

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

HOUSTON-GALVESTON-BRAZORIA EIGHT-HOUR OZONE NONATTAINMENT AREA  
REASONABLE FURTHER PROGRESS SIP

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

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PROJECT NO. 2006-030-SIP-NR

## EXECUTIVE SUMMARY

Section 182 of the 1990 Federal Clean Air Act Amendments (FCAAA) requires ozone nonattainment areas with air quality classified as moderate or higher to submit plans showing reasonable further progress (RFP) towards attainment of the NAAQS. The Houston-Galveston-Brazoria (HGB) area is classified as a moderate nonattainment area for the eight-hour ozone standard with an attainment date of June 15, 2010. The RFP SIP is not required or intended to demonstrate attainment of the ozone National Ambient Air Quality Standards (NAAQS), but rather is to demonstrate that ozone precursor emissions will be reduced by 15 percent for the period between 2002 and 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 eight-hour ozone nonattainment areas must demonstrate RFP. Target year inventories include the latest information available to estimate emissions growth. Target levels for 2008 also account for RFP corrections and non-creditable reductions. All of the RFP inventories are based upon an ozone season weekday analysis.

The RFP methodology involves development of the base year and milestone year inventories, emission reductions for each milestone year, and an estimate of the effects of non-creditable reductions and pre-1990 FCAAA rules. 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 forecasted controlled emission inventories are less than the target level. The results demonstrating that the HGB RFP area meets the FCAAA RFP requirements for the 2008 milestone year are shown in Table 3-3: *Summary of RFP Demonstration for Eight HGB Counties*.

This SIP revision also sets the nitrogen oxides (NO<sub>x</sub>) and volatile organic compounds (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 motor vehicle emissions budget for the established year.

Although no new on-road mobile source controls have been adopted for the HGB 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 eight-county HGB ozone nonattainment area. A summary of the revised MVEBs is presented in Table ES-1: RFP Motor Vehicle Emission Budgets for HGB. This MVEB remains consistent with the 2007 NO<sub>x</sub> MVEB budget from the HGB Mid-Course Review SIP as adopted on December 1, 2004, by the Commission.

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

Description	NO <sub>x</sub> tpd	VOC tpd
2008 RFP MVEBs	186.13	86.77

Based on comments received from the EPA during the public comment period, changes were made to the proposed HGB RFP SIP in Chapters 2 and 5. Table 2-11: *HGB RFP Ozone Season Weekday On-Road Mobile Source NO<sub>x</sub> Emissions and Control Strategy Reductions* and Table 2-

12: *HGB RFP Ozone Season Weekday On-Road Mobile Source VOC Emissions and Control Strategy Reductions* were added 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 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 of the Texas Water Code. 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 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; 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)

1. *Dallas-Fort Worth RFP (Revised May 23, 2007)*

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

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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

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)

# Houston-Galveston-Brazoria 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  
EI= Emissions Inventory  
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  
HGB= Houston-Galveston-Brazoria  
HGAC=Houston-Galveston Area Council  
I/M= Inspection and Maintenance  
MECT = Mass Emissions Cap and Trade Program  
MVEBs= Motor Vehicle Emission Budgets  
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  
STARS= State of Texas Air Reporting System  
TCEQ=Texas Commission on Environmental Quality  
TDMs= Travel Demand Models  
TexAQS 2000= Texas Air Quality Study 2000  
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 HOUSTON-GALVESTON-BRAZORIA AREA REASONABLE FURTHER PROGRESS BACKGROUND

“The History of the Texas State Implementation Plan (SIP),” a comprehensive overview of the SIP revisions submitted to 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>

### 1.2 REASONABLE FURTHER PROGRESS REQUIREMENTS

The 1990 Federal Clean Air Act Amendments (FCAAA), 42 USC §7410, require states to submit State Implementation Plan (SIP) revisions that contain enforceable measures to achieve the National Ambient Air Quality Standards (NAAQS). The FCAAA also requires states with nonattainment areas due to air quality classified as “moderate” or above, to submit plans showing reasonable further progress (RFP) toward attainment of the ozone standard. The RFP SIP is not required or intended to demonstrate attainment of the ozone NAAQS, but is rather to demonstrate that ozone precursor emissions will be reduced by 15 percent between 2002 and 2008.

On April 30, 2004, EPA published the rule designating the eight-hour ozone nonattainment areas (69 Fed Reg 23936). The HGB eight-hour nonattainment area for ozone is the same as the HGB nonattainment area for one-hour ozone, which consists of Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery and Waller.

On June 15, 2004, the EPA finalized Phase I of the Eight-Hour Ozone Implementation Rule, which outlines requirements for demonstrating RFP toward attainment of the ozone standard. In November 2005, the EPA finalized Phase II of its Eight-Hour Ozone Implementation Rule, which detailed RFP requirements for eight-hour ozone nonattainment areas (70 Fed Reg 71612-71705). The EPA requires submittal of the RFP plan by June 15, 2007.

The milestone demonstration requirement shows reasonable further progress by demonstrating a 15 percent emissions reduction for the period between 2002 and 2008. This RFP SIP revision shows progress toward attainment of the NAAQS for ozone by demonstrating a 15 percent NO<sub>x</sub> emissions reduction in the eight-county HGB area for the period between 2002 and 2008.

In addition to the RFP analyses, this SIP revision provides updated RFP on-road mobile vehicle emissions budgets (MVEB) and updated 2002 emissions inventories for point, area, on-road mobile, and non-road mobile sources. Furthermore, this SIP revision includes existing contingency measure requirements to be implemented if the area fails to achieve the RFP milestones.

### 1.3 PUBLIC HEARING AND COMMENT INFORMATION

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

CITY	DATE	TIME	LOCATION
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 (EIs) be prepared for ozone nonattainment areas. Ozone is photochemically produced in the atmosphere when VOCs are mixed with NO<sub>x</sub> in the presence of sunlight. The TCEQ maintains an EI of up-to-date information on NO<sub>x</sub> and VOC sources. 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 inventory provides data for a variety of air quality planning tasks, including establishing baseline emission levels, calculating reduction targets, developing control strategies to achieve the emission reductions, developing emission inputs into air quality models, and tracking actual emission reductions against established emissions growth and control budgets. The total inventory of VOC and NO<sub>x</sub> emissions for an area is summarized from the estimates developed for the five general categories of emission sources: point, area, on-road mobile, non-road mobile, and biogenics.

Since the previous Houston-Galveston-Brazoria (HGB) 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 HGB RFP SIP revision updates emissions data for the eight-hour ozone RFP base year (2002) and for the milestone year (2008). Because of the updates to the base year and milestone year inventories, the emissions reductions due to control strategies have been reevaluated. This SIP revision updates both the reductions and the control strategies used to fulfill the RFP and contingency requirements.

