

**Texas Commission on Environmental Quality
2010 Five Year Ambient Air Monitoring
Network Assessment**



**Texas Commission on Environmental Quality
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Five Year Network Assessment

Texas Commission on Environmental Quality (TCEQ) has prepared this five year network assessment as required by 40 Code Federal Regulations (CFR) Part 58 to be submitted to the U.S. Environmental Protection Agency (EPA) by July 1, 2010.

Executive Summary

In 1970, the Federal Clean Air Act (FCAA) established the requirement that health-based National Ambient Air Quality Standards (NAAQS) be set and periodically updated to reflect new scientific information. The State of Texas is delegated the responsibility to monitor compliance with the NAAQS. The TCEQ maintains an extensive network of air quality monitors to measure ambient air concentrations of the NAAQS pollutants: ozone, lead, carbon monoxide (CO), sulfur dioxide (SO₂), nitrogen dioxide (NO₂), and particulate matter (PM). In 1987 EPA changed the indicator of the standards to regulate inhalable particles smaller than, or equal to, 10 micrometers in diameter (PM₁₀). Then in 1997, EPA revised the PM standards, setting separate standards for fine particles (PM_{2.5}).

In recent years, the EPA has updated the NAAQS for several pollutants and new standards are expected to be in place for all NAAQS pollutants by 2012. The changes to these standards often include new requirements for air monitoring. Over the next several years, the TCEQ will be dedicating resources to the expansion of the monitoring network to meet these requirements. Highlights of the network expansion include:

- Ozone monitoring in urban areas with populations between 50,000 and 350,000. New ozone monitors will be added in Abilene, Amarillo, Bryan-College Station, Lubbock, Midland, Odessa, San Angelo, Sherman-Dennison, Texarkana, and Wichita Falls. Ozone monitors are already in place in the Waco, Killeen, Tyler and Longview areas. If the ozone design value for an area with at least 350,000 population is at least 85 percent of the ozone NAAQS, the EPA rule requires a second ozone monitor in the area. (The ozone design value is equal to the average of the fourth highest daily eight-hour ozone concentrations over the last three complete calendar years of data.) If the EPA lowers the ozone standard, the monitoring rule is likely to require a second ozone monitor for both the Brownsville and Killeen areas. The EPA is scheduled to issue a new rule revising the ozone NAAQS by September 30, 2010.
- Lead monitoring at airports and sources that emit between 0.5 and 1.0 tons per year. New monitors could be installed in up to 12 locations, depending on results from source-based emission reporting.
- CO and NO₂ monitoring near peak traffic areas in Austin, Dallas/Ft. Worth, El Paso, Houston, San Antonio and South Texas.
- SO₂ monitoring in populous areas and near emission sources. As many as 13 to 19 new SO₂ monitors could be installed around the state, depending on results from source-based emission reporting.
- Monitoring will be enhanced at three sites to measure particulate matter between 2.5 and 10 microns; one each in Dallas/Ft. Worth, El Paso, and Houston.

Overall, these new requirements are expected to result in between 20 and 40 new monitoring locations and approximately 50 new monitoring instruments around the state by 2015.

Assessment Process

As required in 40 CFR Part 58.10(d), monitoring agencies must conduct a network assessment once every five years to determine if the network meets the monitoring objectives defined in Appendix D to this part, whether new sites are needed, whether existing sites are no longer needed and can be terminated, and whether new technologies are appropriate for incorporation into the ambient air monitoring network.

Following this requirement and using EPA Network Tools and Guidance posted on <http://www.epa.gov/ttn/amtic/network-assessment.html>, a team including staff from the TCEQ Air Quality Division (AQD), the Toxicology Division, and Field Operations Support Division (FOSD) has evaluated the current air monitoring network. A summary of the team's recommendations for the existing network is included in Appendix A. Figures 1 through 6 depict the existing network as analyzed for this Assessment. Figure 7 depicts changes anticipated in 2011.

The review compared the monitoring in place to the monitoring required by current EPA rules (40 CFR Part 58, Appendix D). The review also considered the changes that recently promulgated EPA rules require, the changes included in currently proposed rules, and the changes that the EPA has informed the TCEQ are under consideration for inclusion in future rule proposals (ozone, 74 Federal Register (FR) 34525; NO₂, 75 FR 6474; lead, 74 FR 69050; SO₂, 74 FR 64810). The network detailed in the 2010 Annual Ambient Air Monitoring Network Review (Annual Network Review), which is included by reference in this Five Year Network Assessment (Assessment), meets or exceeds all currently promulgated network requirements.

The Assessment process included review of the:

- 2006 – 2008 Design Values (DV) compared to the existing NAAQS, proposed revisions to the NAAQS, and pollutant concentration ranges under consideration in current criteria pollutant risk assessments;
- Types of information and the analyses necessary to develop a control strategy if an area were to become nonattainment;
- Spatial coverage in urban, suburban, and rural areas, including review of the population that is in areas with few or no monitors;
- Possible redundancy of sites;
- Changes in the locations where the highest pollutant DV occur;
- Continuing operation of instruments with a long history of operation for the purpose of monitoring long-term pollutant trends;
- Spatial distribution in relation to existing monitoring sites;
- Distribution of SO₂ and lead monitors in relation to pollutant point sources;
- Location setting and land use type using high resolution aerial photography overlaid onto road maps together with review of site photographs; and
- Monitoring objective(s) and spatial scale considering the population density and distribution, the land use, the exposure to rural air on certain wind directions and the gradient in pollutant concentrations in the area.

Isopleth Analysis

This review included preparation and analysis of annual isopleths of design values for ozone and for NO₂ for all major urban areas in Texas. A subset of the isopleths created is included in Appendix B. The isopleths used in this Assessment are contour lines showing the estimated concentrations throughout an area; they are based on statistical calculations using the monitored concentrations at fixed monitoring stations. The 2004 and 2009 ozone results and the

2008 NO₂ results are in Appendix B. The ozone and NO₂ isopleths for the years 2004 through 2008 are available upon request. For clarity, the sites are listed by their Continuous Ambient Monitoring Station (CAMS) numbers. A list of CAMS numbers, site names, and EPA Air Quality System (AQS) numbers is included in the Appendix.

Ozone

Only sites with eight hour ozone DV for 2004 through 2009 were used for the isopleths. The DV for regulatory sites were taken from the AQS. The 2009 DV data was obtained in early March 2010. The DV for the non-regulatory and industry sites are estimated by the TCEQ. Non-regulatory and industry sites were used to enhance the Kriging algorithm that produces the isopleths.

When calculating the isopleths, the blank portions of the statewide ozone DV isopleths are determined from the Kriging uncertainties. All uncertainties above a threshold are left blank. The Kriging algorithm used was the default linear Kriging of the software. An appropriate threshold was thus chosen that blanks out the more uncertain results.

The color scheme was chosen to be orange at the 75 ppbv level of the eight hour ozone NAAQS, with increasingly red to magenta colors above, while going through yellow, green, and increasingly light blue colors below, generally in keeping with the Air Quality Index (AQI) protocols.

Nitrogen Dioxide (NO₂)

The same approach was used for NO₂ DV for 2004 through 2008. The same color scheme was used, though rescaled for the NO₂ NAAQS. Since all NO₂ DV are so far below the NAAQS only the lower levels of the color scheme appear in the isopleths.

Scatter Plot Matrices

This review included extensive examination of scatter plot matrices for ozone to determine if there were any redundancies between selected site pairs with comparable data. Many scatter plot matrices were generated and reviewed by the Assessment team. Selected scatter plot matrices are included in Appendix C. Additional scatter plot matrices are available upon request.

Analysis of the scatter plot matrices indicates that the TCEQ has a reasonably balanced network with a few redundant sites. It was determined that none of the redundant sites should be decommissioned because all of the sites are used for multiple reasons, including, but not limited to, long term trend histories, higher DV, and public interest.

