

Revisions to the State Implementation Plan (SIP)  
for the Control of Ozone Air Pollution

DALLAS-FORT WORTH EIGHT-HOUR OZONE NONATTAINMENT AREA  
REASONABLE FURTHER PROGRESS SIP

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY  
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PROJECT NO. 2006-031-SIP-NR

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May 23, 2007

## EXECUTIVE SUMMARY

Section 182 of the 1990 Federal Clean Air Act Amendments (FCAA) requires ozone nonattainment areas with air quality classified as moderate or higher to submit plans showing reasonable further progress (RFP) towards attainment of the National Ambient Air Quality Standards (NAAQS). The Dallas-Fort Worth (DFW) area is classified as a moderate nonattainment area for the eight-hour ozone standard with an attainment date of June 15, 2010. The DFW RFP SIP is not required or intended to demonstrate attainment of the ozone NAAQS, but rather is intended to demonstrate that emissions will be reduced by 15 percent for the period between 2002 through 2008.

This SIP demonstrates that the RFP 15 percent reduction requirement will be met for the analysis period of 2002 to 2008. Demonstration of RFP is based on the guidelines set forth in the EPA Phase II Eight-Hour Ozone Implementation Rule (published in the November 29, 2005, Federal Register Vol. 70, No. 228) (40 CFR §51.910) specifying how the eight-hour ozone nonattainment areas must demonstrate RFP. Under the Phase II implementation rules, the four core (previously designated as one-hour nonattainment) counties must reduce VOC, NO<sub>x</sub>, or a combination of the two by 15 percent from a 2002 emissions baseline. As explained in Chapter 1, the TCEQ has chosen to meet this requirement using NO<sub>x</sub> reductions in the four core counties. The TCEQ is meeting the 15 percent requirement using existing NO<sub>x</sub> control strategies in the four core counties. The five newly-designated counties in the DFW area must reduce VOC emissions by 15 percent from a 2002 emissions baseline by 2008. A portion of VOC emission reductions (10 tpd) from the four core counties will be used to satisfy the 15 percent VOC reduction requirement in the five newly designated counties. In addition, the TCEQ is using 4.75 tpd of NO<sub>x</sub> reductions in the four county area to account for growth and non-creditable (pre-1990 controls) mobile source reductions in the new five-county area. Creditable control measures and methodologies to estimate reduced emission levels are further described in Sections 4.2 through 4.6.

The RFP methodology involves development of the base year and milestone year inventories, the emission reductions for each milestone year, and an estimate of the effects of non-creditable reductions and pre-1990 FCAA rule corrections. Through this methodology the 15 percent reduction amount is determined. Once these values have been calculated, the milestone target levels and emission inventories can be compared to determine if the forecast controlled emission inventories are less than the target levels. The results demonstrating that this RFP SIP for DFW meets the FCAA RFP requirements for the 2008 milestone year are shown in Table 3-5: *Summary of RFP Demonstration for Four DFW Core Counties* and Table 3-6: *Summary of RFP Demonstration for Five Newly Designated DFW Counties*.

This SIP revision also sets the NO<sub>x</sub> and VOC motor vehicle emission budgets (MVEBs) for transportation conformity purposes for the milestone year 2008. An MVEB is the on-road mobile source allocation of the total allowable emissions for each applicable criteria pollutant or precursor, as defined in the SIP. Transportation conformity determinations must be performed using the budget test, once EPA determines the budget adequate for transportation conformity purposes. To pass the budget test, areas must demonstrate that the estimated emissions from transportation plans, programs, and projects do not exceed the MVEBs for the milestone and/or attainment year.

Although there are no new adopted on-road mobile source controls as part of this DFW RFP SIP, the on-road mobile emission inventories and control reduction values have been updated using the latest EPA on-road mobile source inventory development tool, MOBILE6. Since the inventories have changed, the MVEBs are updated as part of this SIP revision. Chapter 5 documents the development of the revised RFP MVEBs for the nine-county DFW eight-hour ozone nonattainment area. A summary of the revised MVEBs is presented in Table ES-1: *RFP Motor Vehicle Emission Budgets for DFW*.

**Table ES-1: RFP Motor Vehicle Emission Budgets for DFW**

<b>Description</b>	<b>NO<sub>x</sub> tpd</b>	<b>VOC tpd</b>
2008 Eight-Hour Ozone RFP MVEB	249.33	119.81

Based on comments received from the EPA during the public comment period, changes were made to the proposed DFW RFP SIP in Chapters 2 and 5. Ozone season weekday on-road mobile source NO<sub>x</sub> and VOC emissions and control strategy reductions were added under Tables 2-11 and 2-12, respectively, and updated MVEB calculations and tables are provided in Chapter 5.

## SECTION V: LEGAL AUTHORITY

### A. General

The TCEQ has the legal authority to implement, maintain, and enforce the national ambient air quality standards.

The first air pollution control act, known as the Clean Air Act of Texas, was passed by the Texas Legislature in 1965. In 1967, the Clean Air Act of Texas was superseded by a more comprehensive statute, the Texas Clean Air Act (TCAA), found in Article 4477-5, Vernon's Texas Civil Statutes. The Legislature amended the TCAA in 1969, 1971, 1973, 1979, 1985, 1987, 1989, 1991, 1993, 1995, 1997, 1999, 2001, 2003, and 2005. In 1989, the TCAA was codified as Chapter 382 of the Texas Health & Safety Code.

Originally, the TCAA stated that the Texas Air Control Board (TACB) is the state air pollution control agency and is the principal authority in the state on matters relating to the quality of air resources. In 1991, the Legislature abolished the TACB effective September 1, 1993, and its powers, duties, responsibilities, and functions were transferred to the Texas Natural Resource Conservation Commission (TNRCC). With the creation of the TNRCC, the authority over air quality is found in both the Texas Water Code and the TCAA. Specifically, the authority of the TNRCC is found in Chapters 5 and 7. Chapter 5, Subchapters A - F, and H - J and L, include the general provisions, organization, and general powers and duties of the TNRCC, and the responsibilities and authority of the Executive Director. This Chapter also authorizes the TNRCC to implement action when emergency conditions arise and to conduct hearings. Chapter 7 gives the TNRCC enforcement authority. In 2001, the 77<sup>th</sup> Texas Legislature continued the existence of the TNRCC until September 1, 2013, and changed the name of the TNRCC to the Texas Commission on Environmental Quality (TCEQ).

The TCAA specifically authorizes the TCEQ to establish the level of quality to be maintained in the state's air and to control the quality of the state's air by preparing and developing a general, comprehensive plan. The TCAA, Subchapters A - D, also authorize the TCEQ to collect information to enable the TCEQ to develop an inventory of emissions; to conduct research and investigations; to enter property and examine records; to prescribe monitoring requirements; to institute enforcement proceedings; to enter into contracts and execute instruments; to formulate rules; to issue orders taking into consideration factors bearing upon health, welfare, social and economic factors, and practicability and reasonableness; to conduct hearings; to establish air quality control regions; to encourage cooperation with citizens' groups and other agencies and political subdivisions of the state as well as with industries and the Federal Government; to establish and operate a system of permits for construction or modification of facilities.

Local government authority is found in Subchapter E of the TCAA. Local governments have the same power as the TCEQ to enter property and make inspections. They also may make recommendations to the Commission concerning any action of the TCEQ that affects their territorial jurisdiction, may bring enforcement actions, and may execute cooperative agreements with the TCEQ or other local governments. In addition, a city or town may enact and enforce ordinances for the control and abatement of air pollution not inconsistent with the provisions of the TCAA and the rules or orders of the Commission.

Subchapters F, G, and H of the TCAA authorize the TCEQ to establish low emission vehicle requirements for mass transit authorities, local government fleets, and private fleets; create a mobile emissions reduction credit program; establish vehicle inspection and maintenance programs in certain areas of the state, consistent with the requirements of the federal Clean Air Act; establish gasoline volatility and low emission diesel standards; and fund and authorize participating counties to implement low-income vehicle repair assistance, retrofit, and accelerated vehicle retirement programs.

B. Applicable Law

The following statutes and rules provide necessary authority to adopt and implement the SIP.

Statutes

TEXAS HEALTH & SAFETY CODE, Chapter 382	September 1, 2005
TEXAS WATER CODE	September 1, 2005

All sections of each subchapter are included, unless otherwise noted.

Chapter 5: Texas Natural Resource Conservation Commission
Subchapter A: General Provisions
Subchapter B: Organization of the Texas Natural Resource Conservation Commission
Subchapter C: Texas Natural Resource Conservation Commission
Subchapter D: General Powers and Duties of the Commission
Subchapter E: Administrative Provisions for Commission
Subchapter F: Executive Director (except §§ 5.225, 5.226, 5.227, 5.2275, 5.232, and 5.236)
Subchapter H: Delegation of Hearings
Subchapter I: Judicial Review
Subchapter J: Consolidated Permit Processing
Subchapter L: Emergency and Temporary Orders (§§ 5.514, 5.5145 and 5.515 only)

Chapter 7: Enforcement

Subchapter A: General Provisions (§§ 7.001, 7.002, 7.0025, 7.004, 7.005 only)
Subchapter B: Corrective Action and Injunctive Relief (§ 7.032 only)
Subchapter C: Administrative Penalties
Subchapter E: Criminal Offenses and Penalties: §§ 7.177, 7.179-7.181

Rules

All of the following rules are found in Title 30, Texas Administrative Code, as of the following effective dates:

Chapter 7, Memoranda of Understanding, §§ 7.110 and 7.119	May 2, 2002
Chapter 35, Subchapters A-C, K: Emergency and Temporary Orders and Permits; Temporary Suspension or Amendment of Permit Conditions	December 10, 1998
Chapter 39, Public Notice, §§ 39.201; 39.401; 39.403(a) and (b)(8)-(10); 39.405(f)(1) and (g); 39.409; 39.411 (a), (b)(1)-(6) and (8)-(10) and (c)(1)-(6) and (d); 39.413(9), (11), (12) and (14); 39.418(a) and (b)(3) and (4); 39.419(a), (b),(d) and (e); 39.420(a), (b) and (c)(3) and (4); 39.423 (a) and (b); 39.601; 39.602; 39.603; 39.604; and 39.605	August 15, 2002
Chapter 55, Request for Contested Case Hearings; Public Comment, §§ 55.1; 55.21(a) - (d), (e)(2), (3) and (12), (f) and (g); 55.101(a), (b), (c)(6) - (8); 55.103; 55.150; 55.152(a)(1), (2) and (6) and (b); 55.154; 55.156; 55.200; 55.201(a) - (h); 55.203; 55.205; 55.206; 55.209 and 55.211	August 29, 2002
Chapter 101: General Air Quality Rules	June 23, 2005
Chapter 106: Permits by Rule, Subchapters A	June 30, 2004

Chapter 111: Control of Air Pollution from Visible Emissions and Particulate Matter	November 18, 2004
Chapter 112: Control of Air Pollution from Sulfur Compounds	July 16, 1997
Chapter 113, Standards of Performance for Hazardous Air Pollutants and for Designated Facilities and Pollutants	June 15, 2005
Chapter 114: Control of Air Pollution from Motor Vehicles	May 19, 2005
Chapter 115: Control of Air Pollution from Volatile Organic Compounds	May 5, 2005
Chapter 116: Permits for New Construction or Modification	June 15, 2005
Chapter 117: Control of Air Pollution from Nitrogen Compounds	May 19, 2005
Chapter 118: Control of Air Pollution Episodes	March 5, 2000
Chapter 122, § 122.122: Potential to Emit	December 11, 2002
Chapter 122, § 122.215: Minor Permit Revisions	June 3, 2001
Chapter 122, § 122.216: Applications for Minor Permit Revisions	June 3, 2001
Chapter 122, § 122.217: Procedures for Minor Permit Revisions	December 11, 2002
Chapter 122, § 122.218: Minor Permit Revision Procedures for Permit Revisions Involving the Use of Economic Incentives, Marketable Permits, and Emissions Trading	June 3, 2001

