US EPA's Office of Research and Development (ORD) Science and Technical Capabilities

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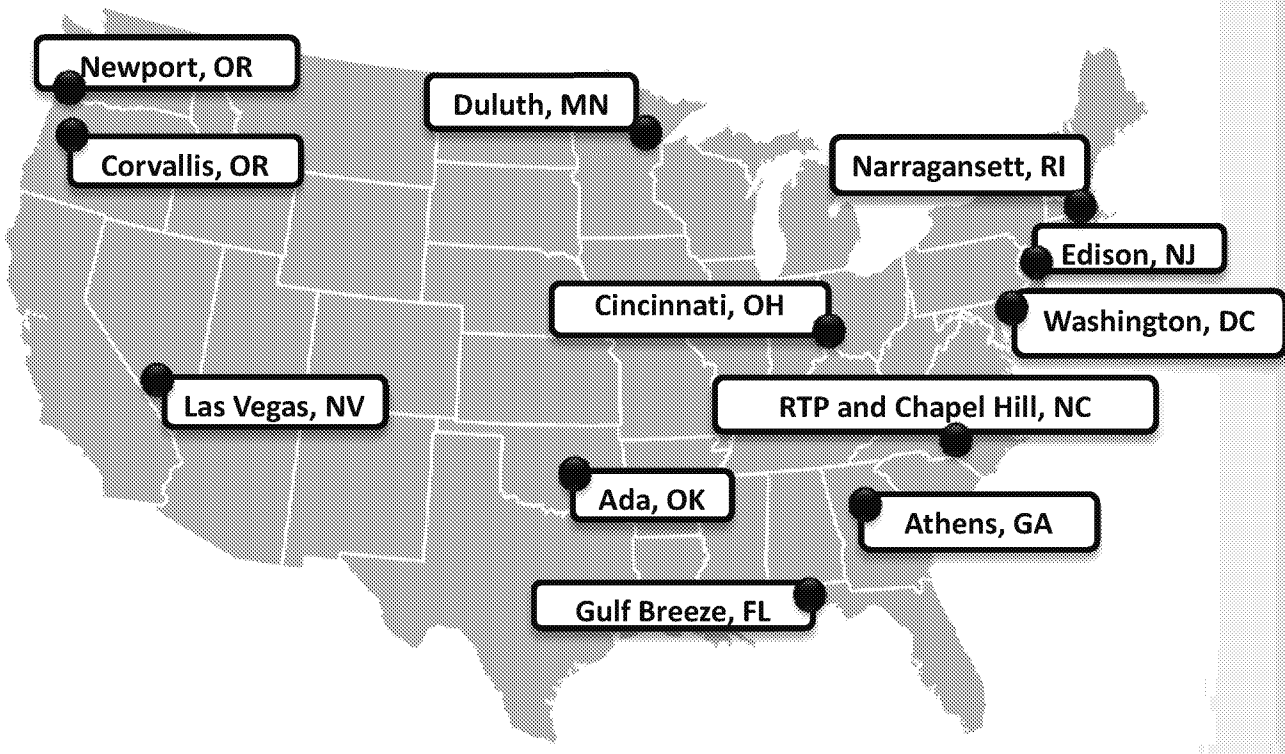
ORD At A Glance

