TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

August 18, 2015

Mr. Ron Curry
Regional Administrator
Environmental Protection Agency, Region 6
Fountain Place 12th Floor, Suite 1200
1445 Ross Avenue
Dallas, Texas 75202-2733

Subject: Redesignation Substitute Reports for the Houston-Galveston-Brazoria (HGB) 1997 Eight-Hour Ozone Standard Nonattainment Area and the Dallas-Fort Worth (DFW) One-Hour and 1997 Eight-Hour Ozone Standard Nonattainment Areas

Dear Mr. Curry:

The Texas Commission on Environmental Quality (TCEQ) submits the enclosed *Redesignation Substitute Report for the Houston-Galveston-Brazoria 1997 Eight-Hour Ozone Standard Nonattainment Area* and the *Redesignation Substitute Report for the Dallas-Fort Worth One-Hour and 1997 Eight-Hour Ozone Standard Nonattainment Areas* for your consideration and concurrence that the HGB area has met the requirements for the 1997 eight-hour ozone National Ambient Air Quality Standard (NAAQS) and that the DFW areas have met the requirements for both the one-hour and 1997 eight-hour ozone NAAQS.

These redesignation substitute reports include: monitoring data showing attainment of the relevant ozone NAAQS; a showing that attainment was due to permanent and enforceable emissions reductions; and, a demonstration that the areas can maintain the standards through 2028 based on emission inventory trends and projections of future emissions.

The United States Environmental Protection Agency's (EPA) *Implementation of the 2008 National Ambient Air Quality Standards for Ozone: State Implementation Plan Requirements; Final Rule* (2008 ozone standard SIP requirements rule) published in the March 6, 2015 *Federal Register* (80 FR 12264), includes a mechanism for lifting anti-backsliding obligations under a revoked ozone NAAQS. According to the rule, a state can provide a showing, termed a redesignation substitute, based on Federal Clean Air Act (FCAA), §107(d)(3)(E) redesignation criteria to demonstrate that an area qualifies for lifting anti-backsliding obligations under a revoked standard. The enclosed reports fulfill the requirements for a redesignation substitute, as described in the 2008 ozone standard SIP requirements rule, for the HGB 1997 eight-hour ozone nonattainment area and the DFW one-hour and 1997 eight-hour ozone nonattainment areas.

The DFW one-hour ozone nonattainment area comprises Collin, Dallas, Denton, and Tarrant Counties. The DFW four-county area monitored attainment of the one-hour ozone NAAQS based on certified monitoring data from 2004 through 2006 and has continued to monitor

attainment since that time. On October 16, 2008, the EPA published final determination (73 FR 61357) that the DFW four-county nonattainment area had attained the one-hour ozone standard. The DFW four-county area has continued to monitor attainment of the one-hour ozone NAAQS since 2006.

The DFW 1997 eight-hour ozone nonattainment area comprises Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant Counties. The HGB 1997 eight-hour ozone nonattainment area comprises Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller Counties. The TCEQ submitted early certification of 2014 ozone air monitoring data to the EPA on February 24, 2015, and a request for a determination of attainment for both the DFW and HGB eight-hour ozone nonattainment areas on February 27, 2015. On April 28, 2015, the EPA published a proposed clean data determination for the DFW 1997 eight-hour ozone nonattainment area (80 FR 23487). On June 10, 2015, the EPA verified that the 2014 ambient ozone monitoring data for the HGB area met all data quality requirements for attaining the 1997 eight-hour ozone NAAQS. As of August 18, 2015, the DFW and HGB areas continue to monitor attainment of the 1997 eight-hour ozone standard.

Title 40 Code of Federal Regulations §51.1105(b)(2) allows the EPA to remove the provisions for nonattainment new source review for the revoked one-hour and 1997 eight-hour ozone NAAQS upon the EPA's approval of the 1997 eight-hour ozone HGB redesignation substitute and the DFW one-hour and 1997 eight-hour redesignation substitute. With these redesignation substitutes, the TCEQ requests that the EPA concur that the HGB and DFW areas are attaining and will continue to attain the revoked one-hour and revoked 1997 eight-hour ozone NAAQS, and that the relevant nonattainment NSR provisions no longer apply to the areas.

If you have questions or need additional information, please contact David Brymer, Director of the Air Quality Division, at (512) 239-1725.

Sincerely,

Richard A. Hyde, P.E., Executive Director
Texas Commission on Environmental Quality

RH/DB/lb/mr

Enclosures: *Redesignation Substitute Report for the Houston-Galveston-Brazoria 1997 Eight-Hour Ozone Standard Nonattainment Area*
Redesignation Substitute Report for the Dallas-Fort Worth One-Hour and 1997 Eight-Hour Ozone Standard Nonattainment Areas

REDESIGNATION SUBSTITUTE REPORT FOR THE DALLAS-FORT WORTH (DFW) ONE-HOUR AND 1997 EIGHT-HOUR OZONE STANDARD NONATTAINMENT AREAS

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SECTION 1: GENERAL

1.1 Purpose of this Redesignation Substitute Report

This redesignation substitute (RS) report for the Dallas-Fort Worth (DFW) One-Hour and 1997 Eight-Hour Ozone nonattainment areas supports the requirements described in the EPA's *Implementation of the 2008 National Ambient Air Quality Standards for Ozone: State Implementation Plan Requirements; Final Rule* (2008 ozone standard SIP requirements rule), published in the *Federal Register* (FR) on March 6, 2015 (80 12264).

The DFW one-hour ozone nonattainment area comprises Collin, Dallas, Denton, and Tarrant Counties. The DFW four-county area monitored attainment of the one-hour ozone National Ambient Air Quality Standard (NAAQS) with a design value of 124 ppb based on certified monitoring data from 2004 through 2006, and continues to demonstrate attainment with a design value of 102 ppb based on certified data through 2014. On October 16, 2008, the EPA published final determination that the DFW four-county nonattainment area had attained the one-hour ozone standard (73 FR 61357).

The DFW 1997 eight-hour ozone nonattainment area comprises Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant Counties. On February 24, 2015, the TCEQ submitted early certification of 2014 ozone air monitoring data to the EPA, along with a request for a determination of attainment for the 1997 eight-hour ozone standard for the nine-county DFW area with a design value of 81 ppb based on monitoring data from 2012, 2013, and 2014. On April 28, 2015, the EPA published a proposed clean data determination for the DFW 1997 eight-hour ozone nonattainment area (80 FR 23487). As of August 4, 2015, the 1997 eight-hour ozone design value is 80 ppb.

The EPA's 2008 ozone standard SIP requirements rule includes a mechanism for lifting anti-backsliding obligations under a revoked ozone NAAQS. According to the EPA's 2008 ozone standard SIP requirements rule, a state can provide a showing, termed a redesignation substitute, based on Federal Clean Air Act (FCAA), §107(d)(3)(E) redesignation.

This DFW RS report is intended to satisfy the EPA's requirements to lift anti-backsliding obligations for the revoked one-hour and the revoked 1997 eight-hour ozone NAAQS by ensuring that specific redesignation requirements are met for the DFW four-county one-hour and nine-county 1997 eight-hour ozone nonattainment areas. This DFW RS report is being submitted to the EPA as provided in the 2008 ozone standard SIP requirements rule instead of a redesignation request and maintenance plan, which the FCAA requires to remove anti-backsliding obligations under a standard that has not been revoked.

Title 40 Code of Federal Regulations (CFR) §51.1105(b)(2) allows the EPA to remove the provisions for nonattainment new source review (NSR) for the revoked one-hour and 1997 eight-hour ozone NAAQS upon the EPA's approval of the one-hour and 1997 eight-hour ozone DFW RS report. With this DFW RS report, the TCEQ requests that the EPA concur that the DFW areas are attaining and will continue to attain the revoked one-hour and revoked 1997 eight-hour ozone NAAQS, and that the nonattainment NSR provisions for the revoked standards no longer apply to the areas.

Certified ambient air quality monitoring data for 2004 through 2006 demonstrate that the four-county DFW area monitored attainment of the one-hour ozone NAAQS starting in 2006 with a design value of 124 ppb, and continues to demonstrate attainment with a design value of 102 ppb based on certified data through 2014. The nine-county DFW area demonstrates attainment of the 1997 eight-hour ozone NAAQS with a design value of 81 ppb based on certified data from

2012 through 2014. This DFW RS report further supports the demonstration that the DFW areas will continue to attain the one-hour and 1997 eight-hour ozone standard due to permanent and enforceable emission reductions and demonstrates continued attainment of both standards through 2028 via emissions inventory trends, 2012 attainment inventory, and projected future emissions. Since removing anti-backsliding obligations is contingent upon the EPA's approval, the TCEQ has set a horizon year of 2028. This 10-year period also aligns with the EPA's requirement of maintenance plans to demonstrate attainment for a 10-year period following the date of redesignation.

Consistent with the EPA's 2008 ozone standard SIP requirements rule, this DFW RS report for the one-hour and 1997 eight-hour ozone NAAQS includes the following elements.

Monitoring Data Showing Attainment of the Revoked One-Hour and 1997 Eight-Hour Ozone NAAQS

Section 2: *Air Quality Data* includes monitoring network and reporting requirements as well as ozone data and trend analyses. The DFW four-county area attained the one-hour ozone standard with a design value of 124 parts per billion (ppb), based on certified 2004 through 2006 monitoring data. The 2012 through 2014 certified monitoring data for the nine-county DFW area demonstrate that the area is monitoring attainment of the 1997 eight-hour ozone NAAQS with a design value of 81 ppb. Ozone concentrations have decreased dramatically in the DFW areas since the 1990s. Examination of the trends in one-hour and eight-hour ozone design values reveals substantial downward trends in monitored ozone levels.

Showing That Attainment Was Due to Permanent and Enforceable Emissions Reductions

Section 3: *Permanent and Enforceable Emissions Reductions* identifies permanent and enforceable control measures that have resulted in reductions in nitrogen oxides (NO_X) and volatile organic compounds (VOC) emissions, and air quality improvements in the DFW four-county one-hour and nine-county 1997 eight-hour ozone nonattainment areas. The 30 Texas Administrative Code (TAC) Chapter 115, *Control of Air Pollution from Volatile Organic Compounds* and 30 TAC Chapter 117, *Control of Air Pollution from Nitrogen Compounds* regulations have significantly reduced overall ozone precursor emissions in the DFW areas. The DFW areas have attained the one-hour and 1997 eight-hour ozone NAAQS as the result of implemented federal, state, and local controls. These enforceable measures will remain in place to ensure continued maintenance of the one-hour and 1997 eight-hour ozone NAAQS in the DFW areas.

Demonstration That the Areas Can Maintain the Standard Over the Next 10 Years

Section 4: *Maintenance Demonstration* provides emissions inventory trends, the 2012 attainment inventory, and projected future emissions, and demonstrates continued attainment of the one-hour and 1997 eight-hour ozone standards through 2028. Analysis of projected ozone precursor emissions from 2012 through 2028 shows an overall projected decrease of 207.32 tons per day (tpd) in combined NO_X and VOC emissions for the DFW four-county one-hour ozone nonattainment area. This net change for the four-county area includes a projected 61.09 tpd decrease in VOC and a 146.23 tpd decrease in NO_X. For the DFW nine-county 1997 eight-hour ozone nonattainment area, the trend analysis shows an overall decrease of 257.04 tpd in combined NO_X and VOC emissions. The net change for the nine-county area includes a projected 83.86 tpd decrease in VOC and a 173.18 tpd decrease in NO_X. Based on emissions projections and previous photochemical modeling analysis, continued attainment of the one-hour and 1997 eight-hour ozone standards are shown for the four-county and nine-county DFW areas through 2028.

1.2 Ozone NAAQS History

The following history of the one-hour and eight-hour ozone standards and summaries of the DFW area one-hour and 1997 eight-hour ozone SIP revisions are provided to give context and greater understanding of the complex issues involved in attaining the ozone standard in the DFW area.

1.2.1 One-Hour Ozone NAAQS History

The EPA established the one-hour ozone NAAQS of 0.08 parts per million (ppm) in the April 30, 1971 issue of the *Federal Register* (36 FR 8186). The EPA revised the one-hour ozone standard to 0.12 ppm on February 8, 1979 (44 FR 4202). The DFW four-county one-hour ozone nonattainment area (Collin, Dallas, Denton, and Tarrant Counties) was designated in 1991 as moderate in accordance with the 1990 FCAA Amendments (56 FR 56694). As a moderate nonattainment area, the four-county DFW area was required to demonstrate attainment of the one-hour ozone standard by November 15, 1996. Ambient air monitoring data for the years 1994 through 1996, however, showed that the one-hour ozone standard was exceeded more than one day per year over the three-year period. As a result, the EPA reclassified the four-county DFW area from a moderate to a serious nonattainment area (effective March 20, 1998) for failure to attain the one-hour ozone standard by the November 1996 deadline (63 FR 8128). The EPA required the State of Texas to submit a SIP revision within one year that demonstrated attainment of the one-hour ozone NAAQS and addressed FCAA requirements for serious ozone nonattainment areas.

1.2.1.1 March 1999

The TCEQ submitted the Attainment Demonstration (AD) for the Dallas-Fort Worth Ozone Nonattainment Area SIP revision, which contained a rate-of-progress (ROP) demonstration, to the EPA on March 18, 1999. The photochemical modeling contained in the revision indicated that additional reductions in NO_X emissions would be needed to attain the standard by November 1999. The following rules were developed and included in the SIP revision:

- reasonably available control technology (RACT) for NO_X point sources;
- nonattainment new source review for NO_X point sources; and
- revisions resulting from the change in the major source threshold for RACT applicability for VOC.

Additionally, the commission indicated that, due to time constraints, the ROP demonstration for the serious classification would not incorporate all rules that were necessary to bring the DFW nonattainment area into attainment by the November 1999 deadline and that a complete AD would be submitted in the spring of 2000. The EPA determined that the AD and ROP demonstrations were incomplete.

Additional local control strategies were necessary for the DFW nonattainment area to reach attainment. To develop further control strategy options to augment the federal and state programs in the AD and ROP SIP revision, the DFW area established the North Texas Clean Air Steering Committee. The committee members included local elected officials, business leaders, and other community stakeholders. This committee identified specific control strategies for review by technical subcommittee members.

1.2.1.2 April 2000

On April 19, 2000, the commission adopted a SIP revision and associated rules for the DFW one-hour ozone AD. The April 2000 One-Hour Ozone AD SIP revision contained a number of control strategies and the following elements:

- a modeling demonstration that showed air quality in the DFW nonattainment area was influenced at times by transport from the Houston-Galveston-Brazoria (HGB) nonattainment area (Under the EPA's July 16, 1998 transport policy[1], if photochemical modeling demonstrated that emissions from an upwind area located in the same state and with a later attainment date interfered with the downwind area's ability to attain, the downwind area's attainment date could be extended to no later than that of the upwind area. For the DFW nonattainment area, following this policy would extend the attainment date to November 15, 2007, the same attainment date as the HGB area.);
- photochemical modeling of specific control measures and future state and national rules for attainment of the one-hour ozone standard in the DFW nonattainment area by the attainment deadline of November 15, 2007;
- identification of the VOC and NO_X emissions reductions necessary to attain the one-hour ozone standard by 2007. The reductions of 141 tpd NO_X from federal measures and 225 tpd NO_X from state measures resulted in a total of 366 tpd NO_X reductions for the AD;
- a 2007 motor vehicle emissions budget (MVEB) for transportation conformity; and
- a commitment to perform and submit a mid-course review by May 1, 2004.

At the time it was submitted, the April 2000 One-Hour Ozone AD SIP revision allowed the EPA to determine that the DFW nonattainment area should not be reclassified from serious to severe under the conditions of the EPA's July 16, 1998 transport policy.

The Inspection Maintenance (I/M) program was implemented in the DFW nonattainment area on May 1, 2002 in Collin, Dallas, Denton, and Tarrant Counties and on May 1, 2003 in Ellis, Johnson, Kaufman, Parker, and Rockwall Counties. For more information on the I/M program, see Table 3-1: *Existing Ozone Control Measures Applicable to the DFW Nonattainment Area*.

1.2.1.3 August 2001

The next commission action was required by legislative mandate. Senate Bill (SB) 5, passed by the 77th Texas Legislature in May 2001, required the repeal of two rules contained in the April 2000 one-hour AD SIP revision. The first rule restricted the use of construction and industrial equipment (non-road, heavy-duty diesel equipment rated at 50 horsepower (hp) or greater). The second rule required the replacement of diesel-powered construction, industrial, commercial, and lawn and garden equipment rated at 50 hp or greater with newer Tier 2 or Tier 3 equipment. The Texas Emissions Reduction Plan grant incentive program established by SB 5 replaced the NO_X emissions reductions previously claimed for the two programs. The commission implemented the legislative mandate of SB 5 by submitting the rule repeals as part of a SIP revision adopted in August 2001.

1.2.1.4 March 2003

On March 5, 2003, the SIP was further revised to include the following:

[1] Additional information on the EPA's *Guidance on Extension of Attainment Dates for Downwind Transport Areas* is available at http://www.epa.gov/ttn/oarpg/t1/memoranda/transpor.pdf.

- the adoption of revised 30 Texas Administrative Code (TAC) Chapter 117 NO_X emission limits for cement kilns;
- the estimation of NO_X reductions from energy efficiency measures, using a methodology that was to be further refined before energy efficiency credit was formally requested in the SIP revision; and
- the commitment to perform modeling with MOBILE6, the latest version of the EPA's emission factor model for mobile sources at that time.

Meanwhile, the EPA's July 16, 1998 transport policy, on which the extension of the DFW nonattainment area's attainment date to November 15, 2007 was based, was challenged by environmental groups. A suit was filed challenging the extension of the Beaumont-Port Arthur (BPA) area's attainment date based on transport from the HGB area. On December 11, 2002, the United States Fifth Circuit Court of Appeals ruled that the EPA was not authorized to extend the BPA area's attainment date based on transport. The EPA published a final action in the *Federal Register* on March 30, 2004 reclassifying the BPA area to serious with an attainment date of November 15, 2005 and requiring a new AD to be submitted by April 30, 2005. Although the court decision was specifically for the BPA area, the direct implication for the DFW nonattainment area was that the EPA could not approve extensions of the DFW one-hour ozone attainment date past 1999, the date mandated by the FCAA for serious areas. In addition, the EPA did not approve the April 2000 One-Hour Ozone DFW AD SIP revision.

1.2.1.5 EPA Determination of One-Hour Ozone Attainment

Since the early 1990s, when the DFW area was designated as nonattainment for the one-hour ozone standard, much has been done to bring the area into attainment with federal air quality standards. Contributions to improved air quality in the DFW nonattainment area include: TCEQ-implemented control strategies, local control strategies adopted by the North Central Texas Council of Governments (NCTCOG), and on-road and non-road mobile source measures implemented by the EPA. Despite the EPA's lack of approval for multiple SIP revisions, air quality in the DFW nonattainment area continued to improve.

By 2006, certified ambient monitoring data reflected attainment of the one-hour standard. On October 16, 2008, the EPA published a final determination (73 FR 61357) that the DFW area one-hour ozone nonattainment counties (Collin, Dallas, Denton, and Tarrant) had attained the one-hour ozone standard with a design value of 124 ppb, based on certified 2004 through 2006 ambient monitoring data. The four-county DFW area continues to demonstrate attainment of the one-hour ozone NAAQS with certified data for 2012 through 2014.

1.2.2 1997 Eight-Hour Ozone NAAQS History

On July 18, 1997, the EPA published the revised NAAQS for ground-level ozone in the *Federal Register* (62 FR 38856), and it became effective on September 16, 1997. The EPA phased out and replaced the previous one-hour ozone NAAQS with an eight-hour NAAQS set at 0.08 ppm based on the three-year average of the annual fourth-highest daily maximum eight-hour average ozone concentrations measured at each monitor within an area. Effective June 15, 2004, the nine-county DFW area (Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant Counties) was designated as nonattainment with a moderate classification in the first phase of the EPA's implementation rule for the 1997 eight-hour ozone NAAQS (69 FR 23951). The TCEQ was required to submit a SIP revision for the 1997 eight-hour ozone NAAQS to the EPA by June 15, 2007, and demonstrate attainment of the standard by June 15, 2010. The EPA addressed the control obligations that apply to areas designated nonattainment for the 1997 eight-hour ozone NAAQS in the second phase of the implementation rule (70 FR 71612). To satisfy the requirements of Phase I of the 1997 eight-hour ozone standard implementation rule

(69 FR 23951), the TCEQ adopted the DFW Eight-Hour Ozone Five Percent Increment of Progress SIP Revision on April 27, 2005 and submitted it to the EPA. The revision used a 5% increment of progress from the area's 2002 emissions baseline beyond the reductions from federal and state measures already approved by the EPA, and was the first DFW SIP revision submitted under the 1997 eight-hour ozone standard.

1.2.2.1 May 23, 2007

The commission adopted the May 2007 DFW AD SIP revision and the reasonable further progress (RFP) SIP revision for the DFW nonattainment area on May 23, 2007. These SIP revisions were the first step in addressing the 1997 eight-hour ozone standard in the DFW nonattainment area.

This eight-hour ozone SIP revision for the DFW nonattainment area contained photochemical modeling and weight of evidence, including corroborative analysis and additional measures not included in the model. In addition to the existing control strategies in the DFW nonattainment area, the SIP revision included new rules for the following sources:

- DFW nonattainment area cement kilns;
- DFW nonattainment area electric generating units;
- DFW nonattainment area industrial, commercial, and institutional major sources;
- DFW nonattainment area minor sources; and
- East Texas combustion sources in 33 counties beyond the DFW nonattainment area.

The SIP revision included additional commitments for a Voluntary Mobile Emissions Reduction Program (VMEP) and transportation control measures (TCM). The revision also contained the reasonably available control measure (RACM) analysis, RACT analysis, contingency measures, emissions inventories, and MVEBs.

On July 14, 2008, the EPA proposed conditional approval (73 FR 40203) of the May 2007 DFW AD SIP Revision, providing that final conditional approval was contingent upon the State of Texas adopting and submitting to the EPA an approvable contingency plan SIP revision for the DFW nonattainment area. The DFW AD SIP Revision for the 1997 Eight-Hour Ozone Standard (Contingency Measures Plan) was adopted by the commission on November 5, 2008 and submitted to the EPA on November 15, 2008. The SIP revision identified measures to satisfy the EPA's 3% reduction contingency requirement for 2010 for the DFW nonattainment area, to apply in the event that the DFW nonattainment area failed to meet the 1997 eight-hour ozone standard by the attainment deadline.

An additional condition stipulated by the EPA for final approval of the May 2007 DFW AD SIP Revision was that the TCEQ adopt and submit rule and SIP revisions to implement an enforceable mechanism to limit the use of discrete emission reduction credits (DERC) in the DFW nonattainment area by March 1, 2009. The DFW AD SIP Revision for the 1997 Eight-Hour Ozone Standard DERC Program incorporated rulemaking that amended Chapter 101, Subchapter H, Division 4: *Discrete Emission Credit Banking and Trading* rules to set a limit on DERC use for the DFW nonattainment area.