## SECTION VI. CONTROL STRATEGY

A. Introduction (No Change)

B. Ozone (Revised)

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Chapter 1: General

Chapter 2: Emission Inventories

Chapter 3: Target Emission Levels and RFP Demonstration

Chapter 4: Control Measures to Achieve Target Emission Levels

Chapter 5: Motor Vehicle Emissions Budget

2. *Houston-Galveston-Brazoria RFP (Revised May 23, 2007)*

3. *Beaumont-Port Arthur (No change)*

4. *El Paso (No change)*

5. *Regional Strategies (No change)*

6. *Northeast Texas (No change)*

7. *Austin Area (No change)*

8. *San Antonio Area (No change)*

C. Particulate Matter (No change)

D. Carbon Monoxide (No change)

E. Lead (No change)

F. Oxides of Nitrogen (No change)

G. Sulfur Dioxide (No change)

H. Conformity with the National Ambient Air Quality Standards (No change)

I. Site Specific (No change)

J. Mobile Sources Strategies (No change)

K. Clean Air Interstate Rule (No change)

# **Dallas-Fort Worth Reasonable Further Progress List of Acronyms**

ABY= Adjusted Base Year  
ATP= Anti-Tampering Programs  
DERCs = Discrete Emission Reduction Credits  
DFW= Dallas-Fort Worth  
EBT=Emissions Banking and Trading  
EDMS= Emissions and Dispersion Model System  
EDMS= Environmental Data Management System  
EGAS=Economic Growth Analysis System  
EGUs= Electric Generating Units  
EIQs= Emissions Inventory Questionnaires  
EPA= Environmental Protection Agency  
ERCs= Emission Reduction Credits  
ESAD= Emission Specifications for Attainment  
Demonstration  
FCAA= Federal Clean Air Act Amendments  
FMVCP= Federal Motor Vehicle Control Program  
HDDVs= Heavy Duty Diesel Vehicles  
HGAC=Houston-Galveston Area Council  
HGB= Houston-Galveston-Brazoria  
I/M= Inspection and Maintenance  
MECT = Mass Emissions Cap and Trade Program  
MVEB= Motor Vehicle Emissions Budget  
NAAQS= National Ambient Air Quality Standards  
NLEV= National Low Emission Vehicle  
NOx= Nitrogen Oxides  
REMI= Regional Economic Modeling, Inc.  
RFP=Reasonable Further Progress  
ROP= Rate of Progress  
RVP= Reid Vapor Pressure  
SIC= Standard Industrial Classification  
SIP = State Implementation Plan  
SO<sub>2</sub>= Sulfur Dioxide  
STARS= State of Texas Air Reporting System  
TCEQ=Texas Commission on Environmental Quality  
TDMs= Travel Demand Models  
TIPI= Texas Industrial Production Index  
tpd= Tons Per Day  
TxLED= Texas Low Emission Diesel  
VMT= Vehicle Miles Traveled  
VOC= Volatile Organic Compounds

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## CHAPTER 1: GENERAL

### 1.1 DALLAS-FORT WORTH REASONABLE FURTHER PROGRESS BACKGROUND

“The History of the Texas State Implementation Plan (SIP),” a comprehensive overview of the SIP revisions submitted to the U.S. Environmental Protection Agency (EPA) by the State of Texas, is available at the following web site:

<http://www.tceq.state.tx.us/implementation/air/sip/sipintro.html#History>

The Dallas-Fort Worth (DFW) area was originally designated as a moderate nonattainment area for the former one-hour ozone standard in the early 1990s. The one-hour ozone nonattainment area included Collin, Dallas, Denton, and Tarrant Counties. As a result of the designation, the State of Texas was required to submit a state implementation plan (SIP) demonstrating a 15 percent volatile organic compounds (VOC) emissions reduction, net of growth, for the DFW area from 1990 to 1996. The Texas Commission on Environmental Quality (TCEQ) adopted the 15 percent Rate-of-Progress (ROP) SIP in two phases in November 1993 and May 1994 and submitted it to the EPA.

The EPA determined that the DFW area did not attain the one-hour ozone standard by the November 1996 deadline, and consequently EPA reclassified the area to “serious” providing a new attainment deadline of November 1999. The reclassification required the TCEQ to demonstrate an additional nine percent VOC emission reduction between 1996 and 1999. In March 1999, the TCEQ submitted a SIP to the EPA that addressed attainment of the one-hour standard for the DFW area and included VOC reductions that partially satisfied the additional nine percent ROP requirement for 1996 to 1999. The commission adopted a complete nine percent ROP SIP in October 1999 and submitted it to the EPA, fulfilling all ROP requirements for the one-hour ozone standard.

On April 30, 2004, EPA published the rule designating the eight-hour ozone nonattainment areas (69 FR23936). This rule expanded the original four-county ozone nonattainment area to nine counties by adding Ellis, Johnson, Kaufman, Parker, and Rockwall Counties. The new nine-county area was designated as a moderate nonattainment area.

On November 29, 2005, EPA finalized Phase II of its Eight-Hour Ozone Implementation Rule, which detailed reasonable further progress (RFP) requirements for eight-hour ozone nonattainment areas (70 Fed Reg 71612-71705).

### 1.2 REASONABLE FURTHER PROGRESS REQUIREMENTS

The DFW eight-hour ozone nonattainment area consists of two sets of counties: the original four one-hour nonattainment counties (Collin, Dallas, Denton, and Tarrant) and the five newly designated nonattainment counties (Ellis, Johnson, Kaufman, Parker, and Rockwall). Because of this unique circumstance, the TCEQ has two options under the federal rule for fulfilling its eight-hour ozone RFP requirements for the DFW area. Option 1 treats all nine counties as a single area with a single RFP reduction target. Under this option, a 15 percent reduction in VOC emissions from the entire nine-county area between 2002 and 2008 must be demonstrated. Option 2 treats the two sets of counties as separate areas with separate RFP targets. In accordance with 40 CFR §51.910, the newly designated five-county area must demonstrate a 15 percent VOC reduction between 2002 and 2008. For the four original counties, the TCEQ must demonstrate a 15 percent reduction in emissions for the four-county area between 2002 and 2008, and either VOC, nitrogen oxides (NO<sub>x</sub>), or a combination of the two may be used to reduce emissions.

The TCEQ chose Option 2 to fulfill the eight-hour ozone RFP requirements for the DFW area, using VOC reductions for the five-county area and NO<sub>x</sub> reductions for the four-county area. Using NO<sub>x</sub> reductions for the four-county area is consistent with the DFW eight-hour ozone

attainment demonstration SIP that shows NO<sub>x</sub> emissions reductions are more effective than VOC emission reductions for reducing ozone levels in the DFW nine-county area.

**1.3 PUBLIC HEARING AND COMMENT INFORMATION**

The commission held public hearings at the following times and locations:

<b>CITY</b>	<b>DATE</b>	<b>TIME</b>	<b>LOCATION</b>
Houston	January 29, 2007	2:00 P.M.	Houston-Galveston Area Council 3555 Timmons Lane Houston, TX 77027 Conference Room A, on the second floor
Houston	January 29, 2007	6:00 P.M.	Houston-Galveston Area Council 3555 Timmons Lane Houston, TX 77027 Conference Room A, on the second floor
Dallas	January 31, 2007	7:00 P.M.	Dallas Public Library Auditorium 1515 Young St., Dallas, TX 75201
Arlington	February 1, 2007	2:00 P.M.	Arlington City Hall 101 W. Abram Street Arlington, TX 76010
Midlothian	February 1, 2007	6:00 P.M.	Midlothian Conference Center 1 Community Center Circle Midlothian, TX 76065
Longview	February 6, 2007	2:00 P.M.	Longview Public Library 222 W. Cotton Street Longview, TX 75601
Austin	February 8, 2007	2:00 P.M.	Texas Commission on Environmental Quality 12100 Park 35 Circle, Austin, TX 78753 Building E, Room 201S

Comments were also accepted via fax, mail, or electronic comment. The comment period opened on December 29, 2006, and closed February 12, 2007.

**1.4 SOCIAL AND ECONOMIC CONSIDERATIONS**

No new control strategies have been incorporated into this revision. Therefore, there are no additional social or economic costs associated with this revision.

**1.5 FISCAL AND MANPOWER RESOURCES**

The state has determined that its fiscal and manpower resources are adequate and will not be adversely affected through the implementation of this plan.

## **CHAPTER 2: EMISSIONS INVENTORIES**

### **2.1 INTRODUCTION**

The 1990 FCAA require that RFP emissions inventories be prepared for ozone nonattainment areas. The TCEQ maintains an emissions inventory (EI) of up-to-date emissions information that includes the ozone precursors, NO<sub>x</sub> and VOC. The EI identifies the source types present in an area, the amount of each pollutant emitted, and the types of processes and control devices employed at each plant or source category. A variety of air quality planning tasks are based on the data from the EI. These tasks include establishing baseline emission levels, calculating reduction targets, developing control strategies to meet the required emission reductions, developing emission inputs into air quality models, and tracking actual emission reductions against established emissions growth and control budgets. The total NO<sub>x</sub> and VOC EI for an area is summarized from the estimates developed for the five general categories of emission sources: stationary point, area, on-road mobile, non-road mobile, and biogenics.

Since the previous DFW Rate-of-Progress (ROP) SIP revision was submitted to EPA in 2004 more accurate data has been made available and improved calculation methods have been developed. Because of these changes, this RFP SIP revision updates emissions data for the RFP base year (2002) and for the milestone year (2008). Since the base year and milestone year inventories have been updated, the emissions reductions from control strategies must also be reevaluated. This SIP revision updates both the emission reductions and the control strategies used to fulfill the RFP and contingency requirements.

#### **2.1.1 UPDATED UNCONTROLLED MILESTONE INVENTORIES - 2008**

The uncontrolled milestone year EI represents the inventory for the milestone year if no further action to control emissions is taken beyond the controls already accounted for in the 2002 base year inventory. The inventory is first calculated for each major source category using EPA-approved methodologies and then combined to obtain the total uncontrolled milestone year inventory for VOC and NO<sub>x</sub>. The uncontrolled milestone inventory includes pre-2002 FCAA controls and growth in activity from 2002 to the milestone year, but it does not contain post-2002 FCAA controls.

#### **2.1.2 UPDATED CONTROLLED MILESTONE YEAR - 2008**

The controlled milestone year EI represents the inventory for the milestone year with growth from the 2002 base year and with all RFP controls taken into account. The inventory is first calculated for each major source category using EPA-approved methodologies and then combined to obtain the total controlled milestone year inventory for VOC and NO<sub>x</sub>. The controlled milestone inventory includes pre-2002 FCAA controls, growth in activity from 2002 to the milestone year, and post-2002 FCAA controls used to meet the RFP target emissions level but does not include post-2002 FCAA controls that are not used to meet the RFP target emissions level.

### **2.2 POINT SOURCES**

#### **2.2.1 EMISSIONS INVENTORY DEVELOPMENT**

Point source emissions and industrial process operating data are collected annually from sites that meet the reporting requirements of 30 Texas Administrative Code §101.10. To collect data, the TCEQ mails emissions inventory questionnaires (EIQs) to all sources identified as meeting the reporting requirements. Companies are required to report emissions data for all emissions generating units and emissions points and to provide representative samples of calculations used to estimate the emissions. Information is also required on process equipment descriptions, operating schedules, emission control devices, abatement device control efficiencies, and emission point discharge parameters such as location, height, and exhaust gas flow rate. All data

submitted in the EIQ are subjected to quality assurance procedures. The data are then stored in the State of Texas Air Reporting System (STARS) database.

**2.2.2 UPDATED 2002 BASE YEAR INVENTORY**

The 2002 base year inventory data were retrieved on June 16, 2006, from STARS. The inventory includes all sites in the DFW area that reported their emissions and reflects revisions made on or before that date. Additional information is available upon request from the TCEQ’s Air Quality Division. The following TCEQ web page contains EI guidance documents, 2002 DFW base year inventory, and other historical point source inventories of major pollutants (e.g., NO<sub>x</sub>, VOC, SO<sub>2</sub>, etc.): <http://www.tceq.state.tx.us/implementation/air/industei/psei/psei.html>.

**2.2.3 UPDATED UNCONTROLLED 2008 MILESTONE YEAR INVENTORY**

The TCEQ used the 2002 base year inventory to develop the uncontrolled 2008 future year point source inventory. The 2002 inventory was projected by applying growth factors and adding emissions credits. Industrial emissions growth was determined by multiplying the 2002 inventory by growth factors that represent the projection of industrial expansion to 2008. Emissions were then added to account for unused emissions credits, since these credits may be used to offset future projects.

