



# AIR QUALITY

## BREATHE EASY. THE ANSWERS YOU NEED ARE RIGHT HERE.

Improving air quality is of national and international importance, given the known health and economic impacts that result from exposures to pollutants in ambient and indoor air. When you need accurate, objective answers for air quality questions, count on Battelle. For more than 40 years, government agencies and private companies have trusted Battelle to help them understand complex air quality issues and make effective, science-based decisions. We are advancing the science of emissions characterization and air quality monitoring to lower detection limits, measure chemicals of concern, improve data accuracy and provide clients with actionable insights. Our team brings together extensive expertise in air quality program design and management, field data collection, analytical chemistry, modeling, data analytics, quality assurance, and outreach. This experience allows us to develop comprehensive solutions that enable you to:

- Reduce the costs and timelines for data collection;
- Improve the accuracy and quality of your data;
- Address emerging air quality concerns with new methods and technologies;
- Expand the capacity of your internal teams; and
- Make better decisions with the data you have.

## OUR SERVICES

We provide comprehensive technical support and subject matter expertise for program management, method development and technology transfer. As the world's largest non-profit research & development organization, we continually reinvest in research to stay on top of the latest advances in air quality monitoring and emissions characterization. We give you objective answers and help you find the right solution for your unique air quality challenge.

Battelle uses state-of-the-art methods and equipment to get accurate, defensible air quality data, indoors or out. We get you the data you need to understand emissions, evaluate air quality management programs, ensure compliance with Clean Air Act and other regulatory requirements, and assess potential human health or environmental risks. We help you:

- Characterize emissions from natural and industrial processes;
- Quantify a variety of ambient and indoor pollutants with low detection limits;
- Assess, improve the quality of, and manage air quality monitoring programs;
- Develop and evaluate the performance of air monitoring methods and technologies;
- Model the transport of pollutants through the environment and predict pollutant exposures;
- Build capacity of air monitoring management programs;
- Assess risks to human health from exposure to airborne pollutants; and
- Communicate exposure risks and mitigation decisions to stakeholders.

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## OUR EXPERIENCE

Our team offers a great breadth and depth of air quality experience and expertise.

### Understanding Burn Pit Emissions

Battelle supported toxicology studies for the Naval Medical Research Unit-Dayton to ascertain the health effects of exposure to emissions from the combustion of solid waste in open burn pits. We re-created a controlled but realistic outdoor environment to simulate open burning that occurs in war zones. We then comprehensively characterized the combustion effluent, using both real-time monitors and integrated sampling techniques, for a wide variety of pollutants such as volatile organic compounds (VOCs), polychlorinated dibenzo dioxins and furans (PCDD/PCDF), polycyclic aromatic hydrocarbons (PAHs), and for particulate matter (PM) size distributions, concentrations and composition.

### Emission of Chemicals from Consumer Products

As part of their Exposure Forecasting (ExpoCast) program, EPA is developing an exposure model to better understand whether exposure to semivolatile organic compounds (SVOCs) from various articles of commerce, such as fabrics, could impact human health. In support of EPA's efforts, Battelle measured the emission rates of target SVOCs from articles of clothing and upholstery material. Battelle developed microchamber emission test methods, sample collection and extraction procedures, and analytical techniques for measuring 12 target SVOCs (e.g., flame retardants) from the sample extracts. Battelle conducted microchamber emission tests on 17 fabric samples, adding quantifiable data for more than 100 chemical-article pairs to EPA's exposure model database.

### Ambient Monitoring to Assess the Air Quality Impact of Surface Mine Blasting Emissions

Multiple, dispersed mining blast sites were thought to have adverse impacts on a rural coalfield community's air quality. Battelle conducted a special purpose monitoring study to characterize and document air quality while surface mine blasting operations were being conducted nearby. We used a variety of sampling and analysis methods to determine gaseous air pollutant concentrations and the mass, particle size distribution, and chemical composition of airborne PM.

Our techniques allowed for accurate emission characterization over a large area, and determination of the impact of the blasts vs. other sources of PM to address citizens' concerns.

### Formaldehyde Air Monitoring Methods Development

Exposure to formaldehyde in ambient air poses one of the greatest risks for cancer among the air toxics, and it plays a key role in the formation of ground level ozone and smog. Battelle has systematically investigated the performance of Compendium Method TO-11A, the "gold standard" for monitoring carbonyls such as formaldehyde in ambient air, with the goal of updating guidance on how best to implement this critical air monitoring technique. At the same time, we are working with Ohio State University to design, construct, test, and evaluate a real time, continuous instrument based on submillimeter wave spectroscopy that will ultimately replace TO-11A for the measurement of formaldehyde and other carbonyl compounds in ambient air.

### Modeling Airborne Pesticide Fate and Transport

Battelle worked with a commercial client to develop a modeling approach to assess the fate and potential long-range transport of a volatilized pesticide as a potential alternative to costly field volatilization studies. Using Pesticide Emission Model (PEM) data, Battelle updated the Community Multiscale Air Quality (CMAQ) model to account for application and volatilization of the specific pesticide of interest. With the PEM-CMAQ tool, we predicted the airborne concentrations of the pesticide across the United States during the 2011 summer growing season resulting from typical application patterns.

### Multiple Pathway Human Health Risk Assessment

Battelle is a member of the team working to design, construct, systemize, operate, and close the Pueblo Chemical Agent Pilot Plant (PCAPP) where chemical weapons are being destroyed. In support of this work, Battelle has conducted a comprehensive human health risk assessment to evaluate potential health impacts related to air emissions of chemicals of potential concern, and communicated the risks to various stakeholders. Additionally, Battelle manages the onsite laboratory, analyzing more than 40,000 air samples per day.

Every day, the people of Battelle apply science and technology to solving what matters most. At major technology centers and national laboratories around the world, Battelle conducts research and development, designs and manufactures products, and delivers critical services for government and commercial customers. Headquartered in Columbus, Ohio since its founding in 1929, Battelle serves the national security, health and life sciences, and energy and environmental industries. For more information, visit [www.battelle.org](http://www.battelle.org).

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It can be done