On January 14, 2009, the EPA published final conditional approval of components of the 2007 AD SIP revision, including the May 2007 DFW AD SIP revision, and the April 2008 and November 2008 supplements. The approval provided conditional approval of the 2009 attainment MVEBs, RACM demonstration, and failure-to-attain contingency plan, full approval of local VMEP and TCMs, full approval of the VOC RACT demonstrations for the one-hour and

1997 eight-hour ozone standards, and a statement that all control measures and reductions relied upon to demonstrate attainment were approved by the EPA.

On March 10, 2010, the commission adopted the DFW RACT Update, 30 TAC Chapter 117 Rule Revision Noninterference Demonstration, and Modified Failure-to-Attain Contingency Plan SIP Revision. This SIP revision incorporated several actions adopted by the commission, and supplemented the 1997 eight-hour ozone AD by demonstrating that the revised Chapter 117 rule does not interfere with the DFW AD SIP Revision.

On August 25, 2010, the commission adopted a SIP revision to convert an environmental speed limit (ESL) control strategy to a TCM for the 1997 eight-hour ozone standard in the DFW nonattainment area. The EPA approved this revision to the SIP for the DFW ozone nonattainment area to re-categorize a local ESL control measure as a TCM effective on March 10, 2014.

1.2.2.2 Reclassification to Serious for the 1997 Eight-Hour Ozone Standard

The nine-county DFW 1997 eight-hour ozone nonattainment area is currently classified as serious nonattainment. In 2009, the monitored design value (complete ozone season prior to the attainment date) for the nine-county DFW nonattainment area was 86 ppb. Effective January 19, 2011, the EPA finalized a determination that the DFW nonattainment area did not attain the 1997 eight-hour ozone standard by June 15, 2010, the deadline set by the Phase I implementation guidance for the 1997 ozone standard for areas classified as moderate (75 FR 79302). Based on that determination, the EPA reclassified the DFW nonattainment area to serious and set a January 19, 2012 deadline for the state to submit an AD SIP revision that addressed the 1997 eight-hour ozone standard serious nonattainment area requirements, including RFP. The nine-county DFW nonattainment area's new attainment date for the 1997 eight-hour ozone standard was June 15, 2013 which required that only data through 2012 could be used to determine attainment under the EPA's rules.

As required by the FCAA, the TCEQ published a notice in the *Texas Register (35 TexReg 4268)*, on May 21, 2010, implementing the area's contingency measures for failure to attain the 1997 eight-hour ozone standard by the June 15, 2010 deadline.

Concurrent with the 2011 AD SIP revision, the commission adopted revised and new RACT requirements to address the following Control Techniques Guidelines (CTG) documents issued by the EPA from 2006 through 2008 (Rule Project Number 2010-016-115-EN): Flexible Package Printing; Industrial Cleaning Solvents; Large Appliance Coatings; Metal Furniture Coatings; Paper, Film, and Foil Coatings; Miscellaneous Industrial Adhesives; Miscellaneous Metal and Plastic Parts Coatings; and Auto and Light-Duty Truck Assembly Coatings. Concurrent with this AD SIP revision, the commission also adopted revised and new RACT requirements for VOC storage tanks (Rule Project Number 2010-025-115-EN).

This 2011 AD SIP revision included an MVEB for 2012 that represented the on-road mobile source emissions that were modeled for the AD. The DFW area's metropolitan planning organization must demonstrate that the estimated emissions from transportation plans, programs, and projects do not exceed the MVEB. Additionally, this 2011 AD SIP revision showed that by 2012, the DFW nonattainment area would meet other serious nonattainment area requirements, including an enhanced Inspection and Maintenance Program (which had already been implemented in all nine counties), Stage II vapor recovery systems at gas stations (which had already been implemented in Collin, Dallas, Denton, and Tarrant Counties), a Clean Fuel Fleet Program (which is not required if emissions reductions from the National Low-Emissions

Vehicle Program are more than what would be achieved under such a program), TCMs (which have already been implemented in all nine counties), and enhanced monitoring.

The EPA published final approval of the 2011 DFW RFP SIP revision on November 12, 2014 (79 FR 67068); however, the EPA is scheduled to finalize disapproval of portions of the 2011 DFW 1997 Eight-Hour Ozone AD SIP Revision and to finalize the clean data determination by August 31, 2015 (80 FR 23487). This redesignation substitute SIP revision is intended to satisfy the anti-backsliding obligations for the revoked one-hour and the revoked 1997 eight-hour ozone NAAQS by ensuring that the EPA's requirements for the redesignation of revoked ozone standards are met for the DFW ozone nonattainment area. A revised attainment demonstration for the 1997 eight-hour ozone standard will not be required with the finalization of the EPA's clean data determination. Further, this redesignation substitute includes emissions inventory projections which demonstrate that the DFW area will maintain design values below the 1997 eight-hour ozone NAAQS through 2028.

SECTION 2: AIR QUALITY DATA

The ambient air quality monitoring network provides data to verify continued attainment of the one-hour and 1997 eight-hour ozone National Ambient Air Quality Standard (NAAQS).

The Dallas-Fort Worth (DFW) nonattainment area monitoring network in 2015 consists of 17 regulatory ambient air ozone monitors located in Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall and Tarrant Counties, Texas. The City of Dallas operates four of the monitors: Dallas Hinton (C0060/C0161/C0401/C3002), Dallas Redbird Airport (C402); Dallas North No.2 (C0063/C0679); and Rockwall Health (C0069). The City of Fort Worth operates four of the monitors: Parker County (C0076); Eagle Mountain Lake (C0075); Keller (C0017); and Arlington Municipal Airport (C0061). The Texas Commission on Environmental Quality (TCEQ) operates the remaining 9 ozone monitors: Denton Airport South (C0056/C0157/C0163); Pilot Point (C1032); Midlothian OFW (C0052/C0137); Italy (C1044); Cleburne Airport (C0077/C0682); Kaufman (C0071); Ft. Worth Northwest (C0013); Grapevine Fairway (C0070/C0182); and Frisco (C0031/C0680).

The monitors are managed in accordance with 40 Code of Federal Regulations (CFR) Part 58 to verify the attainment status of the area. The Texas Commission on Environmental Quality (TCEQ) commits to keep in operation an appropriate air monitoring network in the DFW area and will continue to work with the United States Environmental Protection Agency (EPA) through the air monitoring network review process, as required by 40 CFR Part 58, to determine: the adequacy of the ozone monitoring network; if additional monitoring is needed; and when monitoring can be discontinued. Air monitoring data from these monitors will continue to be quality assured according to the requirements in the EPA's regulations until the end of the maintenance period (2028) and reported to the EPA on the schedule required by 40 CFR Part 58.

2.1 Ozone Data

This section provides an analysis of air quality observational data in the DFW four-county and nine-county nonattainment areas. While the one-hour and 1997 eight-hour ozone NAAQS is expressed in units of parts per million (ppm), the familiar convention of expressing concentrations in parts per billion (ppb) is also used in this section. Data for ozone and nitrogen oxides (NO_X) were downloaded from the EPA's Air Quality System (AQS) database, and volatile organic compounds (VOC) data were downloaded from TCEQ's automated gas chromatograph (auto-GC) database. Analyses of ozone data from federal reference method monitors and federal

equivalent method monitors, those used by the EPA to compare to the NAAQS, are included in this section.

2.2 Ozone Trend Analysis

Trends in ozone are used to demonstrate the substantial progress the DFW area has made in improving air quality. The trends in design values for the one-hour and eight-hour ozone NAAQS in the DFW nonattainment areas are seen clearly in Figure 2-1: *One-Hour Ozone Design Values for the DFW Area* and Figure 2.2: *Eight-Hour Ozone Design Values for the DFW Area*. Regarding the one-hour ozone NAAQS the area monitored attainment of 0.12 ppm (or 124 ppb) in 2006 and has since remained in attainment of the standard. . The one-hour ozone design value for 2014 was 102 ppb. The design value for one-hour ozone standard is the 4th highest value, provided that the monitor has three years of completed data. Data has to meet the validity checks of at least eighteen valid hours of data to be declared as valid days, at least 75% of days with data to be valid months, at least two months of data for valid quarters and at least three quarters of data to be declared as a valid year. If one year out of the three year span does not meet the completeness requirements, then the design value will be the 3rd highest value of the three year span. In 2006, the DFW area measured attainment of the one-hour ozone NAAQS. The one-hour ozone design value in the DFW area has shown large decreases over the past eleven years, since 2004. The one-hour ozone design value in 2014 was 102 ppb, which represents a 27% decrease from the 1990 design value of 140 ppb.

The DFW nine-county area exceeded the 1997 eight-hour ozone NAAQS at the end of 2013, but monitored 3 ppb less than the value of the 1997 eight-hour NAAQS of 0.08 ppm (or 84 ppb) in 2014. The design value for the eight-hour ozone standard is the truncated three year average of the fourth highest value, given three years of complete data, as discussed above. In 2014, the DFW area was in attainment of the 1997 eight-hour ozone NAAQS. The eight-hour ozone design value in the DFW area has decreased nearly 23% over the past 24 years, from a design value of 105 ppb in 1990 to a design value of 81 ppb in 2014.

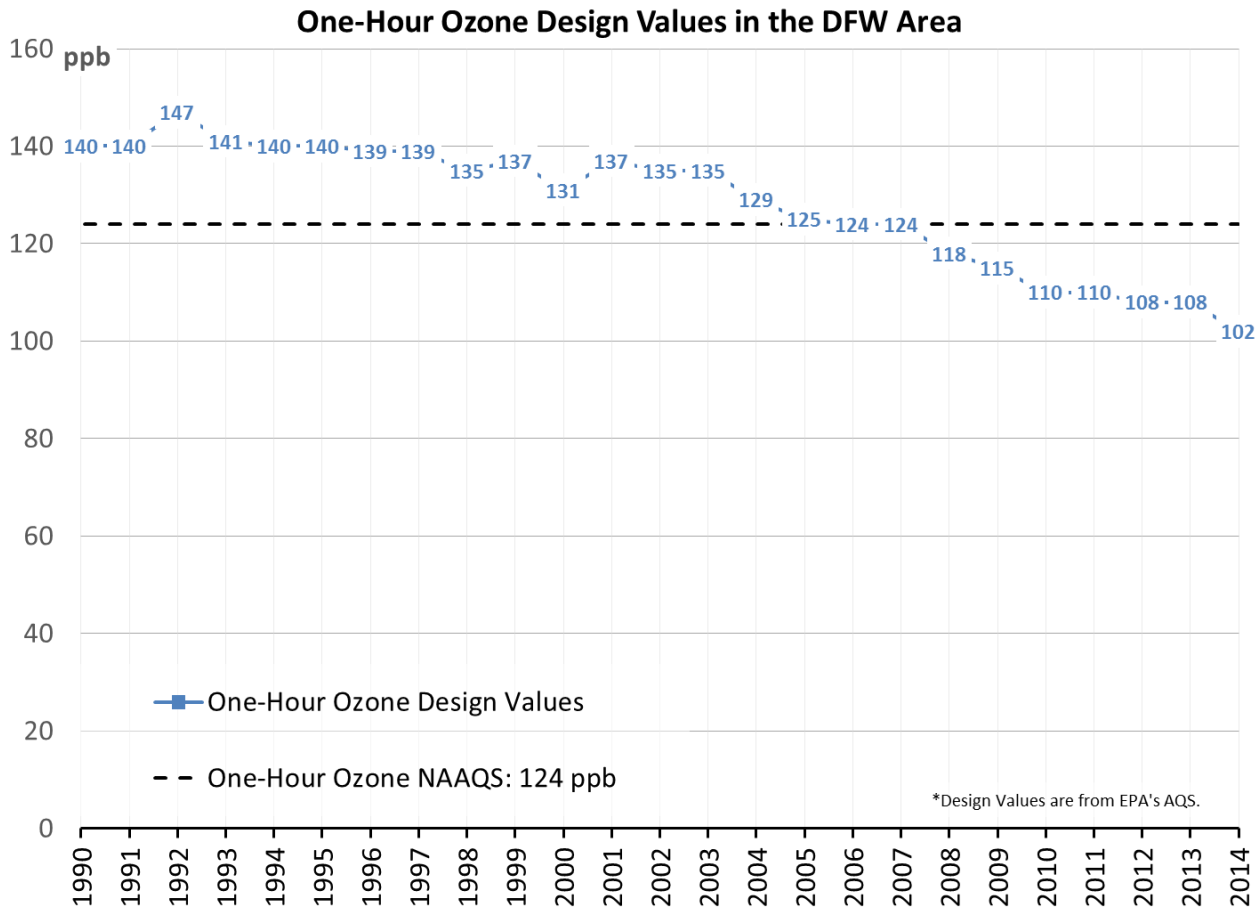

Figure 2-1: One-Hour Ozone Design Values for the DFW Area

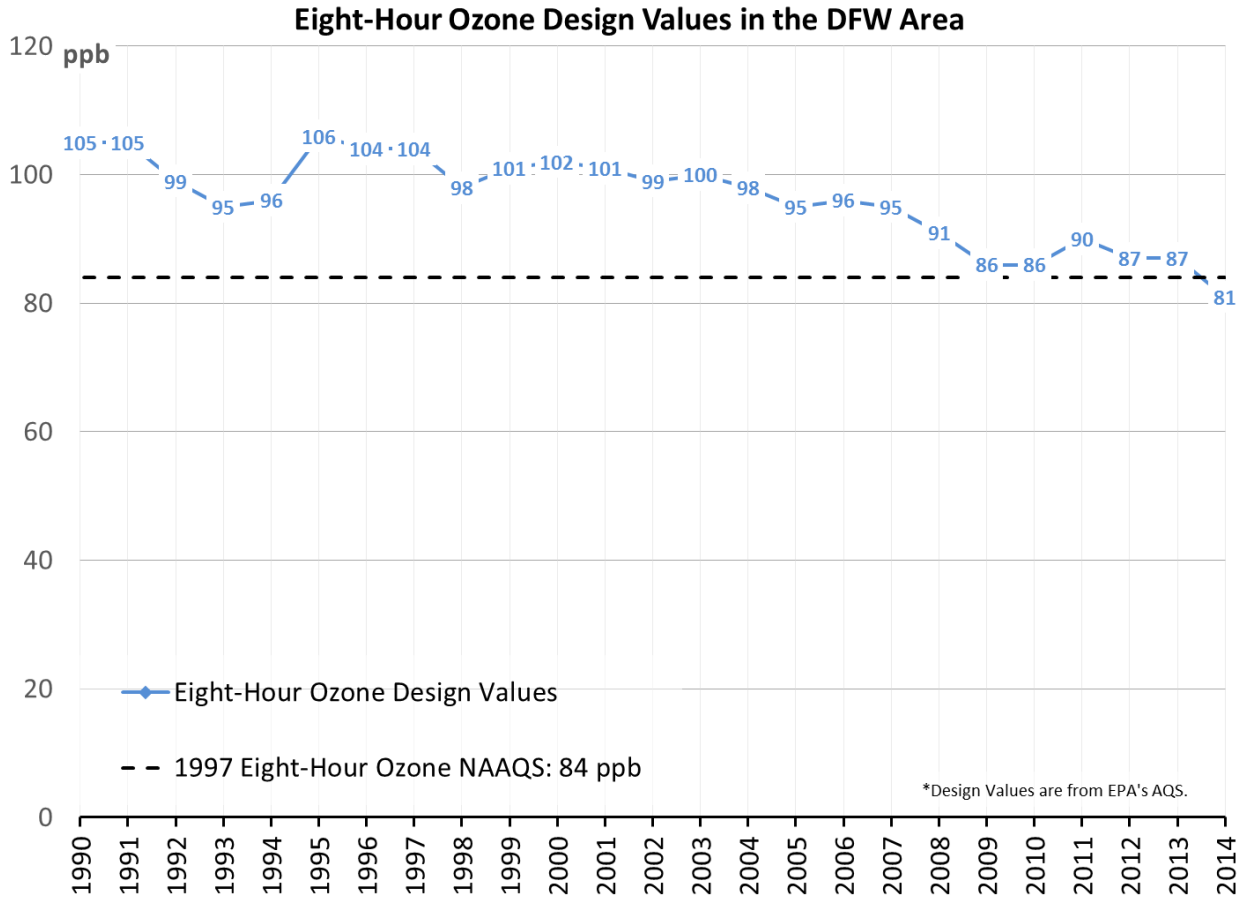

Figure 2-2: Eight-Hour Ozone Design Values for the DFW Area

The design value of a metropolitan area is the maximum design value of all of the area's regulatory monitors' individual design values. Because ozone varies spatially, it is also prudent to investigate trends at all monitors in an area. Table 2-1: *One-Hour Ozone Design Values by Monitor* contains one-hour ozone design values at all regulatory monitors in the DFW area from 2000 through 2014. Since 2006, there have been no monitors in the DFW area that exceeded the one-hour ozone standard. Table 2-2: *Eight-Hour Ozone Design Values by Monitor* contains eight-hour ozone design values at all regulatory monitors in the DFW area from 2000 through 2014. More monitors than those listed in Table 2-1 and Table 2-2 operate in the DFW area, but the design values at those additional monitors are not appropriate for compliance determinations with the DFW nonattainment area because they are not located geographically within the area. Only monitors located within the designated nonattainment area are displayed in Table 2-1 and Table 2-2. Note that the total number of monitors at the bottom of each table is different because there are different counties designated as nonattainment for the one-hour ozone NAAQS and the 1997 eight-hour ozone NAAQS. The total number of monitors also includes monitors that may not have a valid design value for that year.

Table 2-1: One-Hour Ozone Design Values by Monitor

Site Name	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Frisco C31	130	130	119	113	113	113	113	111	110	102	102	108	108	108	100
Anna C68	105	105	108	105	103										
Dallas Hinton St. C401/C60/C	127	125	118	125	118	115	114	114	97	87	89	98	101	101	101
Dallas North No.2 C63	128	128	118	113	118	120	117	116	101	105	105	107	106	106	99
Dallas Redbird Airport C402	118	111	103	112	121	121	111	110	109	105	106	105	105	99	96
Sunnyvale Long Creek C74		89	104	107	107	111	110								
Denton Airport South C56	126	126	128	122	118	117	118	118	118	115	102	109	108	108	99
Pilot Point								107	104	94	97	103	103	103	97
Eagle Mountain Lake C75		137	135	135	129	125	124	124	115	111	110	108	100	98	94
Ft. Worth Northwest C13	131	130	126	126	123	123	117	118	109	102	106	106	101	100	100
Keller C17	128	128	128	128	126	117	115	117	111	108	107	110	108	107	95
Grapevine Fairway C70		122	130	128	125	113	112	111	107	108	104	105	104	104	101
Arlington Municipal Airport			122	120	120	117	113	113	101	100	97	100	102	102	102
Total Number of Regulatory Monitors	14	13	13	13	12	12	13	12	12	11	11	11	11	11	11
Total Number of Monitors Above NAAQS	7	8	5	5	3	1	0	0	0	0	0	0	0	0	0

Table 2-2: Eight-Hour Ozone Design Values by Monitor

Site Name	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Frisco C31	101	99	93	88	89	91	92	88	83	79	77	81	83	84	78
Anna C68		76	83	80	80										
Dallas Hinton St. C401/C60/ C	93	92	91	90	89	90	87	84	74			73	82	84	78
Dallas North No.2 C63		93	89	86	87	90	89	86	80	81	78	82	81	83	77
Dallas Redbird Airport C402	88	84	84	85	87	88	88	85	82	78	78	79	81	80	73
Sunnyvale Long Creek C74				83	83	84									
Denton Airport South C56	102	101	99	97	96	93	95	94	91	85	80	83	83	87	81
Pilot Point									81	77	78	82	82	84	79
Midlothian Tower C94/C158	97	88	86	82	87	84	83	78							
Midlothian OFW C52/C137									75	73	72	74	76	77	71
Italy C1044											68	69	69	72	67
Cleburne Airport C77			89	90	90	89	87	85	83	83	80	79	79	79	76
Kaufman C71				73	73	73	75	76	73	70	67	68	70	74	70
Parker County C76			86	89	86	87	88	91	84	81	75	79	78	79	74

Site Name	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Rockwall Heath C69			83	81	82	81	80	78	75	75	74	77	77	77	73
Arlington Reg. Office C57	95	86													
Eagle Mountain Lake C75			95	96	94	95	96	95	89	86	85	83	82	81	79
Ft. Worth Northwest C13	99	97	96	96	94	95	94	91	83	79	79	82	80	81	80
Keller C17	97	97	98	100	98	95	94	92	87	86	86	90	87	85	77
Grapevine Fairway C70			95	100	98	93	93	92	87	84	82	86	86	86	80
Arlington Municipal Airport					87	87	87	84	79	77	79	79	83	80	75
Total Number of Regulatory Monitors	19	18	18	18	17	17	19	19	19	17	17	17	17	17	17
Total Number of Monitors Above NAAQS	8	8	11	11	13	12	12	10	4	3	2	2	2	3	0

Figure 2-3: *One-Hour Ozone Design Value Statistics for All Monitors in the DFW Area* displays the statistically summarized maximum, median, and minimum one-hour ozone design values computed across all monitors in the DFW area as well as how these distributions changed over time. The figure exhibits no noticeable trend until 2000 when the trend begins to fall steadily. Before 2000, only two monitors in the DFW area met the one-hour ozone standard; since then, the area has seen a steady increase in the number of monitors attaining the standard. By 2014, all monitors in the DFW area were below the one-hour ozone NAAQS of 124 ppb.

Figure 2-4: *Eight-Hour Ozone Design Value Statistics for All Monitors in the DFW Area* shows the eight-hour ozone design value exhibited a fairly consistent downward trend since 2000. Before 2014, the DFW area had not met the 1997 eight-hour ozone NAAQS of 84 ppb. In 2014 however, the area monitored attainment of the standard with a design value of 81 ppb.