The emissions growth from 2002 to 2008 is based on projection factors derived from the following sources: the Texas Industrial Production Index (TIPI) factors; the Economic Growth Analysis System (EGAS) 5.0; the Regional Economic Modeling, Inc. (REMI) Texas model; and the Moody’s Economy, Inc. factors. Sets of factors from each source were obtained for each Standard Industrial Classification (SIC) at the county level. These sets of factors were then compared to an actual growth factor obtained by comparing the emissions increases from the 2002 to the 2004 reported inventories. Next, the projection factor set closest to the actual growth factor was used to project the 2002 base inventory to 2008.

The growth in NO<sub>x</sub> and VOC emissions in the DFW area was adjusted to account for the emissions credits banked in the Emissions Banking and Trading (EBT) database. Emission Reduction Credits (ERC) and Discrete Emission Reduction Credits (DERC) as of July 2006 were applied to the 2008 inventory since these banked emissions are able to return to the airshed in the future.

**2.2.4 UPDATED CONTROLLED 2008 MILESTONE YEAR INVENTORY**

The controlled 2008 inventory was obtained by applying future controls to the uncontrolled 2008 inventory. Controls were applied to electric generating units (EGUs), engines, and surface coating sources. All controls were applied on a generating unit level. For more information on these controls refer to Chapter 4.

A summary of the point source RFP inventories is presented in Table 2-1: *DFW Nine-County RFP Point Source NO<sub>x</sub> Emissions* and Table 2-2: *DFW Nine-County RFP Point Source VOC Emissions*.

**Table 2-1: DFW Nine-County RFP Point Source NO<sub>x</sub> Emissions**

Emissions Inventory	NO <sub>x</sub> (tons per day)		
	Four Core Counties	Five New Counties	Nine-County Total
2002 Base Year	34.55	44.70	79.25
2008 Uncontrolled	43.85	62.94	106.79
2008 Controlled	17.16	61.45	78.61

**Table 2-2: DFW Nine-County RFP Point Source VOC Emissions**

Emissions Inventory	VOC (tons per day)		
	Four Core Counties	Five New Counties	Nine-County Total
2002 Base Year	18.73	7.69	26.42
2008 Uncontrolled	21.66	8.99	30.65
2008 Controlled	21.66	8.81	30.47

For more details on the point source projection method, refer to Appendix 3: *Point Source Inventory Projection Methodology*.

## 2.3 AREA SOURCES

### 2.3.1 EMISSIONS INVENTORY DEVELOPMENT

Area sources are commercial, small-scale industrial, and residential sources that use materials or operate processes that can generate emissions. Area sources are too small to meet the reporting criteria for major point sources, so emissions are calculated as county-wide totals rather than as individual facilities. Area sources can be divided into two groups characterized by the emission mechanism: hydrocarbon evaporative emissions or fuel combustion emissions. Examples of evaporative sources include printing operations, industrial coatings, degreasing solvents, house paints, leaking underground storage tanks, gasoline service station underground tank filling, and vehicle refueling operations. Fuel combustion sources include stationary source fossil fuel combustion at residences and businesses, outdoor refuse burning, structural fires, and wildfires. With some exceptions, these emissions may be calculated by multiplying an established emission factor (emissions per unit of activity) by the appropriate activity or activity surrogate responsible for generating emissions. Population is the most commonly used activity surrogate for many area sources, while other activity data include the amount of gasoline sold in an area, employment by industry type, and acres of cropland.

### 2.3.2 UPDATED 2002 BASE YEAR INVENTORY

The 2002 base year EI was developed in 2003. Since the TCEQ was required to submit this inventory to EPA as the Periodic Emissions Inventory, considerable effort went into its development. Since that time, there have been additional updates to the 2002 area source inventory. Improvements resulted from “bottom-up” surveys for some categories, such as gasoline stations. Surveys produce data that more accurately depict facility activity levels than “top-down” methodologies that usually rely on default surrogates, such as county populations and numbers of employees associated with appropriate EPA emission factors. Activity data for other categories were available from various sources. The Energy Information Administration maintains state-level fuel use data for the residential, industrial, and commercial sectors for fuels ranging from coal to natural gas. This data is useful in calculating emissions from home cooking, water heating, and similar use at the industrial and commercial levels. Actual oil and gas production data were available from the Texas Railroad Commission. State and local governments also provided data on asphalt usage in on-road paving projects. In addition, data for small coating sources (e.g., auto refinishing, coil coatings, and marine coatings) came from actual businesses in the individual counties. The EPA’s Emissions Inventory Improvement Program produced approved methodologies for several area source categories. The latest version of the EPA’s growth factor system, EGAS 5.0, was used to project emissions from the 1999 area source emissions inventory for some sources.

### 2.3.3 UPDATED UNCONTROLLED 2008 MILESTONE YEAR INVENTORY

For most area source categories, the 2002 base year EI was projected to year 2008 using improved growth factors. A major contracted project developed a complete set of updated EGAS growth factors using Regional Economic Modeling, Inc. (REMI) and other economic data. For a few categories, census populations were used to grow the emissions.

### 2.3.4 UPDATED CONTROLLED 2008 MILESTONE YEAR INVENTORY

The controlled 2008 inventory was developed by first projecting the 2002 base year inventory to 2008 and then applying controls. Different sets of controls were applied to the four original nonattainment counties (Collin, Dallas, Denton, and Tarrant) and the five new nonattainment counties (Ellis, Johnson, Kaufman, Parker, and Rockwall). For the four original counties, most area source controls were already in place prior to 2002, so the only additional control in the four-county area is the small portable fuel container rule. Controlled emissions were developed using appropriate rule effectiveness factors. For the five new counties, however, rules concerning specific coating activities were not yet in effect in 2002. These coating categories included automobile refinishing, factory finished wood, wood furniture, metal cans, metal coils, and machinery and equipment. In addition, neither the gasoline station underground tank refilling (Stage I) rule nor the portable fuel container rule were in effect in the five new counties. The 2008 controlled EI for area sources reflects emission reductions from these rules.

A summary of the area source RFP inventories is presented in Table 2-3: *DFW Nine-County RFP Area Source NO<sub>x</sub> Emissions* and Table 2-4: *DFW Nine-County RFP Area Source VOC Emissions*.

**Table 2-3: DFW Nine-County RFP Area Source NO<sub>x</sub> Emissions**

Emissions Inventory	NO <sub>x</sub> (tons per day)		
	Four Core Counties	Five New Counties	Nine-County Total
2002 Base Year	34.96	2.08	37.04
2008 Uncontrolled	31.59	2.02	33.61
2008 Controlled	31.59	2.02	33.61

**Table 2-4: DFW Nine-County RFP Area Source VOC Emissions**

Emissions Inventory	VOC (tons per day)		
	Four Core Counties	Five New Counties	Nine-County Total
2002 Base Year	205.07	32.34	237.41
2008 Uncontrolled	231.54	38.29	269.83
2008 Controlled	227.53	35.17	262.70

## 2.4 NON-ROAD MOBILE SOURCES

### 2.4.1 EMISSIONS INVENTORY DEVELOPMENT

Non-road mobile sources include a large assortment of off-highway equipment, from 600-horsepower engines mounted on construction equipment to one-horsepower string trimmers. EPA's NONROAD model was developed to calculate emissions from all non-road mobile source categories except aircraft, commercial marine, and locomotives. The classes of equipment in the model cover equipment associated with the following areas: recreational, construction, industrial, lawn and garden, agricultural, commercial, logging, railroad maintenance, recreational boating, oil exploration, and airport ground support. Emissions from these NONROAD model sources are based on information about equipment population, engine horsepower and load factor, emission factors, and annual usage. Aircraft emissions are calculated using the Environmental Data Management System (EDMS) model, which uses aircraft types and actual airport operations as calculation activities. Data on locomotives, such as actual fuel use and track distances, were obtained from rail lines and used in emissions calculations. Recently, several projects using improved methodologies have revised the non-road mobile emissions inventory for some categories.

#### 2.4.2 UPDATED 2002 BASE YEAR INVENTORY

Since the 2002 base year EI was originally developed in 2003, some updates in non-road mobile source emissions have occurred. Input data in the NONROAD model were updated using the results of two major contracted projects. Surveys of diesel construction equipment produced an improved emissions inventory for this category. Selected industrial equipment types were also surveyed, and the inventory was likewise improved. Using the new data, revised 2002 non-road emissions inventories for the NONROAD model categories, specifically for the DFW and Houston-Galveston-Brazoria (HGB) nonattainment areas SIP revisions, were developed. For the major non-road mobile categories not included in the model, there were also improvements to the original 2002 inventory.

Commercial aircraft emissions estimates were improved using updated information on actual aircraft types. This data was input into the EDMS aircraft model. Locomotive emissions estimates were updated from a contracted survey of activities of line haul and yard engines.

#### 2.4.3 UPDATED UNCONTROLLED 2008 MILESTONE YEAR INVENTORY

The uncontrolled 2008 inventory for non-road mobile sources was developed by combining the output of the NONROAD model with independently-developed emissions estimates for locomotive engines. To produce the NONROAD portion of the inventory, the NONROAD model was run with federal control measures disengaged. Emissions for locomotives and aircraft were projected from the 2002 base year to 2008 using recently developed REMI EGAS growth factors for the appropriate categories.

#### 2.4.4 UPDATED CONTROLLED 2008 MILESTONE YEAR INVENTORY

Similar to the uncontrolled 2008 inventory, the controlled 2008 inventory for non-road mobile sources was developed by combining the output of the NONROAD model with independently-developed emissions estimates for locomotive engines. The NONROAD portion of the inventory was produced by running the NONROAD model with federal controls in place. The locomotive portion of the controlled 2008 inventory was developed by reviewing federal standards affecting locomotive engines and calculating the inventory with controls in place.

A summary of the non-road mobile source RFP inventories is presented in Table 2-5: *DFW Nine-County RFP Non-Road Mobile Source NO<sub>x</sub> Emissions* and Table 2-6: *DFW Nine-County RFP Non-Road Mobile Source VOC Emissions*.

**Table 2-5: DFW Nine-County RFP Non-Road Mobile Source NO<sub>x</sub> Emissions**

Emissions Inventory	NO <sub>x</sub> (tons per day)		
	Four Core Counties	Five New Counties	Nine-County Total
2002 Base Year	117.22	17.45	134.67
2008 Uncontrolled	176.96	28.30	205.26
2008 Controlled	98.49	13.80	112.29

**Table 2-6: DFW Nine-County RFP Non-Road Mobile Source VOC Emissions**

Emissions Inventory	VOC (tons per day)		
	Four Core Counties	Five New Counties	Nine-County Total
2002 Base Year	108.63	10.97	119.60
2008 Uncontrolled	181.75	17.81	199.56
2008 Controlled	79.83	8.78	88.61

### 2.5 ON-ROAD MOBILE SOURCES

#### 2.5.1 EMISSIONS INVENTORY DEVELOPMENT

On-road mobile emissions 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 (emission factor) and the number of units of activity must be determined. The EPA provides guidance on the development of emission factors and activity levels.

Emission factors are developed using EPA's mobile emission factor model, MOBILE (current version MOBILE6.2.03). This model allows substantial input in order to simulate the driving behavior, meteorological conditions, and vehicle characteristics specific to the DFW area. The inputs used for the DFW RFP on-road mobile emissions inventory development include vehicle speeds for each roadway link, vehicle age distributions for each vehicle type, percentage of miles traveled for each vehicle type, type of inspection-maintenance program, fuel control programs, and gasoline vapor pressure. Because inputs influence the emission factors calculated by the MOBILE model, every effort is made to input parameters reflecting local conditions, rather than national default values.

To estimate on-road mobile emissions, emission factors calculated by the MOBILE model described above must be multiplied by the level of vehicle activity. On-road mobile source emission factors are expressed in units of grams per mile. Therefore, the activity information that is required to complete the inventory calculation is vehicle miles traveled (VMT). The level of vehicle travel activity is developed using travel demand models (TDMs) run by the Texas Department of Transportation or the local metropolitan planning organizations. TDMs are validated against a large number of ground counts, i.e., traffic passing over counters placed in various locations throughout a county. VMT estimates are often calibrated against outputs from the federal Highway Performance Monitoring System, a federal model built from a different set of traffic counters. Roadway speeds, which are required inputs for the MOBILE model, are calculated by using the activity volumes from the TDM and a post-processor speed model.