#### **2.1.1 Updated Uncontrolled Milestone Year - 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 year inventory includes pre-2002 FCAA controls, growth in activity from 1990 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 commission mails EI questionnaires (EIQs) to all sources identified as meeting these 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 quality assured by TCEQ staff. 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 20, 2006, from STARS. The inventory includes all sites that reported in the HGB area and reflects revisions made on or before that date. County-level VOC emissions were revised to account for non-reported VOC discovered in the Texas Air Quality Study 2000 (TexAQS 2000). The following TCEQ web page contains EI guidance documents and 2002 HGB base year inventory and other historical point source inventories of criteria pollutants (e.g., NO<sub>x</sub>, VOC, sulfur dioxide, 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 and non-reported VOC identified during the TexAQS 2000. The emissions growth in sources 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 non-reported VOC emissions and unused emissions credits.

The growth in emissions from 2002 to 2008 is based on projection factors that were 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 the actual growth factor from 2002 to 2004. The projection factor set closest to the actual growth was then used to project the 2002 base inventory to 2008.

The growth in NO<sub>x</sub> and VOC emissions in the HGB area was adjusted to account for the emissions credits banked in the Emissions Banking and Trading database. Emission Reduction Credits (ERCs) and Discrete Emission Reduction Credits (DERCs), unused as of July 2006, were added to the 2008 inventory, because these banked emissions are able to return to the air shed in the future. Additional adjustments were made to county level VOC emissions to account for non-reported VOC emissions identified during TexAQS 2000.

### **2.2.4 Updated Controlled 2008 Milestone Year Inventory**

The 2008 controlled inventory accounts for controls in the HGB area. The NO<sub>x</sub> controls are reflected in the Mass Emissions Cap and Trade Program (MECT) 2008 NO<sub>x</sub> cap. The NO<sub>x</sub> emissions in this program take into account all NO<sub>x</sub> controls, including controls applied to electric generating units (EGUs) and large stationary engines. The uncontrolled emissions include all of the non-MECT capped sources and all VOC sources. The uncontrolled emissions were developed by applying growth factors to the non-MECT sources in the 2002 base year inventory. Emissions were then added to account for non-reported VOC emissions from TexAQS 2000 and unused emissions credits. The following TCEQ Web page contains more information about the Mass Emissions Cap and Trade Program:  
[http://www.tceq.state.tx.us/permitting/air/banking/mass\\_ect\\_prog.html](http://www.tceq.state.tx.us/permitting/air/banking/mass_ect_prog.html).

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

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

<b>Emissions Inventory</b>	<b>NO<sub>x</sub> (tons per day)</b>
2002 Base Year	339.48
2008 Uncontrolled	381.59
2008 Controlled	174.89

**Table 2-2: HGB Eight-County RFP  
Point Source VOC Emissions**

<b>Emissions Inventory</b>	<b>VOC (tons per day)</b>
2002 Base Year	297.12
2008 Uncontrolled	322.04
2008 Controlled	186.25

For more details on the point source projection method, refer to Appendix 2: *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 do “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 is 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 grow 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 2008 using improved growth factors. A major contracted project developed a complete set of updated EGAS growth factors using 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. The only rule affecting area sources in the HGB area that came into effect between 2002 and 2008 is the portable fuel container rule. The EPA default factor of 80 percent was used as the rule effectiveness factor for the portable fuel container rule. Many rules concerning industrial coatings and gasoline station underground tank filling (Stage I) and vehicle refueling (Stage II) were accounted for in the base year numbers.

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

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

<b>Emissions Inventory</b>	<b>NO<sub>x</sub> (tons per day)</b>
2002 Base Year	40.15
2008 Uncontrolled	55.18
2008 Controlled	55.18

**Table 2-4: HGB Eight-County RFP  
Area Source VOC Emissions**

<b>Emissions Inventory</b>	<b>VOC (tons per day)</b>
2002 Base Year	219.51
2008 Uncontrolled	262.08
2008 Controlled	258.19

## **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 equipment classes in the model include 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. The EI for commercial marine vessels has been developed from two surveys of vessel types and activities in the Port of Houston and surrounding ports. 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 EI for this category. Selected industrial equipment types were also surveyed, resulting in further improvements to the inventory. Using the new data, revised 2002 non-road EIs for the NONROAD model categories 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 HGB area activities of line haul and yard engines. Commercial marine vessel emissions were developed by updating the 1999 EI with current shipping and waterway commerce activity data.

### **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 locomotives, aircraft, and commercial marine vessels. To produce the NONROAD portion of the inventory, the NONROAD model was run with federal control measures disengaged. Emissions for locomotives and commercial marine vessels were projected from the 2002 base year to 2008 using recently developed REMI EGAS growth factors for the appropriate categories. Aircraft emissions were modeled using the EDMS model.

### **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 locomotives, aircraft, and commercial marine vessels. The NONROAD portion of the inventory was produced by running the NONROAD model with federal controls in place. The locomotives and commercial marine vessel portions of the controlled 2008 inventory were developed by reviewing federal standards affecting these categories and then calculating the inventory with controls in place. Aircraft emissions were modeled using the EDMS model.

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

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

<b>Emissions Inventory</b>	<b>NO<sub>x</sub> (tons per day)</b>
2002 Base Year	167.74
2008 Uncontrolled	243.03
2008 Controlled	146.66

**Table 2-6: HGB Eight-County RFP  
Non-Road Mobile Source VOC Emissions**

<b>Emissions Inventory</b>	<b>VOC (tons per day)</b>
2002 Base Year	112.37
2008 Uncontrolled	182.92
2008 Controlled	81.82

## **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 factors) 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. The model may be run using national default information or input may be provided to modify the model calculations to simulate the driving behavior, meteorological conditions, and vehicle characteristics specific to the HGB area. 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. The localized inputs used for the HGB RFP on-road mobile 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-maintenance program, fuel control programs, and gasoline vapor pressure.

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) in units of miles per day. 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 or area. 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.

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 on-road inventory development. Roadway speeds, required inputs for the MOBILE model, are calculated by using the activity volumes from the TDM and a post-processor speed model.

In order to perform the RFP calculations, a state must determine the base inventory from which the calculations begin, the amount of control achieved from controls that were implemented prior to the 1990 FCAAA and therefore not creditable toward FCAAA RFP requirements, the uncontrolled milestone year inventory, and the emission reduction controls to demonstrate that RFP is met for the milestone year. To determine all the information required for RFP calculations, a set of on-road mobile source inventories and control reduction estimates 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 FCAAA. 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 between the base year and the milestone year. These uncontrolled inventories serve as the basis for determining how much emissions reduction is required to meet the RFP target.
- 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 emission reductions from control strategies that are then subtracted from the uncontrolled emission reduction, to determine the controlled inventory value. Both the total from on-road mobile control strategies and the emission reductions from each individual control strategy are calculated.

A summary of the on-road mobile source vehicle miles traveled used to develop the various NO<sub>x</sub> and VOC emissions levels in subsequent tables is presented in Table 2-7: *HGB Eight-County RFP Ozone Season Weekday On-Road Mobile Source VMT*, Table 2-8: *HGB Eight-County RFP Ozone Season Weekday On-Road Mobile Source NO<sub>x</sub> Emissions*, and Table 2-9: *HGB Eight-County RFP Ozone Season Weekday On-Road Mobile Source VOC Emissions*. For complete documentation of the development of the on-road mobile source inventories for the HGB RFP demonstration, refer to Appendix 3: *Development of HGB 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.

