

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY  
**AGENDA ITEM REQUEST**  
for State Implementation Plan Revision Adoption

**AGENDA REQUESTED:** July 2, 2014

**DATE OF REQUEST:** June 13, 2014

**INDIVIDUAL TO CONTACT REGARDING CHANGES TO THIS REQUEST, IF NEEDED:** Joyce Spencer-Nelson, (512) 239-5017

**CAPTION: Docket No. 2013-1682-SIP.** Consideration of the adoption of the Emissions Inventory (EI) State Implementation Plan (SIP) Revision for the 2008 Eight-Hour Ozone National Ambient Air Quality Standard (NAAQS) for the Houston-Galveston-Brazoria and Dallas-Fort Worth Areas.

The adopted SIP revision will satisfy the Federal Clean Air Act, §172(c)(3) and §182(a)(1) EI reporting requirements for the Houston-Galveston-Brazoria and Dallas-Fort Worth nonattainment areas under the 2008 eight-hour ozone NAAQS. States are required to submit a comprehensive, accurate, current EI from all relevant sources in ozone nonattainment areas within two years of the July 20, 2012 effective date of designations. (Brian Foster, Terry Salem) (Non-rule Project No. 2013-016-SIP-NR)

Steve Hagle, P.E.  
\_\_\_\_\_  
**Deputy Director**

David Brymer  
\_\_\_\_\_  
**Division Director**

Joyce Nelson  
\_\_\_\_\_  
**Agenda Coordinator**

**Copy to CCC Secretary? NO X YES**

# Texas Commission on Environmental Quality

## Interoffice Memorandum

**To:** Commissioners **Date:** June 13, 2014

**Thru:** Bridget C. Bohac, Chief Clerk  
Richard A. Hyde, P.E., Executive Director

**From:** Steve Hagle, P.E., Deputy Director  
Office of Air

**Docket No.:** 2013-1682-SIP

**Subject:** Commission Approval for Adoption of the Emissions Inventory (EI) State Implementation Plan (SIP) Revision for the 2008 Eight-Hour Ozone National Ambient Air Quality Standard (NAAQS) for the Houston-Galveston-Brazoria (HGB) and Dallas-Fort Worth (DFW) Areas Non-rule Project No. 2013-016-SIP-NR

### **Background and reason(s) for the SIP revision:**

The Federal Clean Air Act (FCAA) requires states to submit EI information for all relevant sources for each area designated nonattainment for a NAAQS. On March 12, 2008, the United States Environmental Protection Agency (EPA) lowered the eight-hour ozone NAAQS from 0.08 parts per million (ppm) to 0.075 ppm. Under the 0.075 ppm (75 parts per billion) standard, the EPA designated the HGB area, which includes Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller Counties, nonattainment with a marginal classification and the DFW area, which includes Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, Tarrant, and Wise Counties, nonattainment with a moderate classification, effective July 20, 2012. According to FCAA, §172(c)(3) and §182(a)(1), states are required to submit “a comprehensive, accurate, current inventory of actual emissions from all sources,” within two years of the effective date of nonattainment designations for the ozone NAAQS. Through the EPA’s *Implementation of the 2008 NAAQS for Ozone: State Implementation Plan Requirements; Proposed Rule* (proposed 2008 ozone standard SIP requirements rule), the EPA interprets these FCAA requirements to be due within two years of the July 20, 2012 effective date of designations for the 2008 eight-hour ozone NAAQS, which would be July 20, 2014 (78 FR 34178).

### **Scope of the SIP revision:**

#### **A.) Summary of what the SIP revision will do:**

This SIP revision satisfies the FCAA, §172 and §182 EI requirements for the HGB and DFW nonattainment areas under the 2008 eight-hour ozone NAAQS. As reinforced by the proposed 2008 ozone standard SIP requirements rule, the ozone nonattainment area base year EI submission is due no later than July 20, 2014 and then every three years thereafter (2017, 2020, etc.). The EPA’s proposed 2008 ozone standard SIP requirements rule recommends states use 2011 as the base year to fulfill the EI requirements. The year 2011 is also a year for a required EI submission under the existing Air Emissions Reporting Requirements (AERR) Rule. The 2011 AERR EI has been developed for many pollutants

Re: Docket No. 2013-1682-SIP

including ozone precursors, volatile organic compounds (VOC) and nitrogen oxides (NO<sub>x</sub>), from point, area, on-road mobile, and non-road mobile emissions source categories.

**B.) Scope required by federal regulations or state statutes:**

The FCAA requires that EIs be prepared for nonattainment areas generally, and provides for specific requirements that apply in ozone nonattainment areas. Because ozone is photochemically produced in the atmosphere when VOC mix with NO<sub>x</sub> in the presence of sunlight, the Texas Commission on Environmental Quality (TCEQ) must compile information on the important sources of these precursor pollutants. 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. The EIs provide data for a variety of air quality planning tasks including establishing baseline emission levels, calculating federally required emission reduction targets, emission inputs into air quality simulation models, and tracking emissions over time. The total inventory of emissions of VOC and NO<sub>x</sub> for an area is summarized from the estimates developed for four general categories of emissions sources: point, area, on-road mobile, and non-road mobile.

In accordance with the EPA's AERR, the National Emissions Inventory (NEI) is a comprehensive and detailed estimate of air emissions of both criteria and hazardous air pollutants from all air emissions. As directed by the AERR, the NEI includes statewide coverage, including specific emissions data for the eight-hour ozone nonattainment areas in Texas. Annual and summer day emissions are reported on a three-year cycle for the AERR.

**C.) Additional staff recommendations that are not required by federal rule or state statute:**

None

**Statutory authority:**

The EI SIP revision is adopted under Texas Health and Safety Code, §382.002, Policy and Purpose; §382.011, General Powers and Duties; §382.012, State Air Control Plan; and §382.014, Emission Inventory. The EI SIP revision is also adopted under the commission's general authority under Texas Water Code, §5.102, General Powers and §5.105, General Policy.

**Effect on the:**

**A.) Regulated community:**

There will be no new effect on the regulated community. Regulated entities are already required to submit EI information to the TCEQ, which is used to develop EI data in accordance with federal requirements.

Commissioners

Page 3

June 13, 2014

Re: Docket No. 2013-1682-SIP

**B.) Public:**

This SIP revision will have no new effect on the public.

**C.) Agency programs:**

This SIP revision will have no new effect on agency programs.

**Stakeholder meetings:**

No stakeholder meetings were held because there are no new rules proposed with this SIP revision.

**Public comment:**

The commission held public hearings on the proposed SIP revision in Houston on January 14, 2014 and in Arlington on January 16, 2014. Notice of public hearing was published in the *Texas Register* and the *Austin American-Statesman*, *Fort Worth Star-Telegram* and *Houston Chronicle* newspapers.

Oral comments were received at the Houston hearing from the Houston Regional Group of the Sierra Club (Sierra Club). Oral comments were received at the Arlington hearing from DFW Regional Concerned Citizens, Downwinders at Risk (Downwinders), the Lone Star Chapter of Sierra Club (Sierra Club), Public Citizen, and five citizens. The TCEQ received written comments from DFW Regional Concerned Citizens, the Sierra Club, and two citizens. A summary of the comments and the TCEQ response is provided as part of this SIP revision in the Response to Comments.

Generally, the comments concerned the development of the EI and questioned the accuracy of the EI data. The comments also focused on nonattainment designations and recommended that the EI SIP revision include the attainment areas that potentially may contribute to the air quality of the nonattainment areas.

