

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

AGENDA REQUESTED: September 21, 2016

DATE OF REQUEST: September 12, 2016

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

CAPTION: Docket No. 2016-1244-SIP. Consideration for publication of, and hearing on, the proposed Houston-Galveston-Brazoria (HGB) Reasonable Further Progress (RFP) State Implementation Plan (SIP) revision to meet the 2008 Eight-Hour Ozone National Ambient Air Quality Standard (NAAQS).

To meet Federal Clean Air Act requirements, the proposed SIP revision would include an analysis of reasonable further progress toward attainment of the 2008 eight-hour ozone NAAQS, demonstrating a 15% emissions reduction in ozone precursors from the 2011 base year through the 2017 attainment year, a 3% emissions reduction for contingency in 2018, and updated RFP motor vehicle emissions budgets. (Dan Robicheaux, Terry Salem) (Non-Rule Project No. 2016-017-SIP-NR)

Steve Hagle, P.E.

Deputy Director

David Brymer

Division Director

Joyce Nelson

Agenda Coordinator

Copy to CCC Secretary? NO X YES

Texas Commission on Environmental Quality

Interoffice Memorandum

To: Commissioners **Date:** September 19, 2016

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

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

Docket No.: 2016-1244-SIP

Subject: Commission Approval for Proposed Houston-Galveston-Brazoria (HGB) Reasonable Further Progress (RFP) State Implementation Plan (SIP) Revision for the 2008 Eight-Hour Ozone Standard Nonattainment Area

HGB 2008 Eight-Hour Ozone RFP SIP Revision
SIP Project No. 2016-017-SIP-NR

Background and reason(s) for the SIP revision:

The Federal Clean Air Act (FCAA) requires states to submit plans showing reasonable further progress toward attainment of the National Ambient Air Quality Standards (NAAQS) for ozone nonattainment areas with a classification of moderate or higher. On May 21, 2012, the eight-county HGB area, consisting of Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller Counties, was designated a marginal nonattainment area for the 2008 eight-hour ozone NAAQS. The attainment date for the HGB marginal nonattainment area was established in the United States Environmental Protection Agency's (EPA) **implementation rule for the 2008 ozone NAAQS** published in the May 21, 2012 *Federal Register* (77 FR 30160) and set as December 31, 2015. Attainment of the standard (expressed as 0.075 parts per million) is achieved when an area's design value does not exceed 75 parts per billion (ppb).

As a result of a December 23, 2014 ruling by the **United States Court of Appeals for the District of Columbia Circuit** and the EPA's final *Implementation of the 2008 National Ambient Air Quality Standards for Ozone: State Implementation Plan Requirements* (2008 ozone standard SIP requirements rule) published in the March 6, 2015 *Federal Register* (80 FR 12264), the attainment date for the HGB marginal nonattainment area changed to July 20, 2015 and the attainment year also changed from 2015 to 2014. The HGB area did not attain the 2008 eight-hour ozone standard in 2014,¹ but qualified for a one-year attainment date extension in accordance with FCAA, §181(a)(5).² The EPA published final approval of the one-year attainment deadline extension on May 4, 2016, which extended the HGB area's attainment date to July 20, 2016 with a 2015 attainment year (81 FR

¹ The attainment year ozone season is the ozone season immediately preceding a nonattainment area's attainment date.

² An area that fails to attain the 2008 ozone NAAQS by its attainment date is eligible for a one-year extension if, for the attainment year, the area's fourth-highest daily maximum eight-hour average is at or below the level of the standard (75 ppb); the HGB area's fourth-highest daily maximum eight-hour average for 2014 was 72 ppb as measured at the Conroe Relocated monitor (C78/A321). The HGB area's design value for 2014 was 80 ppb.

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26697). However, based on 2015 monitoring data,³ the HGB area did not attain the 2008 ozone NAAQS and was not eligible for a second one-year extension.⁴

Because the HGB area's 2015 design value of 80 ppb exceeded this standard, the FCAA requires the area to be reclassified from marginal to moderate nonattainment. This reclassification requires the state to submit an attainment demonstration (AD) SIP revision that addresses the 2008 eight-hour ozone standard moderate nonattainment area requirements, including RFP.

Scope of the SIP revision:

As a result of the future expected reclassification, the commission is required to submit to the EPA an RFP SIP revision consistent with FCAA requirements for areas classified as moderate nonattainment for the 2008 eight-hour ozone NAAQS. The attainment date for the HGB moderate ozone nonattainment area is July 20, 2018 with an attainment year of 2017. The details of the AD SIP revision, also required for the area, are covered in a separate memo (SIP Project No. 2016-016-SIP-NR).

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

This HGB RFP SIP revision is required by the FCAA to demonstrate a 15% emissions reduction in ozone precursors (volatile organic compounds (VOC) and/or nitrogen oxides (NO_x)) between the 2011 base year and the 2017 attainment year and a 3% reduction in the 2018 contingency year according to the following increments:

- 15% emissions reduction in NO_x and/or VOC for the six-year period from January 1, 2012 through December 31, 2017; and
- 3% emissions reduction in NO_x and/or VOC for the one-year period from January 1, 2018 through December 31, 2018 as attainment year RFP contingency.

In addition to demonstrating the required emissions reductions, this proposed HGB RFP SIP revision provides an updated 2017 RFP on-road motor vehicle emissions budget (MVEB) and updated 2011 emissions inventories for point, area, non-road mobile, and on-road mobile sources. This proposed SIP revision also includes emissions reductions for contingency to be implemented if the area fails to achieve the targeted RFP emission reductions in 2017. This proposed SIP revision demonstrates RFP for the 2017 attainment year as well as the 2018 contingency year.

³ The TCEQ submitted Certification Evaluation and Concurrence Report for 2015 air monitoring data to the EPA on April 25, 2015.

⁴ An area is eligible for the second one-year extension if the fourth-highest daily maximum eight-hour value, averaged over both the original attainment year and the first extension year, is at or below the level of the standard (75 ppb); the HGB area's fourth-highest daily maximum eight-hour value averaged over 2014 and 2015 is 76 ppb as measured at the Houston Aldine monitor (C8/AF108/X150). The HGB area's 2015 design value is 80 ppb.

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

This proposed RFP SIP revision is required to demonstrate that the HGB moderate nonattainment area will achieve emissions reductions consistent with the requirements of FCAA, §182(b)(1) and the EPA's *Implementation of the 2008 National Ambient Air Quality Standards for Ozone: State Implementation Plan Requirements* (2008 ozone standard SIP requirements rule), published in the March 6, 2015 *Federal Register* (80 FR 12264).

Requirements for moderate ozone nonattainment areas under the FCAA include a 15% VOC emissions reduction within six years after designation; however, the EPA's 2008 ozone standard SIP requirements rule indicates that nonattainment areas with a previously approved plan meeting the 15% VOC requirement under either the one-hour ozone standard or the 1997 eight-hour ozone standard may substitute reductions in NO_x for VOC.⁵

The RFP calculations documented in this proposed SIP revision rely on an RFP base year of 2011 and a July 20, 2018 attainment deadline. In accordance with the 2008 ozone standard SIP requirements rule, if a state chooses 2011 as a base year for a moderate area designated nonattainment in 2012, the 15% reduction requirement covers the period from January 1, 2012 through December 31, 2017. This proposed SIP revision incorporates an additional 3% emissions reduction for the one-year period from January 1, 2018 through December 31, 2018 as contingency.

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

None.

Statutory authority:

The authority to propose and adopt SIP revisions is derived from the following sections of Texas Health and Safety Code, Chapter 382, Texas Clean Air Act (TCAA), §382.002, which provides that the policy and purpose of the TCAA is to safeguard the state's air resources from pollution; §382.011, which authorizes the commission to control the quality of the state's air; and §382.012, which authorizes the commission to prepare and develop a general, comprehensive plan for the control of the state's air. This HGB RFP SIP revision is required by FCAA, §110(a)(1) and implementing rules in 40 Code of Federal Regulations Part 51.

Effect on the:

A.) Regulated community:

The proposed HGB RFP SIP revision would set a new MVEB for the 2017 attainment year, which would affect transportation planning conducted by local governments in the HGB area.

⁵ NO_x may be substituted for VOC under conditions defined in the EPA's December 1993 [NO_x Substitution Guidance](https://www3.epa.gov/ttn/naaqs/aqmguide/collection/cp2_old/19931201_oaqps_nox_substitution_guidance.pdf) (https://www3.epa.gov/ttn/naaqs/aqmguide/collection/cp2_old/19931201_oaqps_nox_substitution_guidance.pdf).

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B.) Public:

The proposed HGB RFP SIP revision would not require rulemaking for additional emission reductions but would set an MVEB affecting HGB area transportation planning and citizens. The EPA asserts that the general public in the HGB ozone nonattainment area may benefit from improved air quality as a result of lower ozone levels.

C.) Agency programs:

The proposed HGB RFP SIP revision would have no new impact on agency programs.

Stakeholder meetings:

The proposed HGB RFP SIP revision would go through a public review and comment period, including a public hearing.

Potential controversial concerns and legislative interest:

This SIP revision is scheduled to be proposed before the EPA has taken final action to reclassify the HGB area to moderate. While this means that the SIP revision is not legally required at this time, if staff waits to propose this SIP revision until the EPA's final reclassification is effective, there may not be enough time to complete the SIP revision before the EPA's deadline for submittal. Missing the submittal deadline could lead to the EPA issuing a finding of failure to submit, which would start sanctions and federal implementation plan (FIP) clocks.

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

No.

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

The commission could choose to not comply with requirements to develop and submit this HGB RFP SIP revision to the EPA. If an HGB RFP SIP revision is not submitted, the EPA could impose sanctions on the state and promulgate a federal implementation plan (FIP). Sanctions could include transportation funding restrictions, grant withholdings, and 200% emissions offsets requirements for new construction and major modifications of stationary sources in the HGB nonattainment area. The EPA could impose such sanctions and implement a FIP until the state submitted, and the EPA approved, a replacement HGB 2008 eight-hour ozone RFP SIP revision for the area.

Key points in the proposal SIP revision schedule:

Anticipated proposal date: September 21, 2016

Anticipated public hearing date: October 24, 2016

Anticipated public comment period: September 23, 2016 through October 24, 2016

Anticipated adoption date: December 2016

Agency contacts:

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Commissioners
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cc: Chief Clerk, 2 copies
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REVISIONS TO THE STATE OF TEXAS AIR QUALITY
IMPLEMENTATION PLAN FOR THE CONTROL OF OZONE AIR
POLLUTION

HOUSTON-GALVESTON-BRAZORIA 2008 EIGHT-HOUR OZONE
STANDARD NONATTAINMENT AREA



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

**HOUSTON-GALVESTON BRAZORIA REASONABLE FURTHER
PROGRESS STATE IMPLEMENTATION PLAN REVISION FOR
THE 2008 EIGHT-HOUR OZONE STANDARD
NONATTAINMENT AREA**

PROJECT NUMBER 2016-017-SIP-NR

Proposal
September 21, 2016

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EXECUTIVE SUMMARY

The 1990 Federal Clean Air Act (FCAA) Amendments, §182, require ozone nonattainment areas designated with a classification of moderate or higher to submit plans showing reasonable further progress (RFP) toward attainment of the ozone National Ambient Air Quality Standard (NAAQS). On May 21, 2012, the eight-county Houston-Galveston-Brazoria (HGB) area, consisting of Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller Counties, was designated a marginal nonattainment area for the 2008 eight-hour ozone NAAQS. The attainment date for the HGB marginal nonattainment area was established in the United States Environmental Protection Agency's (EPA) implementation rule for the 2008 ozone NAAQS published in the May 21, 2012 *Federal Register* (77 FR 30160) and was set as December 31, 2015. Attainment of the standard (expressed as 0.075 parts per million) is achieved when an area's design value does not exceed 75 parts per billion (ppb).

