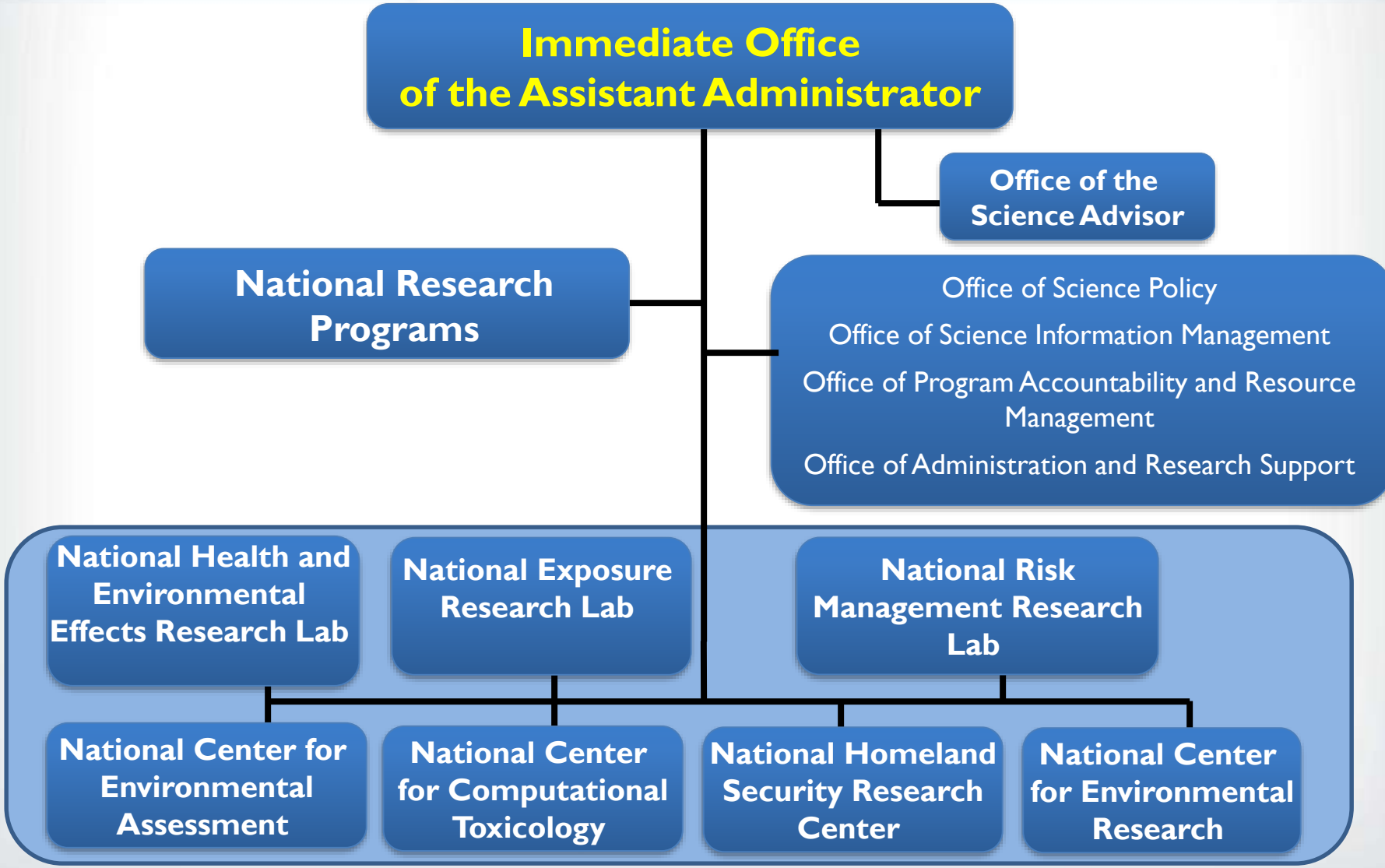
Overview of EPA's Office of Research and Development

Region 4 State Commissioners' Visit to EPA RTP
August 30, 2017

Our Mission

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

ORD Organizational Chart



Research Authorization

- 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 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 EPA program and regional needs to solve longer term environmental challenges and provide the basis of future environmental protection.
2. **Research on Specific Environmental Challenges**: Experts provide research support to 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.

