

# Risk Assessment of Toxic Air Pollutants



## Areas of Expertise

- Emissions Engineering
- Source/Ambient Measurements
- Dispersion, Fate and Transport.
- Toxicology
- Health Risk Assessment
- Ecological Risk Assessment
- Risk Communication
- Legal and Forensic Support

## Key AECOM Attributes

As the largest engineering design firm in the world, AECOM offers a cost-effective mix of national experts and experienced local staff to meet our clients' needs. Our interdisciplinary teams include expertise in health and environmental risk assessment, toxicology, air pollution and process engineering, meteorology, dispersion, deposition and fate and transport modeling and ambient and source measurements.

**Our scientists and engineers are well-versed in presentation of complex technical information to the public, regulators, and stakeholders**

## Overview

Health and ecological risk from emissions of toxic air pollutants is an important component of environmental assessments for new or modified waste and fossil fuel combustion sources as well as remediation of contaminated sites. The Clean Air Act also requires the evaluation of "residual risk" as part of establishing Maximum Available Control Technology (MACT) standards. In addition, many states have separate air toxics control programs that require all types of facilities to establish they will not pose a risk to public health, based on state-specific guidelines. AECOM can help you understand how you are affected by these varying and complex risk assessment requirements.

AECOM's senior experts in toxicology, chemistry, dispersion, fate and transport modeling, exposure assessment and ecology each have over 25 years of experience in evaluating the health and environmental effects of toxic air pollutants. Our team has served clients throughout North America and internationally to apply risk-based decision making to optimize their operations, comply with regulatory requirements, and ensure that public health and the environment is protected.

## Our Approach

Risk-based decision making ensures protection of human health and the environment. AECOM has the knowledge and breadth of expertise to rigorously evaluate potential risk from toxic air pollutants in a wide variety of contexts, each uniquely tailored to the type of sources and pollutants and the regulatory or legal objectives. The complexity of the required assessments can vary greatly. Most state air toxics programs simply require comparison of modeled concentrations with their ambient guidelines. For some classes of sources that emit persistent and bioaccumulative toxic air pollutants, such as mercury or dioxin, the review process requires detailed multi-pathway assessments to assess possible risks to both human health and ecology. In these cases, we have found that developing a work plan outlining approach and assumptions and coordinating closely with the oversight agency expedites the permitting process.

In addition to supporting permitting, AECOM's risk assessment teams:

- Conduct nationwide assessments on behalf of numerous industrial organizations to foster risk-based decision making in the development of emission standards;
- Evaluate fugitive sources, during remediation of contaminated sites, to aid in program design and implementation that is protective of public health;
- Develop case-specific risk assessment approaches, as commonly required for legal cases.

A key goal for all of our projects is to present risk information in a straightforward manner that effectively communicates with the audience. Our scientists and engineers are well-versed in presentation of complex technical information to the public, regulators, and stakeholders.

## Areas of Expertise

- **EMISSIONS ENGINEERING.** Risk assessment starts with identifying and quantifying toxic air pollutants. Based on knowledge of the process and the control technology employed, AECOM air pollution engineers develop emission rates using a combination of source test data, emission factors and engineering calculations. For multi-pathway assessments, we also estimate chemical speciation and the particle size distribution. When risk reduction is called for, we help design process changes and controls to reduce emissions.
- **SOURCE/AMBIENT MEASUREMENTS.** AECOM's source testing specialists measure a wide range of pollutants from vented sources, achieving the lowest possible detection limits to derive source-specific emission factors. For fugitive sources, a fence-line or community-based air monitoring program is often the most direct way to protect public health. AECOM ambient air monitoring scientists and engineers design and deliver systems capable of real-time monitoring programs. Air monitoring installations have been placed in communities near manufacturing facilities, at remediation sites, and in near-road locations. The data from these installations have assured communities of their exposure to toxics during operation, construction, and remediation activities.



## Risk Assessment of Toxic Air Pollutants *(continued)*

- DISPERSION, FATE AND TRANSPORT.** AECOM air quality scientists apply advanced dispersion/deposition models to simulate the dispersion of pollutants in the air and subsequent wet and dry deposition. The transport of pollutants through the soil and waterways, accumulation into sediments and eventual bio-concentration in vegetation, farm animals, eggs, milk and fish are simulated according to established methods such as EPA's Human Health Risk Assessment Protocol, Total Risk Integrated Methodology or methods recommended by State agencies.
- TOXICOLOGY.** A key element of risk assessment is the dose-response assessment, by which human exposure is related to chronic, acute health effects and cancer risk. Although EPA and state agencies have established dose-response factors for a large number of chemicals, AECOM toxicologists often develop defensible dose-response factors when factors are not available or lack scientific justification. Our toxicologists also help develop other critical information such as how a particular substance acts in the body and the target organs that are affected.

- HEALTH RISK ASSESSMENT (HRA).** Every HRA contains aspects of the four basic elements established by the National Academy of Sciences: 1) Hazard Identification, 2) Toxicity Assessment, 3) Exposure Assessment, and 4) Risk Characterization. We recognize the importance of variability and uncertainty in risk assessment outcomes, and include analyses of key areas of uncertainty in all of our assessments. Our specialists tailor the risk assessment to meet applicable regulatory requirements, interact with regulators to negotiate reasonable assumptions and approaches, and communicate results to intended audiences.
- ECOLOGICAL RISK ASSESSMENT (ERA).** The ERA starts with the identification of air toxics that could have ecological impact and a search of the most sensitive species that are present in the study area. Following EPA screening guidance, and supplemented with more recent scientific studies, our ecologists apply measured or modeled media concentrations (air, water, soil, flora, and fish tissue) to evaluate the exposure of these sensitive ecological receptors to specific airborne toxic constituents.

- RISK COMMUNICATION.** AECOM's risk assessment specialists are experienced in explaining complex concepts in a way that is readily understood by the target audience. For AECOM risk assessment specialists, the first step in effective communication is to know and appreciate the concerns of the audience. For instance, for the general public, interpretation of commonly applied risk parameters such as hazard index and lifetime cancer risk require more basic explanations than for the regulatory agency.
- LEGAL AND FORENSIC SUPPORT.** AECOM's risk assessment specialists support special studies often conducted under attorney-client privilege. A few examples included forensic investigations of the potential health effects of historical emissions, evaluations of exposure and risk due to release events, evaluation of community risk from currently operating sources, safety evaluation of chemical operations, and the risk of indoor exposure to chemicals in the workplace and in residences.