There were also numerous comments concerning adverse health effects from oil and gas emissions and recommendations that the TCEQ implement additional monitoring operations and regulations regarding the oil and gas industry.

**Significant changes from proposal:**

As discussed in the proposal, the point source inventory data would be revised and were extracted again on April 1, 2014 in order to assure that the most up-to-date emissions were available for the adoption of this SIP revision. Site-level 2011 NO<sub>x</sub> and VOC emissions data were summarized and provided in a new Appendix K: *Point Source HGB and DFW Site Level Emissions*. This second extract accounts for revisions submitted on or before March 31, 2014 that have been reviewed, approved, and entered into the State of Texas Air Reporting System (STARS).

In response to comments received, the 2011 inventory was improved by updating the projected 2011 drilling activity data from the study *Development Of Texas Statewide*

Re: Docket No. 2013-1682-SIP

*Drilling Rigs Emission Inventories For The Years 1990, 1993, 1996, And 1999 Through 2040* with actual 2011 drilling activity data obtained from the Railroad Commission of Texas (RRC). The TCEQ recently reviewed the number of active oil and gas wells used to develop the 2011 inventory and made an adjustment to the emissions estimates based on this review. Originally, the TCEQ used the total number of active oil and gas wells as of the end of 2011 with the assumption that all of the wells were active for the entire year. For the revised emissions estimates, wells completed in 2011 were assumed to be active on average for half the year instead of the entire year. In addition, emissions estimates from gasoline bulk terminals and gas plants were revised based on the recently completed August 2013 ERG study, *Emission Inventory of Bulk Gasoline Terminals and Bulk Gasoline Plants*. Emissions estimates from oil and gas well heaters were revised based on the August 2013 ERG study, *Upstream Oil and Gas Heaters and Boilers*.

Based on these adjustments, the emissions in Table 2-3: *HGB 2011 NO<sub>x</sub> and VOC Emissions for Area Sources* and Table 2-4: *DFW 2011 NO<sub>x</sub> and VOC Emissions for Area Sources* of the EI SIP revision have been updated. For the HGB area, the 2011 annual NO<sub>x</sub> emissions estimate for area sources decreased from 8,617.31 tons per year (tpy) to 8,577.07 tpy, and the VOC emissions estimate decreased from 107,305.48 tpy to 104,943.91 tpy. For the DFW area, the 2011 annual NO<sub>x</sub> emissions estimate for area sources decreased from 16,639.03 tpy to 15,175.20 tpy, and the VOC emissions estimate decreased from 97,314.07 tpy to 96,604.76 tpy. The drilling rig emissions estimates in Table 2-5: *HGB 2011 NO<sub>x</sub> and VOC Emissions for Non-road Categories* and Table 2-6: *DFW 2011 NO<sub>x</sub> and VOC Emissions for Non-road Categories* of the EI SIP revision were updated using the 2011 drilling activity data obtained from the RRC. For the HGB area, the annual NO<sub>x</sub> emissions estimate for the non-road category decreased from 42,020.62 tpy to 41,946.29 tpy, and the VOC emissions estimate decreased from 18,822.77 tpy to 18,820.83 tpy. For the DFW area, the annual NO<sub>x</sub> emissions estimate for the non-road category increased from 37,539.51 tpy to 39,272.29 tpy, and the VOC emissions estimate increased from 16,914.67 tpy to 16,998.73 tpy.

**Potential controversial concerns and legislative interest:**

None

**Does this SIP revision affect any current policies or require development of new policies?**

No

**What are the consequences if this SIP revision does not go forward? Are there alternatives to SIP revision?**

The commission could choose not to comply with requirements to develop and submit this EI SIP revision to the EPA. If the EI SIP revision is not submitted within two years of the July 20, 2012 effective date of designations for the 2008 eight-hour ozone NAAQS deadline as specified in the FCAA, the FCAA requires the EPA to impose sanctions on the state and promulgate a federal implementation plan (FIP). Sanctions could include

Commissioners

Page 5

June 13, 2014

Re: Docket No. 2013-1682-SIP

transportation funding restrictions, grant withholding, and increased emissions offsets requirements for new construction and major modification of stationary sources in the HGB and DFW ozone nonattainment areas. The EPA would be required to impose such sanctions and implement a FIP until a SIP revision is approved for the area. Additionally, failure to submit the required EI would jeopardize approval of future nonattainment plans for the HGB and DFW ozone nonattainment areas, which must be based on approved EIs.

The EPA's proposed 2008 ozone standard SIP requirements rule states that EI and reasonably available control technology SIP revisions are due by July 20, 2014. Other major SIP elements, including the attainment demonstration, reasonable further progress, and reasonably available control measures are due one year later. Alternatively, states could submit all elements together 30 months after designations by January 2015. However, the January 2015 deadline would not allow sufficient time to complete all SIP required elements.

**Key points in the adoption SIP revision schedule:**

**Anticipated Adoption Date:** July 2, 2014

**EPA Due Date:** July 20, 2014

**Agency contacts:**

Brian Foster, SIP Project Manager, (512) 239-1930, Air Quality Division

Terry Salem, Staff Attorney, (512) 239-0469, Environmental Law Division

**Attachments**

cc: Chief Clerk, 2 copies  
Executive Director's Office  
Marshall Coover  
Tucker Royall  
John Bentley  
Office of General Counsel  
Brian Foster

REVISIONS TO THE STATE OF TEXAS AIR QUALITY  
IMPLEMENTATION PLAN FOR THE CONTROL OF OZONE AIR  
POLLUTION

EMISSIONS INVENTORY FOR THE 2008 EIGHT-HOUR OZONE  
STANDARD NONATTAINMENT AREAS



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY  
P.O. BOX 13087  
AUSTIN, TEXAS 78711-3087

**EMISSIONS INVENTORY STATE IMPLEMENTATION  
PLAN REVISION FOR THE 2008 EIGHT-HOUR OZONE  
NATIONAL AMBIENT AIR QUALITY STANDARD FOR THE  
HOUSTON-GALVESTON-BRAZORIA AND DALLAS-FORT  
WORTH AREAS**

Project Number 2013-016-SIP-NR

Adoption  
July 2, 2014

*This page intentionally left blank*

## **EXECUTIVE SUMMARY**

The Federal Clean Air Act (FCAA) requires states to submit emissions inventory (EI) information for all relevant sources in areas that are designated nonattainment for the National Ambient Air Quality Standards (NAAQS). On March 12, 2008, the United States Environmental Protection Agency (EPA) lowered the eight-hour ozone NAAQS from 0.08 parts per million (ppm) to 0.075 ppm. Under the 0.075 ppm (75 parts per billion) standard, the EPA designated the Houston-Galveston-Brazoria (HGB) area nonattainment with a marginal classification and the Dallas-Fort Worth (DFW) area nonattainment with a moderate classification, effective July 20, 2012. The eight-county HGB area includes Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller Counties. The ten-county DFW area includes Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, Tarrant, and Wise Counties. According to FCAA, §172(c)(3) and §182(a)(1), states are required to submit “a comprehensive, accurate, current inventory of actual emissions from all sources,” within two years of the effective date of nonattainment designations for the ozone NAAQS. This revision to the state implementation plan will satisfy the FCAA EI submittal requirements for the HGB and DFW nonattainment areas under the 2008 eight-hour ozone standard. As reinforced by the EPA’s proposed 2008 ozone standard SIP requirements rule, the nonattainment area base year EI submission is due no later than 24 months from the July 20, 2012 effective date of designations under the 2008 eight-hour ozone standard (July 20, 2014) and then updated every three years thereafter (2017, 2020, etc.). The EPA specified that states use 2011 as a base year in the proposed 2008 ozone standard SIP requirements rule for the 2008 eight-hour ozone NAAQS. An EI submission is also required under the existing Air Emissions Reporting Requirements (AERR) Rule. The 2011 AERR EI has been developed for many pollutants including ozone precursors (volatile organic compounds and nitrogen oxides) from point, area, on-road mobile, non-road mobile, and biogenic emissions source categories. This EI SIP revision is the baseline EI for the 2008 eight-hour ozone NAAQS and the AERR EI submittals every three years thereafter will satisfy the periodic EI requirements.