A set of on-road mobile source inventories are required to complete the RFP calculations.

- The 2002 base year is the starting point for the eight-hour ozone RFP demonstration. This starting point establishes the inventory as it existed in 2002, the RFP base year established by EPA for areas designated as nonattainment for the eight-hour ozone standard.
- The adjusted base year (ABY) inventories are the basis for calculating the percent reductions, as required in the RFP guidance documented in 40 CFR Parts 51, 52, and 80, Final Rule to Implement the 8-Hour Ozone National Ambient Air Quality Standard; Final Rule, November 29, 2005, and as a basis for determining the non-creditable reductions due to control programs implemented prior to the 1990 FCAA. Because the ABY inventory adjusts the 2002 base year inventory for the fleet turnover effects of the pre-1990 Federal Motor Vehicle Control Program (FMVCP) and the 1992 Reid Vapor Pressure (RVP) control, only the emission rates are different than the 2002 base year. Speed and VMT activity levels for both the 2002 base year and ABY inventories are consistent with both the TDM output for the 2002 roadway network and demographic demands.
- An on-road mobile ABY inventory is required for each milestone year and for any year for which a percent reduction requirement calculation must be completed. The ABY inventory is used to determine the level of non-creditable reductions for each RFP milestone year.
- The RFP analysis also requires an uncontrolled inventory with growth for each milestone year. These uncontrolled inventories serve as the basis for determining how much emissions reduction is required to meet the RFP target. The control strategy inventories serve as the basis for calculating on-road mobile source control strategy reductions for each milestone year.

- The RFP analysis requires the calculation of a controlled inventory to subtract from the uncontrolled inventory to determine the effectiveness of control strategies. RFP requires direct calculation of the control reduction, which may then be subtracted from the uncontrolled inventory to determine the controlled inventory value. Both the total control reductions from on-road mobile sources and the emission reductions from each individual control were calculated.

For complete documentation of the development of the on-road mobile source inventories for the DFW RFP demonstration, refer to Appendix 4: *Development of DFW RFP On-Road Mobile Source Emissions Inventories*. The complete set of input and output files are available upon request from the TCEQ's Air Quality Division.

A summary of the on-road mobile source vehicle miles traveled was used to develop the various NO<sub>x</sub> and VOC emissions levels in subsequent tables and is presented in Table 2-7: *DFW Nine-County RFP Ozone Season Weekday On-Road Mobile Source VMT*, Table 2-8: *DFW Nine-County RFP Ozone Season Weekday On-Road Mobile Source NO<sub>x</sub> Emissions*, and Table 2-9: *DFW Nine-County RFP Ozone Season Weekday On-Road Mobile Source VOC Emissions*.

**Table 2-7: DFW Nine-County RFP Ozone Season Weekday On-Road Mobile Source VMT**

Emissions Inventory	VMT (miles per day)		
	4 Core Counties	5 New Counties	9 County Total
2002 Base Year (Chapter 2.5.2)	141,945,229	13,178,419	155,123,648
2002 Adjusted Base Year (ABY) (Chapter 2.5.3)			
2008 ABY (Chapter 2.5.3)	165,117,267	19,218,113	184,335,381
2008 With 2002 Control (Uncontrolled) (Chapter 2.5.4)			
2008 Control Strategy (Chapter 2.5.5)			

**Table 2-8: DFW Nine-County RFP Ozone Season  
Weekday On-Road Mobile Source NO<sub>x</sub> Emissions**

Emissions Inventory	NO <sub>x</sub> (tons per day)		
	4 Core Counties	5 New Counties	9 County Total
2002 Base Year	296.01	60.22	356.23
2002 Adjusted Base Year (ABY)	369.55	68.58	438.13
2008 ABY	343.03	58.16	401.19
2008 With 2002 Control (Uncontrolled)	399.45	75.92	475.37
2008 Control Strategy	187.89	38.78	226.67

**Table 2-9: DFW Nine-County RFP Ozone Season  
Weekday On-Road Mobile Source VOC Emissions**

Emissions Inventory	VOC (tons per day)		
	4 Core Counties	5 New Counties	9 County Total
2002 Base Year	143.28	18.32	161.60
2002 Adjusted Base Year (ABY)	210.42	20.87	231.29
2008 ABY	207.73	18.94	226.67
2008 With 2002 Control (Uncontrolled)	237.18	24.93	262.11
2008 Control Strategy	97.15	11.77	108.92

**2.5.2 UPDATED 2002 BASE YEAR INVENTORY**

The 2002 base year EI for on-road mobile sources was updated using emission factors calculated using the latest version of the MOBILE model, MOBILE6.2.03. Additional updates were made in order to incorporate the latest activity estimates from the DFW travel demand model 2002 network. Only control strategies implemented prior to 2002 were included in the input to the inventory development for the 2002 on-road mobile source base year inventory. These controls include Pre-1990 FMVCP, fleet turnover to Tier 1 FMVCP, reformulated gasoline, and the DFW inspection and maintenance (I/M) program. The activity levels used to calculate the inventory reflect the 2002 roadway network with 2002 VMT and speeds. A summary of the inventory is presented in Tables 2-8 and 2-9. For complete documentation of the development of the inventory and details on MOBILE model inputs, refer to Appendix 4: *Development of DFW RFP On-Road Mobile Source Emissions Inventories*.

**2.5.3 UPDATED 2002 ADJUSTED BASE YEAR INVENTORIES FOR BASE AND MILESTONE YEARS 2002 AND 2008**

The RFP planning process includes calculating the adjusted base year EI, from which required percent emission reductions are calculated. As specified by the 1990 FCAAA, certain on-road mobile source emissions reductions are not creditable toward these required percentage reductions. The non-creditable reductions include reductions that would occur by the target years due to the pre-1990 FCAAA state controls, pre-1990 FMVCP, and pre-1990 promulgated federal fuel volatility regulations (summertime gasoline RVP limits beginning in 1992). Because the defeat device for heavy-duty diesel vehicles (HDDVs) was affecting a FMVCP that was implemented prior to the 1990 FCAAA, the HDDV NO<sub>x</sub> off-cycle emissions effects and associated mitigation program effects are also considered non-creditable. For this updated DFW RFP demonstration, pre-1990 non-creditable emission factor reductions include pre-1990

FCAAA FMVCP, 1992 summertime RVP limits, and HDDV NO<sub>x</sub> off-cycle emissions and mitigation programs.

An adjusted base year EI for on-road mobile sources is developed for the 2008 milestone year using emission factors from the MOBILE model that reflect only control strategies implemented prior to 1990, but projected to the 2008 milestone year. By projecting the pre-1990 FMVCP into future years, the effects of additional fleet turnover due to the new standards is reflected in the emission factors. The controls included in the ABY inventory development include Pre-1990 FMVCP and the 1992 low-RVP control. The activity levels used to calculate the ABY inventories reflect the 2002 roadway network with 2002 VMT and speeds. The estimated non-creditable emissions reductions due to pre-1990 controls are calculated by subtracting the 2002 ABY inventory relative to the target year from the actual 2002 base year inventory. A summary of the inventories and associated non-creditable emissions reductions is presented in Table 2-10: *Summary of DFW Non-Creditable Reductions, Ozone Season Weekday On-Road Mobile Source Emissions*. For complete documentation of the development of the inventory and details on MOBILE model inputs, refer to Appendix 4: *Development of DFW RFP On-Road Mobile Source Emissions Inventories*.

**Table 2-10: Summary of DFW Non-Creditable Reductions, Ozone Season Weekday On-Road Mobile Source Emissions (tons per day)**

Description	DFW Four Core Counties		DFW Five Newly Designated Counties	
	VOC	NO <sub>x</sub>	VOC	NO <sub>x</sub>
2002 Adjusted Base Year (ABY)	210.42	369.55	20.87	68.58
2008 ABY	207.73	343.03	18.94	58.16
2008 RFP Non-creditable Emissions Reductions	2.69	26.52	1.93	10.42

#### **2.5.4 UPDATED UNCONTROLLED 2008 MILESTONE YEAR EMISSIONS INVENTORY**

The milestone year uncontrolled EI for on-road mobile sources was developed using emission factors from the MOBILE model that reflect only the control strategies implemented prior to 2002. MOBILE6.2.03 was used to develop the inventories for this SIP revision. The activity levels were updated to include the latest output from the DFW travel demand model (TDM). These controls include Pre-1990 FMVCP, the 1992 RVP control, fleet turnover to Tier 1 FMVCP, reformulated gasoline, and the DFW I/M program. The activity levels used to calculate the inventory reflect the milestone roadway network with milestone year VMT and speeds. A summary of the inventories is presented in Tables 2-8 and 2-9. For complete documentation of the development of the inventory and details on MOBILE model inputs, refer to Appendix 4: *Development of DFW RFP On-Road Mobile Source Emissions Inventories*.

#### **2.5.5 UPDATED CONTROLLED 2008 MILESTONE YEAR EMISSIONS INVENTORY**

The milestone year controlled EI for on-road mobile sources was developed using emission factors from the MOBILE model that reflect both control strategies implemented prior to 2002 and the control strategies used to demonstrate compliance with RFP requirements. These controls include Pre-1990 FMVCP, fleet turnover to Tier 1 of the FMVCP, fleet turnover to Tier 2 of the FMVCP, the 2007 heavy duty diesel FMVCP standards, Summer Reformulated Gasoline, I/M, Anti-Tampering Program (ATP), and Texas Low Emission Diesel (TxLED). Control scenario inventory values include both the controlled inventory value and the quantification of reductions for each control strategy. A summary of the uncontrolled on-road mobile inventory, the individual on-road mobile control reductions and the resulting controlled on-road mobile

inventory for 2008 are summarized in Tables 2-11: 2008 DFW RFP Ozone Season Weekday On-Road Mobile Source NO<sub>x</sub> Emissions and Control Strategy Reductions and 2-12: 2008 DFW RFP Ozone Season Weekday On-Road Mobile Source VOC Emissions and Control Strategy Reductions.

**Table 2-11: 2008 DFW RFP Ozone Season Weekday On-Road Mobile Source NO<sub>x</sub> Emissions and Control Strategy Reductions**

Emissions Inventory	NO <sub>x</sub> (tons per day)		
	4 Core Counties	5 New Counties	9 County Total
2008 Uncontrolled	399.45	75.92	475.37
Tier 1 Federal Motor Vehicle Control Program (FMVCP)	(-)75.63	(-)19.19	(-)94.82
I/M in Dallas and Tarrant Counties	(-)19.57	NA	(-)19.57
Federal Reformulated Gasoline (RFG) (Core counties only)	(-)53.05	NA	(-)53.05
National Low Emission Vehicle Program (NLEV)	(-)12.39	(-)0.48	(-)11.92
Tier 2 FMVCP	(-)32.34	(-)10.98	(-)43.32
2007 Heavy Duty Diesel FMVCP	(-)8.77	(-)2.88	(-)11.65
Expanded I/M	(-)3.96	(-)2.77	(-)6.73
TxLED	(-)5.85	(-)1.81	(-)7.66
2008 Control Strategy	187.89	38.77*	226.65*

\*Calculations have been rounded to the hundredth's place to maintain consistency between all values.

**Table 2-12: 2008 DFW RFP Ozone Season Weekday On-Road Mobile Source VOC Emissions and Control Strategy Reductions**

Emissions Inventory	VOC (tons per day)		
	4 Core Counties	5 New Counties	9 County Total
2008 Uncontrolled	237.18	24.93	262.11
Tier 1 Federal Motor Vehicle Control Program (FMVCP)	(-)60.85	(-)5.98	(-)66.83
I/M in Dallas and Tarrant Counties	(-)18.28	0.0	(-)18.28
Federal Reformulated Gasoline (RFG) (Core counties only)	(-)39.25	NA	(-)39.25
National Low Emission Vehicle Program (NLEV)	(-)6.54	(-)1.06	(-)7.60
Tier 2 FMVCP	(-)11.80	(-)4.08	(-)15.89
2007 Heavy Duty Diesel FMVCP	(-)0.17	(-)0.03	(-)0.20
Expanded I/M	(-)3.15	(-)2.00	(-)5.15
TxLED	0.00	0.00	0.00
2008 Control Strategy	97.14*	11.78*	108.91*

\* Calculations have been rounded to the hundredth's place to maintain consistency between all values.

