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Sustainability, Innovation, and the Future of Environmental Protection

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U.S. EPA
and the
Office of Research and Development (ORD)

The EPA Administrator's Guiding Principles and Priorities

Guiding Principles

- Science must be the backbone for EPA programs.
- EPA must follow the rule of law.
- EPA's actions must be transparent.

Priorities

- Improving Air Quality
- Assuring the Safety of Chemicals
- Cleaning Up Our Communities
- Protecting America's Waters
- Taking Action on Climate Change
- Building Strong State and Tribal Partnerships
- Expanding the Conversation on Environmentalism and Working for Environmental Justice

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EPA/ORD and DoD/SERDP have complementary research agendas for sustainability, health, and environment protection.

Complementary EPA/DoD Research

- Energy sustainability
  - Alternative energy sources
    - energy security for the military (and the country)
    - less pollution, exposure
    - less international vulnerability
- Worker exposure
  - Protecting soldiers' health is similar to protecting civilian workers' health
    - E.g., off-road diesels and PM emissions, open burning of trash at forward bases
- Global climate
  - Coastal infrastructure is vulnerable to sea level changes

Complementary EPA/DoD Research (contin.)

- Materials sustainability
  - Trace metals
    - Security of supply chain
    - Appropriate selection and use
    - Mass balance on use, reuse, and recovery
  - Persistent organics
    - Identification, fate, effects
    - Substitutes

Air Quality. ORD/SERDP Collaboration: Sampling Open Detonations of Military Ordnance (TNT) to Determine Emissions

An aerostat-lofted sampling instrument was developed by EPA under a SERDP project to measure emissions from open burning and open detonation of military ordnance.

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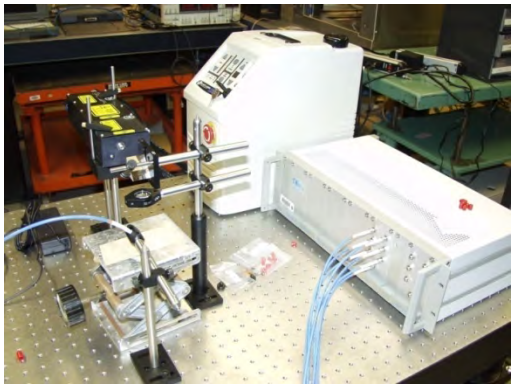
A project with the U.S. Army Corps of Engineers

Air Quality. EPA/U.S. AFRL/et al. Aircraft Testing

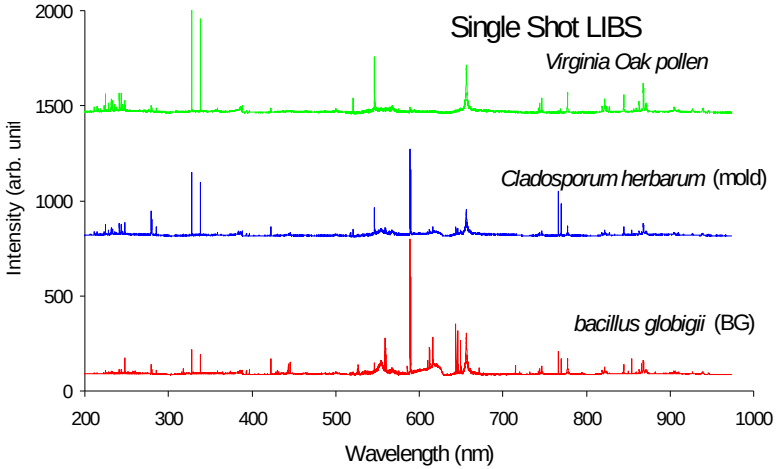
Protecting America's Waters. EPA/USAF/UF Project Predicting DNAPL Source Zone and Plume

United States Environmental Protection Agency

ORD/SERDP Collaboration: Development of Laser Induced Breakdown Spectroscopy (LIBS) for spore detection and explosives detection



Laboratory LIBS



LIBS Unique spectra fingerprints of Bacillus subtilis (a surrogate for B. anthracis)

Man-portable LIBS

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A project with the U.S. Army Research Laboratory

Sampling for Dioxins at the Gulf in situ oil burns with the EPA/SERDP Aerostat/Flyer

