



Air Toxics Risk Assessment



ICF International has been at the forefront in supporting the U.S. Environmental Protection Agency's (EPA) air toxics risk assessment program for over a decade.

Not only has ICF helped EPA to "write the book" on air toxics risk assessment (e.g., *Residual Risk Report to Congress, Air Toxics Assessment Library*), we have applied our capabilities to develop recommendations and strategies for applying best practices for Air Toxic Analysis for National Environmental Policy Act (NEPA) surface transportation projects.

Toxic or hazardous air pollutants are emitted into the air and known or suspected to cause cancer or other serious health effects, such as reproductive problems or birth defects, or adverse environmental effects. Assessing the impacts of these pollutants involves highly complex and challenging science and risk issues. How these issues are addressed can have a major impact on decisions that affect lives, livelihoods, and the environment. Ensuring these decisions are based on the best scientific data and analytical methods is key.

For more than 20 years, ICF International has met these challenges by providing technically sound, legally defensible environmental science and risk assessment services. More than 300 of our staff provide consulting services in human health and ecological risk assessment, population exposure assessment, toxicology, environmental impact assessment, environmental data analysis, statistical analysis, and related technical analysis for regulatory, litigation, and other support. We have successfully completed thousands of projects for a diverse client base including multinational corporations; trade associations; local, state, and federal governments (both foreign and domestic); and research institutions.

Our Approach

ICF's successful approach applies an integrated set of technical, scientific, analytical, and computer skills to assess the impacts of air toxics emitted from various types of facilities and sources.

Characterizing Emissions

ICF develops an emissions inventory (for various types of emissions sources) using our thorough understanding of the processes that generate the emissions and how these emissions are released into the air. Where appropriate, we apply emissions models (the U.S. Environmental Protection Agency's MOBILE model, EMFAC2007) and emissions factors, as well as measurement data, to determine the magnitude and temporal and spatial extent of emissions.

Estimating Environmental Concentrations

ICF applies air quality models, including simple modeling tools for screening-level assessments (SCREEN3) and complex modeling tools that take into account source characteristics, meteorology, and other factors (ISCST3, CALPUFF, AERMOD). We also develop new air models (ASPEN, UAM-Tox, REMSAD) to estimate atmospheric concentrations of emitted air toxics. When appropriate, we perform multimedia fate and transport assessments for persistent/bioaccumulative air toxics.

Exposure Modeling

ICF develops and applies exposure models (HAPEM5, APEX) that consider receptor characteristics, activity patterns, and information on variability and uncertainty to estimate realistic exposures to air toxics via inhalation and other pathways.

Risk Characterization and Communication

ICF identifies appropriate toxicity data for the receptors and endpoints of interest and combines these data with the results of exposure modeling to characterize risks, taking into account uncertainty and variability associated with all of the different aspects of the assessment. We develop highly effective documentation of our risk assessment methodologies, models, and results for region- and site-specific risk assessments, technical support documentation and users' guidance, and Congressional report.

Featured Projects

Residual Risk Assessments

ICF assesses residual risk for industrial source categories under the Clean Air Act as a prime contractor to the Environmental Protection Agency (EPA). We have collected and processed input data such as emissions and physical/chemical attributes of emitted substances and dose-response data on the pollutants of concern, estimated environmental concentrations and exposures associated with these emissions, and completed risk characterizations. Residual risk assessments have ranged from screening analyses of hundreds of facilities in a category to in-depth, refined assessments of individual facilities and emission sources.

Best Practices for NEPA Air Toxic Analysis of Surface Transportation Projects

ICF developed information and guidelines on available analytical models and techniques to assess mobile source air toxic (MSAT) impacts and how to communicate this information for the National Cooperative Highway Research Program. Recommendations were developed on analytical modeling tools to use in MSAT assessments. Methodologies were developed to identify the appropriate level of analysis using typically available information and potential level of exposure based on the size of the transportation project. Five levels of analysis were identified based on both technical and policy considerations. Recommendations were developed on how to conduct the MSAT assessment.

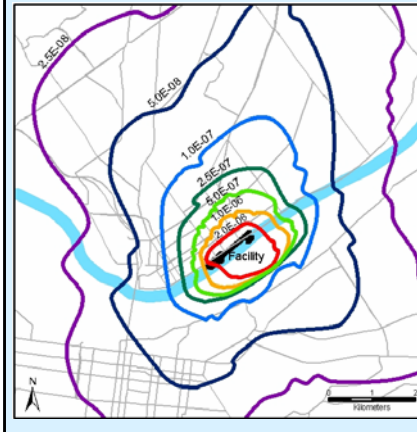
Population Exposure to Diesel Particulate Matter

For a group of private clients, ICF assessed direct exposure of individuals in the near vicinity of operating diesel vehicles to diesel particulate matter. We developed a screening assessment tool specific to the problem at hand and applied several types of air dispersion models to address traveling and idling vehicles on roadways and intersections and aggregated vehicle activity at distribution centers.

Documentation Support

ICF provides expertise in document preparation to EPA on various projects, including Congressional reports (Mercury Study, Residual Risk and Urban Air Toxics), EPA's comprehensive air toxics risk assessment guidance library, and other technical reports.

Dispersion Modeling of Air Emissions for a Residual Risk Assessment



In this example, ICF International performed a risk assessment for a facility using the ISCST3 air dispersion model to predict ground-level ambient air concentrations of a carcinogenic compound in the vicinity of a large manufacturing facility. Dose-response data and exposure parameters were used in combination with predicted air concentrations to estimate isopleths for lifetime individual cancer risk via inhalation.

Portland, Oregon Air Toxics Assessment

ICF performed air dispersion modeling with CALPUFF for 12 hazardous air pollutants emitted from all identified sources in the Portland metropolitan area during 1999 and 2000. Our staff worked closely with Oregon Department of Environmental Quality (ODEQ) and Portland's Metropolitan Regional Government to develop an improved emission inventory at fine spatial resolution, including the specification of precise roadway locations for vehicle emissions. Model predictions showed good consistency with monitored data collected during the same time period. The findings of the study will be used by ODEQ for risk reduction planning.

Hazardous Air Pollutant Exposure Model Development and Application

ICF led a team of researchers in upgrading EPA's Hazardous Air Pollutant Exposure Model (HAPEM), which includes considerations of population activity patterns, population mobility, and concentration estimates for both indoor and outdoor microenvironments. We instituted improvements including incorporating stochastic elements to the model algorithms and developing a database of microenvironment factors for 35 pollutants. The enhanced model was applied to estimate exposure concentrations for ten demographic groups in each U.S. Census tract as part of EPA's National Air Toxics Assessment national-scale assessment.

About ICF International

ICF International (NASDAQ: ICFI) partners with government and commercial clients to deliver consulting services and technology solutions in the energy, environment, transportation, social programs, defense, and homeland security markets. The firm combines passion for its work with industry expertise and innovative analytics to produce compelling results throughout the entire program life cycle, from analysis and design through implementation and improvement. Since 1969, ICF has been serving government at all levels, major corporations, and multilateral institutions. More than 3,000 employees serve these clients worldwide.

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