## **SECTION V-A: LEGAL AUTHORITY**

### General

The Texas Commission on Environmental Quality (TCEQ) has the legal authority to implement, maintain, and enforce the National Ambient Air Quality Standards (NAAQS) and to control the quality of the state's air, including maintaining adequate visibility.

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, 2005, 2007, 2009, 2011, and 2013. In 1989, the TCAA was codified as Chapter 382 of the Texas Health and 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, 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. Chapter 5 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 77th Texas Legislature continued the existence of the TNRCC until September 1, 2013, and changed the name of the TNRCC to the TCEQ. In 2009, the 81st Texas Legislature, during a special session, amended section 5.014 of the Texas Water Code, changing the expiration date of the TCEQ to September 1, 2011, unless continued in existence by the Texas Sunset Act. In 2011, the 82nd Texas Legislature continued the existence of the TCEQ until 2023.

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 commission 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; and 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 G and H of the TCAA authorize the TCEQ to establish vehicle inspection and maintenance programs in certain areas of the state, consistent with the requirements of the Federal Clean Air Act; coordinate with federal, state, and local transportation planning agencies to develop and implement transportation programs and measures necessary to attain and maintain the NAAQS; establish gasoline volatility and low emission diesel standards; and fund and authorize participating counties to implement vehicle repair assistance, retrofit, and accelerated vehicle retirement programs.

#### Applicable Law

The following statutes and rules provide necessary authority to adopt and implement the state implementation plan (SIP). The rules listed below have previously been submitted as part of the SIP.

#### Statutes

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

Texas Health and Safety Code, Chapter 382

September 1, 2013

Texas Water Code

September 1, 2013

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, 5.231, 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)

Subchapter M: Environmental Permitting Procedures (§5.558 only)

Chapter 7: Enforcement

Subchapter A: General Provisions (§§7.001, 7.002, 7.0025, 7.004, and 7.005 only)

Subchapter B: Corrective Action and Injunctive Relief (§7.032 only)

Subchapter C: Administrative Penalties

Subchapter D: Civil Penalties (except §7.109)

Subchapter E: Criminal Offenses and Penalties: §§7.177, 7.179-7.183

#### Rules

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

Chapter 7: Memoranda of Understanding, §§7.110 and 7.119

December 13, 1996 and May 2, 2012

Chapter 19: Electronic Reporting

November 11, 2010

Chapter 35: Subchapters A-C, K: Emergency and Temporary Orders and Permits; Temporary Suspension or Amendment of Permit Conditions

July 20, 2006

Chapter 39: Public Notice, §§39.402(a)(1) - (6), (8), and (10) - (12), 39.405(f)(3) and (g), (h)(1)(A) - (4), (6), (8) - (11), (i) and (j), 39.407, 39.409, 39.411(a), (e)(1) - (4)(A)(i) and (iii), (4)(B), (5)(A) and (B), and (6) - (10), (11)(A)(i) and (iii) and (iv), (11)(B) - (F), (13) and (15), and (f)(1) - (8), (g) and (h), 39.418(a), (b)(2)(A), (b)(3), and (c), 39.419(e), 39.420 (c)(1)(A) - (D)(i)(I) and (II), (D)(ii), (c)(2), (d) - (e), and (h), and 39.601 - 39.605	June 24, 2010
Chapter 55: Requests for Reconsideration and Contested Case Hearings; Public Comment, §§55.150, 55.152(a)(1), (2), (5), and (6) and (b), 55.154(a), (b), (c)(1) - (3), and (5), and (d) - (g), and 55.156(a), (b), (c)(1), (e), and (g)	June 24, 2010
Chapter 101: General Air Quality Rules	June 12, 2013
Chapter 106: Permits by Rule, Subchapter A	May 15, 2011
Chapter 111: Control of Air Pollution from Visible Emissions and Particulate Matter	February 6, 2014
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	May 14, 2009
Chapter 114: Control of Air Pollution from Motor Vehicles	March 6, 2014
Chapter 115: Control of Air Pollution from Volatile Organic Compounds	November 14, 2013
Chapter 116: Permits for New Construction or Modification	August 16, 2012
Chapter 117: Control of Air Pollution from Nitrogen Compounds	May 2, 2013
Chapter 118: Control of Air Pollution Episodes	March 5, 2000
Chapter 122: §122.122: Potential to Emit	December 11, 2002

## **SECTION VI: CONTROL STRATEGY**

- A. Introduction (No change)
- B. Ozone (Revised)
- 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)
- L. Transport (No change)
- M. Regional Haze (No change)

## **TABLE OF CONTENTS**

- Executive Summary
- Section V-A: Legal Authority
- Section VI: Control Strategy
- Table of Contents
- List of Acronyms
- List of Tables
- List of Appendices
- Chapter 1: General
  - 1.1 Background
  - 1.2 Introduction
  - 1.3 Health Effects
  - 1.4 Public Hearing and Comment Information
  - 1.5 Social and Economic Considerations
  - 1.6 Fiscal and Manpower Resources
- Chapter 2: Emissions Inventories (EI)
  - 2.1 Introduction
  - 2.2 Point Sources
    - 2.2.1 Point Source EI Development
    - 2.2.2 HGB Point Source EI
    - 2.2.3 DFW Point Source EI
  - 2.3 Area Sources
    - 2.3.1 Area Source EI Development
    - 2.3.2 HGB Area Source EI
    - 2.3.3 DFW Area Source EI
  - 2.4 Non-road Mobile Sources
    - 2.4.1 Non-road EI Development
    - 2.4.2 HGB Non-road Source EI
    - 2.4.3 DFW Non-road Source EI
  - 2.5 On-road Mobile Sources
    - 2.5.1 On-road Mobile Source EI Development
    - 2.5.2 HGB On-road Mobile Source EI
    - 2.5.3 DFW On-road Mobile Source EI
  - 2.6 Biogenic Sources
  - 2.7 Emissions Summary

## **LIST OF ACRONYMS**

AEO	Annual Energy Outlook
AERR	Air Emissions Reporting Requirements
ASLRRRA	American Short Line and Regional Railroad Association
CenSARA	Central States Air Resources Agencies
CMV	commercial marine vessel
DFW	Dallas-Fort Worth
EDMS	Emissions and Dispersion Modeling System
EI	emissions inventory
EIQ	emissions inventory questionnaire
EPA	United States Environmental Protection Agency
ERG	Eastern Research Group
FCAA	Federal Clean Air Act
FMVCP	Federal Motor Vehicle Control Program
GIS	Geographic Information Systems
HARC	Houston Advanced Research Center
HGB	Houston-Galveston-Brazoria
HRVOC	highly reactive volatile organic compounds
I/M	inspection and maintenance
MOU	Memorandum of Understanding
MOVES	Motor Vehicle Emissions Simulator
NAAQS	National Ambient Air Quality Standard
NEI	National Emissions Inventory
NO <sub>x</sub>	nitrogen oxides
NESHAP	National Emission Standards for Hazardous Air Pollutants
NSPS	New Source Performance Standards
PEI	periodic emissions inventory
ppm	parts per million
RFG	reformulated gasoline
RFP	reasonable further progress
RRC	Railroad Commission of Texas
SIP	state implementation plan
STARS	State of Texas Air Reporting System
TAC	Texas Administrative Code