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

<b>Emissions Inventory</b>	<b>VMT (miles per day)</b>
2002 Base Year	118,741,309
2002 Adjusted Base Year (ABY)	118,741,309
2008 ABY	118,741,309
2008 Uncontrolled	140,957,487
2008 Controlled	140,957,487

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

<b>Emissions Inventory</b>	<b>NO<sub>x</sub> (tons per day)</b>
2002 Base Year	283.20
2002 Adjusted Base Year (ABY)	335.20
2008 ABY	293.00
2008 Uncontrolled	346.83
2008 Controlled	171.65

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

<b>Emissions Inventory</b>	<b>VOC (tons per day)</b>
2002 Base Year	114.30
2002 Adjusted Base Year (ABY)	162.20
2008 ABY	152.20
2008 Uncontrolled	180.99
2008 Controlled	78.88

### **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 HGB 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

HGB vehicle 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 Table 2-10. For complete documentation of the development of the inventory and details on MOBILE model inputs, refer to Appendix 3: *Development of HGB 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 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 HGB 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 each milestone year using emission factors from the MOBILE model that reflect only control strategies implemented prior to 1990. By projecting the pre-1990 FMVCP into future years, the effects of additional fleet turn over benefit because of 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 HGB Non-Creditable Reductions, Ozone Season Weekday On-Road Mobile Source VMT and Emissions*. For complete documentation of the development of the inventory and details on MOBILE model inputs, refer to Appendix 3: *Development of HGB RFP On-Road Mobile Source Emissions Inventories*.

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

Calendar Year	VMT	2002 Base/Adjusted Base Year Inventory		Non-Creditable Emissions Reductions	
		NO <sub>x</sub>	VOC	NO <sub>x</sub>	VOC
2002 Base Year	118,741,309	283.20	114.30	N/A	N/A
2002 Adjusted Base Year (ABY)	118,741,309	335.20	162.20	N/A	N/A
2008 ABY	118,741,309	293.00	152.20	42.20	10.00

### 2.5.4 Updated Uncontrolled 2008 Milestone Year Emission Inventory

The milestone year uncontrolled EI for on-road mobile sources was developed using emission factors from the MOBILE model that reflect only control strategies implemented prior to 2002. The latest version of MOBILE, 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 HGB transportation demand model. These controls include Pre-1990 FMVCP, the 1992 RVP control, fleet turnover to Tier 1 FMVCP, reformulated gasoline, and the HGB vehicle 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 3: *Development of HGB RFP On-Road Mobile Source Emissions Inventories*.

### 2.5.5 Updated Controlled 2008 Milestone Year Emission 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, the HGB vehicle I/M program, anti-tampering program, 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 Table 2-11: *HGB RFP Ozone Season Weekday On-Road Mobile Source NO<sub>x</sub> Emissions and Control Strategy Reductions* and Table 2-12: *HGB RFP Ozone Season Weekday On-Road Mobile Source VOC Emissions and Control Strategy Reductions*.

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

<b>Emissions Inventory</b>	<b>NO<sub>x</sub> (tons per day)</b>
2008 Uncontrolled	346.83
Tier 1 Federal Motor Vehicle Control Program (FMVCP)	63.30
I/M in Harris County	12.08
Federal Reformulated Gasoline (RFG)	44.40
National Low Emission Vehicle Program (NLEV)	9.65
Tier 2 FMVCP	28.67
2007 Heavy Duty Diesel FMVCP	8.24
Expanded I/M	3.58
TxLED	5.26
2008 Control Strategy	171.65*

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

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

Emissions Inventory	VOC (tons per day)
2008 Uncontrolled	180.99
Tier 1 Federal Motor Vehicle Control Program (FMVCP)	41.77
I/M in Harris County	10.15
Federal Reformulated Gasoline (RFG)	31.64
National Low Emission Vehicle Program (NLEV)	5.25
Tier 2 FMVCP	10.33
2007 Heavy Duty Diesel FMVCP	0.13
Expanded I/M	2.80
TxLED	0.04
2008 Control Strategy	78.88*

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

The MVEBs for each milestone year is derived from the on-road mobile source uncontrolled inventory and the amount of emissions 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. A summary of the inventories is presented in Table 2-8: *HGB Eight-County RFP Ozone Season, Weekday On-Road Mobile Source NO<sub>x</sub> Emissions*, and Table 2-9: *HGB Eight-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 3: *Development of HGB 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 therefore are 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. The calculation of the 2002 HGB RFP base year EI is documented in Appendix 1, Sheet 2.

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 HGB ozone nonattainment area is shown in Table 2-13: *HGB Eight-County RFP 2002 Base Year Ozone Season Weekday NO<sub>x</sub> Emissions* and Table 2-14: *HGB Eight -County RFP 2002 Base Year Ozone Season Weekday VOC Emissions*.

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

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

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

<b>Emissions Inventory</b>	<b>NO<sub>x</sub> (tons per day)</b>
Point Source - 2002 RFP Base Year	339.48
Area Source - 2002 RFP Base Year	40.15
Non-Road Mobile Source - 2002 RFP Base Year	167.74
On-Road Mobile Source - 2002 RFP Base Year	283.20
Total Anthropogenic - 2002 RFP Base Year	830.57

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

<b>Emissions Inventory</b>	<b>VOC (tons per day)</b>
Point Source - 2002 RFP Base Year	297.12
Area Source - 2002 RFP Base Year	219.51
Non-Road Mobile Source - 2002 RFP Base Year	112.37
On-Road Mobile Source - 2002 RFP Base Year	114.30
Total Anthropogenic - 2002 RFP Base Year	743.30

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

Emissions Inventory	NO <sub>x</sub> (tons per day)
Point Source - 2008 RFP Uncontrolled	381.59
Area Source - 2008 RFP Uncontrolled	55.18
Non-Road Mobile Source - 2008 RFP Uncontrolled	243.03
On-Road Mobile Source - 2008 RFP Uncontrolled	346.83*
Total Anthropogenic - 2008 RFP Uncontrolled	1026.63*

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

**Table 2-16: HGB Eight-County RFP 2008 Uncontrolled  
Ozone Season Weekday VOC Emissions**

Emissions Inventory	VOC (tons per day)
Point Source - 2008 RFP Uncontrolled	322.04
Area Source - 2008 RFP Uncontrolled	262.08
Non-Road Mobile Source - 2008 RFP Uncontrolled	182.92
On-Road Mobile Source - 2008 RFP Uncontrolled	180.99
Total Anthropogenic - 2008 RFP Uncontrolled	948.03