The scatter plots use hourly ozone data from 2004 through 2008. The data is plotted to show commonality between pairs of sites within each plot in a matrix of such plots. This analysis is similar to the EPA's correlation matrices. The semitransparent red ellipses are 95th percentile ellipses, based upon an estimated variance/covariance matrix for all the data within a given matrix of scatter plots. The relative narrowness of the ellipses corresponds to the relative correlation between the two sites, in a similar fashion to the EPA's correlation matrices. However, the ellipses are centered on the data averages, and have an angle that corresponds to a linear regression of the data.

For the Dallas/Fort Worth and Houston areas, TCEQ generated scatter plot matrices of subsets of interest, since the scatter plot matrices for the entirety of these areas are too large to be printed. These subsets were determined primarily from inspection of the entire matrices, but they were also determined using single linkage cluster analysis on the distance between monitors.

Emission Inventory

In preparing this Assessment, the TCEQ considered emission inventory (EI) changes that have been occurring and significant emission changes that are anticipated in the next five years. The only direct change in the EI may be an increase in the number of point source inventories that are received and reviewed every year. Currently the agency receives approximately 2,000 EIs every year that must be reviewed, loaded into the data base, and submitted to the EPA. There are no plans at this time to propose changes to the annual EI reporting requirements in 30 Texas Administrative Code (TAC) Section 101.10.

The TCEQ is conducting a special inventory in the Barnett Shale area. Phase I will inventory equipment based on information from companies that own or operate leases or facilities in the area. Phase II will be a more detailed inventory that will include emissions and modeling type parameters. Additional information on this inventory can be found at: <http://www.tceq.state.tx.us/implementation/air/industeipsei/psei.html#barnett>

To monitor the air quality impact of the emissions from drilling and production from the Barnett Shale formation, the TCEQ is conducting special purpose monitoring using automated gas chromatographs (auto-GCs). The special purpose monitoring also includes NO₂ monitors and short-term, intensive sampling using canisters and bags. The data will be reviewed to determine whether any additional State and Local Air Monitoring Station (SLAMS) sites will be proposed in the 2011 annual network review.

The main emissions change that is anticipated in the coming decade is the implementation of SO₂ emission reductions as a result of electric generating units coming into compliance with the rules that replace the Clean Air Interstate Rule (CAIR). The main effect of CAIR rules in Texas would not occur until 2015. No new rule has been proposed or promulgated, so any impact will be beyond the scope of this Assessment. For these reasons, major emissions changes are not a consideration in the monitoring and monitoring needs reviewed in this Assessment.

Anticipated Network Changes

Ozone

The EPA proposed changes to the ambient ozone monitoring network design requirements on July 16, 2009 (74 Federal Register 34525). The proposed rule change would require ozone monitoring in the following Texas Metropolitan Statistical Areas (MSA) with a population of 50,000 or more by January 1, 2012 (see Table 1 and Figure 8):

- Abilene;
- Amarillo;
- Bryan-College Station;
- Lubbock;
- Midland;
- Odessa;

- San Angelo;
- Sherman-Dennison;
- Texarkana; and
- Wichita Falls.

The July 16, 2009, proposed rule change would also require three rural ozone monitors in Texas. EPA Region 6 staff has suggested that the requirement may already be met by the following three existing ozone monitors (The nine-digit number in parentheses after each site is the AQS number.):

- Big Bend (480430101);
- Palo Duro (AQS# not required); and
- Alabama-Coushatta (483739001).

However, there may be logistical concerns with these sites, so placement of the required ozone monitors at other locations is still under consideration while these issues are addressed. TCEQ anticipates making final recommendations to EPA regarding the specific locations for the required additional ozone monitors in the 2011 annual network review.

The proposed rule change would also require a second ozone monitor in the Brownsville-Harlingen MSA if the 2008 – 2010 DV for the ozone data is above 85% of the NAAQS. The specific location of the site would be included in the 2011 annual network review. The monitor would be operational by January 1, 2012.

Finally, the proposed rule would also require a second monitor in the Killeen-Temple MSA if the 2009 – 2011 DV for the ozone data is above 85% of the NAAQS. The specific location of the site would be included in the 2012 annual network review. The monitor would be required to be operational on January 1, 2013.

Facing the increased resource demand related to the new ozone monitoring rule, the TCEQ has identified two ozone monitors that could be decommissioned as there is no federal requirement for them to be sited in their current location. To better utilize available resources, the TCEQ is considering discontinuing ozone monitors at:

- Pilot Point CAMS 1032 (481211032); and
- Greenville CAMS 1006 (482311006).

Fine Particulate Matter 2.5 Microns or Less (PM2.5)

Due to resource constraints, the TCEQ anticipates discontinuing operation of several PM2.5 instruments over the next year. These potential network changes are discussed in the Annual Network Review. In addition, through the Assessment process, the TCEQ also identified the following potential changes to improve the efficiency of the PM2.5 network:

- In El Paso, add a new neighborhood PM2.5 Tapered Element Oscillating Microbalance (TEOM) to replace the TEOM and special purpose speciation monitors to be decommissioned at the Sun Metro site (481410053);
- In Galveston, add a special purpose Federal Reference Method (FRM) for selected speciation to support exceptional event analyses; and
- In Corpus Christi, add a collocated FRM to meet Quality Control (QC) requirements (at Dona Park).

Rulemaking related to the PM2.5 NAAQS is expected in the near future. Based on the limited information available at this time, it appears that additional PM2.5 monitors may be required in 2014. However, potential locations have not been identified as the rule has not been proposed or promulgated.

Particulate Matter 10 Microns or Less (PM10)

Through the Assessment process, the TCEQ has analyzed the existing PM10 network. At this time, only one change in the network is expected, adding a continuous PM10 monitor at the Clinton Drive site, to supplement the existing PM10 high-volume (Hi-vol) sampler that operates on an every-third-day schedule. The existing PM10 Hi-vol is currently the only PM10 sampler in the Houston Region that operates on an every-third-day schedule; so on half its sampling days there is no other PM10 data from the region with which to check the plausibility of outlier samples for data validation purposes. The TCEQ may consider deploying two additional continuous PM10 samplers to support AQI reporting, one each in the Dallas/Fort Worth and Austin area.

Lead

On December 23, 2009, the EPA proposed amendments to the lead monitoring rule (74 FR 69050) that would reduce the annual tonnage emission threshold for requiring source-oriented lead monitoring from 1.0 ton per year to 0.5 ton per year. Sources would include airports. If the EPA adopts this rule change as proposed, new lead monitors are expected to be required for the following six point sources and six airports (see Table 1 and Figure 8):

- McWane Inc, Tyler Pipe Co. in Smith County;
- Nibco Inc. in Nacogdoches County;
- San Miguel Electric Cooperative Inc. in Atascosa County;
- Exxonmobil Chemical Co., Baytown Olefins Plant in Harris County;
- Le Tourneau Technologies Inc. in Gregg County;
- Coletto Creek Power L. P. in Goliad County;
- Dallas/Fort Worth International (DFW) Airport in Tarrant County;
- Addison (ADS) Airport in Dallas County;
- La Porte Municipal (T41) Airport in Harris County;
- David Wayne Hooks Memorial (DWH) Airport in Harris County;
- Stinson Municipal (SSF) Airport in Bexar County; and
- Northwest Regional (52F) Airport in Denton County.

The proposed lead rule indicated that these additional monitors would be required within one year of the rule promulgation. As described in the TCEQ's formal comments on this proposal, this time frame is unrealistic for placement of new monitoring locations, especially those that must be source-oriented and maximum concentration sites. As a result, the TCEQ anticipates that these lead monitors may not be operational by the required deadline.

