Far West Texas Area Evaluation

(El Paso Region)

Far West Texas Area Characteristics

Terrain

The Far West Texas area lies in the northwestern portion of the Trans-Pecos area of Texas and can be described by topographic transitions from mountains to inter-mountain plains. The Franklin Mountains (southern edge of the Rocky Mountains) extend into the City of El Paso from the north, dividing west El Paso in the Upper Valley and east El Paso in the Lower Valley. The Lower Valley extends to the Hueco and Diablo Mountains on the eastern edge of Hudspeth County. The Texas Rio Grande River basin forms the southern border of the area. The region ranges from approximately 3,800 to 4,000 feet in elevation, with individual mountains reaching elevations of over 7,000 feet. A topographic map of the region is provided in Figure 101, along with wind roses showing annual average wind speed and direction from meteorological sensors at ambient air monitoring stations. The length of each wind rose bar corresponds to the frequency of the wind coming from the indicated direction. The wind roses from monitors closest to the international border highlight the impact of the Rio Grande River basin in the dominant northwest/southeast wind pattern. Wind roses from sites further removed from the basin, such as Ojo De Agua and Skyline Park, highlight differing wind patterns due to the influence of the Franklin Mountains. (Griffith et al. 2004)

Regional terrain is important when considering typical wind patterns in this area. High winds can occur near the Skyline Park monitor due to funneling effects of the Franklin Mountains. The most pronounced terrain effects are seen in the Rio Grande River basin, where yearlong wind patterns are dominated by a west-northwest to southeast flow due to channeling in the pass between the Franklin Mountains to the north and Juarez Mountains to the south. The Far West Texas area shares this river basin and its airshed with Ciudad Juarez, Mexico, as shown in Figure 101. More information on the modeling of international emissions on El Paso area air quality can be found at the TCEQ webpage http://www.tceq.texas.gov/airquality/sip/elp/sip-elp. Regional terrain characteristics impact how pollutants are transported into and out of areas and how pollutants are dispersed throughout an area.

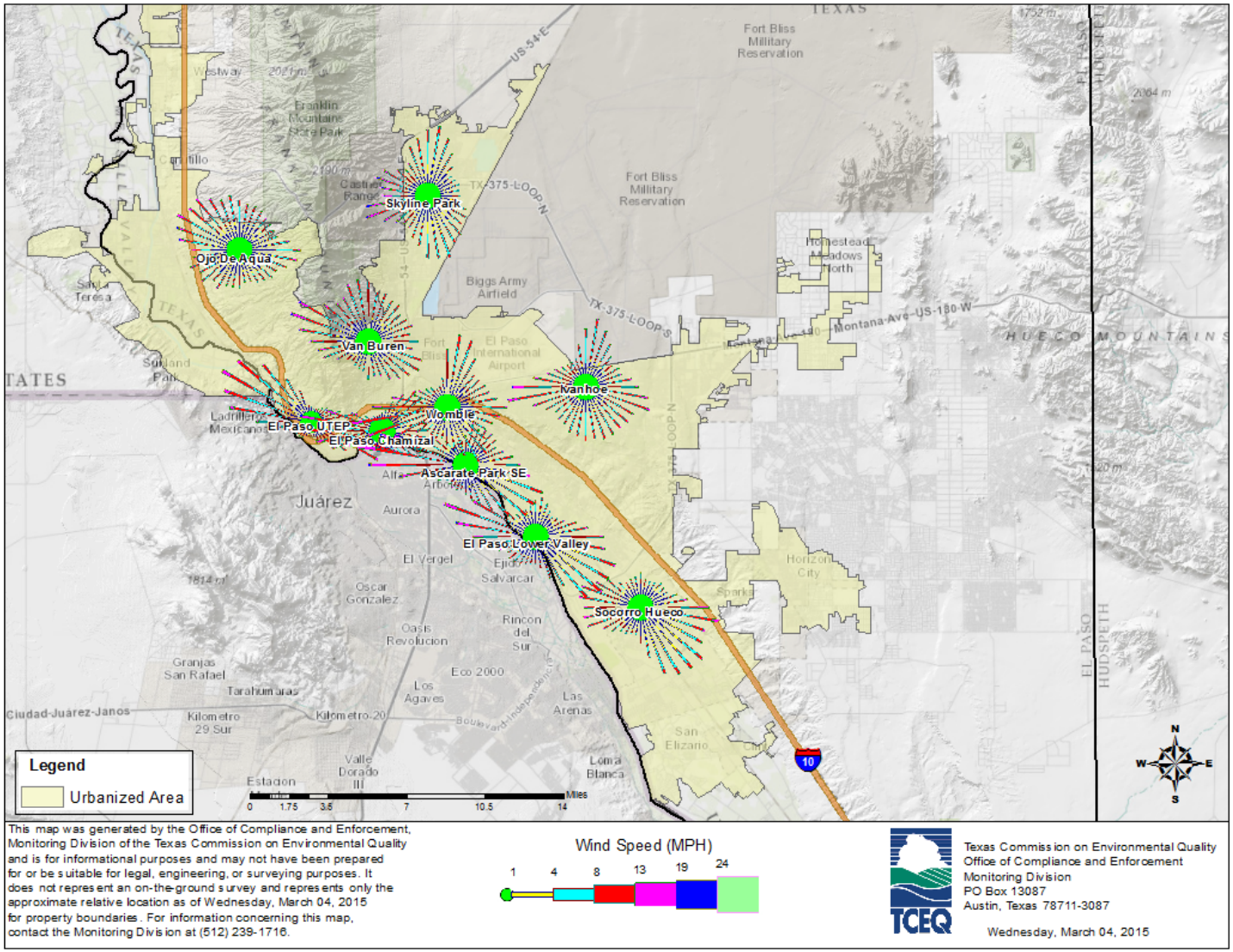


Figure 101: Far West Texas Area Terrain and Wind Data from Ambient Air Quality Monitors

Climate

The Far West Texas area is part of the Chihuahuan Desert, which extends from the Mexican state of Chihuahua into Arizona and New Mexico. Average daily maximum temperatures range from 66°F to 95°F. Ambient temperatures play a key role in regional air quality, as nighttime cooling, particularly during winter months, can form intense temperature inversions that trap pollutants near the surface in the Far West Texas Rio Grande River basin area. In addition, the low humidity and limited rainfall (an average of 8.53 inches of rain per year, though highly variable) paired with the dry lakebeds and playas composed of loose, fine soils of this scarcely vegetated desert make the region prone to dust storms during natural high wind events. More detail on the impact of these high wind events can be found in the TCEQ's *El Paso 2010-2012 Particulate Matter Exceptional Events Demonstration* located on the TCEQ webpage http://www.tceq.state.tx.us/assets/public/compliance/monops/air/pm-event-2010-2012-elpaso.pdf. The local climate makes the area more susceptible to increased pollutant concentrations during regional dust storms and temperature inversions. The high temperatures and lengthy sunny weather also increases the number of days ozone can be formed, as evidenced by El Paso's year-round ozone season.

Population

El Paso is the only major MSA in the Far West Texas area. According to the 2010 United States Census, the El Paso MSA had a population of 804,123 people. The El Paso area is smaller than and downwind of Ciudad Juarez, Mexico, which had a 2010 population of 1,422,863. The 2014 United States Census Bureau population estimate indicates an El Paso MSA population of 836,698 people, which is a 4% increase in the last four years. Figure 102 indicates the regional population is concentrated in central El Paso and areas west of State Highway 375. The 2010 United States Census estimated the Fort Bliss military installation population at 8,591 people. In 2010, Hudspeth County, the county nearest and East of El Paso County, was completely rural, with a total population of 3,476 people.

Based on 2014 population estimates, the Far West Texas area is required to have a minimum of three ozone monitors, one NO_x monitor, one Pb monitor, three $PM_{2.5}$ monitors, and between four and eight PM_{10} monitors. The Texas State Data Center projects the El Paso MSA to grow to 956,347 by 2020, roughly a 16% increase from the 2010 population. If these projections are accurate, the El Paso MSA would not be required to have additional monitoring based on population-driven minimum monitoring requirements.

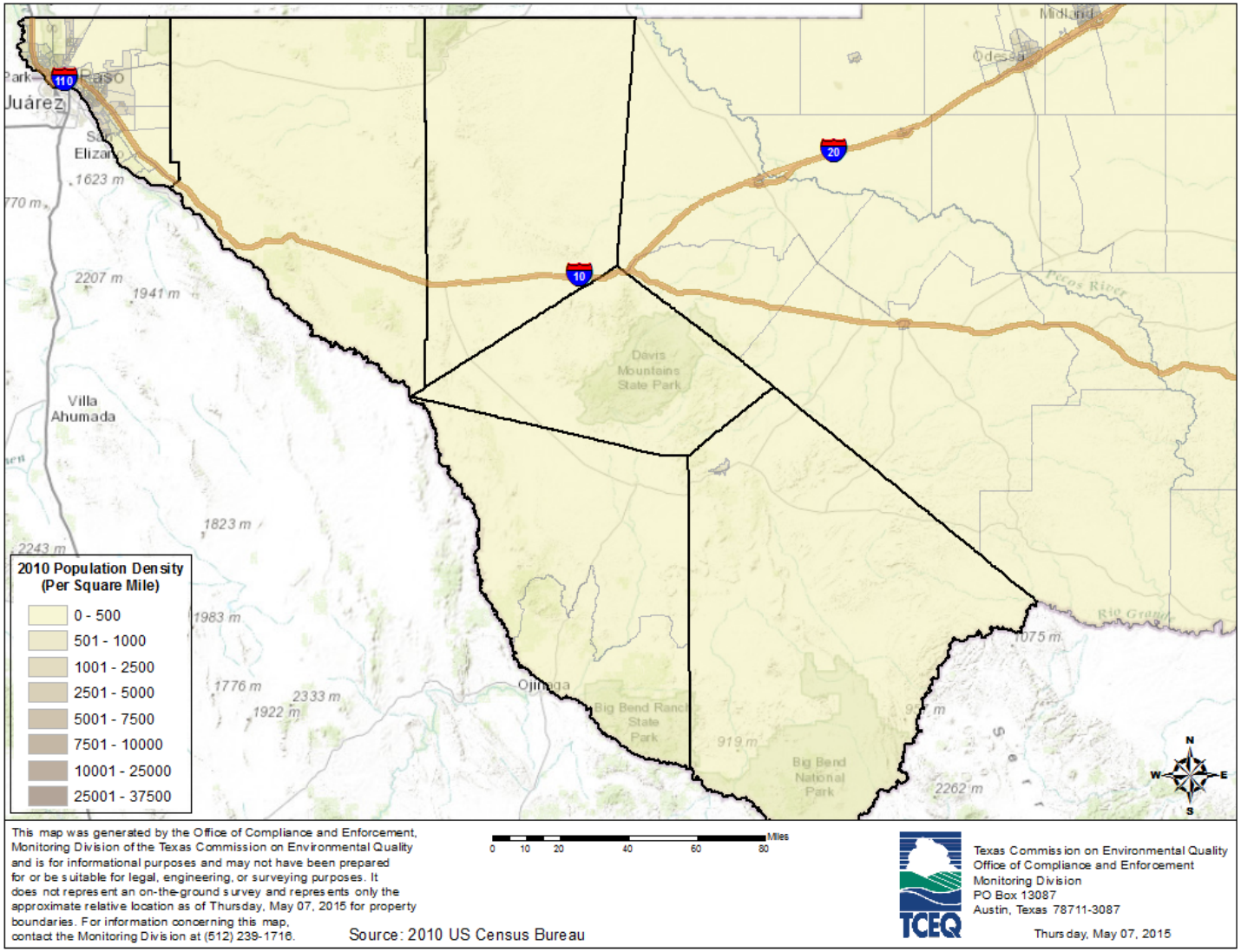


Figure 102: Far West Texas Area Counties and Population Density

Pollutant Sources

Anthropogenic Sources

As expected, on-road mobile sources emitted the most CO and NO_x out of the sectors represented in the EI. Area sources contributed the most $PM_{2.5}$, PM_{10}, and VOCs. Point sources, closely followed by area sources, emitted the most SO_2. Finally, Pb emissions remained low for all sources in the El Paso area.

Evaluation of pending and issued air permits within the Far West Texas area revealed the authorization of only seven new point source sites in El Paso County, as detailed in Appendix D. These new facilities are evenly distributed from northwest of El Paso (within three miles of the Ojo De Agua monitoring site), central El Paso, and to the east of El Paso (within approximately five miles of State Highway 375 from north of State Highway 62 to south of Farm-to-Market Road 1281). This review of permitting actions did not reveal any dense clusters of new sources that would necessitate the addition of air quality monitors. The TCEQ continues to evaluate the need for ambient air quality monitors as changes in industrial activity and populations occur.

Natural Sources

Blowing dust generated by regional high wind events outside of the Far West Texas area has historically had a heavy impact on $PM_{2.5}$ and PM_{10} levels in the area. The overall dust storm frequency and intensity is highly dependent on weather conditions and soil moisture content, but daily average concentrations have reached as high as 130 $\mu g/m^3$ for $PM_{2.5}$ and 249 $\mu g/m^3$ for PM_{10}. These dust storms are most commonly caused by regional high winds associated with large low pressure systems.

Less frequently, regional blowing dust can be transported into the Far West Texas area from the White Sands area in New Mexico, eastern New Mexico, and the Texas Panhandle behind strong cold fronts. These large regional-scale dust storms occur mainly in the spring, but can occur from late October through the winter and spring into early June. On a local scale, high winds from nearby thunderstorms can generate dust that is transported into the El Paso area. These local-scale thunderstorm high wind dust events are most common in June and July.

Long-range transport from other types of events also impact particulate matter measurements in the Far West Texas area, including smoke from forest fires in the Rocky Mountains and haze and smoke accumulated from man-made emissions in the United States and Mexico (also known as continental haze). These other smoke and haze transport events affect $PM_{2.5}$ levels more than PM_{10} levels because of the inherent particle sizes, but are less frequent overall.