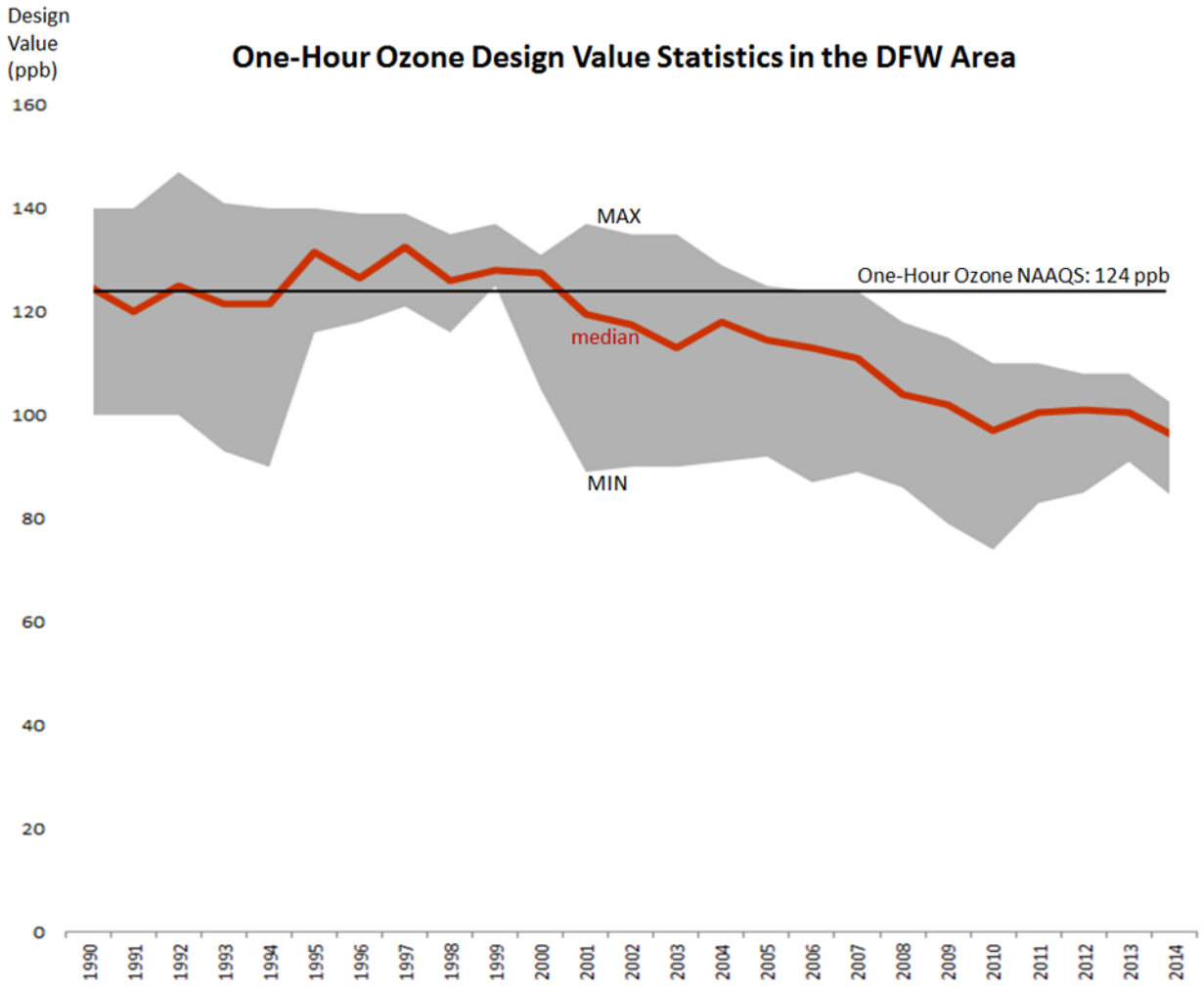

Figure 2-3: One-Hour Ozone Design Value Statistics for All Monitors in the DFW Area

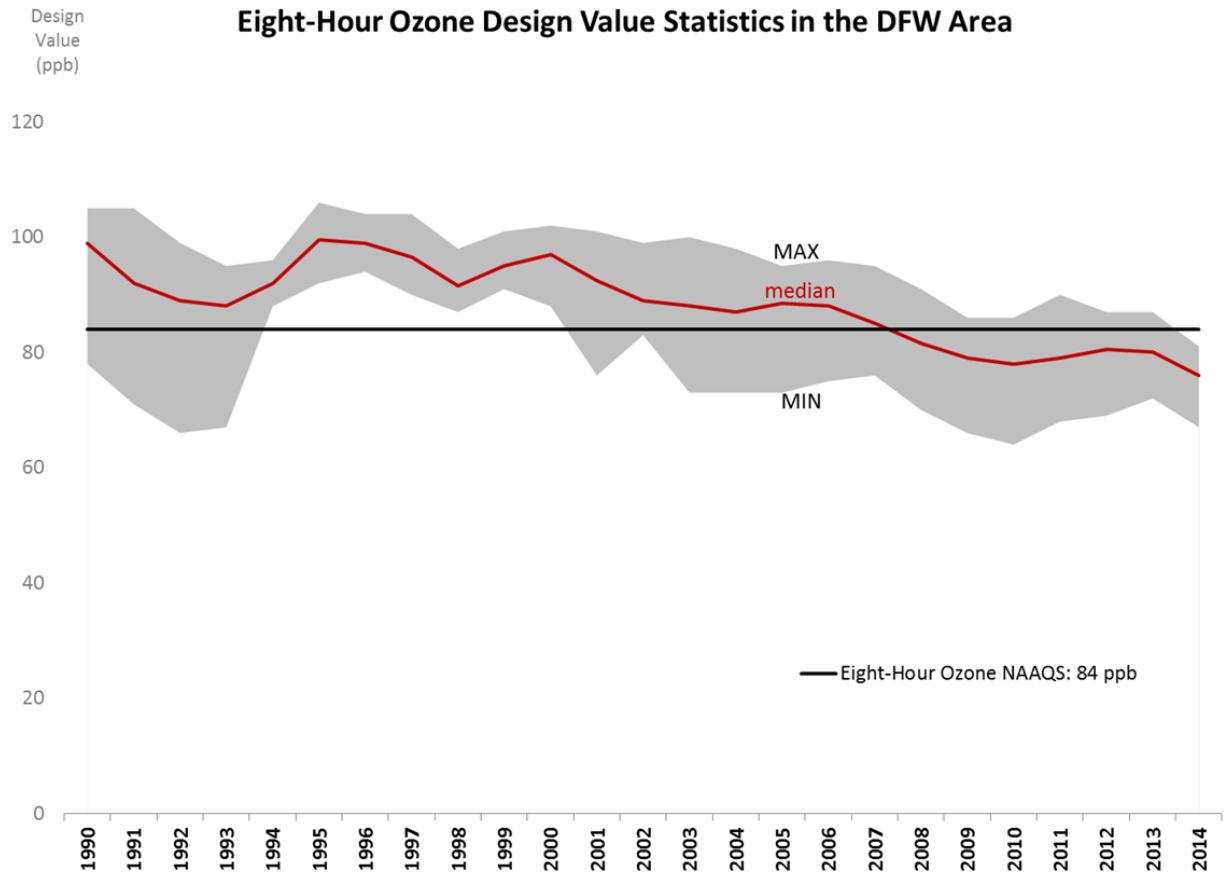

Figure 2-4: Eight-Hour Ozone Design Value Statistics for All Monitors in the DFW Area

Other useful information regarding ozone trends can also be obtained by examining the number of days where the daily one-hour ozone maximum concentration was greater than 124 ppb in a year and examining the number of days where the daily eight-hour ozone maximum concentration was greater than 84 ppb in a year. This information is an important indicator of expected future ozone attainment in an area. The number of exceedance days analysis demonstrates both that the area remains in attainment, in addition to the distribution of exceedances over time, which provides evidence that existing control strategies for ozone are effective. Figure 2 5: *Number of One-Hour Ozone Exceedance Days by Monitor in the DFW Area* shows the number of days where one-hour ozone was greater than 124 ppb by year for each currently operating DFW monitor from 1990 through 2014. The number of days is the total number of unique days (a day with more than one monitor over 124 ppb is only counted once) on which any monitor in the DFW area registered a daily peak one-hour ozone concentration greater than 124 ppb. In 2014, there were zero days that the one-hour ozone concentration was greater than 124 ppb. Since 1990, the number of days with ozone concentrations above 124 ppb has decreased, which is especially pronounced from 1995 through 2008. The number of days with ozone concentrations above 124 ppb occurring in the DFW area fell 100% from seven days in 1990 to zero days in 2014. In the last seven years, only one day had ozone concentrations above the 124 ppb NAAQS threshold. This means that high ozone days are not only decreasing in frequency but they are also decreasing geographically across the entire region, showing an area wide trend for the one-hour ozone NAAQS.

Figure 2-6: *Number of Eight-Hour Ozone Exceedance Days by Monitor in the DFW Area* shows the number of days where the eight-hour ozone was greater than 84 ppb by year for each currently operating DFW monitor from 1990 through 2014. The number of days is the total number of unique days on which any monitor in the DFW area registered a daily peak eight-hour ozone concentration greater than 84 ppb. In 2014, there were three days that the eight-hour ozone concentration was greater than 84 ppb. Since 1990, the number of days with ozone concentrations above 84 ppb has decreased, which is especially pronounced from 2005 through 2010, then again from 2011 through 2014. The number of days with ozone concentrations above 84 ppb occurring in the DFW area has fallen nearly 91% from 32 days in 1990 to three days in 2014.

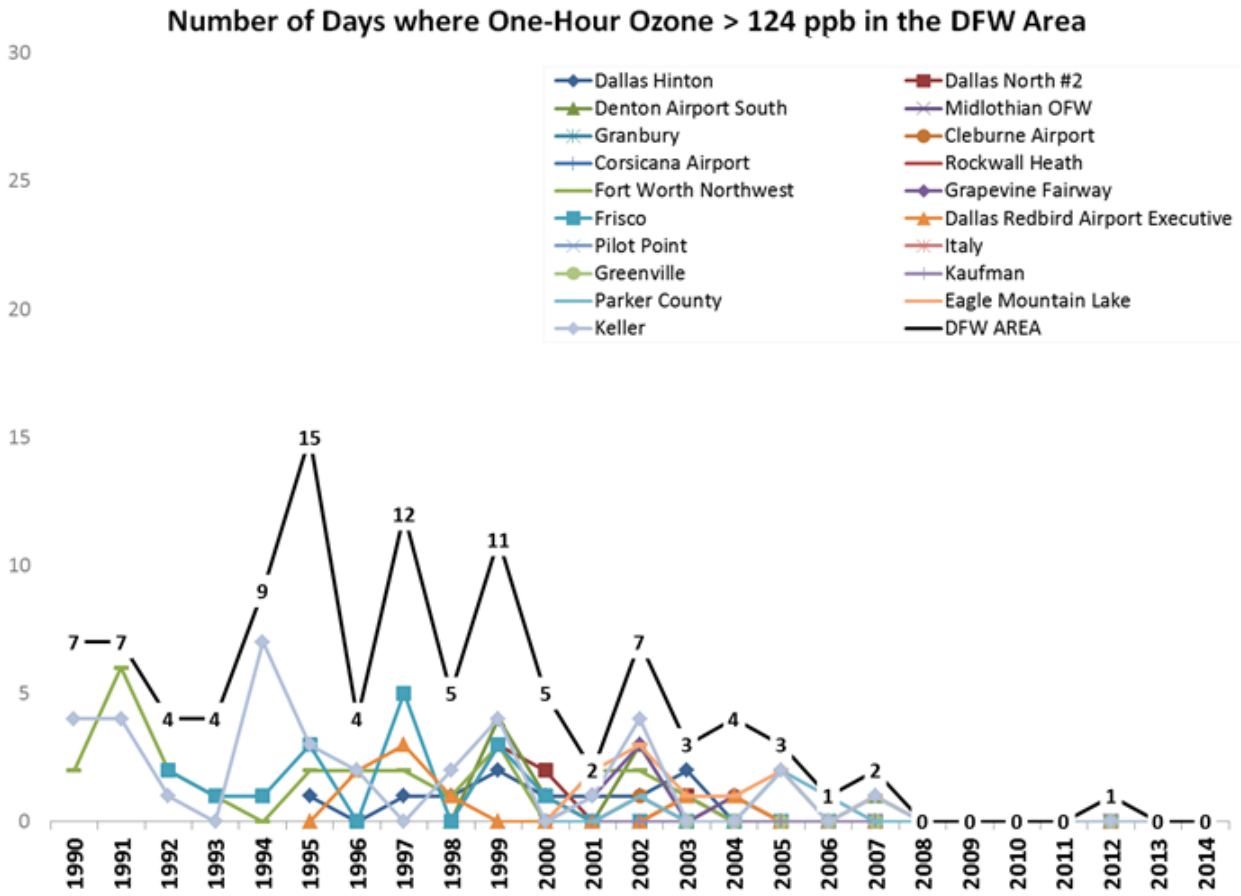

Figure 2-5: Number of One-Hour Ozone Exceedance Days by Monitor in the DFW Area

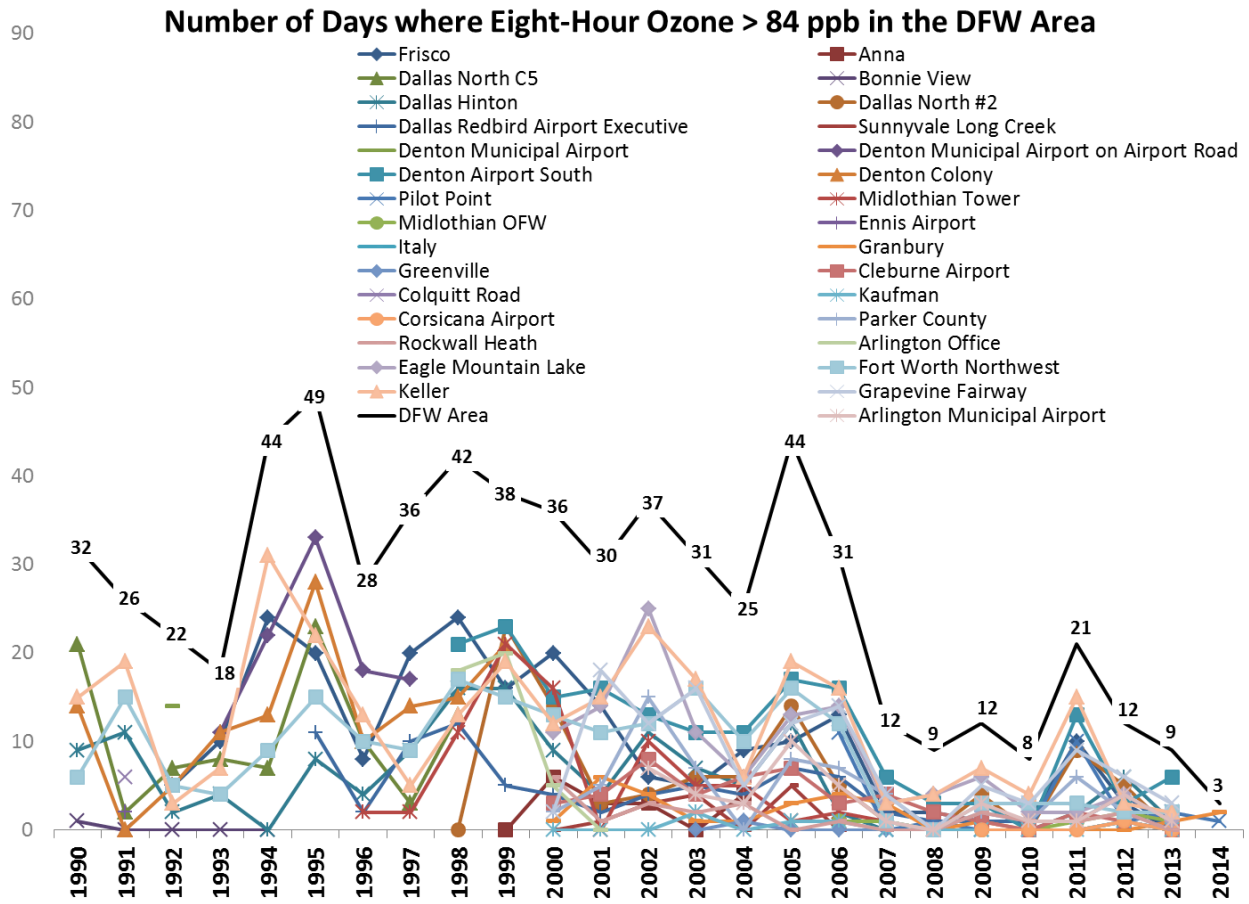

Figure 2-6: Number of Eight-Hour Ozone Exceedance Days by Monitor in the DFW Area

2.3 Trend Analysis for Ozone Precursors

Decreases in NO_X and VOC, precursors to ozone formation, demonstrate the effectiveness of control measures in reducing NO_X and VOC emissions, generally support declining ozone values, and indicate that ozone reductions are due to NO_X and VOC emission reductions in the DFW area; however, ozone may not always exhibit trends identical to its precursors due to other variables such as meteorological conditions.

This section evaluates trends in concentrations of NO_X and VOC. Only data that met data completeness checks are used in this section. To meet the completeness check, each day must contain at least 18 valid hours of data, each month must contain at least 75% of days with data, each quarter must have at least two months of data, and each year must contain at least three quarters of data. NO_X emissions are a variable mixture of nitric oxide and nitrogen dioxide and are critical precursors to ozone formation. As NO_X emissions decrease, ambient concentrations of these compounds should also decrease. NO_X emissions are primarily created by fossil fuel combustion, lightning, biomass burning, and microbial action in soil.

Annual maxima, annual 90th percentile, and annual average daily peak one-hour NO_X values observed in the DFW area are plotted in Figure 2-7: *Annual Maxima, 90th Percentile and Average of Daily Peak NOX Values (ppb) in the DFW Area, 2000 through 2014*. The figure uses a logarithmic scale so that all three statistics are visible and a linear regression line was added to

each statistic. The linear regression line of the yearly maximum shows a negative slope of 10.6 ppb per year with an r^2 of 0.43, and the regression line of the yearly 90th percentile shows a negative slope of 5.1 ppb per year with an r^2 of 0.90. The linear regression line of the yearly average shows a negative slope of 2.4 ppb per year with an r^2 of 0.93. All three measures have decreased over the 2000 through 2014 period, falling 32% (maximum), 60% (90th percentile), and 61.5% (mean). Strong downward trends in ambient NO_X concentrations depicted in the emission-trend data are evidence of the effectiveness of emission controls implemented in the DFW area and would be expected to support declining ozone values, as observed in the DFW area.

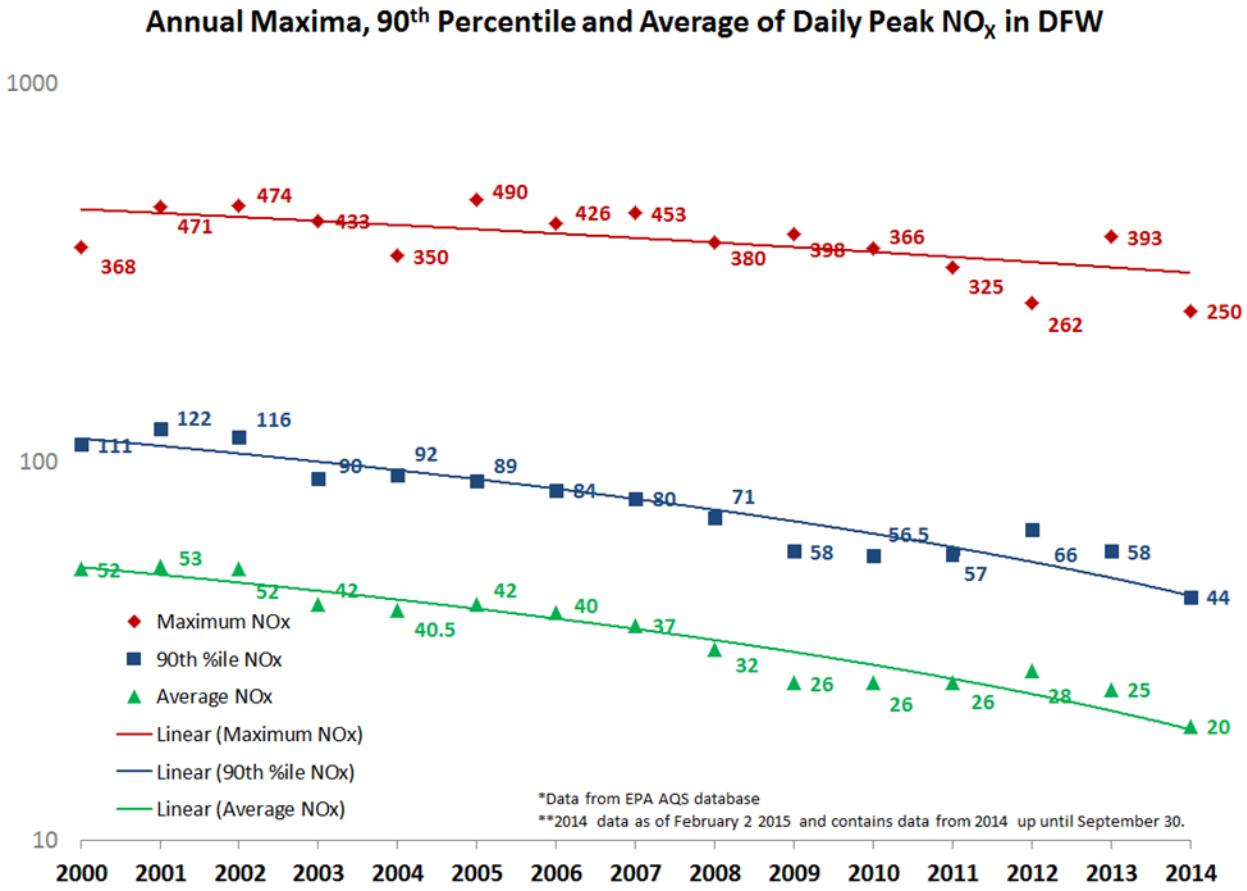

Figure 2-7: Annual Maxima, 90th Percentile and Average of Daily Peak NO_X Values (ppb) in the DFW Area, 2000 through 2014

The other major class of ozone precursors is VOC. Since the mid-1990s, the TCEQ has collected 40-minute time-integrated measurements in the DFW area, on an hourly basis, of over 40 VOC compounds using auto-GC instruments. This section will focus on two prevalent VOC compounds that are associated with rapid and efficient ozone formation, ethylene and propylene. Yearly geometric means were computed from valid ambient hourly measurements. A geometric mean was calculated by taking the natural logarithm of each measurement, averaging these logs, and then calculating the antilog of this mean log value. The geometric mean is a preferable statistic to median or arithmetic (ordinary) mean for evaluating the central tendency of data when the data are skewed, that is, when the data are not symmetrically, or normally, distributed, but instead clustered around extreme high or low values. It is more robust than an ordinary average, meaning its value is not greatly influenced by one or a few very high or very

low values. Many distributions of pollutant measurements, especially VOC, in the DFW area are skewed, thus the geometric mean was evaluated to provide an assessment of VOC emissions in the DFW area.

The annual geometric mean of ethylene concentrations in parts per billion carbon (ppbC) is shown in Figure 2-8: *Yearly Geometric Mean Ethylene Concentrations (ppbC) at Nine DFW Monitors, 2000 through 2014*. Prior to 2010, only two of the nine monitors had enough valid data to calculate annual geometric mean ethylene. . Values for ethylene are fairly low; the highest geometric mean ethylene in the DFW area in 2014 was below 0.6 ppbC. While trends are generally variable from year to year, the geometric mean ethylene has decreased at the two monitors with the longest record of auto-GC data. Ethylene at the Flower Mound Shiloh (C1007) monitor had been steadily increasing until 2013, when the geometric mean ethylene decreased in 2014. Concentrations at the Arlington UT Campus (C1018), Eagle Mountain Lake (C0075) and Kennedale Treepoint Drive (C1062) monitors saw increases between 2013 and 2014, although the Arlington UT Campus (C1018) and Kennedale Treepoint Drive (C1062) monitors only have two years of valid data to calculate the geometric mean.