TACB	Texas Air Control Board
TCAA	Texas Clean Air Act
TCEQ	Texas Commission on Environmental Quality (commission)
TDM	travel demand model
TexN	Texas NONROAD Model
TNRCC	Texas Natural Resource Conservation Commission
tpd	tons per day
tpy	tons per year
TxLED	Texas Low Emission Diesel
VMT	vehicle miles traveled
VOC	volatile organic compounds

## **LIST OF TABLES**

Table 2-1: HGB 2011 NO<sub>x</sub> and VOC Emissions for Point Sources (tons per day and tons per year)

Table 2-2: DFW 2011 NO<sub>x</sub> and VOC Emissions for Point Sources (tons per day and tons per year)

Table 2-3: HGB 2011 NO<sub>x</sub> and VOC Emissions for Area Sources (tons per day and tons per year)

Table 2-4: DFW 2011 NO<sub>x</sub> and VOC Emissions for Area Sources (tons per day and tons per year)

Table 2-5: HGB 2011 NO<sub>x</sub> and VOC Emissions for Non-road Categories (tons per day and tons per year)

Table 2-6: DFW 2011 NO<sub>x</sub> and VOC Emissions for Non-road Categories (tons per day and tons per year)

Table 2-7: HGB 2011 NO<sub>x</sub> and VOC Emissions for On-road Mobile Sources (tons per day and tons per year)

Table 2-8: DFW 2011 NO<sub>x</sub> and VOC Emissions for On-road Mobile Sources (tons per day and tons per year)

Table 2-9: Summary of HGB 2011 NO<sub>x</sub> and VOC Emissions (tons per day and tons per year)

Table 2-10: Summary of DFW 2011 NO<sub>x</sub> and VOC Emissions (tons per day and tons per year)

## **LIST OF APPENDICES**

<u>Appendix</u>	<u>Appendix Name</u>
Appendix A	Characterization of Oil and Gas Production Equipment and Develop a Methodology to Estimate Statewide Emissions
Appendix B	Condensate Tank Oil and Gas Activities
Appendix C	Development of 2008 Annual and Ozone Season Daily Emissions Inventories and Activity Data for Non-road Sources within the Texas NONROAD Model (TexN)
Appendix D	Development of Statewide Annual Emissions Inventory and Activity Data for Airports
Appendix E	Development of Annual Emissions Inventories and Activity Data for Airports in the 12-County Dallas-Fort Worth Area
Appendix F	Development of 2011 Statewide Toxics and Actual Annual and Ozone Season Weekday Emissions Inventories for Commercial Marine Vessels
Appendix G	Development of Texas Statewide Drilling Rigs Emissions Inventories for the Years 1990, 1993, 1996, and 1999 through 2040
Appendix H	2011 Texas Railroad Emission Inventory Report
Appendix I	Development of 2011 On-road Mobile Source Actual Annual and Summer Weekday Emissions Inventories for All Texas Counties (Except for 12 Counties in the Dallas-Fort Worth Area), and Winter Weekday Emissions Inventories for El Paso: Houston-Galveston-Brazoria Area
Appendix J	Development of 2011 On-road Mobile Source Actual Annual and Summer Season Weekday Emissions Inventories for 12 Counties in the Dallas-Fort Worth Metropolitan Statistical Area-Amendment
Appendix K	Point Source HGB and DFW Site Level Emissions

## CHAPTER 1: GENERAL

### 1.1 BACKGROUND

“The History of the Texas State Implementation Plan (SIP),” a comprehensive overview of the SIP revisions submitted to the United States Environmental Protection Agency (EPA) by the State of Texas, is available on the [Introduction to the SIP](http://www.tceq.texas.gov/airquality/sip/sipintro.html#History) Web page (<http://www.tceq.texas.gov/airquality/sip/sipintro.html#History>) on the [Texas Commission on Environmental Quality's \(TCEQ\)](http://www.tceq.texas.gov) website (<http://www.tceq.texas.gov>).

### 1.2 INTRODUCTION

On March 12, 2008, the United States Environmental Protection Agency (EPA) lowered the eight-hour ozone standard from 0.08 parts per million (ppm) to 0.075 ppm. Under the 0.075 ppm (75 parts per billion) standard, the EPA designated the Houston-Galveston-Brazoria (HGB) area nonattainment with a marginal classification and the Dallas-Fort Worth (DFW) area nonattainment with a moderate classification, effective July 20, 2012. The eight-county HGB area includes Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller Counties. The ten-county DFW area includes Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, Tarrant, and Wise Counties.

This SIP revision satisfies the Federal Clean Air Act (FCAA), §172 and §182 emissions inventory (EI) requirements for the nonattainment areas under the 2008 eight-hour ozone National Ambient Air Quality Standard (NAAQS). Through the *Implementation of the 2008 NAAQS for Ozone: State Implementation Plan Requirements; Proposed Rule* (proposed 2008 ozone standard SIP requirements rule), the EPA interprets the FCAA requirements that states submit a comprehensive, accurate, current EI from all sources, as described in FCAA, §172(c)(3) and §182(a)(1) to be due within two years of the July 20, 2012 effective date of designations for the 2008 eight-hour ozone NAAQS. The FCAA requires that EIs be prepared for nonattainment areas generally, and provides for specific requirements that apply in ozone nonattainment areas. Because ozone is photochemically produced in the atmosphere when volatile organic compounds (VOC) are mixed with nitrogen oxides (NO<sub>x</sub>) in the presence of sunlight, states are required to compile information on key sources of these precursor pollutants. The EIs provide data for a variety of air quality planning tasks including establishing baseline emission levels, calculating federally required emission reduction targets, emission inputs into air quality simulation models, and tracking emissions over time. The total EI of VOC, NO<sub>x</sub>, and other pollutants for an area are summarized from the estimates developed for five general categories of emissions sources: point, area, on-road mobile, non-road mobile, and biogenic.

The EPA specified in the proposed 2008 ozone standard SIP requirements rule that states use 2011 as a base year for EI SIPs to address the EI requirements. The year 2011 is also a year for a required EI submission under the existing Air Emissions Reporting Requirements (AERR) Rule. In accordance with the EPA's AERR, the National Emissions Inventory (NEI) is a comprehensive and detailed estimate of air emissions of both criteria and hazardous air pollutants. As directed by the AERR, the NEI includes statewide coverage. Annual and summer day emissions are reported on a three-year cycle for the AERR. States can rely on these periodic AERR EI submittals to satisfy ongoing SIP EI submission requirements every three years. The periodic EI SIP revision submission requirements fall on the same years as the AERR submittals.

### **1.3 HEALTH EFFECTS**

In 2008, the EPA revised the primary ozone standard to 0.075 ppm. To support the 2008 eight-hour primary ozone standard, the EPA provided information that suggested that health effects may potentially occur at levels lower than the previous 0.080 ppm standard. Breathing relatively high levels of ground-level ozone can cause acute respiratory problems like cough and respiratory irritation and can aggravate the symptoms of asthma. Repeated exposures to high levels of ozone can potentially make people more susceptible to respiratory infection and lung inflammation and can potentially aggravate preexisting respiratory diseases, such as bronchitis and emphysema.