Gill et al. (2007) investigated dust source hot spots for multiple dust storm events from 2002 to 2006. Their research found that a huge playa complex within the Lake Palomas region of northern Chihuahua, Mexico, frequently contributed concentrated plumes of particulate matter that spread into the El Paso/Ciudad Juarez area. Surface sediment

particle size analyses from these playas revealed very fine clays and silts with grain sizes in the $PM_{2.5}$ and PM_{10} ranges, including particles as small as 0.2 micrometers.

Regional Air Quality

Criteria Pollutants

As of January 2015, the El Paso area is designated attainment for current ozone, Pb, CO, NO_2, and $PM_{2.5}$ NAAQS. The City of El Paso is in moderate nonattainment of the PM_{10} NAAQS. The Governor has recommended designating El Paso in attainment of the one-hour SO_2 NAAQS, but a final action has not been taken by the EPA. Additionally, the updated data requirements rule for the one-hour SO_2 NAAQS is currently pending from the EPA.

Current Nonattainment Designations

The November 15, 1990, FCAA amendments specified that all former Particulate Matter Group I areas, including El Paso, were to be designated nonattainment for Particulate Matter. In November 1991, Texas adopted a PM_{10} attainment demonstration for El Paso. This attainment demonstration included air quality and meteorological analyses, including data from a special December 1990 study that demonstrated the international scope of the air quality problem in El Paso. Section 179B of the FCAA contains special provisions for nonattainment areas like El Paso that are affected by emissions coming from outside the United States. Modeling of United States emissions indicated that El Paso would have attained the PM_{10} NAAQS in 1991 and by the 1994 attainment deadline, if not for emissions transported from Mexico. Texas also adopted control measures to minimize impacts from United States sources, including fugitive dust controls. The EPA approved the El Paso PM_{10} attainment demonstration on January 18, 1994. (59 FR 2532)

On January 25, 2012, the TCEQ adopted a PM_{10} SIP revision that updated the particulate matter controls for streets and alleys, and incorporated a revised Memorandum of Agreement between the TCEQ and the City of El Paso based on those updated controls. More information about the SIP to improve air quality in the El Paso area is available online at (http://www.tceq.texas.gov/airquality/sip/elp/sip-elp).

Prior Nonattainment Designations

Carbon Monoxide

A portion of El Paso was designated moderate nonattainment for CO upon enactment of the 1990 FCAA amendments. A CO attainment demonstration SIP revision was adopted by the TCEQ's predecessor agency in September 1992 to address CO nonattainment in El Paso. This SIP revision included a comprehensive 1990 base year inventory, an oxygenated fuel program effective throughout El Paso County, new source review provisions for major CO sources, and a commitment to make corrections to an existing vehicle inspection and maintenance (I/M) program.

In January 2006, the TCEQ submitted a CO Redesignation Request and Maintenance Plan SIP Revision for El Paso to the EPA. El Paso was eligible for redesignation to

attainment of the eight-hour CO NAAQS because there had been no monitored violations of the standard since 2001. The EPA published a direct final approval on January 23, 2007. However, before the comment period closed, the EPA received adverse comments and withdrew its final approval on March 26, 2007.

On January 30, 2008, the TCEQ adopted a revision to the SIP modifying the existing maintenance plan for CO in El Paso. This revised maintenance plan replaced the maintenance plan submitted in January 2006, amending the previously submitted CO redesignation request. The EPA proposed approval of the redesignation request and maintenance plan and the associated motor vehicle emissions budget in the *Federal Register* (73 FR 45162) on August 4, 2008, and it became effective on October 3, 2008.

One-Hour Ozone Standard

As a result of the 1990 FCAA amendments, El Paso County was designated nonattainment of the one-hour ozone NAAQS of 0.12 ppm. El Paso County was classified as a serious nonattainment area with an attainment deadline of November 15, 1999. Plans to reduce VOC emissions by 15% in El Paso County were submitted in 1993 and 1994.

In September 1994, the TCEQ's predecessor agency adopted a demonstration for the El Paso area that included modeling showing that El Paso could attain the NAAQS with the planned 15% reduction in emissions from the United States side of the border alone. In December 2002, the TCEQ adopted changes to the El Paso vehicle I/M program to make onboard diagnostic testing a contingency measure. This action was based on the El Paso area having experienced five years with no monitored ozone standard violations.

In 1997, the one-hour ozone standard was replaced by the more protective eight-hour ozone standard. The one-hour standard has been revoked in all areas, although some former one-hour ozone nonattainment areas have continuing obligations to comply with the anti-backsliding requirements described in 40 CFR §51.905(a).

1997 Eight-Hour Ozone Standard (1997 to Present)

On April 15, 2004, the EPA designated El Paso County attainment (effective June 15, 2004) for the 1997 eight-hour ozone NAAQS of 0.080 ppm. El Paso County monitors at that time showed attainment of both the one-hour and eight-hour ozone NAAQS. The EPA's Phase I Implementation Rule for the eight-hour ozone standard directed that areas designated nonattainment for the one-hour ozone standard but attainment for the eight-hour ozone standard submit a maintenance plan for the 1997 eight-hour ozone standard by June 15, 2007. The TCEQ submitted this maintenance plan to the EPA on January 20, 2006. On January 15, 2009, the EPA proposed approval of the El Paso ozone maintenance SIP revision. (74 FR 2387) The EPA did not receive any adverse comments regarding the maintenance plan approval, and the plan became effective on March 16, 2009.

2008 Eight-Hour Ozone Standard (2008 to Present)

On March 10, 2009, the Governor recommended to the EPA that El Paso County be designated nonattainment for the 2008 ozone standard. In September 2009, the EPA announced it would reconsider the 2008 NAAQS. On January 19, 2010, the EPA

proposed to lower the primary ozone standard to a range of 0.060 to 0.070 ppm and proposed a separate secondary standard based on cumulative seasonal average ozone concentrations. On September 2, 2011, President Obama announced that he had requested the EPA withdraw the proposed reconsidered ozone standard.

In a memo dated September 22, 2011, from EPA Assistant Administrator Gina McCarthy, the EPA announced that it would proceed with initial area designations under the 2008 eight-hour ozone standard, starting with the recommendations states made in 2009 and updating them with the most current, certified air quality data (2008 through 2010). On May 21, 2012, the EPA published final designations for the 2008 eight-hour ozone standard in the *Federal Register*. (77 FR 30088) The updated air quality data indicated that air quality had improved and that a nonattainment designation was no longer appropriate. El Paso County was designated attainment/unclassifiable under the 2008 eight-hour ozone NAAQS, effective July 20, 2012.

Air Toxics

Over the past five years exposure to all measured VOC, SVOC, $PM_{2.5}$ metals, and carbonyl concentrations in Far West Texas area would not be expected to cause adverse health effects or odorous conditions. In 2004, hydrogen sulfide in the area near a non-regulatory monitor in southeast El Paso was added to the APWL due to exceedances of the 30-minute state standard. More information about this APWL area is publicly available online at http://www.tceq.texas.gov/permitting/air/apwl/apwl-index.html.

Monitoring Network Evaluation

Ozone

Network History

As of January 1, 2015, there were six ozone monitors in the Far West Texas area as listed in Appendix A and shown in Figure 103. El Paso Chamizal and El Paso UTEP were deployed in 1998. The El Paso Chamizal ozone monitor was deployed in central El Paso to evaluate ambient concentrations in populated areas likely impacted by maximum ozone precursor concentrations. Ozone monitors at El Paso UTEP and Ascarate Park SE, deployed soon after, were intended to provide ozone concentration data upwind and downwind of the City of El Paso core, depending on the wind flow. The Socorro Hueco ozone monitor was added in 1999 to provide data on background ozone concentrations in a populated area further removed from the city. Skyline Park and Ivanhoe ozone monitors were added in 2000 to improve spatial coverage in the populated area to the north and east of the downtown city core. Since the last five-year assessment period, no significant ozone network changes have occurred in the Far West Texas area.

Ozone monitoring in the Far West Texas area exceeds current minimum federal monitoring requirements. Two federal ozone monitoring requirements (related to NCore and the area's population and ozone design value) currently apply to the El Paso area, resulting in a minimum of three required ozone monitors. Additional ozone monitoring sites also continue to be operated in the El Paso area under former PAMS requirements due to El Paso's prior designation as an ozone nonattainment area. Monitoring objectives related to these federal requirements include collection of ambient data in areas frequented by the public, likely impacted by maximum ozone concentrations, and representative of upwind and/or downwind concentrations.

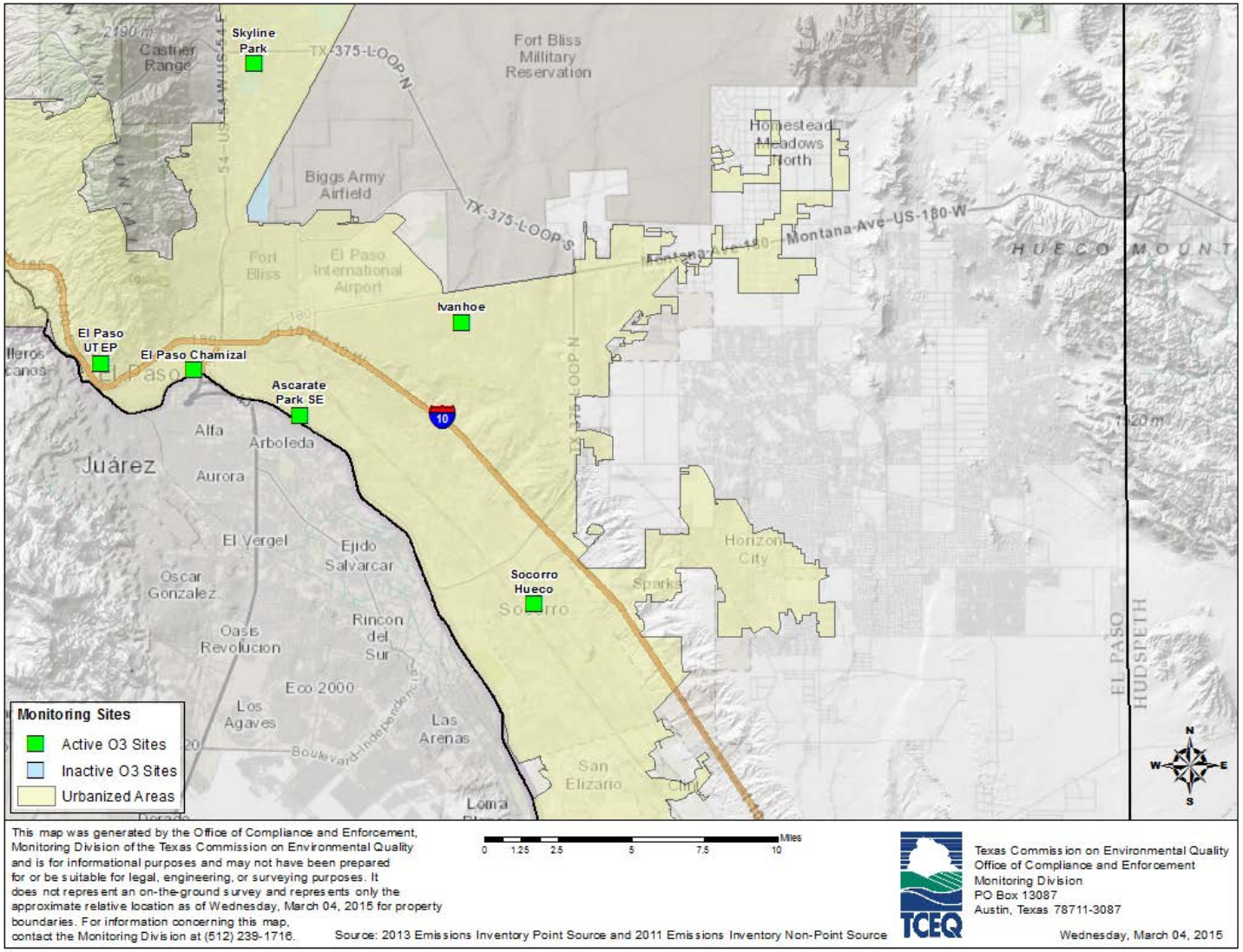
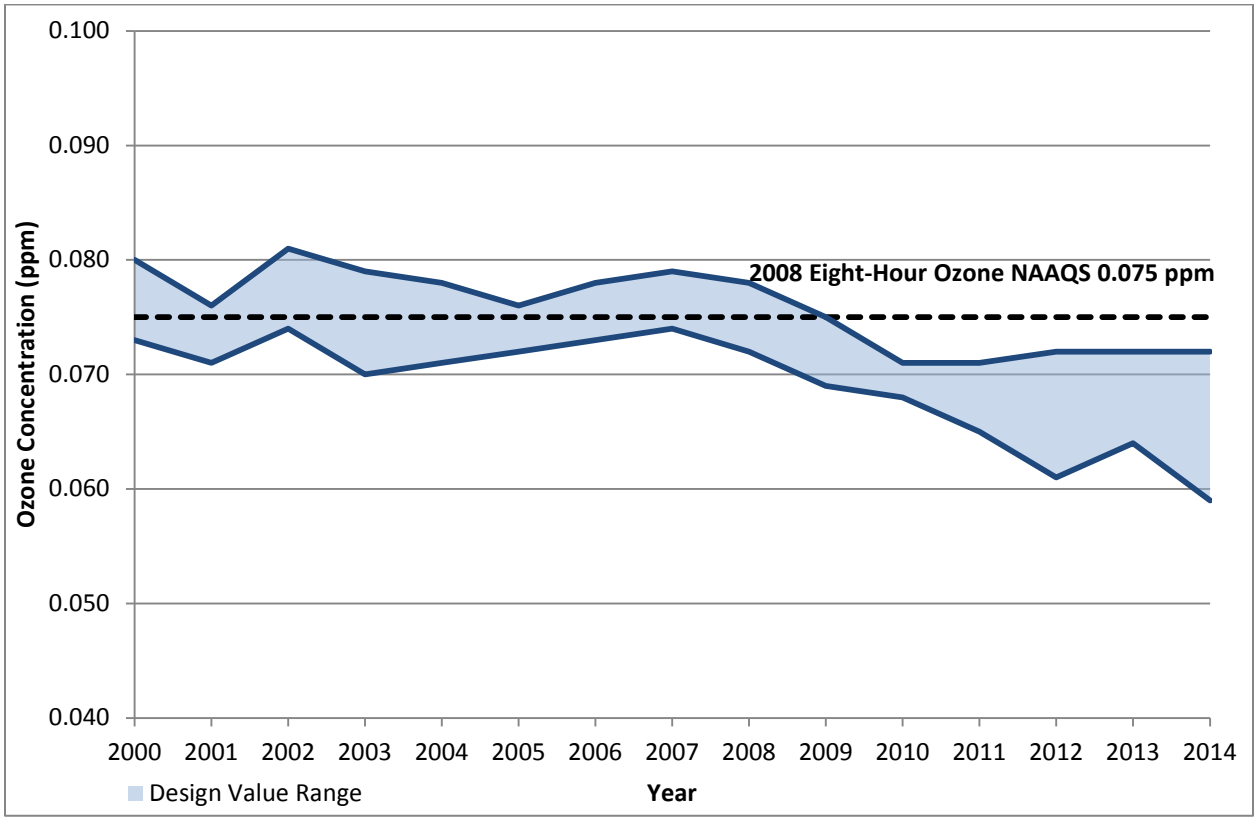


Figure 103: Far West Texas Area Ozone (O_3) Monitors

Design Values and Trends

Eight-hour ozone design values in the Far West Texas area have continually declined since 2002 as shown in Figure 104. At 0.072 ppm, the area's 2014 design value is below the 2008 eight-hour NAAQS of 0.075 ppm, and ambient concentrations decreased 10% overall from 2000 to 2014. The highest ozone concentrations continue to be measured by the El Paso UTEP and El Paso Chamizal monitors, which are located closest to the city's urban core and the international border. The lowest ozone concentrations have been recorded on the east side of the City of El Paso's urban core at the Socorro Hueco and Ivanhoe monitors.