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

Emissions Inventory	NO <sub>x</sub> (tons per day)
Point Source – 2008 RFP Controlled	174.89
Area Source - 2008 RFP Controlled	55.18
Non-Road Mobile Source - 2008 RFP Controlled	146.66
On-Road Mobile Source - 2008 RFP Controlled	171.65*
Total Anthropogenic - 2008 RFP Controlled	548.38*

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

**Table 2-18: HGB Eight-County RFP 2008 Controlled  
Ozone Season Weekday VOC Emissions**

<b>Emissions Inventory</b>	<b>VOC (tons per day)</b>
Point Source – 2008 RFP Controlled	186.25
Area Source - 2008 RFP Controlled	258.19
Non-Road Mobile Source - 2008 RFP Controlled	81.82
On-Road Mobile Source - 2008 RFP Controlled	78.88
Total Anthropogenic - 2008 RFP Controlled	605.14

## CHAPTER 3: TARGET EMISSION LEVELS AND RFP DEMONSTRATION

### 3.1 INTRODUCTION

This chapter details the process and results to show that the state meets the 15 percent emission reduction requirements 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 HGB 2008 RFP demonstration are calculated and used to demonstrate compliance with 2008 RFP requirements and provides a summary of the 2008 HGB 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

EPA guidance 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 the adjusted base year inventories for 2002 and 2008.
4. Calculate the non-creditable fleet turnover correction.
5. Calculate the 2008 necessary 15 percent emission reduction.
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 the base year and all other SIP EIs. Details of the development of the 2002 HGB base year inventory are discussed in Chapter Two. Summaries of the 2002 HGB base year NO<sub>x</sub> and VOC emissions inventories are presented in Table 2-13: *HGB Eight-County RFP 2002 Base Year Ozone Season Weekday NO<sub>x</sub> Emissions* and Table 2-14: *HGB Eight-County RFP 2002 Base Year Ozone Season Weekday VOC Emissions* in Chapter 2. A summary of the target calculations is presented in Tables 3-1: *Summary of Calculation of Target Level for HGB*.

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 HGB 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: *HGB Eight-County RFP 2002 Base Year Ozone Season Weekday NO<sub>x</sub> Emissions* and Table 2-14: *HGB Eight-County RFP 2002 Base Year Ozone Season Weekday VOC Emissions*.

Step three of the target calculation methodology is development of the adjusted base year (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. This estimation 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, set the model evaluation year to the RFP base or milestone year, and then the model is run to determine emission factors for each base or 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 HGB 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. Since the ABY inventories estimate the effects of the non-creditable pre-1990 FCAAA controls, the difference between ABY inventories represent an estimate of the non-creditable RFP emission reductions, also referred to as the fleet turnover correction. The equation for calculating the fleet turn over 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 CAA controls and 2002 evaluation year
- EF<sub>2008ABY</sub> = MOBILE6.2.03 emission rate with pre-1990 CAA 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 ABY inventory 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, but use of NO<sub>x</sub> emissions reductions must meet the criteria in Section 182(c)(2)(C) in the FCAAA. For the eight HGB counties, an equivalent percentage of NO<sub>x</sub> reduction may be substituted for VOC reduction requirements. The total percent NO<sub>x</sub> and VOC reductions must equal the 15 percent. Accordingly, the RFP reduction requirement for this SIP is satisfied with 15 percent reduction in NO<sub>x</sub> emissions. The following equation generally describes the method to calculate the percentage of NO<sub>x</sub> emissions substituted for VOC emissions:

$$N_{2008} = 15 - V_{2008}$$

where:

$V_{2008}$  = percentage VOC reductions for 2008  
 $N_{2008}$  = percentage NO<sub>x</sub> reductions for 2008

The VOC and NO<sub>x</sub> percentages are multiplied by the 2002 ABY inventories 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 described below. Details of the emission reductions used to satisfy the RFP requirements are documented in Chapter 4 and summarized in Table 4-1: *Summary of HGB RFP Emission Reductions for 2008.*

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

and

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

where:

$RQ_{VOC}$	= required percent VOC emission reductions by 2008
$RQ_{NOx}$	= required percent NO <sub>x</sub> emission reductions by 2008
$BY_{2002VOC}$	= 2002 base year inventory for VOC
$BY_{2002NOx}$	= 2002 base year inventory for NO <sub>x</sub>
$ABY_{2002VOC}$	= 2002 adjusted base year inventory for VOC
$ABY_{2002NOx}$	= 2002 adjusted base year inventory for NO <sub>x</sub>
$ABY_{2008VOC}$	= 2008 adjusted base year inventory for VOC
$ABY_{2008NOx}$	= 2008 adjusted base year inventory for NO <sub>x</sub>
$PV_{2008}$	= percentage VOC reductions by 2008
$PN_{2008}$	= percentage NO <sub>x</sub> reductions by 2008

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 in 2008 in order for the HGB 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:

$TL_{2008X}$	= Target level of emissions for 2008 milestone
$RFPBY_{2002X}$	= 2002 RFP base year emissions
$RQ_X$	= Emission reduction requirement for 2008 for pollutant X
$FTC_{2008X}$	= 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. Appendix 1, Sheet 14 documents the calculation of the 2008 target values. Table 3-1: *Summary of Calculation of Target Level for HGB* summarizes calculation of the target levels for 2008 for the HGB 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 HGB**

Description	NO <sub>x</sub> tpd	VOC tpd
① Step 1: 2002 Base Year Inventory (Tables 2-13 and 2-14)	830.57	743.30
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 (Tables 2-14 and 2-15)	830.57	743.30
④ Step 3: 2002 Adjusted Base Year Inventory (Appendix 1, Sheet 9, ABY Calcs)	882.57	791.20
⑤ 2008 Adjusted Base Year Inventory (Appendix 1, Sheet 9, ABY Calcs)	840.37	781.20
⑥ Step 4: Calculate Non-creditable reductions (④ minus ⑤ )	42.20	10.00
⑦ Step 5 :Adjust 2002 Base Year Inventory for Non-creditable Reductions (③ minus ⑥)	788.37	733.30
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 )	118.26	0.00
⑩ Step 6 Calculate the Target Level of Emissions (③ minus ⑥ minus ⑨ )	670.11	733.30

### 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 HGB milestone year. Table 3-2: *Summary of Required Reductions that Include Growth for HGB* summarizes the calculation of the required reductions for the HGB area.

