

Highlights of Battelle's International Energy,

# ETEUpdates

Transportation, and Environmental Leadership

WINTER 2007

## ENVIRONMENTAL SOLUTIONS



- 2 Safe Transport of Hazardous Materials
- 3 Battelle Develops a Support Tool for Monitoring Optimization
- 4 Earth Observations for Environmental Solutions
- 6 Battelle Holds First Environmental IR&D Roundtable
- 7 Announcements



# Safe Transport of Hazardous Materials

Hazardous materials are essential to our everyday lives as they are used for farming and medical applications and in manufacturing, mining, and other industrial processes. Millions of tons of explosive, toxic, corrosive, flammable, and radioactive materials are transported every day. However, these substances may pose a threat to public safety or the environment during transportation due to their physical, chemical, or nuclear properties.

These materials move by plane, train, truck, or vessel in quantities ranging from several ounces to many thousands of gallons with the vast majority of these shipments arriving safely at their destinations. In an effort to be proactive and reduce the probability and quantity of any hazardous material release, a hazardous material regulatory system was established. This risk management system is prevention-oriented and focused on identifying any safety hazards. Under the Department of Transportation's Hazardous Materials Regulations (HMRs), hazardous materials (hazmat) are categorized by hazard analysis and experience into hazard classes and packing groups.

The U.S. Department of Transportation's (DOT) hazardous materials transportation safety program historically has focused on reducing risks related to the unintentional release of hazardous materials. The HMRs are designed to achieve two goals: (1) to ensure that hazardous materials are packaged and handled safely during transportation, thus minimizing the possibility of their release should an incident occur, and (2) to effectively communicate to carriers, transportation workers, and emergency responders the hazards of the materials being transported. The HMRs specify how to classify and package a hazardous material.

Since the terrorist attacks in 2001, the DOT has collaborated

with the Transportation Security Administration (TSA) in the U.S. Department of Homeland Security to address the risks of intentional releases of hazmat in transportation. The DOT and the TSA have developed significant new requirements to improve the security of certain "high-hazard" hazmat while in transit, including requirements for security plans, security training, and background checks for drivers. The DOT and the TSA also have conducted major new studies and field tests to demonstrate the potential for new technology, such as real-time global positioning system tracking, to enhance security.

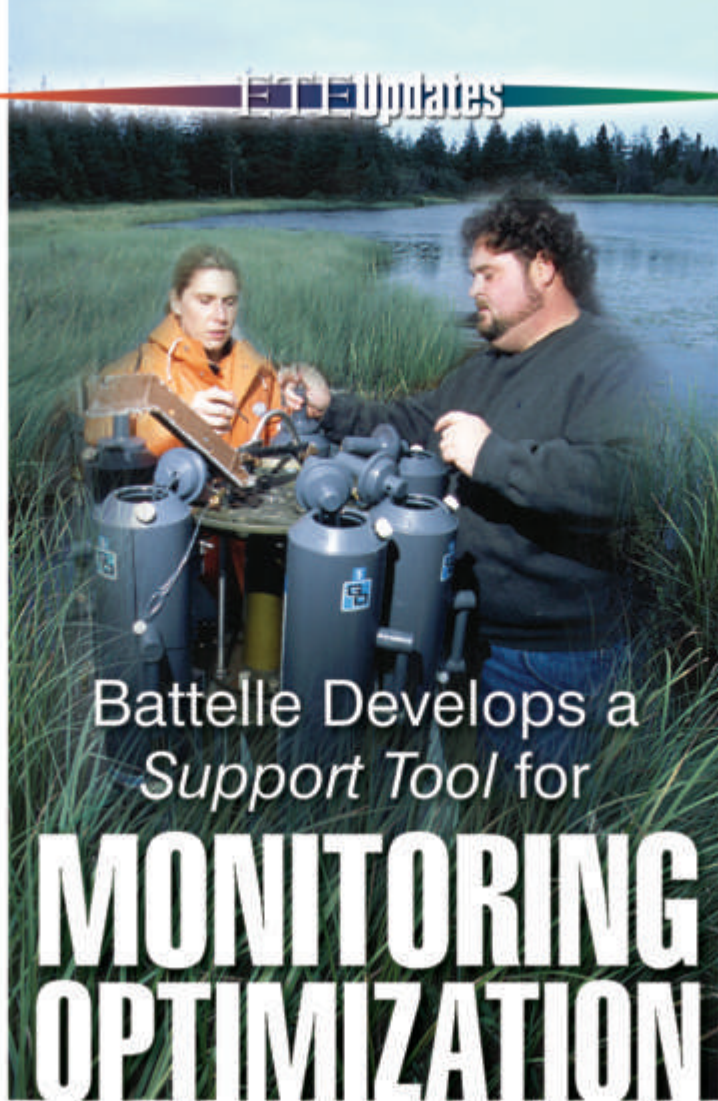
Battelle has been called upon by both the DOT and the TSA to help conduct new research to address these security concerns. Battelle led a major multi-year, field operational test to evaluate promising technology such as real-time tracking, remote vehicle disabling, biometric driver identification systems, electronic cargo seals, and emergency driver alerts. Battelle also recently won a competitive award to support DOT's Pipeline and Hazardous Materials Safety Administration's Office of Hazardous Materials Safety (OHMS) with the rulemakings that they manage to amend the Hazardous Materials Regulations. Additionally, Battelle supports DOT's Federal Motor Carrier Safety Administration (FMCSA) in analyzing safety regulations including a new task to assess the adequacy of hazmat routing regulations. Both OHMS and FMCSA also benefit from Battelle's environmental analysis capabilities.