NAAQS – National Ambient Air Quality Standards
ppm – parts per million

Figure 104: Eight-Hour Ozone Design Value Trends in the Far West Texas Area, 2000-2014

Network Evaluation

Based on current ozone monitoring requirements and proximity of design values to the eight-hour NAAQS, all El Paso area ozone monitors are considered of high value. Peak ozone concentrations have continued to be measured in the City of El Paso's urban core and near the international border. The El Paso UTEP monitor continues to have the highest ozone concentrations in the El Paso area. The greatest reductions in ozone concentrations have been noted at the Ivanhoe monitor (21% decrease since 2002) and the Ascarate Park SE monitor (23% decrease since 2002). These two monitors have also measured the lowest ozone concentrations in the area.

Figure 105 shows the correlation, relative difference, and distance between the Far West Texas area ozone sites. Sites are identified by AQS numbers, which can be referenced in Appendix A. The closest ozone correlations are between El Paso Chamizal (AQS 48-141-0044) and El Paso UTEP (AQS 48-141-0037) (Pearson's coefficient=0.954, relative difference=0.092). The two sites are 4 kilometers apart. Even though these sites are close together, they provide spatial gradient information that aids in understanding area ozone formation and transport.

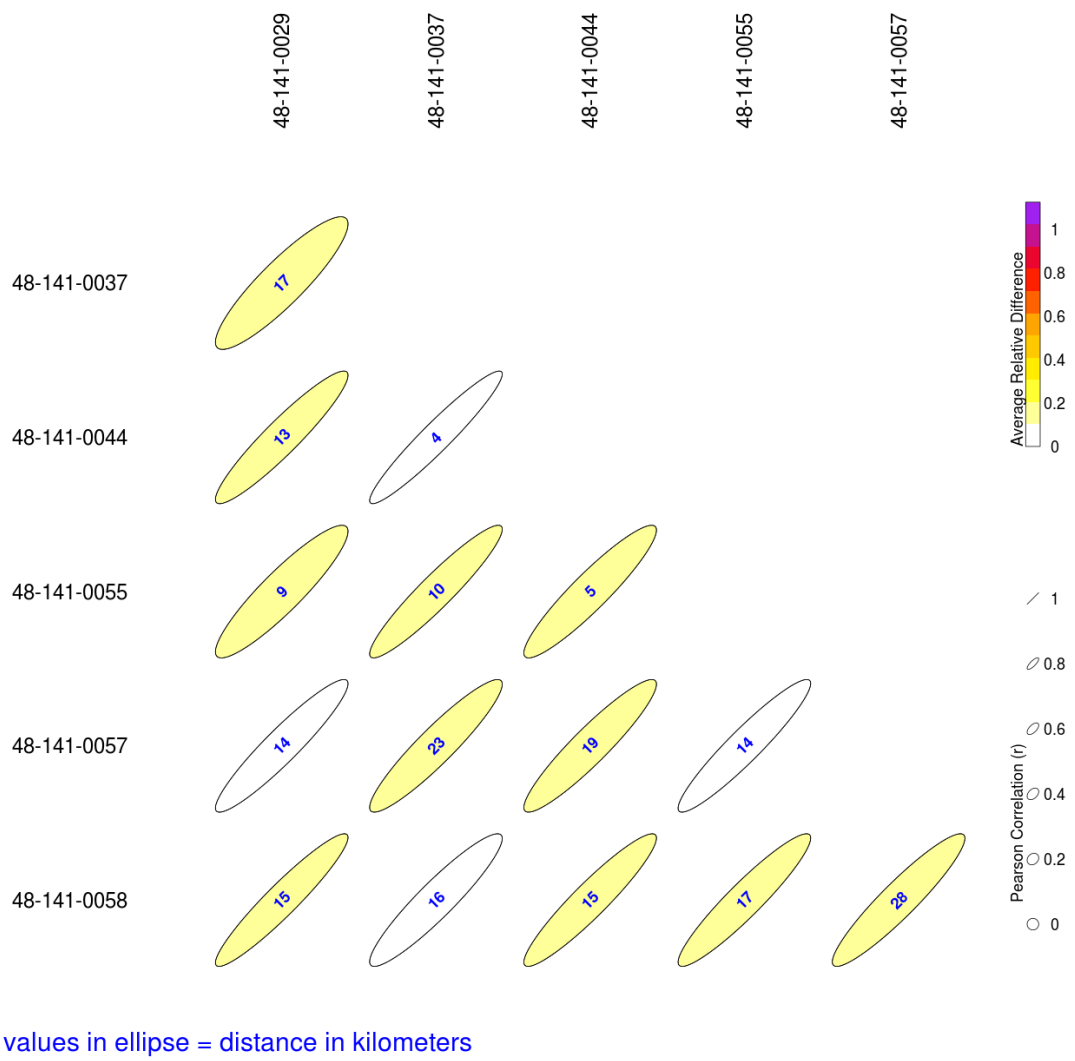


Figure 105: Eight-Hour Daily Maximum Ozone Concentration Correlations in the Far West Texas Area, 2011-2013

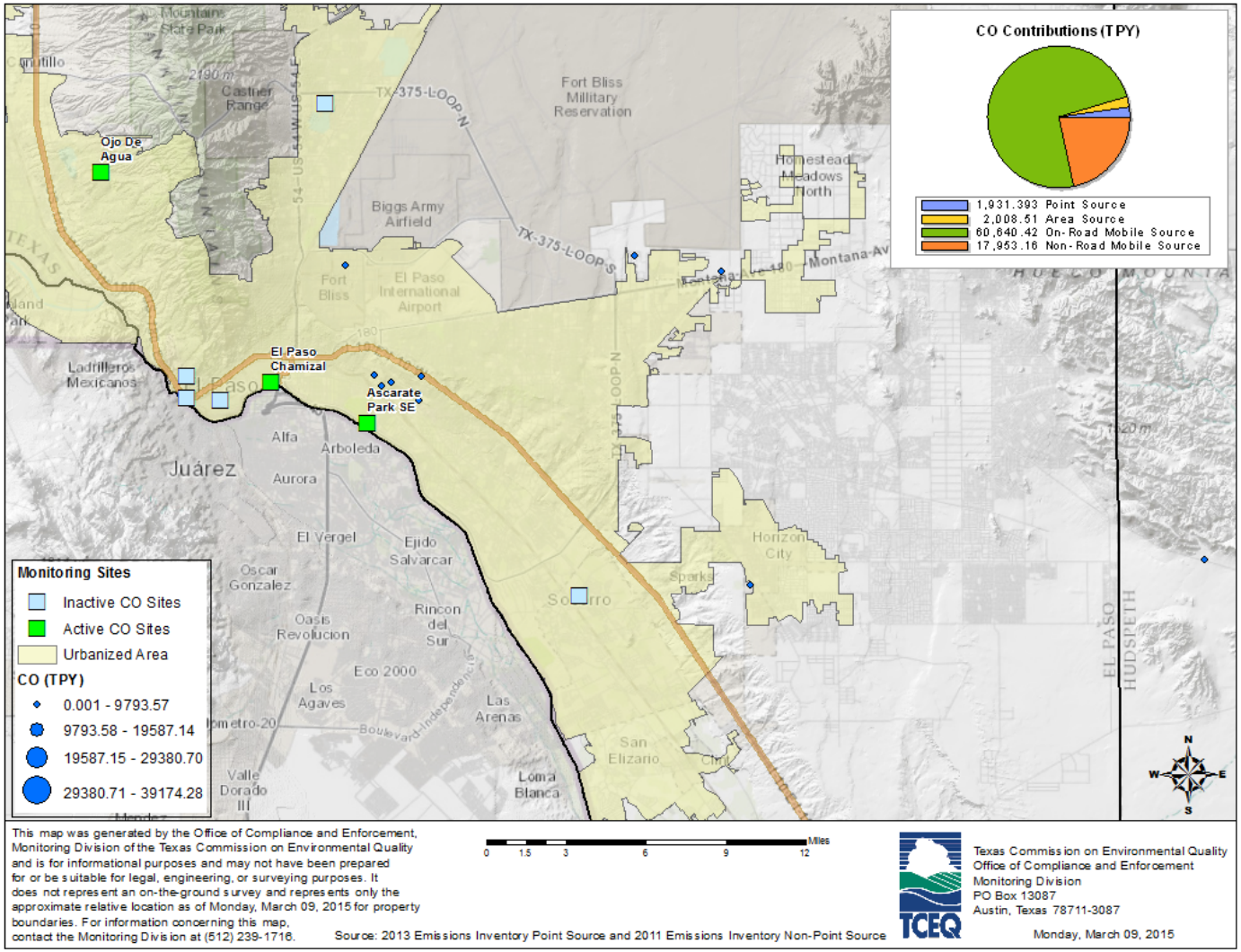
Given current and historical ozone concentrations, prevailing winds, and increased population in these areas, the ozone monitor placement along and near the international border continues to be appropriate. All six active ozone monitors in the El Paso area are considered of high value. These monitors cover multiple monitoring objectives including measuring maximum concentrations and upwind/downwind concentrations in populated locations. Details on each monitor's value are provided in Appendix C.

Carbon Monoxide

Network History

Three CO monitors are active in the Far West Texas area as of January 1, 2015: El Paso Chamizal, Ascarate Park SE, and Ojo De Agua. The Ascarate Park SE CO monitor was deployed in 1999 in an area that modeling projected could have the highest CO concentrations in the area. In 2010, a high sensitivity CO monitor was placed at El Paso Chamizal to monitor CO concentrations concurrently with ozone precursors in an area where maximum ozone precursor emissions were expected. The El Paso Chamizal CO monitor also serves as a federally required NCore monitor. In 2013, the Tillman monitor property was sold, and the CO monitor was relocated to Ojo De Agua. The Ojo De Agua CO monitor provides data that is representative of populated residential areas in Northwest El Paso. Design values are not yet available for the Ojo De Agua monitor.

Prior to 2010, CO monitoring requirements were limited to monitoring at PAMS sites and NCore sites; however, based on the El Paso area's previous CO nonattainment designation, as many as seven sites included CO monitoring as of the last five-year network assessment. Since that 2010 assessment, four CO monitors were decommissioned because of low historical value (design values well below both the one-hour and eight-hour CO NAAQS) and the operation of the monitors exceeded minimum federal requirements. The Socorro Hueco and Sun Metro CO monitors were decommissioned in 2012, while the Skyline Park and El Paso UTEP CO monitors were decommissioned in 2014. Appendix A provides a full list of both active and recently decommissioned ozone monitors, as well as their location, monitoring objectives, and associated spatial scales. Locations of CO monitors and point sources are shown in Figure 106.