The motor vehicle emission budgets (MVEBs) for each milestone year is derived from the on-road mobile source uncontrolled inventory and the amount of emission reduction for each mobile source control used in the demonstration of the RFP requirements. MVEB calculations are documented in Chapter 5.

The activity levels used to calculate the inventory reflect the milestone roadway network with milestone year VMT and speeds. Summaries of the inventories are presented in Table 2-8: *DFW Nine-County RFP Ozone Season Weekday On-Road Mobile Source NO<sub>x</sub> Emissions* and Table 2-9: *DFW Nine-County RFP Ozone Season Weekday On-Road Mobile Source VOC Emissions*. For complete documentation of the development of the inventory and details on MOBILE model inputs, refer to Appendix 4: *Development of DFW RFP On-Road Mobile Source Emissions Inventories*.

## **2.6 BIOGENIC SOURCES**

Biogenic sources include hydrocarbon emissions from crops, lawn grass, and trees, as well as a small amount of NO<sub>x</sub> emissions from soils. Plants are sources of VOC such as isoprene, monoterpene, and alpha-pinene. Tools for estimating biogenic emissions include satellite imaging for mapping of vegetative types, field biomass surveys, and computer modeling of emission estimates based on emission factors by plant species using the GLOBEIS model. The biogenic emissions are important in determining the overall emissions profile of an area and are therefore required for regional air quality modeling and to meet periodic EPA reporting requirements. Since the 2002 base year EI is based upon the inventory developed to meet EPA periodic reporting requirements, the 2002 base year EI includes biogenic emissions.

The RFP methodology does not include biogenic emissions. Therefore, the first step in the RFP methodology subtracts the biogenic emissions from the 2002 base year EI. The resulting 2002 total anthropogenic EI is called the 2002 RFP base year EI. As required in the RFP demonstration methodology, biogenic emissions have been subtracted from the 2002 DFW base year EI to calculate the 2002 DFW RFP base year EI. The calculation of the 2002 DFW RFP base year EI is documented in Appendix 1, Sheet 2 *DFW RFP Demonstration Calculations Spreadsheet Four Core Counties* and Appendix 2, Sheet 2 *DFW RFP Demonstration Calculations Spreadsheet Five New Counties*.

Since the RFP methodology excludes biogenic emissions, biogenic RFP EIs are not developed for RFP milestone years.

## **2.7 EMISSIONS SUMMARY**

The 2002 base year EI summary for the DFW ozone nonattainment area is shown in Table 2-13: *DFW Nine-County RFP 2002 Base Year Ozone Season Weekday NO<sub>x</sub> Emissions* and Table 2-14: *DFW Nine-County RFP 2002 Base Year Ozone Season Weekday VOC Emissions*.

The 2008 future year EI without controls for the DFW area is summarized in Table 2-15: *DFW Nine-County RFP 2008 Uncontrolled Ozone Season Weekday NO<sub>x</sub> Emissions* and Table 2-16: *DFW Nine-County RFP 2008 Uncontrolled Ozone Season Weekday VOC Emissions*.

The 2008 future year EI with controls for the DFW area is summarized in Table 2-17: *DFW Nine-County RFP 2008 Controlled Ozone Season Weekday NO<sub>x</sub> Emissions* and Table 2-18: *DFW Nine-County RFP 2008 Controlled Ozone Season Weekday VOC Emissions*.

**Table 2-13: DFW Nine-County RFP 2002 Base Year  
Ozone Season Weekday NO<sub>x</sub> Emissions**

Emissions Inventory	NO <sub>x</sub> (tons per day)		
	4 Core Counties	5 New Counties	9 County Total
Point Source - 2002 RFP Base Year	34.55	44.70	79.25
Area Source - 2002 RFP Base Year	34.96	2.08	37.04
On-Road Mobile Source - 2002 RFP Base Year	296.01	60.22	356.23
Non-Road Mobile Source - 2002 RFP Base Year	117.22	17.45	134.67
Total Anthropogenic - 2002 RFP Base Year	482.74	124.45	607.19

**Table 2-14: DFW Nine-County RFP 2002 Base Year  
Ozone Season Weekday VOC Emissions**

Emissions Inventory	VOC (tons per day)		
	4 Core Counties	5 New Counties	9 County Total
Point Source - 2002 RFP Base Year	18.73	7.69	26.42
Area Source - 2002 RFP Base Year	205.07	32.34	237.41
On-Road Mobile Source - 2002 RFP Base Year	143.28	18.32	161.60
Non-Road Mobile Source - 2002 RFP Base Year	108.63	10.97	119.60
Total Anthropogenic - 2002 RFP Base Year	475.71	69.32	545.03

**Table 2-15: DFW Nine-County RFP 2008 Uncontrolled  
Ozone Season Weekday NO<sub>x</sub> Emissions**

Emissions Inventory	NO <sub>x</sub> (tons per day)		
	4 Core Counties	5 New Counties	9 County Total
Point Source - 2008 RFP Uncontrolled	43.85	62.94	106.79
Area Source - 2008 RFP Uncontrolled	31.59	2.02	33.61
On-Road Mobile Source - 2008 RFP Uncontrolled	399.45	75.92	475.37
Non-Road Mobile Source - 2008 RFP Uncontrolled	176.96	28.30	205.26
Total Anthropogenic - 2008 RFP Uncontrolled	651.85	169.18	821.03

**Table 2-16: DFW Nine-County RFP 2008 Uncontrolled  
Ozone Season Weekday VOC Emissions**

Emissions Inventory	VOC (tons per day)		
	4 Core Counties	5 New Counties	9 County Total
Point Source - 2008 RFP Uncontrolled	21.66	8.99	30.65
Area Source - 2008 RFP Uncontrolled	231.54	38.29	269.83
On-Road Mobile Source - 2008 RFP Uncontrolled	237.18	24.93	262.11
Non-Road Mobile Source - 2008 RFP Uncontrolled	181.75	17.81	199.56
Total Anthropogenic - 2008 RFP Uncontrolled	672.13	90.02	762.15

**Table 2-17: DFW Nine-County RFP 2008 Controlled  
Ozone Season Weekday NO<sub>x</sub> Emissions**

Emissions Inventory	NO <sub>x</sub> (tons per day)		
	4 Core Counties	5 New Counties	9 County Total
Point Source - 2008 RFP Controlled	17.16	61.45	78.61
Area Source - 2008 RFP Controlled	31.59	2.02	33.61
On-Road Mobile Source – 2008 RFP Controlled	187.89	38.78	226.67
Non-Road Mobile Source - 2008 RFP Controlled	98.49	13.80	112.29
Total Anthropogenic - 2008 RFP Controlled	335.13	116.05	451.18

**Table 2-18: DFW Nine-County RFP 2008 Controlled  
Ozone Season Weekday VOC Emissions**

Emissions Inventory	VOC (tons per day)		
	4 Core Counties	5 New Counties	9 County Total
Point Source - 2008 RFP Controlled	21.66	8.81	30.47
Area Source - 2008 RFP Controlled	227.53	35.17	262.70
On-Road Mobile Source – 2008 RFP Controlled	97.15	11.77	108.92
Non-Road Mobile Source - 2008 RFP Controlled	79.83	8.78	88.61
Total Anthropogenic - 2008 RFP Controlled	426.17	64.53	490.70

## CHAPTER 3: TARGET EMISSION LEVELS AND RFP DEMONSTRATION

### 3.1 INTRODUCTION

This chapter details the process and results to show the state meets the 15 percent emission reduction requirement for the period between the 2002 base year through the first RFP milestone year 2008.

Compliance with the 2008 milestone emission reduction requirements are demonstrated by using EPA methodologies, first to calculate the elements of the RFP demonstration and then to use these elements in conjunction with EPA RFP methodology to demonstrate compliance with RFP reduction requirements.

The required RFP elements are:

- 2002 base year emissions,
- 2002 to 2008 non-creditable reductions,
- 2008 target levels of emissions,
- 2008 projected emissions with growth,
- 2008 required emission reductions for VOC and NO<sub>x</sub>, and
- control strategy emissions reduction for 2008.

This chapter describes how the elements of the DFW 2008 RFP demonstration are calculated and used to demonstrate compliance with 2008 RFP requirements and provides a summary of the 2008 DFW RFP demonstration. First, the target level of emissions for 2008 is calculated. Second, the 2008 RFP control reductions are subtracted from the 2008 EI that includes growth between 2002 and 2008. When the 2008 projected inventory minus the RFP controls is less than the target level of emissions for VOC and/or NO<sub>x</sub>, the RFP requirement has been met.

### 3.2 TARGET LEVEL METHODOLOGY

Appendix A to the preamble for the EPA Phase II Eight-Hour Ozone Implementation Rule specifies the method states use to calculate the maximum amount of emissions a nonattainment area can emit for each RFP milestone year. These RFP target levels of emissions are calculated with a six step process.

1. Develop the 2002 base year inventory,
2. Develop the 2002 RFP base year inventory,
3. Develop adjusted base year (ABY) inventories for 2002 and 2008,
4. Calculate the non-creditable fleet turnover correction,
5. Calculate the 2008 necessary 15 percent emission reduction, and
6. Calculate the 2008 target levels of emissions for VOC and NO<sub>x</sub>.

### 3.3 CALCULATION OF TARGET EMISSION LEVELS

Step one of the RFP target calculation is development of the 2002 base year EI. EPA guidance specifies the method states must use to develop SIP emissions inventories. Details of the development of the 2002 DFW base year inventory are discussed in Chapter Two. Summaries of the 2002 DFW base year NO<sub>x</sub> and VOC emissions inventories are presented in Table 2-13: *DFW Nine-County RFP 2002 Base Year Ozone Season Weekday NO<sub>x</sub> Emissions* and Table 2-14: *DFW Nine-County RFP 2002 Base Year Ozone Season Weekday VOC Emissions* in Chapter 2. A summary of the target calculations is presented in Table 3-1: *Summary of Calculation of Target Level for Four DFW Core Counties* and Table 3-2: *Summary of Calculation of Target Level for Five Newly Designated DFW Counties*.

The second step of the RFP target calculation methodology adds or subtracts any emissions from outside the nonattainment area that need to be included with or excluded from the nonattainment area. The resulting inventory is called the 2002 RFP base year inventory and represents the total anthropogenic emissions for the area. Details of the development of the 2002 DFW RFP base year inventory are discussed in Chapter Two. A summary of the 2002 DFW RFP base year emission inventory is presented in Table 2-13: *DFW Nine-County RFP 2002 Base Year Ozone Season Weekday NO<sub>x</sub> Emissions* and Table 2-14: *DFW Nine-County RFP 2002 Base Year Ozone Season Weekday VOC Emissions*.

Step three of the target calculation methodology is development of the ABY inventories for 2002 and 2008. These inventories are an algebraic representation of the effects of the pre-1990 FCAAA controls projected to the RFP base and milestone years. As such these inventories can be used to estimate the effects of the pre-1990 FCAAA controls between milestone years. EPA's methodology allows for the calculation of the non-creditable control reduction that is done as step four. The emission rates for an ABY inventory are developed using the latest version of EPA's emission factor model, MOBILE6.2.03. The model input file is set up to turn off all 1990 FCAAA effects, the model evaluation year is set to the RFP base or milestone year, and then the model is run to determine emission factors for each base/milestone year with only pre-1990 FCAAA controls. The emission factors for all years are then multiplied by the 2002 base year VMT. Since all the inventories use the base year VMT, these inventories are referred to as RFP ABY inventories. Details of the development of the 2002 and 2008 DFW RFP ABY inventories are documented in Chapter Two.