For additional information on Battelle's hazardous materials transportation expertise, contact Mr. John Allen at (202) 646-5225, [allenj@battelle.org](mailto:allenj@battelle.org), or Dr. Mark Lepofsky at (202) 646-7786, [lepofskym@battelle.org](mailto:lepofskym@battelle.org).

Many water quality monitoring programs, as well as ecosystem restoration projects, are continually challenged with providing relevant data and information under a diverse set of regulations, goals, and objectives with smaller and smaller budgets. These drivers demand that managers continually adapt to, and utilize, a range of techniques that ensure only relevant data are efficiently generated. Many approaches are gaining attention to allow scientists and managers to spatially and temporally optimize the monitoring designs for both small-scale and large-scale water quality monitoring programs. These optimization approaches ensure that redundant data collection is minimized while maintaining key data and statistical robustness. Effective optimization addresses the suite of parameters being monitored, the spatial distribution of sampling locations, and sample frequency of sample collection necessary to meet monitoring program goals and objectives.

Battelle has developed an optimization approach for evaluating trends in water quality monitoring parameters to meet South Florida Water Management District (SFWMD) program objectives. Seventeen distinct SFWMD water quality monitoring projects were evaluated to determine if the current sampling design was sufficient to meet the goals and objectives of each respective project. The approach incorporates clear articulation of the end-uses of the data, and thorough awareness of the management and policy decisions that the data will support.

The optimization of these projects incorporated the EPA Data Quality Objectives process to better define the monitoring



Battelle Develops a  
*Support Tool* for  
**MONITORING  
OPTIMIZATION**

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hypotheses and identify the need for the information, the data to be collected, and the statistical analytical procedures that can be applied. For the monitoring projects evaluated during this study, the DQO process determined that the monitoring data were primarily used to detect trends and changes from those trends in selected water quality parameters. A non-parametric statistical procedure based on the Seasonal Kendall Tau trend analysis, developed by Reckhow et al. (1993), coupled with statistical modeling allowed an evaluation of the current monitoring design and a series of alternative designs to determine which design would provide the best estimate of an annual percent change in water quality parameter concentrations. The resulting statistical tool, written and performed using SAS, was delivered to the SFWMD and is being used for evaluation of other current and future monitoring designs.

This optimization approach and statistical tool requires a validated long-term-monitoring dataset, and allows program managers to determine how much change in a trend can be detected with specific monitoring designs. Predictions are based on statistical characterizations of historic trends and patterns present in the dataset. By employing this optimization, the SFWMD was able to assess alternative sampling designs to consider trade-offs between maximizing monitoring information obtained and minimizing monitoring costs.

For additional information about Battelle's water quality monitoring capabilities, contact Dr. Carlton Hunt at (781) 952-5374, [huntc@battelle.org](mailto:huntc@battelle.org).