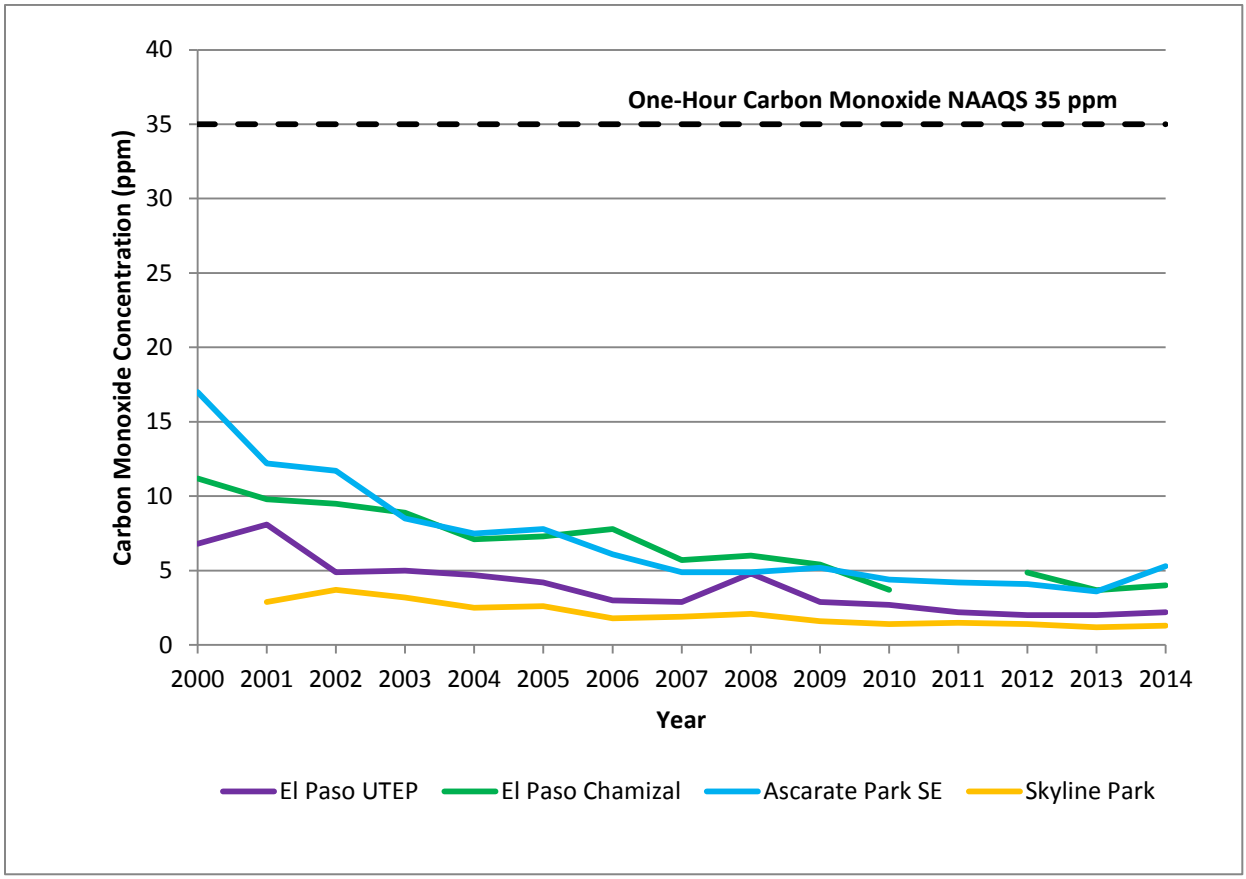
TPY- tons per year

Figure 106: Far West Texas Area Carbon Monoxide (CO) Point Sources and Monitors

Design Values and Trends

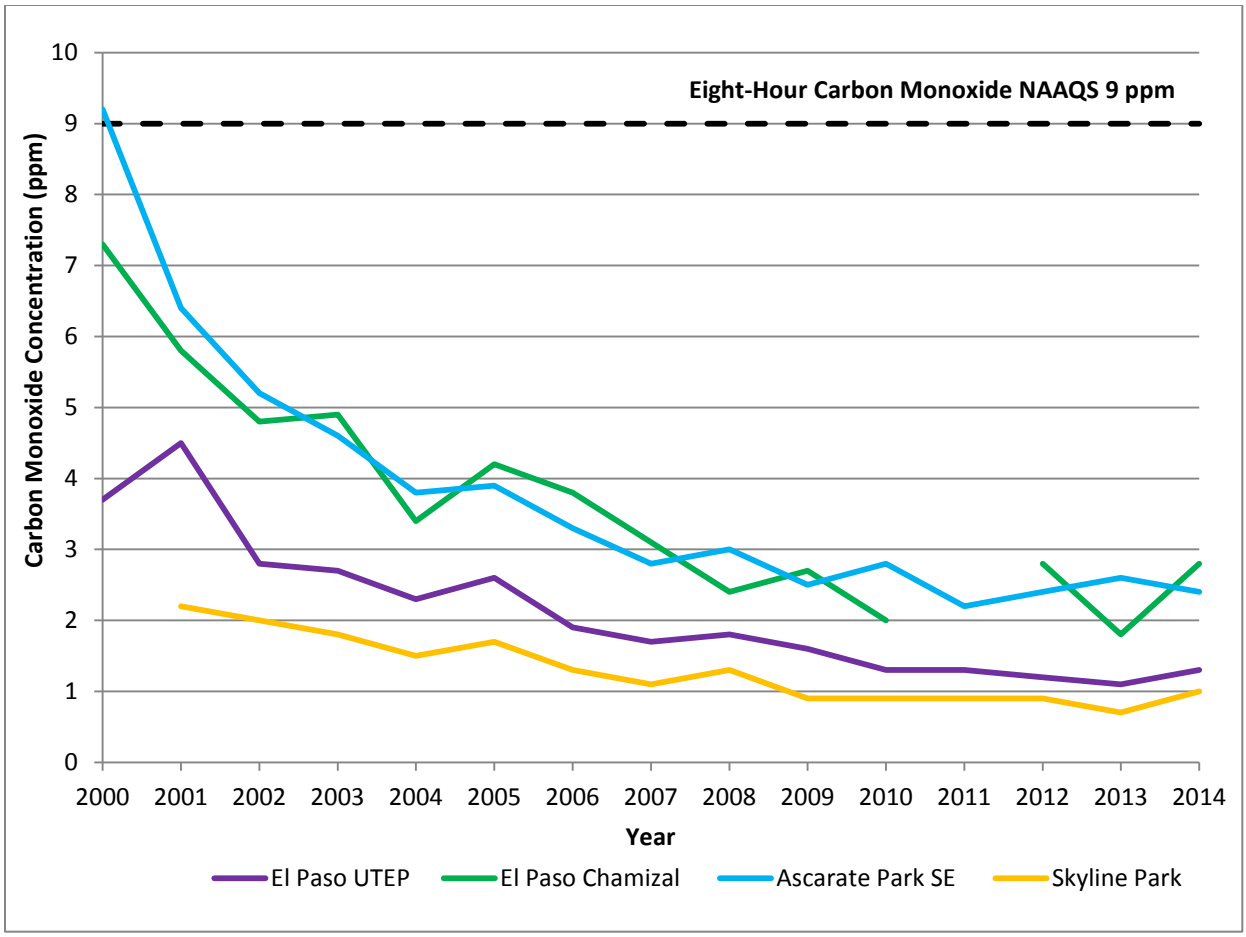
The El Paso area has an extensive CO monitoring history due to previous federal monitoring requirements and nonattainment status. Most of the elevated CO concentrations measured in the El Paso area have occurred at night in conjunction with temperature inversions, characterized by light winds, cold temperatures, and clear or partly cloudy skies. With these conditions, atmospheric mixing and transport is limited and pollutants emitted near ground level are quickly accumulated in a shallow layer adjacent to the ground. The greatest frequency of inversion episodes occurs in November and December, with occasional episodes in October and January.

El Paso area one-hour and eight-hour CO design values are shown in Figure 107 and Figure 108 respectively. As shown, design values at the El Paso Chamizal and Ascarate Park SE CO monitors have remained nearly identical since 2003. These two monitors are located only 3.34 miles apart, and data from both sites have remained well below the NAAQS at 3.6-17 ppm between 2000 and 2014. Insufficient data return in 2011 at El Paso Chamizal resulted in the lack of a design value for the one-hour and eight-hour CO standard for that year.



ppm – parts per million
NAAQS - National Ambient Air Quality Standards

Figure 107: One-Hour Carbon Monoxide Design Value Trends at Far West Texas Area Monitors, 2000-2014



ppm – parts per million
NAAQS - National Ambient Air Quality Standards

Figure 108: Eight-Hour Carbon Monoxide Design Value Trends at Far West Texas Area Monitors, 2000-2014

Network Evaluation

All CO monitors in the El Paso area have maintained design values well below the one-hour and eight-hour CO NAAQS since 2001. The steady decrease in CO levels throughout the El Paso area can be attributed to El Paso's naturally arid climate combined with several emissions reduction programs, including:

- enhanced vehicle emissions inspections;
- increased use of fuel efficient and mixed fuel vehicles;
- gasoline vapor recovery programs;
- the Texas Low Emission Diesel (TxLED) Program; and
- the El Paso Oxygenated Fuel Program.

Under existing regulations, only the El Paso Chamizal CO monitor is required to meet federal monitoring requirements. This monitor is a good indicator of the highest CO levels in the El Paso MSA, as shown in Figure 107 and Figure 108. Although eight-hour CO concentrations can be slightly higher at Ascarate Park SE than El Paso Chamizal, concentrations at both locations are well below the level of the NAAQS and have

remained within 1 ppb of each other since 2001. The El Paso Chamizal CO monitor is likely impacted by on-road emissions from downtown El Paso located less than a mile away, a major highway, and a heavily trafficked border crossing located less than a quarter mile away.

Because CO concentrations have consistently remained well below the NAAQS and no new significant CO sources have been identified, the Ascarate Park SE and Ojo De Agua CO monitors are considered of low value. The TCEQ may consider further evaluation of low value, redundant CO monitors in future assessments. Details on each monitor's value are provided in Appendix C.

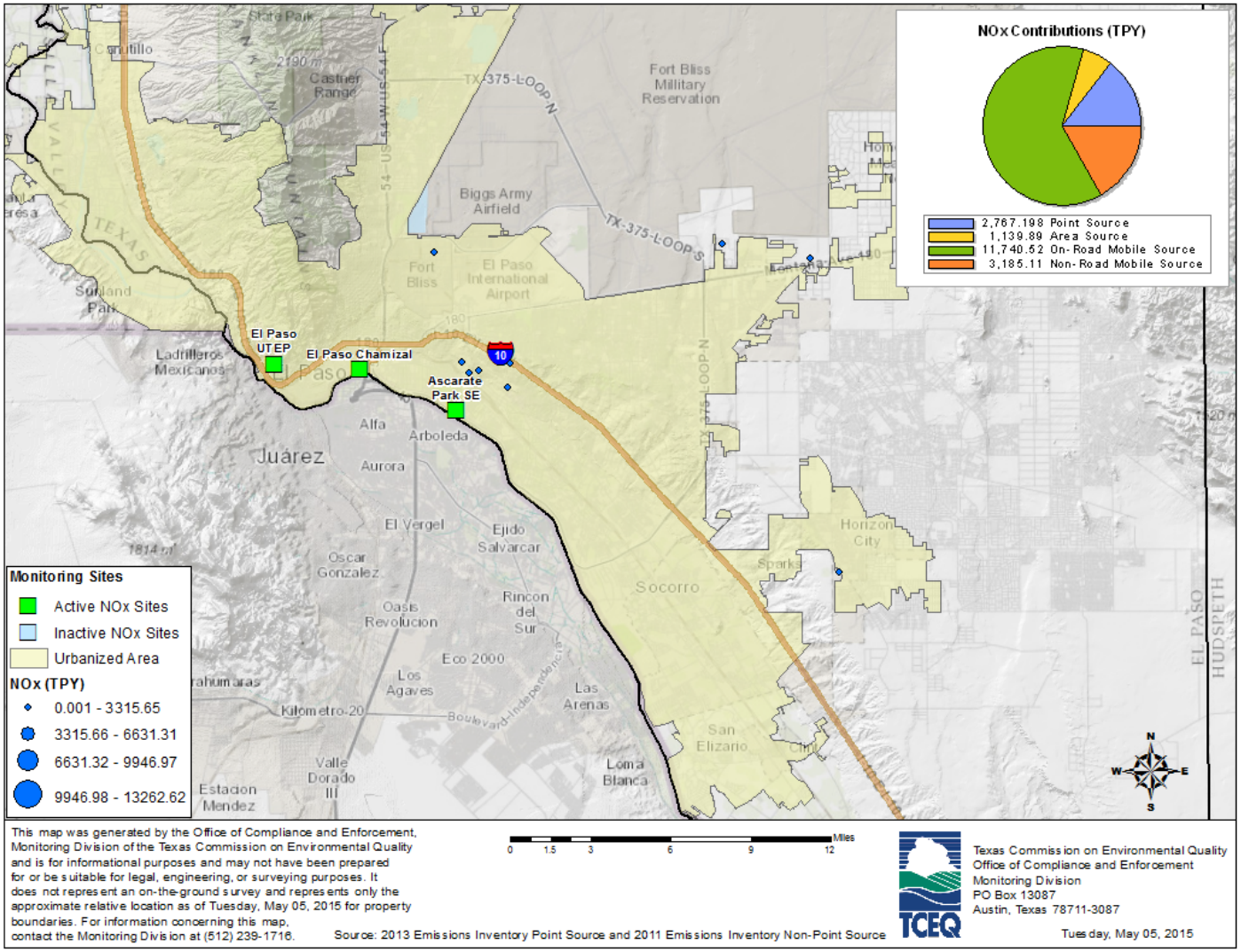
Oxides of Nitrogen

Network History

As of January 1, 2015, NO_x monitoring occurred at three locations (shown in Figure 109) in Far West Texas: El Paso UTEP, El Paso Chamizal, and Ascarate Park SE. Three federal monitoring requirements for NO_2 currently apply to the El Paso MSA: NO_2 monitoring at NCore sites, at PAMS sites, and at a site located to protect susceptible and vulnerable populations. In addition, the EPA promulgated new rules in 2010 requiring near-road NO_2 monitoring in metropolitan areas with populations of 500,000 or more by January 1, 2017.

The NO_x monitors at El Paso UTEP and El Paso Chamizal were deployed in 1998 to evaluate ozone precursor concentrations in populated areas where modeling projected the highest ozone concentrations in the El Paso MSA. Since deployment, the El Paso UTEP NO_x monitor has provided valuable information about ambient NO_2 concentrations around the heavily populated UTEP campus and is situated in a prime location to monitor NO_2 emissions coming across the border and from downtown El Paso. The El Paso Chamizal site is located less than one mile from downtown El Paso and less than a mile from a major highway and a heavily trafficked border crossing, both of which are considered major on-road sources of NO_2. In 2010, a monitor measuring NO_y was added at the El Paso Chamizal site to comply with NCore monitoring requirements. NO_y compounds are considered ozone and $PM_{2.5}$ precursors. The NO_x monitor at Ascarate Park SE was deployed in 1999 to meet PAMS requirements and is located in a densely populated area, surrounded by schools. This monitor is well-sited to measure NO_2 emissions without interference from emissions generated in downtown El Paso due to its predominately upwind location.

