Executive Summary

What's Covered in Executive Summary:

- Initiation of RAIMI Program
- RAIMI Pilot Study Design
- Potential Agency Applications
- Risk Management Capabilities

The U.S. Environmental Protection Agency (EPA), Region 6, is considering establishing a Regional Air Impact Modeling Initiative (RAIMI) Program for Region-wide prioritization of the potential for health risks, on a community level of resolution, as a result of exposure to multiple contaminants from multiple sources and through multiple exposure pathways. As a test of the RAIMI methods and approach, a Pilot Study was designed and implemented in a small area in southeast Texas.

The Pilot Study was designed to be done in two phases. The first phase to test methods and approach for initial prioritization of sources based on estimated risks resulting from direct inhalation, while the second phase is to study indirect exposures resulting from air-related sources. This document presents an overview of the initial phase of the RAIMI Pilot Study, including background information on the project, the methodologies and tools employed, and the Pilot Study results for the first phase. This initial phase includes prioritization of risk concerns based on the estimation of potential inhalation risks associated with modeled air concentrations from local emission sources within the Port Neches Assessment Area, Jefferson County, Texas.

In accordance with the design of the RAIMI, the soundness of the initial results for the Pilot Study analysis are a direct function of the accuracy and completeness of the data upon which the estimates were made. Findings for the Pilot Study could change as source and contaminant emissions data become more complete, allowing better quantification and reduction of uncertainties.

Initiation of RAIMI Program

U.S. EPA's 1999 Cumulative Exposure Project (CEP) reported potentially significant risk in counties and parishes within EPA Region 6 that contain relatively high densities of industrial sources located in proximity to communities. Whereas the CEP results applied more generally to county-wide populations and serve as an indication of protectiveness on a broad scale, EPA Region 6 recognized that a more refined approach would be required to effectively highlight and adequately address areas of unacceptable risks resulting from aggregate exposure.

In addition to the need to further assess CEP findings, EPA Region 6 also identified the potential for the RAIMI to be used by permitting authorities–EPA, state, and local, independently or combined–as a risk-based tool to evaluate and demonstrate protectiveness of cross program permitting decisions. Also important is the need to provide a standardized and consistent means to account for and assess aggregate health effects to multiple contaminants from multiple sources, which are often subject to multiple permitting schemes, but impacting the same receptor neighborhoods.

RAIMI Pilot Study Design

Specifically, the RAIMI Pilot Study is designed to provide a prioritization based on the estimate of potential health risks resulting from multiple contaminants and air emissions sources within a pre-defined geographical area as a whole, and to a community level of resolution. In addition, results from the RAIMI are fully transparent such that estimated risk levels are completely traceable to each source, each pathway, and each contaminant. This allows for prioritization of sources and contaminants based on the highest potential impact, and provides the most useful information in focusing risk management opportunities on the worst impacts first.

RAIMI was designed to simultaneously calculate and track risks from literally hundreds of sources and contaminants based on various emissions scenarios (e.g., actual or estimated emissions data submitted by facilities to the state agency). As new or refined data becomes available, it can be directly incorporated into the assessment to obtain revised risk estimates on essentially a real time basis. The RAIMI Pilot Study design has demonstrated a flexible and dynamic platform, allowing for the rapid identification, characterization, assessment, and management of aggregate environmental exposures.

Potential Agency Applications

The RAIMI technical approach was developed to utilize existing guidance and technical tools, but to expand use of these tools to an aggregate exposure assessment application. In doing so, EPA Region 6 believes that the RAIMI may have

far-reaching uses in agency and facility decision making, as well as addressing Government Performance and Reinvention Act (GPRA) goals.

The risk-based approach of the RAIMI is well suited for supporting prioritizations based on the analysis of aggregate exposure and cumulative risk. The evaluation of aggregate exposure and cumulative risk from all significant sources impacting a location is an approach which looks at exposures much more like they are expected to take place in the community. This is a more effective approach than conventional risk assessments, where risks are evaluated one at a time from emissions at single facilities or sources, and can better enable EPA to fulfill its mandate to protect human health and the environment.