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

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

Where:

$$ER_{NO_x2008} = \text{RFP NO}_x \text{ emission reductions for 2008}$$

$$UPE_{2008NO_x} = \text{uncontrolled projected NO}_x \text{ emissions for 2008}$$

$$TL_{2008NO_x} = \text{Target level of NO}_x \text{ emissions for 2008 milestone}$$

$$ER_{VOC2008} = \text{RFP VOC emission reductions for 2008}$$

$$UPE_{2008VOC} = \text{uncontrolled projected VOC emissions for 2008}$$

$$TL_{2008VOC} = \text{Target level of VOC emissions for 2008 milestone}$$

**Table 3-2: Summary of Required Reductions that Include Growth for HGB**

Description	NO <sub>x</sub> tpd	VOC tpd
① Uncontrolled Projected 2008 Inventory (Chapter 2, Tables 2-15 and 2-16)	1026.63	948.03
② Target Level of Emissions for 2008 (from Table 3-1)	670.11	733.30
③ Required Reductions for 2008 (① minus ② )	356.52	214.73
④ Noncreditable Reductions (from Table 3-1)	42.20	10.00
⑤ 2002 to 2008 15% Reduction Requirement (from Table 3-1)	118.26	0.00
⑥ Amount of Reduction to Account for Growth (③ minus ④ minus ⑤ )	196.06	204.73

The projection or forecast year EIs is 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 EIs are derived by applying the appropriate projection methodologies to the 2002 base year EIs, 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 reductions achieved are then subtracted from the required reductions. The control strategy plan must show emission reductions that will reduce the future EIs to a value less than the emissions target value. For the eight HGB counties, this requirement is met by reductions of 15 percent NO<sub>x</sub> for RFP and three percent NO<sub>x</sub> for contingency purposes. Since all reductions in the HGB counties are accomplished with NO<sub>x</sub> reductions, there are no VOC reduction requirements for these counties. Table 3-3: *Summary of RFP Demonstration for Eight HGB Counties* summarizes the demonstration of the RFP plan for HGB 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.

**Table 3-3: Summary of RFP Demonstration for Eight HGB Counties for 2008**

<b>Description</b>	<b>NO<sub>x</sub> tpd</b>	<b>VOC* tpd</b>
2008 Uncontrolled Emissions Forecast (Chapter 2, Tables 2-15 and 2-16)	1026.63	948.03
Target Level of 2008 Emissions (Table 3-1)	670.11	733.30
Required Reductions from 2008 Uncontrolled Emissions Forecast (Table 3-2)	356.52	214.73
Sum of 2008 RFP Control Reductions (from Chapter 4, Table 4-1)	472.67	341.40
Are Control Reductions Greater Than Required Reductions?	Yes	Yes

\* VOC reductions were not used for RFP demonstration purposes, 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 used to achieve 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 emission reductions reflect the identified federal and state emission controls. All state control measures are codified in Texas state regulations. The list of controls does not include all emission reduction programs for the HGB area. The summary of emission reductions from the control measures used to meet the 2008 RFP target is presented in Table 4-1: *Summary of HGB RFP Emission Reductions for 2008*. The 15 percent reduction requirement is satisfied using reductions in NO<sub>x</sub> emissions. VOC emission reductions were not used for RFP demonstration purposes, but are needed to establish the MVEB.

**Table 4-1: Summary of HGB RFP Emission Reductions for 2008**

Control Strategy Description	NO <sub>x</sub> tpd	VOC tpd
Mass Emissions Cap and Trade Program (MECT)	206.70	0.00
HRVOC Cap	0.00	135.79
Portable Fuel Containers	0.00	3.89
Tier 1 Federal Motor Vehicle Control Program (FMVCP)	63.30	41.77
I/M in Harris County	12.08	10.15
Federal Reformulated Gasoline (RFG)	44.40	31.64
National Low Emission Vehicle Program (NLEV)	9.65	5.25
Tier 2 Federal Motor Vehicle Control Program (FMVCP)	28.67	10.33
2007 Heavy Duty Diesel FMVCP	8.24	0.13
Expanded I/M	3.58	2.80
TxLED	5.26	0.04
Tier I and II Locomotive NOX Standards	4.02	0.00
New Non-road Spark-Ignition (SI) Engines*	-7.21	46.61
Heavy Duty Non-Road Engines	43.92	10.61
Tier 1, 2, and 3 Non-Road Diesel Engines	24.62	1.95
Small Non-Road SI Engines (Phase II)	4.63	37.45
Large Non-Road SI and Recreational Marine	20.81	2.98
<b>Sum of Control Reductions</b>	<b>472.67</b>	<b>341.40</b>

\* Projections from the EPA NONROAD 2005 model suggest that net NO<sub>x</sub> emissions will exceed control strategy reductions for new non-road spark-ignition engines. This emission increase results from a projected increase in total number of non-road engines that outpaces the emissions reduction per individual unit expected.

### 4.2 POINT SOURCE CONTROLS

The point source controls are calculated using several sources of data, including but not limited to emissions inventory data, mass emissions cap and trade (MECT) 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 summary of uncontrolled and controlled emissions for the HGB area for point sources may be found below in Table 4-2:

*Summary of Point Source Emissions.* Point source controls are detailed in Appendix 1 - Sheet 13. The most significant of these strategies is the 30 TAC Chapter 117 emission specifications for attainment demonstration (ESADs) and the MECT Program for NO<sub>x</sub>. Some of the source categories and associated reductions from these strategies are utility boilers, turbines and duct burners, heaters and furnaces, IC engines and industrial boilers with an overall point source NO<sub>x</sub> reduction of approximately 80 percent. The estimated reduction in point source VOC emissions comes from the HRVOC rules in Chapter 115, Subchapter H.

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

<b>Houston-Galveston-Brazoria (tpd)</b>	<b>2008</b>	
	<b>NO<sub>x</sub></b>	<b>VOC</b>
Uncontrolled Emissions Estimates	381.59	322.04
Controlled Emissions Estimates	174.89	186.25
Total Reductions	206.70	135.79

#### **4.3 AREA SOURCE CONTROLS**

The only area source control in the HGB area used in this RFP demonstration is the portable fuel container rule. The EI forecast used EPA-approved EGAS growth factors to develop the corresponding controlled EIs for milestone and attainment years. To develop the controlled emissions, rule effectiveness factors were applied for source categories with applicable TCEQ rules. The summary of uncontrolled and controlled emissions for area sources in the HGB area may be found below in Table 4-3: *Summary of Area Source Emissions.*

**Table 4-3: Summary of Area Source Emissions**

<b>Houston/Galveston/Brazoria (tpd)</b>	<b>2008</b>	
	<b>NO<sub>x</sub></b>	<b>VOC</b>
Uncontrolled Emissions Estimates	55.18	262.08
Controlled Emissions Estimates	55.18	258.19
Total Reductions	0.00	3.89

#### **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 customized several data files used by the NONROAD model to more accurately reflect the emissions generated by non-road mobile equipment in Texas. Emissions from the remaining non-road mobile sources 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 4: *Reasonable 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 estimates were calculated using the EPA approved Emissions and Dispersion Model System (EDMS) model. Commercial marine vessel emissions were developed in 1999 by contractor. Emissions were developed from surveys to determine vessel types and shipping activities within the Houston ship channel. The inventory was then updated for 2002.

The summary of uncontrolled and controlled emissions for the HGB area for all non-road mobile sources may be found below in Table 4-4: *Summary of Non-Road Mobile Emissions*. Details of the non-road control strategy emission reductions are documented in Appendix 4: *Reasonable Further Progress Analysis for Non-Road Sources*.

