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Improving Air Quality in Paso del Norte

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Abstract

The Paso del Norte region is an airshed that comprises portions of three states (Texas, New Mexico, and Chihuahua) in two countries (the United States and Mexico). Air quality in this region has been a problem since initial monitoring began in the 1970s and 1980s. El Paso, Texas, was officially declared in violation of the U.S. health-based standards for ozone and carbon monoxide in the 1970s and in violation of the standard for particulate matter in 1990. Other areas in the region had similar problems. A number of actions were taken by federal, state, and local governments in both countries over a period of several years and an innovative, inter-jurisdictional mechanism for developing mutual strategies was created. Air quality has improved measurably and redesignations of El Paso's status under U.S. regulations are in process. This success is due to a combination of factors: the national regulatory framework, state and local government programs, favorable natural and climatological conditions, and local (but binational) stakeholder-based activity and advocacy. Yet, perversely, some of the same things that have worked for the improvement of air quality have also worked in other ways to its detriment. The net result, however, is positive.

Mejora de la Calidad del Aire en Paso del Norte

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Resumen

La región Paso del Norte es una cuenca de aire que comprende porciones de tres estados (Texas, Nuevo Mexico y Chihuahua) en dos países (México y los Estados Unidos). La calidad del aire en esta región ha sido un problema desde que inició el monitoreo en las décadas de 1970 y 1980. En la década de 1970, El Paso, Texas, fue oficialmente declarado en violación de los estándares estadounidenses basados en la salud para el ozono y el monóxido de carbono y en 1990 en violación del estándar para materia particulada. Otras áreas en la región tenían problemas similares. Un número de acciones se llevaron a cabo por los gobiernos federal, estatal y local de ambos países en el transcurso de varios años y se creó un mecanismo innovador e interjurisdiccional para el desarrollo de estrategias comunes. La calidad del aire ha mejorado de modo medible y las redesignaciones de la condición de El Paso están en proceso bajo las reglamentaciones estadounidenses. Este éxito se debe a una combinación de factores: el marco reglamentario nacional, programas de gobierno locales y estatales, condiciones climatológicas naturales y favorables y la abogacía y actividades con base en las personas interesadas a nivel local (pero binacional). No obstante, a la inversa, algunas de las mismas cosas que han funcionado para mejorar la calidad del aire también han contribuido hacia su detrimento. El resultado neto, sin embargo, es positivo.

Introduction

The Paso del Norte region, an airshed that includes portions of three states (Texas, New Mexico, and Chihuahua) in two countries (the United States and Mexico) was declared in violation of respective national air quality standards for three different pollutants in the early 1990s. This created a challenge because of the potential hurdles implied by dealing with multiple jurisdictions and differences in legal systems, language, and cultures.

The region's air quality has been improving measurably, although the general public probably does not perceive it. Instead, people notice degraded visibility and a brown cloud and thus think the air is bad. People see a tall, dormant smoke stack at the Asarco plant, and not their tail pipe, and think the air is bad.

The very real improvements in air quality are due to a combination of factors: the national standards and regulatory framework, state and local government programs, favorable natural and climatological conditions, and local (but binational) stakeholder-based activity and advocacy. Yet, perversely, the same things that have worked for the improvement of air quality have also contributed to its detriment. The net result, however, has been positive.

This chapter provides short descriptions of the region, the original problems, and the progress made. It then examines which actions have been or have not been effective in helping bring about that progress.

An Overview of the Region

The Paso del Norte region comprises the communities of Ciudad Juárez, Chihuahua; El Paso County, Texas; and southern Doña Ana County, New Mexico. Total population is approximately 2.25 million. Ecologically, the region is high Chihuahuan desert at an altitude of approximately 4,000 feet. Average annual rainfall is nearly eight inches (the past decade has been lower), humidity is very low, winters are mild, and summers are hot and dry, with diurnal temperature variations of 30°F to 40°F. Like most of the U.S.-Mexican border, the U.S. portion of the region is economically depressed compared to the U.S. average; the Mexican side is depressed relative

to the U.S. side and economically advantaged compared to the rest of Mexico. Topographically, the region is complex terrain, with dominant mountain features that create a bowl that traps pollutants, especially during stagnant and inversion conditions.