Research Programs

Air, Climate & Energy

- *Air pollution*
- *Global climate change*

Sustainable & Healthy Communities

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

Homeland Security

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

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*

Safe & Sustainable Water Resources

- *Drinking water treatment systems*
- *Surface water quality*
- *Green infrastructure*

EPA ORD's Research Triangle Park Campus

Research at EPA's RTP Campus

- **Largest facility ever built by EPA**
  - ORD conducts world-class research that impacts decision making at local, regional and national levels
  - 1.2 million square feet of labs and offices
  - Home to 591 ORD employees and a total of 1,230 EPA employees

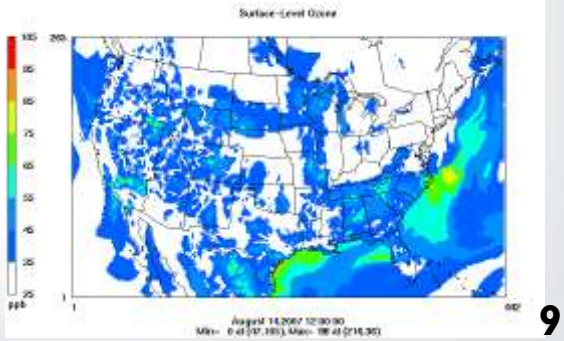
- **Wide range of research activities, including the following signature research capabilities to address science challenges**
  - **Air Research:** Characterizing impacts of air pollutants across the "source to effects" continuum
  - **Chemical Safety:** Developing and applying rapid methods to characterize chemical exposures and hazards for thousands of chemicals
  - **Homeland Security Research:** Responding to clean-up needs after a natural or man made disaster
  - **Community-Focused Research:** Supporting and enhancing decision making and problem solving for human and ecosystem communities

Air Research

- **Nation's hub for interdisciplinary air pollution research in support of Clean Air Act**

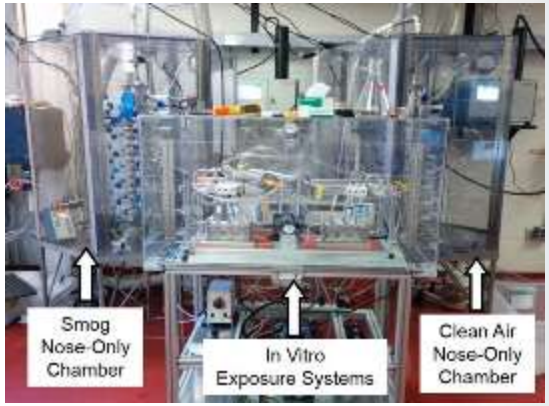
- **Emissions Measurement and Control**
  - **Mobile sources**: Effects of alternate fuels, driving conditions using heavy and light duty dynamometers, and on-road testing.
  - **Advanced measurement methods**: Next generation real-time monitoring, technology demonstration to enhance compliance monitoring.

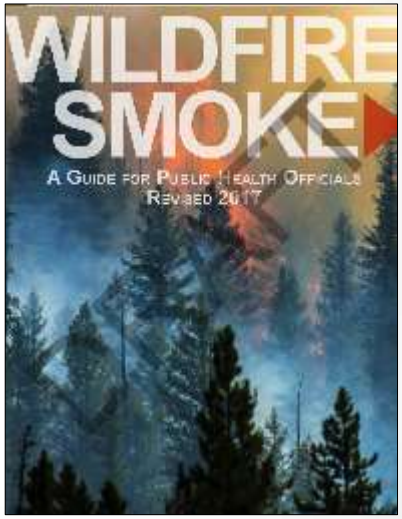
- **Air Pollution Exposure**
  - **Air Quality Modeling (e.g., CMAQ)**: Enhances and evaluates air quality modeling tools used by the EPA and state/local organizations.
  - **New monitoring approaches**: Air Sensor citizen science research where low-cost and portable sensors are developed and evaluated for use by states and communities.



Air Research (cont.)

- **Public Health**
  - **Multidisciplinary Effects Research**: Multiple emission combustion systems and a photochemical smog chamber that can produce different atmospheric mixtures to understand the health effects of air pollutants.
  - **Wildfires**: Effects of emissions from natural wildfires and prescribed burns, including education and outreach to reduce exposure and public health impact.