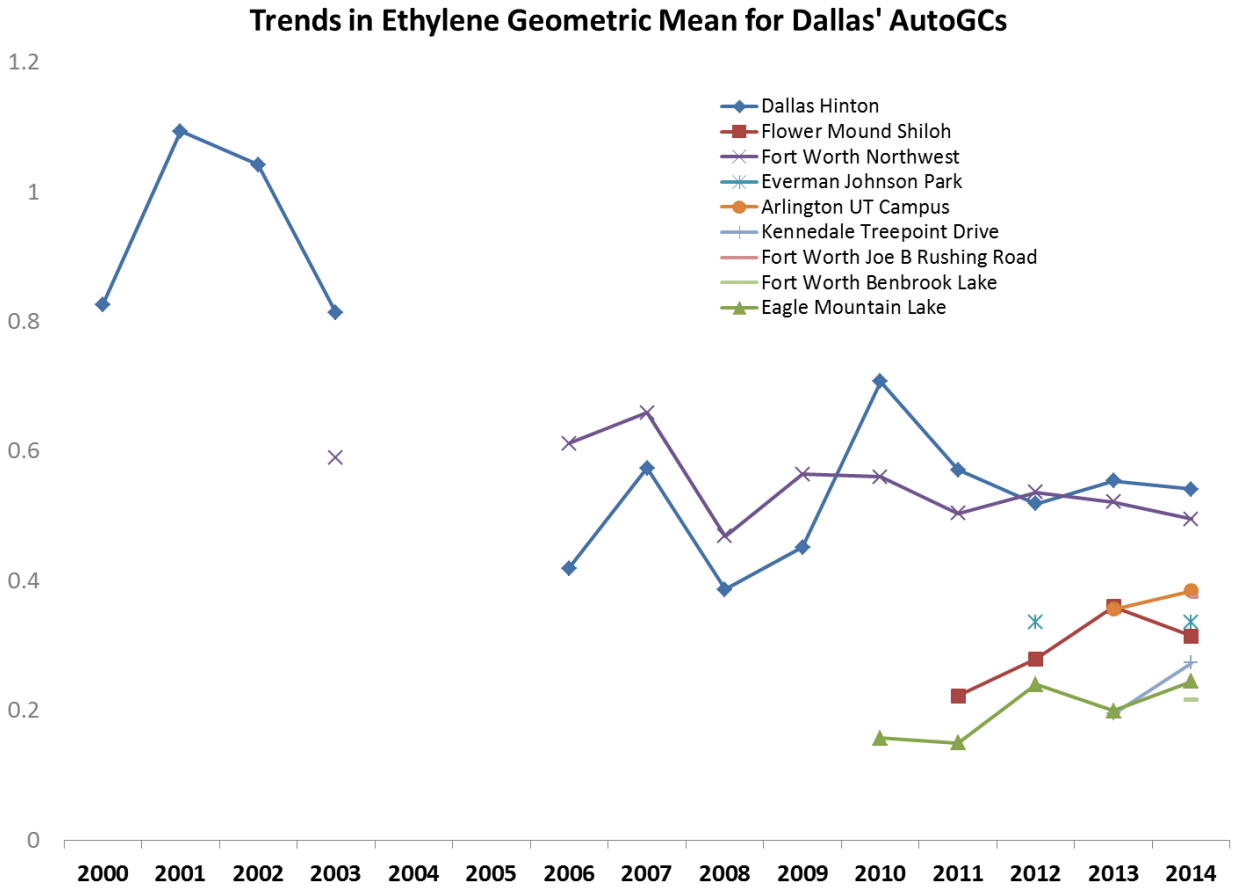

Figure 2-8: Yearly Geometric Mean Ethylene Concentrations (ppbC) at Nine DFW Monitors, 2000 through 2014

Figure 2-9: *Yearly Geometric Mean Propylene Concentrations (ppbC) at Nine DFW Monitors, 2000 through 2014* shows the annual geometric mean for propylene. Like ethylene, prior to 2004 only three of the nine monitors had enough valid data to calculate annual geometric mean

propylene. Note that the y-axis is the same as in Figure 2-8. The geometric means for propylene are even lower than the geometric means for ethylene for most of the years, with the highest geometric mean propylene concentration in the DFW area in 2014 below 0.4 ppbC. All monitors have been showing a steady decrease in geometric mean propylene from 2000 through 2014. The Fort Worth Northwest (C0013) monitor saw a slight increase in propylene measurements between 2013 and 2014. Though decreasing at different rates, these long-term decreases in ambient concentrations of ethylene and propylene suggest overall industrial and automobile emissions of these compounds have decreased considerably since 2000.

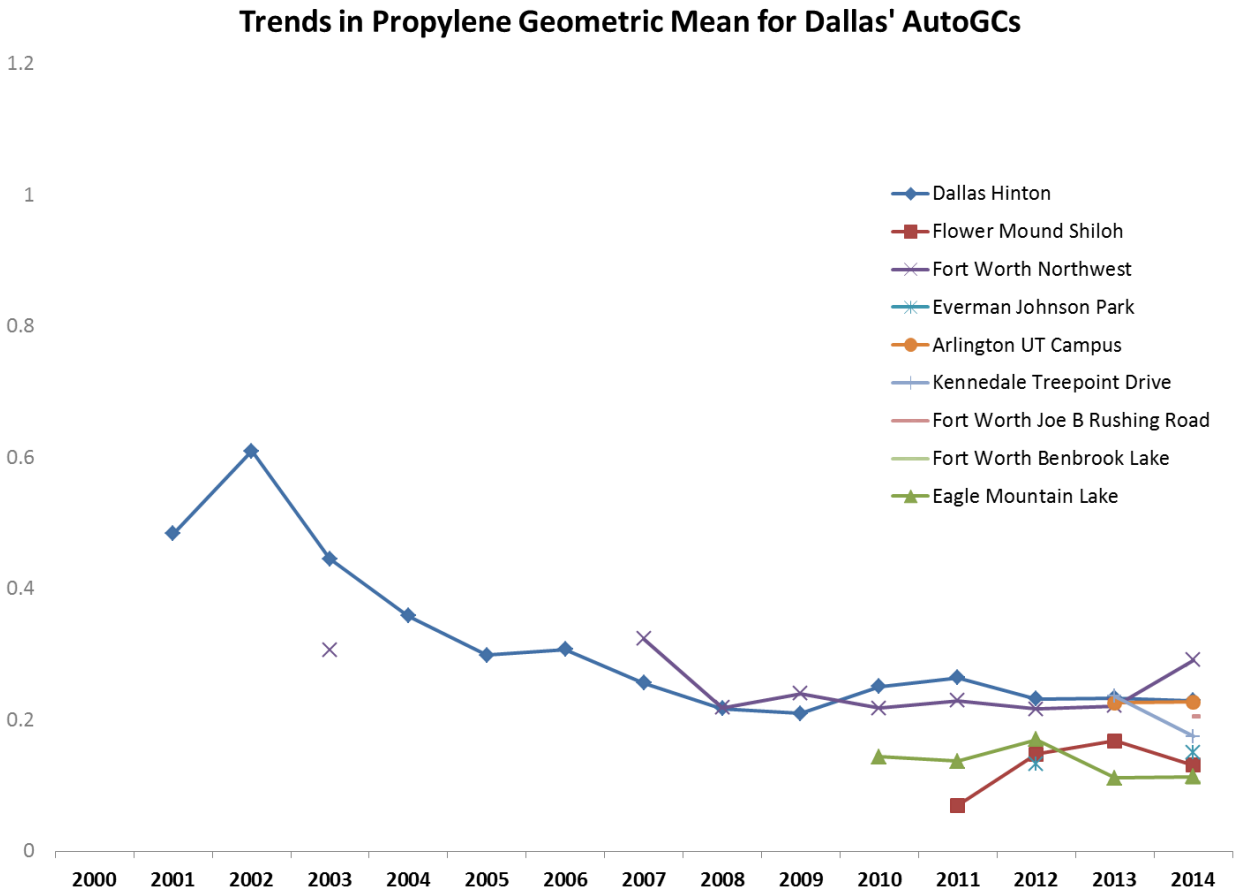

Figure 2-9: Yearly Geometric Mean Propylene Concentrations (ppbC) at Nine DFW Monitors, 2000 through 2014

2.4 Ozone Data Summary

Ozone concentrations have decreased dramatically in the DFW area since the 1990s. In 2008, the one-hour design value dipped below the standard of 0.12 ppm (or 124 ppb); since 2008, only one day monitored a one-hour ozone concentration greater than 124 ppb. In 2014, the eight-hour ozone design value met the 1997 eight-hour ozone NAAQS of 84 ppb. Examination of the number of days that one-hour ozone concentrations exceeded 0.124 ppm and that eight-hour ozone concentrations exceeded 0.084 ppm reveals substantial downward trends. Evaluation of local changes of ozone precursors showed similar significant downward trends. These results suggest that the significant ozone reductions achieved in the DFW area are primarily due to NO_X and VOC reductions in the DFW area, the emission reduction control strategies are effective, and that projections for future attainment status are well-founded.

SECTION 3: PERMANENT AND ENFORCEABLE EMISSIONS REDUCTIONS

3.1 Control Measures

The Dallas-Fort Worth (DFW) nonattainment area for the one-hour National Ambient Air Quality Standard (NAAQS), which consists of Collin, Dallas, Denton, and Tarrant Counties and for the 1997 eight-hour ozone NAAQS, which consists of Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, and Rockwall, and Tarrant Counties, include a wide variety of major and minor industrial, commercial, and institutional entities. The Texas Commission on Environmental Quality (TCEQ) has implemented stringent and innovative regulations that address emissions of nitrogen oxides (NO_X) and volatile organic compounds (VOC) from these sources.

3.2 List of Existing Control Measures

Since the early 1990s, a broad range of control measures have been implemented for each emission source category for ozone planning in the DFW area. Table 3-1: *Existing Ozone Control Measures Applicable to the DFW Nonattainment Area* lists the existing ozone control strategies that have been implemented for the one-hour and 1997 eight-hour ozone NAAQS in the DFW areas.

Table 3-1: Existing Ozone Control Measures Applicable to the DFW Nonattainment Area

Measure	Description	Start Date(s)
DFW Industrial, Commercial, and Institutional (ICI) Major Source Rule 30 Texas Administrative Code (TAC) Chapter 117, Subchapter B, Division 4	Applies to major sources (50 tons per year (tpy) of nitrogen oxides (NO_X) or more) with affected units in Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant Counties Applies to major sources (100 tpy of NOx or more) with affected units in Wise County Affected source categories included in rule: boilers; process heaters; stationary gas turbines, and duct burners used in turbine exhaust ducts; lime kilns; heat treat and reheat metallurgical furnaces; stationary internal combustion engines; incinerators; glass, fiberglass, and mineral wool melting furnaces; fiberglass and mineral wool curing ovens; natural gas-fired ovens and heaters; brick and ceramic kilns; lead smelting reverberatory and blast furnaces; natural gas-fired dryers used in organic solvent, printing ink, clay, brick, ceramic tile, calcining, and vitrifying processes; and wood-fired boilers	March 1, 2009 or March 1, 2010, depending on source category Note: these NO_X control requirements are in addition to the NO_X control strategies previously implemented for ICI major sources in Collin, Dallas, Denton, and Tarrant Counties in March 2002 for the one-hour ozone National Ambient Air Quality Standards (NAAQS) January 1, 2017 for Wise County and wood-fired boilers in all ten counties of the DFW area

Measure	Description	Start Date(s)
DFW ICI Minor Source Rule 30 TAC Chapter 117, Subchapter D, Division 2	Applies to all minor sources (less than 50 tpy of NO_X) with stationary internal combustion engines in Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant Counties	March 1, 2009 for rich-burn gas-fired engines, diesel-fired engines, and dual-fuel engines March 1, 2010 for lean-burn gas-fired engines
Stationary Diesel Engines 30 TAC Chapter 117, Subchapter B, Division 4 and Subchapter D, Division 2 and Subchapter C, Division 4	Prohibition on operating stationary diesel and dual-fuel engines for testing and maintenance purposes between 6:00 a.m. and noon in Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant Counties	April 1, 2009
DFW Major Utility Electric Generation Source Rule 30 TAC Chapter 117, Subchapter C, Division 4	NO_X control requirements for major source (50 tpy of NOx or more) utility electric generating facilities in Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant Counties NOx control requirements for major source (100 tpy of NOx or more) utility electric generating facilities in Wise County Applies to utility boilers, auxiliary steam boilers, stationary gas turbines, and duct burners used in turbine exhaust ducts used in electric power generating systems Note: these NO_X control requirements are in addition to the NO_X control strategies implemented for utilities in Collin, Dallas, Denton, and Tarrant Counties in 2001 through 2005 for the one-hour ozone NAAQS	March 1, 2009 for Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant Counties January 1, 2017 for Wise County
Utility Electric Generation in East and Central Texas 30 TAC Chapter 117, Subchapter E, Division 1	NO_X control requirements on utility boilers and stationary gas turbines (including duct burners used in turbine exhaust ducts) at utility electric generation sites in East and Central Texas, including Parker County	May 1, 2003 through May 1, 2005

Measure	Description	Start Date(s)
DFW Cement Kiln Rule 30 TAC Chapter 117, Subchapter E, Division 2	NO_X control requirements for all Portland cement kilns located in Ellis County	March 1, 2009
NO_X Emission Standards for Nitric Acid Manufacturing – General 30 TAC Chapter 117, Subchapter F, Division 3	NO_X emission standards for nitric acid manufacturing facilities (state-wide rule – no nitric acid facilities in DFW)	November 15, 1999
East Texas Combustion Sources 30 TAC Chapter 117, Subchapter E, Division 4	NO_X control requirements for stationary rich-burn, gas-fired internal combustion engines (240 horsepower and greater) Measure implemented to reduce ozone in DFW area although controls not applicable in DFW area	March 1, 2010
Natural Gas-Fired Small Boilers, Process Heaters, and Water Heaters 30 TAC Chapter 117, Subchapter E, Division 3	NO_X emission limits on small-scale residential and industrial boilers, process heaters, and water heaters equal to or less than 2.0 million British thermal units per hour	May 11, 2000
Offset Lithographic Printing 30 TAC, Chapter 115, Subchapter E, Division 4	Control technology requirements for offset lithographic printing Revision to limit Volatile Organic Compounds (VOC) content of solvents used by offset lithographic printing facilities and to include smaller sources in rule applicability	December 31, 2000 for Collin, Dallas, Denton, and Tarrant Counties and March 1, 2009 in Ellis, Johnson, Kaufman, Parker, and Rockwall Counties March 1, 2011 for major printing sources (50 tons of VOC per year or more) and March 1, 2012 for minor printing sources (less than 50 tons of VOC per year)
VOC Rules – Degassing Operations 30 TAC, Chapter 115, Subchapter F, Division 3	VOC control requirements for degassing during, or in preparation of, cleaning any storage tanks and transport vessels	May 21, 2011 for Collin, Dallas, Denton, and Tarrant Counties

Measure	Description	Start Date(s)
VOC Control Measures – Storage Tanks 30 TAC Chapter 115, Subchapter B, Division 1	Applies to major source storage tanks (50 tpy of VOC or more) in Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant Counties Applies to major source storage tanks (100 tpy of VOC or more) in Wise County Requires controls for slotted guidepoles and more stringent controls for other fittings on floating roof tanks, and control requirements or operational limitations on landing floating roof tanks Eliminates exemption for storage tanks for crude oil or natural gas condensate and regulates flash emissions from these tanks New inspection requirements to control flashed gases from storage tanks and corresponding recordkeeping requirements for fixed roof storage tanks	March 1, 2013 January 1, 2017 for major source storage tanks in Wise County and for new inspection requirements to control flashed gases from storage tanks and corresponding recordkeeping requirements for fixed roof storage tanks in Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, Tarrant and Wise Counties
VOC Control Measures – Solvent-Using Processes 30 TAC Chapter 115, Subchapter E	Revised rules to implement RACT requirements per Control Techniques Guidelines issued by the United States Environmental Protection Agency (EPA) including new control, testing, monitoring and recordkeeping requirements for eight emission source categories in the DFW area: paper, film, and foil coatings; large appliance coatings; metal furniture coatings; miscellaneous metal and plastic parts coatings; automobile and light-duty truck coating; industrial cleaning solvents; miscellaneous industrial adhesives; and flexible package printing (see DFW AD SIP Revision for the 1997 Eight-Hour Ozone Standard Nonattainment Area (2010-022-SIP-NR))	March 1, 2013 for Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant Counties January 1, 2017 for Wise County

Measure	Description	Start Date(s)
Refueling – Stage I 30 TAC, Chapter 115, Subchapter C, Division 2	Captures gasoline vapors that are released when gasoline is delivered to a storage tank Vapors returned to tank truck as storage tank is filled with fuel, rather than released into ambient air	1990 for Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant Counties January 1, 2017 for Wise County A SIP revision related to Stage I regulations was approved by the EPA, effective June 29, 2015
Refueling – Stage II 30 TAC, Chapter 115, Subchapter C, Division 4	Captures gasoline vapors when vehicle is fueled at pump Vapors returned through pump hose to petroleum storage tank, rather than released into ambient air	1992 (Collin, Dallas, Denton, and Tarrant Counties) A SIP revision authorizing the decommissioning of Stage II vapor control equipment was approved by the EPA on March 17, 2014. Facilities may continue operating Stage II until August 31, 2018
VOC Control Measures 30 TAC Chapter 115	Control technology requirements for VOC sources for reasonably available control technology (RACT) and other SIP planning purposes including: storage, general vent gas, industrial wastewater, loading and unloading operations, general VOC leak detection and repair, solvent using processes, etc.	December 31, 2002 and earlier for Collin, Dallas, Denton, and Tarrant Counties June 15, 2007 or March 1, 2009 for Ellis, Johnson, Kaufman, Parker, and Rockwall Counties January 1, 2017 for Wise County

Measure	Description	Start Date(s)
Texas Emissions Reduction Plan (TERP) 30 TAC Chapter 114, Subchapter K	Provides grant funds for on-road and non-road heavy-duty diesel engine replacement/retrofit. The first emissions reduction incentive grant projects funded under TERP were for fiscal years 2002 - 2003 (September 1, 2001, through August 31, 2003). To focus the emissions reduction benefits for the areas that needed them the most, applications were accepted only for projects in the Houston-Galveston-Brazoria (HGB) and DFW nonattainment areas for fiscal years 2002 through 2003. An application period limited to the DFW, HGB, and Beaumont-Port Arthur areas was done in 2006 and 2007. The allocation approach established by the commission for TERP included several grant programs for reducing emissions from mobile sources and encouraging the use of cleaner alternative fuels for transportation, including the Diesel Emissions Reduction Incentive Program providing grants to replace or upgrade heavy-duty on-road vehicles, non-road equipment, locomotives, marine vessels, and some stationary engines.	January 2002
Texas Low Emission Diesel 30 TAC Chapter 114, Subchapter H, Division 2	Requires all diesel fuel for both on-road and non-road use to have a lower aromatic content and a higher cetane number	Phased in from October 31, 2005 through January 31, 2006
Texas Low Reid Vapor Pressure (RVP) Gasoline 30 TAC Chapter 114, Subchapter H, Division 1	Requires all gasoline for both on-road and non-road use to have RVP of 7.8 pounds per square inch or less from May 1 through October 1 each year	April 2000 in Ellis, Johnson, Kaufman, Parker, Rockwall, and Wise Counties

Measure	Description	Start Date(s)
Vehicle Inspection/ Maintenance (I/M) 30 TAC Chapter 114, Subchapter C	Yearly treadmill-type testing for pre-1996 vehicles and computer checks for 1996 and newer vehicles	May 1, 2002 in Collin, Dallas, Denton, and Tarrant Counties May 1, 2003 in Ellis, Johnson, Kaufman, Parker, and Rockwall Counties The DFW area meets the FCAA, §182(b)(4) requirements to implement an Inspection and Maintenance (I/M) program , and according to 40 CFR §51.350(b)(2), an I/M program is required to cover the entire urbanized area based on the 1990 census. The current I/M program in the DFW ozone nonattainment area sufficiently covers a population equal to the DFW urbanized area, thus expansion of the I/M program to include Wise County is not required.
California Gasoline Engines	California standards for non-road gasoline engines 25 horsepower and larger	May 1, 2004
Transportation Control Measures	Various measures in North Central Texas Council of Governments' (NCTCOG) long-range transportation plans	2007
Voluntary Energy Efficiency/Renewable Energy (EE/RE)	See Chapter 3.3.3: *Energy Efficiency and Renewable Energy Measures*	See Chapter 3.3.3
Voluntary Mobile Emissions Reduction Program	Various pedestrian, bicycle, traffic, and mass transit voluntary measures administered by NCTCOG	2007
Federal On-Road Measures	Series of emissions limits implemented by the EPA for on-road vehicles Included in measures: Tier 1, Tier 2, and Tier 3 light-duty and medium-duty passenger vehicle standards, heavy-duty vehicle standards, low sulfur diesel standards, National Low Emission Vehicle standards, and reformulated gasoline	Phase in through 2010 Tier 3 phase in from 2017 through 2025

Measure	Description	Start Date(s)
Federal Area/Non-Road Measures	Series of emissions limits implemented by the EPA for area and non-road sources Examples: diesel and gasoline engine standards for locomotives and leaf-blowers	Phase in through 2018

3.2.1 Tier 3 Motor Vehicle Emission and Gasoline Sulfur Standards

On April 28, 2014, the United States Environmental Protection Agency (EPA) finalized the *Control of Air Pollution from Motor Vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards* (79 *Federal Register* 23413). Starting in 2017, Tier 3 sets new vehicle emissions standards and lowers the sulfur content of gasoline, considering the vehicle and its fuel as an integrated system.

Tier 3 motor vehicle emission standards of Tier 3 will reduce both tailpipe and evaporative emissions from passenger cars, light-duty trucks, medium-duty passenger vehicles, and some heavy-duty vehicles beginning model year 2017 and will be fully phased in by model year 2025. The Tier 3 motor vehicle emission standards also extend the regulatory useful life period during which the standards apply from 120,000 miles to 150,000 miles.

When fully implemented, the Tier 3 motor vehicle exhaust emission standards for light-duty vehicles will provide approximately an 80% reduction in non-methane organic gases (NMOG) and NO_X (NMOG+NO_X) standards and a 70% reduction in per-vehicle particulate matter (PM) standards when compared to the current fleet average. The Tier 3 motor vehicle exhaust standards for heavy-duty vehicles provide about a 60% reduction in both fleet average NMOG+NO_X vehicle emissions standards and per-vehicle PM standards when compared to the current vehicle emissions standards.

The Tier 3 gasoline sulfur standards will limit gasoline sulfur to no more than 10 parts per million (ppm) of sulfur on an annual average basis beginning January 1, 2017, a reduction of approximately 66% when compared to the current standard. The current gasoline sulfur standards specifying an 80 ppm refinery gate cap and 95 ppm downstream cap are maintained under the new Tier 3 gasoline sulfur standards. Removing sulfur from gasoline allows a vehicle's catalyst to work more efficiently. The Tier 3 fuel standards will make emission control systems more effective for both existing and new vehicles, and will enable automobile manufacturers to meet the Tier 3 motor vehicle emissions standards.