The population in the region, which reached approximately 1.9 million in 2000, has been growing at a high rate (Federal Reserve Bank of Dallas 2001), although not any higher than some other urban areas in the U.S.-Mexican border area. The 1990s witnessed annual growth of 3.7% in Paso del Norte, which was nearly triple the U.S. national rate and nearly double the Mexican rate (disaggregating the data for El Paso and Ciudad Juárez shows the rate of growth in the latter was significantly higher than in the former).

For years the area drew attention for its poor air quality. El Paso had the dubious distinction of being the only city in the United States that was designated by the U.S. Environmental Protection Agency (EPA) as nonattainment for the National Ambient Air Quality Standards (NAAQS) for three of the six criteria pollutants—ozone (O_3), carbon monoxide (CO), and particulate matter (PM).

Monitoring of ozone and CO began in El Paso in 1970 and the data soon showed the area violated the original one-hour standard for average ozone concentrations and the eight-hour standard for average CO concentrations (Texas Natural Resource Conservation Commission [TNRCC] 2002). The first plan for addressing the problems was submitted to EPA in 1979. A new classification system established by the 1990 amendments to the Federal Clean Air Act (FCAA) designated El Paso as a "serious" nonattainment area for ozone.

Monitoring of PM_{10} (particulate matter with a diameter of 10 microns or less) began in El Paso in the late 1980s and it was clear that both the 24-hour and the annual standards were being violated. The 1990 amendments to FCAA made El Paso a "moderate" nonattainment area under the two standards.

Similarly, Ciudad Juárez exceeded the Mexican national standards (Normas Oficiales Mexicanas, or NOM). EPA designated portions of Doña Ana County nonattainment for PM_{10} and ozone.

These designations, of course, garnered widespread publicity, and much of the public still believes the problems remain unchanged. What gets the public's attention is visibility. The region is often blanketed by the aforementioned brown cloud.

The designations, however, also generated a series of national, state, and local actions on both sides of the border. Some combination of these actions appears to have worked. Air quality data in El Paso over the past 10 years to 15 years have indicated significant improvement in relation to U.S. standards for the three pollutants in question, despite population growth in the region. Likewise, monitoring data in Ciudad Juárez indicate the improvements have been basin-wide.

As a result, EPA is in the process of redesignating El Paso. First, when the designations for the new U.S. eight-hour ozone standard were announced by EPA in the spring of 2004, El Paso was declared an attainment area. Its previous status under the one-hour ozone standard became a non-issue because that standard was officially revoked in June 2005. It is worth noting that El Paso had not experienced any violations of the one-hour standard since the mid-1990s. Nevertheless, the Texas Commission on Environmental Quality (TCEQ) was required to submit what is referred to as a maintenance plan, as is required for all areas in attainment, and as part of this plan the agency left in place most of the programs that had resulted in improvement during the 1990s.

Monitors also have recorded a decreasing number of exceedances of the eight-hour CO standard since 1990, although with fluctuations as might be expected. Since 1997 technical compliance under that standard has been maintained (TNRCC 2002). In January 2006 TCEQ submitted a request to EPA for redesignation to attainment under the carbon monoxide standard. It is not known how soon EPA will be able to respond.

Finally, annual average concentrations of PM_{10} declined significantly in the early 1990s, then more or less leveled off with fluctuations over the next few years. All monitors except one special-purpose monitor have shown compliance with the standards since 1992 (TNRCC 2002). A few issues remain with respect to PM, but at some point in the future El Paso and TCEQ hope for redesignation of El Paso for this pollutant also.

As with the ozone standard, TCEQ will be required to submit maintenance plans for CO and particulate matter, and existing control programs will likely stay in place.

Two general observations can be made. First, significant improvement occurred during the early or mid-1990s in the concentrations of all three pollutants, and the gains have been maintained. Second, this sustained improvement occurred despite high rates of population growth in the region.

National Regulations

At the top of the legal hierarchy are the standards and other requirements promulgated by the two national governments, as well as programs they implement in support of improvement. What has helped Paso del Norte?

