments of individual chemicals and chemical mixtures to support priority EPA risk assessment and management decisions

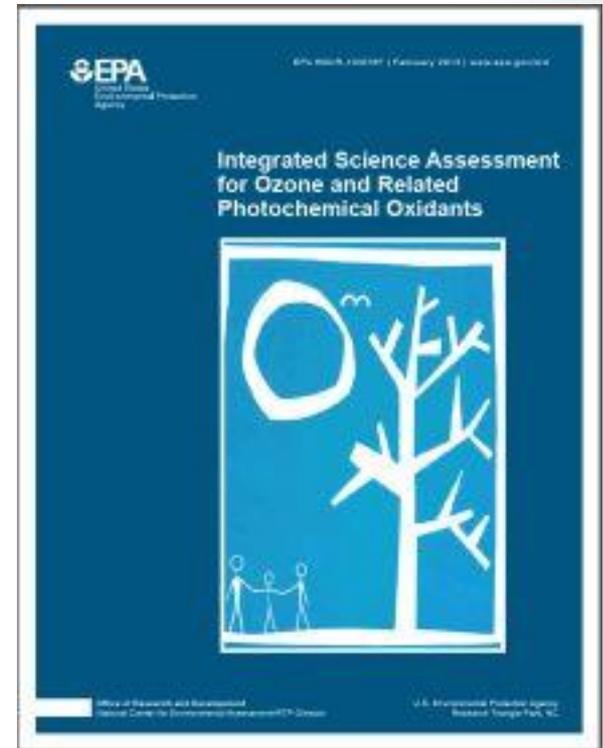
- Health effects assessment for chemicals
- Integrated Science Assessments for air pollutants
- Community and site-specific risk
- Advancing analyses and applications



**John Vandenberg
National Program
Director**



- **Enhancements to the Integrated Risk Information System (IRIS)**
 - Systematic review process across chemicals, with stopping rules
 - Streamlined documents
 - Increased stakeholder engagement and transparency
 - Ongoing NAS review
 - SAB Chemical Assessment Advisory Committee
- **Final Integrated Science Assessments for air pollutants: Lead and Ozone**
- **Collaborating with National Center for Environmental Economics on risk valuation**





Homeland Security Research

Improving EPA's capabilities to prepare for and respond to environmental disasters

Providing decision-support tools, data, models and technologies that support:

- **Systems approach to water security and resilience**
- **Systems approach to site cleanup**



Greg Sayles
National
Program
Director



Employs “all hazards” approach - all disasters:

- Man-made – terrorism, industrial accidents
- Natural – hurricanes, floods, droughts, earthquakes



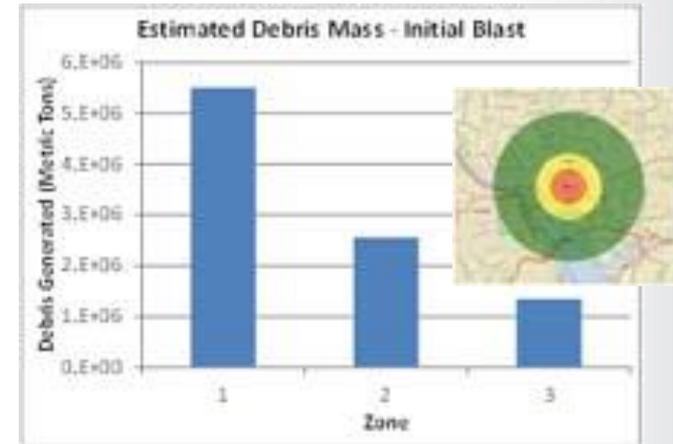
Tools to Assist Decision Makers and Water Utilities

Support response to environmental disasters: site cleanup

- Radiological Waste Estimation Support Tool (WEST)

Support effective water system protection and recovery from disasters

- Consequence and Vulnerability Assessment Tool



Debris estimations constructed for a DHS FEMA Improvised Nuclear Device Tabletop Exercise.