Appendix A lists the active NO_x monitors, their location, monitoring objectives, and associated spatial scales.



TPY – tons per year

Figure 109: Far West Texas Area Oxides of Nitrogen (NO_x) Point Sources and Monitors

Design Values and Trends

All three active NO_x monitors in the Far West Texas area have consistently measured NO_2 design values well below both the one-hour NAAQS of 100 ppb and the annual NAAQS of 53 ppb. In 2014, measured one-hour NO_2 design values ranged from 53 to 57 ppb, while annual design values ranged from 12 to 14 ppb.

Network Evaluation

Design values from all three sites have also been on a downward trend since 2008 due to increased emissions control measures such as:

- enhanced vehicle emissions inspection;
- increased use of fuel efficient and mixed fuel vehicles;
- gasoline vapor recovery programs;
- the TxLED Program; and,
- the El Paso Oxygenated Fuel Program.

The existing NO_2 monitoring network in the Far West Texas area meets all current federal monitoring requirements and achieves established monitoring objectives. The NO_x and NO_y monitors at El Paso Chamizal satisfy both PAMS and NCore requirements and are considered of high value. In addition, the Ascarate Park SE NO_x monitor fulfills requirements for monitoring in areas with susceptible and vulnerable populations. This location was chosen to satisfy this requirement because three elementary schools and a juvenile detention center are located within a mile and a half of the monitor. For these reasons, the Ascarate Park SE site is also considered of high value for NO_2.

The NO_x monitor at the El Paso UTEP site is beyond minimum federal monitoring requirements. While El Paso UTEP has traditionally provided valuable information regarding NO_2 concentrations around UTEP, the site is located 2.69 miles from El Paso Chamizal and has consistently produced NO_2 values lower than Ascarate Park SE and El Paso Chamizal since mid-2006. Although the El Paso UTEP NO_x monitor is not of high regulatory value, the monitor is considered of medium value for the historical information it provides on ozone formation. Details on each monitor's value are provided in Appendix C. The TCEQ will reevaluate the network once the EPA finalizes its proposed ozone rule, as PAMS requirements and ozone nonattainment areas are likely to change.

Sulfur Dioxide

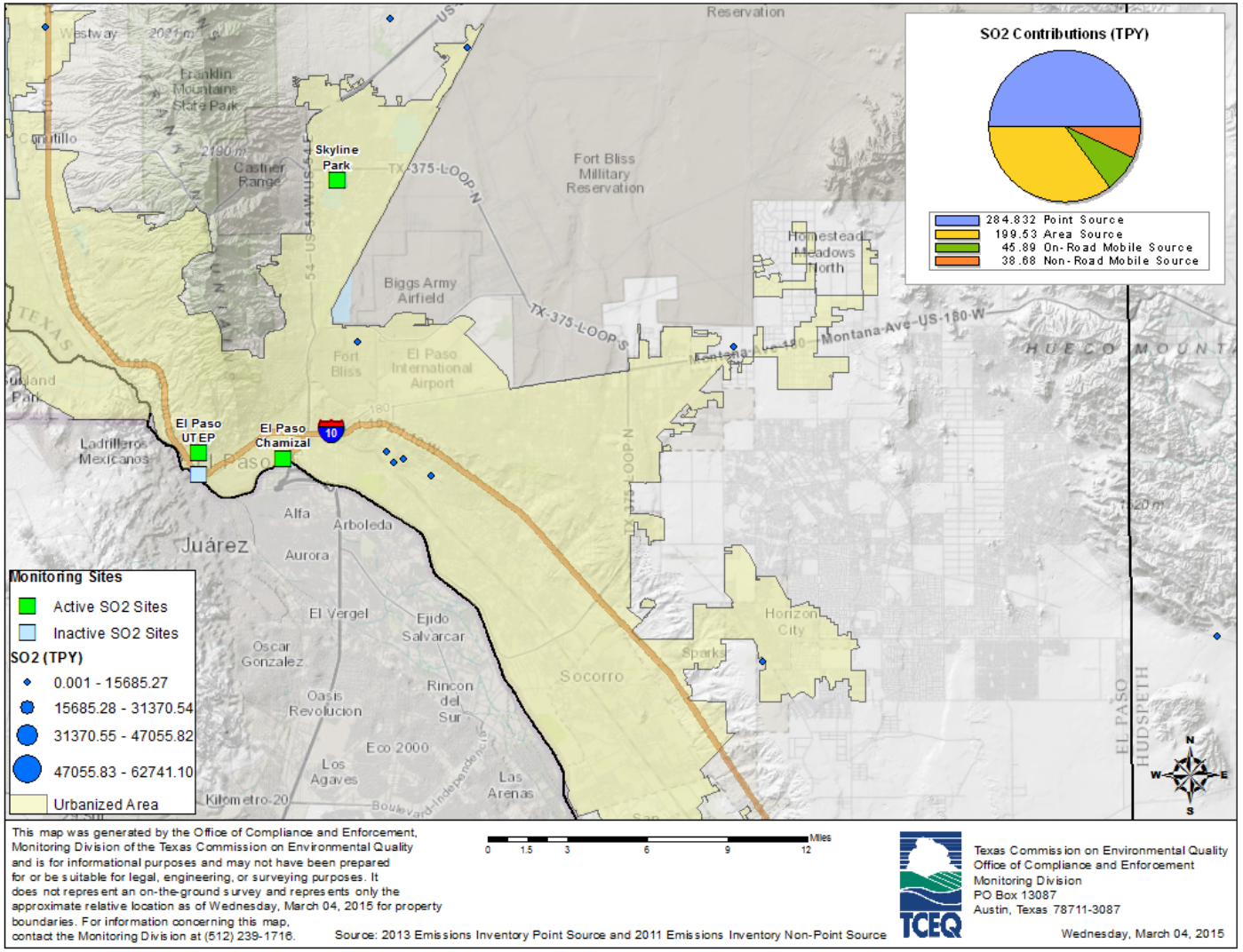
Network History

As of January 1, 2015, three active SO_2 monitors (shown in Figure 110) operated in the Far West Texas area to measure ambient SO_2 concentrations near populated areas or downwind of known SO_2 point sources. The El Paso UTEP monitor was originally deployed to measure SO_2 concentrations in a populated area downwind of the American Refining and Smelting Company (ASARCO), LLC smelter, located east of downtown. In

1998, an SO_2 monitor was deployed at the El Paso Sun Metro site. The site was located near the United States-Mexico border, just west of multiple railroad tracks and Interstate 10 and was located in an area likely to measure the highest area SO_2 concentrations, as well as emissions coming across the international border. Skyline Park was deployed in 2000.

Since the last five-year network assessment, two SO_2 network changes have occurred. In late 2010, a trace level SO_2 monitor was deployed at the El Paso Chamizal site to comply with NCore monitoring requirements. Additionally, the El Paso Sun Metro site was decommissioned in 2012 due to the sale of the property where the monitoring station was located. Although the El Paso Sun Metro site had the highest design value in the El Paso area, SO_2 concentrations had historically remained less than 20% of the NAAQS.

Appendix A provides a full list of both active and recently decommissioned SO_2 monitors, as well as their location, monitoring objectives, and associated spatial scales.



TPY – tons per year

Figure 110: Far West Texas Area Sulfur Dioxide (SO_2) Point Sources and Monitors

Design Values and Trends

Design values for the three SO_2 monitors in El Paso County have shown a decreasing trend since 2008. In 2014, the measured one-hour SO_2 design values for these monitors ranged from 2 to 10 ppb, well below the one-hour SO_2 NAAQS of 75 ppb.

Network Evaluation

The current SO_2 monitoring network in the Far West Texas area exceeds minimum federal monitoring requirements and continues to satisfy established monitoring objectives. Monitoring is currently not required in any of the Far West Texas area counties based on population and reported emissions from existing sources, and ambient SO_2 levels from existing monitors remain well below a level of concern. Because emissions and monitored concentrations are so low, two of the existing SO_2 monitors (El Paso UTEP and Skyline Park) that exceed current SO_2 monitoring requirements are considered of medi15um value. The SO_2 monitor at the El Paso Chamizal site fulfills NCore requirements and therefore is considered of high value. Details on each monitor's value are provided in Appendix C.

Due to proposed federal regulatory action and pending designations for the 2010 one-hour SO_2 standard, no network changes are currently recommended. Once the EPA's final SO_2 Data Requirements Rule is promulgated, the TCEQ will evaluate the existing SO_2 network for potential optimization that will provide for compliance with any associated SO_2 monitoring requirement changes. These network changes will be included in the *2016 Annual Monitoring Network Plan*.

Lead

Network History

As of January 1, 2015, the TCEQ monitored Pb at three locations in the El Paso area as shown in Figure 111. Current federal rules require monitoring in locations likely to measure maximum Pb concentrations near each point source emitting 0.50 tpy or more of Pb and each airport emitting 1.0 tpy or more of Pb based on the National Emissions Inventory or other justifiable method. In addition, Pb monitoring is required at all NCore monitoring sites. As indicated in Figure 111, five sources in the El Paso area reported Pb emissions in 2013. None of these sources reported emissions greater than 0.06 tons of Pb per year. Based on 2013 Pb point source emissions and 2011 area source emissions, no source-oriented Pb monitoring is required in the Far West Texas area.

The largest historical source of Pb in the Far West Texas area was the ASARCO smelter, which operated from 1887 to 1999. Site-wide demolition was completed in 2013, and remedial activities are projected to be complete by early 2016. Air monitoring performed by the ASARCO site trustee indicates that possible Pb emissions from the site are minimal during the site remediation process. More information about the site and its remediation can be found online at http://www.recastingthesmelter.com.

Historically, Pb monitoring in the El Paso area has been conducted in populated areas downwind of the ASARCO facility. Prior to 2000, the TCEQ monitored ambient Pb concentrations at the Tillman and Kern sites, which were located in the populated downtown El Paso area. These monitors were later relocated to the Ojo de Agua and UTEP sites, respectively. In 2005, a Pb monitor was deployed at Skyline Park to measure background ambient Pb concentrations in a populated area on the north side of the city.

Since the last five-year assessment in 2010, the El Paso area Pb monitoring network has seen several changes. In 2011, a new Pb monitor was deployed at Ascarate Park SE to fulfill NCore requirements. Although the El Paso Chamizal site is the designated NCore site in the area, space limitations at that site precluded deployment of additional monitoring equipment and Ascarate Park was selected as an alternative site for meeting this requirement. In 2012, the Pb monitor at the Kern site was relocated to El Paso UTEP for logistical reasons. In 2013, the Tillman monitor property was sold, and the monitors were relocated to the new Ojo De Agua site, located in a populated residential area in Northwest El Paso. Finally, the Pb monitor at Skyline Park was decommissioned in 2014 based on historical measured design values well below the Pb NAAQS of 0.15 $\mu g/m^3$. Appendix A provides a list of active and decommissioned Pb monitors, as well as their location, monitoring objectives, and associated spatial scales.

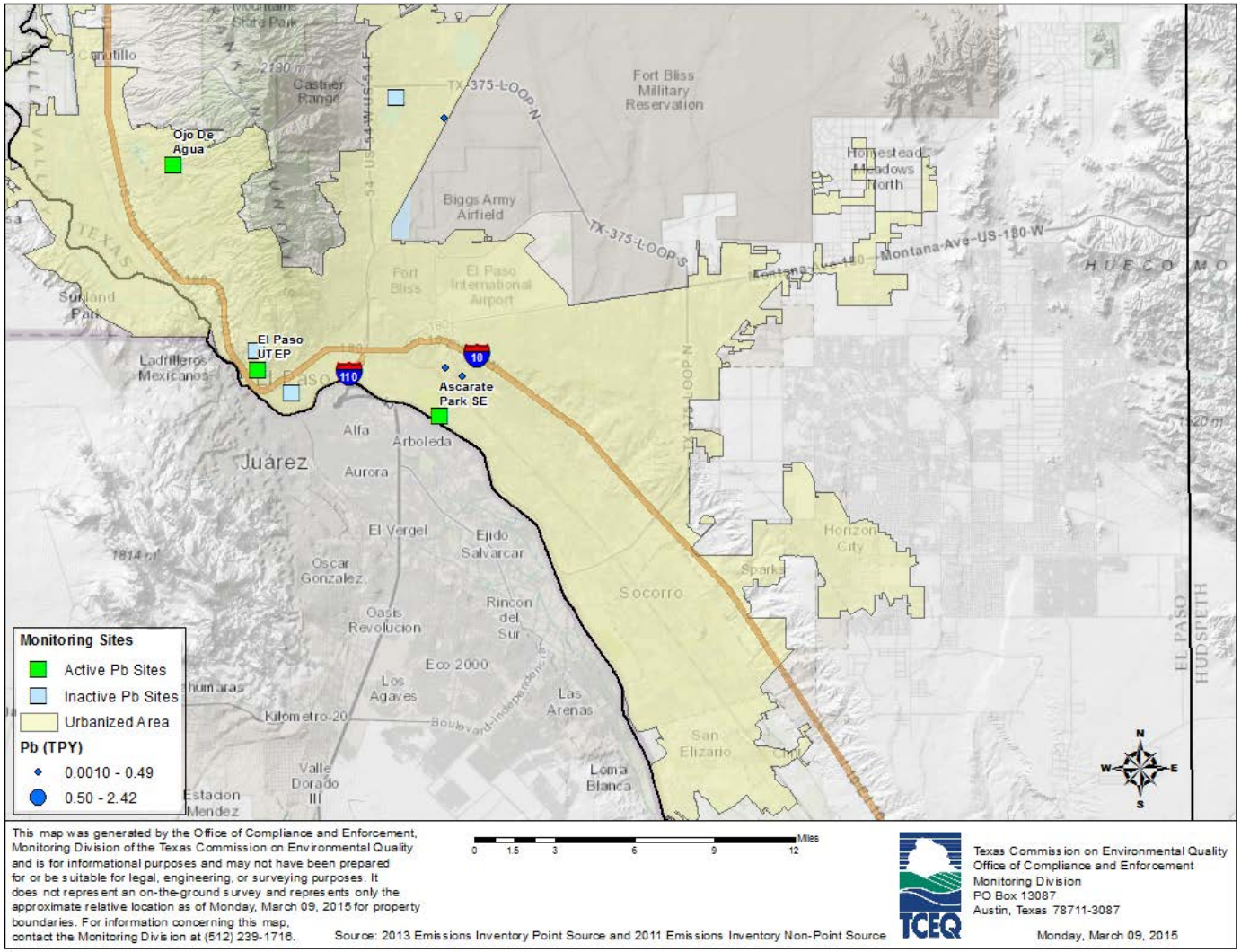
Design Values and Trends

Due to their recent deployments, active El Paso Pb monitors have not yet achieved the required 38 months of data to calculate an official design value. Table 5 below provides the highest 3-month rolling averages for the former Tillman, Kern, and Skyline Park monitors and three current monitors in El Paso County. Note these maximum values from these former and current monitors are well below the Pb NAAQS of 0.15 $\mu g/m^3$.