As a result of a December 23, 2014 ruling by the United States Court of Appeals for the District of Columbia Circuit and the EPA's final *Implementation of the 2008 National Ambient Air Quality Standards for Ozone: State Implementation Plan Requirements* (2008 ozone standard SIP requirements rule) published in the March 6, 2015 *Federal Register* (80 FR 12264), the attainment date for the HGB marginal nonattainment area changed to July 20, 2015 and the attainment year also changed from 2015 to 2014. The HGB area did not attain the 2008 eight-hour ozone standard in 2014,¹ but qualified for a one-year attainment date extension in accordance with FCAA, §181(a)(5).² The EPA published final approval of the one-year attainment date extension on May 4, 2016, which extended the HGB area's attainment date to July 20, 2016 with a 2015 attainment year (81 FR 26697). However, based on 2015 monitoring data,³ the HGB area did not attain the 2008 ozone NAAQS and was not eligible for a second one-year extension.⁴

Because the HGB area's 2015 design value of 80 ppb exceeded this standard, the FCAA requires the area to be reclassified from marginal to moderate nonattainment. This reclassification requires the state to submit an attainment demonstration SIP revision that addresses the 2008 eight-hour ozone standard moderate nonattainment area requirements, including RFP. As indicated in the EPA's 2008 ozone standard SIP

¹ The attainment year ozone season is the ozone season immediately preceding a nonattainment area's attainment date.

² An area that fails to attain the 2008 ozone NAAQS by its attainment date would be eligible for the first one-year extension if, for the attainment year, the area's fourth-highest daily maximum eight-hour average is at or below the level of the standard (75 ppb); the HGB area's fourth-highest daily maximum eight-hour average for 2014 was 72 ppb as measured at the Conroe Relocated monitor (C78/A321). The HGB area's design value for 2014 was 80 ppb.

³ The TCEQ submitted Certification Evaluation and Concurrence Report for 2015 air monitoring data to the EPA on April 25, 2015.

⁴ An area is eligible for the second one-year extension if the fourth-highest daily maximum eight-hour value, averaged over both the original attainment year and the first extension year, is at or below the level of the standard (75 ppb); the HGB area's fourth-highest daily maximum eight-hour value averaged over 2014 and 2015 is 76 ppb as measured at the Houston Aldine monitor (C8/AF108/X150). The HGB area's 2015 design value is 80 ppb.

requirements rule, the attainment deadline for moderate classification is July 20, 2018 with an attainment year of 2017.

This SIP revision is not required to demonstrate attainment of the ozone NAAQS but rather to demonstrate that the HGB nonattainment area will meet the RFP requirements for the future expected reclassification to a moderate ozone nonattainment area. These requirements, as specified in Section 182(c)(2) of the 1990 FCAA Amendments and in 40 Code of Federal Regulations (CFR) §51.910, involve reducing ozone precursor emissions (nitrogen oxides (NO_x) and volatile organic compounds (VOC)) incrementally between the base year and the attainment year. With a 2017 attainment year, this HGB RFP SIP revision is required by the FCAA to demonstrate a 15% emissions reduction in ozone precursors from the 2011 base year through the 2017 attainment year and a 3% reduction for contingency in 2018.

The RFP methodology involves development of the base year, attainment year, and contingency year emissions inventories; and emissions reductions for each analysis year. The amount of emissions reductions is determined through the RFP methodology. Once calculated, the target levels and emissions inventories can be compared to determine if the forecasted controlled (post-control) emissions inventories are less than the target level, thus meeting FCAA RFP requirements. The results of the HGB RFP analysis year comparisons are provided in Chapter 3: *Progress Toward Meeting Target Emissions Levels*.

This SIP revision also sets the NO_x and VOC motor vehicle emissions budgets (MVEB) for transportation conformity purposes. As detailed in Chapter 5: *Motor Vehicle Emissions Budgets*, this document establishes an MVEB for a 2017 attainment year. 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 the 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 MVEB for the established year.

SECTION V-A: LEGAL AUTHORITY

General

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

The first air pollution control act, known as the Clean Air Act of Texas, was passed by the Texas Legislature in 1965. In 1967, the Clean Air Act of Texas was superseded by a more comprehensive statute, the Texas Clean Air Act (TCAA), found in Article 4477-5, Vernon's Texas Civil Statutes. The legislature amended the TCAA in 1969, 1971, 1973, 1979, 1985, 1987, 1989, 1991, 1993, 1995, 1997, 1999, 2001, 2003, 2005, 2007, 2009, 2011, 2013, and 2015. In 1989, the TCAA was codified as Chapter 382 of the Texas Health and Safety Code.

Originally, the TCAA stated that the Texas Air Control Board (TACB) is the state air pollution control agency and is the principal authority in the state on matters relating to the quality of air resources. In 1991, the legislature abolished the TACB effective September 1, 1993, and its powers, duties, responsibilities, and functions were transferred to the Texas Natural Resource Conservation Commission (TNRCC). With the creation of the TNRCC, the authority over air quality is found in both the Texas Water Code and the TCAA. Specifically, the authority of the TNRCC is found in Chapters 5 and 7. Chapter 5, Subchapters A - F, H - J, and L, include the general provisions, organization, and general powers and duties of the TNRCC, and the responsibilities and authority of the executive director. Chapter 5 also authorizes the TNRCC to implement action when emergency conditions arise and to conduct hearings. Chapter 7 gives the TNRCC enforcement authority. In 2001, the 77th Texas Legislature continued the existence of the TNRCC until September 1, 2013, and changed the name of the TNRCC to the TCEQ. In 2009, the 81st Texas Legislature, during a special session, amended section 5.014 of the Texas Water Code, changing the expiration date of the TCEQ to September 1, 2011, unless continued in existence by the Texas Sunset Act. In 2011, the 82nd Texas Legislature continued the existence of the TCEQ until 2023.

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

Local government authority is found in Subchapter E of the TCAA. Local governments have the same power as the TCEQ to enter property and make inspections. They also

may make recommendations to the commission concerning any action of the TCEQ that affects their territorial jurisdiction, may bring enforcement actions, and may execute cooperative agreements with the TCEQ or other local governments. In addition, a city or town may enact and enforce ordinances for the control and abatement of air pollution not inconsistent with the provisions of the TCAA and the rules or orders of the commission.

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

Applicable Law

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

Statutes

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

| | |
|---|-------------------|
| TEXAS HEALTH & SAFETY CODE, Chapter 382 | September 1, 2015 |
| TEXAS WATER CODE | September 1, 2015 |

Chapter 5: Texas Natural Resource Conservation Commission

Subchapter A: General Provisions

Subchapter B: Organization of the Texas Natural Resource Conservation Commission

Subchapter C: Texas Natural Resource Conservation Commission

Subchapter D: General Powers and Duties of the Commission

Subchapter E: Administrative Provisions for Commission

Subchapter F: Executive Director (except §§5.225, 5.226, 5.227, 5.2275, 5.231, 5.232, and 5.236)

Subchapter H: Delegation of Hearings

Subchapter I: Judicial Review

Subchapter J: Consolidated Permit Processing

Subchapter L: Emergency and Temporary Orders (§§5.514, 5.5145, and 5.515 only)

Subchapter M: Environmental Permitting Procedures (§5.558 only)

Chapter 7: Enforcement

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

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

Subchapter C: Administrative Penalties

Subchapter D: Civil Penalties (except §7.109)

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

Rules

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

| | |
|--|-----------------------------------|
| Chapter 7: Memoranda of Understanding, §§7.110 and 7.119 | December 13, 1996 and May 2, 2002 |
| Chapter 19: Electronic Reporting | March 15, 2007 |
| Chapter 35: Subchapters A-C, K: Emergency and Temporary Orders and Permits; Temporary Suspension or Amendment of Permit Conditions | July 20, 2006 |
| Chapter 39: Public Notice, §§39.402(a)(1) - (6), (8), and (10) - (12), 39.405(f)(3) and (g), (h)(1)(A) - (4), (6), (8) - (11), (i) and (j), 39.407, 39.409, 39.411(a), (e)(1) - (4)(A)(i) and (iii), (4)(B), (5)(A) and (B), and (6) - (10), (11)(A)(i) and (iii) and (iv), (11)(B) - (F), (13) and (15), and (f)(1) - (8), (g) and (h), 39.418(a), (b)(2)(A), (b)(3), and (c), 39.419(e), 39.420 (c)(1)(A) - (D)(i)(I) and (II), (D)(ii), (c)(2), (d) - (e), and (h), and 39.601 - 39.605 | December 31, 2015 |
| Chapter 55: Requests for Reconsideration and Contested Case Hearings; Public Comment, §§55.150, 55.152(a)(1), (2), (5), and (6) and (b), 55.154(a), (b), (c)(1) - (3), and (5), and (d) - (g), and 55.156(a), (b), (c)(1), (e), and (g) | December 31, 2015 |
| Chapter 101: General Air Quality Rules | July 28, 2016 |
| Chapter 106: Permits by Rule, Subchapter A | April 17, 2014 |
| Chapter 111: Control of Air Pollution from Visible Emissions and Particulate Matter | February 6, 2014 |
| Chapter 112: Control of Air Pollution from Sulfur Compounds | July 16, 1997 |
| Chapter 113: Standards of Performance for Hazardous Air Pollutants and for Designated Facilities and Pollutants | May 14, 2009 |
| Chapter 114: Control of Air Pollution from Motor Vehicles | August 25, 2016 |
| Chapter 115: Control of Air Pollution from Volatile Organic Compounds | June 25, 2015 |
| Chapter 116: Permits for New Construction or Modification | July 31, 2014 |
| Chapter 117: Control of Air Pollution from Nitrogen Compounds | June 25, 2015 |
| Chapter 118: Control of Air Pollution Episodes | March 5, 2000 |
| Chapter 122: §122.122: Potential to Emit | April 17, 2014 |

| | |
|--|-------------------|
| 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

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- B. Ozone (Revised)
 - 1. Dallas-Fort Worth (No change)
 - 2. Houston-Galveston-Brazoria (No change)
 - Chapter 1: General
 - Chapter 2: Emissions Inventories
 - Chapter 3: Progress Toward Meeting Target Emissions Levels
 - Chapter 4: Control Measures to Achieve Target Levels
 - Chapter 5: Motor Vehicles Emissions Budgets
 - 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)
 - 9. Victoria 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)
- L. Transport (No change)
- M. Regional Haze (No change)

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Chapter 5: Motor Vehicle Emissions Budgets

5.1 Introduction

5.2 Overview of Methodologies and Assumptions

5.3 Motor Vehicle Emissions Budgets for RFP Analysis Years

References for Guidance Documents

LIST OF ACRONYMS

| | |
|-----------------|---|
| ABY | adjusted base year |
| AD | attainment demonstration |
| AERR | Air Emissions Reporting Requirements |
| APU | auxiliary power unit |
| ASLRRA | American Short Line and Regional Railroad Association |
| BY | base year |
| CFR | Code of Federal Regulations |
| CMV | commercial marine vessel |
| EDMS | Emission and Dispersion Modeling System |
| EI | emissions inventory |
| EIA | United States Energy Information Administration |
| EIQ | emissions inventory questionnaire |
| EPA | United States Environmental Protection Agency |
| ERG | Eastern Research Group |
| FAA | Federal Aviation Administration |
| FCAA | Federal Clean Air Act |
| FMVCP | Federal Motor Vehicle Control Program |
| FR | <i>Federal Register</i> |
| GSE | ground support equipment |
| HGB | Houston-Galveston-Brazoria |
| I/M | inspection and maintenance |
| MOVES | Motor Vehicle Emissions Simulator |
| MVEB | motor vehicle emissions budget |
| NAAQS | National Ambient Air Quality Standard |
| NEI | National Emissions Inventory |
| NO _x | nitrogen oxides |
| ppb | parts per billion |
| ppm | parts per million |
| PN | percent of NO _x |
| PV | percent of VOC |
| RFG | reformulated gasoline |
| RFP | reasonable further progress |

| | |
|-------|--|
| ROP | rate of progress |
| RRC | Railroad Commission of Texas |
| SCC | source classification code |
| SI | spark ignition |
| SIP | state implementation plan |
| STARS | State of Texas Air Reporting System |
| TAC | Texas Administrative Code |
| TACB | Texas Air Control Board |
| TCAA | Texas Clean Air Act |
| TCEQ | Texas Commission on Environmental Quality (commission) |
| TDM | travel demand model |
| TexN | Texas NONROAD Model |
| TNRCC | Texas Natural Resource Conservation Commission |
| tpd | tons per day |
| TTI | Texas A&M Transportation Institute |
| TxLED | Texas Low Emission Diesel |
| VMT | vehicle miles traveled |
| VOC | volatile organic compounds |

LIST OF PREVIOUS STATE IMPLEMENTATION PLAN (SIP) REVISIONS AND REPORTS

The following list references SIP revisions and reports that were previously adopted by the commission and submitted to the United States Environmental Protection Agency. The list identifies how these SIP revisions are referenced in this document and contains the project number, adoption date, full title, and a hyperlink for each SIP revision or report.