Children are at a relatively higher risk from exposure to ozone when compared to adults, since they breathe more air per pound of body weight than adults and because children's respiratory systems are still developing. Children also spend a considerable amount of time outdoors during summer and during the start of the school year (August through October) when high ozone levels are typically recorded. Adults most at risk from exposures to elevated ozone levels are people working or exercising outdoors and individuals with preexisting respiratory diseases.

### **1.4 PUBLIC HEARING AND COMMENT INFORMATION**

The commission held public hearings on this SIP revision on January 14, 2014 at 2:00 p.m. in Houston at the Houston-Galveston Area Council of Governments and on January 16, 2014 at 2:00 p.m. in Arlington at the Arlington City Hall Building. Notice of the public hearings for this SIP revision was published in the *Texas Register* and the *Austin American-Statesman*, the *Fort Worth Star-Telegram*, and *Houston Chronicle* newspapers.

The public comment period opened on December 13, 2013 and closed on January 27, 2014. Written comments were accepted via mail, fax, and through the [eComments](http://www5.tceq.state.tx.us/rules/ecomments) (<http://www5.tceq.state.tx.us/rules/ecomments>) system. Oral comments were received at the Houston hearing from the Houston Regional Group of the Sierra Club (Sierra Club). Oral comments were received at the Arlington hearing from DFW Regional Concerned Citizens, Downwinders at Risk (Downwinders), the Lone Star Chapter of Sierra Club (Sierra Club), Public Citizen, and five citizens. The TCEQ received written comments from DFW Regional Concerned Citizens, the Sierra Club, and two citizens. A summary of the comments and the TCEQ response is provided as part of this SIP revision in the Response to Comments.

An electronic version of this SIP revision and appendices can be found at the TCEQ's [Air Pollution from Ozone](http://www.tceq.texas.gov/airquality/sip/siplans.html) Web page (<http://www.tceq.texas.gov/airquality/sip/siplans.html>).

### **1.5 SOCIAL AND ECONOMIC CONSIDERATIONS**

Because this SIP revision does not create new obligations for sources to report EI information, there are no changes that would have an impact on society or the economy.

### **1.6 FISCAL AND MANPOWER RESOURCES**

The TCEQ 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 (EI)**

### **2.1 INTRODUCTION**

The Federal Clean Air Act (FCAA) requires that EIs be prepared for ozone nonattainment areas. Tropospheric, or ground-level, ozone is produced when ozone precursors, volatile organic compounds (VOC) and nitrogen oxides (NO<sub>x</sub>), undergo photochemical reactions in the presence of sunlight. The Texas Commission on Environmental Quality (TCEQ) maintains a current EI for sources of NO<sub>x</sub> and VOC that identifies the types of emissions sources present in an area, the amount of each pollutant emitted, and the types of processes and control devices employed at each facility or source category. The EI provides data for a variety of air quality planning tasks, including establishing baseline emissions levels, calculating federally required emission reduction targets, developing emissions inputs for air quality models, and tracking emissions reductions over time. The total inventory of NO<sub>x</sub> and VOC emissions for an area is derived from estimates developed for five general categories of emissions sources: point, area, non-road mobile, on-road mobile, and biogenic.

The federal Air Emissions Reporting Requirements (AERR) rule requires states to develop and submit periodic EIs to the United States Environmental Protection Agency (EPA) every three years. The 2011 inventory was the first periodic emissions inventory (PEI) submitted under the AERR. In accordance with the AERR, the 2011 PEI was reported to the EPA's National Emissions Inventory (NEI) as a comprehensive and detailed estimate of air emissions, including ozone precursors (NO<sub>x</sub> and VOC). As directed by the AERR, the Texas PEI includes annual emissions for the entire state and ozone season daily emissions for the 2008 eight-hour ozone nonattainment areas in Texas.

### **2.2 POINT SOURCES**

#### **2.2.1 Point Source EI Development**

Stationary point source emissions data are collected annually from sites that meet the reporting requirements of 30 Texas Administrative Code (TAC) §101.10. To collect the data, the TCEQ sends emissions inventory questionnaire (EIQ) courtesy notification letters to all sites identified as meeting the reporting requirements of 30 TAC §101.10. Companies are required to report emissions data, including ozone season (defined in TCEQ point source guidance *2013 Emissions Inventory Guidelines* as May through September), and to provide samples of calculations used to determine reported emissions in accordance with detailed guidance. The guidance documents are available at the [TCEQ Point Source Emissions Inventory](http://www.tceq.texas.gov/airquality/point-source-ei/psei.html) Web page (<http://www.tceq.texas.gov/airquality/point-source-ei/psei.html>). Information characterizing the process equipment, the control devices, and the emissions points is also required. Data submitted to the TCEQ are reviewed for quality assurance purposes and then stored in the State of Texas Air Reporting System (STARS) database.

The 2011 base year point source EI data were extracted from STARS on April 1, 2014. The extracted data contain ozone season daily and annual NO<sub>x</sub> and VOC emissions from each site in the Houston-Galveston-Brazoria (HGB) and Dallas-Fort Worth (DFW) 2008 eight-hour ozone nonattainment areas that submitted a 2011 EIQ, including revisions reviewed, approved, and entered on or before the extract date. Site level 2011 NO<sub>x</sub> and VOC emissions data are summarized and provided in Appendix K: *Point Source HGB and DFW Site Level Emissions*. Further information, including 2011 unit-level NO<sub>x</sub> and VOC emissions data, is available upon request.

A summary of the 2011 point source EI data for the HGB and DFW 2008 eight-hour ozone nonattainment areas is presented in Table 2-1: *HGB 2011 NO<sub>x</sub> and VOC Emissions for Point Sources (tons per day and tons per year)*, and Table 2-2: *DFW 2011 NO<sub>x</sub> and VOC Emissions for Point Sources (tons per day and tons per year)*.

### 2.2.2 HGB Point Source EI

**Table 2-1: HGB 2011 NO<sub>x</sub> and VOC Emissions for Point Sources (tons per day and tons per year)**

County	Ozone Season Weekday NO <sub>x</sub> (tpd)	Annual NO <sub>x</sub> (tpy)	Ozone Season Weekday VOC (tpd)	Annual VOC (tpy)
Brazoria	18.46	6,896.26	11.39	3,837.75
Chambers	7.93	2,344.79	5.66	1,970.04
Fort Bend	19.84	5,583.10	1.60	508.70
Galveston	13.18	3,602.04	15.40	3,613.96
Harris	47.32	16,076.28	55.78	18,801.24
Liberty	0.29	109.14	3.35	980.83
Montgomery	1.21	361.75	1.49	513.35
Waller	0.21	77.06	0.16	53.13
Total	108.44	35,050.42	94.83	30,279.00

### 2.2.3 DFW Point Source EI

**Table 2-2: DFW 2011 NO<sub>x</sub> and VOC Emissions for Point Sources (tons per day and tons per year)**

County	Ozone Season Weekday NO <sub>x</sub> (tpd)	Annual NO <sub>x</sub> (tpy)	Ozone Season Weekday VOC (tpd)	Annual VOC (tpy)
Collin	0.66	173.98	0.80	234.73
Dallas	2.97	811.83	4.92	1,586.86
Denton	1.31	479.95	2.92	812.87
Ellis	12.15	4,122.43	5.12	1,681.72
Johnson	6.12	2,093.01	3.48	1,120.60
Kaufman	3.51	1,058.26	0.61	168.27
Parker	1.17	410.44	2.23	638.68
Rockwall	0.01	3.30	0.07	16.88
Tarrant	3.44	1,145.65	7.51	2,280.66
Wise	8.61	2,581.53	2.14	644.99
Total	39.95	12,880.38	29.80	9,186.26

## 2.3 AREA SOURCES

Stationary source emissions data from sites and processes that do not meet the reporting requirements for point sources are classified as area sources. Area sources are small-scale industrial, commercial, and residential sources that generate emissions. Emissions are

calculated and recorded on the county-level. Area sources are divided according to emissions mechanism: hydrocarbon evaporative emissions or fuel combustion emissions. Examples of evaporative emissions sources include: printing operations, industrial coatings, degreasing solvents, house paints, gasoline service station underground tank filling, and vehicle refueling operations. Examples of fuel combustion emissions sources include: stationary source fossil fuel combustion, outdoor refuse burning, and structural fires. With some exceptions, area source emissions are calculated by multiplying an established emissions factor (emissions per unit of activity) by the appropriate activity or activity surrogate responsible for generating emissions. Population is one of the more commonly used activity surrogates for area sources. Other activity data include the amount of gasoline sold in an area, employment by industry type, and crude oil and natural gas production.