Sustainable & Healthy Communities

- **Decision support and innovation**
 - Tools for communities
- **Community Well-Being**
 - Public Health
 - Ecosystem Goods & Services
- **Sustainable approaches for contaminated sites and material management**
- **Integrated solutions for sustainable communities**



Mike Slimak
National Program
Director

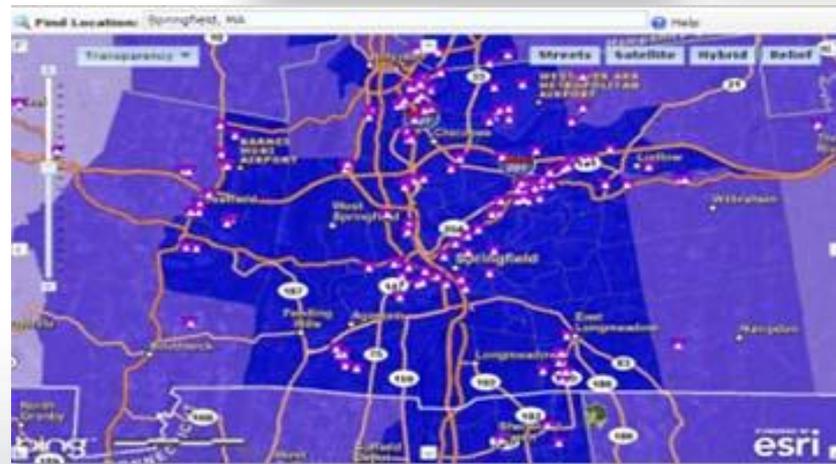
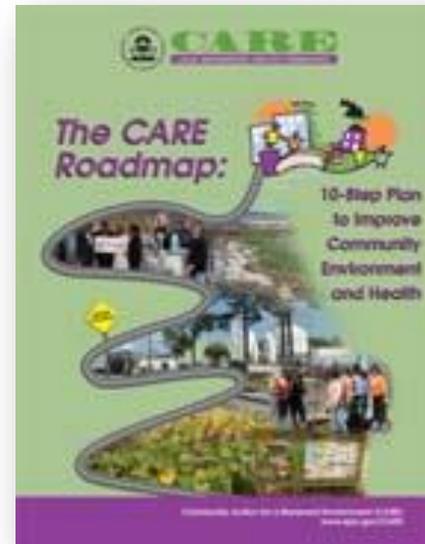




Tools for Sustainable Communities

Facilitating Community and Tribal Decision-making

- Web-based “toolkits” providing easier access to information for more than 40 environmental issues
- Mapping local exposures, health risks, and potentially vulnerable sites and populations





Cross-cutting Research



- Climate change



- Nitrogen and co-pollutants



- Children's environmental health



- Environmental justice





Roadmaps for Cross-cutting Issues

- **Purposes**
 - Describe coordination/collaboration with EPA and federal partners, and others
 - Show how research is integrated across the six programs; identifies gaps
 - Catalyze integration across the 6 programs
 - Focused on a small number of cross-cutting issues
- **Research Roadmaps at different stages of development**
 - Nitrogen and Co-Pollutants
 - Global Climate Change
 - Children's Environmental Health
 - Environmental Justice
- **Key Distinction from StRAPs**
 - Not creating additional research programs beyond the six
 - Does not serve as basis for resource planning
 - Informed by and informs the StRAPs

Potential areas for post doc hires:

- Social Science
 - Economic, anthropology
- Computational Science
 - Informatics, chemistry
- Monitoring
 - air sensors
- Ecological Assessment
 - Restoration, energy extraction impacts
- Decision Support
 - GIS expert, energy modeling



- **President's nominee for the Assistant Administrator for ORD announced, Tom Burke**
- **Experience with NAS and BEST**
 - Member of several committees relevant to EPA, including *Science and Decisions*
- **Served on EPA's Science Advisory Board & the Executive Committee of the Board of Scientific Counselors**



Tom Burke



Questions?