# Earth Observations for *Environmental Solutions*

The amount of data and information we have on the Earth's systems is expanding exponentially, including data from satellites, lidar systems, weather stations, buoys, and hundreds of other types of monitors. From database portals to geographic information systems (GIS) to Google Earth, the Internet brings the Earth's vital statistics to scientists, policy-makers, and the public worldwide. As a direct result, we have a new understanding that human impacts can be global. For example, air pollution from the U.S. Midwest and East Coast affects Europe, mercury from power plants and other sources is found in fish in the middle of oceans around the world, and global warming is impacting the remote Arctic more than any other place on the planet.

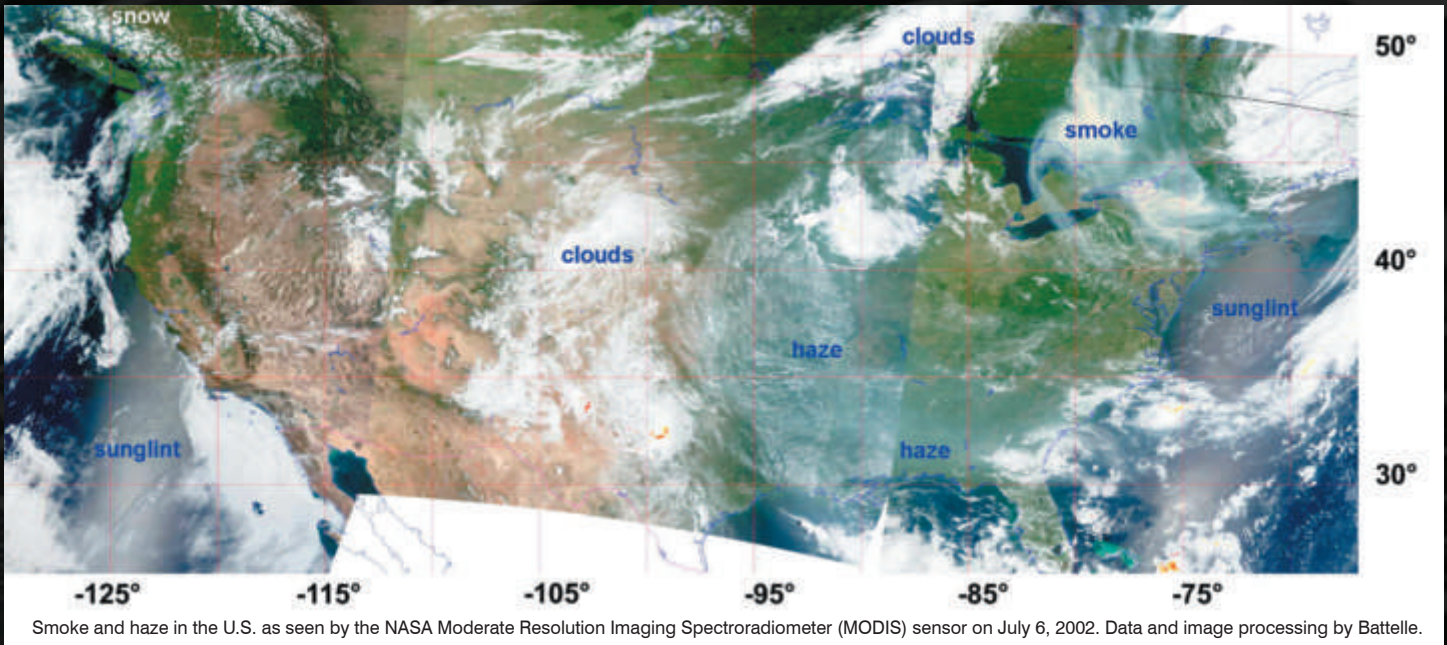
This ability to monitor the entire Earth should enable us to make better environmental decisions based on this abundance of accumulated, available information. Environmental challenges like climate change and urban air quality are not science or political problems, but rather interdisciplinary problems that require a unified science-based solution.

International and national monitoring efforts such as Global Earth Observation System of Systems (GEOSS) and the Integrated Ocean Observing System (IOOS) are in progress. However, more than monitoring is required. Battelle scientists need global measures, along with data synthesis, and visualization to present information in such a way that people can understand the data in order to make informed decisions.