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

Houston-Galveston-Brazoria (tpd)	2008	
	NO <sub>x</sub>	VOC
Uncontrolled Emissions Estimates	243.03	182.92
Controlled Emissions Estimates	146.66	81.82
Total Reductions*	90.79	99.60

\* Not all possible control measures were necessary 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 mobile source emissions inventories documented in Appendix 3: *Development of HGB 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 eight-county HGB area. Not all available mobile source controls are needed to demonstrate RFP for the HGB area. A summary of the on-road mobile controls included in the 2002 and 2008 RFP inventories is presented in Table 4-5: *Control Programs Modeled in MOBILE6 Emissions Factors for 2002 and 2008 RFP Controlled Emissions Inventories*.

**Table 4-5: Control Programs Modeled in MOBILE6 Emissions Factors for 2002 and 2008 RFP Controlled Emissions Inventories**

Milestone Year	Controls Modeled
2002 Base Year	Pre-90 FMVCP, Post-1990 FMVCP, Summer Reformulated Gasoline, 2002 State Programs: I/M in Harris County ATP in Harris County
2008 Control Strategy	Pre-90 FMVCP, Post-1990 FMVCP, Summer Reformulated Gasoline, 2007 State Programs: I/M in Brazoria, Fort Bend, Galveston, Harris and Montgomery Counties ATP in Brazoria, Fort Bend, Galveston, Harris and Montgomery Counties

Table 4-6: *On-Road Mobile Control Reduction Summary 2008, HGB, Ozone Season Weekday* summarizes the amount of control reduction for on-road mobile sources for the milestone year.

**Table 4-6: On-Road Mobile Control Reduction Summary  
2008, HGB, Ozone Season Weekday**

Houston/Galveston/Brazoria (Tons/Day)	2008	
	NO <sub>x</sub>	VOC
Uncontrolled Emissions Estimates	346.83	180.99
Controlled Emissions Estimates	171.65	78.88
Total Reductions*	175.18	102.11

#### 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. Controlled emission reductions not previously used in the 2008 milestone demonstration may be used to satisfy contingency requirements. Because the excess emission reductions from the 2008 RFP demonstration are greater than the reductions required for 2009 contingency, the 2009 contingency plan for the HGB 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 4-7: *RFP Contingency Demonstration for HGB Area*. This contingency plan meets the reduction requirements for all years.

**Table 4-7: RFP Contingency Demonstration for HGB Area**

Description	2009	
	NO <sub>x</sub>	VOC
<b>Adjusted 2008 Base Year EI</b>	788.37	733.30
	x 3.0%	N/A
<b>Required Contingency Reductions in 2009</b>	23.65	N/A
Excess From 2008 RFP Demonstration (see Appendix 1 Sheet 12)	47.25	86.41
<b>Total Contingency Reductions</b>	47.25	86.41
<b>Contingency Excess (+) or Shortfall (-)</b>	<b>+23.60</b>	<b>+86.41</b>
<b>Are contingency reductions greater than required contingency reduction?</b>	<b>Yes</b>	<b>Yes</b>

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

### **5.1 INTRODUCTION**

The HGB 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 HGB 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 budget, as required by the federal transportation conformity rule.

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

The TCEQ developed updated on-road mobile source EIs and control strategy reduction estimates that use 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 Houston-Galveston Area Council (HGAC) to develop this inventory. Appendix 4: *Development of HGB RFP On-Road Mobile Source Emissions Inventories* is a copy of the HGAC contractor report and provides detailed documentation of the on-road mobile inventory development.

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

Based on comments received by the EPA, this MVEB remains consistent with the 2007 NO<sub>x</sub> MVEB budget from the HGB Mid-Course Review SIP as adopted on December 1, 2004, by the Commission. The HGB Mid-Course Review SIP NO<sub>x</sub> MVEB was deemed adequate by the EPA on March 23, 2005, and approved by the EPA in August 2006. The RFP VOC MVEB reflects the 2008 on-road mobile EIs, the on-road mobile reduction strategies used to demonstrate RFP, and a ten percent transportation conformity safety margin. The NO<sub>x</sub> safety margin is the difference between the 2008 on-road emissions projection with post-1990 FCAA controls and the 2007 NO<sub>x</sub> MVEB budget from the HGB Mid-Course Review SIP. 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 and, therefore, even if the safety margin is used for a transportation conformity determination, the HGB 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 for the HGB Area* and Appendix 1, Sheet 15.

**Table 5-1: 2008 Eight-Hour Ozone RFP Motor Vehicle Emission Budgets for the HGB Eight-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	346.83	180.99
2008 On-Road Mobile Reasonable Further Progress Controls:		
Tier 1 Federal Motor Vehicle Control Program (Tier 1 FMVCP)	63.30	41.77
I/M in Harris County	12.08	10.15
Federal Reformulated Gasoline (Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery and Waller)	44.40	31.64
National Low Emission Vehicle Program (NLEV)	9.65	5.25
Tier 2 Federal Motor Vehicle Control Program (Tier 2 FMVCP)	28.67	10.33
2007 Heavy Duty Diesel FMVCP	8.24	0.13
Expanded I/M –Inspection/Maintenance (I/M) (Brazoria, Fort Bend, Galveston, and Montgomery)	3.58	2.80
TxLED	5.26	0.04
2008 On-Road Emissions Projection With Post-1990 FCAAA Controls (Uncontrolled inventory minus control reductions)	171.65	78.88
Add Transportation Conformity Safety Margin	14.48	7.89
<b>2008 Eight-Hour Ozone RFP VOC Motor Vehicle Emission Budgets</b>	<b>NA</b>	<b>86.77</b>
<b>2008 Eight-Hour Ozone RFP NO<sub>x</sub> Motor Vehicle Emissions Budget as Contained in the December 1, 2004, HGB Mid-Course Review SIP</b>	<b>186.13</b>	<b>NA</b>

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  
Houston-Galveston-Brazoria (HGB) 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 Houston Sierra Club (HSC).

United States Environmental Protection Agency

The EPA commented that it appreciates the TCEQ's close coordination with EPA Region Six and the Office of Air Quality Planning and Standards to gain an understanding of the RFP requirements for the HGB area during development of the proposal. Further, the EPA supports the methodology used by the TCEQ to calculate projected emissions and demonstrate that NO<sub>x</sub> will be reduced by at least 15 percent between 2002 and 2008.

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

EPA commented there was a discrepancy between the HGB attainment demonstration 2002 ozone season weekday emission inventories and RFP SIP emission inventories, and recommended updating the 2002 emission inventory data where appropriate. EPA further recommended adding a table of the 2002 baseline emission inventory and source categories in Chapter 2 of the RFP SIP.