- The air quality standards themselves (NAAQS in the United States and NOM in Mexico forced everyone to recognize the problems that existed)
- The national regulations triggered in the United States by nonattainment designations
- Auto emissions standards
- Fuel-related programs, such as lead-free gasoline, use of oxygenates, and vapor controls
- Monitoring programs

The Mexican and U.S. national standards for the criteria pollutants are, for the most part, equivalent (see Table A at the beginning of this monograph), although recent changes in U.S. ozone and particulate matter standards have created differences.

Periodic changes to standards made by EPA, specifically in what is measured or how long a period of time is averaged, have been a double-edged sword. El Paso is one of a handful of communities that could have had future problems with the old one-hour ozone standard because it is possible that part of the success of the past decade is due to Mother Nature, and that a long, hot summer like 1996 could cause problems. But, the federal change from a one-hour standard to an eight-hour standard helped define this problem out of existence. On the other hand, changing the PM standard from PM_{10}

to $PM_{2.5}$ (particulate matter that measures 2.5 microns or less in diameter) caused many communities to cease monitoring the former, thereby losing much information that might be valuable in assessing the relation between air pollution and health effects.

U.S. fuel consumption standards and increasingly strict emission standards for automobiles have been beneficial to the nation, and to a lesser extent to the U.S.-Mexican border region. The border region will certainly reap benefits from these standards, but at a slower rate than the rest of the nation because poor economies and dry climates, where vehicles don't rust away, lead to older vehicle fleets, and older vehicles are generally dirtier in terms of emissions. Likewise, the increased marketshares of SUVs and light trucks tend to offset the automobile gains as long as those categories are treated much more leniently.

The mandate for lead-free gasoline, along with the introduction of newer-generation automobiles, may be the most significant factors in the improvement of air quality. Likewise, the use of oxygenated gasoline in winter and low Reid Vapor Pressure gasoline in summer have significantly helped mitigate the seasonal problems of carbon monoxide and ozone, respectively.

On the other hand, it would be better if these fuel programs were applied more consistently throughout the region. Currently, the New Mexico sector of Paso del Norte does not require these fuels, and the concentration of oxygenates used in fuel in Ciudad Juárez in the winter is roughly half of what is required in El Paso. But it is fortunate that the preferred oxygenate is ethanol, as the region's groundwater sources could be vulnerable to methyl tertiary-butyl ether (MTBE), especially in Ciudad Juárez where gasoline storage tanks may be more susceptible to leakage.

Another important program has been the use of vapor controls at fueling facilities. El Paso has stage I and II vapor controls in place. Ciudad Juárez and Doña Ana County have not yet instituted such programs.

U.S. mandates for diesel engine emissions and ultra-low-sulfur diesel fuels, which will be phased in over the next four years, will also bring air quality improvements. The challenge will be to foster uniformity within the airshed.

Lastly, the application of available control technologies to El Paso's most prominent industrial source, the now dormant Asarco smoke stack, in the late 1980s and early 1990s also contributed to emissions reductions that ultimately manifested in air quality improvements.

State and Local Programs

While national governments set standards, and proscribe selected regulations, in the United States the responsibility for execution of the regulations and adoption of implementing programs, as well as air quality management in general, lies with state and local governments.

The impact of the State Implementation Plans (SIPs), and their Mexican analog, the Pro-aire program (although, the latter is federal in design but local in implementation), cannot be underestimated. Texas has SIPs for ozone, PM, and CO in El Paso (TCEQ 2006). They mandate a variety of actions and controls to reduce emissions, including controls on burning, street sweeping programs, inspections of gas stations to ensure compliance with fuel programs, and vehicle inspection and maintenance.

State and local ambient air monitoring programs collect data concerning various pollutants, air toxics, and meteorological conditions. These data are available to the public in near real-time on websites operated by the states of Texas and New Mexico. Regional news media also provide information about the air quality index (AQI), levels of ultraviolet radiation, and pollen counts.