A new scientific technology that is beginning to achieve relevance to environmental policy is Earth-observing satellite sensors, developed and managed by agencies such as the U.S. National Aeronautics and Space Administration (NASA) and the National Oceanic and Atmospheric Administration (NOAA). These advanced environmental monitoring technologies collect large amounts of data about the Earth's natural processes and the human impact on the Earth's environment. Although environmental and Earth scientists are increasingly using these datasets, policymakers rarely utilize these data when addressing many environmental issues.

Battelle is deeply involved in evaluating and translating data from environmental monitors, such as satellite sensors, into information relevant for environmental policymakers. In collaboration with policymakers and remote sensing experts, we have worked on air quality and energy management environmental challenges.

Photo courtesy NASA Goddard Space Flight Center



**Monitoring Air Quality from Space**

Battelle has been a leader in the development of the analytical techniques for the use of satellite remote sensing data in air quality monitoring, forecasting, modeling, and public policy. Satellite remote sensing data can help air quality policymakers identify the location of peak concentrations and determine the concentration gradients between surface monitoring stations. Satellite sensors also provide a broad view of regional haze and can help determine the impact on urban air quality from local fires, dust storms, or transport of pollutants from more distant sources, including those crossing national or regional boundaries. These satellite technologies also have possible application in monitoring air quality in rural or remote regions where no ground-based monitoring network exists.

Battelle research and applications on remote sensing and air quality have supported the Clean Air Interstate Rule and the integration of NASA satellite data into the Environmental Protection Agency's air quality databases.



A pale band of haze hangs along the front of the Himalaya Mountains in Nepal, India, and Bangladesh in this photo-like image, taken on February 5, 2006, by the Moderate Resolution Imaging Spectroradiometer (MODIS) on NASA's Aqua satellite. (Image from NASA Earth Observatory)

**Energy Management**

Effective, environmentally sound development, production, and delivery of energy depend on Earth monitoring information. Industries and researchers in the energy sector have used satellite remote sensing data and products for climatology and development of solar and wind energy sources. The potential exists for application of Earth observation data in other energy management arenas. Battelle has been working closely with NASA to identify the key organizations, decisions-support tools, and partnerships that have the greatest potential to benefit from application of satellite-based information, particularly supply and load forecasting, long-term energy modeling and forecasting, and renewable energy (biomass and hydro-electric energy).

For more information, contact Dr. Jill Engel-Cox at (703) 875-2144, [engelcoxj@battelle.org](mailto:engelcoxj@battelle.org), or Ms. Erica Zell at (703) 236-1420, [zelle@battelle.org](mailto:zelle@battelle.org).



# Battelle Holds *First* Environmental IR&D Roundtable

On October 11, 2006, Battelle hosted its inaugural Independent Research and Development (IR&D) Environmental Roundtable in Arlington, Virginia, to obtain advice on the investment of the firm's fiscal year 2007 environmental IR&D budget. Each year, Battelle devotes more than \$40 million to IR&D projects. Approximately \$3 million is earmarked specifically for environmental research initiatives, while many of the other projects also have considerable environmental content. Participants in this first Roundtable included senior R&D officials from the United States Environmental Protection Agency, the Department of Defense, the Department of Energy, the Department of Interior, the Department of Agriculture, the National Oceanic and Atmospheric Administration, as well as representatives from professional organizations.

In his opening remarks, Dr. Edward Saltzberg of Battelle asked participants to think about ways in which Battelle could use its IR&D budget to make a difference in advancing the nation's environmental research agenda and contributing to

sound environmental stewardship. Specifically, he encouraged them to identify research that could provide leverage to attract additional funding, accelerate ongoing research, jump-start new research, or fill key gaps in critical Federal environmental research programs.

The Roundtable featured concurrent breakout sessions that focused on five broad research topics:

- Climate Change and Energy
- Emerging Human Health Issues
- Ecological Systems
- Restoration
- Sustainability.

In each session, participants worked with a Battelle senior scientist to develop a prioritized list of research candidates. At the conclusion of the Roundtable, participants discussed the results of the individual sessions. Over 100 research candidates emerged from the breakout sessions, with 24 selected as research priorities. Four themes common to some or all of the five topic areas were also identified:

- the need for improved tools and models to predict and assess outcomes
- the need for improved indicators to better understand the health of environmental systems and prediction of outcomes
- the need for more effective integration and use of data
- the need to better incorporate social and economic factors into environmental assessment methods and tools.