The RAIMI represents a dynamic platform to assist State or Federal permitting agencies in evaluating or establishing emissions permit conditions and requirements based on the impacts that such conditions would have on individual communities. In areas where there is a high density of large-volume sources, the permit conditions can be guided by aggregate impacts to individual receptors. Further, the RAIMI approach may assist the permitting agencies in evaluating impacts from non-compliance and in determining appropriate enforcement or corrective actions. Industry sectors or emission sources with low impacts can be acknowledged and categorized as a lower priority. The effectiveness of regional or facility-specific emissions reduction programs to lower impacts can be tracked. Facilities, in turn, may adapt the RAIMI risk-based approach to assist with business decisions regarding plant maintenance, upgrades, and process control.

The efficiency and traceability designed into the RAIMI methods allows for improvements to the screening risk evaluation process through:

- Enabling the development and design of air monitoring programs tailored to measure ambient air concentrations of specific contaminants from multiple sources in at-risk neighborhoods;
- Reduction of uncertainty in default assumptions to more precisely protect public health;
- Identification of sensitive inputs and parameters, unique to aggregate risk, that could direct research efforts and risk management strategies; and
- Refinement of program-specific emissions characterization requirements to further support the completeness of, and confidence in, model-ready emissions inventories for risk-based evaluation and risk management purposes.

Risk Management Capabilities

The RAIMI Pilot Study successfully demonstrated its stated design objectives. As a practical application of the RAIMI methods, results generated allow:

- Identification and prioritization of emission sources, regardless of type (i.e., area, point, mobile) and permit status (i.e., RCRA, CAA, exempt), that are

resulting in the highest risk-based impacts. For example, at any given location within the Port Neches Assessment Area, a ranking of modeled emission sources, based on relative potential impact, is available specific to that location and available emissions characterization information.

- Identification of data gaps and needed information that may have the most significant effect on the ability to accurately characterize potential impacts, and /or evaluate risk management opportunities. For example, unspeciated emissions from sources near a specific neighborhood receptor location may warrant closer scrutiny and additional resolution and speciation to further assess risk impacts at that location.

- Generation of results at a level of resolution and transparency that fully supports consideration of risk management opportunities. For example, results specific to a defined location include the relative impact attributable to each emission source, the contaminants from each emission source that are responsible for that impact, and the tracking of important source attributes such as permit status, emissions rates, and applicable technology-based emissions limits.

- Options and flexibility to incorporate new or refined data as it becomes available, so that prioritizations can be readily updated with the implementation of risk management efforts and/or enhancement in the certainty of data inputs. For example, annual updates to state emissions databases can be readily incorporated into the existing RAIMI structure, providing a dynamic mechanism to assess current impacts and track changes to receptor-specific impacts over time based on new emissions data.

In addition to testing the capabilities of the RAIMI as a risk-based approach to accomplish stated objectives, this document presents site-specific findings resulting from currently available data on air emissions and significant sources within the air shed of the Port Neches Assessment Area, Jefferson County, Texas. As is the design of the RAIMI, findings are anticipated to change as source and contaminant emission data sets become more complete, and as risk management efforts are implemented. Likewise, uncertainties are also expected to be reduced and better quantified.

EPA acknowledges that the design goals would only be *fully* achieved, in the Pilot Study or in other applications of the RAIMI methods and approach, with input data of appropriate quality commensurate with the permitting or risk management decision being made. In most cases, given the current availability of data, this will be realized – for more costly or controversial risk management or permitting decisions – not at the stage of using "readily available data," but only after inclusion of site-specific additional information that results in refinement of the analysis specific to highest risk concerns and significant data gaps. However, the process of identifying and focusing on significant risk concerns based on available data is the first and necessary step in effectively considering risk management opportunities.