**The commission has made no change in response to this comment. The 2002 Consolidated Emissions Reporting Rule (CERR) emissions inventory documented as Appendix G of the HGB Eight-Hour Ozone SIP was finalized earlier than the 2002 RFP SIP Base Year Emissions Inventory. Emission inventories are constantly being developed using the latest information and data. Therefore, a more recently developed inventory will be different than an older inventory for the same area. Additionally, the 2002 CERR three-year cycle inventory is based on an average summer day and the RFP inventory is based on an ozone season day, which is generally warmer and has higher solar radiation than an average summer day. The temperature inputs for the on-road mobile inventory development are different for these two types of inventories and therefore the values for the inventory will be different. Also, contracted work that resulted in updates to the 2002 RFP SIP Base Year Emissions Inventory was not made available in time to update the CERR emissions inventory, which was used for the HGB Eight-Hour Ozone 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 controlled projected inventory.**

The EPA commented that there was a small discrepancy between the total for the individual control reductions and the difference between the uncontrolled and controlled emission inventories for on-road mobile source in Appendix 1 of the HGB RFP SIP, which should be corrected.

**The commission agrees with this comment and has corrected the values in Appendix 1 of the HGB RFP SIP.**

EPA commented that although the MVEBs in the proposed HGB RFP SIP were calculated consistent with the eight-hour ozone 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, reflect projected 2008 emissions, and improve air quality, or the commission should provide a demonstration consistent with FCAA, § 110(1) that the 2008 MVEBs will not interfere with attainment of the eight-hour ozone standard.

**The commission agrees with this comment and updated the HGB 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 the HGB area was assigned to the 2008 HGB VOC RFP MVEB. In addition, based on comments received by the EPA, the HGB RFP SIP MVEB remains consistent with the 2007 NO<sub>x</sub> MVEB budget from the HGB Mid-Course Review SIP as adopted on December 1, 2004, by the Commission. The NO<sub>x</sub> safety margin is the difference between the 2008 on-road emissions projection with post-1990 FCAAA controls and the 2007 NO<sub>x</sub> MVEB budget from the HGB Mid-Course Review SIP. The MVEBs documented in the SIP narrative have been updated to reflect use of the additional mobile controls and the safety margin.**

#### Houston Sierra Club Comments

Houston Sierra Club commented that on Page 2-2 in Chapter 2 of the HGB RFP SIP that it was not clear where the projected 2008 emission reductions come from and whether they will be made.

**The commission has made no change in response to this comment. Future emission inventories and the associated control reductions are developed using methodologies required by the EPA for SIP development. These estimates are based upon the best information available at the time the SIP is developed. The inventory development and control reduction calculation are documented in the HGB RFP SIP Appendices 2, 3, and 4.**

The Houston Sierra Club commented that on Page 4-1 of Chapter 4 of the HGB RFP SIP that the projected emission reductions for 2008 could not have occurred since 2008 is in the future, and there is no verification for Table 4-1.

**The commission has made no change in response to this comment. Table 4-1 is a summary of the estimates for control reductions projected for 2008. Although 2008 has not occurred, it is possible to estimate the effects of control strategies using EPA approved methodologies.**

The Houston Sierra Club questioned the effectiveness of the non-road mobile source controls, and requested information regarding the results of these controls, rule effectiveness, and how the effectiveness of control strategies was analyzed.

**The commission made no change in response to this comment. All controls or emissions standards established for affected non-road mobile source categories were developed by the Environmental Protection Agency (EPA) over the last several years. Some of these standards were in effect for the base year and other “Tiers” come into effect in later years.**

**The EPA's Office of Transportation and Air Quality has several web sites that define and discuss the regulatory history and criteria for the non-road mobile emission standards. These sites are accessible at [www.epa.gov/nonroad](http://www.epa.gov/nonroad).**

**The EPA NONROAD model is the tool used to generate the emissions reduction estimates for non-road mobile equipment most affected by regulations. The NONROAD model can estimate current year emissions as well as projected future year emissions and backcast past year emissions for calendar years 1970 through 2050. For the HGB RFP SIP the latest version of NONROAD, version 2005, was used to develop the base and future year emissions inventories for non-road mobile sources.**

**The NONROAD model incorporates the projected emissions reductions resulting from the EPA emission standards by equipment model years. The results of modeling for a particular year will include the emission reductions associated with the EPA regulations for that year. Rule effectiveness and the analysis of control strategies has been developed and performed by EPA, and the results recorded in EPA documents and are reflected in the emissions generated by the NONROAD model used by the commission for this SIP development.**

**The commenter is referred to Appendix 4 of the HGB RFP SIP document, "Rate of Further Progress Analysis for Non-Road Sources" for a description of controls in Table 4-1 that were utilized for the 15 percent demonstration.**

The Houston Sierra Club commented that Table 2-2 of Appendix 4 of the HGB RFP SIP did not explicitly state the values for fleet turnover of vehicles affected by the Large SI (International System of Units) rule for the standards that begin in 2004, 2006, and 2007. They also stated that because large vehicles have a slow fleet turnover rate, the emission reductions in the early years of the rule will be small and that information on fleet turnover rates must be provided in order for the RFP SIP to make sense.

**The commission has made no change in response to this comment. The commission used the EPA NONROAD Model to develop emission estimates and reductions for vehicles affected by the Large SI Rule. The NONROAD model includes national default fleet turnover rates for each equipment category and calculates emission reductions for each analysis year based upon the start date of the federal rule and the EPA fleet turnover rate. The EPA's Office of Transportation and Air Quality has several web sites that define and discuss the regulatory history and criteria for the non-road mobile emission standards. These sites are accessible at [www.epa.gov/nonroad](http://www.epa.gov/nonroad).**

The Houston Sierra Club commented that the TCEQ is untruthful when it states that no additional fiscal and manpower resources will be needed through the implementation of this RFP SIP revision. New types of investigations will be required and monitoring will increase the workload.

**The commission has made no change in response to this comment. The HGB RFP SIP does not impose new control strategy obligations; instead, it quantifies and commits specific emission reductions for RFP purposes. Additional fiscal and manpower resources were accounted for when the rules were adopted.**

The Houston Sierra Club commented that an 80-90 percent reduction in NO<sub>x</sub> and VOC from point, area, non-road, and on-road, sources is needed to assure that attainment occurs and is

maintained and that emission inventory projections are inadequate. Additional VMT reductions are also needed to assure that attainment occurs and is maintained.

The Houston Sierra Club commented that if the TCEQ is not attaining the NAAQS by 2010, this SIP cannot be “reasonable further progress,” especially if the EI is not accurate, which results in inaccurate modeling, which means the 15 percent is inaccurate. The Houston Sierra Club also questioned why the 15 percent NO<sub>x</sub> emission reductions were calculated for the period 2002-2008 when attainment was required by 2007.