Table 5: Highest Three-Month Rolling Averages at Current and Historical Lead Monitors in the Far West Texas Area

Site Name	2011	2012	2013	2014
Tillman	0.03	0.03	0.03	*
Kern	0.02	0.02	*	*
El Paso UTEP	*	0.03	0.03	0.02
Ascarate Park SE	0.01	0.02	0.01	0.01
Skyline Park	0.02	0.02	0.03	0.02
Ojo De Agua	*	*	0.02	0.02

Concentrations are provided in micrograms per cubic meter.
*Values are not available for these years.



TPY – tons per year

Figure 111: Far West Texas Area Lead (Pb) Point Sources and Monitors

Network Evaluation

The existing Pb monitoring network in the Far West Texas area currently exceeds federal monitoring requirements and continues to meet existing monitoring objectives. Due to space limitations at El Paso Chamizal, the Ascarate Park SE Pb monitor is fulfilling NCore requirements and is considered of high value.

No source in the Far West Texas area emitted more than 0.50 tpy of Pb based on the 2013 point source emissions reported to the TCEQ. In addition, Pb has been monitored at five locations across the City of El Paso since 2005. Ambient concentrations at all of these locations were measured well below the level of the NAAQS. For these reasons, El Paso UTEP and Ojo De Agua Pb monitors are considered of low value.

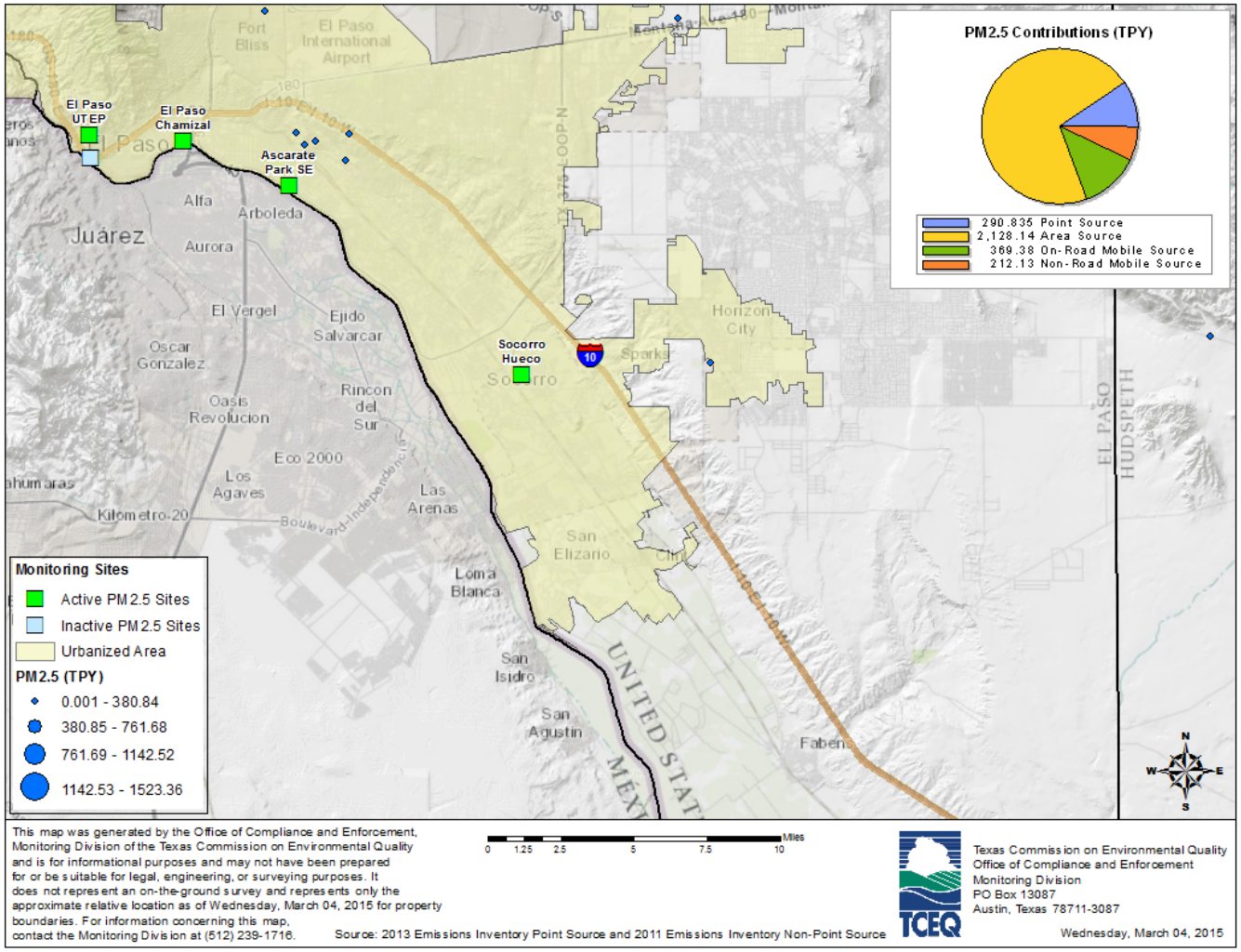
Particulate Matter of 2.5 Micrometers or Less

Network History

As of January 1, 2015, there were two $PM_{2.5}$ FRMs, four continuous $PM_{2.5}$ monitors, and one speciation monitor in the Far West Texas area, as shown in Figure 112. A variety of $PM_{2.5}$ samplers are located at El Paso area sites distributed along the international border with Mexico to evaluate regional transport, $PM_{2.5}$ background levels, and ambient $PM_{2.5}$ concentrations in populated areas. Additional $PM_{2.5}$ monitoring is deployed in Big Bend National Park to further assess regional transport across the United States and Mexico border. A full site list of both active and decommissioned $PM_{2.5}$ monitors, as well as their location, monitoring objectives, and associated spatial scales is provided in Appendix A.

Since the last five-year network assessment, two monitors have been relocated and two monitors have been decommissioned within the El Paso area. In November 2010, the TCEQ relocated a continuous $PM_{2.5}$ sampler from El Paso Chamizal to Ascarate Park SE to monitor concentrations in the populated area on the east side of downtown El Paso. At the same time, the TCEQ decommissioned the El Paso Chamizal $PM_{2.5}$ speciation sampler and a collocated speciation sampler at the El Paso Sun Metro site to create efficiencies within the $PM_{2.5}$ network. Following the sale of the property in 2012, the TCEQ relocated a continuous $PM_{2.5}$ sampler from El Paso Sun Metro to Socorro Hueco to monitor $PM_{2.5}$ background concentrations to the southeast of El Paso.

Multiple federal $PM_{2.5}$ monitoring requirements with unique monitoring objectives currently apply to the Far West Texas area. Based on population and ambient concentrations, the El Paso MSA is required to have a minimum of two $PM_{2.5}$ FRM monitors to measure concentrations representative of area-wide air quality with at least one sited in an area of expected maximum concentrations. In addition, continuous measurements of $PM_{2.5}$ are required at half of the required FRM sites and $PM_{2.5}$ FRM and continuous monitors are required at all NCore sites. These monitoring requirements are met with the monitors at the El Paso UTEP and El Paso Chamizal sites. Finally, $PM_{2.5}$ speciation monitoring is required at designated $PM_{2.5}$ STN sites to evaluate elemental constituents, selected anions and cations, and carbon. The speciation monitor at the El Paso Chamizal site fulfills this requirement.

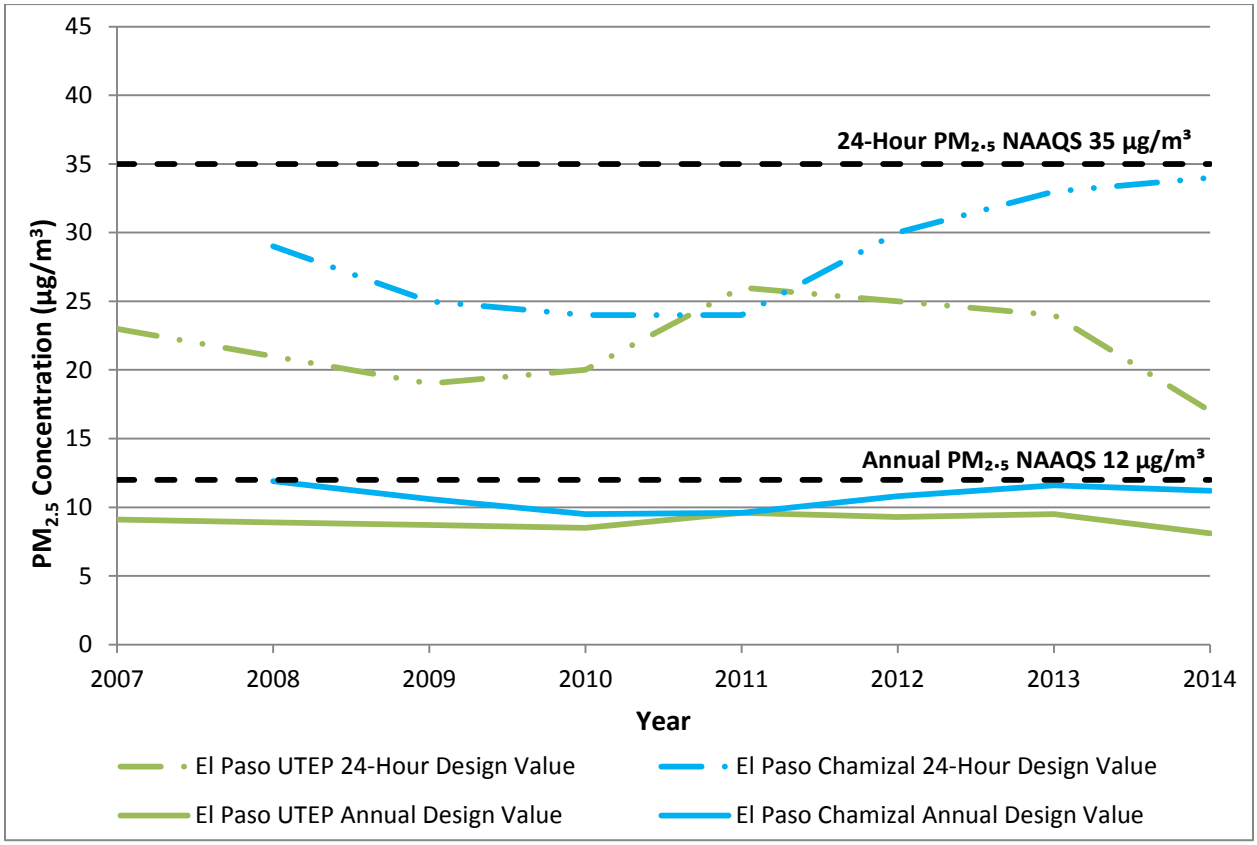


TPY – tons per year

Figure 112: Far West Texas Area Particulate Matter of 2.5 Micrometers or Less in Diameter ($PM_{2.5}$) Point Sources and Monitors

Design Values and Trends

The annual $PM_{2.5}$ design values in the Far West Texas area have been stable since 2000, while the 24-hour average $PM_{2.5}$ measurements have shown more variability from year to year. Since the 98th percentile of the 24-hour average (the form of the standard) represents the highest two percent of all 24-hour measurements, the presence or absence of dust events on sampling days can greatly influence trend variability. Figure 113 depicts the trends in both the annual and 98th percentile of the 24-hour average using FRM data collected on a one in six day frequency from the El Paso Chamizal and El Paso UTEP monitors.



NAAQS - National Ambient Air Quality Standards
µg/m³ - microgram per cubic meter

Figure 113: Trends of 98th Percentiles of 24-Hour and Annual Averages Particulate Matter of 2.5 Micrometers or Less in Diameter ($PM_{2.5}$) Monitoring Sites in the Far West Texas Area Including Exceptional Event Days

Prior to 2011, El Paso Chamizal only had regulatory data from a filter-based monitor, which sampled every sixth day. In 2011, a regulatory continuous monitor was installed at El Paso Chamizal. Data handling procedures require regulatory continuous data be used when data from the filter-based monitor are unavailable for calculation of design values. The increased monitoring captured more high $PM_{2.5}$ days, causing an increase in the annual average $PM_{2.5}$. Some of those high days are proposed exceptional events

(typically dust events). More information about these exceptional event packages is publicly available online at https://www.tceq.texas.gov/airquality/monops/pm_flags.html.