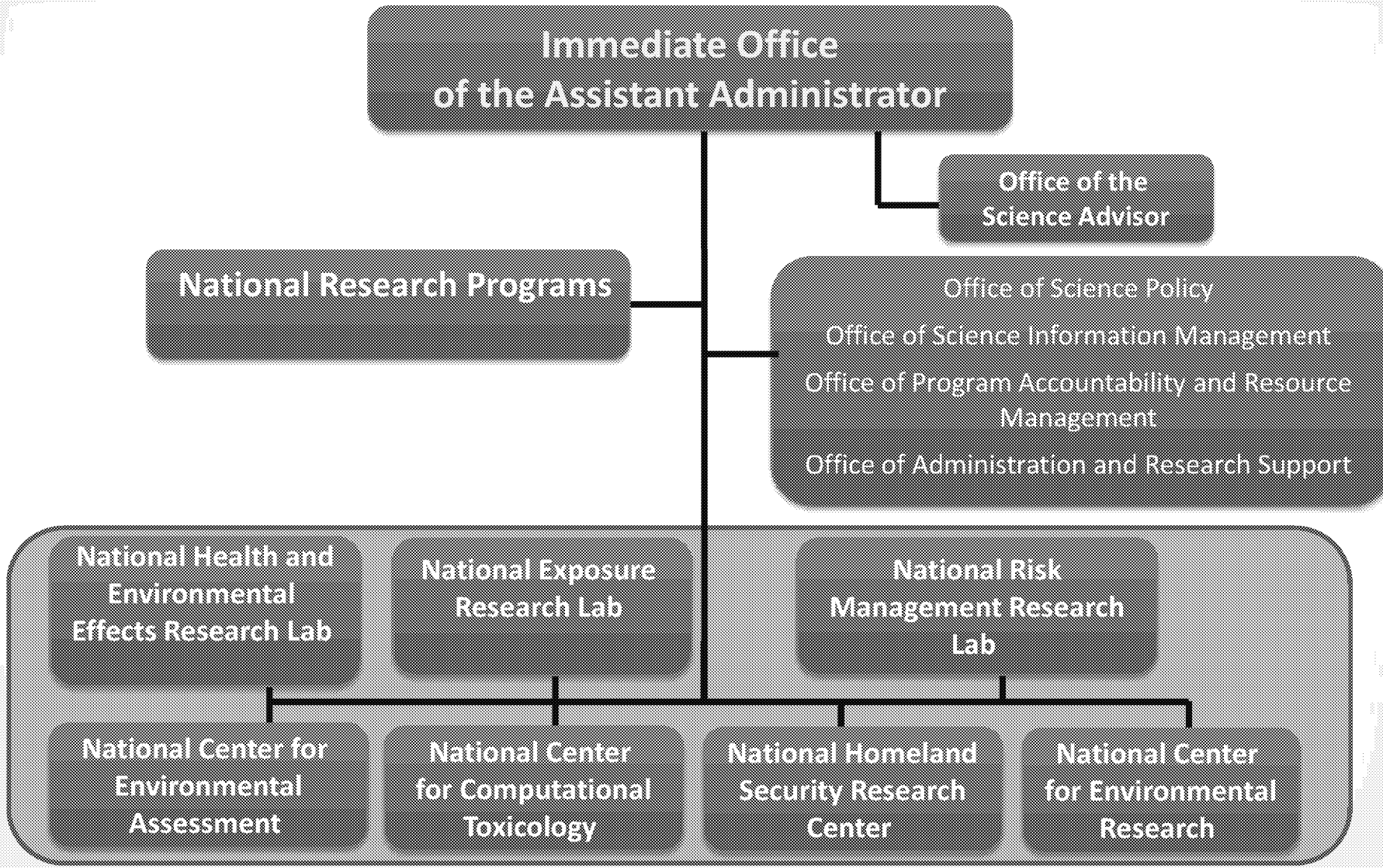
Our Mission

Provide the science, technical support, technology and tools to inform US EPA's mission to protect public health and the environment.



1,513.9 full time equivalents
(proposed OP plan)
$492 million budget
12 locations

ORD Organizational Chart



Research Authorization

US EPA's research provides science that is authorized by nearly 50 environmental laws including:

- **Toxic Substances Control Act:** "conduct such research, development, and monitoring as is necessary to carry out the purposes of this Act. The Administrator may enter into contracts and may make grants for research, development, and monitoring under this subsection."
- **Safe Drinking Water Act**: "conduct research, studies, and demonstrations relating to the causes, diagnosis, treatment, control, and prevention of physical and mental diseases and other impairments of man resulting directly or indirectly from contaminants in water, or to the provision of a dependably safe supply of drinking water."
- **Comprehensive Environmental Response, Compensation, and Liability Act:** "shall assure the initiation of a program of research designed to determine the health effects (and techniques for development of methods to determine such health effects) of such substance…and in combination with other substances with which it is commonly found."
- **Clean Air Act:** "shall establish a national research and development program for the prevention and control of air pollution."

ORD Research

ORD provides the scientific foundation for US EPA to execute its mandate to protect human health and the environment.

1. **Longer Term Research**: Conducts ***innovative and anticipatory*** research applied to a range of US EPA program and regional needs to solve longer term environmental challenges and provide the basis of future environmental protection.
2. **Research on Statutory Requirements and Specific Environmental Challenges**: Experts provide research support to US EPA program and regional offices, as well as states, tribes and communities, to help them respond to contemporary environmental challenges.
3. **Technical and Emergency Support**: Because of our expertise, local, state and national officials come to us for technical support to respond to environmental crises and needs, large and small.