Battelle has prepared a report summarizing the results of the Roundtable, which is guiding Battelle's fiscal year 2007 IR&D investment decisions. Roundtable participants are updated periodically on the progress of Battelle's environmental research projects. The report is available to the public.

For additional information about this program and for a copy of the report, contact Ms. Natasha Rhodes at (703) 416-5818, [rhodesn@battelle.org](mailto:rhodesn@battelle.org).

## Battelle Awarded *New Contract* by South Florida Water Management District

Battelle was recently awarded a \$775K Work Order through their Science and Technology Services Contract with the South Florida Water Management District (SFWMD). The work order is for 26 months and involves placing two Battelle staff on-site at the South Florida Water Management District's headquarters in West Palm Beach, FL. The work involves supporting the staff within the District's Everglades Division by optimizing the functioning of three research facilities needed by Everglades scientists in efforts to restore the Everglades. These facilities include a laboratory for smaller bench-scale studies, a greenhouse, and a large-scale impoundment referred



to as the Everglades Living Laboratory. The greenhouse facility is currently used by District scientists to study a variety of issues pertaining to the vegetation of South Florida and the Everglades. The Everglades Living Laboratory provides a facility that can mimic the Everglades ecosystem in a smaller, more controlled setting. Battelle will conduct a comprehensive evaluation of each of the facilities and will draft an operations plan for the facilities that will allow the Everglades Division Scientists to fulfill their important mission in the overall restoration of the Everglades. For additional information, contact Ms. Jennifer Field at (561) 656-6303, [fieldj@battelle.org](mailto:fieldj@battelle.org).

## Battelle Part of *Winning Team* on Four EPA Procurements

Battelle was recently notified of its award as part of a winning team on four separate procurements issued by the U.S. EPA's Office of Solid Waste and Emergency Response (OSWER). Subcontracts have been signed or are being developed with the prime contractors for three Superfund Technical Assistance and Response Team (START) III procurements and the U.S. EPA's new Decontamination and Analytical Services (DATS) procurement. The START subcontracts are for Region 5 (where Battelle is a subcontractor to Weston Solutions, Inc.), Region 6 (where Battelle is a subcontractor to Dynamac Corporation), and Region 9 (where Battelle is a subcontractor to the AECOM/URS joint venture). The DATS subcontract is with Dynamac Corporation.

For each of these procurements, Battelle will provide high-level technical assistance, specialized labor, analytical services, and other technical capabilities related to site remediation, risk assessment, and homeland security in addition to other technical support areas. For additional information, contact Mr. Joe Carvitti at (614) 424-4843, [carvittij@battelle.org](mailto:carvittij@battelle.org).

## Precht Joins Battelle

Mr. William F. Precht has joined Battelle's Applied Coastal and Environmental Services (ACES) group as Senior Program Manager of its West Palm Beach, Florida, office. Mr. Precht brings over 25 years of professional experience and leadership in geological, ecological, and biological conservation to Battelle, with emphasis on the restoration and rehabilitation of coastal resources.



His expertise includes work on upland, wetland, tidal marsh, mangrove, seagrass, hardbottom, and coral reef ecosystems throughout southeastern United States, Caribbean, and Central America. Mr. Precht comes to Battelle after an extensive ecological sciences program management career with a large A&E firm based in Florida, where he managed various environmental studies projects. These projects pertained to the permitting of dredge and fill for wetland and coastal construction, baseline environmental monitoring studies, endangered species and essential fish habitat studies, wetland evaluation and delineation studies, natural resource damage assessments, as well as NEPA environmental impact analysis and assessment studies. Mr. Precht is a licensed professional geologist and a certified senior ecologist, who earned an M.A. in marine geology and geophysics from the Rosenstiel School of Marine and Atmospheric Sciences of the University of Miami, an M.S. in earth and environmental science from Adelphi University, and a B.S. in geology with a concentration in marine biology from S.U.N.Y. at Oswego. Mr. Precht may be reached at (561) 656-6302, [prechtw@battelle.org](mailto:prechtw@battelle.org).

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