Step four, calculating the non-creditable fleet turnover correction, is accomplished by subtracting the 2008 ABY inventory from the 2002 adjusted base inventory, as shown in Table 2-10. Since the ABY inventories estimate the effects of the non-creditable pre-1990 FCAAA controls, the difference between ABY inventories represents an estimate of the non-creditable RFP emission reductions, also referred to as the fleet turnover correction. The equation for calculating the fleet turnover correction for 2008 is:

$$\text{Fleet Turnover Correction for 2008} = [ \text{EF}_{2002\text{ABY}} * \text{VMT}_{2002} ] - [ \text{EF}_{2008\text{ABY}} * \text{VMT}_{2002} ]$$

Where:

- EF<sub>2002ABY</sub> = MOBILE6.2.03 emission rate with pre-1990 FCAA controls and 2002 evaluation year
- EF<sub>2008ABY</sub> = MOBILE6.2.03 emission rate with pre-1990 FCAA controls and 2008 evaluation year
- VMT<sub>2002</sub> = 2002 vehicle miles traveled

Step five, calculating required 2008 reductions, is accomplished by multiplying the 2002 base year inventory adjusted to 2008 values by the percent reduction needed to meet RFP requirements. EPA's Phase II Eight-Hour Ozone Implementation Rule requires all ozone nonattainment areas classified as moderate and above to reduce NO<sub>x</sub> and/or VOC emissions by 15 percent for the period 2002 through 2008. For the five newly designated DFW counties, the entire 15 percent reduction must come from VOC reduction. For the four core area DFW counties, an equivalent percentage of NO<sub>x</sub> reduction may be substituted for VOC reduction requirements, but the total percent NO<sub>x</sub> and VOC reductions must equal 15 percent. The DFW eight-hour ozone attainment demonstration SIP shows that reductions in NO<sub>x</sub> emissions are more effective than reductions in VOC emissions for reducing ozone levels in the DFW nine-county area. Accordingly, for the four core counties, the RFP reduction requirement for this SIP is satisfied with a 15 percent reduction in NO<sub>x</sub> emissions.

The VOC and NO<sub>x</sub> percentages are multiplied by the 2002 base year inventories adjusted to 2008 for VOC and NO<sub>x</sub>, respectively, to calculate the required VOC and NO<sub>x</sub> emission reductions for 2002. The adjustment to 2008 is calculated by subtracting the non-creditable reductions between 2002 and 2008 from the 2002 base year inventory. The equations for calculating the required percent reductions for VOC and NO<sub>x</sub> are shown below:

$$RQ_{VOC} = [ BY_{2002VOC} - ( ABY_{2002VOC} - ABY_{2008VOC} ) ] * PV_{2008}$$

and

$$RQ_{NO_x} = [ BY_{2002NO_x} - ( ABY_{2002NO_x} - ABY_{2008NO_x} ) ] * PN_{2008}$$

where:

RQ <sub>VOC</sub>	= required VOC emission reductions by 2008
RQ <sub>NO<sub>x</sub></sub>	= required NO <sub>x</sub> emission reductions by 2008
BY <sub>2002VOC</sub>	= 2002 base year inventory for VOC
BY <sub>2002NO<sub>x</sub></sub>	= 2002 base year inventory for NO <sub>x</sub>
ABY <sub>2002VOC</sub>	= 2002 ABY inventory for VOC
ABY <sub>2002NO<sub>x</sub></sub>	= 2002 ABY inventory for NO <sub>x</sub>
ABY <sub>2008VOC</sub>	= 2008 ABY inventory for VOC
ABY <sub>2008NO<sub>x</sub></sub>	= 2008 ABY inventory for NO <sub>x</sub>
PV <sub>2008</sub>	= percentage VOC reductions by 2008
PN <sub>2008</sub>	= percentage NO <sub>x</sub> reductions by 2008

For the five newly designated counties, VOC emissions reduction measures in the five counties and surplus VOC emissions reductions from mobile sources in the four core counties were used to meet the 15 percent reduction requirements. Emission reductions from the four core counties can be used to satisfy the 15 percent VOC reduction requirement for the five newly designated counties per 40 Code of Federal Regulations (CFR) 51.910(a)(1)(iii)(B)(1). Surplus VOC reductions of 10 tons per day (tpd) from the Tier 1 Federal Motor Vehicle Control Program (FMVCP) in the four core counties were applied to the reduction requirement for the five new counties. Details of the emission reductions from all control strategies are documented in Chapter 4 and summarized in Table 4-1: *Summary of Emission Reductions*.

Step six, calculating 2008 target levels of emissions, is accomplished by subtracting the required emission reductions calculated in step five, and the fleet turnover correction factor calculated in step four, from the 2002 base year inventory. This target level represents the level of emissions that must be met in 2008 in order for the DFW area to meet its eight-hour ozone RFP requirements for the 2008 RFP milestone year. Because the fleet turnover correction affects both NO<sub>x</sub> and VOC, target levels will be calculated for both pollutants even when the entire reduction requirement is taken from one pollutant or the other. The calculation of the target levels of emissions for the milestone year can be generalized into the following equation:

$$TL_{2008X} = RFPBY_{2002X} - RQ_X - FTC_{2008X}$$

where:

TL <sub>2008X</sub>	= Target level of emissions for 2008 milestone
RFPBY <sub>2002X</sub>	= 2002 RFP Base Year Emissions
RQ <sub>X</sub>	= Emission reduction requirement for 2008 for pollutant X
FTC <sub>2008X</sub>	= Fleet turnover correction term for 2008 for pollutant X
X	= Either VOC or NO <sub>x</sub>

The RFP plan must demonstrate that the projected emissions for 2008, reflecting the RFP control strategy, will be less than or equal to the calculated target values. For the four core counties, the target level is 387.79 tpd of NO<sub>x</sub> emissions. For the five new counties, the target level is 57.28 tpd of VOC emissions. Appendix 1: *DFW RFP Demonstration Calculations Spreadsheet Four Core Counties* and Appendix 2: *DFW RFP Demonstration Calculations Spreadsheet Five New Counties* documents the calculation of the 2008 target values. Table 3-1: *Summary of Calculation of Target Level for Four DFW Core Counties* and Table 3-2: *Summary of Calculation of Target Level for Five Newly Designated DFW Counties* summarize calculation of the target levels for 2008 for the DFW area. The following sections describe how the target levels are integrated into the RFP demonstration.

**Table 3-1: Summary of Calculation of Target Level for Four DFW Core Counties**

Description	NO <sub>x</sub> tpd	VOC tpd
① Step 1: 2002 Base Year Inventory	482.74	475.71
② Step 2: Add or subtract emissions that are to be added from outside the NA	0.00	0.00
③ 2002 RFP Base Year Inventory	482.74	475.71
④ Step 3: 2002 ABY Inventory	556.28	542.85
⑤ 2008 ABY Inventory	529.76	540.16
⑥ Step 4: Calculate Non-creditable reductions (④ minus ⑤ )	26.52	2.69
⑦ Step 5 :Adjust 2002 Base Year Inventory for Non-creditable Reductions (③ minus ⑥)	456.22	473.02
⑧ Percent of NO <sub>x</sub> (PN) and VOC (PV) to meet 15% Reduction Requirement PN + PV = 15	15	0
⑨ Calculate the 2002 to 2008 15% Reduction Requirement (⑦ x ⑧ )	68.43	0.00
⑩ Step 6 Calculate the Target Level of Emissions (③ minus ⑥ minus ⑨ )	387.79	473.02

**Table 3-2: Summary of Calculation of Target Level for Five Newly Designated DFW Counties**

Description	NO <sub>x</sub> tpd	VOC tpd
① Step 1: 2002 Base Year Inventory	124.45	69.32
② Step 2: Add or subtract emissions that are to be added from outside the NA	0.00	0.00
③ 2002 RFP Base Year Inventory	124.45	69.32
④ Step 3: 2002 ABY Inventory	132.81	71.87
⑤ 2008 ABY Inventory	122.39	69.94
⑥ Step 4: Calculate Non-creditable reductions (④ minus ⑤ )	10.4	1.9
⑦ Step 5 :Adjust 2002 Base Year Inventory for Non-creditable Reductions (③ minus ⑥)	114.03	67.39
⑧ Percent of NO <sub>x</sub> (PN) and VOC (PV) to meet 15% Reduction Requirement PN + PV = 15	0	15
⑨ Calculate the 2002 to 2008 15% Reduction Requirement (⑦ x ⑧ )	0.00	10.11
⑩ Step 6 Calculate the Target Level of Emissions (③ minus ⑥ minus ⑨ )	114.03	57.28

### 3.4 GROWTH

This 2008 RFP SIP demonstration must also describe how any growth in emissions between 2002 and 2008 will be offset. If the target levels are subtracted from projected inventories that include growth and exclude all controls between 2002 and 2008, the result will be the required RFP control reductions that account for noncreditable reductions, the percent reduction requirement and emissions growth. The following two equations represent the general calculation methodology for determining the total amount of control reduction for VOC and NO<sub>x</sub> that is required for the 2008 DFW milestone year. Table 3-3: *Summary of Required Reductions that Include Growth for Four DFW Core Counties* and Table 3-4: *Summary of Required Reductions that Include Growth for Five Newly Designated DFW Counties* summarize the calculation of the required reductions for the four core and five newly designated DFW counties.

$$ER_{NO_x2008} = UPE_{2008NO_x} - TL_{2008NO_x}$$

$$ER_{VOC2008} = UPE_{2008VOC} - TL_{2008VOC}$$

Where:

- ER<sub>NO<sub>x</sub>2008</sub> = RFP NO<sub>x</sub> emission reductions for 2008
- UPE<sub>2008NO<sub>x</sub></sub> = uncontrolled projected NO<sub>x</sub> emission for 2008
- TL<sub>2008NO<sub>x</sub></sub> = Target level of NO<sub>x</sub> emissions for 2008 milestone
- ER<sub>VOC2008</sub> = RFP VOC emission reductions for 2008
- UPE<sub>2008VOC</sub> = uncontrolled projected VOC emission for 2008
- TL<sub>2008VOC</sub> = Target level of VOC emissions for 2008 milestone

**Table 3-3: Summary of Required Reductions that Include Growth for Four DFW Core Counties**

Description	NO <sub>x</sub> tpd	VOC tpd
① Uncontrolled Projected 2008 Inventory (Chapter 2, Tables 2-15 and 2-16)	651.85	672.13
② Target Level of Emissions for 2008 (from Table 3-1)	387.79	473.02
③ Required Reductions for 2008 (① minus ② )	264.06	199.11
④ Noncreditable Reductions (from Table 3-1)	26.52	2.69
⑤ 2002 to 2008 15% Reduction Requirement (from Table 3-1)	68.43	0.00
⑥ Amount of Reduction to Account for Growth (③ minus ④ minus ⑤ )	169.11	196.42

**Table 3-4: Summary of Required Reductions that Include Growth for Five Newly Designated DFW Counties**

Description	NO <sub>x</sub> tpd	VOC tpd
① Uncontrolled Projected 2008 Inventory (Chapter 2, Tables 2-15 and 2-16)	169.18	90.02
② Target Level of Emissions for 2008 (from Table 3-2)	114.03	57.28
③ Required Reductions for 2008 (① minus ② )	55.15	32.74
④ Noncreditable Reductions (from Table 3-2)	10.4	1.9
⑤ 2002 to 2008 15% Reduction Requirement (from Table 3-2)	0.00	10.11
⑥ Amount of Reduction to Account for Growth (③ minus ④ minus ⑤ )	44.75	20.73

The projection or forecast year emissions inventories are the state's estimation of the level of VOC and NO<sub>x</sub> emissions if no further action is taken to control VOC or NO<sub>x</sub> emissions. The VOC and NO<sub>x</sub> projected year emissions inventories are derived by applying the appropriate projection methodologies to the 2002 base year emissions inventories, to emission factor development, and/or to activity level estimates. The resulting inventories include any growth that occurs between 2002 and 2008. The projection methodology for the uncontrolled 2008 RFP EIs excludes changes in the emission factors due to control strategies so that the projections represent the total growth in emissions. The development of the uncontrolled projected EIs is documented in Chapter Two.