2000 HGB One-Hour Ozone ROP and AD SIP Revision (TNRCC Rule Log No. 2000-011-SIP-AI, adopted December 6, 2000) [Houston-Galveston-Brazoria Post-1999 Rate-Of-Progress And Attainment Demonstration State Implementation Plan Revision for the One-Hour Ozone Standard](https://www.tceq.texas.gov/assets/public/implementation/air/sip/sipdocs/2000-12-HGB/00011sip_ado.pdf)
(https://www.tceq.texas.gov/assets/public/implementation/air/sip/sipdocs/2000-12-HGB/00011sip_ado.pdf)

2001 HGB One-Hour Ozone ROP and AD SIP Revision Follow-Up (TNRCC Rule Log No. 2001-007-SIP-AI, adopted September 26, 2001) [Houston-Galveston-Brazoria Post-1999 Rate-Of-Progress And Attainment Demonstration State Implementation Plan Revision for the One-Hour Ozone Standard](https://www.tceq.texas.gov/assets/public/implementation/air/sip/sipdocs/2001-09-HGB/01007sip_ado.pdf)
(https://www.tceq.texas.gov/assets/public/implementation/air/sip/sipdocs/2001-09-HGB/01007sip_ado.pdf)

2004 HGB One-Hour Ozone ROP SIP Revision (TCEQ Project No. 2004-049b-SIP-AI, adopted October 27, 2004) [Houston-Galveston-Brazoria Post-1999 Rate-Of-Progress State Implementation Plan Revision for the One-Hour Ozone Standard](https://www.tceq.texas.gov/assets/public/implementation/air/sip/sipdocs/2004-05-HGBROP/04049bsip_ado.pdf)
(https://www.tceq.texas.gov/assets/public/implementation/air/sip/sipdocs/2004-05-HGBROP/04049bsip_ado.pdf)

2007 HGB 1997 Eight-Hour Ozone RFP SIP Revision (TCEQ Project No. 2006-030-SIP-NR, adopted May 23, 2007) [Houston-Galveston-Brazoria Reasonable Further Progress State Implementation Plan Revision for the 1997 Eight-Hour Ozone Standard](https://www.tceq.texas.gov/assets/public/implementation/air/sip/hgb/hgb_rfp_2007/HGB_RFP_SIP_CompleteDocument_woAppendices.pdf)
(https://www.tceq.texas.gov/assets/public/implementation/air/sip/hgb/hgb_rfp_2007/HGB_RFP_SIP_CompleteDocument_woAppendices.pdf)

2010 HGB 1997 Eight-Hour Ozone AD SIP Revision (TCEQ Project No. 2009-017-SIP-NR, adopted March 10, 2010) [Houston-Galveston-Brazoria Attainment Demonstration State Implementation Plan Revision for the 1997 Eight-Hour Ozone Standard](http://www.tceq.texas.gov/assets/public/implementation/air/sip/hgb/hgb_sip_2009/09017SIP_completeNarr_ado.pdf)
(http://www.tceq.texas.gov/assets/public/implementation/air/sip/hgb/hgb_sip_2009/09017SIP_completeNarr_ado.pdf)

2010 HGB 1997 Eight-Hour Ozone RFP SIP Revision (TCEQ Project No. 2009-018-SIP-NR, adopted March 10, 2010) [Houston-Galveston-Brazoria Reasonable Further Progress State Implementation Plan Revision for the 1997 Eight-Hour Ozone Standard](http://www.tceq.texas.gov/assets/public/implementation/air/sip/hgb/hgb_sip_2009/09018SIP_ado.pdf)
(http://www.tceq.texas.gov/assets/public/implementation/air/sip/hgb/hgb_sip_2009/09018SIP_ado.pdf)

2013 HGB 1997 Eight-Hour Ozone MVEB SIP Revision (TCEQ Project Number 2012-002-SIP-NR, adopted April 23, 2013) [Houston-Galveston-Brazoria Motor Vehicle Emissions Budgets Update for the 1997 Eight-Hour Ozone Standard](https://www.tceq.texas.gov/assets/public/implementation/air/sip/hgb/hgb_mveb_2012/12002SIP_ado_complete.pdf)
(https://www.tceq.texas.gov/assets/public/implementation/air/sip/hgb/hgb_mveb_2012/12002SIP_ado_complete.pdf)

2014 HGB One-Hour Ozone RS Report (Submitted to the EPA on July 22, 2014) [Houston-Galveston-Brazoria Redesignation Substitute Report for the One-Hour Ozone Standard](https://www.tceq.texas.gov/assets/public/implementation/air/sip/hgb/HGB_1Hr_Ozone_RS_Report.pdf)
(https://www.tceq.texas.gov/assets/public/implementation/air/sip/hgb/HGB_1Hr_Ozone_RS_Report.pdf)

2015 HGB 1997 Eight-Hour Ozone RS Report (Submitted to the EPA on August 18, 2015) [Houston-Galveston-Brazoria Redesignation Substitute Report for the 1997 Eight-Hour Ozone Standard](https://www.tceq.texas.gov/assets/public/implementation/air/sip/hgb/1997ozone_RS_Report/HGB_RS_1997_8Hr_report.pdf)
(https://www.tceq.texas.gov/assets/public/implementation/air/sip/hgb/1997ozone_RS_Report/HGB_RS_1997_8Hr_report.pdf)

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CHAPTER 1: GENERAL

1.1 HOUSTON-GALVESTON-BRAZORIA REASONABLE FURTHER PROGRESS BACKGROUND

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

1.1.1 One-Hour Ozone Standard

Under the one-hour ozone National Ambient Air Quality Standard (NAAQS) of 0.12 parts per million (ppm), the Houston-Galveston-Brazoria (HGB) nonattainment area comprised Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller Counties. The EPA designated this eight-county area as a Severe-17 nonattainment area in 1991 with an attainment date of November 15, 2007.

The Texas Natural Resources Conservation Commission, a predecessor to the TCEQ, adopted a rate of progress (ROP) SIP revision on December 6, 2000. This SIP revision provided emissions inventories; ROP analyses for 2002, 2005, and 2007; and motor vehicle emissions budgets (MVEB) for nitrogen oxides (NO_x) and volatile organic compounds (VOC). On September 26, 2001, the Follow-Up One-Hour Ozone Attainment Demonstration (AD) and ROP SIP Revision was adopted. This revision incorporated changes to several control strategies and described how the state would fulfill the commitment to obtain the additional emission reductions necessary to address the remainder of the emission reductions shortfall and demonstrate attainment of the one-hour ozone standard in the HGB area. The EPA published approval of both the December 2000 and September 2001 SIP revisions in the November 14, 2001 issue of the *Federal Register* (66 FR 57159).

On October 27, 2004, the commission adopted the HGB One-Hour Ozone Post-1999 ROP SIP Revision. This revision provided updated emissions inventories and ROP analyses for 2002, 2005, and 2007 and revised MVEBs for the HGB area based on new models for estimating on-road and non-road mobile emissions sources. This SIP revision replaced the previous versions of the Post-1999 ROP that the EPA approved in November 2001. On February 14, 2005, the EPA published approval of this SIP revision (70 FR 7407). The one-hour ozone NAAQS was revoked in the June 15, 2005 issue of the *Federal Register* (69 FR 23951).

According to the EPA's *Implementation of the 2008 National Ambient Air Quality Standards for Ozone: State Implementation Plan Requirements* (2008 ozone standard SIP requirements rule), a state can provide a showing, termed a redesignation substitute, based on the Federal Clean Air Act (FCAA), §107(d)(3)(E) redesignation criteria to demonstrate that an area qualifies for lifting anti-backsliding obligations under a revoked standard. The TCEQ submitted an HGB one-hour ozone redesignation substitute demonstration to the EPA on July 22, 2014, which the EPA approved October 20, 2015 (80 FR 63429).

1.1.2 1997 Eight-Hour Ozone Standard

On July 18, 1997, the EPA published the revised NAAQS for ground-level ozone in the *Federal Register* (62 FR 38856), and it became effective on September 16, 1997. The EPA revoked and replaced the previous one-hour ozone NAAQS with an eight-hour NAAQS set at 0.08 ppm, based on the three-year average of the annual fourth-highest daily maximum eight-hour average ozone concentrations measured at each monitor within an area.

Effective June 15, 2004, Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller Counties were designated nonattainment in the first phase of the EPA's implementation rule for the 1997 eight-hour ozone NAAQS (69 FR 23951). The HGB area was classified moderate nonattainment for the standard, with an attainment deadline of June 15, 2010. The TCEQ was required to submit a reasonable further progress (RFP) SIP revision for the 1997 eight-hour ozone NAAQS to the EPA by June 15, 2007. The commission adopted the 2007 HGB 1997 Eight-Hour Ozone Nonattainment Area RFP SIP revision on May 23, 2007, which demonstrated that a required 15% emissions reduction in ozone precursors (VOC and NO_x) would be met for the 2001 through 2008 RFP analysis period. On April 22, 2009, the EPA published approval of this SIP revision, the associated MVEB, and the 2002 base year emissions inventory (74 FR 18298).

On June 15, 2007, the state requested that the HGB area be reclassified from a moderate to a severe nonattainment area for the 1997 eight-hour ozone NAAQS, with an attainment deadline of June 15, 2019. On December 31, 2007, the EPA published its proposal to grant the governor's request and took comments on a range of dates for the state to submit a revised SIP (72 FR 74252). The TCEQ provided comments to the EPA that supported the reclassification and justification for an April 2010 SIP submission date. On October 1, 2008, the EPA published approval of the governor's request to voluntarily reclassify the HGB ozone nonattainment area from a moderate to a severe nonattainment area for the 1997 ozone NAAQS (73 FR 56983), effective October 31, 2008. The EPA set April 15, 2010 as the date for the state to submit a SIP revision addressing the severe-ozone nonattainment requirements and set a new attainment deadline of June 15, 2019.

The 2010 HGB 1997 Eight-Hour Ozone RFP SIP Revision, as required by the EPA, demonstrated an 18% emissions reduction occurred for the 2002 through 2008 RFP analysis period and that an average of 3% per year emissions reduction will occur between each of the analysis years 2008, 2011, 2014, 2017, and 2018. This SIP revision established baseline emission levels, calculated reduction targets, identified control strategies to meet emission target levels, and tracked actual emission reductions against established emissions growth. This revision also included an MVEB for each analysis year and a contingency plan.

On January 25, 2011, the EPA published a notice of its determination that the MVEBs in the March 10, 2010 SIP revisions, which were developed using the on-road mobile source emissions inventories based on the EPA's MOBILE 6.2 model, were adequate for transportation conformity purposes (76 FR 4342). On January 2, 2014, the EPA published approval of this RFP SIP revision (79 FR 51). On April 23, 2013, the commission adopted the 2013 HGB 1997 Eight-Hour Ozone MVEB SIP Revision. This SIP revision updated on-road mobile source emissions inventories and MVEBs for the HGB

area using the Motor Vehicle Emissions Simulator (MOVES) 2010a version of the EPA's mobile emissions estimation model. The 2013 SIP revision also met the primary obligation of the mid-course review commitment in the 2010 HGB 1997 Eight-Hour Ozone AD SIP Revision by demonstrating that the outstanding 3% contingency requirement was fulfilled. Updated on-road inventories and emissions analysis based on the EPA's August 30, 2012 vehicle miles traveled offset guidance and a modified version of the MOVES model demonstrated compliance with FCAA requirements for transportation control measures in severe nonattainment areas.

On January 2, 2014, the EPA published approval of this 2013 HGB 1997 Eight-Hour Ozone MVEB SIP Revision along with its approval of the 2010 HGB 1997 Eight-Hour Ozone AD SIP Revision (79 FR 57). The 1997 eight-hour ozone NAAQS was revoked in the March 6, 2015 issue of the *Federal Register* (80 FR 12264).