National Research Programs

Air and Energy

- *Air pollution*
- *Air quality monitoring*
- *Decision support tools*

Sustainable & Healthy Communities

- *Ecosystem services*
- *Human health*
- *Sustainable materials management*
- *Superfund*

Safe & Sustainable Water Resources

- *Watersheds/recreational waters*
- *Nutrients and harmful algal blooms (HABs)*
- *Water treatment and infrastructure*

Chemical Safety for Sustainability

- *Computational toxicology and exposure*
- *Evaluation of risk across life cycle of manufactured chemicals, materials and products*

Human Health Risk Assessment

- *Risk assessments for specific chemicals*
- *Risk assessment methods*

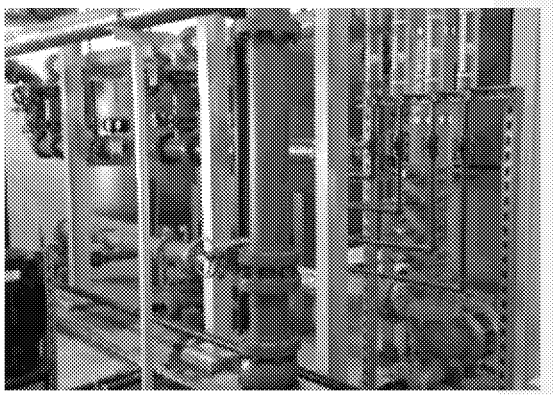
Homeland Security

- *Water system security*
- *Resilience and remediating wide areas*

State Engagement

ORD regularly engages with state agencies to ensure states' environmental science needs are being met and to provide science-based tools, approaches and methods, technical support and training.

- **State Research Needs**
  - ECOS/ERIS surveys
- ***ECOS and ORD: Partners for Meeting State Research Needs*, Sept 2017**
  - This most recent summary compiles 78 stories of how ORD's work during the past 5 years has supported states
- **Memorandum of Agreement (MOA) with ECOS and ASTHO**
  - Current project gathered information on how states communicate the risks of per- and poly-fluorinated alkyl substances (PFAS) and harmful algal blooms (HABs)
- **Webinars on Research Products and Tools**
  - *EPA Tools & Resources* monthly series
- **Outreach and Collaboration**
  - Lab visits to share ORD science & technical capabilities and discuss science-related topics of interest to states



"Ammonia residual in the distribution system can cause nitrification and other operational 'nightmares.' This EPA ORD supported pilot project in Palo is successful and the use of biologically active filters is an innovative, emerging drinking water technology that can be a viable option for certain other systems." — Bill Ehm, Director, Environmental Services Division, Iowa Dept of Natural Resources

EPA Research Supports States

Some Recent Examples

10

AK – PFAS
ID – Modeling for agriculture, energy, water and air systems interactions
OR – Water nitrate contamination; Tools to help communities identify environmental issues; Ocean acidification research; Reducing methyl mercury levels; Advanced monitoring technologies
WA – Managing nutrients in riparian ecosystems; Habitat suitability models

9

CA – Evaluating chemicals; Population and land use projections; Synthetic turf field safety; Decontaminating subway railcars; Decision support tools to advance communities' priority projects; Risk assessment training; Advanced monitoring technologies
NV – Groundwater characterization and remediation

8

CO – Simulating conditions in drinking water utilities; Advanced monitoring technologies
MT – IRIS assessment for Libby Amphibole Asbestos; Asbestos exposure following forest fires
UT – Fine particle air pollution; Emissions measurement methods

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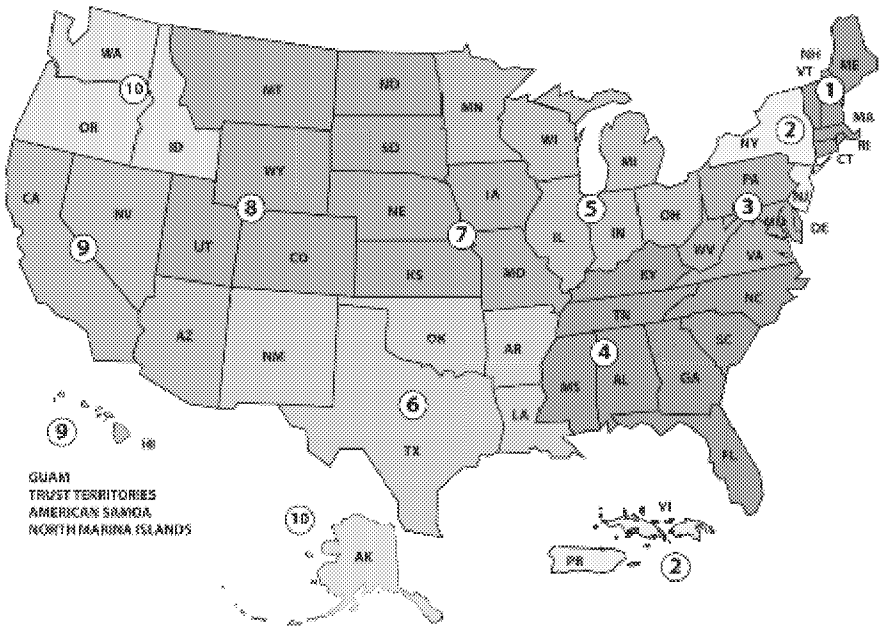
IA – High ammonia levels in drinking water
KS – Prairie rangeland burning; Community air quality monitoring
MO – Models and tools to reduce sewer overflows