### **2.3.1 Area Source EI Development**

The 2011 area source EI was developed according to the AERR reporting requirements, using a combination of methodologies and data: EPA-generated EIs, TCEQ-contracted projects, TCEQ staff projects, and categories grown from the 2008 EI using factors derived from study data compiled by Eastern Research Group's (ERG) [Economy and Consumer Credit Analytics](http://www.economy.com/default.asp) website (<http://www.economy.com/default.asp>) and Annual Energy Outlook (AEO).

The EPA developed EIs for states to use for many source categories as part of the NEI. The states access these individual inventories through the [EPA's NEI](ftp://ftp.epa.gov/EmisInventory/2011nei/doc/) website (<ftp://ftp.epa.gov/EmisInventory/2011nei/doc/>). These source categories include but are not limited to industrial coatings; degreasing; residential, commercial/institutional, and industrial fuel use; commercial cooking; aviation fuel use; and consumer products. For some source categories, the TCEQ developed state-specific emissions estimates by acquiring current state specific activity data and applying appropriate emissions factors. These source categories include but are not limited to: storage tanks, structural fires, dry cleaners, automobile fires, and oil and gas.

In particular, significant resources were expended to improve the oil and gas area source inventory production categories for 2011. The improvements included the development and refinement of a state-specific oil and gas area source emissions calculator that uses county-level production and local equipment activity data with local emissions requirements to estimate emissions from individual production categories including compressors engines, condensate and oil storage tanks, loading operations, heaters, and dehydrators. The documentation for the development of the oil and gas emissions calculator can be found in Appendix A:

*Characterization of Oil and Gas Production Equipment and Develop a Methodology to Estimate Statewide Emissions.* A significant improvement made to the oil and gas calculator for the 2011 inventory was the development of refined emission factors for VOC emissions from condensate storage tanks. The documentation for the refined emission factors can also be found in Appendix B: *Condensate Tank Oil and Gas Activities.*

### **2.3.2 HGB Area Source EI**

County-level totals from the 2011 area source EI for the HGB area are presented in Table 2-3: *HGB 2011 NO<sub>x</sub> and VOC Emissions for Area Sources (tons per day and tons per year).*

**Table 2-3: HGB 2011 NO<sub>x</sub> and VOC Emissions for Area Sources (tons per day and tons per year)**

County	Ozone Season Weekday NO <sub>x</sub> (tpd)	Annual NO <sub>x</sub> (tpy)	Ozone Season Weekday VOC (tpd)	Annual VOC (tpy)
Brazoria	1.63	648.43	32.35	11,390.72
Chambers	0.29	108.11	7.96	2,843.21
Fort Bend	1.49	698.96	25.14	8,390.74
Galveston	0.79	370.19	16.92	5,649.96
Harris	13.88	5,515.16	175.35	58,858.77
Liberty	0.76	295.27	24.21	8,688.68
Montgomery	1.97	821.76	22.73	7,712.93
Waller	0.33	119.18	4.07	1,409.03
Total	21.14	8,577.06	308.73	104,944.04

### 2.3.3 DFW Area Source EI

County-level totals from the 2011 area source EI for the DFW area are presented in Table 2-4: *DFW 2011 NO<sub>x</sub> and VOC Emissions for Area Sources (tons per day and tons per year)*.

**Table 2-4: DFW 2011 NO<sub>x</sub> and VOC Emissions for Area Sources (tons per day and tons per year)**

County	Ozone Season Weekday NO <sub>x</sub> (tpd)	Annual NO <sub>x</sub> (tpy)	Ozone Season Weekday VOC (tpd)	Annual VOC (tpy)
Collin	2.41	1,039.42	24.10	7,712.30
Dallas	11.70	4,144.41	84.25	26,613.80
Denton	2.26	975.32	34.54	11,644.710
Ellis	0.70	242.62	7.05	2,245.47
Johnson	2.06	758.48	17.98	6,253.20
Kaufman	0.42	152.32	5.35	1,716.17
Parker	0.67	253.47	12.85	4,422.75
Rockwall	0.16	77.18	3.01	965.71
Tarrant	10.12	3,656.01	74.18	24,270.94
Wise	12.14	4,435.29	29.18	10,454.74
Total	42.64	15,734.52	292.49	96,299.78

## 2.4 NON-ROAD MOBILE SOURCES

Non-road vehicles do not normally operate on roads or highways and are often referred to as off-road or off-highway vehicles. The non-road source category is composed of a diverse collection of equipment, many of which are powered by diesel engines. Non-road emissions sources include, but are not limited to: agricultural equipment, construction and mining equipment, lawn and garden equipment, aircraft and airport equipment, locomotives, drilling rigs and commercial marine vessels (CMV). For the 2011 EI, emissions inventories for non-road

sources were developed as subcategories: NONROAD model categories; airports; CMVs; drilling rigs; and locomotives. The sections below describe the emissions calculation methods used for the non-road mobile source subcategories.

#### **2.4.1 Non-road EI Development**

A Texas-specific version of the EPA's latest NONROAD 2008a model, called the Texas NONROAD (TexN) model, was used to calculate emissions from all non-road mobile source equipment and recreational vehicles, with the exception of airports, locomotives, CMVs, and drilling rigs. The TexN model allows TCEQ staff to replace the EPA NONROAD model's default data with more specific local survey data per EPA recommendations. Several equipment survey studies have been conducted which focused on various equipment categories operating in different areas in Texas. The resulting survey data are used as inputs to the TexN model to more accurately estimate non-road emissions for the state of Texas. The 2011 non-road category EI development used the same methodology found in the report *Development of 2008 Annual and Ozone Season Daily Emissions Inventories and Activity Data for Non-Road Sources within the Texas NONROAD Model (TexN)*. A copy of the ERG report and associated inputs and meteorological data are provided in Appendix C: *Development of 2008 Annual and Ozone Season Daily Emissions Inventories and Activity Data for Non-Road Sources within the Texas NONROAD Model (TexN)*.

The 2011 airport EI contains both annual and ozone season weekday emissions for airport sources related to aircraft operations. These emission sources include aircraft engines, auxiliary power units, and ground support equipment. The United States Federal Aviation Administration's Emissions and Dispersion Modeling System (EDMS) was used to calculate airport source emissions. To estimate the 2011 emissions from the airport sources, a survey collected updated information on aircraft activity, fleet mix, and other EDMS model input parameters. Model input data was compiled and reviewed, and any identified data gaps were filled using the most closely related data available. Documentation of methods and procedures used in developing HGB area 2011 airport EI can be found in Appendix D: *Development of Statewide Annual Emissions Inventory and Activity Data for Airports*. Documentation of methodology and procedures used to develop the DFW airport EIs can be found in Appendix E: *Development of Annual and Emissions Inventories and Activity Data for Airports in the 12-County Dallas-Fort Worth Area*.