3.3 Additional Measures

3.3.1 SmartWay Transport Partnership and Blue Skyways Collaborative

Among its various efforts to improve air quality in Texas, the TCEQ continues to promote two voluntary programs in cooperation with the EPA: SmartWay Transport Partnership and Blue Skyways Collaborative.

The SmartWay Transport Partnership is a market-driven partnership aimed at helping businesses move goods in the cleanest most efficient way possible. This is a voluntary EPA program primarily for the freight transport industry that promotes strategies and technologies to help improve fleet efficiency while also reducing air emissions.

There are over 3,000 SmartWay partners in the United States (U.S.), including most of the nation's largest truck carriers, all the Class 1 rail companies, and many of the top Fortune 500 companies. Since its founding, SmartWay has reduced oil consumption by 120.7 million barrels and prevented the release of 738,000 tons of NO_X and 37,000 tons of PM into the atmosphere[2]. Approximately 170 Texas companies are SmartWay partners. The SmartWay Transport Partnership will continue to benefit the DFW area by reducing emissions as more companies and affiliates join, and additional idle reduction, trailer aerodynamic kits, low-rolling resistance tire, and retrofit technologies are incorporated into SmartWay-verified technologies.

The Blue Skyways Collaborative was created to encourage voluntary air emission reductions by planning or implementing projects that use innovations in diesel engines, alternative fuels, and renewable energy technologies applicable to on-road and non-road sources. The Blue Skyways Collaborative partnerships include international, federal, state, and local governments, non-profit organizations, environmental groups, and private industries.

3.3.2 Cement Kiln Consent Decree

Cement kilns located in Ellis County are subject to the requirements of Chapter 117, Subchapter E, Division 2. Ash Grove Cement Company operated three kilns in Ellis County, with an established source cap under §117.3123 of 4.4 tons per day (tpd).

However, a 2013 consent decree between Ash Grove and the EPA required by September 10, 2014 shutdown of two kilns and reconstruction of kiln #3 with selective noncatalytic reduction (SNCR) with an emission limit of 1.5 pounds of NOx per ton of clinker (lbs NO_X/ton) and a 12-month rolling tonnage limit for NOx of 975 tpy. The reconstructed kiln is a dry kiln with year-round SNCR operation. The redesign allows 949,000 tpy of clinker, or 1.95 tpd of NO_X, which is well below the 4.4 tpd source cap. Any modifications or new construction would be required to meet nonattainment new source review with best available control technology requirements, and would be subject to the same 1.5 lbs NO_X/ton of clinker emission limit in the New Source Performance Standards for Portland Cement Plants.

3.3.3 Energy Efficiency and Renewable Energy Measures

Energy efficiency (EE) measures are typically programs that reduce the amount of electricity and natural gas consumed by residential, commercial, industrial, and municipal energy consumers. Examples of EE measures include increasing insulation in homes, installing compact fluorescent light bulbs, and replacing motors and pumps with high efficiency units. Renewable energy (RE) measures include programs that generate energy from resources that are replenished or are otherwise not consumed as with traditional fuel-based energy production. Examples of renewable energy include wind energy and solar energy projects.

Texas leads the nation in RE generation from wind. As of December 2014, Texas has 14,098 megawatts (MW) of installed wind generation capacity[3]; more than double that of California, the state with the next highest amount of installed wind generation capacity. Texas' total net electrical generation from renewable wind generators for 2014 is estimated to be approximately

[2] EPA, 2014. SmartWay Program Highlights 2014, EPA-420-F-14-003, February 2014, http://www.epa.gov/smartway/about/documents/basics/420f14003.pdf

[3] U.S. Department of Energy, National Renewable Energy Laboratory, http://apps2.eere.energy.gov/wind/windexchange/wind_installed_capacity.asp

39 million megawatt-hours (MWh)[4], approximately 22% of the total wind net electrical generation for the U.S.

While EE/RE measures are beneficial and do result in lower overall emissions from fossil fuel-fired power plants in Texas, emission reductions resulting from these programs are not explicitly included in photochemical modeling for state implementation plan (SIP) purposes because local efficiency efforts may not result in local emissions reductions or may be offset by increased demand in electricity. The complex nature of the electrical grid makes accurately quantifying emission reductions from EE/RE measures difficult. At any given time, it is impossible to determine exactly where a specific user's electricity was produced. The electricity for users in a nonattainment area may not necessarily be generated solely within that nonattainment area. For example, some of the electricity used within a nonattainment area in East Texas could be generated by a power plant in a nearby attainment county or even in West Texas. If electrical demand is reduced in a nonattainment area due to local efficiency measures, the resulting emission reductions from power generation facilities may occur in any number of locations around the state. Similarly, increased RE generation may not necessarily replace electrical generation from local fossil fuel-fired power plants within a particular nonattainment area.

The Texas Legislature has enacted a number of EE/RE measures and programs. The following is a summary of Texas EE/RE legislation since 1999.

- 76th Texas Legislature, 1999
  - Senate Bill (SB) 7
  - House Bill (HB) 2492
  - HB 2960
- 77th Texas Legislature, 2001
  - SB 5
  - HB 2277
  - HB 2278
  - HB 2845
- 78th Texas Legislature, 2003
  - HB1365 (Regular Session)
- 79th Texas Legislature, 2005
  - SB 20 (1st Called Session)
  - HB 2129 (Regular Session)
  - HB 2481 (Regular Session)
- 80th Texas Legislature, 2007
  - SB 12
  - HB 66
  - HB 3070
  - HB 3693
- 81st Texas Legislature, 2009
  - None
- 82nd Texas Legislature, 2011
  - SB 898 (Regular Session)
  - SB 924 (Regular Session)
  - SB 981 (Regular Session)

[4] U.S. Department of Energy, Energy Information Administration, Form EIA-923 data, http://www.eia.gov/electricity/data/eia923/

- SB 1125 (Regular Session)
- SB 1150 (Regular Session)
- HB 51 (Regular Session)
- HB 362 (Regular Session)

- 83rd Texas Legislature, 2013
  - None
- 84th Texas Legislature, 2015
  - SB 1626
  - HB 1736

3.3.3.1 Renewable Energy

SB 5, 77th Texas Legislature, 2001, set goals for political subdivisions in affected counties to implement measures to reduce energy consumption from existing facilities by 5% each year for five years from January 1, 2002 through January 1, 2006. In 2007, the 80th Texas Legislature passed SB 12, which extended the timeline set in SB 5 through 2007 and made the annual 5% reduction a goal instead of a requirement. The State Energy Conservation Office (SECO) is charged with tracking the implementation of SB 5 and SB 12. Also during the 77th Texas Legislature, 2001, the Energy Systems Laboratory (ESL), part of the Texas Engineering Experiment Station, Texas A&M University System, was mandated to provide an annual report on EE/RE efforts in the state as part of TERP under Texas Health and Safety Code (THSC), §388.003(e).

The 79th Texas Legislature, 2005, Regular and 1st Called Sessions, amended SB 5 through SB 20, HB 2129, and HB 2481 to add, among other initiatives, renewable energy initiatives which require: 5,880 MW of generating capacity from renewable energy by 2015; the TCEQ to develop a methodology for calculating emission reductions from renewable energy initiatives and associated credits; the ESL to assist the TCEQ in quantifying emissions reductions from EE/RE programs; and the Public Utility Commission of Texas (PUCT) to establish a target of 10,000 MW of installed renewable technologies by 2025.

Wind power producers in Texas exceeded the renewable energy generation target by installing over 10,000 MW of wind electric generating capacity by 2010.

HB 2129, 79th Texas Legislature, 2005, Regular Session, directed the ESL to collaborate with the TCEQ to develop a methodology for computing emission reductions attributable to use of renewable energy and for the ESL to annually quantify such emission reductions. HB 2129 directed the Texas Environmental Research Consortium to use the Texas Engineering Experiment Station to develop this methodology. With the TCEQ's guidance, the ESL produces an annual report, *Statewide Air Emissions Calculations from Energy Efficiency, Wind and Renewables*, detailing these efforts.

In addition to the programs discussed and analyzed in the ESL report, local governments may have enacted measures beyond what has been reported to SECO and the PUCT. The TCEQ encourages local political subdivisions to promote EE/RE measures in their respective communities and to ensure these measures are fully reported to SECO and the PUCT.

SB 981, 82nd Texas Legislature, 2011, Regular Session, allows a retail electric customer to contract with a third party to finance, install, or maintain a distributed renewable generation system on the customer's side of the electric meter, regardless of whether the customer owns the installed system. SB 981 also prohibits the PUCT from requiring registration of the system as an electric utility if the system is not projected to send power to the grid.

HB 362, 82nd Texas Legislature, 2011, Regular Session, helps property owners install solar energy devices such as electric generating solar panels by establishing requirements for property owners associations' approval of installation of solar energy devices. HB 362 specifies the conditions that property owners associations may and may not deny approval of installing solar energy devices.

SB 1626, 84th Texas Legislature, 2015, modifies the provisions established by HB 362 from the 82nd Texas Legislature, 2011, Regular Session, regarding property owners associations' authority to approve and deny installations of solar energy devices such as electric generating solar panels. HB 362 included an exception that allowed developers to prohibit installation of solar energy devices during the development period. SB 1626 limits the exception during the development period to developments with 50 or fewer units.

3.3.3.2 Residential and Commercial Building Codes and Programs

THSC, Chapter 388, Texas Building Energy Performance Standards, as adopted in SB 5 of the 77th Texas Legislature, 2001, states in §388.003(a) that single-family residential construction must meet the energy efficiency performance standards established in the energy efficiency chapter of the International Residential Code. The Furnace Pilot Light Program includes energy savings accomplished by retrofitting existing furnaces. Also included is a January 2006 federal mandate raising the minimum Seasonal Energy Efficiency Ratio for air conditioners in single-family and multi-family buildings from 10 to 13.

THSC, Chapter 388, as adopted in SB 5 of the 77th Texas Legislature, 2001, states in §388.003(b) that non-single-family residential, commercial, and industrial construction must meet the energy efficiency performance standards established in the energy efficiency chapter of the International Energy Conservation Code.

HB 51, 82nd Legislature, 2011, Regular Session, requires municipalities to report implementation of residential and commercial building codes to SECO.

HB 1736, 84th Texas Legislature, 2015, update THSC §388.003 to adopt, effective September 1, 2016, the energy efficiency chapter of the International Residential Code as it existed on May 1, 2015. HB 1736 also established a schedule by which SECO could adopt updated editions of the International Residential Code in the future, not more often than once every six years.

3.3.3.3 Federal Facility EE/RE Projects

Federal facilities are required to reduce energy use by Presidential Executive Order 13123 and the Energy Policy Act of 2005 (Public Law 109-58 EPACT20065). The ESL compiled energy reductions data for the federal EE/RE projects in Texas.

3.3.3.4 Political Subdivisions Projects

SECO funds loans for energy efficiency projects for state agencies, institutions of higher education, school districts, county hospitals, and local governments. Political subdivisions in nonattainment and affected counties are required by SB 5, 77th Texas Legislature, 2001, to report EE/RE projects to SECO. These projects are typically building systems retrofits, non-building lighting projects, and other mechanical and electrical systems retrofits such as municipal water and waste water treatment systems.

3.3.3.5 Electric Utility Sponsored Programs

Utilities are required by SB 7, 76th Texas Legislature, 1999, and SB 5, 77th Texas Legislature, 2001, to report demand-reducing energy efficiency projects to the PUCT (see THSC, §386.205

and Texas Utilities Code (TUC), §39.905). These projects are typically air conditioner replacements, ventilation duct tightening, and commercial and industrial equipment replacement.

SB 1125, 82nd Texas Legislature, 2011, Regular Session, amended the TUC, §39.905 to require energy efficiency goals to be at least 30% of annual growth beginning in 2013. The metric for the energy efficiency goal remains at 0.4% of peak summer demand when a utility program accrues that amount of energy efficiency. SB 1150, 82nd Texas Legislature, 2011, extended the energy efficiency goal requirements to utilities outside the Electric Reliability Council of Texas area.

3.3.3.6 State Energy Efficiency Programs

HB 3693, 80th Texas Legislature, 2007, amended the Texas Education Code, Texas Government Code, THSC, and TUC. The bill:

- requires state agencies, universities and local governments to adopt energy efficiency programs;
- provides additional incentives for electric utilities to expand energy conservation and efficiency programs;
- includes municipal-owned utilities and cooperatives in efficiency programs;
- increases incentives and provides consumer education to improve efficiency programs; and
- supports other programs such as revision of building codes and research into alternative technology and renewable energy.

HB 51, 82nd Texas Legislature, 2011, Regular Session, requires new state buildings and major renovations to be constructed to achieve certification under an approved high-performance design evaluation system. HB 51 also requires, if practical, that certain new and renovated state-funded university buildings comply with approved high-performance building standards.

SB 898, 82nd Texas Legislature, 2011, Regular Session, extended the existing requirement for state agencies, state-funded universities, local governments, and school districts to adopt energy efficiency programs with a goal of reducing energy consumption by at least 5% per state fiscal year (FY) for 10 state FYs from September 1, 2011 through August 31, 2021.

SB 924, 82nd Texas Legislature, 2011, Regular Session, requires all municipally-owned utilities and electric cooperatives that had retail sales of more than 500,000 MWh in 2005 to report each year to SECO information regarding the combined effects of the energy efficiency activities of the utility from the previous calendar year, including the utility's annual goals, programs enacted to achieve those goals, and any achieved energy demand or savings goals.

3.3.4 Clean Air Interstate Rule and Cross-State Air Pollution Rule

In March 2005, the EPA issued the Clean Air Interstate Rule (CAIR) to address electric generating unit (EGU) emissions that transport from one state to another. The rule incorporates the use of three cap and trade programs to reduce sulfur dioxide (SO_2) and NO_X: the ozone-season NO_X trading program, the annual NO_X trading program, and the annual SO_2 trading program.

For CAIR, Texas was not included in the ozone season NO_X program but was included for the annual NO_X and SO_2 programs. As such, Texas must make necessary reductions in annual SO_2 and NO_X emissions from new and existing EGUs to demonstrate that emissions from Texas do not contribute to nonattainment or interfere with maintenance of the 1997 particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers ($PM_{2.5}$) NAAQS

in another state. CAIR consists of two phases for implementing necessary NO_X and SO_2 reductions. Phase I addresses required reductions from 2009 through 2014. Phase II addresses reductions in 2015 and thereafter.

In July 2006, the commission adopted a SIP revision to address how the state would meet emissions allowance allocation budgets for NO_X and SO_2 established by the EPA to meet the federal obligations under CAIR. The commission adopted a second CAIR-related SIP revision in February 2010. This revision incorporated various federal rule revisions that the EPA had promulgated since the TCEQ's initial submittal. It also incorporated revisions to 30 TAC Chapter 101 resulting from legislation during the 80th Texas Legislature, 2007, Regular Session.

A December 2008 court decision found flaws in CAIR but kept CAIR requirements in place temporarily while directing the EPA to issue a replacement rule. In July 2011, the EPA finalized the Cross-State Air Pollution Rule (CSAPR) to meet FCAA requirements and respond to the court's order to issue a replacement program. Texas was included in CSAPR for ozone season NO_X, annual NO_X, and annual SO_2 due to the EPA's determination that Texas significantly contributes to nonattainment or interferes with maintenance of the 1997 eight-hour ozone NAAQS and the 1997 $PM_{2.5}$ NAAQS in other states. As a result of numerous EGU emission reduction strategies already in place in Texas, the annual and ozone season NO_X reduction requirements from CSAPR were relatively small but still significant. CSAPR required an approximate 7% reduction in annual NO_X emissions and less than 5% reduction in ozone season NO_X emissions.

On August 21, 2012, the U.S. Court of Appeals for the District of Columbia (D.C.) Circuit vacated the CSAPR. Under the D.C. Circuit Court's ruling, CAIR would remain in place until the EPA develops a valid replacement. On October 5, 2012, the EPA filed a petition seeking an *en banc* rehearing of the U.S. Court of Appeals' decision regarding CSAPR, but the appeal was denied.

The EPA and various environmental groups petitioned the Supreme Court of the United States to review the D.C. Circuit Court's decision on CSAPR. On June 24, 2013, the Supreme Court granted the petitions and heard oral arguments on December 10, 2013. On April 29, 2014, a decision by the Supreme Court reversed the D.C. Circuit Court's decision and remanded the case. On June 26, 2014, the EPA filed a motion with the U.S. Court of Appeals for the D.C. Circuit to lift the stay of CSAPR, which was granted on October 23, 2014. On November 21, 2014, the EPA issued rulemaking, which shifted the effective dates of CSAPR requirements to account for the time that had passed after the rule was stayed in 2011. As a result, the EPA is implementing the CSAPR federal implementation plan for Texas. Phase 1 of CSAPR took effect January 1, 2015 and Phase 2 is scheduled to begin January 1, 2017. Oral arguments on the remanded case were held on February 25, 2015. On July 28, 2015, the D.C. Circuit Court ruled that the 2014 annual SO2 budgets and the 2014 ozone season NOX budgets for Texas were invalid because they required overcontrol of Texas emissions, and remanded these budgets back to the EPA without vacatur.

3.3.5 Clean School Bus Program

HB 3469, 79th Texas Legislature, 2005, Regular Session, established the Clean School Bus Program, which provides monetary incentives for school districts in the state for reducing emissions of diesel exhaust from school buses. As of May 2015, the TCEQ Clean School Bus Program has reimbursed approximately $28.5 million in grants for over 7,200 school buses across the state, with $4.5 million being used for 833 school buses in the DFW area.

3.3.6 Texas Emission Reduction Plan

The Texas Emissions Reduction Plan (TERP) was created in 2001 by the 77th Texas Legislature, Regular Session, to provide grants to offset the incremental costs associated with reducing NO_X emissions from high-emitting heavy-duty internal combustion engines on heavy-duty vehicles, non-road equipment, marine vessels, locomotives, and some stationary equipment.

The primary emissions reduction incentives are awarded under the Diesel Emissions Reduction Incentive Program (DERI). DERI incentives are awarded to projects to replace, repower, or retrofit eligible vehicles and equipment to achieve NO_X emission reductions in Texas ozone nonattainment areas and other counties identified as affected counties under the TERP program where ground-level ozone is a concern.

From 2001 through August 2014, $905 million in DERI grants were awarded for projects estimated to help reduce 160,836 tons of NO_X. Over $313 million in DERI grants were awarded to projects in the DFW area, with a projected 57,052 tons of NO_X reduced. These projects were estimated to reduce up to 18.3 tons per day of NO_X in the DFW area in 2015. The emissions reduction estimates will change yearly as older projects reach the end of the project life and new projects begin achieving emissions reductions. Also, of that $313 million awarded in the DFW area, $22 million were awarded to North Central Texas Council of Governments through third-party grants to administer subgrants in the DFW area.

An additional 666 DERI grants were selected for funding in FY 2015 for $80.6 million. Ninety-one of these projects were in the DFW area and totaled approximately $9.1 million. Subject to final contracting, these projects are estimated to reduce approximately 986 tons of NO_X in the DFW area, representing almost 0.6 tons per day of NO_X reduced beginning in 2017.

Three other incentive programs under the TERP program will result in the reduction in NO_X emissions in the DFW area as discussed below.

A new Drayage Truck Incentive Program was established in 2013 to provide grants for the replacement of drayage trucks operating in and from seaports and rail yards located in the nonattainment areas. The program has awarded grants to nine projects totaling $3.95 million. These projects are estimated to reduce 233 tons of NO_X, including 25 tons in the DFW area. This represents an additional 0.02 tpd of NO_X projected to be reduced in the DFW area beginning in 2017.

The Texas Clean Fleet Program (TCFP) was established in 2009 to provide grants for the replacement of light-duty and heavy-duty diesel vehicles with vehicles powered by alternative fuels, including: natural gas, liquefied petroleum gas, hydrogen, methanol (85% by volume), or electricity. This program is for larger fleets; applicants must commit to replacing at least 20 eligible diesel-powered vehicles with qualifying alternative fuel or hybrid vehicles over a 12-month period. From 2009 through August 2014, almost $23.6 million in TCFP grants were awarded for projects to help reduce a projected 314.5 tons of NO_X. Over $3.3 million in TCFP grants were awarded to projects in the DFW area, with a projected 89.4 tons of NO_X reduced. The projects are estimated to reduce over 0.07 tpd of NO_X in the DFW area starting in 2015. The latest TCFP grant application period ended October 3, 2014, with five projects totaling $8.85 million selected for funding. Subject to final contracting, these projects are estimated to result in an additional 124 tons of NO_X reduced, including 94 tons in the DFW area. This represents an additional 0.076 tpd of NO_X projected to be reduced in the DFW area beginning in 2017.

The Texas Natural Gas Vehicle Grant Program (TNGVGP) was established in 2011 to provide grants for the replacement of medium-duty and heavy-duty diesel vehicles with vehicles powered by natural gas. This program may include grants for individual vehicles or multiple vehicles. The majority of the vehicle's operation must occur in the Texas nonattainment areas, other counties designated as affected counties under the TERP, and the counties in and between the triangular area between Houston, San Antonio, and Dallas-Fort Worth. From 2011 through August 2014, over $36.4 million in TNGVGP grants were awarded for projects to help reduce a projected 1,137 tons of NO_X. Over $13.2 million in TNGVGP grants were awarded to projects where the applicant indicated the primary operation of the vehicle would occur in and around the DFW area, with a projected 452 tons of NO_X reductions. These projects are estimated to reduce up to 0.36 tpd of NO_X in the DFW area starting in 2015.

An additional 53 projects for approximately $15.8 million were selected for funding in FY 2015. Twenty-four of these grants totaling $7.1 million are for projects with primary operation in the DFW area. The estimated emissions reductions from the FY 2015 projects will be available once final contracts are completed and calculations are performed. HB 1, General Appropriations Bill, 84th Texas Legislature, 2015, appropriated $118.1 million per year for implementation of the TERP in FYs 2016 and 2017. This represents an increase of $40.5 million per year over the appropriation amount in FYs 2014 and 2015. This additional funding will be available for future grant projects that should result in NO_X reductions in the eligible TERP areas, including the DFW area.

3.3.7 Low Income Vehicle Repair Assistance, Retrofit, and Accelerated Vehicle Retirement Program

The TCEQ established a financial assistance program for qualified owners of vehicles that fail the emissions test. The purpose of this voluntary program is to repair or remove older, higer emitting vehicles from use in certain counties with high ozone. The Low Income Vehicle Repair Assistance, Retrofit, and Accelerated Vehicle Retirement Program (LIRAP) provisions of HB 2134, 77th Texas Legislature, 2001, Regular Session, created the program. In 2005, HB 1611, 79th Texas Legislature, Regular Session, modified the program to apply only to counties that implement a vehicle inspection and maintenance program and have elected to implement LIRAP fee provisions. The counties currently participating in the LIRAP are Brazoria, Fort Bend, Galveston, Harris, Montgomery, Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, Tarrant, Travis, and Williamson Counties.