As discussed in the Annual Network Review, the lead rule published November 12, 2008 (73 Federal Register 66964) required additional lead monitors be operational by January 1, 2011 for population based monitoring in the following MSA: Austin-Round Rock, Dallas-Fort Worth-Arlington, El Paso, Houston-Sugarland-Baytown, McAllen-Edinburg-Mission, and San Antonio. The EPA Region 6 staff has indicated that the TCEQ may not wish to proceed with installation

of these population based lead monitors until the 2009 rule is finalized. The 2009 proposed revision to the lead monitoring rule would replace the 2008 requirements with the requirement for a lead monitor at each National Core (NCore) monitoring site. The NCore sites in Texas are:

- Chamizal in El Paso (481410044);
- Hinton Street in Dallas (481130069); and
- Deer Park in the Houston Region (482011039).

Nitrogen Dioxide (NO₂)

The EPA published a final rule revising the NAAQS for NO₂ on February 9, 2010 (75 FR 6474). Near-road NO₂ monitoring is required by the new rule based on traffic counts. Section 40 CFR 58.10 paragraph (a) (5) states, "A plan for establishing NO₂ monitoring sites in accordance with the requirements of Appendix D to this part shall be submitted to the Administrator by July 1, 2012. The plan shall provide for all required monitoring stations to be operational by January 1, 2013." Specific site information is not yet available. The areas that will require new near-road monitoring and the number of sites required for each area are (see Table 1 and Figure 9):

- Dallas-Fort Worth-Arlington – 2;
- Houston-Sugarland-Baytown – 2;
- Austin-Round Rock – 1;
- El Paso – 1;
- McAllen-Edinburg-Mission – 1; and
- San Antonio MSA – 1.

Sulfur Dioxide (SO₂)

The EPA published a rule revising the NAAQS for SO₂ on June 2, 2010 (74 FR 64810). The proposed rule changes would require 13 source-oriented maximum concentration monitors near large emission sources in the following seven Core Based Statistical Areas (CBSA) in Texas. The number of monitors required is listed after the CBSA (see Table 1 and Figure 9):

- Houston-Sugar Land-Baytown – 2;
- Dallas-Fort Worth-Arlington – 2;
- San Antonio – 2;
- Austin-Round Rock – 2;
- Longview – 2;
- Beaumont-Port Arthur – 2; and
- Amarillo – 1.

The proposed rule would add a requirement for six additional source-oriented maximum concentration monitors based on the ratio of the Texas' total SO₂ emissions to the total U.S. SO₂ emissions. Preliminary review of 2008 emissions inventory data and the proposed SO₂ rule suggest that the new sites would be placed to monitor the impact of sources in the following counties:

- Rusk;
- Titus (two monitors may be required in this county);
- Freestone;
- Fayette; and
- Limestone.

Carbon Monoxide (CO)

The rule revision of the CO NAAQS and the possible revised monitoring requirements has not yet been proposed. Based on available information, it appears that the rule change could require up to eight additional monitors based on population and traffic requirements. The possible locations are listed in Table 1 and Figure 10.

Air Toxics

The Toxicology Division reviewed the current air toxics network and determined that the current locations of air toxics monitors are appropriate in order to monitor for community exposure and to assess source impacts.

Volatile Organic Compounds (VOC)

Canisters

The TCEQ Community Air Toxics Monitoring (CATM) network consists of 46 VOC canister samplers that operate every sixth day. Canister samples are analyzed for 85 VOCs. There are no current EPA requirements for these monitors. At this time, the TCEQ does not anticipate any changes to the CATM network in the next five years. However, as demand for limited resources increases, some of these sites may need to be decommissioned.

The TCEQ Photochemical Assessment Monitoring Station (PAMS) network includes 12 speciated VOC canister samplers that operate every sixth day and three sites that collect multiple samples on selected high and low ozone forecast days during ozone season. This canister monitoring is above the minimum EPA PAMS monitoring requirements. At this time, the TCEQ does not anticipate any changes to the PAMS canister network in the next five years. However, as demand for limited resources increases, some of these samplers may need to be decommissioned.

Auto-GCs

The TCEQ also operates 14 auto-GCs, which measure benzene and other specific hydrocarbons. Eight of the auto-GCs are operated to meet the EPA PAMS network requirements. The other six auto-GCs are part of TCEQ special studies. The TCEQ plans to deploy two additional auto-GCs to the Barnett Shale area in the next six months. No other specific plans for changes to the auto-GC networks are anticipated at this time.

Carbonyls

The TCEQ PAMS and National Air Toxics Trends Station (NATTS) networks include six samplers that operate every sixth day. This carbonyl monitoring is above the minimum EPA PAMS monitoring requirements. TCEQ also operates one sampler in Houston that collects samples every third day from July through September due to the area's attainment status. The only change to the PAMS network anticipated in the next five years may be the addition of one sampler that collects samples every third day in the Dallas/Fort Worth area if the attainment

status is upgraded. However, as demand for limited resources increases, some of the samplers that are not required may need to be decommissioned.

Table 1 NAAQS Monitoring Rule Change Summary

Rule Change	Total # of Sites	# of New Sites	# New Samplers Required	New Samplers at Current Locations	New Locations	Submit Plan to EPA	Site Due
Lead - Emission Sources Revision	12	12	12	NA	Smith, Nacogdoches, Atascosa, Harris, Gregg, Goliad, Tarrant, Dallas, Bexar, Denton	3/2011	9/2011
NCore	3	0	3	Chamizal, Deer Park, Hinton	NA	7/1/2009	1/1/2011
Ozone in Medium MSAs	10	5	10	Texarkana, Amarillo, Lubbock, Odessa, Wichita Falls	Bryan/College Station, Abilene, Midland, San Angelo, Sherman/Denton	7/1/2011	1/1/2012
Ozone Standard Change	4?	0 - 4?	2?	Karnack, Alabama-Coushatta, Big Bend	NA	7/1/2011	1/1/2012
NO2 Near Road	8	8	8	NA	Austin, 2 DFW, El Paso, 2 Houston, McAl/Edin/Mis, SA	7/1/2012	1/1/2013
NO2 Standard Change	4	0	4	Houston, DFW, SA, Austin	NA	7/1/2012	1/1/2013
SO2	19	7 - 13	7 - 19	0 to 6 at HGB DFW, San Antonio, Austin, Longview, BPA	HGB, DFW, SA, Austin, Longview, BPA, Amarillo + 6 max concentration	7/1/2012	1/1/2013
CO	8	0 - 8	8	Austin, DFW, El Paso, Houston, McAl/Ed/Mis, SA	NA	7/1/2012	1/1/2014
PM2.5	TBD	TBD	TBD	TBD	TBD	7/1/2012	1/1/2014