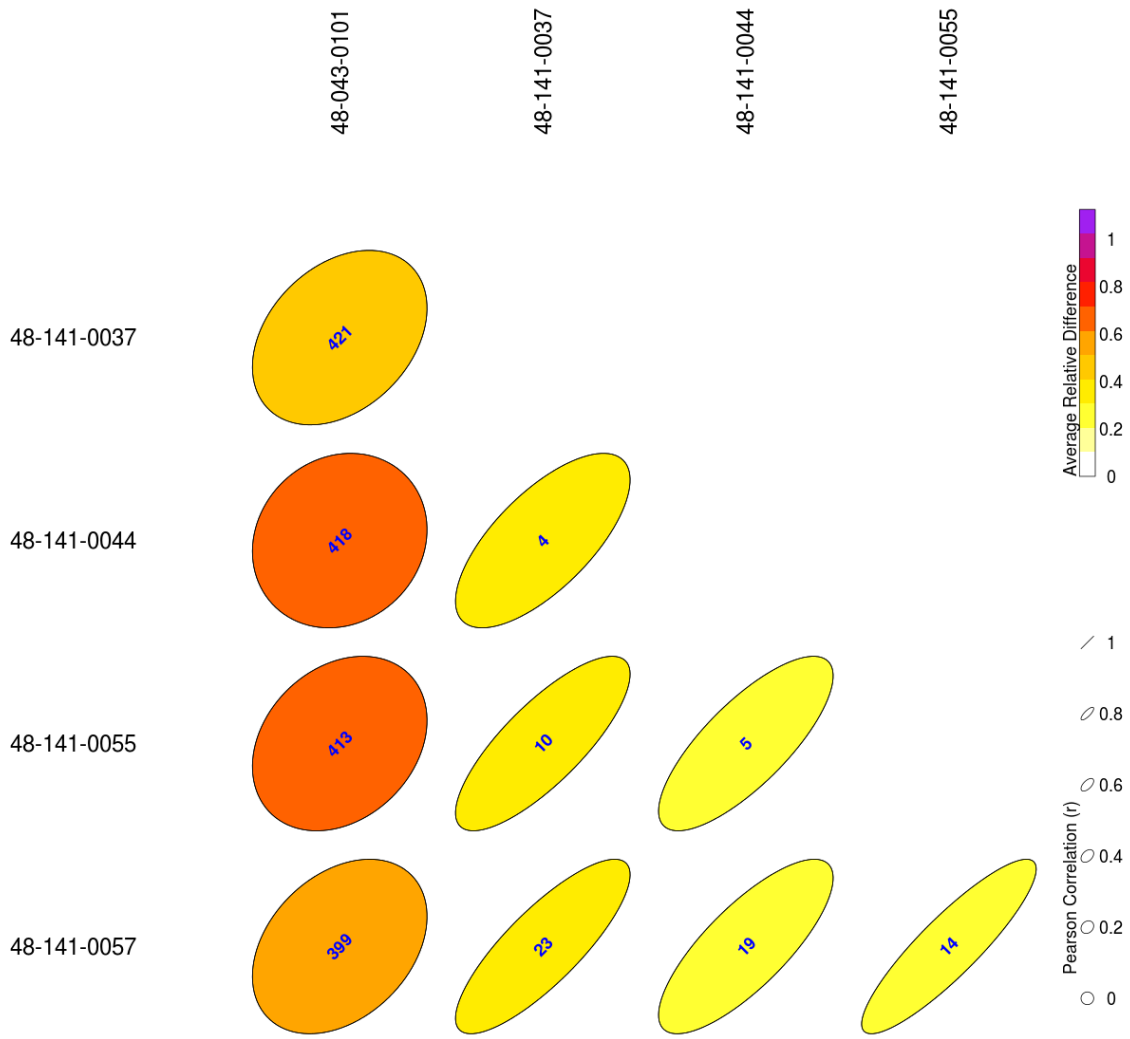
Additionally, the continuous $PM_{2.5}$ monitor at Bravo Big Bend has reported concentrations well below the NAAQS. The annual average data remains below 6.5 $\mu g/m^3$ and the 24-hour average below 16 $\mu g/m^3$.

Network Evaluation

The existing Far West Texas $PM_{2.5}$ monitoring network provides valuable data for the evaluation of both local and transported sources of particulate matter. The current placement of monitors in the Far West Texas area allows for the evaluation of $PM_{2.5}$ concentrations in populated areas of El Paso as well as in areas impacted by background and transported particulate from across the international border.

Based on current $PM_{2.5}$ monitoring requirements, all of the $PM_{2.5}$ monitors at the El Paso Chamizal and El Paso UTEP sites are considered of high value. Both of these sites are located in highly populated areas of the city that are in close proximity to the international border making the location of these sites valuable in evaluating data relevant to regional $PM_{2.5}$ transport and concentrations that impact populated areas. In addition, 24-hour data from the El Paso UTEP and El Paso Chamizal FRM monitors are not well correlated (Pearson's coefficient=0.768; relative difference=0.291), indicating that both of these monitors offer valuable, unique data.

Although the continuous $PM_{2.5}$ monitoring conducted in Far West Texas is in excess of federal monitoring requirements, the data it provides is valuable in understanding $PM_{2.5}$ movement across the area. As shown in Figure 114, 24-hour continuous data are, at best, moderately correlated. The closest correlation is between Ascarate Park SE (AQS 48-141-0055) and Socorro Hueco (AQS 48-141-0057) monitors (Pearson's coefficient=0.888, relative difference=0.287). The moderate correlation and high relative difference of the El Paso area $PM_{2.5}$ data indicate the existing $PM_{2.5}$ monitors are not redundant and provide valuable, unique data. All of the continuous $PM_{2.5}$ monitors are valuable because of the spatial coverage and hourly data points they provide, which are critical for evaluating the impact of dust events.



values in ellipse = distance in kilometers

Figure 114: Correlation Matrix for 24-Hour Particulate Matter of 2.5 Micrometers or Less in Diameter ($PM_{2.5}$) Monitors in the Far West Texas Area, 2011-2013

Given that current $PM_{2.5}$ design values in the Far West Texas area are in excess of 90% of the NAAQS, all current $PM_{2.5}$ monitors are considered of high value. Details on each monitor's value are provided in Appendix C. Since the highest $PM_{2.5}$ concentrations in the area have demonstrated an association to natural events and international sources, the TCEQ will continue to evaluate monitoring opportunities near the border to better understand the impact of dust transported into the Far West Texas area and its effect on ambient $PM_{2.5}$ concentrations.

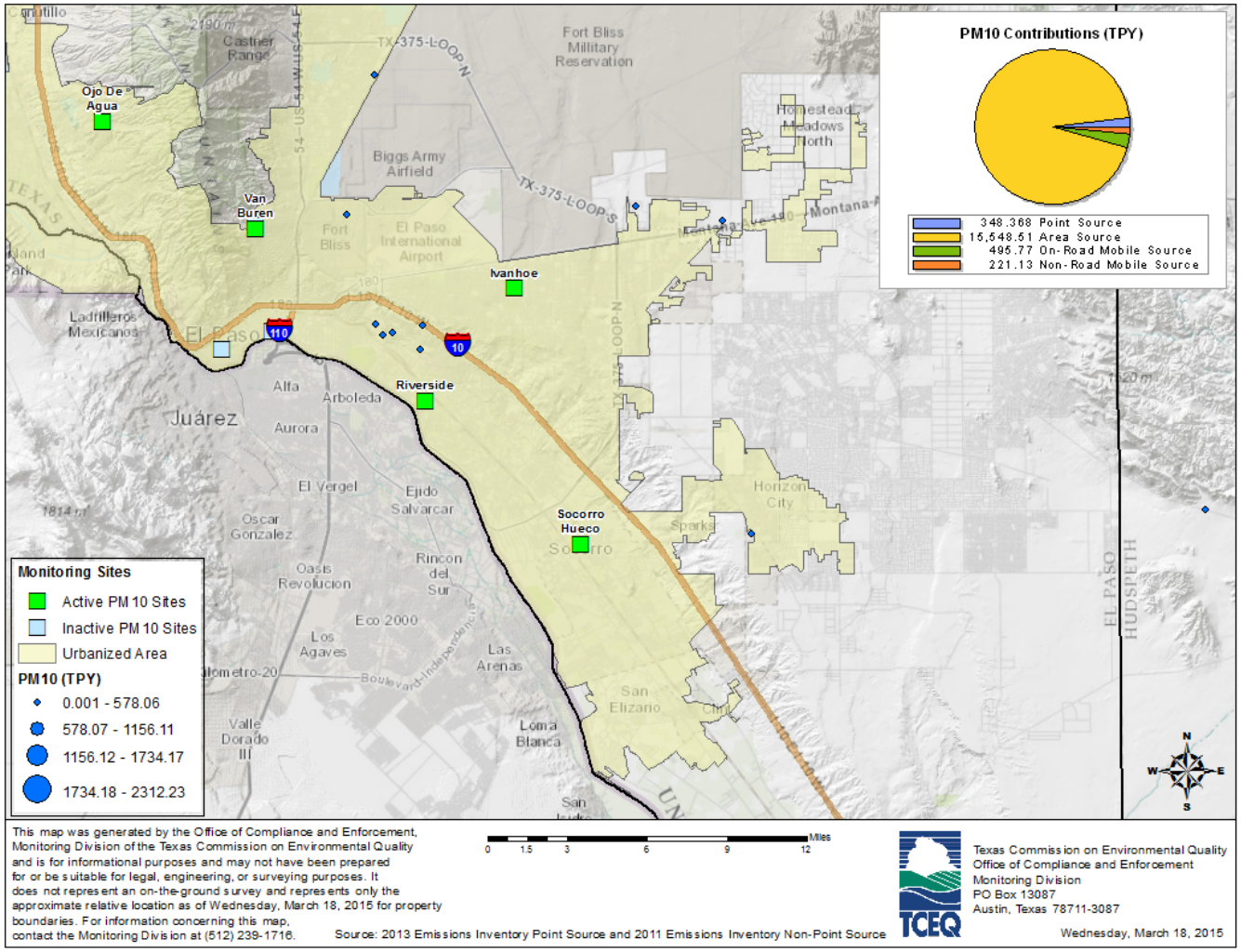
Particulate Matter of 10 Micrometers or Less

Network History

As of January 1, 2015, five PM_{10} FRM monitors (Ivanhoe, Ojo De Agua, Riverside, Socorro Hueco, and Van Buren) and two collocated PM_{10} samplers operated in the Far West Texas area to evaluate regional air quality in the populated El Paso area. In addition, one $PM_{10-2.5}$ monitor is operated at the El Paso Chamizal site to assess the variation in coarse particle concentrations as required for NCore sites. The TCEQ began monitoring PM_{10} in the El Paso area in the mid-1980s at sites such as Ivanhoe and Riverside, to measure particulate concentrations in populated neighborhoods throughout the urban area. In 2000, a PM_{10} monitor was added to the Socorro Hueco site to evaluate background concentrations in the populated area to the southeast of El Paso. Another PM_{10} monitor was deployed a year later at the Clendenin School site to evaluate maximum ambient concentrations. The location of these monitors and 2013 point sources is provided in Figure 115.

Since the last five-year assessment in 2010, the Clendenin School site was relocated across the street to the Van Buren site. The $PM_{10-2.5}$ monitor was deployed in 2011 at the El Paso Chamizal site to fulfill NCore monitoring requirements for course particulate. Finally, in 2013 the PM_{10} monitor was moved from the Tillman site to the new Ojo De Agua site due to sale of the Tillman site property. Appendix A provides a full list of active and decommissioned PM_{10} monitors, as well as their locations, monitoring objectives, and associated spatial scales.

Current federal minimum requirements specify PM_{10} monitoring in metropolitan areas based on population and measured concentrations, if available. Based on 2014 concentration data and population estimates, the El Paso MSA is required to have between four and eight PM_{10} FRM monitors. Those requirements are met with existing monitors.



TPY – tons per year

Figure 115: Far West Texas Area Particulate Matter of 10 Micrometers or Less in Diameter (PM_{10}) Point Sources and Monitors

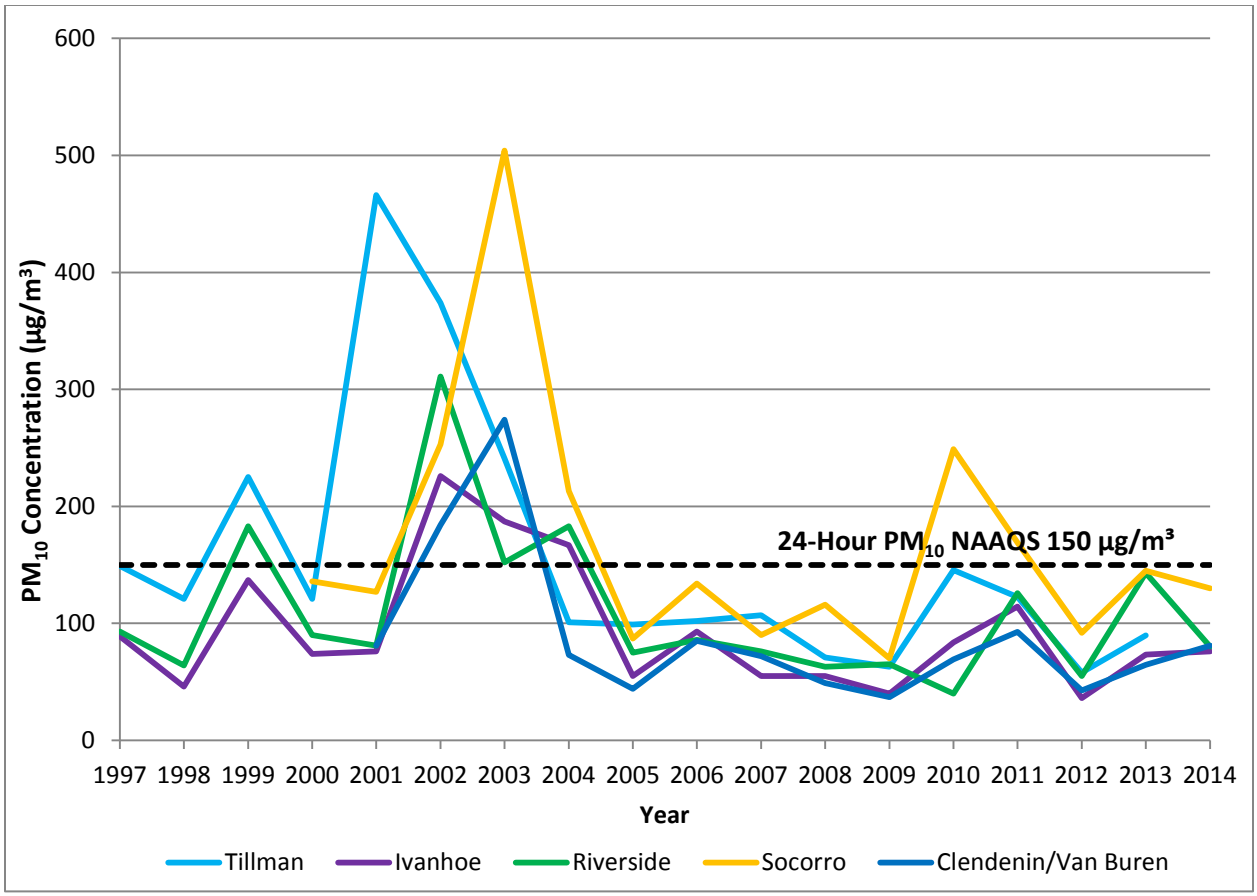
Design Values and Trends

The El Paso area has been classified as nonattainment for the 24-hour PM_{10} NAAQS since November 15, 1990. As shown in Table 6, the estimated number of exceedances per year has hovered between 2 and 6.7 since 2005. Socorro Hueco exceedances have been variable due to the impact of regional blowing dust, and remain heavily impacted by exceptional events. Similarly, as shown in Figure 116, trends in the PM_{10} annual maximum 24-hour averages for El Paso show an overall decline from 2000 to 2014, but are influenced by exceptional dust events coinciding with sampling days.