SB 12, 80th Texas Legislature 2007, Regular Session, expanded the LIRAP participation criteria by increasing the income eligibility to 300% of the federal poverty rate and increasing the amount of assistance toward the replacement of a retired vehicle. HB 3272, 82nd Texas Legislature 2011, Regular Session, expanded the class of vehicles eligible for a $3,500 voucher to include hybrid, electric, natural gas, and federal Tier 2, Bin 3 or cleaner Bin certification vehicles. The program provides $3,500 for a replacement hybrid, electric, natural gas, and federal Tier 2, Bin 3 or cleaner Bin certification vehicle of the current model year or the previous three model years; $3,000 for cars of the current or three model years; and $3,000 for trucks of the current or previous two model years. The retired vehicle must be 10 years old or older or must have failed an emissions test. From December 12, 2007 through May 31, 2015, the program has retired and replaced 28,604 vehicles in the DFW area at a cost of $85,903,000. During the same period, an additional 16,635 vehicles in the DFW area have had emissions-related repairs at a cost of $8,318,866. The total retirement/replacement and repair expenditure for the DFW area from December 12, 2007 through May 31, 2015 is $94,221,866.

HB 1, General Appropriations Bill, 84th Texas Legislature, 2015, Regular Session, appropriated $43.5 million per year for FYs 2016 and 2017 to continue this clean air strategy in the 16 participating counties. The nine counties that participate in the program in the DFW area, Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant, were allocated approximately $21.6 million per year for the LIRAP for FYs 2016 and 2017. This is an increase of approximately $18.8 million per year over the previous biennium.

3.3.8 Local Initiative Projects

Funds are provided to counties participating in the LIRAP for implementation of air quality improvement strategies through local projects and initiatives. In the DFW area, Local Initiative Projects (LIP) funding is available to the nine counties currently participating in the LIRAP: Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant. HB 1, General Appropriations Bill, 84th Texas Legislature 2015, Regular Session, appropriated $4.8 million per year for FYs 2016 and 2017 to continue this clean air strategy. The nine DFW area counties were allocated approximately $2.4 million per year for FYs 2016 and 2017. This is an increase of approximately $2.1 million per year over the previous biennium.

Dallas County used LIP funds in 2008 to establish the Dallas County Clean Air Emissions Task Force. For its first seven years, the task force targeted high-emitting vehicles, smoking vehicles, and suspicious vehicles to verify that the state safety and emissions inspection windshield certificates on these vehicles were legitimate and in compliance with air quality standards. The task force's objective is to reduce the number of fraudulent, fictitious, or improperly issued safety and emissions inspection windshield certificates.

Following the success of Dallas County's emissions enforcement project, Denton (2009-2015), Ellis (2008-2014), Johnson (2010-2014), Kaufman (2012-2015), and Tarrant (2010-2015) Counties established similar task forces. Beginning in March 2015, the emission enforcement task forces adjusted their objectives to concentrate on the identification of vehicles with counterfeit registration insignia and the reduction of fraudulent vehicle inspection reports. These programs have partnered with local and state agencies to enforce state laws, codes, rules, and regulations regarding air quality and mobile emissions in the DFW area. The citizens of the entire north Texas region benefit from these programs as a result of the reduction in NO_X emissions from each vehicle brought into emissions compliance.

The City of Plano, through Interlocal Agreements with Collin County, used LIP funding in 2012 and 2014 for Local Initiative Projects. In 2012, LIP funding was used by the City of Plano to install auxiliary power units in police department vehicles to reduce vehicle emissions during the daily activities of traffic enforcement. This idle reduction technology powers equipment such as lights, radio, and computers so that law enforcement officers can shut-off their vehicles to perform traffic control, traffic accident investigations, lunch breaks, and other activities where the enforcement officer is outside their vehicle. In 2014, the City of Plano used LIP funding to install wireless communications technology at 20 intersections and additional pan/tilt cameras at 19 of those intersections. The project allows signal management from a traffic management center to reduce traffic congestion and idling in an effort to reduce emissions. The project reduces idling by improving traffic flow and decreasing the number of times vehicles must stop at traffic lights. The exhaust phase of an engine emits the most emissions during starting, idling, and breaking stationary inertia. The project increases the emissions reduction benefits by allowing real-time traffic management instead of a stagnate model to better manage peak-hour congestion, while minimizing cross-traffic congestion, and reducing emissions.

3.3.9 84th Texas Legislature

Bills passed during the 84th Texas Legislature, 2015, that have the potential to impact the DFW area are discussed in Section 3.3.3: *Energy Efficiency and Renewable Energy* Measures and Section 3.3.7: *Low Income Vehicle Repair Assistance, Retrofit, and Accelerated Vehicle Retirement Program*. As discussed in Section 3.3.7, HB1 appropriated $43.5 million per year for FYs 2016 and 2017 to continue this clean air strategy in the 16 participating counties. The nine counties that participate in the program in the DFW area, Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant, were allocated approximately $21.6 million per year for the LIRAP for FYs 2016 and 2017. This is an increase of approximately $18.8 million per year over the previous biennium.

3.4 Control Strategies Summary

The permanent and enforceable VOC and NO_X control measures contained in Section 3.2: *List of Existing Control Measures* have resulted in air quality improvement in the DFW area. These enforceable measures will remain in place to ensure continued maintenance of the one-hour and the 1997 eight-hour ozone NAAQS in the DFW areas. In addition, Section 3.3: *Additional Measures* lists control measures that may not meet all of the EPA's standard tests of SIP creditability (permanent, enforceable, surplus, and quantifiable) but are crucial to the success of the air quality plan in the DFW area. Implementation of these control measures will contribute to the continued maintenance of the one-hour and the 1997 eight-hour ozone NAAQS. The TCEQ continues to seek innovative air quality improvement measures and technologies to implement in the DFW area.

SECTION 4: MAINTENANCE DEMONSTRATION

4.1 General

This redesignation substitute (RS) state implementation plan (SIP) revision is intended to demonstrate that the Dallas-Fort Worth (DFW) area will remain in attainment of the one-hour and 1997 eight-hour ozone National Ambient Air Quality Standards (NAAQS) for the 10-year period following the date that anti-backsliding obligations under the revoked standard would be lifted. Since removing anti-backsliding obligations is contingent upon the United States Environmental Protection Agency's (EPA) approval, the Texas Commission on Environmental Quality (TCEQ) has set a horizon year of 2028. This 10-year period also aligns with the EPA's requirement of maintenance plans to demonstrate attainment for a 10-year period following the date of redesignation.

The most current emissions inventory (EI) data were analyzed as part of this maintenance demonstration. The year 2012 was chosen as the base year for the analyses presented in this section because it is one of the three years (2012, 2013, and 2014) used to determine the design value for the 2014 attainment year and due to periodic inventory data availability. At the time of this RS SIP revision proposal, the TCEQ was developing the 2014 periodic emissions inventory for the DFW area in accordance with the EPA's Air Emissions Reporting Requirements (40 Code of Federal Regulations Part 51, Subpart A). The calendar year 2011 periodic inventory was the most recent periodic inventory available to develop this RS SIP revision inventory. Since 2011 was not one of three years used to determine the design value for the 2014 attainment year, the TCEQ developed a 2012 base year inventory from available data for area and mobile sources, and used the reported calendar year 2012 data for point sources. Additionally, the 10 years prior to the 2012 base year (2002 through 2011) were analyzed to develop historical trend data. During this time, the EI for the DFW four-county one-hour and nine-county 1997 eight-hour ozone nonattainment areas showed a significant decrease in ozone precursor emissions from all source categories as detailed in Section 4.2: *Historical Emissions Inventory Trends*, which contributed to the attainment of the one-hour and 1997 eight-hour ozone NAAQS. These

reductions were accomplished through a variety of federal, state, and local regulations and programs as detailed below.

4.2 Historical Emissions Inventory Trends

For the historical period prior to the 2012 base year, 2002 through 2011, overall anthropogenic ozone precursor emissions in the DFW four-county and nine-county nonattainment areas declined substantially as a result of regulations implemented at the federal, state, and local levels and innovative programs implemented by the TCEQ. In the DFW four-county one-hour ozone nonattainment area from 2002 through 2011, anthropogenic volatile organic compounds (VOC) emissions have decreased 12%, and anthropogenic nitrogen oxides (NO_X) emissions have decreased 36%. In the DFW nine-county 1997 eight-hour ozone nonattainment area from 2002 to 2011, anthropogenic VOC emissions have decreased 8%, and anthropogenic NO_X emissions have decreased 37%.These trends are detailed in:

- Figure 4-1: *DFW Four-County Nonattainment Area Historical NO_X Emissions Trends*,
- Figure 4-2: *DFW Nine-County Nonattainment Area Historical NO_X Emissions Trends,*
- Figure 4-3: *DFW Four-County Nonattainment Area Historical VOC Emissions Trends, and*
- *Figure 4-4: DFW Nine-County Nonattainment Area Historical VOC Emissions Trends*.

Both 30 Texas Administrative Code (TAC) Chapter 115*: Control of Air Pollution from Volatile Organic Compounds* and 30 TAC Chapter 117: *Control of Air Pollution from Nitrogen Compounds* regulations have significantly reduced overall ozone precursor emissions at both major and minor (point and area) industrial, commercial, and institutional sources in the DFW ozone nonattainment area. Innovative emissions reduction programs such as the Texas Emissions Reduction Plan and the AirCheckTexas Drive a Clean Machine program in 30 TAC Chapter 114: *Control of Air Pollution from Motor Vehicles* have also reduced mobile source emissions, the primary source of NO_X emissions in the DFW area.

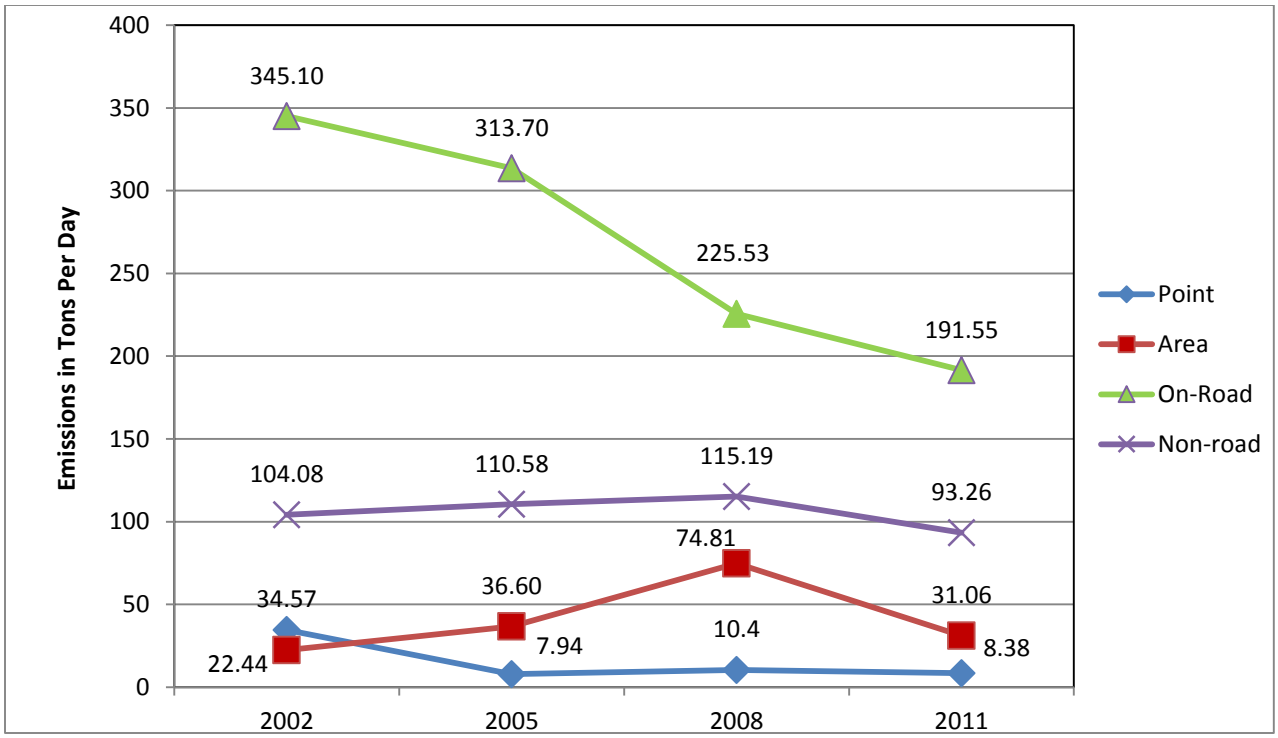

Figure 4-1: DFW Four-County Nonattainment Area Historical NO_X Emissions Trends

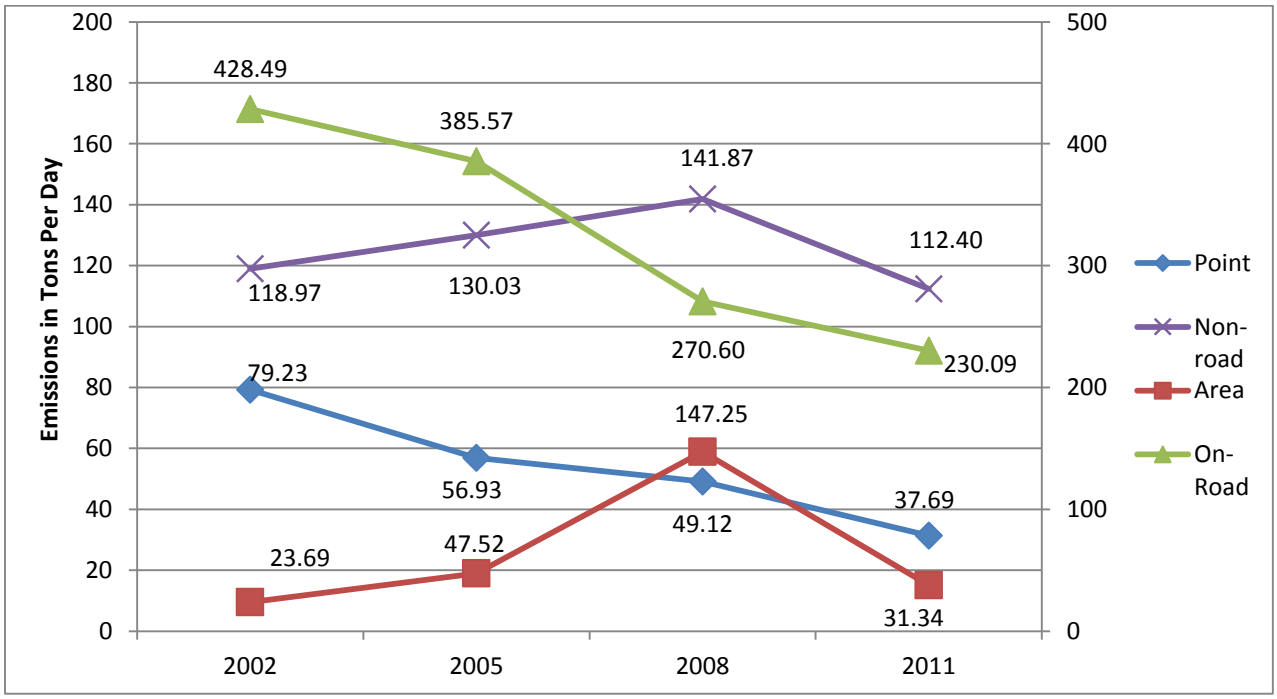

Figure 4-2: DFW Nine-County Nonattainment Area Historical NO_X Emissions Trends

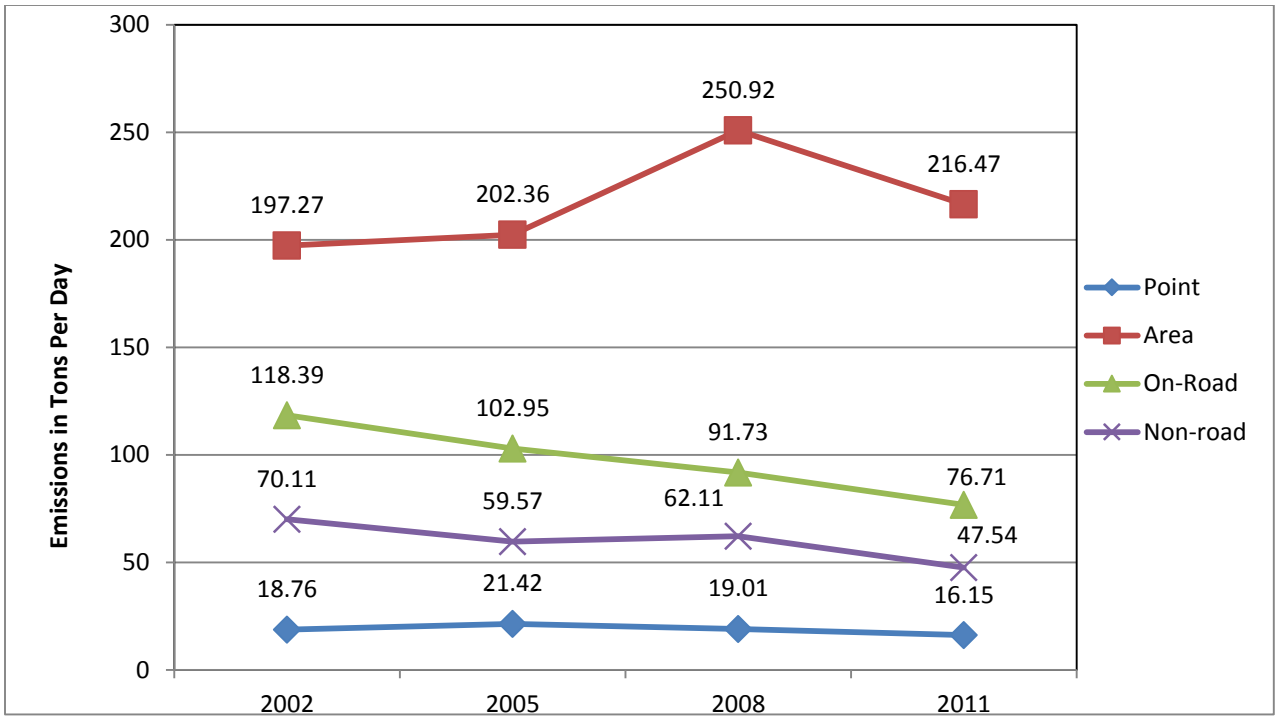

Figure 4-3: DFW Four-County Nonattainment Area Historical VOC Emissions Trends

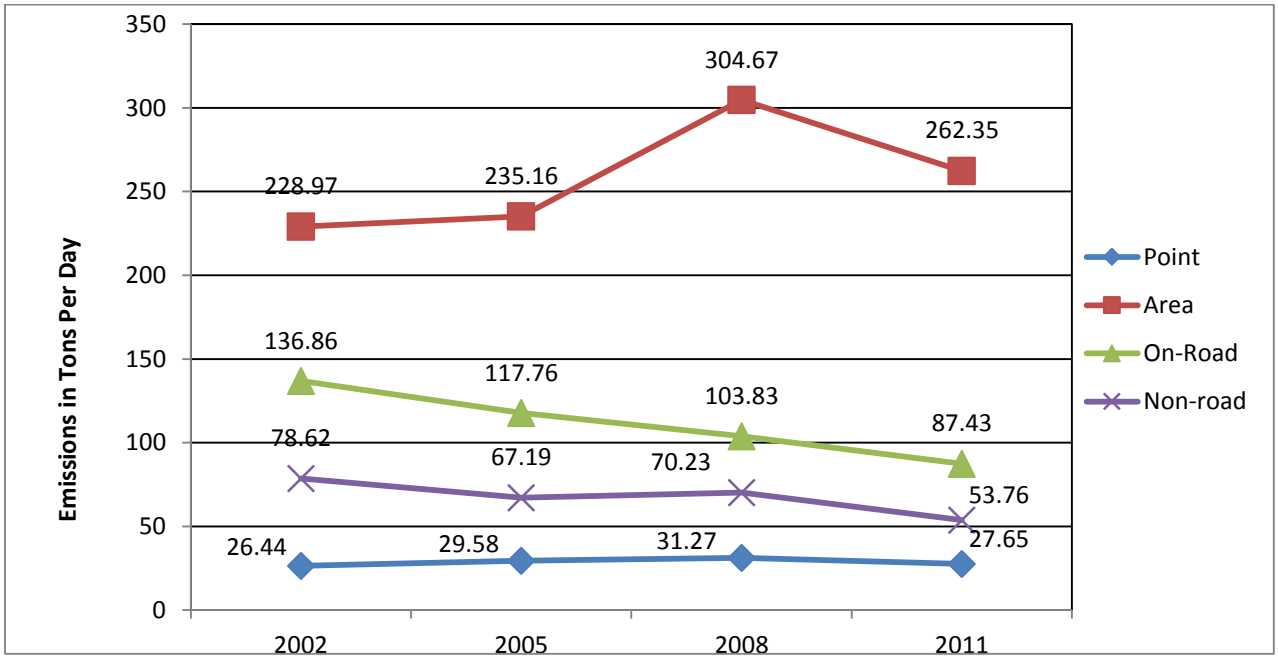

Figure 4-4: DFW Nine-County Nonattainment Area Historical VOC Emissions Trends

4.3 Attainment Inventory Base Year

The 1990 Federal Clean Air Act Amendments require that EIs be prepared for ozone nonattainment areas. Because ozone is photochemically produced in the atmosphere when VOC mixes with NO_X in the presence of sunlight, the TCEQ must compile information on the sources of these precursor pollutant emissions. The EI must identify the source types present in an area, the amount of each pollutant emitted, and the types of processes and control devices employed at stationary sources or other source categories. The EI provides data for a variety of air quality planning tasks, including establishing baseline emission levels, calculating reduction targets, control strategy development for achieving the required emission reductions, emission inputs into air quality simulation models, and tracking actual emission reductions against the established emissions growth and control budgets.

The 2012 base year inventory for the DFW area is based on the VOC and NO_X emissions that occur on a typical summer weekday. Consistent with a September 4, 1992 EPA memorandum entitled *Procedures for Processing Requests to Redesignate Areas to Attainment*, the attainment EI base year may be any one of the three years used to determine the design value for the attainment year. For this DFW one-hour and 1997 eight-hour ozone nonattainment areas RS report, the attainment EI base year is 2012 and it is one of the three years used to determine the design value for the 2014 attainment year. The total VOC and NO_X EIs for the four one-hour and nine 1997 eight-hour ozone nonattainment counties in the DFW area are summarized from the estimates developed for four general categories of anthropogenic emissions sources, which are each explained in Section 4.4.1: *Area Sources*, Section 4.4.2: *On-Road Mobile Sources*, Section 4.4.3: *Non-Road Mobile Sources*, and Section 4.4.4: *Stationary Point Sources*. Summaries of the 2012 VOC and NO_X emissions by source type are provided in Section 4.5: *Emissions Summary*.