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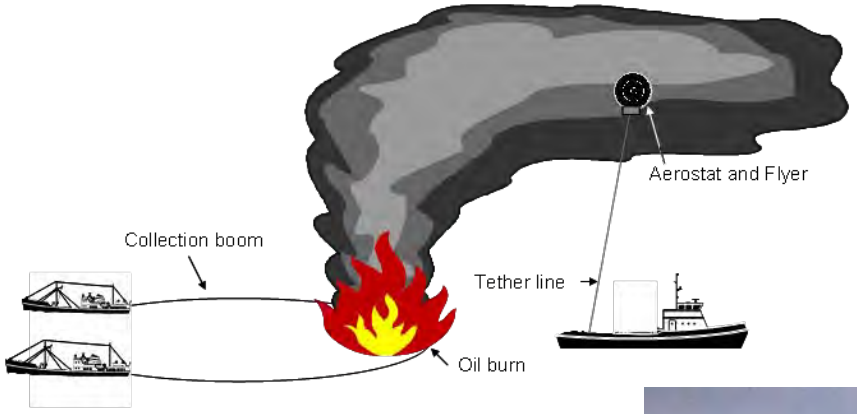

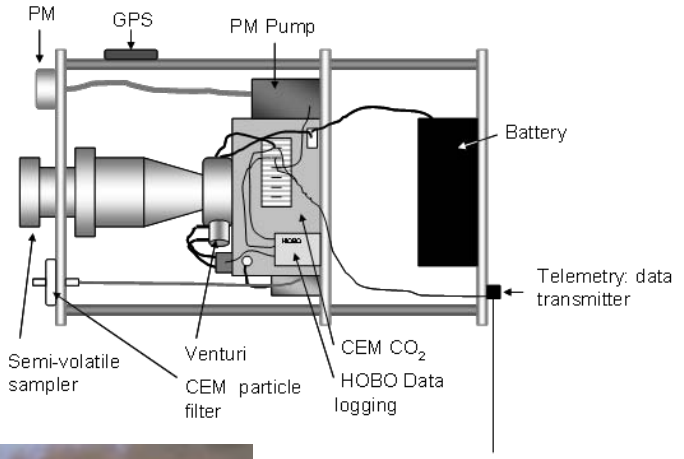

Office of Research and

EPA/SERDP Development of a Trace Organic Monitor

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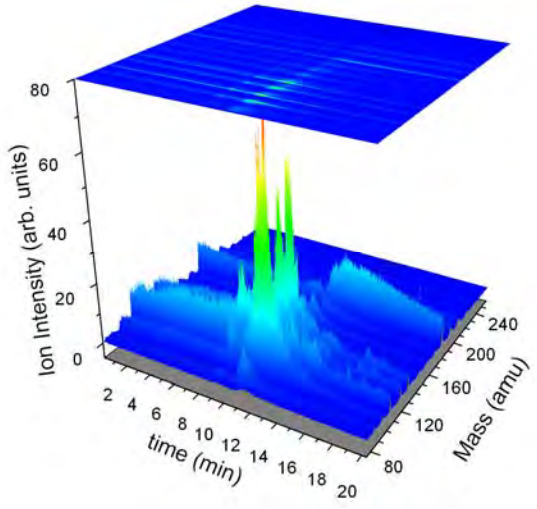
REMPI-TOFMS: Resonance-Enhanced Multiphoton Ionization – Time of Flight Mass Spectrometry, a sensitive, selective, and real-time aromatic monitor

