Assessment of Land-based Sources of Air Quality Contaminants in the Binational Border Region of Southwestern New Mexico and Northwestern Chihuahua

Project Summary

Problem Statement

Air quality is one of the most critical environmental health concerns in Southwestern New Mexico and Northwestern Chihuahua. Moderate and extreme wind events launch high levels of particulate matter into air basins affecting rural and urban residents of Otero, Doña Ana, Luna, Hidalgo, and southern Sierra and Grant Counties in New Mexico, and the Municipalities of Janos, Nuevo Casas Grandes, Ascension, Villa Ahumada, and Juarez Municipalities in Chihuahua. Doña Ana County and most of Luna County are under Natural Events Action Plans (NEAP) in an effort to reduce the sources of dust and sand (PM_{10}). Windblown dust is an especially acute problem frequently aggravating health conditions in and around the Village of Columbus as well as its sister city of Palomas, Chihuahua; while less-frequent larger-scale regional wind events and "dust storms" affect the entire binational border region. Automobile and industrial emissions emanating from Juarez and El Paso affect the greater Paso del Norte Region, including southern Doña Ana County, especially during winter inversions; with Sunland Park and Anthony are classified by the EPA as non-attainment areas for ozone ($PM_{2.5}$).

Pollen spores emanating from natural and exotic plant, shrub, tree and agricultural species are present during different times of the year, resulting in waves of allergens that cause seasonal allergies and serve as triggers for chronic conditions, including asthma, bronchitis and sinusitis. Methane, fungal spores (e.g., *Aspergillus spp*.), and airborne particulates of manure from confined animal feeding operations (dairies and cattle holding facilities) in southern Doña Ana County affect residents in nearby communities of Mesquite, Vado, Del Cerro, and Anthony. Historic and recent assessments have shown that the fungus *Coccidioides posadasii* is endemic in Chihuahuan desert soils and is dispersed by low and high-intensity wind events, causing coccidioidomycosis ("cocci"), an infectious pulmonary disease in both acute and chronic forms commonly referred to as "valley fever."

The aforementioned conditions instigate or exacerbate several important health conditions that, while they can affect all residents, put more vulnerable segments of the population at extreme health risks. Existing respiratory ailments, including asthma, emphysema, chronic bronchitis, chronic obstructive pulmonary disease (COPD) and severe allergies, as well as chronic conditions and co-morbidities (diabetes, hypertension, and cardiovascular disease) can be exacerbated during air pollution events. The elderly have reduced defenses to fight off complications related to poor air quality, while infants and young children, whose lungs and other organs and immune systems are still in development, are especially vulnerable. Airborne contaminants also cause eye irritation and infections.

Several studies indicate that future climatic variation on a global and continental scale will result in concomitant changes in weather systems affecting Southwestern New Mexico and Northwestern Chihuahua. Projected potential changes include warmer and dryer conditions, a reduction in winter rains, and an intensification of monsoonal storm events, among others. Consequently, current air quality problems in the region could be exacerbated, resulting in an increase of related human health problems.

The Assessment

While various geographically-isolated, contaminant-specific, and/or general epidemiological studies have been carried out in the southwestern New Mexico over the last 20 years, not one has been comprehensive in scope or considered all factors related to air quality problems in the region. The current assessment proposes a series of interconnected studies to develop a better understanding of the sources of air quality contaminants, both natural and human-induced, and the climatological/meteorological phenomena that control them. A new and more comprehensive air quality monitoring network will be established incorporating and/or upgrading stations already in place, as well as through the placement of new monitoring stations (including meteorological instrumentation). A new epidemiological baseline of chronic health conditions in the region will permit an assessment of the cause-and-effect of varying air quality conditions throughout the region. The proposed assessment will consider the following elements, most of which will be applicable in southwestern New Mexico and northwestern Chihuahua:

- Inventory of landforms, soils, hydrology, vegetation and all types of land use, including and assessment of soil erodability;
- Systematic assessment of climatology and meteorological phenomena affecting southwestern New Mexico and northwestern Chihuahua, including a comprehensive study of seasonal wind characteristics, and moderate to high-intensity wind events;

- Assessment of air quality based on past and ongoing monitoring data available from stations in the region, upgrading of existing stations and establishment of new strategically-placed stations;
- Inventory and characterization of point sources of chemical, industrial, agricultural and naturally-occurring emissions;
- Focalized studies of *Aspergillus spp*. fungal spore dispersion from confined animal feeding operations;
- Pollen counts and dispersion studies, considering the type and seasonality of plant species, and climatological/meteorological phenomena;
- Distribution of chronic diseases and any infectious or other disease anomalies considering both incidence and prevalence rates among discrete demographic groups and geographic locations;
- Improved diagnosis and monitoring of cocci cases in southwestern New Mexico, facilitated through training of clinicians in cocci diagnosis and lab confirmations;
- Modeling of air quality considering factors of wind, point and non-point sources of contamination, whether natural or human-induced;
- Determination of actual and/or most probable causes and sources of air quality contamination (PM_{10} and $PM_{2.5}$) affecting the sub-air basins and the regional air basin of southwestern New Mexico; and
- Specific recommendations for reducing air quality contamination specific for those causes and sources identified, including proposals for best available control technologies (BACT) for industry and agricultural processes, and best-practices of land management, agriculture, and vegetative restoration, as may be determined appropriate.

Project Implementation

The project was initiated on April 1, 2010 and is being implemented under a Memorandum of Agreement with the consortium led by New Mexico State University, with partners University of Texas-El Paso, the Desert Research Institute, and the Autonomous University of Juarez (Chihuahua).The scope of activities will depend on current availability of pertinent secondary sources of information, need and costs to deploy additional monitoring and upgrade equipment and instrumentation, and the potential for leveraging additional funding and the cooperation of various agencies on both sides of the border. As currently proposed, the assessment will be implemented over a four-year time horizon. The New Mexico Department of Health, Office of Border Health has earmarked $236,000/year to fund the project. Use of these funds will be restricted to the State of New Mexico. Additional funding and in-kind contributions of state and federal agencies in the U.S. and Mexico, and/or international organizations, is required to fully build out the monitoring network and several of the natural resource inventories.

Collaborating Organizations and Agencies

Implementation will require collaboration with numerous local, state and federal government agencies, universities and institutions, as well as public health and environmental advocacy organizations, soil and water conservation districts in both Mexico and the U.S. The scope of the assessment indicates the need for cooperation of those working in public health, agriculture, land management, urban and residential development, transportation, several industrial and energy sub-sectors, environmental protection, and legislators. Such organizations and agencies are deemed as natural stakeholders by virtue of their respective regulatory mandate, organizational mission, productive and economic interests, scientific interest and capability, sources of data pertinent to the study, and/or as advocates for environmental health in the communities of southwestern New Mexico and northwestern Chihuahua. Memoranda of understanding and/or mutual-aid agreements will be required between the New Mexico Department of Health and many of these entities to forge a successful and fully collaborative project in the binational border region shared by the U.S. and Mexico.

For more information or inquiries, please contact:

Paul Dulin, Director, Office of Border Health
New Mexico Department of Health,
1170 North Solano, Suite L
LAS CRUCES NM 88001 USA
TEL: (575) 528-5154 **paul.dulin@state.nm.us**
www.nmborderhealth.org