4.4 Future Emissions and Verification of Continued Attainment

To track progress of the DFW area toward continued attainment of the one-hour and 1997 eight-hour ozone NAAQS, the TCEQ will continue to develop and submit periodic EIs (PEI) to the EPA every three years as required by the federal Air Emissions Reporting Requirements (AERR) rule. The 2011 inventory was the first PEI submitted under the AERR. As required by the AERR, the 2011 PEI was reported to the EPA's National Emissions Inventory (NEI) as a comprehensive and detailed estimate of air emissions, including ozone precursors (NO_X and VOC). As directed by the AERR, the 2011 Texas PEI includes annual emissions for the entire state and summer weekday emissions for the 2008 eight-hour ozone nonattainment areas in Texas, including the DFW area. Per the EPA's *Implementation of the 2008 National Ambient Air Quality Standards for Ozone: State Implementation Plan Requirements; Final Rule* (2008 ozone standard SIP requirements rule), published in the March 6, 2015 *Federal Register* (80 Federal Register 12264), states can rely on periodic AERR EI submittals to satisfy ongoing SIP EI submission requirements every three years.

Because the EPA has not made guidance available for how to demonstrate continued attainment in a redesignation substitute, the TCEQ is using the method outlined in the EPA's redesignation guidance[5]. Future emissions for the DFW area were projected from the base year inventory (2012) to a future year (horizon year) of 2028. Projecting emissions to 2028 aligns with the EPA's requirement of maintenance plans to demonstrate attainment for a 10-year period following the date of redesignation. The requirement for demonstration of continued attainment

[5] Memorandum from John Calcagni, Director of Air Quality Management Division, September 4, 1992, *Procedures for Processing Requests to Redesignate Areas to Attainment*. EPA Office of Air Quality Planning and Standards.

is satisfied when the state demonstrates that future VOC and NO_X emissions levels are not expected to result in exceedances of the one-hour and the 1997 eight-hour ozone NAAQS.

Future emissions were projected to the horizon year 2028 using two- and three-year intervals to align milestone years with periodic AERR EI years as appropriate. A summary of the base year inventory and the future year inventories for ozone precursor emissions is presented in Section 4.5: *Emissions Summary*.

4.4.1 Area Sources

Stationary source emissions data from sites and processes that do not meet the reporting requirements for point sources are classified as area sources. Area sources are small-scale industrial, commercial, and residential sources that generate emissions. Emissions are calculated and reported at the county level. Examples of area sources include: printing operations, industrial coatings, degreasing solvents, architectural coatings, gasoline service station underground tank filling, vehicle refueling operations, stationary source fossil fuel combustion, outdoor refuse burning, and structural fires. With some exceptions, area source emissions are calculated by multiplying an established emissions factor (emissions per unit of activity) by the appropriate activity or activity surrogate responsible for generating emissions. Population is one of the more commonly used activity surrogates for area sources. Other activity data include the amount of gasoline sold in an area, employment by industry type, and crude oil and natural gas production.

4.4.1.1 Updated 2012 Base Year Inventories

The updated 2012 base year inventory was formed using the 2011 periodic AERR EI. The periodic 2011 inventory was developed per the AERR reporting requirements and was created using a combination of methodologies and data: EPA-generated EIs; TCEQ-contracted projects; TCEQ staff projects; and categories grown from the 2008 EI using factors derived from study data compiled by Eastern Research Group (ERG), the Economic and Consumer Credit Analytics website (http://www.economy.com/default.asp), and the United States Energy Information Administration's (EIA) annual energy outlook publication. The documentation for the development of the ERG study factors can be found in Attachment A: *Projection Factors for Point and Area Sources*.

The EPA developed EIs for states to use for many source categories as part of the NEI. The states access these individual inventories through the EPA's NEI website (ftp://ftp.epa.gov/EmisInventory/2011nei/doc/). These source categories include but are not limited to: industrial coatings; degreasing; residential, commercial/institutional, and industrial fuel use; commercial cooking; aviation fuel use; and consumer products. For some source categories, the TCEQ developed state-specific emissions estimates by acquiring current state-specific activity data and applying appropriate emissions factors. These source categories include but are not limited to: storage tanks, structural fires, dry cleaners, and automobile fires. The 2012 base year inventory was grown from the 2011 periodic AERR EI using factors derived from Attachment A: *Projection Factors for Point and Area Sources*.

In particular, the TCEQ focused on refining oil and gas area source inventory production categories for the EI. The improvements included the development and refinement of a state-specific oil and gas area source emissions calculator. This oil and gas area source emissions calculator uses county-level production and local equipment activity data with local emissions requirements to estimate emissions from individual production categories including compressor engines, condensate and oil storage tanks, loading operations, mud degassing, pump engines, heaters, and dehydrators. The documentation for the development of the oil and gas emissions

calculator can be found in Attachment B: *Characterization of Oil and Gas Production Equipment and Develop a Methodology to Estimate Statewide Emissions*. A significant improvement made to the oil and gas calculator was the development of refined emissions factors for VOC emissions from condensate storage tanks. The documentation for the refined emissions factors can be found in Attachment C: *Condensate Tank Oil and Gas Activities*.

In addition, further improvements were made to the oil and gas calculator through the development of region-specific emissions factors for mud degassing, updated region-specific equipment profiles, and year specific engine emissions factors for hydraulic pump engines. The documentation for these refined factors can be found in Attachment D: *Specified Oil and Gas Well Activities Emissions Inventory Update*. *The 2012 base year inventory for oil and gas area sources was developed using 2012 activity data and production information from the Railroad Commission of Texas (RRC).*

For those area source categories affected by TCEQ rules, rule effectiveness factors are applied to the baseline or uncontrolled emissions to estimate controlled emissions. These factors address the efficiency of the controls and the percentage of the category's population affected by the rule. Quality assurance of area source emissions involves ensuring that the activity data used for each separate category is current and valid. Data such as current population figures, fuel usage, and material usage were updated and the EPA guidance on emissions factors was used. Other routine efforts such as checking calculations for errors and conducting completeness and reasonableness checks were implemented.

4.4.1.2 Updated Milestone Years Inventories

The updated base year (2012), milestone years (2014, 2017, 2020, 2023, and 2026) and horizon year (2028) EIs for most area source categories were developed using factors derived from Attachment A: *Projection Factors for Point and Areas Sources*, the Economic and Consumer Credit Analytics website (http://www.economy.com/default.asp), and the EIA's annual energy outlook publication. The ERG-derived factors contain individual growth factors for each category and for each forecasting year. This projection method is the EPA standard and accepted method for developing future year EIs.

For DFW counties with oil and gas production that reside in the Barnett Shale area, specifically Dallas, Denton, Ellis, Johnson, Parker, and Tarrant Counties, growth factors from the report in Attachment E: *Forecasting Oil and Gas Activities*, were used. These ERG-derived factors deal specifically with oil and gas sources in the Barnett Shale area and employ category-oriented growth factors for each forecasting year.

The updated milestone year area source emissions inventories were developed by applying the selected growth factors to the baseline emissions for each area source category to account for any growth in emissions. Rules controlling emissions from industrial coatings, portable fuel containers, 30 TAC Chapter 117 Subchapter D controls on minor sources in ozone nonattainment areas, and gasoline station underground tank filling (Stage I) and vehicle refueling (Stage II) were accounted for in the base year inventory.

In addition, New Source Performance Standard (NSPS) OOOO controls on upstream oil and gas sources became fully applicable after the 2012 base year. Therefore, these controls were not incorporated in the base year inventory. Additionally, the NSPS OOOO controls were not incorporated into the milestone year inventories because they are not needed to demonstrate maintenance.

4.4.1.3 Area Source Emissions Inventories

The DFW area source base year (2012), milestone years (2014, 2017, 2020, 2023, and 2026) and horizon year (2028) EIs for NO_X and VOC for the two DFW ozone nonattainment areas are summarized in the following tables:

- Table 4-1: *DFW Area Source Four-County One-Hour Ozone Nonattainment Area NO_X and VOC Emissions (tons per day)*, and
- Table 4-2: *DFW Area Source Nine-County 1997 Eight-Hour Ozone Nonattainment Area NO_X and VOC Emissions (tons per day).*

Table 4-1: DFW Area Source Four-County One-Hour Ozone Nonattainment Area NO_X and VOC Emissions (tons per day)

Pollutant	2012	2014	2017	2020	2023	2026	2028
NO_X	28.54	29.41	27.79	25.96	24.90	24.68	24.68
VOC	218.90	224.51	218.56	211.43	209.81	210.69	211.77

Table 4-2: DFW Area Source Nine-County 1997 Eight-Hour Ozone Nonattainment Area NO_X and VOC Emissions (tons per day)

Pollutant	2012	2014	2017	2020	2023	2026	2028
NO_X	33.60	34.77	32.01	28.98	27.37	26.97	26.93
VOC	265.43	273.08	260.19	245.76	241.13	241.19	242.15

4.4.2 On-Road Mobile Sources

On-road mobile emission sources consist of automobiles, trucks, motorcycles, and other motor vehicles traveling on public roadways. On-road mobile source emissions are usually categorized as either combustion-related emissions or evaporative hydrocarbon emissions. Combustion-related emissions are estimated for vehicle engine exhaust. Evaporative hydrocarbon emissions are estimated for the fuel tank and other evaporative-leak sources on the vehicle. To calculate emissions, both the rate of emissions per unit of activity (emissions factors) and the number of units of activity must be determined. The emissions factors for on-road mobile sources are determined using models developed and approved by the EPA. The models allow for input of local conditions and vehicle characteristics. The activity information corresponding to the emissions factors is obtained using local travel demand models (TDM), the output from the highway performance monitoring system, and speed models.

In March 2010, the EPA released the Motor Vehicle Emissions Simulator (MOVES) model as the official emissions factor model for developing on-road mobile source category EIs. Although MOVES represented a new approach to assessing on-road emissions, the sources are the same, and the opportunity to use local inputs for meteorological conditions, control programs, and fleet characteristics remains. When using MOVES in emission-rates mode, emission rates are produced for subsets of the on-road fleet, and the emission rates are multiplied by the activity level of each vehicle type or source-use type to calculate emissions.

The on-road mobile source category EIs for this DFW one-hour and 1997 eight-hour ozone RS report were developed using the latest version of the MOVES model that is available, MOVES2014. The EPA made MOVES2014 available on July 31, 2014; officially released the MOVES2014 version of the model as a replacement to MOVES2010b for SIP applications on

October 7, 2014 (70 FR 60343); and released an update to the model on October 27, 2014. The TCEQ, working with the North Central Texas Council of Governments (NCTCOG), recently completed MOVES2014-based 2012, 2014, 2017, 2020, 2023, 2026, and 2028 on-road emission inventories for the DFW area. The planning assumptions, fleet characteristics, and vehicle miles traveled (VMT) estimates were updated to incorporate the latest available information at the time the inventories are developed.

To estimate on-road mobile source emissions, emissions rates calculated by the MOVES model are multiplied by the level of vehicle activity. On-road mobile source emissions factors are expressed in units of grams per mile, grams per vehicles (evaporative), and grams per hour (extended idle mode); therefore, the activity data required to complete the inventory calculation are VMT in units of miles per day, vehicle populations, and source hours idling. The level of vehicle travel activity is developed using a TDM run by the Texas Department of Transportation or by the local metropolitan planning organization. The TDMs are validated against a large number of ground counts, i.e., traffic passing over counters placed in various locations throughout a county or area. For SIP and reporting inventories, VMT estimates are calibrated against outputs from the federal highway performance monitoring system, a model built from a different set of traffic counters. Vehicle populations by source type are derived from the Texas Department of Motor Vehicle registration database and, as needed, national estimates for vehicle source type population.

In addition to the number of miles traveled on each roadway link, the speed on each roadway type or segment is also needed to complete an on-road EI. Roadway speeds, required inputs for the MOVES model, are calculated by using the activity volumes from the TDM and a post-processor speed model.

4.4.2.1 On-Road Mobile Source Emissions Inventories

The 2012, 2014, 2017, 2020, 2023, 2026, and 2028 on-road mobile source EIs for this DFW one-hour and 1997 eight-hour ozone RS report were developed by the NCTCOG using the latest available data, current emissions factors and models, and the most current planning assumptions. The inventories include the four DFW-area counties designated as nonattainment for the one-hour ozone NAAQS and the nine DFW-area counties designated as nonattainment for the 1997 eight-hour ozone NAAQS.

Consistent with on-road inventory development procedures for reporting requirements and reasonable further progress demonstration state implementation plans, the on-road inventories for each of these calendar years are based on VMT estimates and emission rates for an average summer weekday. MOVES2014, which is the latest available version of the EPA's MOVES model, was used to estimate the summer weekday emission rates in units of grams per mile for NO_X and VOC.

The roadway link-level VMT estimates were obtained from travel demand modeling for each of the DFW counties for each analysis year. Two methods are used to establish VMT: a federal system, the Highway Performance Monitoring System (HPMS); and a local system, a travel demand model (TDM). For historical years, the HPMS data constitutes the official measurement of highway performance, including VMT. The TDM represents the best method for distributing VMT to the roadway links within the local travel network and for predicting future year VMT. To provide consistency between the estimates for the two systems, the TDM-forecasted VMT estimates are adjusted using a VMT ratio based on an historical year for which the TDM was validated and the HPMS data has been made available. A summary of the on-road mobile source VMT used to develop the various NO_X and VOC emissions estimates for the four-county one-

hour and the nine-county 1997 eight-hour ozone nonattainment areas are presented separately in the following tables:

- Table 4-3: *DFW Four-County One-Hour Ozone Nonattainment Area VMT (miles per average summer day)*, and
- Table 4-4: *DFW Nine-County 1997 Eight-Hour Ozone Nonattainment Area VMT (miles per average summer day*).

Table 4-3: DFW Four-County One-Hour Ozone Nonattainment Area VMT (miles per average summer day)

Year	Vehicle Miles Traveled
2012	158,968,136
2014	166,904,345
2017	182,658,562
2020	193,804,121
2023	203,852,679
2026	214,346,979
2028	225,718,496

Table 4-4: DFW Nine-County 1997 Eight-Hour Ozone Nonattainment Area VMT (miles per average summer day)

Year	Vehicle Miles Traveled
2012	183,855,804
2014	193,671,709
2017	212,516,292
2020	226,113,715
2023	238,584,779
2026	251,758,922
2028	265,309,733

The on-road mobile source 2012, 2014, 2017, 2020, 2023, 2026, and 2028 EIs for NO_X and VOC for the DFW nonattainment areas are summarized in the following tables:

- Table 4-5: *DFW Four-County One-Hour Ozone Nonattainment Area Average Summer Weekday NO_X and VOC Emissions for On-Road Mobile Sources (tons per day)*, and
- Table 4-6: *DFW Nine-County 1997 Eight-Hour Ozone Nonattainment Area Average Summer Weekday NO_X and VOC Emissions for On-Road Mobile Sources (tons per day).*

For complete documentation of the development of the on-road mobile source EIs for the DFW one-hour and 1997 eight-hour ozone nonattainment areas RS SIP revision, including the inventory development methods, MOVES inputs, and the results, refer to Appendix F: *Development of DFW On-Road Emission Inventories for the Years 2012, 2014, 2017, 2020, 2023, 2026, and 2028*. The complete set of input and output files are available from the Emissions Assessment Section of the TCEQ Air Quality Division upon request.

Table 4-5: DFW Four-County One-Hour Ozone Nonattainment Area Average Summer Weekday NO_X and VOC Emissions for On-Road Mobile Sources (tons per day)

Pollutant	2012	2014	2017	2020	2023	2026	2028
NO_X	171.20	147.42	96.74	69.67	54.44	43.33	38.83
VOC	78.56	71.20	55.59	46.81	41.53	35.85	32.94

Table 4-6: DFW Nine-County 1997 Eight-Hour Ozone Nonattainment Area Average Summer Weekday NO_X and VOC Emissions for On-Road Mobile Sources (tons per day)

Pollutant	2012	2014	2017	2020	2023	2026	2028
NO_X	216.74	188.65	129.19	95.95	77.87	64.62	59.75
VOC	92.17	83.75	65.62	55.36	49.21	42.70	39.49

4.4.2.2 On-Road Mobile Source Control Strategies

The on-road mobile EIs for each analysis year were developed using MOVES2014 emissions factors that reflect all control strategies used to demonstrate maintenance of the one-hour and 1997 eight-hour ozone NAAQS. The controls that were modeled include: pre-1990 Federal Motor Vehicle Control Program (FMVCP), fleet turnover to Tier 1 of the FMVCP, fleet turnover to Tier 2 of the FMVCP, the 2007 heavy duty diesel FMVCP, fleet turnover to Tier 3 of the FMVCP, the lower sulfur gasoline associated with Tier 3 FMVCP, the National Low Emission Vehicle (NLEV) program, summer reformulated gasoline (RFG), the Texas Regional Low RVP, the DFW vehicle inspection and maintenance (I/M) program, the DFW anti-tampering program, and Texas Low Emission Diesel (TxLED). The federal RFG program was implemented in the four DFW one-hour counties. The Texas Regional Low RVP Program does not include RFG counties and is modeled only for Ellis, Johnson, Kaufman, Parker, and Rockwall Counties. The DFW I/M program began in 1990 in Dallas and Tarrant counties; was expanded in 2002 and 2003 to include additional counties; and now includes all nine DFW one-hour and 1997 eight-hour ozone nonattainment counties. A summary of the DFW on-road mobile source control strategies used for this DFW one-hour and 1997 eight-hour ozone RS report are presented in Table 4-7: *DFW On-Road Mobile Control Strategies Summary*.

Table 4-7: DFW On-Road Mobile Control Strategies Summary

Control Program Description	Year Control Program Started	Control Scenario Notes
Pre-1990 FMVCP	Pre-1990	Included for 2012, 2014, 2017, 2020, 2023, 2026, and 2028
Anti-Tampering Program	1986	Included for 2012, 2014, 2017, 2020, 2023, 2026, and 2028
1992 Federal Controls on Gasoline Volatility	1992	Maximum Reid Vapor Pressure of 7.8 pounds per square inch (psi) Included for 2012, 2014, 2017, 2020, 2023, 2026, and 2028
Tier 1 FMVCP	1994	Included for 2012, 2014, 2017, 2020, 2023, 2026, and 2028

Control Program Description	Year Control Program Started	Control Scenario Notes
RFG Phase 1	1995 for Phase 1	Collin, Dallas, Denton, and Tarrant Counties Superseded by RFG Phase 2
I/M Program	1990 thru 2003	Dallas and Tarrant Counties (1990); Collin and Denton Counties added (2002); Ellis, Johnson, Kaufman, Parker, and Rockwall Counties added (2003)
RFG Phase 2	2000 for Phase 2	Collin, Dallas, Denton, and Tarrant Counties Included for 2012, 2014, 2017, 2020, 2023, 2026, and 2028
Texas Regional Low RVP	2000	Ellis, Johnson, Kaufman, Parker, and Rockwall Counties Maximum summertime RVP of 7.8 psi
NLEV Program	2001	Included for 2012, 2014, 2017, 2020, 2023, 2026, and 2028
Tier 2 FMVCP	2004	Phased in from 2004 to 2009 Included for 2012, 2014, 2017, 2020, 2023, 2026, and 2028
TxLED	2006	Low aromatic hydrocarbon and high cetane number to control NO_X Included for 2012, 2014, 2017, 2020, 2023, 2026, and 2028
Federal Low Sulfur Highway Diesel	2006	15 ppm maximum sulfur content Included for 2012, 2014, 2017, 2020, 2023, 2026, and 2028
2007 Heavy Duty FMVCP	2007	Phased in from 2007 to 2010 Included for 2012, 2014, 2017, 2020, 2023, 2026, and 2028
Tier 3 FMVCP	2017	Will be phased in from 2017 to 2025
Lower sulfur gasoline associated with Tier 3 FMVCP	2017	10 ppm maximum gasoline sulfur

4.4.2.3 On-Road Mobile Source Control Strategy Reductions

Due to the on-road mobile source control programs in place for each analysis year, the on-road NO_X and VOC emissions are steadily decreasing from the base year of 2012 to each milestone year and the 2028 horizon year despite projected growth in VMT for all milestone years, for both the one-hour and 1997 eight-hour ozone nonattainment county groups. A summary of the

tons per day (tpd) change from the 2012 base year to each milestone year and the horizon year are summarized in the following tables:

- Table 4-8: *DFW Four-County One-Hour Ozone Nonattainment Area Estimated On-road Mobile Sources Reductions from 2012 Baseline Due to FMVCP, I/M, RFG, and TxLED (tons per day*), and

- Table 4-9: *DFW Nine-County 1997 Eight-Hour Ozone Nonattainment Area Estimated On-road Mobile Sources Reductions from 2012 Baseline Due to FMVCP, I/M, RFG, and TxLED (tons per day)*

A summary of the percent change in NO_X and VOC from the 2012 base year to each milestone year and the horizon year are summarized in the following tables:

- Table 4-10: *DFW Four-County One-Hour Ozone Nonattainment Area Estimated Percent On-road Mobile Sources Reductions from 2012 Baseline Due to FMVCP, I/M, RFG, and TxLED*, and
- Table 4-11: *DFW Nine-County 1997 Eight-Hour Ozone Nonattainment Area Estimated Percent On-road Mobile Sources Reductions from 2012 Baseline Due to FMVCP, I/M, RFG, and TxLED.*

Table 4-8: DFW Four-County One-Hour Ozone Nonattainment Area Estimated *On-road Mobile Sources* Reductions from 2012 Baseline[1] Due to FMVCP, I/M, RFG, and TxLED (tons per day)

Inventory Year	NO_X (tons per day)	VOC (tons per day)
2012	0	0
2014	-23.78	-7.36
2017	-74.46	-22.97
2020	-101.53	-31.75
2023	-116.76	-37.03
2026	-127.87	-42.71
2028	-132.37	-45.62

Note 1: The four county 2012 on-road emissions levels from which the reductions are taken are: 171.20 tpd NO_X and 78.56 tpd VOC (see Table 4-5)

Table 4-9: DFW Nine-County 1997 Eight-Hour Ozone Nonattainment Area Estimated *On-road Mobile Sources* Reductions from 2012 Baseline[2] Due to FMVCP, I/M, RFG, and TxLED (tons per day)

Inventory Year	NO_X (tons per day)	VOC (tons per day)
2012	0	0
2014	-28.09	-8.42
2017	-87.55	-26.55
2020	-120.79	-36.81
2023	-138.87	-42.96
2026	-152.12	-49.47
2028	-156.99	-52.68

Note 2: The nine county 2012 on-road emissions levels from which the reductions are taken are: 216.74 tpd NO_X and 92.17 tpd VOC (see Table 4-6)

Table 4-10: DFW Four-County One-Hour Ozone Nonattainment Area Estimated Percent *On-road Mobile Sources* Reductions from 2012 Baseline[3] Due to FMVCP, I/M, RFG, and TxLED

Inventory Year	NO_X % Reductions	VOC % Reductions
2012	0	0
2014	-13.9	-9.4
2017	-43.5	-29.2
2020	-59.3	-40.4
2023	-68.2	-47.1
2026	-74.7	-54.4
2028	-77.3	-58.1

Note 3: The four county 2012 on-road emissions levels from which the percent reductions are taken are: 171.20 tpd NO_X and 78.56 tpd VOC (see Table 4-5)

Table 4-11: DFW Nine-County 1997 Eight-Hour Ozone Nonattainment Area Estimated Percent *On-road Mobile Sources* Reductions from 2012 Baseline[4] Due to FMVCP, I/M, RFG, and TxLED

Inventory Year	NO_X % Reductions	VOC% Reductions
2012	0	0
2014	-13	-9.1
2017	-40.4	-28.8
2020	-55.7	-39.9
2023	-64.1	-46.6
2026	-70.2	-53.7
2028	-72.4	-57.2

Note 4: The nine county 2012 on-road emissions levels from which the percent reductions are taken are: 216.74 tpd NO_X and 92.17 tpd VOC (see Table 4-6)

4.4.3 Non-Road Mobile Sources

Non-road vehicles do not typically operate on roads or highways and are often referred to as off-road or off-highway vehicles. The non-road source category is composed of a diverse collection of equipment. Non-road emissions sources include but are not limited to: agricultural equipment, construction and mining equipment, lawn and garden equipment, aircraft and airport equipment, locomotives, commercial marine vessels (CMV), and drilling rigs. EIs for non-road sources developed as subcategories include: NONROAD model categories, airports, CMVs, drilling rigs, and locomotives. Note CMV activities do not apply to the DFW area; therefore all counties in the DFW area will indicate zero emissions for CMV activities. The following sections describe the emissions calculation methods used for the non-road mobile source subcategories.