The HGB area monitored attainment of the 1997 eight-hour ozone NAAQS based on 2012 through 2014 monitoring data. In February 2015, the TCEQ submitted certification of 2014 ozone data in support of the TCEQ's subsequent request for a determination of attainment, also known as a clean data determination, for the 1997 eight-hour ozone NAAQS for the HGB area, which the EPA approved in the December 30, 2015 *Federal Register* (80 FR 81466). The HGB area continues to monitor attainment of the 1997 eight-hour ozone standard with a 2015 design value of 80 ppb.

The TCEQ submitted an HGB 1997 eight-hour ozone redesignation substitute demonstration to the EPA on August 18, 2015. On May 25, 2016, the EPA published its proposed approval of the HGB area redesignation substitute and a finding of attainment for the 1997 eight-hour ozone NAAQS (81 FR 33166).

1.1.3 2008 Eight-Hour Ozone Standard

On March 12, 2008, the EPA lowered the primary and secondary eight-hour ozone NAAQS to 0.075 ppm (73 FR 16436). On May 21, 2012, the EPA published in the *Federal Register* final designations for the 2008 eight-hour ozone standard of 0.075 ppm. An eight-county HGB area including Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller Counties was designated nonattainment with a marginal classification.

The United States Court of Appeals for the District of Columbia Circuit (D.C. Circuit Court) published an opinion on December 23, 2014 agreeing with two challenges to the EPA's initial rule implementing the 2008 ozone NAAQS published on May 21, 2012 (77 FR 30160). The court vacated the provisions of the rule relating to attainment deadlines and revocation of the 1997 ozone NAAQS for transportation conformity purposes. As part of the final 2008 ozone standard SIP requirements rule, the EPA modified 40 Code of Federal Regulations §51.1103 consistent with the D.C. Circuit Court decision to establish attainment dates that run from the effective date of designation, i.e., July 20, 2012, and revoked the 1997 ozone NAAQS for all purposes.

As a result of the D.C. Circuit Court ruling, the attainment date for the HGB marginal nonattainment area changed from December 31, 2015 to July 20, 2015. In addition, because the attainment year ozone season is the ozone season immediately preceding a nonattainment area's attainment date, the attainment year for the HGB marginal nonattainment area changed from 2015 to 2014.

The HGB area did not attain the 2008 eight-hour ozone standard in 2014, but qualified for a one-year attainment date extension in accordance with FCAA, §181(a)(5). In the May 4, 2016 *Federal Register* (81 FR 26697), the EPA granted a one-year attainment deadline extension for the HGB 2008 eight-hour ozone marginal nonattainment area to July 20, 2016.

Because the HGB area's 2015 design value of 80 ppb exceeded the 2008 eight-hour ozone NAAQS, the FCAA requires the area to be reclassified under the HGB 2008 eight-hour ozone nonattainment area from marginal to moderate nonattainment. Texas is required to submit an RFP SIP revision that addresses the 2008 eight-hour ozone standard moderate nonattainment area requirements. As indicated in the EPA's 2008 ozone standard SIP requirements rule, the attainment deadline for areas with a moderate classification is July 20, 2018 with an attainment year of 2017.

1.2 RFP REQUIREMENTS

The 1990 FCAA amendments, 42 United States Code §7410, require states to submit SIP revisions that contain enforceable measures to achieve the NAAQS. The FCAA also requires states with ozone nonattainment areas classified as moderate or above to submit plans showing reasonable further progress toward attainment. This proposed RFP SIP revision is not required to demonstrate attainment of the ozone NAAQS but rather to demonstrate that ozone precursor emissions (NO_x and/or VOC) will be reduced by specified amounts between a 2011 base year and the expected future HGB moderate nonattainment area's 2017 attainment year.

This RFP SIP revision demonstrates that the HGB moderate nonattainment area will achieve emissions reductions consistent with the requirements of FCAA, §182(b)(1) and the EPA's 2008 ozone standard SIP requirements rule, published in the March 6, 2015 *Federal Register* (80 FR 12264). Requirements for moderate ozone nonattainment areas under the FCAA include a 15% VOC emissions reduction within six years after designation; however, the EPA's 2008 ozone standard SIP requirements rule indicates that nonattainment areas with a previously approved plan meeting the 15% VOC requirement under either the one-hour ozone standard or the 1997 eight-hour ozone standard may substitute reductions in NO_x for VOC.⁵

The RFP calculations documented in this proposed SIP revision rely on an RFP base year of 2011 and a July 20, 2018 attainment deadline. In accordance with the 2008 ozone standard SIP requirements rule, if a state chooses 2011 as a base year for a moderate area designated nonattainment in 2012, the 15% reduction requirement covers the period from January 1, 2012 through December 31, 2017. This proposed SIP revision incorporates an additional 3% emissions reduction for the one-year period from January 1, 2018 through December 31, 2018 as contingency.

This proposed RFP SIP revision for the HGB area includes a demonstration of:

⁵ NO_x may be substituted for VOC under conditions defined in the EPA's December 1993 [NO_x Substitution Guidance](https://www3.epa.gov/ttn/naaqs/aqmguide/collection/cp2_old/19931201_oaqps_nox_substitution_guidance.pdf) (https://www3.epa.gov/ttn/naaqs/aqmguide/collection/cp2_old/19931201_oaqps_nox_substitution_guidance.pdf).

- 15% emissions reduction in NO_x and/or VOC for the six-year period from January 1, 2012 through December 31, 2017; and
- 3% emissions reduction in NO_x and/or VOC for the one-year period from January 1, 2018 through December 31, 2018 as attainment year RFP contingency.

In addition to the RFP analysis, this proposed SIP revision provides an updated 2017 RFP on-road MVEB and updated 2011 emissions inventories for point, area, non-road mobile, and on-road mobile sources.

This proposed SIP revision demonstrates RFP for the 2017 attainment year as well as the 2018 contingency year. A summary of the HGB area’s progress toward meeting RFP requirements can be found in Appendix 1: *Reasonable Further Progress Demonstration Spreadsheet*.

1.3 PUBLIC HEARING AND COMMENT INFORMATION

The commission will hold a public hearing on this proposed HGB RFP SIP revision at the following time and location.

Table 1-1: Public Hearing Information

| City | Date | Time | Location |
|---------|------------|-----------|--|
| Houston | October 24 | 2:00 p.m. | Texas Department of Transportation District Office Auditorium 7600 Washington Avenue Houston, TX 77007 |

The public comment period will open on September 23, 2016, and close on October 24, 2016. Written comments will be accepted via mail, fax, or through the [eComments](http://www1.tceq.texas.gov/rules/ecomments/index.cfm) (<http://www1.tceq.texas.gov/rules/ecomments/index.cfm>) system. All comments should reference the “HGB Reasonable Further Progress SIP Revision for the 2008 Eight-Hour Ozone Nonattainment Area” and should reference Project Number 2016-017-SIP-NR. Comments may be submitted to Dan Robicheaux, MC 206, State Implementation Plan Team, Air Quality Division, Texas Commission on Environmental Quality, P.O. Box 13087, Austin, Texas 78711-3087 or faxed to (512) 239-6188. If you choose to submit electronic comments, they must be submitted through the eComments system. File size restrictions may apply to comments being submitted via the eComments system. Comments must be received by October 24, 2016.

An electronic version of the HGB RFP SIP Revision for the 2008 Ozone NAAQS and appendices can be found at the TCEQ’s [HGB: Latest Ozone Planning Activities](https://www.tceq.texas.gov/airquality/sip/hgb/hgb-latest-ozone) Web page (<https://www.tceq.texas.gov/airquality/sip/hgb/hgb-latest-ozone>).

1.4 SOCIAL AND ECONOMIC CONSIDERATIONS

No new control strategies have been incorporated into this SIP 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 Federal Clean Air Act (FCAA) Amendments of 1990 require that reasonable further progress (RFP) emissions inventories (EI) be prepared for ozone nonattainment areas. Tropospheric ozone is produced when ozone precursors, volatile organic compounds (VOC) and nitrogen oxides (NO_x), undergo photochemical reactions in the presence of sunlight.

The Texas Commission on Environmental Quality (TCEQ) maintains an inventory of current information for sources of NO_x and VOC that identifies the types of emissions sources present in an area, the amount of each pollutant emitted, and the types of processes and control devices employed at each plant or source category. The total inventory of NO_x and VOC emissions for an area is derived from estimates developed for four general categories of emissions sources: point, area, mobile (both non-road and on-road), and biogenic. The emissions inventory also provides data for a variety of air quality planning tasks, including establishing baseline emissions levels, calculating reduction targets, developing control strategies to achieve emissions reductions, developing emissions inputs for air quality models, and tracking actual emissions reductions against established emissions growth and control budgets.

This SIP revision demonstrates RFP for a 2017 attainment year per the guidance in the EPA's *Implementation of the 2008 National Ambient Air Quality Standards for Ozone: State Implementation Plan Requirements; Final Rule* (2008 ozone standard SIP requirements rule), published in the *Federal Register* on March 6, 2015 (80 FR 12264).

All of the HGB 2008 eight-hour ozone nonattainment area counties met the 15% VOC-only emissions reduction requirement for RFP under the revoked one-hour ozone standard (66 FR 57160). This SIP revision demonstrates a 15% emissions reduction for the designated ozone nonattainment counties by combining NO_x and VOC emissions reductions.

To complete the RFP calculations, a set of inventories and control measures reduction estimates is required. In accordance with the requirement for these inventories and estimates, this SIP revision includes documentation of emissions inventories for the 2011 base year, for the 2017 attainment year, and for the attainment year RFP contingency requirement (2018). Those emissions inventories provide the basis for demonstrating how the required RFP emissions reductions will be met.

To develop an RFP SIP revision for a moderate nonattainment area for the 2008 ozone NAAQS, states must: (1) determine the base year emissions for NO_x and VOC; (2) calculate RFP target emissions reductions levels based on the RFP percent reduction requirements; (3) determine attainment year inventories for 2017 based upon RFP requirements; and (4) subtract RFP-creditable emissions reductions from attainment year uncontrolled or (for point and area sources) existing controlled NO_x and VOC emissions that include growth between the baseline year and the attainment year. When the RFP controlled emissions reductions meet or exceed the calculated target emissions reductions, then RFP is demonstrated.

The requirement to calculate and account for the non-creditable emissions reductions due to pre-1990 Federal Motor Vehicle Control Program (FMVCP) reductions in RFP analyses was removed under the 2008 ozone standard SIP requirements rule. This rule change eliminates the requirements to: calculate the adjusted base year (ABY) emissions inventory that estimates the effects of the non-creditable pre-1990 FCAA controls; use the ABY emissions inventory to calculate the percent reductions; and include the non-creditable reductions in the RFP target calculations. The RFP analyses presented in this SIP revision do not include any of the RFP elements or non-creditable effects related to the pre-1990 FMVCP, including ABY emissions inventories and related summaries and documentation.

This HGB RFP SIP revision includes:

- a 2011 base year emissions inventory;

The base year emissions inventory is the starting point for calculating the target levels of emissions. A base year of 2011 was selected in accordance with the EPA's 2008 ozone standard SIP requirements rule.

- for point, area, and specified non-road mobile sources, a 2014 analysis year emissions inventory;

The TCEQ designated the 2014 inventory as the starting point for point, area, and specified non-road mobile source emissions inventory projections for the attainment year because it is the most recent periodic inventory year.

- for mobile sources, 2017 uncontrolled emissions inventories;

The RFP analysis requires an uncontrolled emissions inventory with growth between the base year and the attainment year. The uncontrolled emissions inventories serve as the basis for determining the amount of emissions reductions required to meet the RFP target for the attainment year.

- for point and area sources, 2017 emissions inventories developed using 2014 or prior controls;

For stationary (point and area) sources, any controls implemented by the end of 2014 limit future emissions growth from these sources. Forecasted inventories for the attainment year are developed that reflect growth using specified existing controls implemented by the end of the base year. These inventories are referenced as "existing controlled" inventories.

- 2017 attainment year control reductions;

The RFP analysis requires the calculations of emissions reductions for control strategies, which are then subtracted from the uncontrolled or existing controlled emissions to determine the controlled RFP inventory value. The RFP emissions reductions for each control strategy that pertains to particular source categories are individually quantified. The controlled projected RFP emissions inventory is the result of subtracting the emissions reductions for controls that are used to

demonstrate RFP from the uncontrolled or existing controlled projected emissions inventory. A discussion of RFP control strategies is provided in Chapter 4: *Control Measures to Achieve Target Levels*.