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LA – Cancer risk assessments
OK and **TX** – Community air quality monitoring
OK – Chemical composition analysis; Evaluating water interactions at Superfund site
TX – Chemical contamination risks

5

MI – Lead contamination technical support; Simulating conditions in drinking water utilities
MN – Sulfate standard development support; Modeling bioaccumulation of PCBs and mercury in fish
OH – Harmful algal blooms limiting drinking water; Managing algal toxins; Small drinking water systems; Simulating conditions in drinking water utilities
WI – Predicting water quality at beaches

1

CT – Community air quality monitoring;
CT, MA, ME , NH, RI and **VT** – Stream monitoring network; Planning for energy and air emissions
CT and **NH** – Advanced monitoring technologies
ME – Tribal risk assessment (sediment and water quality)
VT – Impervious cover data for watersheds

2

NJ and **NY** – Stream monitoring network; Planning for energy and air emissions
NJ – PFAS
NY – Management of bio-hazardous wastes; Planning for biological incident; Simulating conditions in drinking water utilities

3

DE, MD, PA, VA and **WV** – Stream monitoring network
MD – Managing stormwater treatment systems; Advanced monitoring technologies; Reducing harmful air pollutants; Management of bio-hazardous wastes
MD, PA and VA – Stormwater management planning support
PA – CADDIS causal assessment; Community air quality monitoring

4

AL, GA, KY, NC, SC, TN – Stream monitoring network
FL, GA, KY, NC, SC, TN – Characterizing urban background levels for contaminated site cleanup levels
FL, KY – Simulating conditions in drinking water utilities
GA – Green infrastructure in Atlanta's Proctor Creek
KY – Advanced monitoring technologies
MS – Fecal bacterial and viral indicators
NC – Community air quality monitoring; STEM education; Wright Chemical Superfund Site
SC – Food waste reduction

https://www.epa.gov/research/us-epa-office-research-and-development-and-environmental-council-states-partners-meeting

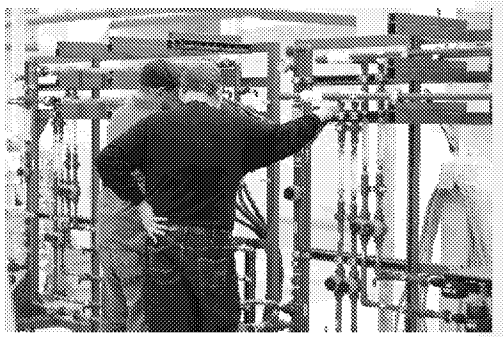
Technical Assistance on PFAS to New Hampshire

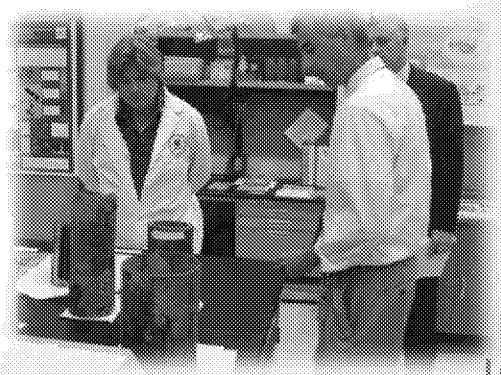
- Extensive work characterizing "legacy" PFAS previously conducted by NH using contract laboratories
- Ongoing technical challenges including limitations in fluorochemistry and related fate and transport expertise, with handling more complex sample matrices, and with the unknown nature of compounds
- NH Department of Environmental Services requested ORD's assistance which resulted in a strong collaborative effort with NH collecting valuable samples and ORD applying novel methods of sampling (air) and analysis (non-targeted high-resolution mass spectrometry)
- Status:
  - Sampling and analysis is ongoing
  - First report (targeted analysis) delivered 4/4/2018
  - Non-targeted analysis is identifying novel PFAS
- Impact:
  - This work will help NH determine the needs for and proper design of air pollution control equipment to prevent PFAS emissions