4.4.3.1 Updated 2012 Base Year Inventories

A Texas-specific version of the EPA's latest NONROAD 2008a model, called the Texas NONROAD (TexN) model, was used to calculate emissions for all non-road mobile source equipment and recreational vehicles, with the exception of airports, locomotives, and drilling rigs. Several equipment survey studies have been conducted that focused on various equipment categories operating in different areas in Texas. The resulting survey data are used as inputs to the TexN model to more accurately estimate non-road emissions for the State of Texas instead of using the national default values in the EPA's NONROAD2008a model. Documentation of methods and procedures used in developing NONROAD model category EIs can be found in Attachment G: *Development of Air Emissions Inventories for NONROAD Model Category Mobile Sources (Task 3).*

The United States Federal Aviation Administration's Emissions and Dispersion Modeling System, Version 5.1.3 (EDMS) was used with updated activity data to calculate airport source emissions. These airport emissions sources include aircraft engines, auxiliary power units, and ground support equipment. To estimate the emissions from the airport sources, a survey was conducted by ERG under contract with the TCEQ to collect updated information on aircraft activity, fleet mix, and other EDMS model input parameters. Documentation of methods and procedures used in developing DFW area airport EIs can be found in Attachment H: *Airport Emissions Inventories for Houston-Galveston-Brazoria and Dallas-Fort Worth Areas for Select Years 2012, 2014, 2017, 2020, 2023, 2026, and 2028*.

The 2012 Texas locomotive EI includes Class I, II, and III locomotive activity and emissions by rail segment for all counties within Texas. Locomotive line-haul and yard activity data were compiled from companies operating in Texas and from additional resources identified by contractor ERG to create a county-level Class I line-haul inventory. Data developed by Eastern Regional Technical Advisory Committee in collaboration with the Federal Railroad Administration, the American Short Line and Regional Railroad Association (ASLRRA), and members of the Class II and III railroad communities used 2008 activity and emissions profiles for Class II and Class III railroads. To calculate annual gallons of fuel used by railroads, data compiled by ASLRRA from the Class II and III railroads, including total industry fuel use in 2008 for locomotives and total Class II/III route miles, were used. Based on the EIA's latest annual energy outlook publication, 2008 fuel usage values were grown to estimate 2012 emissions. Documentation of methods and procedures used in developing the locomotive EIs can be found in Attachment I*: Controlled and Uncontrolled Average Summer Weekday Locomotive Inventories for Houston-Galveston-Brazoria and Dallas-Fort Worth Areas for Select Years 2012, 2014, 2017, 2020, 2023, 2026, and 2028*.

The 2012 inventory for the drilling rig diesel engines was developed based on a statewide EI improvement study and updated with 2012 activity data. A survey of oil and gas exploration and production companies was used to develop improved drilling rig emissions characterization profiles. Documentation of methods and procedures used in developing the drilling rig diesel engine EIs can be found in Attachment J: *Development of Texas Statewide Drilling Rigs Emissions Inventories for the Years 1990, 1993, 1996, and 1999 through 2040*. The drilling rig emissions characterization profiles from this study were combined with 2012 drilling activity data obtained from the RRC to develop the 2012 inventory.

4.4.3.2 Updated Milestone Years Inventories

The updated milestone year inventories for the NONROAD model categories were developed using the most recent version of the TexN 2008a model (version 1.7). The TexN model runs were performed by ERG for the analyses years 2012, 2014, 2017, 2020, 2023, 2026, and 2028 to estimate the average summer weekday emissions for the NONROAD model categories. For more details, please see Attachment G: *Development of Air Emissions Inventories for Non-Road Model Category Mobile Sources (Task3)*. The TexN model contains unique population files for all 254 Texas counties that have been developed for every possible analysis year (1970 to 2050) within the TexN model, using county and source category classification-specific growth factors. Due to fluctuations in engine activity and their associated surrogates, the TexN population files are periodically updated with new growth factors such as those available on the Economic and Consumer Credit Analytics website (https://www.economy.com) to support more accurate forecasting and back-casting of emissions.

The updated milestone year inventories for the following source categories were developed based on studies found in the appendices listed below.

- NONROAD model category mobile sources inventories were based on the ERG study found in Attachment G: *Development of Air Emissions Inventories for Non-Road Model Category Mobile Sources (Task3)*,

- airport source inventories were based on the ERG study found in Attachment H: *Airport Emissions Inventories for Houston-Galveston-Brazoria and Dallas-Fort Worth Areas for Select Years 2012, 2014, 2017, 2020, 2023, 2026, and 2028,*

- locomotive inventories were based on the ERG study found in Attachment I: *Controlled and Uncontrolled Average Summer Weekday Locomotive Inventories for Houston-Galveston-Brazoria and Dallas-Fort Worth Areas for Select Years 2012, 2014, 2017, 2020, 2023, 2026, and 2028* , and

- drilling rig inventories were based on the ERG study found in Attachment J: *Development of Texas Statewide Drilling Rigs Emission Inventories for the Years 1990, 1993, 1996, and 1999 through 2040*.

The updated milestone year inventories for drilling rigs were based on the 2012 inventory developed using the drilling rig emissions characterization profiles from the ERG report in Attachment J: *Development of Texas Statewide Drilling Rigs Emission Inventories for the Years 1990, 1993, 1996, and 1999 through 2040* combined with 2012 drilling rig activity data from the RRC. The 2012 inventory was then projected to future years using growth factors. Documentation on the development of growth factors can be found in Attachment A: *Projection Factors for Point and Area Sources*.

4.4.3.3 Non-Road Mobile Source Emissions Inventories

The non-road mobile source NO_X and VOC emissions for the 2012 through 2028 milestone years for the DFW area are presented in:

- Table 4-12: *DFW Four-County One-Hour Ozone Nonattainment Area NO_X Emissions for Non-Road EI Categories (tons per day)*,
- Table 4-13: *DFW Four-County One-Hour Ozone Nonattainment Area VOC Emissions for Non-Road EI Categories (tons per day),*
- Table 4-14: *DFW Nine-County 1997 Eight-Hour Ozone Nonattainment Area NO_X Emissions for Non-Road EI Categories (tons per day)*, and
- Table 4-15: *DFW Nine-County 1997 Eight-Hour Ozone Nonattainment Area VOC Emissions for Non-Road EI Categories (tons per day).*

Please note that although drilling rig VOC emissions for 2026 and 2028 are shown as 0.00 tons per day in Tables 4-13 and 4-15, there are actually small amounts of drilling rig VOC emissions forecasted for these two years. These emissions are below 0.005 tons per day for each of the forecasted years, so the values round downwards to zero.

Table 4-12: DFW Four-County One-Hour Ozone Nonattainment Area NO_X Emissions for Non-Road EI Categories (tons per day)

Category	2012	2014	2017	2020	2023	2026	2028
Airport	10.12	11.28	12.34	13.31	14.19	15.24	16.07
Commercial Marine Vessels	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Drilling Rigs	3.75	4.08	2.56	1.00	0.32	0.10	0.04
Locomotive	10.33	10.12	8.89	8.21	7.45	6.33	5.71
NONROAD Model Categories	52.75	46.81	37.77	30.79	26.91	24.69	23.84
Non-road Total	76.95	72.29	61.56	53.31	48.87	46.36	45.66

Table 4-13: DFW Four-County One-Hour Ozone Nonattainment Area VOC Emissions for Non-Road EI Categories (tons per day)

Category	2012	2014	2017	2020	2023	2026	2028
Airport	2.95	3.14	3.41	3.64	3.85	4.09	4.28
Commercial Marine Vessels	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Drilling Rigs	0.18	0.19	0.12	0.05	0.02	0.00	0.00
Locomotive	0.60	0.56	0.46	0.40	0.36	0.30	0.27
NONROAD Model Categories	37.66	32.59	28.6	26.99	26.81	27.13	27.53
Non-road Total	41.39	36.48	32.59	31.08	31.04	31.52	32.08

Table 4-14: DFW Nine-County 1997 Eight-Hour Ozone Nonattainment Area NO_X Emissions for Non-Road EI Categories (tons per day)

Category	2012	2014	2017	2020	2023	2026	2028
Airport	10.15	11.31	12.37	13.34	14.22	15.28	16.11
Commercial Marine Vessels	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Drilling Rigs	4.97	5.40	3.40	1.33	0.43	0.13	0.06
Locomotive	14.36	14.04	12.24	11.25	10.16	8.61	7.74
NONROAD Model Categories	63.50	56.08	44.82	36.18	31.40	28.69	27.64
Non-road Total	92.98	86.83	72.83	62.10	56.21	52.71	51.55

Table 4-15: DFW Nine-County 1997 Eight-Hour Ozone Nonattainment Area VOC Emissions for Non-Road EI Categories (tons per day)

Category	2012	2014	2017	2020	2023	2026	2028
Airport	3.02	3.22	3.49	3.72	3.92	4.17	4.36
Commercial Marine Vessels	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Drilling Rigs	0.24	0.26	0.16	0.06	0.02	0.01	0.00
Locomotive	0.83	0.76	0.61	0.53	0.47	0.40	0.35
NONROAD Model Categories	42.78	37.10	32.47	30.47	30.14	30.42	30.82
Non-road Total	46.87	41.34	36.73	34.78	34.55	35.00	35.53

4.4.4 Stationary Point Sources

4.4.4.1 Emissions Inventory Development

Stationary point source emissions data are collected annually from sites that meet the reporting requirements of 30 TAC §101.10. This rule, referred to as the TCEQ emissions inventory reporting rule, establishes EI reporting thresholds in ozone nonattainment areas that are currently at or less than major source thresholds in the DFW ozone nonattainment area. Therefore, some minor sources in the DFW ozone nonattainment area report to the point source EI.

To collect the data, the TCEQ sends notices to sites identified as potentially meeting the reporting requirements. Companies are required to report emissions data and to provide sample calculations used to determine the emissions. Information characterizing the process equipment, the abatement units, and the emission points is also required.

All data submitted in the emissions inventory questionnaire (EIQ) are reviewed for quality-assurance purposes and then stored in the State of Texas Air Reporting System (STARS) database. EIQ guidance documents and historical point source emissions of major pollutants are available on the TCEQ's Point Source Emissions Inventory Web page (https://www.tceq.texas.gov/airquality/point-source-ei/psei.html). Additional information is available upon request from the TCEQ's Air Quality Division.

4.4.4.2 Updated 2012 Base Year Inventory

The TCEQ extracted the 2012 point source inventory data from STARS on June 5, 2014. The extracted data included reported annual and ozone season daily emissions of NO_X and VOC for

each site in the DFW area for which a 2012 EIQ was submitted and reflected revisions made on or before the extract date.

4.4.4.3 Updated Milestone Year Inventories

The TCEQ designated the 2013 EI as the starting point for emissions inventory projections for each of the milestone years because it was the most recent point source EI data available. Using the most recent point source EI data captures the most recent economic conditions and any recent applicable controls, which can improve the accuracy of emissions projections. The TCEQ extracted the 2013 point source inventory data from STARS on March 4, 2015. The extracted data included reported annual and ozone season daily emissions of NO_X and VOC for each site in the DFW area that submitted a 2013 EIQ and reflected revisions made on or before the extract date.

In the development of the milestone year inventories for each ozone precursor (NO_X and VOC), the TCEQ projected future emissions from major and minor sources separately when appropriate and then added unused emissions reductions credits to the inventories. Further details are explained below. Title V operating permit data were reviewed to identify sites that were major for NO_X or VOC.

NO_X emissions from electric generating units (EGU) and cement kilns were projected separately from other sources. EGU emissions were projected using Cross State Air Pollution Rule (CSAPR) allocations. Ozone season allocations were averaged over the 153 day season to obtain milestone year projections for 2017 and beyond. No CSAPR allocations were available for 2014 so EGU emissions for 2014 were projected using growth factors; the projected values for NO_X emissions were within 0.01 tons per day (tpd) of NO_X emissions reported to the EPA's Clean Air Markets Division under the Acid Rain Program. Emissions from other non-CSAPR units at EGU sites were projected using growth factors. Cement kiln emissions for 2017 and beyond were projected using the 30 TAC Chapter 117 cap, which limits future emissions growth to the cap levels. The 30 TAC Chapter 117 cap provides a conservative estimate of emissions growth.

Other major source emissions were projected by adding emissions growth allowed under the major modification thresholds. Specifically, NO_X emissions from non-EGU and non-cement sites identified as major sources of NO_X emissions and VOC emissions from sites identified as major sources of VOC emissions were projected using the moderate nonattainment major modification threshold of 40 tons per year. The moderate nonattainment threshold was selected based upon the DFW area's classification for the 2008 ozone NAAQS. Title V operating permit data from 2014 were reviewed to identify major sources of NO_X and VOC emissions. For each site identified, a daily average of this growth was calculated by prorating the annual 40-ton major modification threshold by the site-wide ratio of ozone season to annual emissions to provide a one-time growth limit added to the site's 2013 emissions. To maintain a conservative approach, all growth was taken into account for the 2017 milestone year inventory.

For minor sources, NO_X and VOC emissions were projected using emissions trend data and growth factors for each milestone year. Emissions trends for each site were established using 2009 through 2013 annual emissions data. For sites with decreasing emission trends, milestone year inventories were set equal to the 2013 baseline inventory. For sites with increasing emission trends, milestone year inventories were determined by applying growth factors to the 2013 baseline inventory. The growth factor information can be found in Attachment A. To maintain a conservative approach, any growth factors that projected a decrease in future emissions were modified so that emissions for these source categories remained equal to the 2013 baseline inventory through future years.

Finally, each of the milestone year inventories were adjusted to account for available (unused) emissions credits. Emissions credits are banked emissions reductions that may return to the air shed in the future through the use of these emissions credits either to modify existing facilities, construct new facilities, or by facilities to demonstrate compliance with emissions limit obligations where provided for in commission rules. To account for the possible use of the banked NO_X and VOC emissions, available Emissions Reduction Credit (ERC) and Discrete Emissions Reduction Credit (DERC) data for DFW were added to the inventories as discussed below.

Projected ERC use was determined by assuming that banked ERCs would be used for offsets in permitting new or modified sources. In ozone nonattainment areas, ERCs used to permit new or modified sources must be reduced by a factor called the 'offset ratio' to assist with ensuring progress towards attaining air quality standards. Therefore, available ERCs were reduced by 15% (i.e., divided by 1.15 to account) for the Nonattainment New Source Review permitting offset ratio for moderate ozone nonattainment areas since the area would be classified as moderate nonattainment upon redesignation. Applying the moderate ozone nonattainment offset ratio (1.15 to 1) instead of the serious ozone nonattainment offset ratio (1,2 to 1) to unused credits conservatively estimates growth: since less credits are needed to offset emissions from new or modified sources, the amount of credits available to return to the airshed increases.

All available ERCs listed in the emissions banking and trading database as of January 15, 2015 were added to each milestone year starting with 2017. This includes transactions with available information for the period 2008 to 2014 to account for credits taken from the bank and applied to projects that may not have been completed in time for the 2013 inventory.

Projected VOC DERC use was determined by assuming that all available credits would be used over the 2017 to 2028 timespan. The credits were averaged over the 2017 to 2028 projected timespan to obtain a yearly amount. The yearly amount was averaged over the DFW ozone season to obtain a daily contribution and added to the projected inventories. The DERC transactions between 2008 and 2014 were not applied as they were used for one-time compliance projects applicable to, and reflected in, emissions for those years only.

Projected NO_X DERC use was determined by using the flow control value of 17.0 tons per day as listed in 30 TAC § 101.379 adopted June 3, 2015. This approach is conservative and simplified; historical use has been considerably less. The flow control value of 17.0 tpd is added to each of the 2017 through 2028 milestone year NO_X emissions.

A summary of the point source inventories is presented in the following tables:

- Table 4-16*: DFW Four-County One-Hour Ozone Nonattainment Area Point Source NO_X and VOC Emissions (tons per day)*
- *Table 4-17: DFW Nine-County 1997 Eight-Hour Ozone Nonattainment Area Point Source NO_X and VOC Emissions (tons per day)*

Table 4-16: DFW Four-County One-Hour Ozone Nonattainment Area Point Source NO_X and VOC Emissions (tons per day)

Pollutant	*2012*	*2014*	*2017*	*2020*	*2023*	*2026*	*2028*
NO_X	8.47	8.79	29.47	29.57	29.65	29.71	29.76
VOC	11.11	11.02	11.52	11.71	11.86	11.99	12.08

Table 4-17: DFW Nine-County 1997 Eight-Hour Ozone Nonattainment Area Point Source NO_X and VOC Emissions (tons per day)

Pollutant	*2012*	*2014*	*2017*	*2020*	*2023*	*2026*	*2028*
NO_X	30.80	31.25	62.38	62.49	62.57	62.64	62.71
VOC	27.66	28.61	29.46	29.97	30.41	30.82	31.10

4.5 Emissions Summary

The 2012 base year and the 2014, 2017, 2020, 2023, 2026, and 2028 future year EI summaries by source categories for the DFW four one-hour and nine 1997 eight-hour ozone nonattainment areas are shown in:

- Table 4-18: *DFW Four-County One-Hour Ozone Nonattainment Area NO_X Emissions by Source Category (tons per day),*
- Table 4-19: *DFW Four-County One-Hour Ozone Nonattainment Area VOC Emissions by Source Category (tons per day),*
- Table 4-20: *DFW Nine-County 1997 Eight-Hour Ozone Nonattainment Area NO_X Emissions by Source Category (tons per day)*, and
- Table 4-21: *DFW Nine-County 1997 Eight-Hour Ozone Nonattainment Area VOC Emissions by Source Category (tons per day).*

These tables illustrate that in the horizon year of 2028, mobile sources (on-road and non-road) contribute the most NO_X emissions and area sources contribute the most VOC emissions for both the DFW four one-hour and nine 1997 eight-hour ozone nonattainment counties. Contributions from biogenic emissions are not included in the summary because this analysis is limited to anthropogenic sources.

Table 4-18: DFW Four-County One-Hour Ozone Nonattainment Area NO_X Emissions by Source Category (tons per day)

Category	2012	2014	2017	2020	2023	2026	2028
Point Sources	8.47	8.79	29.47	29.57	29.65	29.71	29.76
Area Sources	28.54	29.41	27.79	25.96	24.90	24.68	24.68
On-Road Mobile Sources (MOVES2014)	171.20	147.42	96.74	69.67	54.44	43.33	38.83
Non-Road Mobile Sources	76.95	72.29	61.56	53.31	48.87	46.36	45.66
Total	285.16	257.91	215.56	178.51	157.86	144.08	138.93

Table 4-19: DFW Four-County One-Hour Ozone Nonattainment Area VOC Emissions by Source Category (tons per day)

Category	2012	2014	2017	2020	2023	2026	2028
Point Sources	11.11	11.02	11.52	11.71	11.86	11.99	12.08
Area Sources	218.90	224.51	218.56	211.43	209.81	210.69	211.77
On-Road Mobile Sources (MOVES2014)	78.56	71.20	55.59	46.81	41.53	35.85	32.94

Category	2012	2014	2017	2020	2023	2026	2028
Non-Road Mobile Sources	41.39	36.48	32.59	31.08	31.04	31.52	32.08
Total	349.96	343.21	318.26	301.03	294.24	290.05	288.87

Table 4-20: DFW Nine-County 1997 Eight-Hour Ozone Nonattainment Area NO_X Emissions by Source Category (tons per day)

Category	2012	2014	2017	2020	2023	2026	2028
Point Sources	30.80	31.25	62.38	62.49	62.57	62.64	62.71
Area Sources	33.60	34.77	32.01	28.98	27.37	26.97	26.93
On-Road Mobile Sources (MOVES2014)	216.74	188.65	129.19	95.95	77.87	64.62	59.75
Non-Road Mobile Sources	92.98	86.83	72.83	62.10	56.21	52.71	51.55
Total	374.12	341.50	296.41	249.52	224.02	206.94	200.94

Table 4-21: DFW Nine-County 1997 Eight-Hour Ozone Nonattainment Area VOC Emissions by Source Category (tons per day)

Category	2012	2014	2017	2020	2023	2026	2028
Point Sources	27.66	28.61	29.46	29.97	30.41	30.82	31.10
Area Sources	265.43	273.08	260.19	245.76	241.13	241.19	242.15
On-Road Mobile Sources (MOVES2014)	92.17	83.75	65.62	55.36	49.21	42.70	39.49
Non-Road Mobile Sources	46.87	41.34	36.73	34.78	34.55	35.00	35.53
Total	432.13	426.78	392.00	365.87	355.30	349.71	348.27

4.6 Maintenance Demonstration Conclusion

Future year trends were analyzed using the 2012 base year and the 2028 projected emissions above for the DFW four-county one-hour and the nine-county 1997 eight-hour ozone nonattainment areas. Trend analysis using the 2028 future year emissions shows an overall decrease of 207.32 tpd in combined NO_X and VOC emissions for the DFW four-county one-hour ozone nonattainment area. This net change for the four-county area includes a projected 61.09 tpd decrease in VOC and a 146.23 tpd decrease in NO_X.

For the DFW nine-county 1997 eight-hour ozone nonattainment area, the trend analysis shows an overall decrease of 257.04 tpd in combined NO_X and VOC emissions. The net change for the nine-county area includes a projected 83.86 tpd decrease in VOC and a 173.18 tpd decrease in NO_X.

Previous photochemical modeling analysis for the DFW area shows that reducing NO_X emissions is expected to be more effective in reducing the one-hour and the 1997 eight-hour ozone design values than VOC reductions. Therefore, the projected 146.23 tpd and 173.18 tpd decreases of NO_X are expected to reduce one-hour and 1997 eight-hour ozone design values more effectively than the smaller 61.09 tpd and 83.86 tpd decreases in VOC emissions. Based on

future expected trends and previous photochemical analysis, the DFW area is projected to show continued attainment of the one-hour and 1997 eight-hour ozone NAAQS through 2028.