Figure 1: 2010 Air Monitors in Texas

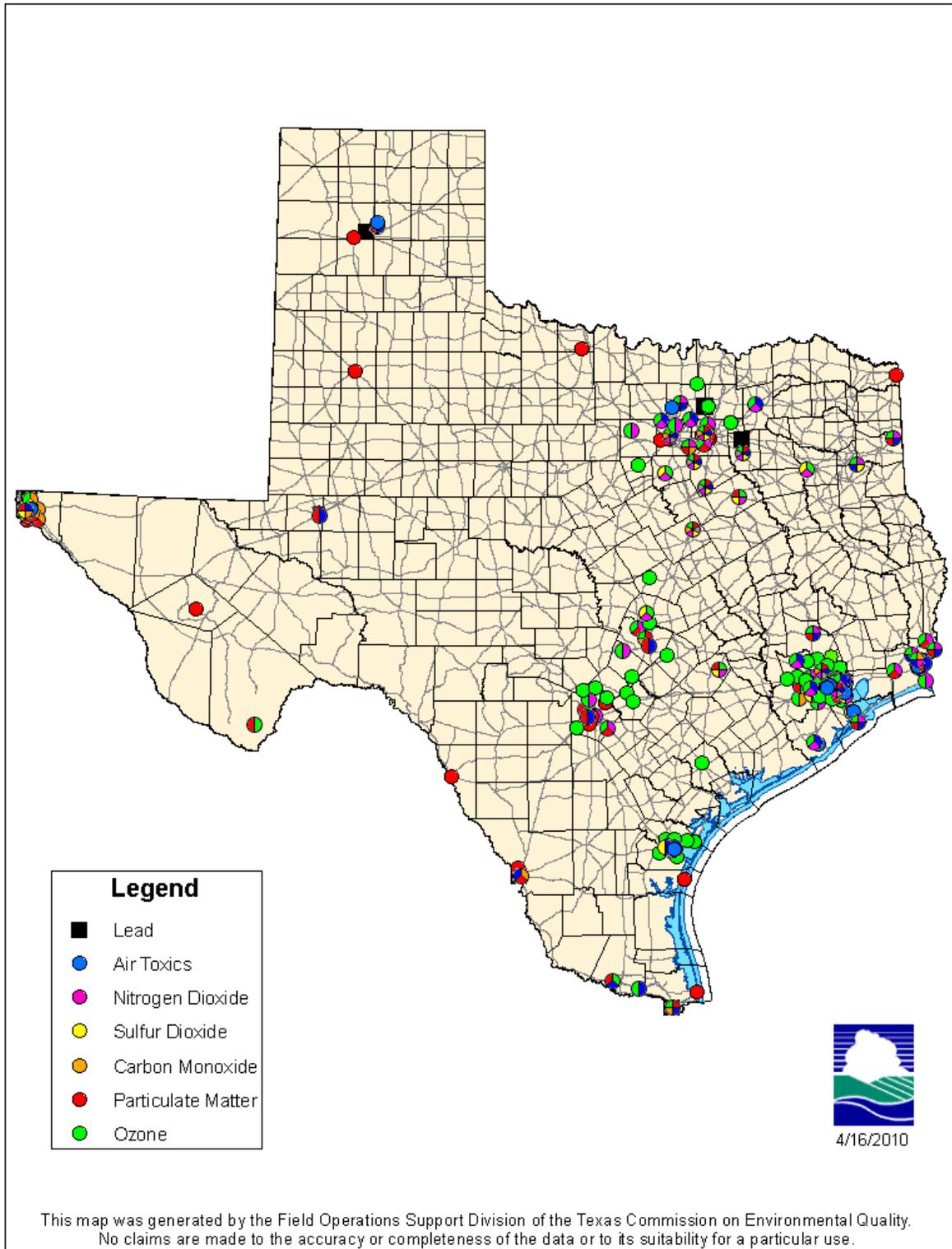


Figure 2: Air Monitors in Dallas/Fort Worth Area

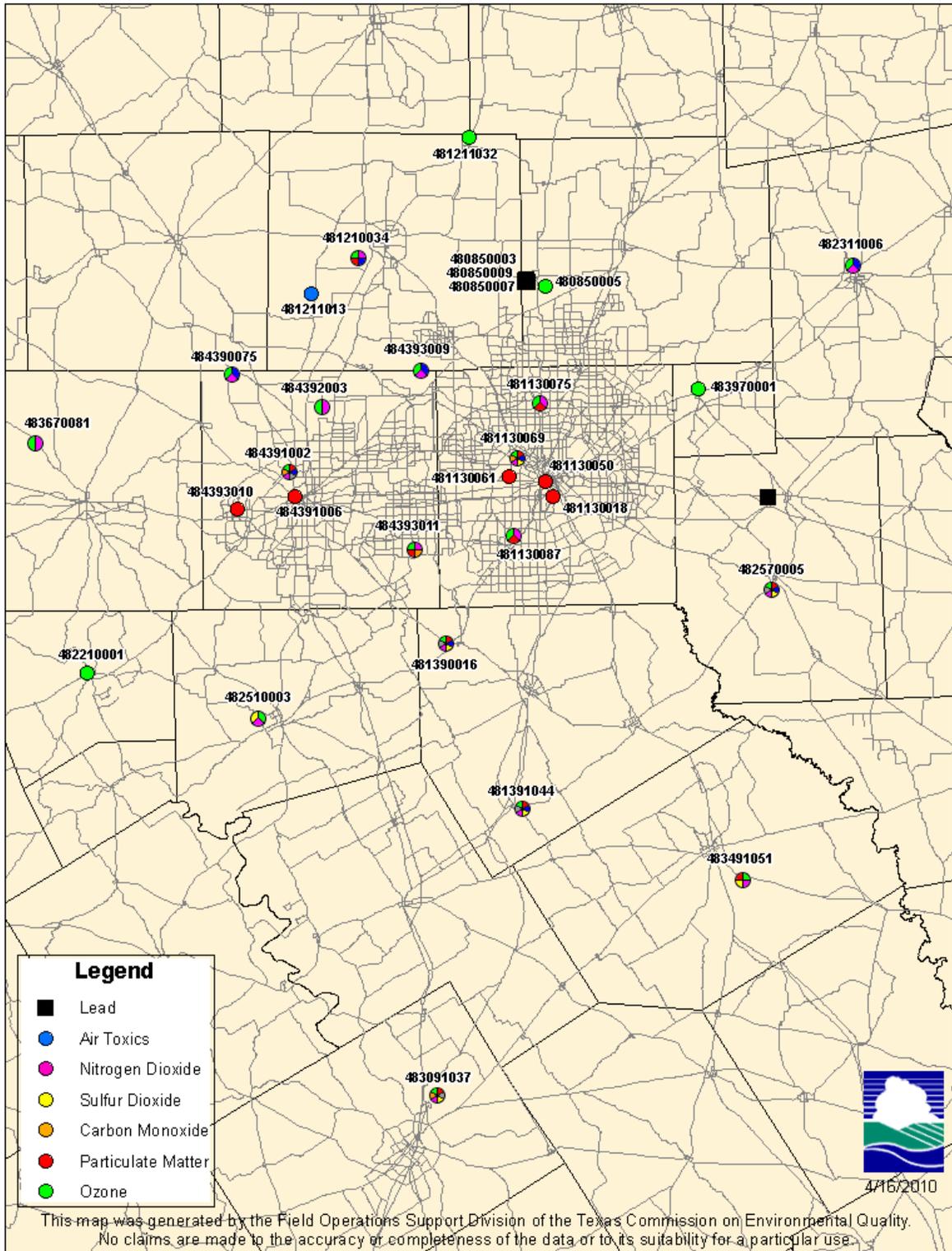


Figure 3: Air Monitors in El Paso Area

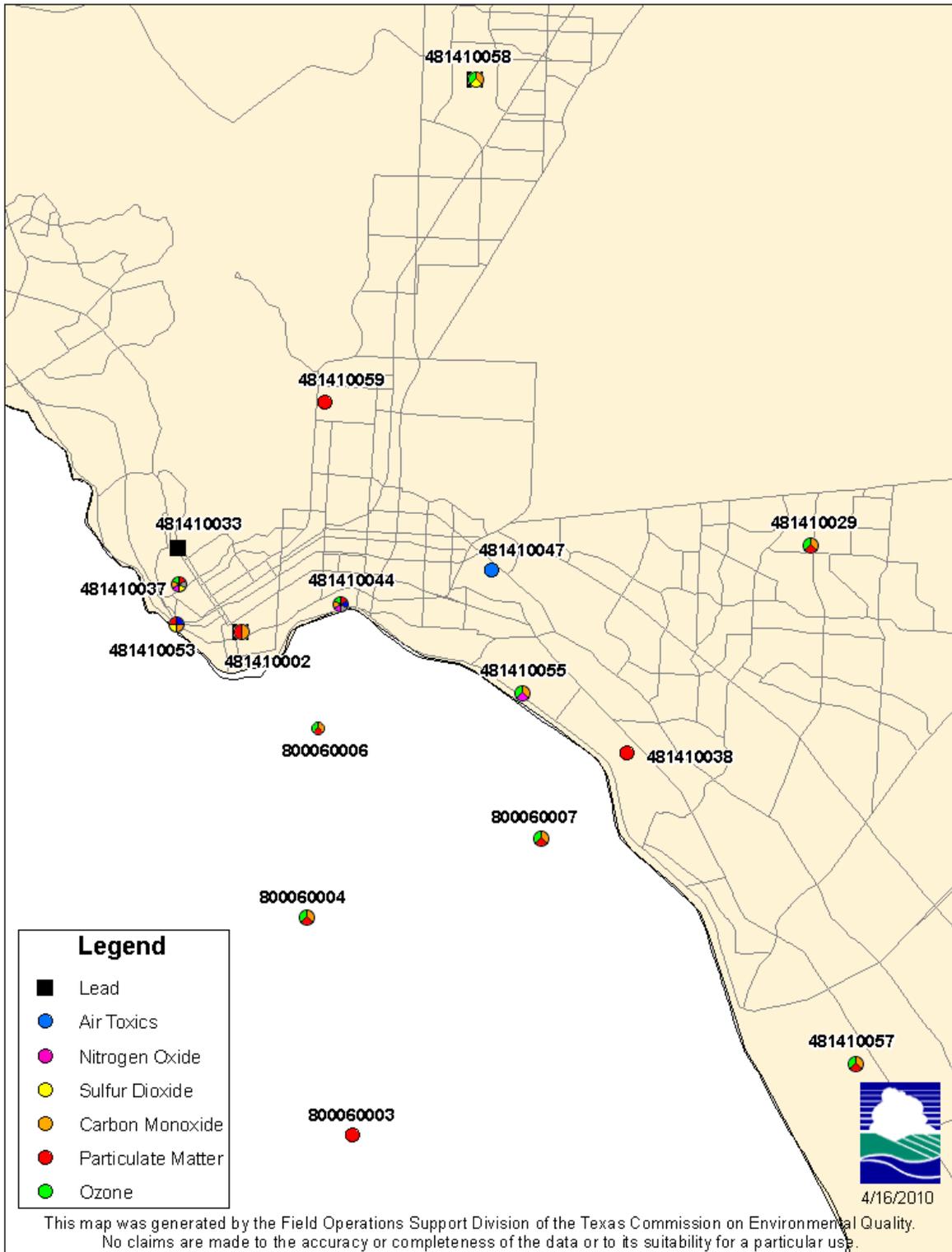


Figure 4: Air Monitors in Central Texas

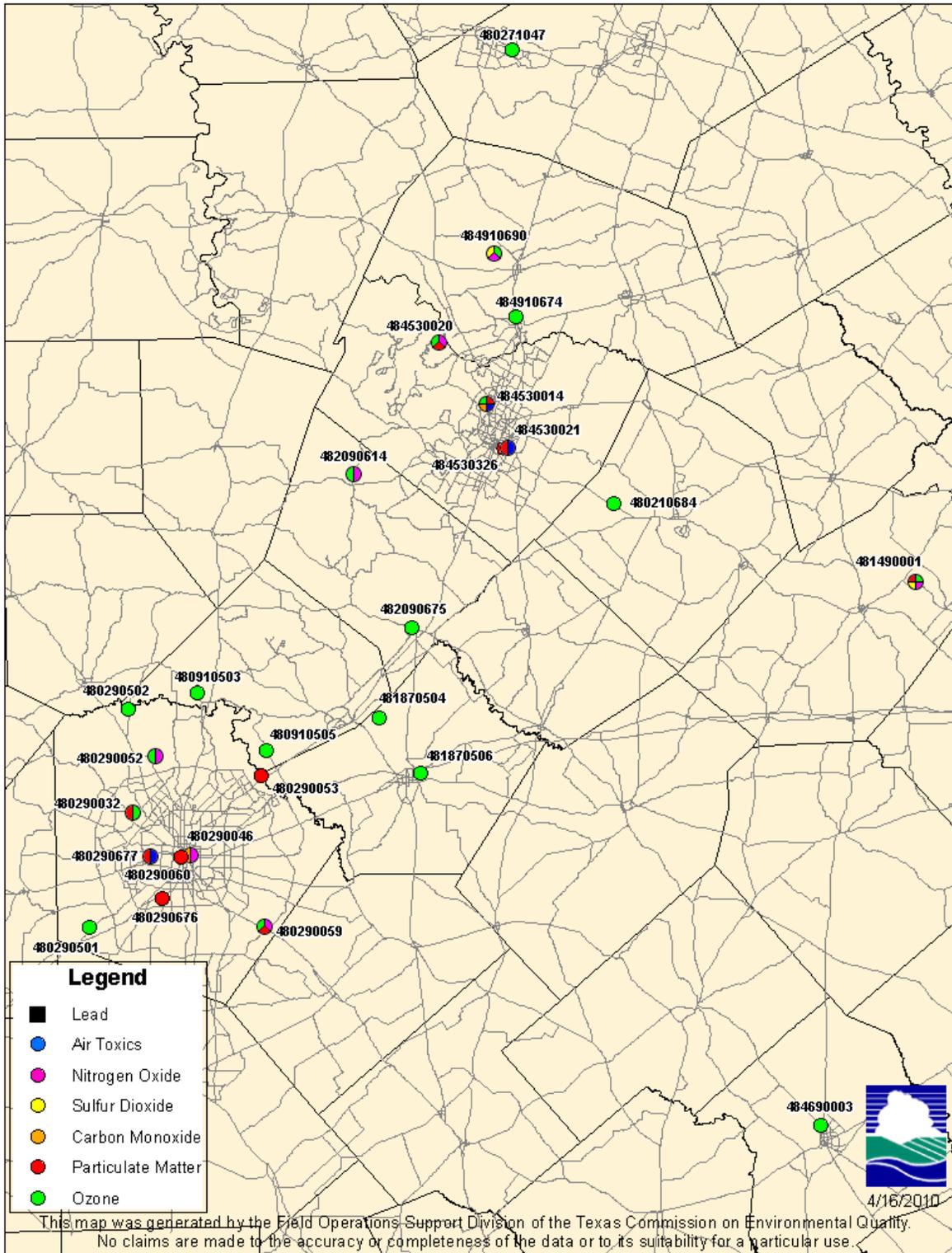


Figure 5: Air Monitors in Beaumont Area

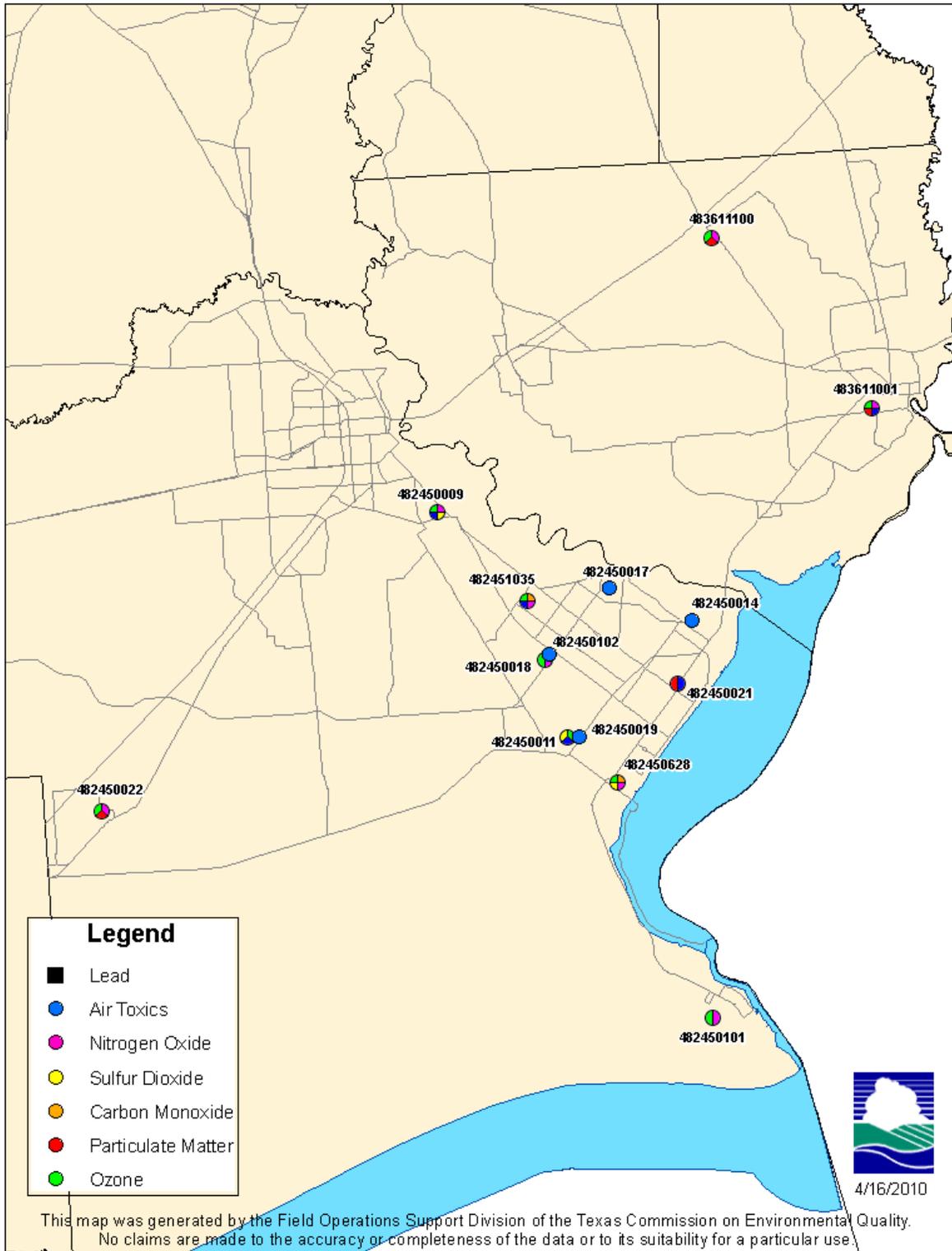


Figure 6: Air Monitors in Houston Area

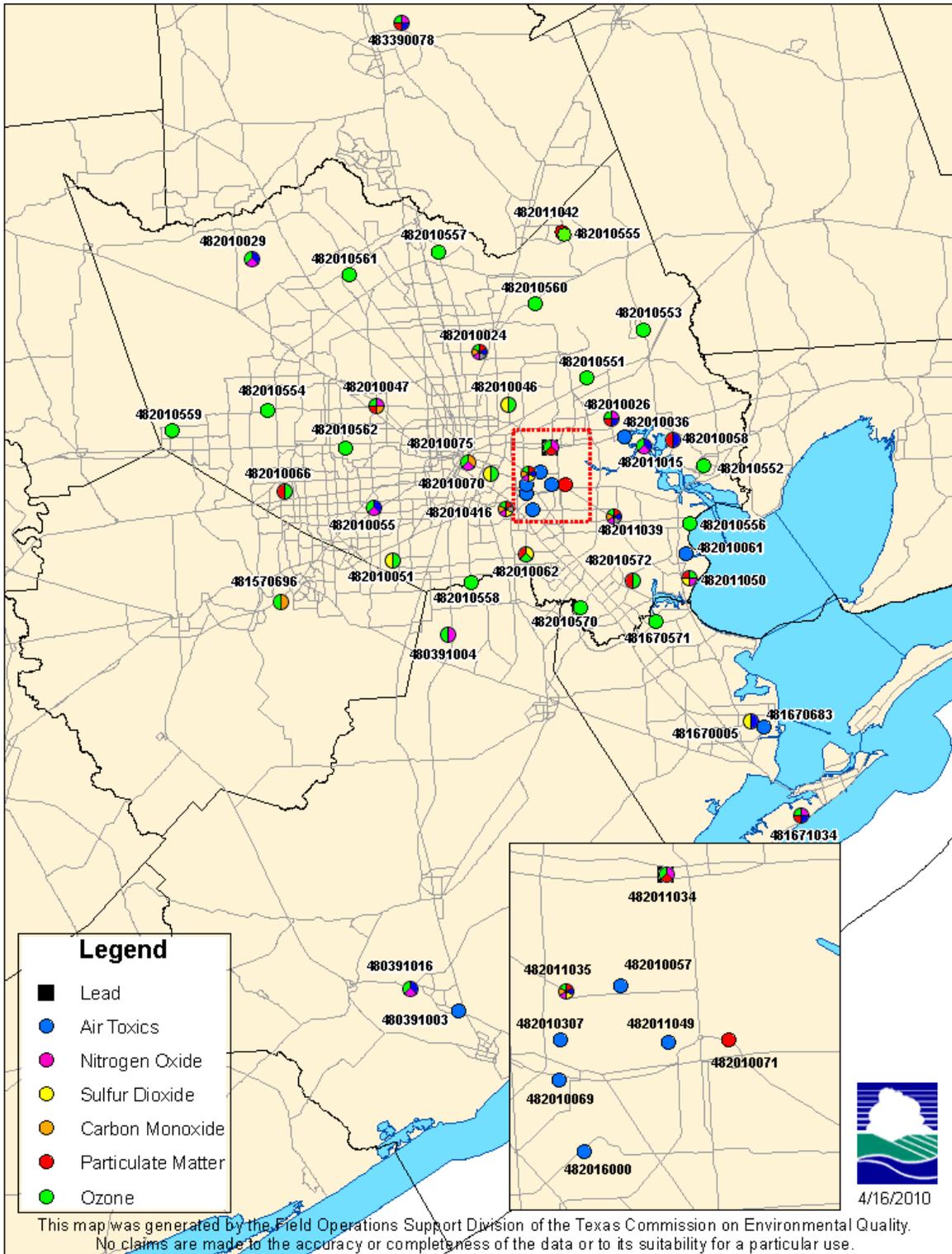


Figure 7: 2011 Anticipated Network Changes as a Result of EPA Rule Changes