- 2017 controlled emissions inventories; and

The controlled emissions inventories represent the projected (forecasted) emissions inventories with all controls implemented, even controls not used or not creditable to demonstrate RFP. Due to the inclusion of non-creditable controls, these inventories may be less than the RFP emissions inventories that include only creditable controls used to demonstrate RFP.

- 2017 attainment year RFP contingency control reductions.

The RFP analysis requires the calculation of the emissions reductions for control strategies for the year following the attainment year. These control reductions can be implemented if an RFP requirement is not met. A discussion of the RFP contingency control strategies for this SIP revision is provided in Chapter 4.

2.1.1 Updated Uncontrolled Attainment Year Inventories for Mobile Sources

Uncontrolled attainment year emissions inventories for mobile sources represent what each attainment year's emissions would be if the post-1990 mobile control strategies were never implemented. First, emissions inventories are calculated for each mobile source category using EPA-approved methodologies. The inventories are then combined to derive the total uncontrolled attainment year emissions inventory for NO_x and VOC. The uncontrolled attainment year emissions inventories include 1990 or prior FCAA and/or state controls as well as growth in activity from 2011 to the attainment year, but the inventories do not include post-1990 FCAA and/or state controls.

2.1.2 Updated Existing Controlled Inventories for Stationary Sources

Existing controlled attainment year emissions inventories represent the estimated attainment year's emissions if no further action to control emissions growth were taken beyond the controls already accounted for in the 2011 base year emissions inventory and the 2014 analysis year inventory. First, emissions inventories are calculated for each source category using methods as detailed in the appropriate sections below. The inventories are then combined to derive the total attainment year emissions inventory for NO_x and VOC that reflects specified controls implemented by the end of the 2014 analysis year. The attainment year emissions inventories include specified 2014 or prior FCAA and/or state controls as well as growth in activity from 2014 to the attainment year that reflects these controls, but the inventories do not include post-2014 FCAA and/or state controls.

2.1.3 Updated Controlled or Post-2011 Controlled Attainment Year Inventories

The controlled attainment year emissions inventories represent projected emissions for 2017, accounting for emissions growth from the 2011 base year or 2014 analysis year as detailed below, and specified applicable controls. Emissions inventories are calculated for each inventory category using EPA-approved methodologies. Then, the inventories are combined to obtain the total controlled attainment year emissions

inventories for NO_x and VOC. The controlled attainment year emissions inventories include: specified FCAA and/or state controls implemented prior to the base year or analysis year, growth in activity from the base year or the analysis year to the attainment year, and specified FCAA and/or state controls used to meet RFP target emissions levels implemented after the base or analysis year. The inventories do not include FCAA controls that are not creditable towards meeting RFP target emissions levels.

2.1.4 Updated Adjusted Base Year Inventories

The on-road ABY emissions inventories are not required for this SIP revision. See Section 2.1: *Introduction* for additional information.

2.2 POINT SOURCES

2.2.1 Emissions Inventory Development

Stationary point source emissions data are collected annually from sites that meet the reporting requirements of Title 30 Texas Administrative Code (TAC) § 101.10. The TCEQ emissions inventory reporting rule establishes emissions inventory reporting thresholds in ozone nonattainment areas that are currently at or less than major source thresholds in the HGB area. Therefore, some minor sources in the HGB ozone nonattainment area report to the point source emissions inventory. To collect the data, the TCEQ provides detailed reporting instructions and tools for completing and submitting emissions inventory questionnaires (EIQ). Companies submit emissions inventory data using a Web-based system. Companies are required to report emissions data and to provide sample calculations used to determine the emissions. Information characterizing the process equipment, the abatement units, and the emission points is also required. Company representatives certify that reported emissions are true, accurate, and fully represent emissions that occurred during the calendar year to the best of the representative's knowledge.

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

2.2.2 Updated 2011 Base Year Inventory

The TCEQ extracted the 2011 base year inventory data from STARS on July 29, 2016. The extracted data included reported ozone season daily emissions of NO_x and VOC from each site in the HGB area that submitted a 2011 EIQ and reflected revisions made on or before the extract date.

2.2.3 Updated Analysis Year Inventories

Updated analysis year inventories were developed according to the general requirements described in Section 2.2.1: *Emissions Inventory Development*. The TCEQ designated the 2014 inventory as the starting point for emission inventory projections because 2014 point source data were the most recent data available. The 2014 point source inventory data were extracted from STARS on July 29, 2016. The dataset included reported ozone season daily emissions of NO_x and VOC for each site in the

HGB area that submitted a 2014 EIQ and reflected revisions made on or before the extract date.

The TCEQ requested regulated entities submit any appropriate revisions to the 2014 point source emissions inventory by August 1, 2016. The point source emissions in this RFP SIP revision are preliminary as the schedule for the inventory development did not allow time to incorporate any updates submitted by regulated entities by August 1, 2016 to the 2014 point source emissions. Final 2014 point source emissions for use in the adopted RFP SIP revision are anticipated to differ slightly from those reported in this proposal. However, revisions to the emission inventory data are expected to add less than one ton per day each of VOC and NO_x emissions to the current point source emissions. As a result, the final RFP SIP revision may change between proposal and adoption to reflect updates to the point source emissions inventories.

In the development of the 2017 attainment year inventory, the TCEQ projected future emissions from major and minor sources separately as appropriate and then applied available emissions credits to the inventories; for further details, please reference *Appendix 2: Development of Reasonable Further Progress Point Source Emissions Inventories for the Houston-Galveston-Brazoria (HGB) Nonattainment Area*.

A summary of the point source RFP inventories is presented in:

- Table 2-3: *HGB RFP Summary of the 2011 Base Year Average Summer Weekday NO_x and VOC Emissions (tons per day)* and
- Table 2-4: *HGB RFP Summary of the 2017 Attainment Year Average Summer Weekday NO_x and VOC Emissions (tons per day)*.

2.3 AREA SOURCES

2.3.1 Emissions Inventory Development

Stationary emissions sources that do not meet the reporting requirements for point sources are classified as area sources. Area sources are small-scale stationary industrial, commercial, and residential sources that use materials or perform processes that generate emissions. Examples of typical sources of VOC emissions include: oil and gas production sources; printing operations; industrial coatings; degreasing solvents; house paints; gasoline service station underground tank filling; and vehicle refueling operations. Examples of typical fuel combustion sources include: oil and gas production sources; stationary source fossil fuel combustion at residences and businesses; outdoor refuse burning; structure fires; and wildfires.

Area source emissions are calculated as county-wide totals rather than as individual sources. Area source emissions are typically calculated by multiplying an established emissions factor (emissions per unit of activity) by the appropriate activity or activity surrogate responsible for generating emissions. Population is one of the more commonly used activity surrogates for area source calculations. Other activity data commonly used include the amount of gasoline sold in an area, employment by industry type, and crude oil and natural gas production.

2.3.2 Updated 2011 Base Year Inventory

The 2011 area source inventory was developed in accordance with the requirements of the Air Emissions Reporting Requirements (AERR) rule. The 2011 inventory was developed using EPA-generated emissions inventories; TCEQ-contracted projects to develop emissions inventories; TCEQ staff projects to develop emissions inventories; and projecting 2008 emissions inventories by applying growth factors derived from Eastern Research Group, Inc. (ERG) study data; the [Economy and Consumer Credit Analytics](http://www.economy.com/default.asp) website (<http://www.economy.com/default.asp>); and the United States Energy Information Administration's (EIA) *Annual Energy Outlook* publication. The documentation for the development of the growth factors can be found in Appendix 3: *Growth Factors for Area and Point Sources*.

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

Quality assurance of area source emissions involves ensuring that the activity data used for each separate category are current and valid. Data such as current population figures, fuel usage, and material usage were updated and the EPA guidance on emissions factors was used. Other routine efforts such as checking calculations for errors and conducting completeness and reasonableness checks were completed.

For those area source categories affected by TCEQ rules, rule effectiveness factors are applied to the baseline emissions to estimate controlled emissions for each category. These factors address the efficiency of the controls and the percentage of the category's population affected by the rule.

2.3.3 Updated Analysis Year Inventories

Updated analysis year inventories were developed according to the general requirements described in Section 2.3.1: *Emissions Inventory Development*. The TCEQ designated the 2014 inventory as the starting point for emission inventory projections for the attainment year because it is the most recent periodic inventory year.

The 2014 area source inventory was developed in accordance with the requirements of the AERR rule. The 2014 inventory was developed using EPA-generated emissions inventories, TCEQ-contracted projects to develop emission inventories, and TCEQ staff projects to develop emission inventories.

Additionally, the TCEQ committed significant resources to improve the oil and gas area source inventory production categories for the 2014 inventory. The improvements included the refinement of a previously developed, state-specific oil and gas area source emissions calculator. This oil and gas area source emissions calculator uses

county-level production and local equipment activity data with local emissions requirements to estimate emissions from individual production categories including compressors engines, condensate and oil storage tanks, loading operations, heaters, and dehydrators. The documentation for the development of the oil and gas emissions calculator can be found in Appendix 4: *Characterization of Oil and Gas Production Equipment and Develop a Methodology to Estimate Statewide Emissions and Specified Oil and Gas Well Activities Emissions Inventory Update*. The emissions calculator from this study was updated with 2014 oil and gas activity data obtained from the Railroad Commission of Texas (RRC) to develop the 2014 inventory. An example of a recent significant refinement made to the oil and gas calculator was the development of updated emission factors for VOC emissions from condensate storage tanks. The documentation for the refined emission factors can be found in Appendix 5: *Condensate Tank Oil and Gas Activities*.

The updated 2017 attainment year inventory for the area source categories was developed using factors derived from Appendix 3. The study in this appendix contains individual growth factors for each source category and for each forecasting year. This projection method is the EPA standard and accepted methodology for developing future year emissions inventories.

The 2017 area source emissions inventory was developed by applying the selected emission factor to the 2014 emissions for each area source category to account for any growth in emissions. Rules controlling emissions from industrial coatings, portable fuel containers, 30 TAC Chapter 117 Subchapter D controls on minor sources in ozone nonattainment areas, and gasoline station underground tank filling (Stage I) and vehicle refueling (Stage II) were applied in the base year inventory. No additional controls were incorporated into the attainment year inventories; see Chapter 4 for additional details.

A summary of the area source RFP inventories is presented in Tables 2-3 and 2-4.

2.4 NON-ROAD MOBILE SOURCES

Non-road vehicles do not normally operate on roads or highways and are often referred to as off-road or off-highway vehicles. Non-road emissions sources include, but are not limited to: agricultural equipment, commercial and industrial equipment, construction and mining equipment, lawn and garden equipment, aircraft and airport equipment, locomotives, drilling rigs, and commercial marine vessels (CMV). For this RFP SIP revision, emissions inventories for non-road sources were developed for the following subcategories: NONROAD model categories, airports, locomotives, CMVs, and drilling rigs used in upstream oil and gas exploration activities. The airport subcategory includes estimates for emissions from the aircraft, auxiliary power units (APU), and ground support equipment (GSE) subcategories added together and presented as a total. The sections below describe the emissions estimates methodologies used for the non-road mobile source subcategories.

2.4.1 NONROAD Model Categories Emissions Estimation Methodology

A Texas-specific version of the EPA's latest NONROAD 2008a model, called the Texas NONROAD (TexN) model, was used to calculate emissions from all non-road mobile source equipment and recreational vehicles, with the exception of airports,

locomotives, commercial marine vessels, and drilling rigs used in upstream oil and gas exploration activities. Because emissions for airports, commercial marine vessels, and locomotives are not included in either the NONROAD model or the TexN model, the emissions for these categories are estimated using other EPA-approved methods and guidance as described in the sections below. Although emissions for drilling rigs are included in the NONROAD model, alternate emissions estimates were developed for that source category in order to develop more accurate inventories as described in Section 2.4.2: *Drilling Rig Diesel Engines Emissions Estimation Methodology*. The equipment populations for drilling rigs were set to zero in the TexN model to avoid double counting emissions from these sources.