El Paso has an Ozone Action Day program. One function is to alert sensitive and vulnerable portions of the population when levels of ozone are expected to be higher than normal. Presumably, informed individuals may take action to reduce their exposure and mitigate the effects of this pollutant. The Ozone Action Day program includes an outreach component that recommends actions to reduce pre-cursor emissions. Those actions include reducing per person vehicle miles traveled by carpooling, using public transportation, and consolidating trips; avoiding fueling operations during midday; deferring lawn mowing; and avoiding drive-thru lanes and excessive vehicle idling. At present, these actions are voluntary.

Residents of Ciudad Juárez and Doña Ana County are exposed to the El Paso program's notices through shared media outlets. In addition, the Texas Department of Transportation conveys Ozone Action Day alerts on electronic road-side media in the city.

Through the Clean Cities program, sponsored by the U.S. Department of Energy, El Paso has increased the number of vehicle fleets using alternative fuels.

Ciudad Juárez periodically sponsors Ecological Fairs that provide citizens with a wide variety of environmental information, especially concerning ways to minimize environmental risks. One of the important messages disseminated is that a well-maintained automobile is likely to have cleaner emissions.

Both El Paso and Ciudad Juárez have inspection and maintenance programs for automobiles, although the degree of compliance and enforcement may be considerably less than program officials would like to admit.

Inconsistent application of air quality programs and unequal or nonexistent enforcement of regulations are also factors that work against air quality improvement in multi-jurisdictional regions. One of the principal causes of these inconsistencies is the notion that we can manage environmental conditions along environmental boundaries. Nowhere is this more evident that in the Paso del Norte region, where an electric power plant located within three miles upwind of downtown El Paso, but in the state of New Mexico (and therefore not in the El Paso nonattainment area), is less strictly regulated than two power plants in the northeast quadrant of El Paso County that are 20 or more miles, and not upwind, from downtown. Management of air quality in the Paso del Norte region would likely be more effective if EPA would exercise its authority under Section 107(c) of FCAA to declare the entire U.S. portion of Paso del Norte an interstate air quality control region.

Creation of an interstate air quality control region could eliminate one of the barriers to consistency in management of air pollution. Currently, New Mexico's Air Quality Act provides that the state may not adopt regulations more stringent than those of the federal government in four areas governed by it: performance standards, prevention of significant deterioration, non-attainment, and

visibility. Because the Doña Ana ozone nonattainment area is not classified as severe or serious, the state will not apply requirements for vehicle inspection and maintenance or fuels programs.

Local, Binational Stakeholder-based Activity and Advocacy

The involvement of citizen stakeholders in regional air quality issues predates both the U.S.-Mexico Border 2012 program and its predecessor, Border XXI. In 1993 the Paso del Norte Air Quality Task Force was created with the strong support and involvement of a variety of organizations and individuals from both sides of the border. A principal thrust of the task force was advocacy for the establishment for an International Air Quality Management District—a mechanism to conduct basin-wide air quality monitoring, planning, and management.

With the strong encouragement of the governors of Texas and Chihuahua, the two nations used the framework of the 1983 La Paz Agreement to establish the Joint Advisory Committee for the Improvement of Air Quality in the Ciudad Juárez, Chihuahua, El Paso, Texas, Doña Ana County, New Mexico Air Basin (JAC) in 1996 (Appendix I to Annex V) (Government of the United States of America and Government of the United Mexican States 1996). That 20-member body is co-chaired by representatives of EPA and the Mexican Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT) and includes representatives of state and local agencies from all three states, as well as a mix of private individuals representing the corporate, academic, health, and community sectors.