Technical and Emergency Support: Lead

Supporting States & Regions:

- Researching methods to improve the ability to identify lead service lines in a non-destructive way (e.g., Flint, MI; Galesburg, IL)
- Assessing composition of pipe scales and treatment progress (e.g., Fall River, MA; Providence, RI; Flint, MI)
- Assisting with review of corrosion control plans and studies (e.g., Sebring, OH; Denver, CO; Providence, RI)





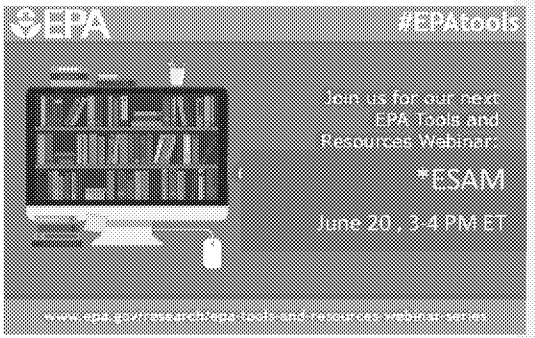
Supporting the Lead & Copper Rule:

- Regulatory option selection
- Multimedia exposure modeling to inform a health-based benchmark for lead in drinking water
- Corrosion control treatment options for various water systems
- Sampling methods for monitoring lead
- Cost and benefits analysis

Other Emergency Response

- **ReAChback for Emergency Response**
  - Quick-response scientific support capability to ensure coordinated, timely response to large-scale disasters
- **Corpus Christi, TX Drinking Water Contamination**
  - Identified decontamination approaches to purge the drinking water systems of the contaminant
- **Ebola Response**
  - Responded to Ebola patients in U.S. by identifying decontamination methods for vehicles, facilities, and Personal Protective Equipment for health care workers, technical support for waste management, and the fate of the virus in wastewater
- **Gold King Mine**
  - Provided toxicity information and developed modeling for long-term monitoring
- **Elevating Critical Public Health Issues Policy**
  - Developed a process to allow staff to expedite the elevation of important issues

Research Products and Tools



To help ensure that the tools and resources EPA develops are accessible and useful to needs on the ground, ORD hosts a public monthly *EPA Tools and Resources* webinar series to share our research, demonstrate tools and seek input from our partners.

Webinar Topics:

- ✓ Publically available, easily understandable, and not overly technical
- ✓ Relevant to identified state science needs, including case studies
- ✓ Highlighting work at the nexus of public health and the environment

When?

Generally the **3rd Wednesday of every month**, 3-4 PM ET.

Past webinars and upcoming registration at:
https://www.epa.gov/research/epa-tools-and-resources-webinar-series

*(ESAM) Environmental Sampling and Analytical Methods

Communicating the Risks of PFAS and HABs: State Case Studies and Toolkits

- In early 2018, ASTHO and ECOS interviewed health and environmental agency staff from 13 states about their **risk communication strategies and lessons learned** for either PFAS contamination or HABs. This project was funded by ORD under the MOA.

- Results were compiled into brief **case studies** that outline the states' overall efforts, risk communication efforts, relevant resources, key messages for the public, and challenges in the states' programs or communications.
  - ECOS states for PFAS state case studies (**PA, MI** and **NH**); ASTHO states (**CO, MN** and **NY**)
  - ECOS states for HABs state case studies (**MO, NC, OH** and **UT**); ASTHO states (**IN, OR** and **VT**)

- **Public webinars** in June 2018 provided key findings from the case studies and offered potential considerations to others seeking to implement or improve their risk communication practices.

ECOS-EPA Bimonthly PFAS Calls

Coordinate calls with ECOS/states to share information on PFAS human health/toxicity, analytical methods, site characterization/exposure and remediation/treatment work. (Next call is scheduled June 20, 4-5 pm ET)

For More Information

- **EPA Research web page**
  www.epa.gov/research

  - **States and ORD: Partners to Meet State Research Needs**
    https://www.epa.gov/research/states-and-ord-partners-meet-state-research-needs

  - **EPA Tools and Resources webinar series**
    https://www.epa.gov/research/epa-tools-and-resources-webinar-series

  - **EPA ORD Strategic Research Action Plans**
    http://www.epa.gov/research/strategic-research-action-plans

  - **EPA Methods, Models, Tools and Databases**
    https://www.epa.gov/research/methods-models-tools-and-databases

- **EPA Science Matters newsletter**
  https://www.epa.gov/sciencematters

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