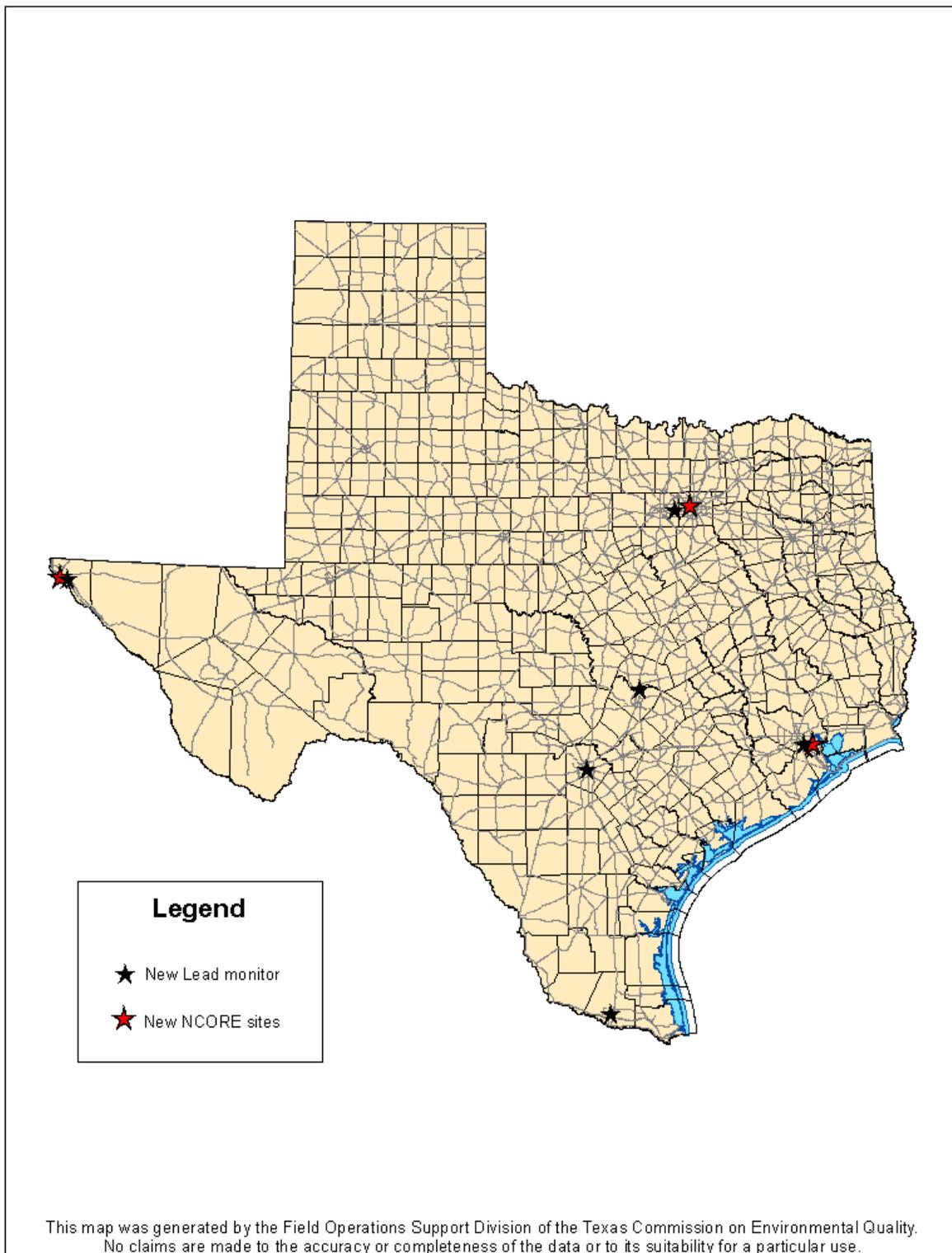


Figure 8: 2012 Anticipated Network Changes as a Result of EPA Rule Changes

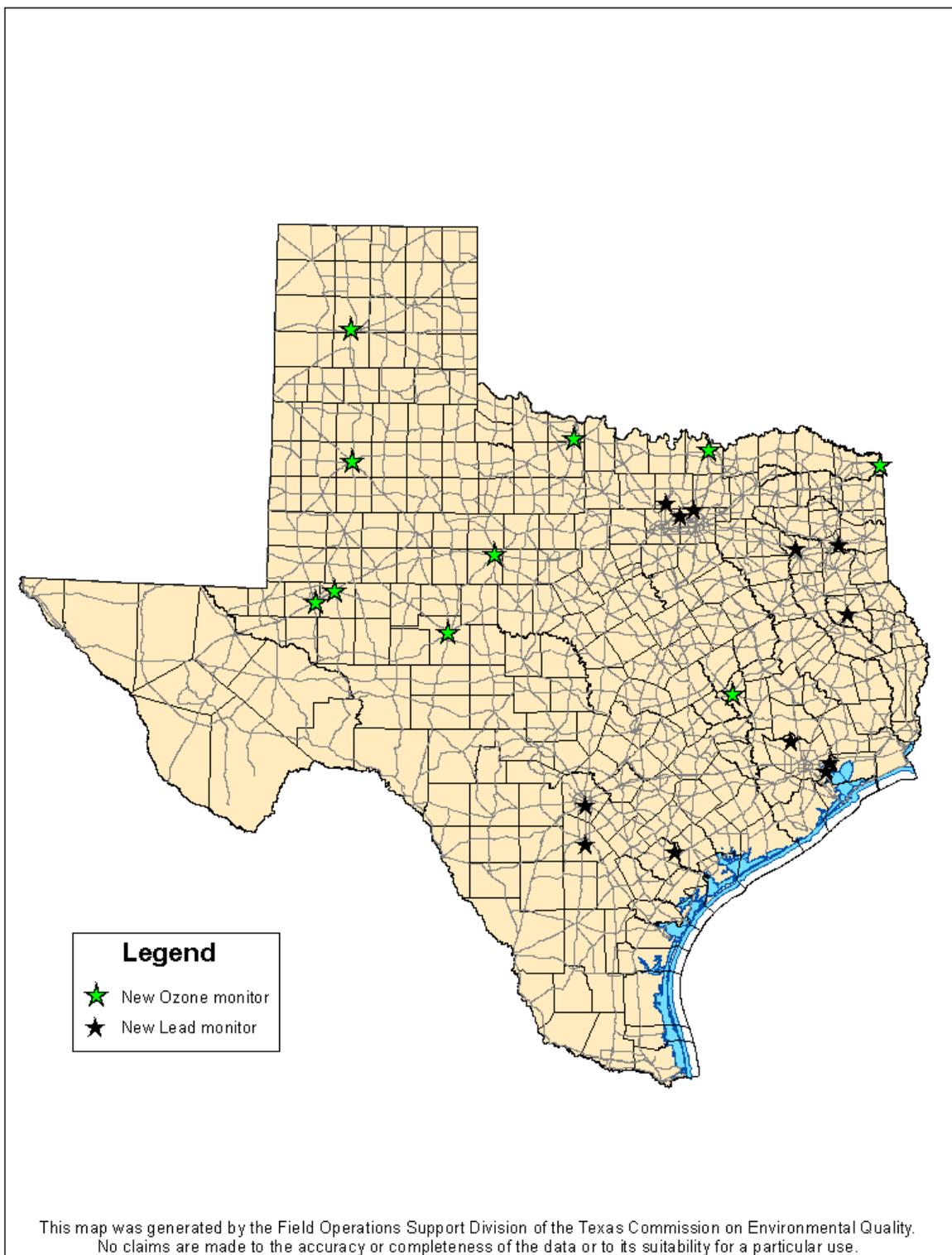


Figure 9: 2013 Anticipated Network Changes as a Result of EPA Rule Changes

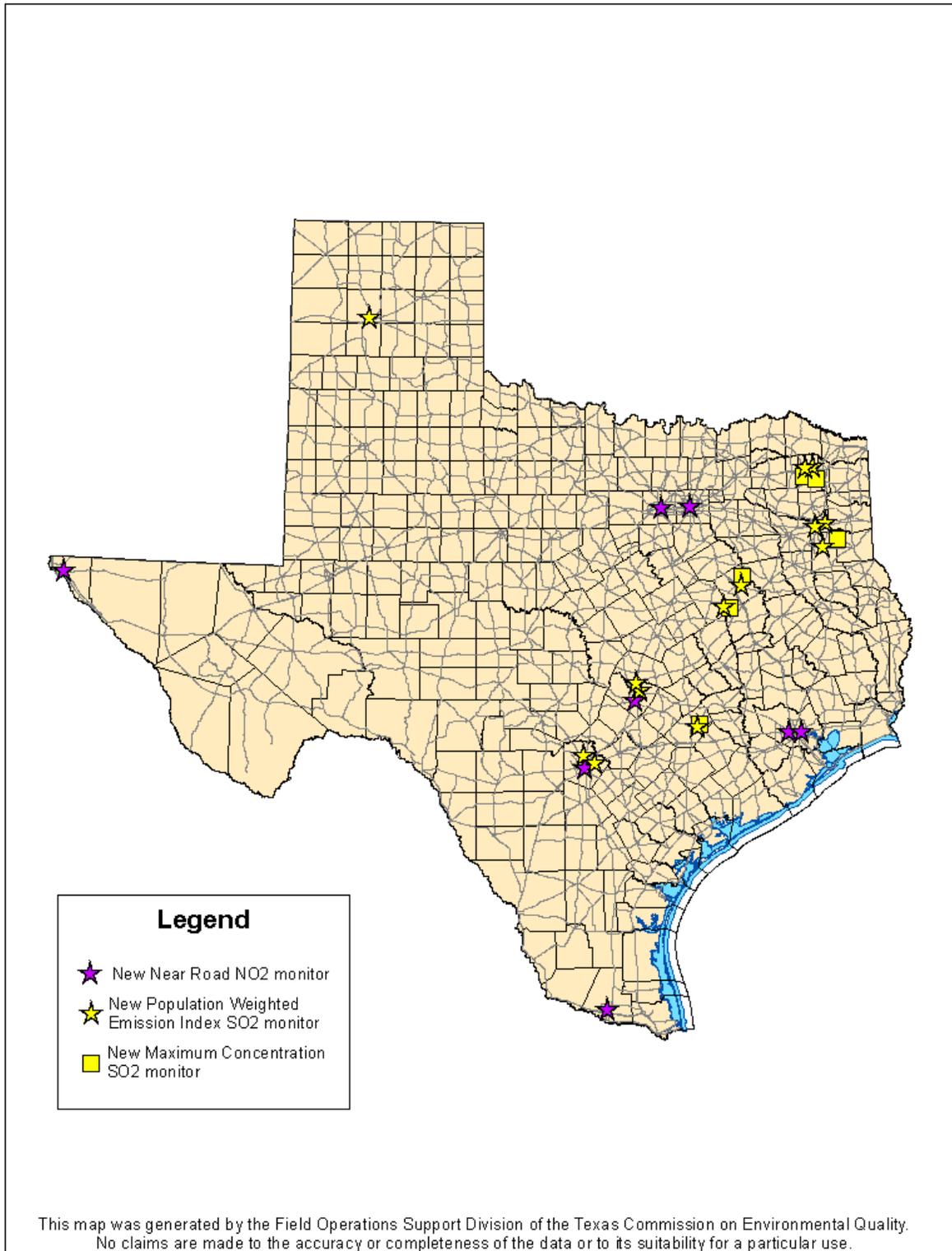
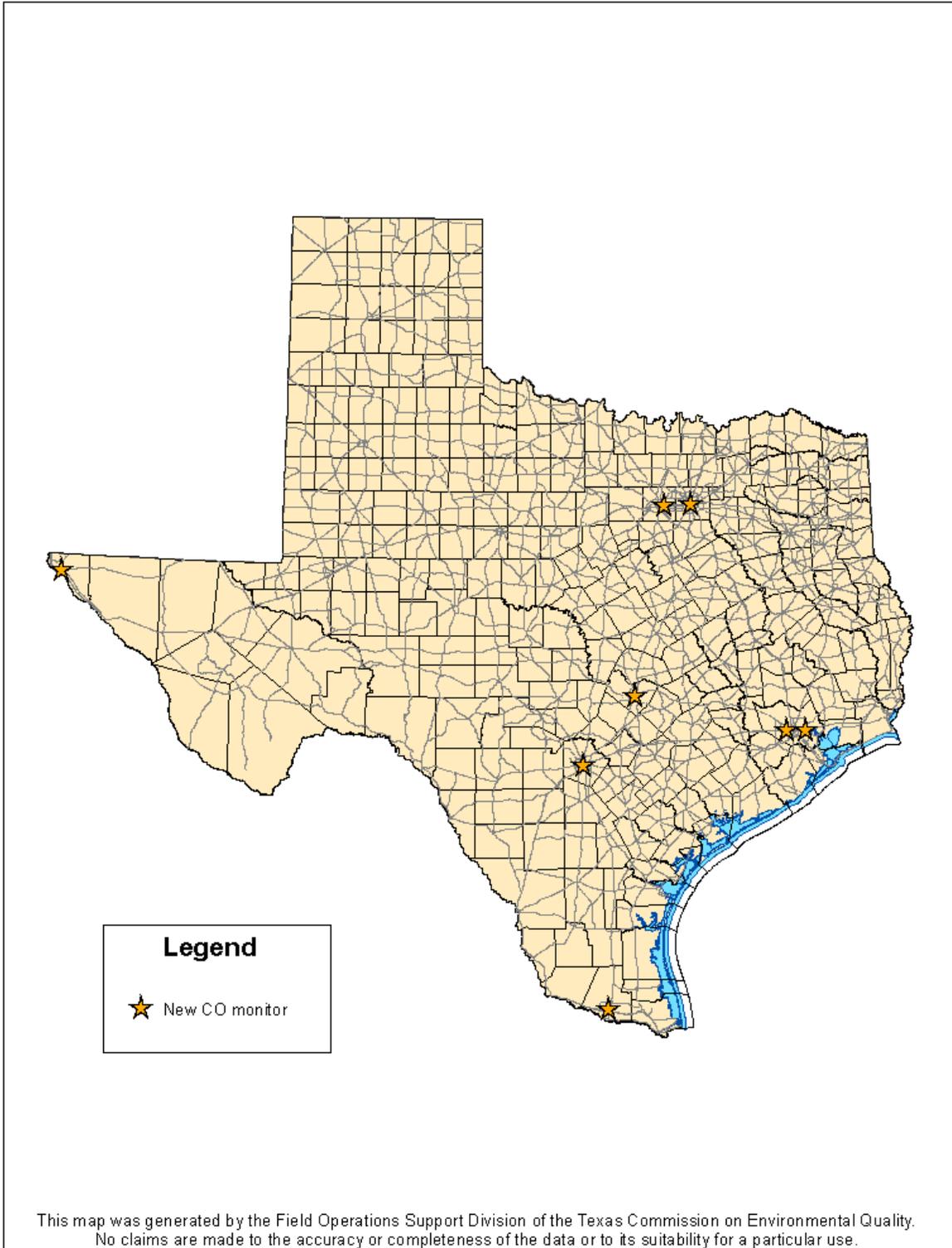


Figure 10: 2014 Anticipated Network Changes as a Result of EPA Rule Changes



Appendix A
Recommended Changes to Existing Network
(Not Required by EPA Rule)