JAC meets quarterly. Its purpose is to develop, promote, and recommend measures to improve the region's air quality, and it has enjoyed several successes:

- Distribution of oxygenated gasoline in Ciudad Juárez during winter months
- Texas legislation that permits Supplemental Environmental Program funds to be used outside the boundaries of the state when they produce improvements in the state, the so-called International Supplemental Environmental Program (ISEP)

- Texas legislation that recognizes certain cross-border, cross-pollutant emissions reductions
- Design and construction of new-style brick kilns in Ciudad Juárez; the "environmental brick kiln" has up to 88% fewer emissions than the kilns that have been traditionally used in this micro-industry
- Integration of the Ciudad Juárez continuous air quality monitoring network into TCEQ's air quality monitoring network
- Completion of an emissions inventory of area sources
- Establishment of a vehicle emissions testing program in Ciudad Juárez
- Expanded road-paving programs throughout the air basin
- A "cash-for-clunkers" program developed as a result of an enforcement action that resulted in 400 operating vehicles from the entire basin being traded in for cash
- Training programs in Ciudad Juárez that taught small auto paint shop operators to use low-pressure paint guns and reduce emissions of VOCs

Recently, JAC reviewed its strategic priorities and decided to focus on the principle of a unified air basin (the One Basin Resolution) and three priority areas: data, particulate matter, and mobile sources. These priorities are known to the members as the three D's: data, dust, and driving—although both the mobile source and PM topics share a fourth D, diesel.

JAC's One Basin Resolution, passed in 2002, is a reaffirmation of the principle of a unified approach to air quality management in a transboundary area. The resolution called on the respective local, state, and federal governments for assistance in overcoming the variety of obstacles, including legal, regulatory, institutional, technical, and fiscal barriers. The resolution listed five specific measures where such assistance is requested:

- To define accurately the physical scope of the air basin, rather than using the existing administrative and political boundaries
- To standardize monitoring, forecasting, and data collection and dissemination
- To develop a standardized and accurate emissions inventory for the air basin

- To promote joint air quality modeling activities as a tool for diagnosis, planning and policy-making
- To harmonize or coordinate the respective air quality standards and management and control programs

The feeling of the JAC membership was that if it could not have a single, unified agency manage the air basin, then the preferred alternative was to work closely enough that the two countries, three states, and three local jurisdictions would be taking the same approaches and actions. In short, the goal is complementary, coordinated management activities in all three states in the basin.

Participants do not claim that everything runs perfectly. Sometimes one or more participants may take actions inconsistent with the One Basin Resolution or the concept of coordinated management. An example is New Mexico's recent development of a web-based program to disseminate the data from monitors in Doña Ana County: it is not compatible with the pre-existing system used by TCEQ to display data from monitors in El Paso and Ciudad Juárez. As a result, the public cannot go to a single site to see the readings of all the monitors in the community.

Turnover of JAC members has also been problematic, especially in the Mexican and New Mexican delegations. Likewise, attendance has been inconsistent and the committee has sometimes had difficulty assembling a quorum.

As with many binational U.S.-Mexican environmental work groups, policy forums, or task forces, it has sometimes proven difficult to get things done in the periods between the regularly scheduled meetings. JAC recently consolidated a large number of sub-committees to a reasonable number of five, an action that will increase productivity between the full committee meetings, it is hoped.

Finally, in a positive move, JAC has changed operating procedures to make it more open to the public it represents, inviting public comment at meetings and full participation in sub-committee activities.

Conclusions and Remaining Issues

With respect to national ambient air quality standards, the Paso del Norte region has made significant progress. El Paso has shed its nonattainment status for one pollutant and likely will do the same with regard to the two remaining pollutants. Ciudad Juárez is likewise improving.

The improvements in the air quality of the region have been the result of a variety of national, state, and local governmental programs; favorable natural conditions; and active binational, community-based, stake-holder initiatives. Chief among these factors are lead-free gasoline and newer automobiles. These efforts have individually and collectively worked in a positive fashion overall.

But there is still work to be done. The existence of adverse localized conditions, "hot spots," and short-term episodes of elevated concentrations require continued effort. As an example, a recent study in Sunland Park, in southern Doña Ana County, showed that on some days the community experiences half its PM load in a three-hour evening period and that occasionally one-hour averages may be an order of magnitude greater than the daily average (Li 2005).

Emerging issues such as elevated levels of hydrogen sulfide in a portion of the airshed and proposed new NAAQS for PM require analysis, and perhaps action, to preclude the loss of the progress achieved to date. Continued engagement of citizens and governments, partly through the well-respected partnership of JAC, is necessary to avoid back-sliding and resolve the outstanding issues.

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