The 2011 CMV inventory was developed based on multiple recent studies and datasets. The 2011 activity data were compiled using local port data and the United States Department of Transportation Maritime Administration. The EPA's updated 2011 emissions factors were used to account for vessel turnover and compliance with marine vessel air quality regulations. The emissions factors were applied to the 2011 activity values to calculate 2011 emissions. The emissions were spatially allocated to Geographic Information Systems (GIS) shape-files. Documentation of methodologies and procedures used in developing the CMV EIs can be found in Appendix F: *Development of 2011 Statewide Toxics and Actual Annual and Ozone Season Weekday Emissions Inventories for Commercial Marine Vessels*.

The 2011 EI for the drilling rig diesel engines was developed as part of a statewide EI improvement study. Well activity data were obtained through the acquisition of the "Drilling Permit Master and Trailer" database from the Railroad Commission of Texas (RRC) and through a survey of oil and gas exploration and production companies, which was used to develop improved drilling rig emissions characterization profiles. Documentation of methods and procedures used in developing the drilling rig diesel engine EIs can be found in Appendix G: *Development of Texas Statewide Drilling Rigs Emissions Inventories for the Years 1990, 1993,*

1996, and 1999 through 2040. An improvement made for the 2011 inventory involved updating the projected 2011 drilling activity data from the study with actual 2011 drilling activity data obtained from the RRC.

The 2011 Texas locomotive EI includes Class I, II, and III locomotive activity and emissions by rail segment for all counties within Texas. Locomotive line haul and yard activity data were compiled from companies operating in Texas to create a county-level Class I line haul inventory. Data developed by the Eastern Regional Technical Advisory Committee in collaboration with the Federal Railroad Administration, the American Short Line and Regional Railroad Association (ASLRRA), and members of the Class II and III railroad communities used 2008 activity and emissions profiles for Class II and Class III railroads. To calculate annual gallons of fuel used by railroads, data compiled by ASLRRA from the Class II and III railroads, including total industry fuel use in 2008 for locomotives and total Class II/III route miles, were used. Based on the United States Energy Information Administration's latest AEO, 2008 fuel usage values were grown to estimate 2011 emissions. Documentation of methods and procedures used in developing the locomotive EIs can be found in Appendix H: *2011 Texas Railroad Emission Inventory Report*.

#### 2.4.2 HGB Non-Road Source EI

County-level 2011 non-road category source EI totals for the eight-county HGB 2008 eight-hour ozone nonattainment area are presented in Table 2-5: *HGB 2011 NO<sub>x</sub> and VOC Emissions for Non-Road Categories (tons per day and tons per year)*.

**Table 2-5: HGB 2011 NO<sub>x</sub> and VOC Emissions for Non-Road Categories (tons per day and tons per year)**

County	Ozone Season Weekday NO <sub>x</sub> (tpd)	Annual NO <sub>x</sub> (tpy)	Ozone Season Weekday VOC (tpd)	Annual VOC (tpy)
Brazoria	8.94	3,165.17	3.38	1,306.36
Chambers	1.10	409.09	1.04	533.25
Fort Bend	6.60	2,262.79	2.54	872.54
Galveston	14.32	5,235.62	4.07	2,093.54
Harris	80.85	27,575.79	33.44	11,715.84
Liberty	3.60	1,289.23	0.71	260.74
Montgomery	4.76	1,668.65	4.32	1,876.34
Waller	0.94	339.95	0.43	162.22
Total	121.11	41,946.29	49.93	18,820.83

#### 2.4.3 DFW Non-Road Source EI

County-level 2011 non-road category source EI totals for the ten-county DFW 2008 eight-hour ozone nonattainment area are presented in Table 2-6: *DFW 2011 NO<sub>x</sub> and VOC Emissions for Non-Road Categories (tons per day and tons per year)*.

**Table 2-6: DFW 2011 NO<sub>x</sub> and VOC Emissions for Non-Road Categories (tons per day and tons per year)**

County	Ozone Season Weekday NO <sub>x</sub> (tpd)	Annual NO <sub>x</sub> (tpy)	Ozone Season Weekday VOC (tpd)	Annual VOC (tpy)
Collin	8.41	2,499.54	6.00	1,823.14
Dallas	30.89	9,622.11	21.73	6,569.42
Denton	11.43	3,895.51	4.85	1,542.32
Ellis	3.76	1,138.51	1.59	480.65
Johnson	7.56	2,509.24	1.15	352.16
Kaufman	3.34	958.56	1.07	314.98
Parker	3.77	1,169.07	1.19	363.23
Rockwall	0.95	284.14	1.22	416.69
Tarrant	43.65	14,912.53	14.95	4,728.63
Wise	6.85	2,283.08	1.25	407.51
Total	120.61	39,272.29	55.00	16,998.73

## 2.5 ON-ROAD MOBILE SOURCES

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

### 2.5.1 On-Road Mobile Source EI Development

The 2011 on-road mobile source inventory was developed using the latest available data, current emissions factors and models, and the most current planning assumptions. Changes in the inventories can be expected when a SIP is revised if there have been changes in any of the underlying tools or data used in the inventory development. On-road mobile source category EIs presented in this SIP revision used emissions factors developed from the EPA's Motor Vehicle Emissions Simulator (MOVES) model and methods consistent with both the EPA SIP inventory development guidance and with the requirements of transportation conformity.

In March 2010, the EPA replaced the MOBILE6.2 model with MOVES as the official emissions factor model for developing on-road mobile source category EIs. Although MOVES represents a new approach to assessing on-road emissions, the sources are the same, and the opportunity to use local inputs for meteorological conditions, control programs, and fleet characteristics remains. The primary approach to developing an on-road inventory is the same with either MOVES or MOBILE6.2. With both models, emission rates are produced for subsets of the on-road fleet, and the emission rates are multiplied by the activity level of each vehicle type or source use type.

During the development phase of the 2011 AERR inventories, the EPA released multiple versions of the MOVES model. The EPA prefers that states use the latest version of MOVES that is available. According to the EPA's guidance, if states have completed significant work on an inventory for periodic reporting or for a SIP revision when a new version of MOVES is released, such work can be completed and submitted to EPA using the previous version of the model. The EPA released MOVES2010a in August of 2010 and MOVES2010b in April 2012. The EPA originally released MOVES2010b in April 2012 to allow MOVES users to benefit from several improvements to general model performance relative to MOVES2010a. The difference in the models is related solely to model performance and does not affect the final emissions estimates. In October 2012, a database update to MOVES2010b was released, which corrected an error that affects emissions estimates for years after 2020; however, this version was not used for the 2011 AERR inventories due to schedule constraints.

The 2011 AERR emissions estimates for all pollutants, precursors, or toxics were not affected by which version of the MOVES model was used. The inventories for reporting under the AERR for which significant work had been completed by April 2012 were developed using MOVES2010a. The AERR inventories developed after April 2012 used MOVES2010b (April 2012). The AERR inventory development schedule for HGB required the use of MOVES2010a. The AERR inventory development schedule for DFW allowed the use of MOVES2010b (April 2012).