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Recommended Changes to Existing Network
(Not Required by EPA Rule)

SITE	MONITOR	ACTION	DESIGN VALUE	REASON AND COMMENTS
Ozone				
Pilot Point CAMS 1032 (481211032)	Ozone	Decommission	77	Site was expected to be high concentration downwind site but has not met expected profile. Available for redeployment.
Greenville CAMS 1006 (482311006)	Ozone	Decommission	66	Deployed as eastern upwind site but has not met profile – possibly because of local NO sources. Available for redeployment.
PM2.5 Federal Reference Method (FRM) Changes				
El Paso site not yet selected	CO, SO2, TEOM, VOC, PAH, met	Deploy	NA	Add a new, population-oriented neighborhood site to replace the Sun Metro TEOM.
Galveston Airport (481671034)	Special Purpose FRM and selected speciation	Deploy	NA	Will provide evidence of intercontinental transport of dust from Northern Africa during exceptional events.
Corpus Christi Dona Park (483550034)	PM2.5 FRM Collocated	Deploy	NA	Added Quality Control (QC) instrument to meet QC requirements after Corpus Christi Huisache is decommissioned.
PM10 Instrumentation Changes				
Houston Clinton (482011035)	Continuous PM10	Deploy	NA	Install continuous PM10 monitors for AQI reporting for metropolitan areas without PM10 based AQI reporting.
Dallas/Fort Worth site not yet selected	Continuous PM10	Deploy	NA	Install continuous PM10 monitors for AQI reporting for metropolitan areas without PM10 based AQI reporting.
Austin site not yet selected	Continuous PM10	Deploy	NA	Install continuous PM10 monitors for AQI reporting for metropolitan areas without PM10 based AQI reporting.

Appendix B
Selected Ozone and NO₂ Isopleths