Sustainability, Innovation, and the Future of Environmental Protection

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September 2010
**Report Documentation Page**

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Standard Form 298 (Rev. 8-98)  
Prescribed by ANSI Std Z39-18
U.S. EPA
and the
Office of Research and Development (ORD)
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
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
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.
Air Quality. EPA/U.S. AFRL/et al. Aircraft Testing
Protecting America’s Waters. EPA/USAF/UF
Project Predicting DNAPL Source Zone and Plume
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**

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

Office of Research and Development
EPA/SERDP Development of a Trace Organic Monitor

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
EPA/SERDP Project: Real time detection of trace aromatics

Tyndall AFB, F15/F22

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

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

Stationary M1A2 and Bradley engine monitoring

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
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
Sustainability
Innovation
Transdisciplinary Collaboration
Scientific Values for the Path Forward

• Sustainability
  – True North
  – Safety by Design

• Transdisciplinary Collaboration and Integrative Systems

• Innovation and Catalysis
Design for a Systems Context

"I'm sure glad the hole isn't in our end..."
Sustainability, & chemical product design

Coffee decaffeination using methylene chloride

Coffee decaffeination using CO₂ (not a “solvent” by FDA)

Coffee beans without caffeine
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.
Current ORD Research Activities and Strategic Directions.
**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**
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**
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
THANK YOU!

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