**The comment appears to refer to the eight-hour ozone SIP revision proposal. This RFP SIP revision is meant to demonstrate a 15 percent emissions reduction between 2002 and 2008 as specified by the Federal Clean Air Act. The EPA promulgated final rules regarding RFP requirements for the eight-hour ozone NAAQS, 40 CFR § 51.910, which require that the HGB area demonstrate a 15 percent reduction in either VOC or NO<sub>x</sub> between 2002 and 2008. This RFP SIP revision shows progress towards attainment of the eight-hour ozone NAAQS by demonstrating a 15 percent NO<sub>x</sub> emissions reduction in the eight-county HGB area for the period between 2002 and 2008. As a part of developing the HGB attainment demonstration, the TCEQ will determine the appropriate NO<sub>x</sub> and/or VOC emission reductions from appropriate source categories necessary for attainment and maintenance of the eight-hour ozone NAAQS. The amount and source of emission reductions cannot be determined until future photochemical modeling work has been performed. The HGB area’s attainment date for the one-hour ozone NAAQS was in 2007, however that date is not relevant for the eight-hour ozone RFP SIP.**

**The collection of emission inventory data is conducted in accordance with EPA guidance and regulatory requirements. Emission inventory data is collected periodically and quality assured to assess and improve accuracy. Emission inventories are not intended to be exact quantitative replications of emissions, but instead are intended to be comprehensive emission estimates useful for SIP planning. As such, the commission continuously updates and quality assures emission inventory data in compliance with EPA requirements.**

The Houston Sierra Club commented that the TCEQ tends to rear-end load VOC and NO<sub>x</sub> reductions instead of front-end loading, which does not provide the commission and the public with the ability to see if control measures are working until it is too late.

**The commission has made no change in response to this comment. Following EPA guidance in development and calculation of emissions reductions in evaluating a potential control strategy the commission considers several factors in determining appropriate control measures. Many control measures require extensive engineering planning, construction and testing before they are operational, which must be considered in setting compliance dates.**

The Houston Sierra Club commented that the TCEQ does not provide the public with information on the motor vehicle emissions budget, in particular, information that indicates the budgets are accurate, to enable the public to understand and comment on the SIP.

**The commission has made no change in response to this comment. General information on the motor vehicle emission budget (MVEB) development is documented in Chapter 5 of the HGB RFP SIP. Detailed information regarding the MVEB, including how they were calculated is documented in Appendix 1 to the HGB RFP SIP. Both of these sections were included in the proposal and were available for public review and comment.**

The Houston Sierra Club commented that the MOBILE model used by the TCEQ does not accurately reflect the speed of many motorists, since the TCEQ modeled a maximum of 65 mph when it should have used 70 mph as many people are going 70-80 mph on Houston area freeways. Additionally, the driving cycle input to the MOBILE model is inaccurate, and the TCEQ should conduct additional research to develop a more accurate driving cycle input for the model.

**The commission has made no change in response to this comment as the RFP SIP did not contain modeling. Generally, EPA's MOBILE6.2 emissions model, which the TCEQ is required to use for on-road mobile source emissions inventory development, does not estimate NO<sub>x</sub>, VOC, and CO gram-per-mile emission rates for speeds above 65 mph.**

**For more information, both the MOBILE6.2 User's Guide and Technical Guidance can be accessed on EPA's MOBILE6.2 website (<http://www.epa.gov/otaq/m6.htm>). In addition, EPA's MOBILE6.2 Technical Documentation website (<http://www.epa.gov/otaq/models/mobile6/m6tech.htm>) contains information related to the analysis of speed impacts on emission rates:**

The Houston Sierra Club questioned how the TCEQ verifies actual emissions. The Houston Sierra Club also commented there is no independent verification for the EI, industry figures via monitoring and measurements in-the-field, and mass emissions cap and trade (MECT) program information. The commenter questioned how the TCEQ planned to accurately show or measure an in-the-field 15 percent reduction of volatile organic compounds (VOC) and nitrogen oxides (NO<sub>x</sub>). Additionally, Houston Sierra Club commented that the public has no assurances that the emission inventory relied upon for the RFP SIP is accurate.

**The commission has made no change in response to this comment. The emissions inventories developed by the TCEQ undergo quality assurance reviews and are some of the most detailed used for SIP preparation in the United States. The inventories follow EPA prescribed emissions inventory development methodologies and are more robust than EPA guidance requirements. The TCEQ has conducted numerous scientific studies, special inventories, fence line monitoring, and investigations to assess and improve the accuracy of the emissions inventory. Examples of the scientific studies include TexAQS I and II. The Mass Emission Cap and Trade Program (MECT) program requires companies to provide supporting documentation, which includes stack testing, continuous emissions monitoring (CEMS) reports, fuel use, etc., as part of Form ECT-3, Level of Activity Certification and Form ECT-1, Annual Compliance Report. The documentations are reviewed thoroughly to ensure information is accurate and matches the information provided in the level of activity certification or annual compliance report. The calculated emissions from Form ECT-3 are also compared to the historical emissions reported in the emission inventory. The companies are required to certify that all information on ECT-3 and ECT-1 are accurate with the knowledge that intentionally or knowingly making false material statements or representation is a criminal offense subject to criminal penalties.**

**While it is not feasible for the TCEQ to conduct source testing at all sources affected by the 15 percent RFP SIP control measures, all industrial sources meeting the reporting requirements of 30 TAC 101.10 are required to report emissions annually to the TCEQ. All other point sources are inventoried every three years. While the commission agrees that emission inventories may not be exact quantitative replications of all industrial emissions, the TCEQ has gone well beyond the requirements of the Federal Clean Air Act and EPA**

**rules and guidance to ensure that periodic emissions are adequately represented in SIP revisions.**

The Houston Sierra Club commented that the TCEQ does not provide verification that controlled emission reductions not previously used in the 2008 milestone year may be used to satisfy contingency requirements.

**The commission has made no change in response to this comment. The EPA has previously approved SIPs that use existing measures that provide reductions in excess of those needed for RFP. This issue is also addressed in the preamble to EPA's Phase II Eight-Hour Ozone Implementation Rule, 70 Fed. Reg. 71612, 71651, published in the Federal Register on November 29, 2005. In the preamble to the rule, EPA noted that a federal court decision upheld contingency measures that were previously required and implemented where they were in excess of attainment demonstration and RFP SIPs. The court decision is *LEAN v. EPA*, 382 F.3d 575 (5<sup>th</sup> Circuit, 2004).**

The Houston Sierra Club commented that additional information is needed for the basis for estimated emission reductions from low evaporative portable gas cans, and questioned whether these gas cans will achieve market penetration. Additionally, Houston Sierra Club requested information on the percentage of gas cans that will malfunction and the rule effectiveness.

**Estimated emission reductions from portable fuel containers are based on a method developed by the California Air Resources Board (CARB), as applied to Texas in a study performed by ERG, Inc., in 2002. The study presumes a control efficiency of 62 percent for the low evaporative containers and a container life expectancy of seven years. Since the requirements for low emission fuel containers apply to containers manufactured after December 31, 2005, full market penetration of compliant containers is expected by December 31, 2012. A market penetration of 43 percent (3/7) was presumed for the RFP SIP, since the RFP demonstration covers the years 2002 – 2008. The TCEQ estimated a rule effectiveness of 80 percent for this rule. Thus, the overall percentage reduction in emissions estimated from the use of low evaporative portable fuel containers is  $(0.62)(0.43)(0.8) = 21.3$  percent of VOC emissions reduced that otherwise would not have been without the portable fuel container rule.**