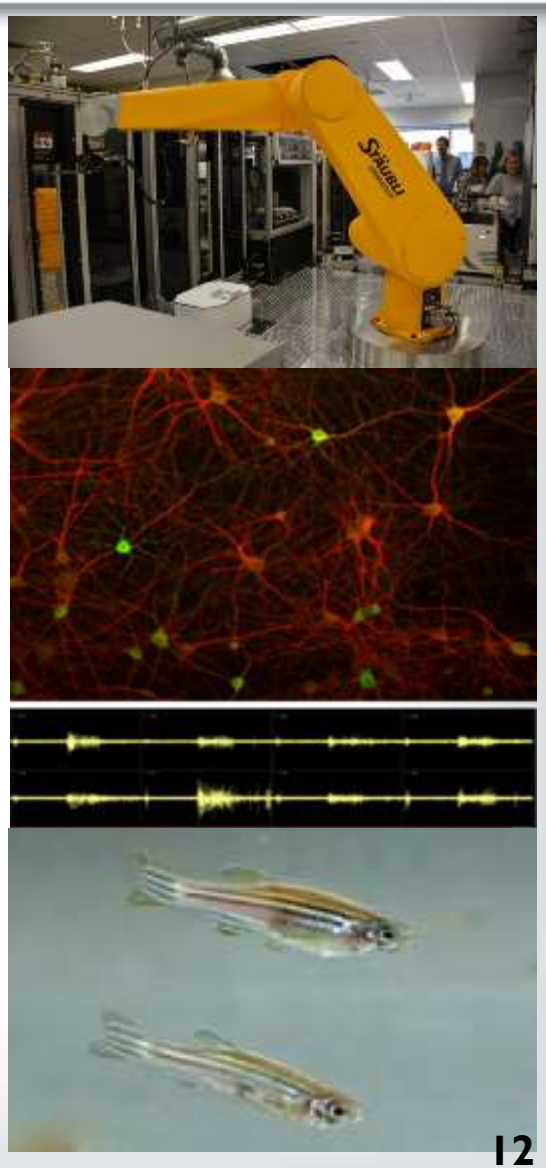
- **Direct Support for NAAQS**
  - **Integrated Science Assessments**: Creating evaluations and syntheses of the most policy-relevant science for reviewing the National Ambient Air Quality Standards.

Homeland Security Research

- **Studies what approaches are best for cleanup of wide areas after a natural or man-made disaster (e.g., terrorist incident).**
- **Decontamination Technology Research Laboratories**
  - Includes an 800 cubic foot enclosed stainless steel chamber - used to determine the best methods for decontaminating and sampling indoor spaces such as an office space contaminated with anthrax spores
- **Aerosol Test Facility**
  - One of only a few large aerosol wind tunnel research facilities in the nation - used to increase the understanding of aerosol particle behavior in the environment to inform environmental response

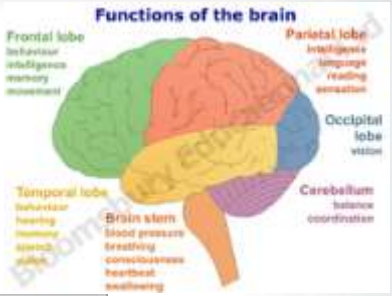
Chemical Safety and Exposure Science

- **Develops and applies cutting-edge technologies to** efficiently and economically **evaluate the safety of thousands of chemicals** currently in use
- **TSCA implementation** – provide expertise to evaluate specific chemicals
- **TSCA implementation** – develop and use innovative, non-animal approaches to prioritize thousands of chemicals to determine those in most need of further testing
- **Publicly available data and tools** for use by states, companies and the scientific community
- **Tox21 partnership** with NIH (NCATS and NIEHS/NTP) and FDA has screened ~10,000 chemicals
- Endorsed by National Academy of Sciences reports

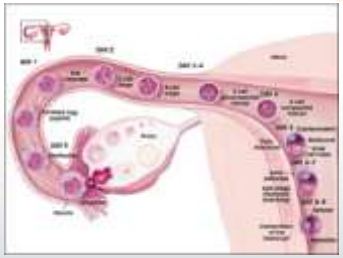


Chemical Safety and Exposure Science

- **RTP scientists are supporting tools to translate and interpret science results such as the Adverse Outcome Pathway (AOP) WIKI and Knowledge Database; single authoritative source for AOP descriptions**
  - Working closely with Organization for Economic Co-operation and Development and international community
    - Guidance
    - Training
    - Workshops
  - Internationally harmonized AOP-wiki