Field test at RDF Waste-to-Energy Facility



Start-up emission profile

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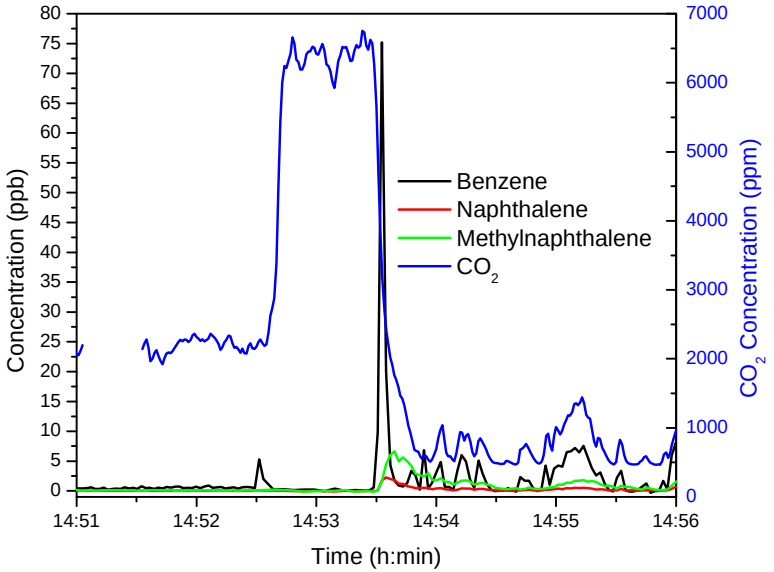
EPA/SERDP Project: Real time detection of trace aromatics



A project with the U.S. Air Force Research Laboratory

Office of Research and Development

EPA/SERDP Project: Emission/Performance Testing at Aberdeen Test Center

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High Mobility Multipurpose Wheeled Vehicle (HMMWV) vehicles tested on a chassis dynamometer

Stationary M1A2 and Bradley engine monitoring

Office of Research and Development

A project with the U.S. Army, Aberdeen Test Center

EPA/USAFIT Project: Monitoring and Characterization of Emissions from Burn Pits in Forward Operating Bases

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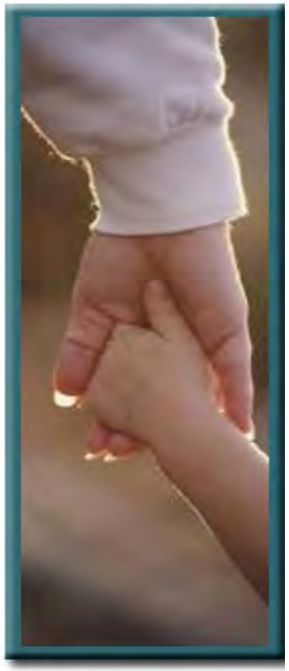
Mission of EPA's Office of Research and Development (ORD)

Provide the scientific foundation to support the 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 academia and other agencies, 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

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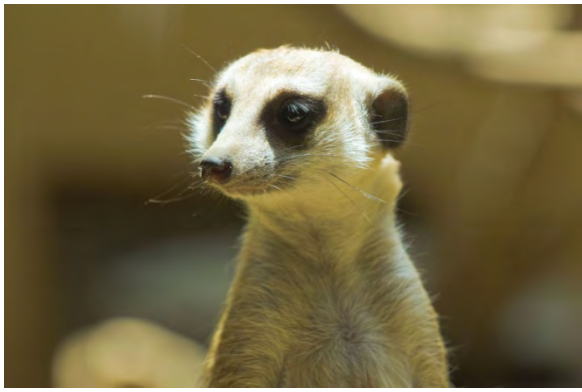
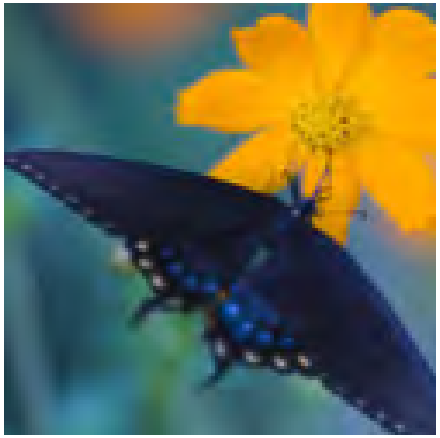
Sustainability
Innovation
Transdisciplinary Collaboration

Scientific Values for the Path Forward



- Sustainability
  - True North
  - Safety by Design
- Transdisciplinary Collaboration and Integrative Systems
- Innovation and Catalysis



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Design for a Systems Context