The TexN model is a software tool for estimating emissions for non-road mobile source categories that are included in the EPA NONROAD model, with the exception of drilling rigs, as discussed above, and it was developed to help provide high quality non-road emissions inventories for Texas. The model allows air quality planners to replace the EPA's default emissions data used in the NONROAD model with more specific local survey emissions data, a practice encouraged by the EPA. Local, county-level input data are incorporated into the TexN model as it becomes available to the TCEQ. Several equipment survey studies have been conducted in Texas to improve upon the default emissions data available in the EPA's NONROAD model. Those studies focused on various equipment categories operating in different areas of the state, including: diesel construction equipment, liquid propane gas powered forklifts, transportation refrigeration units, commercial lawn and garden equipment, agricultural equipment, and recreational marine vessels. Input data used for the TexN model produce a more accurate representation of non-road emissions for the HGB nonattainment area. The NONROAD model category emissions included in this RFP SIP revision were developed using version 1.7.1 of the TexN emissions model.

2.4.2 Drilling Rig Diesel Engines Emissions Estimation Methodology

Drilling rig diesel engines used in upstream oil and gas exploration activities are included in the NONROAD model category "Other Oilfield Equipment," which includes various types of equipment; however, due to significant growth in the oil and gas exploration and production industry, a 2015 survey of oil and gas exploration and production companies was used to develop updated drilling rig emissions characterization profiles. The uncontrolled and controlled drilling rig emissions characterization profiles from this study were combined with drilling activity data obtained from the RRC to develop the emissions inventory. The documentation of procedures used in developing the drilling rigs emissions inventory can be found in Appendix 6: *2014 Statewide Drilling Rig Emissions Inventory with Updated Trends Inventories*.

2.4.3 Commercial Marine Vessel and Locomotive Emissions Estimation Methodology

The locomotive emissions inventory was developed from a TCEQ-commissioned study using EPA-accepted emissions inventory development methods. The locomotive emissions inventory includes line haul and yard emissions activity data from all Class I, II, and III locomotive activity and emissions by rail segment. Documentation of methods and procedures used to develop the locomotive emissions inventory can be

found in Appendix 7: *2014 Texas Statewide Locomotive Emissions Inventory and 2008 through 2040 Trend Inventories*.

The commercial marine vessel emissions inventory was developed from a TCEQ-commissioned study using EPA-accepted emissions inventory development methods. The commercial marine vessel emissions inventory includes at-port and underway emissions activity data from Category I, II, and III commercial marine vessels by county. Documentation of the methods and procedures used to develop the commercial marine vessel emissions inventory can be found in Appendix 8: *2014 Texas Statewide Commercial Marine Vessel Emissions Inventory and 2008 through 2040 Trend Inventories*.

2.4.4 Airport Emissions Estimation Methodology

The airport emissions inventory was developed from a TCEQ-commissioned study using the Federal Aviation Administration's (FAA) Emission and Dispersion Modeling System (EDMS) model. The airport emissions categories used for this RFP SIP revision included aircraft (commercial air carriers, air taxis, general aviation, and military), APU, and GSE operations. Documentation of methodology and procedures used to develop the HGB airport 2011 emissions inventory can be found in Appendix 9: *Aircraft Emissions Inventory for Texas Statewide 2014 AERR Inventory and 2008 through 2040 Trend Analysis Years*.

2.4.5 Updated 2011 Base Year Inventory

For certain non-point source categories detailed below, the updated 2011 base year emissions inventory was developed from the 2014 periodic emissions inventory to provide consistency between emissions estimation approaches for the two years. Exceptions and specific details about non-road source category inventory development are included in the relevant section below.

2.4.5.1 Updated 2011 Base Year NONROAD Model Category Inventory

The 2011 base year inventory used for all of the non-road mobile source categories was developed using the latest version of the TexN model with updated county-specific input data. More detailed information on the TexN emissions model, guidance document, and updates to the model can be found in the [TexN directory](ftp://amdaftp.tceq.texas.gov/pub/EI/nonroad/TexN/) (ftp://amdaftp.tceq.texas.gov/pub/EI/nonroad/TexN/) on the TCEQ's Air Modeling and Data Analysis file transfer protocol (FTP) site.

2.4.5.2 Updated 2011 Base Year Drilling Rig Diesel Engines Inventory

The 2011 base year emissions inventory for drilling rig diesel engines used in upstream oil and gas exploration activities was developed by backcasting 2014 drilling rig controlled and uncontrolled emissions inventories using growth factors taken from the report in Appendix 3. The 2014 drilling rig controlled and uncontrolled inventories were developed as part of a statewide emissions inventory improvement study. The 2014 drilling activity data were obtained from the RRC and through a survey of oil and gas exploration and production companies, which was used to develop improved drilling rig emissions characterization profiles. The documentation of procedures used in developing the 2014 drilling rigs emissions inventory can be found in Appendix 6.

2.4.5.3 Updated 2011 Base Year Commercial Marine Vessel and Locomotive Inventory

The 2011 base year Texas locomotive inventory was developed by backcasting (retroactively estimating) 2014 controlled and uncontrolled emissions inventories. The 2014 locomotive inventory was developed by ERG under contract with the TCEQ and includes Class I, II, and III locomotive activity and emissions by rail segment for all counties within Texas; the report associated with developing the locomotive inventory is contained in Appendix 7. The 2013 locomotive line haul and yard activity data were reported by companies operating in Texas to create a county-level Class I line haul inventory. The 2008 activity and emissions profiles were used for Class II and Class III railroads; these data were developed by the Eastern Regional Technical Advisory Committee in collaboration with the Federal Railroad Administration, the American Short Line and Regional Railroad Association (ASLRRA), and members of the Class II and III railroad communities. The annual gallons of fuel used by railroads were estimated from data compiled by ASLRRA from the Class II and III railroads, including total industry fuel use in 2008 for locomotives and total Class II/III route miles. Based on the EIA's latest *Annual Energy Outlook*, 2008 fuel usage values were grown to estimate 2014 emissions. Documentation of methods and procedures used to develop the locomotive emissions inventories can be found in Appendix 7.

The 2011 base year commercial marine vessel inventory was developed by backcasting 2014 controlled and uncontrolled emissions inventories. The 2014 commercial marine vessel emissions inventory includes Category I, II, and III commercial marine vessel activity and emissions for all coastal counties within Texas. The 2014 commercial marine vessel emissions inventory was developed using Automatic Identification System activity data for commercial marine vessels from PortVision, which provided vessel location, speed, and other identifying information. In addition to activity data, vessel-specific data from the Information Handling Services Vessel Database were used to determine which subsets of emissions factors were applicable for each vessel. Documentation of the methods and procedures used to develop the commercial marine vessel emissions inventories can be found in Appendix 8.

2.4.5.4 Updated 2011 Base Year Airport Inventory

The 2011 base year airport emissions inventories were prepared by ERG under contract with the TCEQ using the FAA's EDMS. To estimate the 2011 emissions from the airport sources, a survey was conducted to collect updated information on aircraft activity, fleet mix, and other EDMS model input parameters for airports within the HGB area. Model input data were then compiled and reviewed, and any identified data gaps were replaced with values developed using the most closely related data available. Documentation of methodology and procedures used to develop the HGB airport 2011 inventories can be found in Appendix 9.

2.4.6 Updated Uncontrolled Analysis Year Inventories

The NONROAD model category uncontrolled emissions for each analysis year (2011 and 2017) were calculated by removing all federal and state controls from the model runs. The TCEQ calculated updated, uncontrolled emissions from airports based on the information and growth factors from the ERG report found in Appendix 9. The updated uncontrolled analysis year emissions for the locomotive sources were primarily determined by applying activity adjustment factors by source classification code (SCC) to the 2014 inventory per the ERG report in Appendix 7. The activity

adjustment factors used were based on the EIA's [Transportation Sector Key Indicators and Delivered Energy Consumption data](http://www.eia.gov/forecasts/aeo/tables_ref.cfm) (http://www.eia.gov/forecasts/aeo/tables_ref.cfm). Uncontrolled emissions for commercial marine vessel sources were based on emission factors developed by ERG with guidance from the EPA that excluded adjustments for fleet turnover and the implementation of state and federal regulatory programs; see Appendix 8 for more information. The uncontrolled 2014 emissions inventory for drilling rigs was developed using the uncontrolled factors from the ERG report found in Appendix 6. The emissions were then projected to 2017 using the factors contained in the ERG report found in Appendix 3.

2.4.7 Updated Controlled Analysis Year Inventories

For the NONROAD model category sources, the TCEQ developed county-level controlled inventories for the 2017 attainment year using the latest version of the TexN model. The model runs were performed accounting for all state and federal control measures. The TCEQ then modeled a set of uncontrolled scenarios, disabling all state and federal controls simultaneously for each county and target year. Emissions reductions for individual control measures were assessed through a series of TexN model runs for both controlled and uncontrolled scenarios for each federal and state control measure.

The updated controlled analysis year emissions for the airports were calculated by the TCEQ based on the information provided by ERG found in Appendix 9. Control strategies for airport emissions included emission credits from the GSE and APU electric conversions.

Controlled emissions for locomotive sources were determined by applying activity adjustment factors by SCC, and emission rate adjustment factors. The emission rate adjustment factors were obtained from the EPA's [Emission Factors for Locomotives Fact Sheet](http://www.epa.gov/otaq/regs/nonroad/locomotv/420f09025.pdf) (<http://www.epa.gov/otaq/regs/nonroad/locomotv/420f09025.pdf>). The activity adjustment factors used were based on the EIA's [Transportation Sector Key Indicators and Delivered Energy Consumption data](http://www.eia.gov/forecasts/aeo/tables_ref.cfm) (http://www.eia.gov/forecasts/aeo/tables_ref.cfm).

Controlled emissions for commercial marine vessel sources were based on emission factors developed by ERG with guidance from the EPA, which took into account fleet turnover and the implementation of state and federal regulatory programs; see Appendix 8 for more information.

Diesel drilling rig emissions trends were developed based on the controlled and uncontrolled 2014 emissions inventories projected to 2017, using the growth factors derived from Appendix 3.

A summary of the non-road mobile source RFP inventories is presented in Tables 2-3 and 2-4.

2.5 ON-ROAD MOBILE SOURCES

The 2011, 2017, and 2018 on-road mobile source emissions inventories for this RFP SIP revision were developed under contract by the Texas A&M Transportation Institute (TTI). The data, methods, activity inputs, emissions factors, and results are

documented in the TTI report and provided in Appendix 10: *Development of On-Road Emission Inventories for the Years 2011, 2017, and 2018*. The inventories include the eight HGB area counties designated as nonattainment for the 2008 ozone national ambient air quality standard (NAAQS). As required by the RFP implementation rules, the on-road inventories are based on vehicle miles traveled (VMT) estimates and emission rates for an average summer work weekday. The latest version of the EPA's Motor Vehicle Emission Simulator (MOVES) model, MOVES2014a, was used to estimate the summer weekday emission rates in units of grams per mile for NO_x and VOC. The roadway link-level VMT estimates were obtained from travel demand modeling for the eight-county HGB area for each analysis year.

As stated above, the on-road mobile source category emissions inventories for this RFP SIP revision were developed using the MOVES2014a model. The on-road mobile emissions estimates are preliminary as the schedule for the inventory development did not allow time to incorporate final on-road mobile inventories. Final on-road emission estimates may be different than those reported in this proposal due to ongoing quality assurance activities. As a result, this narrative may change between proposal and adoption to reflect updates to the on-road mobile emissions inventories.

2.5.1 On-Road 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 ozone precursor emissions are usually categorized as 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.

Emission factors for this RFP SIP revision were developed using the EPA's mobile emissions factor model, MOVES2014a. The MOVES2014a model may be run using national default information or the default information may be modified to simulate data specific to an area, such as the control programs, driving behavior, meteorological conditions, and vehicle characteristics. Because modifications to the national default values influence the emission factors calculated by the MOVES2014a model, to the extent that local values are available, parameters that are used reflect local conditions. The localized inputs used for the on-road mobile emissions inventory development include vehicle speeds for each roadway link, vehicle populations, vehicle hours idling, temperature, humidity, vehicle age distributions for each vehicle type, percentage of miles traveled for each vehicle type, type of inspection and maintenance (I/M) program, fuel control programs, and gasoline vapor pressure controls.