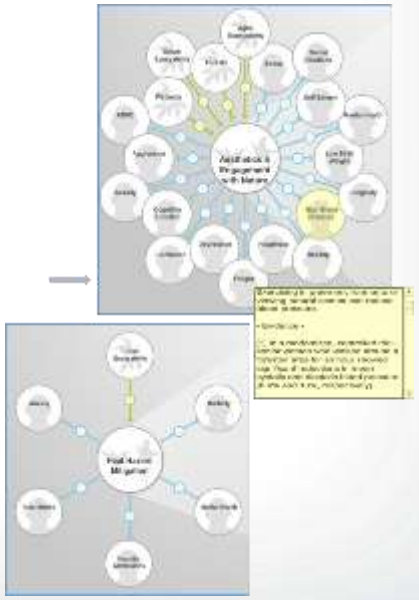


- **Animal study facilities support unique capabilities including:**
  - Measuring sensory perception/function (hearing, seeing, touch, neuromuscular strength) and cognitive function (learning, memory, attention) from chemicals
  - Assessing impacts on reproductive competence, later in life, and subsequent generations; reproductive tract development; cumulative risk models



Community-Focused Research

- **RTP scientists are developing tools to supports decision making by communities**
- **EnviroAtlas:** Easy-to-use, online decision support tool to view, analyze and download high-quality, consistent, research-based maps and other resources: https://www.epa.gov/enviroatlas
  - **Includes Eco-Health Relationship Browser**
    - 4 ecosystems (forests, urban ecosystems, wetlands and agro-ecosystems
    - 6 ecosystem services (nature's benefits)
    - 30 health outcomes
    - Health promotional services and buffering services
- **Community-Focused Exposure and Risk Screening Tool (C-FERST):** Web-based tool to assist communities in characterizing and prioritizing potential risks and in identifying possible solutions: https://www.epa.gov/c-ferst



ORD Support for States

Some Recent Examples

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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

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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

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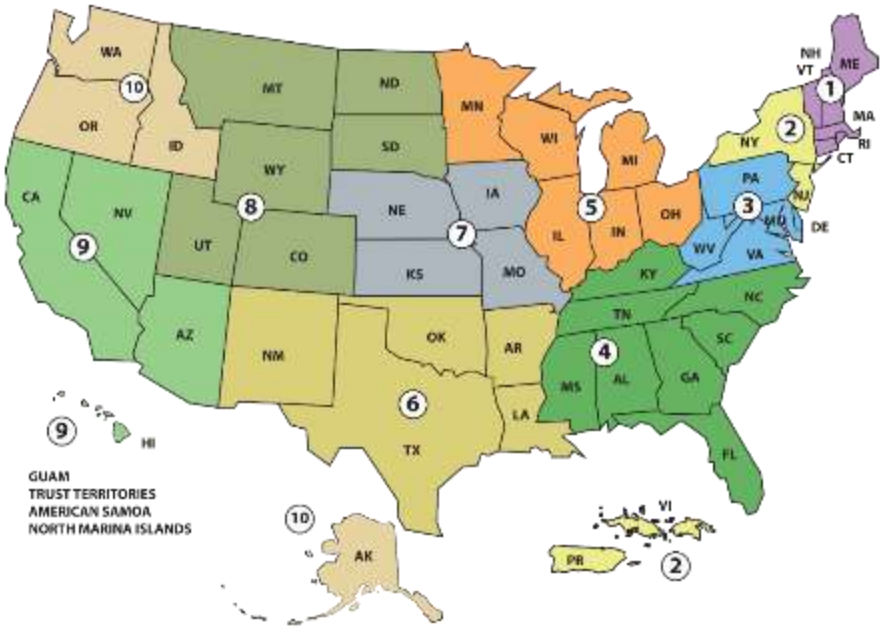
IA – High ammonia levels in drinking water
KS – Prairie rangeland burning; Community air quality monitoring
MO – Models and tools to reduce sewer overflows



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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

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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

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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

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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

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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

For More Information

- EPA research web page
  www.epa.gov/research
  - EPA Science Matters newsletter
    https://www.epa.gov/sciencematters
  - 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 Strategic Research Action Plans
    http://www.epa.gov/research/strategic-research-action-plans
  - ORD list of models, methods, tools and databases
    https://www.epa.gov/research/methods-models-tools-and-databases
- It All Starts with Science blog
  http://blog.epa.gov/science/
- Join more than 21,000 followers on Twitter
  https://twitter.com/EPAresearch