Sustainability, & chemical product design

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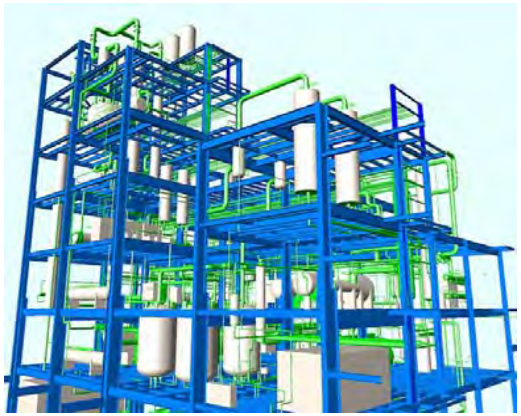
Coffee decaffeination using methylene chloride

Coffee beans without caffeine

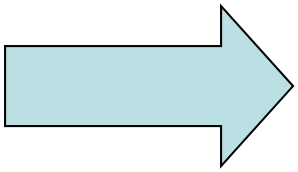


Coffee decaffeination using CO_2 (not a "solvent" by FDA)

Sustainability & chemical product design

The task is the cleaning of clothes; current product is detergent.

Detergent



Concentrated detergent

Self-cleaning clothes?

Desired Outcomes & System Definition

Our company makes lawnmowers; we decide the consumer wants a greener lawnmower…

Ideas:

- **Quieter mower**
- **More fuel efficient**
- **Runs on waste corn oil**
- **Solar powered**

Look at the system and desired outcome

Taking step back….desired customer outcome is grass of certain height…..no-mow grass….*eliminate the mower entirely*.

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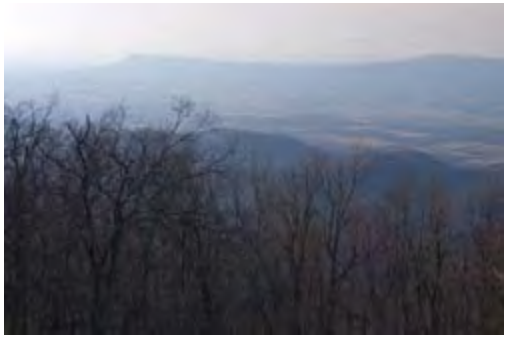
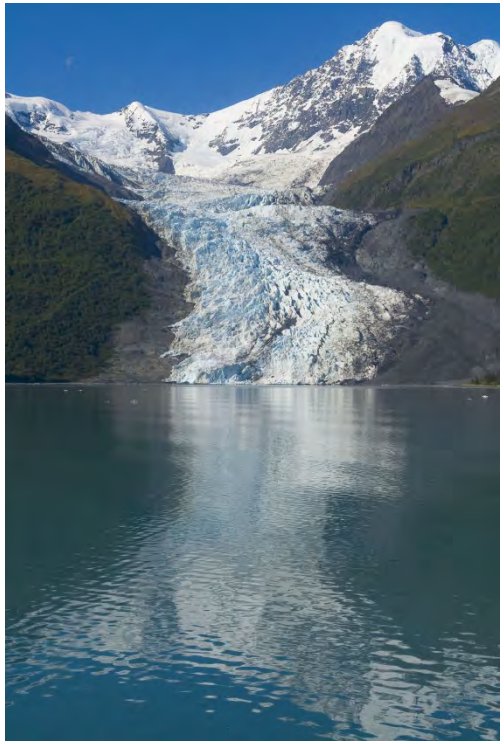
Current ORD Research Activities and Strategic Directions.

Improving Air Quality



Vision: *EPA science will provide the fundamental knowledge needed to appropriately address air-quality issues with innovative and strategic solutions.*



Examples of Current ORD Activity

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Assuring the Safety of Chemicals

Vision: *EPA science will lead the sustainable development, use, and assessment of chemicals.*

Examples of Current ORD Activity

Cleaning Up Our Communities

Vision: *Expand interactions between restoration, sustainable materials management, and land-use research strategies to apply scientific tools and support sustainable community decisions.*

Examples of Current ORD Activity

Protecting America's Waters

Vision: *ORD will develop a "one hydrosphere" approach to conducting science and technology research that leads to the development of safe, resilient, and sustainable water resources.*

Examples of Current ORD Activity

Taking Action on Climate Change

Vision: *ORD will be a key source for Program and Regional Offices on climate change impacts, adaptation, and mitigation research.*

Examples of Current ORD Activity

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THANK YOU!

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