### **3.5 RFP DEMONSTRATION**

The EPA's Phase II Eight-hour Ozone Implementation Rule requires all ozone nonattainment areas classified as moderate and above to reduce NO<sub>x</sub> and/or VOC emissions by 15 percent for the period 2002 through 2008. The target levels are subtracted from the emissions forecast to calculate the required emission reductions necessary for the 2008 milestone year. The actual emissions reductions are then subtracted from the required reductions. The control strategy plan must show emission reductions that will reduce the future emissions inventories to a value less than the emissions target value. For the four core DFW counties, this requirement is met by achieving reductions of 15 percent NO<sub>x</sub> for RFP and three percent NO<sub>x</sub> for contingency. For the five newly designated DFW counties, the requirement is met by achieving reductions of 15 percent VOC for RFP and three percent VOC for contingency. Since all reductions in the core counties are met with NO<sub>x</sub> reductions there is no VOC reduction requirement for these counties. Similarly since all emission reductions are VOC for the five newly designated counties, there are no NO<sub>x</sub> reduction requirements for these counties.

Since the RFP requirement in the four core and the five newly designated counties in DFW are different, separate RFP demonstrations have been performed for each set of counties to complete the RFP requirement for DFW. Table 3-2: *Summary of RFP Demonstration for Four Core DFW Counties*, and Table 3-3: *Summary of RFP Demonstration for Five Newly Designated DFW Counties*, summarize the demonstration of the RFP plan for DFW for the 2008 milestone year. All RFP calculations, including the required 2008 reductions, the fleet turnover correction factor, and the 2008 target emission levels are calculated and shown in Appendix 1: *DFW RFP Demonstration Calculations Spreadsheet Four Core Counties* and Appendix 2: *DFW RFP Demonstration Calculations Spreadsheet Five New Counties*.

**Table 3-5: Summary of RFP Demonstration for Four DFW Core Counties**

Description	2008	
	tpd NO <sub>x</sub>	tpd VOC*
2008 Uncontrolled Emissions Forecast (Chapter 2, Tables 2-15 and 2-16)	651.85	672.13
Target Level of 2008 Emissions (Table 3-1)	387.79	473.02
Required Reductions from 2008 Uncontrolled Emissions Forecast (Table 3-3)	264.06	199.11-
Sum of Control Reductions (from Chapter 4, Table 4-1)	277.76	210.53
Are control reductions greater than the required reductions?	Yes	N/A

\* VOC reductions were not used for RFP demonstrations, but are needed to establish the MVEB as detailed in Chapter Five.

**Table 3-6: Summary of RFP Demonstration for Five Newly Designated DFW Counties**

Description	2008	
	tpd NO <sub>x</sub> *	tpd VOC
2008 Uncontrolled Emissions Forecast (Chapter 2, Tables 2-15 and 2-16)	169.18	90.02
Target Level of 2008 Emissions (Table 3-2)	114.03	57.28
Required Reductions from 2008 Uncontrolled Emissions Forecast (Table 3-4)	55.15	32.74
Sum of Control Reductions (from Chapter 4, Table 4-1)	55.16	35.30
Are control reductions greater than the required reductions?	N/A	Yes

\* NO<sub>x</sub> reductions were not used for RFP demonstrations, but are needed to establish the MVEB as detailed in Chapter Five.

## CHAPTER 4: CONTROL MEASURES TO ACHIEVE TARGET EMISSION LEVELS

### 4.1 OVERVIEW OF CONTROL MEASURES

This section briefly describes the control measures that achieved the necessary emission reductions to meet the RFP requirements. The methodologies used to estimate reduced emission levels are described in Sections 4.2 through 4.6. The projected emissions reflect federal and state emission controls. All state control measures are codified in Texas state regulations. The summary of emission reductions expected from considering the control measures used to meet the 2008 RFP target is presented in Table 4-1: *Summary of Emission Reductions*.

**Table 4-1: Summary of Emission Reductions**

Control Strategy Description	2008 Four Core Counties		2008 Five New Counties	
	NO <sub>x</sub>	VOC	NO <sub>x</sub>	VOC
EGU NO <sub>x</sub> Controls	26.69	0.00	0.01	0.00
Non-EGU NO <sub>x</sub> Controls	0.00	0.00	1.48	0.00
Portable Fuel Containers	0.00	0.00	0.00	0.23
Surface Coating (Area + Point Sources)	0.00	0.00	0.00	1.02
Stage I Refueling Controls	0.00	0.00	0.00	1.99
Tier 1 Federal Motor Vehicle Control Program (FMVCP)	75.63	60.85	19.19	5.98
Tier 1 FMVCP from Core Counties Used for New Counties <sup>3</sup>	-4.75	-10.00	4.75	10.00
Federal Reformulated Gasoline (RFG)	53.05	39.25	NA <sup>1</sup>	NA <sup>1</sup>
National Low Emission Vehicle Program (NLEV)	12.39	6.54	-0.48	1.06
Tier 2 FMVCP	32.34	11.8	10.98	4.08
2007 Heavy Duty Diesel FMVCP	8.77	0.17	2.88	0.03
Expanded I/M	NA <sup>2</sup>	NA <sup>2</sup>	2.77	2.00
Tier I and II Locomotive NO <sub>x</sub> Standards	2.49	0.00	0.42	0.00
New Non-road Spark-Ignition (SI) Engines <sup>4</sup>	-5.93	47.07	-1.10	4.17
Heavy Duty Non-road Engines	35.98	10.71	6.66	0.95
Tier 1, 2, and 3 Non-road Diesel Engines	20.16	1.96	3.73	0.17
Small Non-road SI Engines (Phase II)	3.81	37.82	0.70	3.35
Large Non-road SI & Recreational Marine	17.13	3.00	3.17	0.27
Non-road RFG	0.00	1.36	0.00	0.12
Sum of Reductions from Projected 2008 Uncontrolled Emissions	277.76	210.53	55.16	35.42

Notes:

- 1) There is no RFG requirement in the five newly designated counties.
- 2) This control reduction includes only the benefit from expanding the I/M program to the five newly designated counties.
- 3) This control reduction is used only to satisfy the required VOC reduction in the newly designated counties.
- 4) The negative number is attributed to fleet growth in light of more stringent standards.

### 4.2 POINT SOURCE CONTROLS

The point source controls are calculated using several sources of data, including emissions inventory data, acid rain data, and banked emissions credit data. All emission reductions required by state, federal and local rules are incorporated into the future projections for controlled inventories. The emission controls and the associated reductions are listed in Table 4-1. Point

source controls are further detailed in Appendix 1 - Sheet 13 for the four core counties and Appendix 2 – Sheet 13 for the five new counties. The future controlled emissions estimates represented in Table 4-1 are consistent with the SIP model. For the four core counties, point source reductions came from electric generating units (EGU) NO<sub>x</sub> controls. For the five new counties, reductions came from the nine-county lean-burn and rich-burn engine rule that was adopted as part of the DFW five percent Increment of Progress (IOP) SIP. A small amount of NO<sub>x</sub> reductions came from the EGU NO<sub>x</sub> controls in the five new counties. A small amount of the surface coating VOC reductions were from point sources.

#### 4.3 AREA SOURCE CONTROLS

Emission reductions from the portable fuel container rule, extension of surface coating rules to the five new counties, and expansion of Stage I gasoline controls in the five new counties are credited toward the required 15 percent VOC reduction in the new counties. Although the portable fuel container rule is also in effect for the four core counties and will result in VOC emission reductions, credit for these reductions is not counted for RFP. For the 2002 base year, the emissions inventory was forecast using EPA approved EGAS growth factors to develop the corresponding controlled emissions inventories for the milestone year. To develop the controlled emissions, rule effectiveness factors were applied for appropriate source categories with applicable TCEQ rules. No reductions were made in area source NO<sub>x</sub> emissions. Controlled and uncontrolled area source emissions are summarized in Table 4-2, *Summary of Area Source Emissions*.

**Table 4-2: Summary of Area Source Emissions**

Dallas-Fort Worth (tons per day)	2008 Core Counties		2008 New Counties	
	NO <sub>x</sub>	VOC	NO <sub>x</sub>	VOC
Uncontrolled Emissions Estimates	31.59	231.54	2.02	38.29
Controlled Emissions Estimates	31.59	227.53	2.02	35.17
Total Reductions *	0.00	4.01*	0.00	3.12

\* Not counted toward RFP credit.

#### 4.4 NON-ROAD MOBILE SOURCE CONTROLS

Most non-road mobile source emissions were calculated using the EPA NONROAD 2005 model. The NONROAD 2005 model comes with a set of default files that are required for calculating non-road mobile emissions. The TCEQ has customized several of the data files that are used by the NONROAD model to more accurately reflect the emissions generated by non-road mobile sources in Texas. Emissions from the remaining non-road mobile equipment not included in the NONROAD model, comprised of locomotives, aircraft and support equipment, and commercial marine vessels, were calculated outside of the NONROAD 2005 model using EPA approved methodologies.

For the RFP plan, the model was executed using custom population and activity files. In some cases, custom allocation and technology type data files were also used. The technology type file identifies what percent of an equipment population is expected to use federal non-road equipment controls for the year of interest. Emissions for 2008 were developed with and without controls using the updated version of the model. These emissions were provided by a contractor and the documentation for this procedure is in Appendix 5: *Rate of Further Progress Analysis for Non-Road Sources*.

Once the uncontrolled and controlled emissions estimates were generated by the NONROAD 2005 model, the effectiveness of control strategies for each year of interest was evaluated.

Emissions reductions from federal controls on non-road equipment was calculated by subtracting the controlled emissions estimates from the uncontrolled emissions estimates.

Locomotive emissions were calculated on spreadsheets using track mileage and engine fuel data provided by individual railroad lines. Aircraft emissions were calculated using the EPA approved Emissions and Dispersion Model System model.

The summary of uncontrolled and controlled emissions estimates for the DFW area for all non-road mobile equipment may be found in Table 4-3. Details of the non-road control strategy emission reductions are documented in Appendix 1 - Sheet 13 for the four core counties and Appendix 2 – Sheet 13 for the five new counties. The emissions reductions are from several federal measures, including standards for new non-road spark-ignition (SI) engines (Phases I and II); heavy duty non-road engines; Tier 1, 2, and 3 non-road diesel engines; large non-road SI and recreational marine engines; Tier I and II Locomotive NO<sub>x</sub> Standards; and non-road reformulated gasoline.

**Table 4-3: Summary of Non-Road Mobile Emissions**

Dallas-Fort Worth (tons per day)	2008 Core Counties		2008 New Counties	
	NO <sub>x</sub>	VOC	NO <sub>x</sub>	VOC
Uncontrolled Emissions Estimates	176.96	181.75	28.30	17.81
Controlled Emissions Estimates	98.49	79.83	13.80	8.78
Total Reductions*	73.64	101.36	14.48	8.98

\* Not all possible control measures were used to demonstrate RFP requirements. Thus, the controlled emissions estimates are less than the difference between the uncontrolled emissions estimate and the total reductions.

#### 4.5 ON-ROAD MOBILE SOURCE CONTROLS

The projected on-road mobile source emissions inventories documented in Appendix 4: *Development of DFW RFP On-Road Mobile Source Emissions Inventories* includes quantification of emission reductions for all federal and state on-road mobile source control rules for each RFP milestone year for the nine-county DFW area. Not all available mobile source controls are needed to demonstrate RFP for the DFW area. A summary of the on-road mobile controls included in the 2002 and 2008 RFP inventories is presented in Table 4-4. The on-road mobile controls used to demonstrate RFP include an annual vehicle inspection and maintenance (I/M) program with onboard diagnostics system checks on 1996 and newer model year cars and light trucks (passenger vehicles and light duty trucks); a two-speed idle test for heavy duty gas vehicles; a 2-mode ASM test; an anti-tampering program; a gas cap pressure test; reformulated gasoline; the Federal Motor Vehicle Control Program (FMVCP); and the National Low Emission Vehicle (NLEV) program.