To estimate on-road mobile source emissions, emission factors calculated by the MOVES2014a model must be multiplied by the level of vehicle activity. On-road mobile source emissions factors are expressed in units of grams per mile, grams per vehicle (evaporative), and grams per hour (extended idle); therefore, the activity data required to complete the inventory calculation are VMT in units of miles per day, vehicle populations, and source hours idling. The level of vehicle travel activity is developed using travel demand models (TDM) run by the Texas Department of Transportation or by the local metropolitan planning organizations. The TDMs are validated against a

large number of ground counts, i.e., traffic passing over counters placed in various locations throughout a county or area. For SIP inventories, VMT estimates are calibrated against outputs from the federal Highway Performance Monitoring System (HPMS), a model built from a different set of traffic counters. Vehicle populations by source type are derived from the Texas Department of Motor Vehicles' registration database and, as needed, national estimates for vehicle source type population.

In addition to the number of miles traveled on each roadway link, the speed on each roadway type or segment is also needed to complete an on-road emissions inventory. Roadway speeds, required inputs for the MOVES2014a model, are calculated by using the activity volumes from the TDM and a post-processor speed model.

A summary of the on-road mobile source VMT used to develop the various NO_x and VOC emissions estimates for the HGB area are presented in Table 2-1: *HGB RFP Ozone Season Weekday On-Road Mobile Source VMT (miles per day)*.

The controlled and uncontrolled on-road mobile source emissions inventories are summarized in Tables 2-3 and 2-4.

For complete documentation of the development of the on-road mobile source emissions inventories for the HGB RFP demonstration, refer to Appendix 10: *Development of On-Road Emission Inventories for the Years 2011, 2017, and 2018*. The complete set of input and output files are available upon request from the TCEQ's Air Quality Division.

Table 2-1: HGB RFP Ozone Season Weekday On-Road Mobile Source VMT (miles per day)

| RFP Analysis Year | Uncontrolled Emissions Inventory VMT | Controlled Emissions Inventory VMT |
|----------------------|--------------------------------------|------------------------------------|
| 2011 Base Year | 153,411,903 | 153,411,903 |
| 2017 Attainment Year | 169,918,016 | 169,918,016 |

2.5.2 On-Road Mobile Updated 2011 Base Year Inventory

The 2011 base year emissions inventory for on-road mobile sources was updated using emission factors calculated using the MOVES2014a model. Additional updates were made to incorporate the latest activity estimates from the HGB TDM 2011 network. Only control strategies implemented prior to 2011 were included in the input to the emissions inventory development for the 2011 on-road mobile source base year emissions inventory. Those controls include: the pre-1990 FMVCP; the 1990 to 2011 FMVCP; reformulated gasoline (RFG); the HGB vehicle I/M program, and on-road Texas Low Emission Diesel (TxLED). The activity levels used to calculate the emissions inventory reflect the 2011 roadway network with 2011 VMT and speeds. A summary of the emissions inventory is presented in Tables 2-3 and 2-4. For complete documentation of the development of the emissions inventory and details on MOVES2014a model inputs, refer to Appendix 10.

2.5.3 On-Road Mobile Updated 2011 Adjusted Base Year Inventories for the Base and Attainment Years

The on-road ABY emissions inventories are not required for this RFP SIP revision. See Section 2.1: *Introduction* for additional information.

2.5.4 On-Road Mobile Updated Uncontrolled Attainment Year Inventories

The uncontrolled on-road mobile emissions inventories for each RFP attainment year were developed using emission factors that reflect only control strategies implemented prior to 1990. Those controls include pre-1990 FMVCP and the 1992 RVP control. MOVES2014a was used to develop the emissions inventories for this RFP SIP revision. The activity levels were updated to include the latest output from the HGB TDM. The activity levels used to calculate the emissions inventory reflect the attainment roadway network, with attainment year VMT and speeds. A summary of the emissions inventories is presented in Tables 2-8 and 2-9. For complete documentation of the development of the emissions inventory and details on MOVES2014a model inputs, refer to Appendix 10.

2.5.5 On-Road Mobile Updated Controlled Attainment Year Inventories

The controlled on-road mobile emissions inventories for the attainment year were developed using emission factors that include: the effects of pre-1990 control strategies, the effects of all control strategies between 1990 and 2011, and the effects of all control strategies through the attainment year. The effects of the post-1990 control strategies between 2011 and the attainment year are creditable reductions used to demonstrate compliance with RFP requirements. The pre- and post-1990 controls include pre-1990 FMVCP, post-1990 FMVCP, RFG, the HGB vehicle I/M program, and TxLED. All control strategies used to demonstrate RFP for HGB are documented in Chapter 4. The on-road control strategies are documented in Section 4.5: *On-Road Mobile Source Controls*.

The activity levels used to calculate the attainment year emissions inventories reflect the 2017 roadway network, with 2017 VMT and speeds. A summary of the uncontrolled on-road mobile emissions inventory, the on-road mobile control reductions, and the resulting controlled on-road mobile emissions inventory for the attainment year are summarized in Table 2-2: *2017 HGB RFP Ozone Season Weekday On-Road Mobile Source NO_x and VOC Emissions and Control Strategy Reductions*. For complete documentation of the development of the emissions inventories and details on MOVES2014a model inputs, refer to Appendix 10.

Table 2-2: 2017 HGB RFP Ozone Season Weekday On-Road Mobile Source NO_x and VOC Emissions and Control Strategy Reductions

| Emissions Inventory and Control Strategy Description | NO _x (tons per day) | VOC (tons per day) |
|---|--------------------------------|--------------------|
| 2017 Uncontrolled Inventory | 657.23 | 279.72 |
| RFG with Tier 3 Sulfur and Federal Ultralow Sulfur Diesel | 85.13 | 16.87 |
| Post-1990 FMVCP | 464.25 | 198.54 |
| HGB I/M | 6.89 | 7.94 |
| On-road TxLED | 2.81 | 0.00 |
| 2017 Controlled Inventory | 98.15 | 56.37 |

Quantification of individual control reductions are documented in Chapter 4. MVEB calculations for the attainment year are documented in Chapter 5: *Motor Vehicle Emissions Budgets*.

2.6 BIOGENIC SOURCES

Biogenic sources include VOC emissions from crops, lawn grass, and trees as well as small amounts of NO_x from soils. Previously, under the Consolidated Emissions Reporting Rule (June 2002) and earlier emissions reporting rules, biogenic sources were required to be reported along with point, nonpoint, on-road mobile, and non-road mobile sources. Beginning with the AERR rule (December 2008), the emissions required to be reported to the EPA no longer include emissions from biogenic sources. Therefore, as of the 2011 reporting year, the TCEQ's comprehensive triennial emissions inventory no longer includes emissions from biogenic sources. Biogenic inventories may still be developed for air quality modeling purposes as necessary.

The RFP demonstrations are based upon the emissions from anthropogenic sources only. The guidance for RFP calculations shows the first step is to subtract the emissions from biogenic sources from the total base year emissions to obtain the total anthropogenic emission inventory. As of 2011, under the AERR rule, the base year emissions do not include biogenic sources and already represent the total anthropogenic emissions. In this case, step one of the RFP process is not needed, and the inclusion of emissions from biogenic sources is unnecessary. Therefore, this RFP SIP revision does not include quantification of emissions from biogenic sources.

2.7 EMISSIONS SUMMARY

Uncontrolled and controlled base year NO_x and VOC emissions in the HGB area for each RFP source category are summarized in Table 2-3. For the 2017 attainment year, the HGB area uncontrolled and controlled NO_x and VOC emissions for each RFP source category and analysis year are summarized in Table 2-4. Where there is no difference between the uncontrolled and controlled (post-control) emissions for the base year or the attainment year, there were no controls applied to the projected source inventories.

Table 2-3: HGB RFP Summary of the 2011 Base Year Average Summer Weekday NO_x and VOC Emissions (tons per day)

| Emissions Inventory Source | Uncontrolled NO_x | Controlled NO_x | Uncontrolled VOC | Controlled VOC |
|------------------------------------|---|--|-------------------------|---------------------------------|
| Non-Road Mobile Sources | 216.46 | 142.44 | 112.54 | 49.78 |
| On-Road Mobile Sources (MOVES2014) | 586.15 | 188.02 | 236.90 | 80.73 |
| Emissions Inventory Source | Existing Controlled NO_x | Post-2014 Controlled NO_x | Uncontrolled VOC | Post-2014 Controlled VOC |
| Area Sources | 21.15 | 21.15 | 304.90 | 304.90 |
| Point Sources | 108.33 | 108.33 | 95.99 | 95.99 |

| Emissions Inventory Source | Uncontrolled NO_x | Controlled NO_x | Uncontrolled VOC | Controlled VOC |
|-----------------------------------|------------------------------------|----------------------------------|-------------------------|-----------------------|
| Total of All Sources | 932.09 | 459.94 | 750.33 | 531.40 |

Table 2-4: HGB RFP Summary of the 2017 Attainment Year Average Summer Weekday NO_x and VOC Emissions (tons per day)

| Emissions Inventory Source | Uncontrolled NO_x | Controlled NO_x | Uncontrolled VOC | Controlled VOC |
|------------------------------------|---|--|-------------------------|---------------------------------|
| Non-Road Mobile Sources | 210.26 | 86.97 | 123.21 | 33.58 |
| On-Road Mobile Sources (MOVES2014) | 657.23 | 98.15 | 279.72 | 56.37 |
| Emissions Inventory Source | Existing Controlled NO_x | Post-2014 Controlled NO_x | Uncontrolled VOC | Post-2014 Controlled VOC |
| Area Sources | 24.30 | 24.30 | 313.53 | 313.53 |
| Point Sources | 126.42 | 126.42 | 113.04 | 113.04 |
| Total of All Sources | 1,018.21 | 335.84 | 829.50 | 516.52 |

CHAPTER 3: PROGRESS TOWARD MEETING TARGET EMISSIONS LEVELS

3.1 INTRODUCTION

This chapter describes how the Houston-Galveston-Brazoria (HGB) reasonable further progress (RFP) demonstration is calculated, documents the RFP calculations, and provides a summary of the HGB RFP demonstration for all RFP analysis years. Based upon the United States Environmental Protection Agency's (EPA) *Implementation of the 2008 National Ambient Air Quality Standards for Ozone: State Implementation Plan Requirements; Final Rule* (2008 ozone standard state implementation plan (SIP) requirements rule), published in the *Federal Register* on March 6, 2015 (80 FR 12264), the attainment date for moderate nonattainment areas is July 20, 2018, with an attainment year of 2017.

The 2008 ozone standard SIP requirements rule requires states with moderate nonattainment areas to submit an RFP plan with a 15% emissions reduction from the RFP base year. For this HGB RFP SIP revision, a base year of 2011 was used to harmonize the RFP base year with the triennial reporting requirement of the Air Emissions Reporting Requirements (AERR) rule. In accordance with the 2008 ozone standard SIP requirements rule, if a state chooses 2011 as a base year for a moderate area designated nonattainment in 2012, the 15% reduction requirement covers the period from January 1, 2012 through December 31, 2017. Since 2017 is also the attainment year, there are no post-2017 RFP analysis years.

The RFP requirements include a 3% contingency demonstration for the one year period after each RFP analysis year and the attainment year. For this SIP revision, the only RFP analysis year is the attainment year, therefore the attainment year contingency satisfies the RFP analysis year contingency requirement.

For ozone RFP plans, the percent reductions requirements are for a combination of volatile organic compounds (VOC) and nitrogen oxides (NO_x) emissions. The first 15% RFP reduction achieved by an area must be from VOC emissions. For areas, or county groups within areas, that have already achieved the required 15% reduction in VOC emissions, the RFP guidance in the 2008 ozone standard SIP requirements rule allows the 15% reduction to be from VOC and/or NO_x⁶ emissions as long as the RFP demonstration is done independently from any newly designated counties. The eight HGB counties are all previously designated counties that have already demonstrated the initial 15% VOC reduction requirement and therefore may use a combination of VOC and NO_x emissions reductions to achieve the 15% RFP reduction requirement documented in this SIP revision.

The RFP requirements for this proposal are:

- a 15% VOC and/or NO_x emissions reduction for the six-year period between 2011 and 2017 for the eight counties previously designated under the one-hour and 1997

⁶ NO_x may be substituted for VOC under conditions defined in the EPA's December 1993 [NO_x Substitution Guidance](https://www3.epa.gov/ttn/naaqs/aqmguide/collection/cp2_old/19931201_oaqps_nox_substitution_guidance.pdf) (https://www3.epa.gov/ttn/naaqs/aqmguide/collection/cp2_old/19931201_oaqps_nox_substitution_guidance.pdf).

eight-hour ozone standards (Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller Counties); and

- a 3% emissions reduction for the one-year period between 2017 and 2018 as an RFP attainment year contingency for the eight-county HGB ozone nonattainment area.