The MOVES model may be run using default information, or the default information may be modified to simulate the driving behavior, meteorological conditions, and vehicle characteristics specific to a particular area. Because modifications to the inputs significantly influence the emissions factors calculated by the MOVES model, input parameters reflecting local conditions were used instead of relying on national default values for the development of the 2011 on-road inventory. The localized inputs used for the DFW and HGB on-road mobile source 2011 EI development include vehicle speeds for each roadway link, temperature, humidity, vehicle age distributions for each vehicle type, percentage of miles traveled for each vehicle type, type of inspection and maintenance (I/M) program, fuel control programs, and gasoline vapor pressure controls.

To estimate on-road mobile source emissions, emissions rates calculated by the MOVES model must be multiplied by the level of vehicle activity. On-road mobile source emissions 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) in units of miles per day. The level of vehicle travel activity is developed using a travel demand model (TDM) run by the Texas Department of Transportation or by the local metropolitan planning organizations. The TDMs are validated against a large number of ground counts, i.e., traffic passing over counters placed in various locations throughout a county or area. For SIP and reporting inventories, VMT estimates are calibrated against outputs from the federal highway performance monitoring system, a model built from a different set of traffic counters.

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

A summary of the annual and daily DFW and HGB 2011 on-road mobile source NO<sub>x</sub> and VOC emissions levels is presented in Sections 2.5.2: *HGB On-road Mobile Source EI* and 2.5.3: *DFW On-road Mobile Source EI*. The inventory development methods, MOVES inputs, and the results are documented in Appendix I: *Development of 2011 On-Road Mobile Source Actual Annual and Summer Weekday Emissions Inventories for All Texas Counties (Except for 12*

*Counties in the Dallas-Fort Worth Area), and Winter Weekday Emissions Inventories for El Paso: Houston-Galveston-Brazoria Area and Appendix J: Development of 2011 On-Road Mobile Source Actual Annual and Summer Season Weekday Emissions Inventories for 12 Counties in the Dallas-Fort Worth Metropolitan Statistical Area - Amendment.*

### **2.5.2 HGB On-Road Mobile Source EI**

The 2011 HGB 2008 eight-hour ozone nonattainment area EI for on-road mobile sources was developed using emissions factors calculated using the MOVES2010a version of the MOVES model. All control strategies implemented by 2011 were included in the input to the EI development for the 2011 on-road mobile source base year EI. Those controls include the effects of the federal motor vehicle control program (FMVCP), reformulated gasoline (RFG), the HGB vehicle I/M program, and the Texas Low Emission Diesel (TxLED) program.

The VMT was developed using the latest activity estimates from the HGB TDM 2011 network. The activity levels used to calculate the EI reflect the 2011 roadway network with 2011 VMT and speeds. A summary of the EI is presented in Table 2-7: *HGB 2011 NO<sub>x</sub> and VOC Emissions for On-road Mobile Sources (tons per day and tons per year)*. Complete documentation of the development of the EI and details on MOVES model inputs are provided in Appendix I.

**Table 2-7: HGB 2011 NO<sub>x</sub> and VOC Emissions for On-Road Mobile Sources (tons per day and tons per year)**

County	Ozone Season Weekday NO <sub>x</sub> (tpd)	Annual NO <sub>x</sub> (tpy)	Ozone Season Weekday VOC (tpd)	Annual VOC (tpy)
Brazoria	8.44	3,155.45	4.20	1,436.68
Chambers	6.84	2,501.74	1.07	357.56
Fort Bend	12.54	4,720.44	6.20	2,143.22
Galveston	7.37	2,746.59	3.86	1,319.75
Harris	137.01	50,782.06	58.18	19,955.62
Liberty	4.92	1,772.54	1.66	547.55
Montgomery	15.22	5,727.18	6.30	2,161.07
Waller	3.87	1,470.91	1.15	391.48
Total	196.21	72,876.91	82.62	28,312.93

### **2.5.3 DFW On-Road Mobile Source EI**

The 2011 DFW 2008 eight-hour ozone nonattainment area EI for on-road mobile sources was developed using emissions factors calculated using the MOVES2010b version of the MOVES model. All control strategies implemented by 2011 were included in the input to the EI development for the 2011 on-road mobile source base year EI. Those controls include the effects of the FMVCP; RFG, the DFW vehicle I/M program, and the TxLED program.

The VMT was developed using the latest activity estimates from the DFW TDM 2011 network. The activity levels used to calculate the EI reflect the 2011 roadway network with 2011 VMT and speeds. A summary of the EI is presented in Table 2-8: *DFW 2011 NO<sub>x</sub> and VOC Emissions for On-Road Mobile Sources (tons per day and tons per year)*. Complete documentation of the development of the EI and details on MOVES model inputs are provided in Appendix J.

**Table 2-8: DFW 2011 NO<sub>x</sub> and VOC Emissions for On-Road Mobile Sources (tons per day and tons per year)**

County	Ozone Season Weekday NO <sub>x</sub> (tpd)	Annual NO <sub>x</sub> (tpy)	Ozone Season Weekday VOC (tpd)	Annual VOC (tpy)
Collin	22.76	7,827.63	10.28	3,050.34
Dallas	89.86	31,244.48	37.98	11,301.26
Denton	20.99	7,349.39	8.68	2,582.00
Ellis	11.39	4,195.26	3.31	1,003.77
Johnson	8.81	3,197.03	3.21	972.89
Kaufman	9.40	3,323.77	2.33	799.21
Parker	8.68	3,238.67	2.43	738.60
Rockwall	3.29	1,181.82	1.22	360.17
Tarrant	57.48	20,088.88	27.12	8,039.88
Wise	6.21	2,270.95	1.80	556.29
Total	238.87	83,917.88	98.36	29,404.41

## 2.6 BIOGENIC SOURCES

Biogenic sources include VOC 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 emissions such as isoprene, monoterpene, and alpha-pinene. Biogenic emissions are estimated by the EPA using its biogenic emissions inventory tool.

## 2.7 EMISSIONS SUMMARY

The 2011 NO<sub>x</sub> and VOC emissions in the HGB and DFW 2008 eight-hour ozone nonattainment areas for each source category are summarized in Table 2-9: *Summary of HGB 2011 NO<sub>x</sub> and VOC Emissions (tons per day and tons per year)* and Table 2-10: *Summary of DFW 2011 NO<sub>x</sub> and VOC Emissions (tons per day and tons per year)*.

**Table 2-9: Summary of HGB 2011 NO<sub>x</sub> and VOC Emissions (tons per day and tons per year)**

Category	Ozone Season Weekday NO <sub>x</sub> (tpd)	Annual NO <sub>x</sub> (tpy)	Ozone Season Weekday VOC (tpd)	Annual VOC (tpy)
Point	108.44	35,050.42	94.83	30,279.00
Area	21.14	8,577.06	308.73	104,944.04
Non-Road Mobile	121.11	41,946.29	49.93	18,820.83
On-Road Mobile	196.21	72,876.91	82.62	28,312.93
Total	446.90	158,450.68	536.12	182,356.80

**Table 2-10: Summary of DFW 2011 NO<sub>x</sub> and VOC Emissions (tons per day and tons per year)**

Category	Ozone Season Weekday NO <sub>x</sub> (tpd)	Annual NO <sub>x</sub> (tpy)	Ozone Season Weekday VOC (tpd)	Annual VOC (tpy)
Point	39.95	12,880.38	29.80	9,186.26
Area	42.64	15,734.52	292.49	96,299.78
Non-Road Mobile	120.61	39,272.29	55.00	16,998.73
On-Road Mobile	238.87	83,917.88	98.36	29,404.41
Total	442.08	151,805.07	475.65	151,889.18