**Table 4-4: Control Programs Modeled in MOBILE6 Emissions Factors  
for 2002 and 2008 RFP Controlled Emissions Inventories**

Rule Description	Strategy Notes	Start Year	Modeled For 2002 Base Year	Modeled For 2008 Control Strategy
Pre-1990 FMVCP	Pre-1990 Control	Pre-1990	✓	✓
1992 Federal Controls on Gasoline Volatility	Pre-1990 Control Max RVP 7.8 psi	1992	✓	✓
Anti-Tampering Programs (ATP) (Dallas and Tarrant only)		1986	✓	✓
I/M Program (Dallas and Tarrant Only)		1990	✓	✓
FMVCP Tier 1		1994	✓	✓
Federal Reformulated Gasoline (RFG <sup>3</sup> ) Model only Phase 2	Use EPA method to model rather than RFG toggle	1995 (Phase 1) 2000 (Phase 2)	✓	✓
NLEV		2001	✓	✓
Expanded I/M and ATP	Collin and Denton  Ellis, Johnson, Kaufman, Parker, Rockwall	2002  2003	✓	✓
FMVCP Tier 2	Phase in 2004 to 2009	2004		✓
Texas Low-Emission Diesel	15 ppm maximum sulfur  Low aromatic HC and high cetane number to control NOx	2006		✓
Federal Low-Sulfur Highway Diesel	15 ppm maximum sulfur content	2006		✓
FMVCP - Heavy-Duty 2007	Phase in 2007 to 2010	2007		✓
Voluntary Emission Reduction Program (VMEP)	Post process calculation			
Transportation Control Measures (TCM)	Post process calculation			
Texas Emission Reduction Plan (TERP)	Post process calculation			

The RFP control reductions for each on-road mobile control were calculated for each of the nine DFW eight-hour ozone nonattainment counties. Table 4-5: *On-Road Mobile Control Reduction Summary 2008, DFW, Ozone Season Weekday* summarizes the total amount of control reduction for on-road mobile sources for the 2008 RFP milestone year, for both the four core and the five newly designated DFW counties. Surplus VOC emissions reductions from Tier 1 FMVCP in the four core DFW counties have been used to satisfy part of the 15 percent VOC reduction obligation for the five newly designated counties.

**Table 4-5: On-Road Mobile Control Reduction Summary  
2008, DFW, Ozone Season Weekday**

Dallas-Fort Worth (tons per day)	Core Counties		Newly Designated Counties	
	NO <sub>x</sub>	VOC	NO <sub>x</sub>	VOC
Uncontrolled Emissions Estimates	399.45	237.18	75.92	24.93
Controlled Emissions Estimates	187.89	97.15	38.78	11.77
Total Reductions	211.56	140.03	37.14	13.16

**4.6 CONTINGENCY MEASURES**

In case of a milestone failure, the state is required to have contingency control measures that reduce emissions by an additional three percent between the milestone year and the next calendar year. Emissions reductions not previously used in the 2008 milestone demonstration may be used to satisfy contingency requirements. Because the excess emissions reductions from the 2008 RFP demonstration are greater than the reductions required for 2009 contingency, the 2009 contingency plan for the DFW area does not include any additional controls. A summary of the estimated control reductions and the required contingency level of reductions is presented in Table 4-6: *RFP Contingency Demonstration for Four Core DFW Counties* and Table 4.7: *RFP Contingency Demonstration for Five New DFW Counties*. This contingency plan meets the reduction requirements for all years.

**Table 4-6: RFP Contingency Demonstration for Four Core DFW Counties**

Description	2009	
	NO <sub>x</sub>	VOC*
<b>2002 Base Year EI Adjusted to 2008 (see Appendix 1, Sheet 10, Table 10-5)</b>	456.22	473.02
	x 3.0%	N/A
<b>Required Contingency Reductions in 2009</b>	13.69	N/A
Excess From 2008 RFP Demonstration (see Appendix 1 Sheet 13)	13.70	11.42
<b>Total Contingency Reductions</b>	13.70	11.42
<b>Contingency Excess (+) or Shortfall (-)</b>	<b>+0.01</b>	<b>+11.42</b>
<b>Are contingency reductions greater than required contingency reduction?</b>	<b>Yes</b>	<b>N/A</b>

\* Included for illustrative purposes only.

**Table 4-7: RFP Contingency Demonstration for Five New DFW Counties**

Description	2009	
	NO <sub>x</sub> *	VOC
<b>2002 Base Year EI Adjusted to 2008 (see Appendix 2, Sheet 10, Table 10-5)</b>	114.03	67.39
	0.0	x 3.0%
<b>Required Contingency Reductions in 2009</b>	0.0	2.02
Excess From 2008 RFP Demonstration (see Appendix 1 Sheet 13)	0.01	2.56
<b>Total Contingency Reductions</b>	0.01	2.56
<b>Contingency Excess (+) or Shortfall (-)</b>	<b>+0.01</b>	<b>+0.54</b>
<b>Are contingency reductions greater than required contingency reduction?</b>	<b>N/A</b>	<b>Yes</b>

\* Included for illustrative purposes only.

## **CHAPTER 5: MOTOR VEHICLE EMISSION BUDGETS**

### **5.1 INTRODUCTION**

The DFW RFP SIP establishes motor vehicle emission budgets (MVEBs) setting the allowable on-road mobile emissions an area can produce and continue to demonstrate RFP. The DFW RFP MVEBs are calculated by subtracting the on-road mobile control strategy emission reductions that are necessary to demonstrate RFP from the uncontrolled, projected on-road mobile source emissions for RFP milestone years. Local transportation planning organizations use the MVEBs to demonstrate that projected emissions from transportation plans, programs, and projects are equal to or less than the MVEBs, as required by the federal transportation conformity rule.

### **5.2 OVERVIEW OF METHODOLOGIES AND ASSUMPTIONS**

The TCEQ developed updated on-road mobile source emission inventories and control strategy reduction estimates using the latest planning assumptions and the newest version of EPA's emission factor model. Updated inventory development included development of a 2002 base-year inventory, adjusted base-year inventories for 2002 and 2008, 2008 milestone year inventories, and control strategy reduction estimates for 2008. The TCEQ worked with the North Central Texas Council of Governments (NCTCOG) to develop this inventory. Appendix 4: *Development of DFW RFP On-Road Mobile Source Emissions Inventories* is a copy of the NCTCOG contractor report that provides detailed documentation of the on-road mobile inventory development.

### **5.3 MOTOR VEHICLE EMISSION BUDGETS FOR RFP MILESTONE YEAR 2008**

The DFW area meets eight-hour ozone RFP requirements for the 2008 RFP milestone year using NO<sub>x</sub> and VOC reductions. The RFP MVEBs reflects the 2008 on-road mobile emissions inventory, the on-road mobile reduction strategies used to demonstrate RFP, and a ten percent transportation conformity safety margin. A transportation conformity safety margin is allowed when there is an excess in emission reductions required to demonstrate RFP for the milestone year. The amount of the safety margin is less than the total in excess emission reductions for each pollutant and, therefore, even if the safety margin is used for a transportation conformity determination, the DFW area will still meet the eight-hour ozone RFP requirements for 2008. See Table 5-1: *2008 Eight-Hour Ozone RFP Motor Vehicle Emission Budgets (MVEB) for DFW Nine-County Ozone Nonattainment Area* for the MVEB for the entire nine-county DFW area.

**Table 5-1: 2008 Eight-Hour Ozone RFP Motor Vehicle Emission Budgets (MVEB) for the DFW Nine-County Ozone Nonattainment Area**

Description	NO <sub>x</sub> tons per day	VOC tons per day
2008 On-Road Emissions Projection Without Post-1990 FCAAA Controls	475.38	262.11
2008 On-Road Mobile Reasonable Further Progress Controls:		
Tier 1 Federal Motor Vehicle Control Program (Tier 1 FMVCP)	94.82	66.83
I/M in Dallas and Tarrant Counties	19.57	18.28
Federal Reformulated Gasoline (Collin, Dallas, Denton, and Tarrant Counties only)	53.05	39.25
National Low Emission Vehicle Program (NLEV)	11.92	7.60
Tier 2 Federal Motor Vehicle Control Program (Tier 2 FMVCP)	43.32	15.89
2007 Heavy Duty Diesel FMVCP	11.65	0.20
Expanded I/M - Inspection/Maintenance (I/M), Gas Cap Check, Anti-Tampering Program (Ellis, Johnson, Kaufman, Parker and Rockwall Counties only)	6.73	5.15
TxLED	7.66	0.00
2008 On-Road Emissions Projection With Post-1990 FCAAA Controls (Uncontrolled inventory minus control reductions)	226.66	108.92
Add Transportation Conformity Safety Margin	22.67	10.89
2008 Eight-Hour Ozone RFP Motor Vehicle Emission Budgets	249.33	119.81

The 2008 RFP control strategy produces more than the required emission reductions. Some of the excess in emission reductions is used to provide a safety margin for 2008. This safety margin is less than the total emission reductions needed for the RFP demonstration. Therefore, even if this safety margin is used, the area will still demonstrate RFP 2008.

**Response to Comments Received Regarding the  
Dallas-Fort Worth (DFW) Eight-Hour Ozone  
Reasonable Further Progress (RFP)  
State Implementation Plan (SIP) Revision**

The commission received comments from the following entities: The United States Environmental Protection Agency (EPA) Region Six and North Central Texas Council of Governments (NCTCOG).

Environmental Protection Agency (EPA)

The EPA thanks the TCEQ for close coordination with EPA Region 6 and the Office of Air Quality Planning and Standards to gain an understanding of the RFP requirements for the DFW area during development of the proposal. Further, the EPA supports the methodology used by the TCEQ to calculate projected NO<sub>x</sub> and VOC emission reductions.

**The commission appreciates the EPA's comment and will continue to coordinate closely with the EPA on SIP development.**

EPA recommended that a table be added to Chapter 2 of the DFW RFP SIP that provided a break out of the 2002 baseline emission inventory by source category code (SCC). EPA also commented that in Chapter 2 of the DFW RFP SIP it was unclear what control strategies and emission reductions were used to get from the 2008 uncontrolled to the 2008 controlled emission inventory for on-road mobile sources.

**The calculations for the RFP demonstration are done using the total anthropogenic inventory. Additional details on inventory development and quantification at additional level of detail is presented in the RFP SIP Appendices 2, 3, and 4. The number of SCCs for DFW would make it difficult to present the information in the context of the narrative. The inventory for each major source category is included in Chapter 2 of the RFP SIP.**

**Tables 2-11 and 2-12 have been added to Chapter 2 of the RFP SIP, which summarize the uncontrolled mobile inventory, the amount of reduction for each individual control strategy, and the 2008 controlled inventory.**

EPA commented that although the MVEBs in the proposed DFW RFP SIP were calculated consistent with the eight-hour RFP requirements, the 2008 MVEBs were not consistent with previous MVEBs adopted by the commission and approved by EPA. Additionally the proposed 2008 MVEBs were significantly higher than previous budgets. EPA further commented that the MVEBs should be revised to be consistent with previous MVEBs and demonstrate the 2008 MVEB will not interfere with attainment of the eight-hour ozone standard.

**The commission updated the DFW RFP SIP to include all mobile source controls except the voluntary mobile emissions reduction program (VMEP), transportation control measures (TCMs) and the Texas Emission Reduction Plan (TERP), to make the 2008 MVEBs consistent with previous MVEBs and reflect projected 2008 emissions. Based on EPA guidance following the close of comment period, a ten percent safety margin for demonstrating RFP in DFW was assigned to the 2008 DFW RFP MVEB. The MVEBs documented in the SIP narrative have been updated to reflect use of the additional mobile controls and the safety margin.**

North Central Texas Council of Governments (NCTCOG)

NCTCOG commented that there was an inconsistency in the MVEBs listed in the TCEQ Interoffice Memorandum at the beginning of the DFW RFP SIP and the narrative of the RFP SIP and requested clarification on the budgets.

**The commission has made no change in response to this comment. The Interoffice Memorandum MVEB was a typographical error and is not part of the adoption package. The correct budgets are the budgets in the DFW RFP SIP narrative.**

NCTCOG commented that the DFW MVEBs have a significant effect on DFW planning and conformity. They requested to be kept involved in the MVEB development process and to be kept informed of changes to the MVEBs.

**The commission is committed to including all stakeholders in the process of developing MVEBs. The commission worked with the NCTCOG to update the MVEB in the eight-hour RFP. The commission is committed to continue working with the NCTCOG.**

NCTCOG requested that they be provided with a detailed analysis of the development of the MVEB for the DFW RFP SIP. NCTCOG included an example of the level of detail they preferred.

**Documentation of the development of the DFW RFP MVEB, to the same level of detail requested in the example provided, is included in Appendices 1 and 2 of the DFW RFP SIP document.**