Table 6: Far West Texas Area Estimated Number of Exceedances Days of the National Ambient Air Quality Standard for Particulate Matter of 10 Micrometers or Less in Diameter

Site Name	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Ivanhoe	6.1	2	0	*	*	*	0	0	0	0
Riverside	2	2	0	*	*	*	*	0	0	0
Vilas^	4.1	*	*	*	*	*	*	*	*	*
Lindbergh^	4	*	*	*	*	*	*	*	*	*
Socorro Hueco	6.2	2.2	0	0	0	2	6.1	6.1	4	6.7
Skyline Park	3.8	*	*	*	*	*	*	*	*	
Clendenin School^	0	*	*	*	*	*	*	*	*	*
Van Buren	*	*	*	*	*	*	*	*	0	0

The average estimated exceedance values are computed based on the 3-year period ending with the represented year.
*Data were unavailable for design value calculation.
^Deactivated sites



µg/m^3 - micrograms per cubic meter.

Figure 116: Trends of Far West Texas Area Particulate Matter of 10 Micrometers or Less in Diameter (PM_{10}) Annual Maximum 24-Hour Averages Including Exceptional Event Days, 1997-2014

Network Evaluation

The existing Far West Texas area PM_{10} monitoring network meets federal monitoring requirements. The current location of PM_{10} monitors continues to be sufficient to meet the established monitoring objective of measuring ambient PM_{10} concentrations in populated urban and suburban environments. Based on their regulatory obligation and monitoring objectives, all of the current monitors are of high value. While no network changes are recommended at this time, the TCEQ continues to evaluate monitoring opportunities near the border to better understand the impact of dust transported into the El Paso area and its effect on ambient PM_{10} concentrations.

Air Toxics

Network History

VOCs

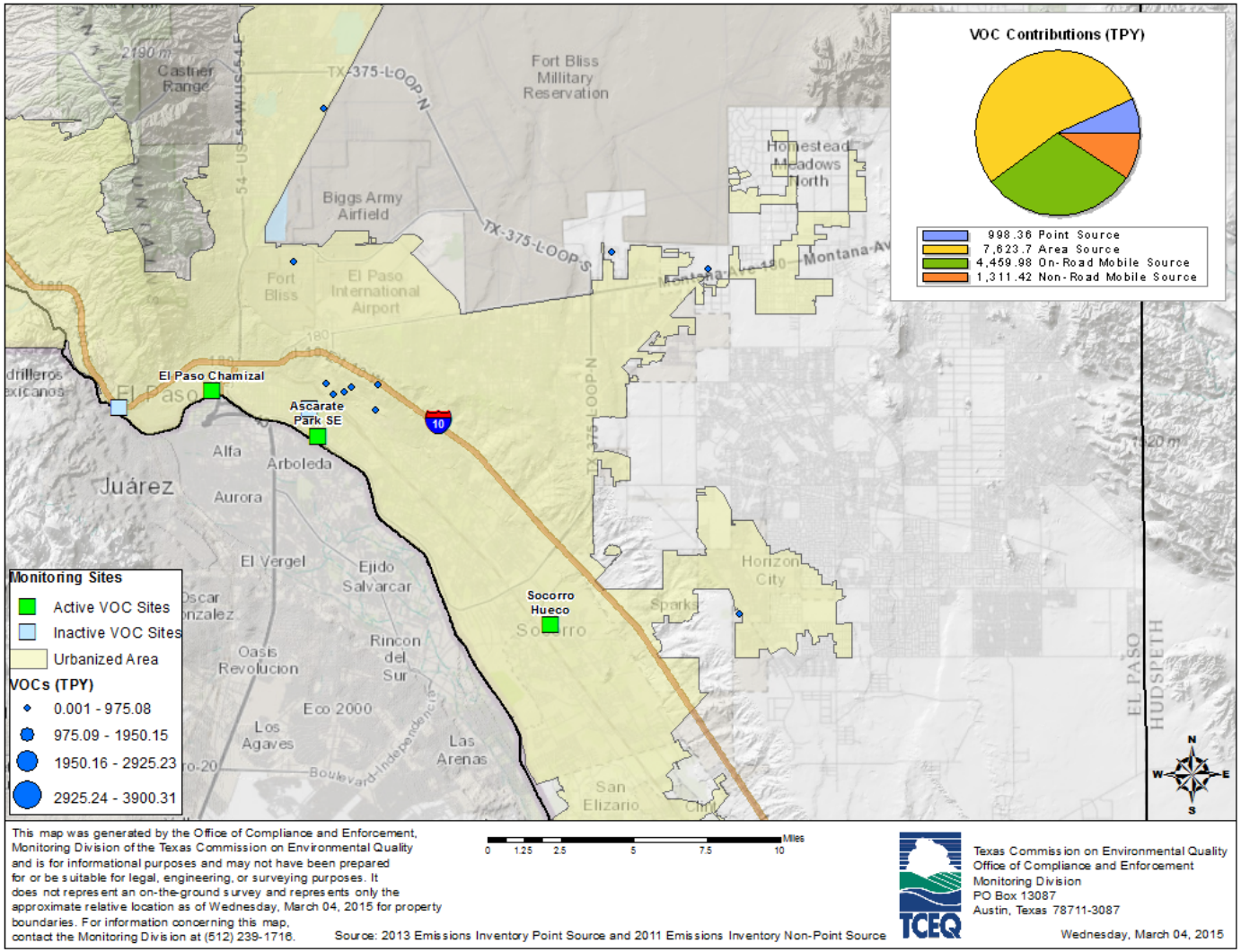
Figure 117 shows the locations of sources reporting VOC emissions in 2013. The Far West Texas area currently has one autoGC measuring VOCs. The El Paso Chamizal autoGC was deployed in 1995 to meet the PAMS network requirement and characterize short-term changes in regional and local ambient air conditions in the El Paso area. A canister sampler was deployed at the Ascarate Park SE site in 2010 to monitor concentrations in populated areas and better understand background VOC concentrations. Under the United States/Mexico Border grant, an additional autoGC was deployed at the El Paso Delta site as part of a short-term study to characterize ozone precursor emissions. The El Paso Delta site was decommissioned in August 2013 when the study was completed. Also in 2013, the canister sampler at the Ascarate Park SE site was deactivated due to low historical VOC concentrations and adequate monitoring coverage by the El Paso Chamizal autoGC and other non-regulatory El Paso area VOC monitors.

Other Air Toxics

As of January 1, 2015, the Far West Texas area had one $PM_{2.5}$ speciation sampler, one carbonyl monitor, and one SVOC sampler. Since 2000, the TCEQ has collected $PM_{2.5}$ samples every third day the El Paso Chamizal site and analyzed then for a set of 40 speciated compounds. The speciation data are representative of ambient concentrations in a populated, urban area and provide meaningful information about the composition of area windblown dust.

In 2010, the carbonyl sampler was relocated from El Paso Chamizal to Ascarate Park SE to address logistical issues. Every sixth day, this sampler collects a 24-hour sample that is analyzed for 17 carbonyl compounds. Data are used to characterize ozone precursor concentrations and assess ambient concentrations in populated areas.

In 2012, the SVOC sampler was relocated from Sun Metro to Socorro Hueco after the sale of the Sun Metro property. As with carbonyls, a 24-hour sample is collected every sixth day for subsequent laboratory analysis. SVOC data provide information about ambient concentrations of certain combustion products, as well as provide concentration trends in an urban environment that are useful for direct toxicological evaluations.



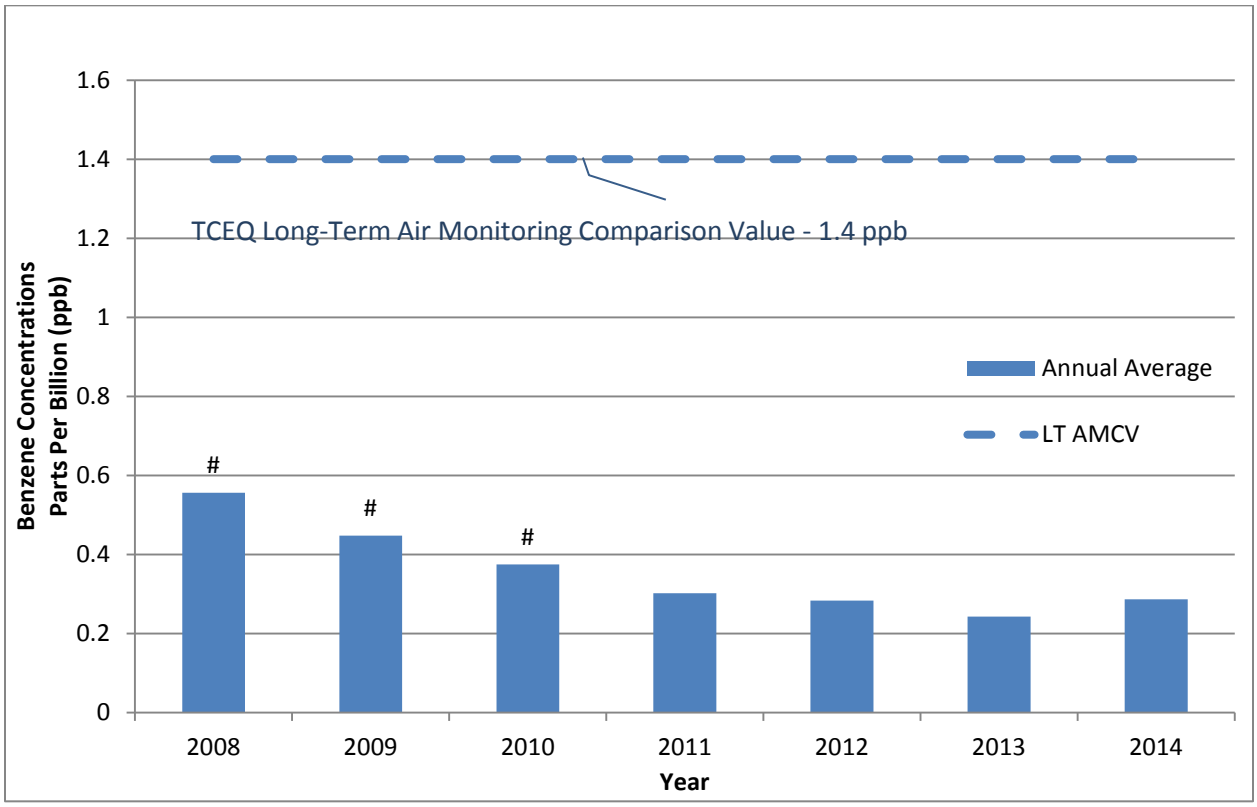
TPY – tons per year

Figure 117: Far West Texas Area Volatile Organic Compound (VOC) Point Sources and Monitors

Network Evaluation

Although most air toxics monitors in the El Paso area were deployed to evaluate regional air quality and trends in ozone precursors in populated areas, the Toxicology Division also evaluates all air toxics monitoring data annually for their potential to cause health or welfare concerns. According to the annual monitoring data evaluations, exposure to measured VOC, SVOC, metals, and carbonyl concentrations in the El Paso area over the past five years would not be expected to cause adverse health effects or odorous conditions. Full Toxicology Division evaluations of ambient air data are available online at http://www.tceq.state.tx.us/toxicology/regmemo/AirMain.html.

Ambient air toxics concentrations in the El Paso area have remained below a level of potential health concern for over five years, even in areas that are closest to sources and expected to have the highest concentrations. Benzene is a common air pollutant in ambient air, particularly in urban areas impacted by mobile sources. Benzene is also frequently the VOC measured at concentrations closest to its AMCV. Therefore, benzene is a good surrogate for evaluating trends in air quality, particularly in urban settings. As shown in Figure 118, rolling annual average benzene concentrations have decreased since the mid-1990s in the El Paso area. This decreasing trend is consistent with the statewide decrease in benzene over the past five years.



ppb – parts per billion
#Indicates an incomplete data set

Figure 118: Rolling Annual Average Benzene Trends at El Paso Chamizal, 1996-2014

Each of the air toxics monitors is considered of high value because of continued federal PAMS monitoring requirements or because of the value in the continued evaluation of air toxics trends in the El Paso area. In addition, the existing air toxics network is adequately sited to evaluate air toxics trends in populated El Paso areas. El Paso Chamizal and Ascarate Park SE provide representative air quality data in the populated urban core, as well as information on air toxics emissions from the international border.

Because air toxics concentrations have remained below a level of concern, and monitors are appropriately sited for both health effects evaluations and ozone precursor emission evaluations, additional monitoring is not anticipated at this time. The TCEQ will continue to assess the monitoring needs in this area as new data and regulatory requirements are made available.