

# Evaluating Cumulative Risks in the Chicago Metropolitan Area

*Risk assessment within the U.S. Environmental Protection Agency (EPA) has historically focused on the incremental risks of chemicals emitted in significant quantities from a single facility. Recently, the EPA has been shifting the emphasis of risk assessment increasingly to a more broadly based approach. This approach is characterized by greater consideration of multiple end points, sources, pathways, and routes of exposure; community-based decision making; flexibility in achieving goals; case-specific responses; a focus on all environmental media; and holistic reduction of risk. Such a broad scope requires more complex analyses that involve cumulative risk assessment, an evolving field in which EVS is providing research and technical assistance to the EPA.*

## PROBLEM/OPPORTUNITY

In response to a Chicago Legal Clinic petition filed in 1996 on behalf of 11 community advocacy groups, the EPA funded the Chicago Cumulative Risk Initiative (CCRI). This effort is designed to address issues of cumulative environmental loading and health risks from multiple sources in Cook County, Illinois, and Lake County, Indiana. To address community needs and advance methods for assessing cumulative risks, the CCRI focuses on developing and implementing a strategy for analyzing cumulative risks to populations (especially children) exposed to contaminants in the Chicago metropolitan area.

## APPROACH

EVS and Argonne's Decision and Information Sciences Division developed three conceptual approaches for consideration in planning the CCRI risk assessment effort: source-oriented, receptor-oriented, and source/receptor hybrid. Each approach has different implications for risk management decision making. Next, the general scope and technical approach for the cumulative risk assessment study were further refined to include a screening analysis of environmental and health indicators, a cumulative exposure and risk evaluation for multiple air pollutants and multiple sources, and a description of other risk pathways. Integrating these components will produce a broadly inclusive risk assessment that will facilitate the comparison of contributions among multiple sources. The resulting methodology should be applicable to other metropolitan areas.

The initial screening phase has been conducted, with air toxics as the focus; however, criteria pollutants, health

effects rates, and facility locations were also included. Because no single basis is considered sufficient for identifying high hazard areas with regard to air toxics, the screening process depended on analyzing the consistency of multiple measures. Databases for emissions from various source sectors, modeled ambient concentrations from the EPA's National Cumulative Exposure Project, and available monitored ambient concentrations were employed. Hazard levels were assessed by using toxicity weights and risk-based benchmark concentrations.

## RESULTS

The screening assessment has resulted in several significant outcomes. It has provided a basis for identifying small geographic areas with different types and levels of hazards, which may be used to select localities to study in more detail. The screening effort also has produced a "hazardscape" in the Chicago area; that is, a mapping of the locations and relative hazards associated with toxic emissions, air toxic concentrations, and emission sources. To the degree that there was adequate information available to do so, pollutants were evaluated cumulatively. Finally, the screening effort assembled data for some disease rates among children residing in various areas.

## FUTURE

Argonne pursued a phased approach to the cumulative risk assessment which incorporated a preliminary planning phase; a second phase involving a detailed screening evaluation of relevant health and environmental indicators; and a third phase tentatively involving a focused, community-based cumulative risk analysis. The planning task and screening evaluation have been

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completed. The direction of the third phase will be determined by EPA following stakeholder input.

## COMMUNICATION OF RESULTS

Argonne completed a draft final report on the screening evaluation of health and environmental indicators that was reviewed by EPA, petitioners, other stakeholders, and an external peer review panel. The final report, *Air Screening Assessment for Cook County, Illinois, and Lake County, Indiana*, was published in March 2004. In addition, white papers that present various conceptual approaches and address planning and scoping issues related to the proposed study design were also completed.

EVS staff also gave presentations on the background, methodology, and preliminary results of the study at annual meetings of the Society for Risk Analysis (SRA) and the Midwest Society of Environmental Toxicology and Chemistry (SETAC).

The principal investigator has participated in several EPA peer review panels for which cumulative risk was a central issue (for a risk assessment report on the Waste Technologies Industries [WTI] incinerator, the mercury study report to Congress, and EPA's *Framework for Cumulative Risk Assessment*).



Source: Farr Associates Architecture and Urban Design

*The importance of considering environmental health risks to children is becoming increasingly clear.*