For RFP and contingency analyses, the requirement to calculate and account for the non-creditable emissions reductions due to pre-1990 Federal Motor Vehicle Control Program (FMVCP) reductions was removed under the 2008 ozone standard SIP requirements rule. This rule change eliminates the requirements to calculate the adjusted base year, use the adjusted base year to calculate the percent reductions, and include the non-creditable reductions in the RFP target calculations. The RFP analyses presented in this SIP revision do not include any of the RFP elements or non-creditable effects related to the pre-1990 FMVCP.

Progress toward the 2017 attainment year emissions reductions requirements is demonstrated using EPA methodologies to calculate the elements of the RFP demonstration and complete the RFP analyses. First, the emissions inventories and control reductions are developed for each analysis year. Second, the target level of emissions is calculated for each analysis year. Third, the RFP control measure reductions for each analysis year are subtracted from the uncontrolled or existing controlled emissions inventory for the corresponding analysis year. The difference includes growth from the base year to the selected analysis year. When the combined uncontrolled and existing controlled projected inventory for each analysis year minus the RFP controls is less than or equal to the target level of emissions for VOC and/or NO_x, the RFP requirement has been met.

Required moderate nonattainment area RFP elements for the eight-county HGB ozone nonattainment area include:

- the 2011 base year emissions;
- 2017 target levels;
- 2017 projected emissions, with growth; and
- individually quantified emissions reductions from control measures for 2017.

The on-road mobile source category emissions inventories, and the corresponding HGB RFP demonstrations, for this proposed RFP SIP revision were developed using the Motor Vehicle Emission Simulator (MOVES) 2014a model. The on-road mobile emissions estimates in this SIP revision are preliminary as the schedule for the inventory development did not allow time to incorporate final on-road mobile inventories. Final on-road emission estimates may be different than those reported in this proposal due to ongoing quality assurance activities. As a result, the SIP narrative may change between proposal and adoption to reflect updates to the on-road mobile emissions inventories.

3.2 TARGET LEVEL METHODOLOGY

EPA guidance specifies the method that should be used to calculate the maximum amount of emissions a nonattainment area can emit for each RFP analysis year. Those RFP target levels of emissions are calculated using a four step process, which is used for this SIP revision. The two steps previously required to account for pre-1990 non-

creditable reductions are no longer required and are not included. The four steps used to calculate the RFP targets are:

1. Determine the 2011 base year emissions inventory.
2. Determine the 2011 RFP base year emissions inventory.
3. Calculate the required 15% emissions reduction amount between 2011 and 2017.
4. Calculate the 2017 emissions target levels for VOC and NO_x.

Each of these steps is explained in more detail in Section 3.3: *Calculation of Target Emissions Levels*.

3.3 CALCULATION OF TARGET EMISSIONS LEVELS

A summary of the four step process described above for target calculations for 2017 is presented in Table 3-1: *Summary of the Calculation Process for 2017 HGB RFP Target Levels*. The 2017 HGB attainment year VOC and NO_x target levels are found in Line 6 of Table 3-1: *Summary of the Calculation Process for 2017 HGB RFP Target Levels*.

Table 3-1: Summary of the Calculation Process for 2017 HGB RFP Target Levels

| Line | Description | NO _x | VOC |
|--------|---|-----------------|--------|
| Line 1 | Step 1: 2011 base year emissions inventory in tons per day (tpd) (see Table 2-3) | 459.94 | 531.40 |
| Line 2 | Step 2: Add or subtract emissions that are to be included from outside the nonattainment area | 0.00 | 0.00 |
| Line 3 | Revised 2011 RFP base year emissions inventory, tpd (see Table 2-3) (Line 1 minus Line 2) | 459.94 | 531.40 |
| Line 4 | Percent of NO _x (PN) and VOC (PV) to meet 15% reduction requirement (PN plus PV = 15) | 14.50 | 0.50 |
| Line 5 | Step 3: Calculate the 15% NO _x and VOC reduction requirement between 2011 and 2017, tpd (Line 3 multiplied by Line 4) | 66.69 | 2.66 |
| Line 6 | Step 4: Calculate the 2017 target level of emissions, tpd (Line 3 minus Line 5) | 393.25 | 528.74 |

Step one of the RFP target calculation process involves the development of the 2011 base year emissions inventory. EPA guidance specifies the methodology that must be used to develop the base year emissions inventory and all other SIP emissions inventories.⁷ Details of the development of the 2011 HGB base year emissions inventory are discussed in Chapter 2: *Emissions Inventories*. Summaries for the 2011 HGB base year NO_x and VOC emissions inventories are presented in Table 2-3: *HGB RFP Summary of the 2011 Base Year Average Summer Weekday NO_x and VOC Emissions (tons per day)*.

Step two of the RFP target calculation process adds or subtracts any emissions from outside the nonattainment area that need to be included with or excluded from the nonattainment area emissions inventory. The resulting, revised emissions inventory

⁷ References for guidance documents used for emissions inventory development in this SIP proposal are listed in the *References for Guidance Documents* section at the end of this document.

becomes the 2011 RFP base year emissions inventory, which represents the total anthropogenic emissions for the area. In the final 2008 ozone standard SIP requirements rule, the EPA indicates that emissions and emissions reductions from outside the nonattainment area cannot be used as part of the demonstration of RFP. For example, although on-road vehicles produce emissions and the FMVCP reduces those emissions both inside and outside the nonattainment area, only the emissions and emissions reductions inside the nonattainment area are used to determine and meet RFP requirements. For this RFP SIP revision the amount of emissions from outside the area has been set to zero for both VOC and NO_x. The revised 2011 RFP base year emissions inventory is the same as the 2011 base year emissions inventory.

Step three of the RFP target calculation process, calculating the emissions reduction amount required per year for each analysis year, is accomplished by multiplying the RFP base year emissions inventory values by the percent reduction needed to meet RFP requirements. For the HGB nonattainment area, the first requirement is to reduce ozone precursor (VOC and NO_x) emissions by 15% between 2011 and 2017. Since 2017 is also the attainment year, there are no additional RFP reduction requirements.

The EPA's final 2008 ozone standard SIP requirements rule allows ozone nonattainment areas to substitute NO_x reductions for VOC reductions, but use of NO_x emissions reductions must meet the criteria in §182(c)(2)(C) in the Federal Clean Air Act (FCAA). The eight-county HGB area, which was previously designated nonattainment under the one-hour ozone national ambient air quality standard (NAAQS) and the 1997 eight-hour ozone NAAQS, has already satisfied the 15% VOC emissions reduction requirement; therefore, all eight HGB nonattainment counties may substitute NO_x reductions for VOC under the conditions detailed in the EPA's NO_x substitution guidance.⁸ The total of the percent NO_x and VOC reductions must equal the total emissions reduction requirements.

The 2017 reduction requirement for HGB is met through a 14.5% NO_x reduction and 0.5% VOC reduction. Equation 3-2 describes the method to calculate the percentage of NO_x emissions substituted for VOC emissions:

$$\text{Equation 3-2: } N_{AY} = 15 - V_{AY}$$

where:

AY = RFP attainment year

N_{AY} = percentage NO_x reductions for year AY

V_{AY} = percentage VOC reductions for year AY

Emissions reductions percentages are multiplied by the corresponding NO_x and VOC base year emissions inventories to calculate the required NO_x and VOC emissions

⁸ NO_x may be substituted for VOC under conditions defined in the EPA's December 1993 [NO_x Substitution Guidance](https://www3.epa.gov/ttn/naaqs/aqmguide/collection/cp2_old/19931201_oaqps_nox_substitution_guidance.pdf) (https://www3.epa.gov/ttn/naaqs/aqmguide/collection/cp2_old/19931201_oaqps_nox_substitution_guidance.pdf).

reductions for the attainment year. The equations for calculating the required reductions for NO_x and VOC are shown in Equations 3-3A and 3-3B. Line 5 of Table 3-1 provides a summary of the NO_x and VOC reductions needed to satisfy the 15% requirement for the RFP attainment year.

Equation 3-3A:
$$RPR_{AY, VOC} = [BY_{2011, VOC}] \times PV_{AY}$$

and

Equation 3-3B:
$$RPR_{AY, NOx} = [BY_{2011, NOx}] \times PN_{AY}$$

where:

AY = RFP attainment year

RPR_{AY, VOC} = required VOC emission reductions between 2011 and AY

RPR_{AY, NOx} = required NO_x emission reductions between 2011 and AY

BY_{2011, VOC} = 2011 base year emissions inventory for VOC

BY_{2011, NOx} = 2011 base year emissions inventory for NO_x

PV_{AY} = percentage VOC reductions for year AY

PN_{AY} = percentage NO_x reductions for year AY

Step four of the RFP target calculation process, calculating RFP target levels of emissions, is accomplished by subtracting the required emissions reductions (step three) from the 2011 base year emissions inventory. The target level represents the level of emissions for the RFP attainment year for the HGB ozone nonattainment area to meet its 2008 eight-hour ozone standard RFP requirements. The method for calculating the target level of emissions for the HGB RFP attainment year is shown in Equation 3-4.

Equation 3-4:
$$TL_{AY, X} = EI_{BY, X} - RPR_{AY, X}$$

where:

AY = RFP attainment year

BY = RFP base year

TL_{AY, X} = target level of emissions for AY for pollutant X

EI_{BY, X} = emissions inventory for the RFP base year for pollutant X

RPR_{AY, X} = emission reduction requirement for year AY for pollutant X

X = either VOC or NO_x

Appendix 1: *Reasonable Further Progress Demonstration Spreadsheet* documents the calculation of the target values for the RFP attainment year. Table 3-1 provides a step-by-step summary of the calculation of the 2017 HGB RFP target levels of VOC and NO_x.

In Section 3.5: *RFP Demonstration*, the target levels are integrated into the RFP demonstration.

3.4 GROWTH

The RFP SIP revision must account for any growth in emissions between the RFP base year (2011) and the attainment year (2017). For future analysis years, the uncontrolled (for mobile sources) or existing controlled (for stationary sources) NO_x and VOC emissions inventories are developed by applying the appropriate projection methodologies to the most recent emissions inventory estimates, emission factors, and/or to activity level estimates. The resulting emissions inventories include any growth between 2011 and 2017.

The projection methodology for the uncontrolled or existing controlled RFP emissions inventory excludes changes in the emissions factor due to control strategies so that the projections represent the total growth in emissions. When the creditable RFP control reductions are subtracted from uncontrolled or existing controlled projected emissions inventories that include growth, the result will be the forecasted controlled RFP emissions.

The controlled RFP emissions are compared to the target emissions levels to determine if a nonattainment area successfully demonstrates RFP, thereby meeting RFP requirements. The method for accounting for growth is based on EPA guidance for performing RFP calculations.⁹ The development of the uncontrolled or existing controlled projected emissions inventory is documented in Chapter 2: *Emissions Inventories*. The development of the projected control reductions are documented in Chapter 4: *Control Measures to Achieve Target Levels*.

3.5 RFP DEMONSTRATION

The EPA's final 2008 ozone standard SIP requirements rule requires the HGB RFP control strategy plan to show ozone precursor (VOC and NO_x) emissions reductions that will reduce controlled RFP 2017 attainment year emissions inventories to values equal to or less than the emissions target values for 2017. The creditable RFP control reductions are subtracted from the uncontrolled or existing controlled forecast emissions inventory for the attainment year. For this RFP SIP revision, the only RFP analysis year is the attainment year; therefore the post-attainment year contingency satisfies the RFP post-analysis year contingency requirement. No additional controls are needed to demonstrate RFP post-analysis year contingency and none are accounted for in the 2017 controlled RFP inventory.

The final 2008 ozone standard SIP requirements rule allows ozone nonattainment areas to substitute NO_x emissions reductions for VOC emissions reductions, but use of NO_x emissions reductions must meet the criteria in §182(c)(2)(C) of the FCAA. The

⁹ United States Environmental Protection Agency, "Final Rule to Implement the 8-Hour Ozone National Ambient Air Quality Standard; Final Rule," *Federal Register* (70 FR 71631), November 29, 2005.

eight HGB counties were all previously designated ozone nonattainment counties that have already demonstrated the initial 15% VOC reduction requirement and therefore may use a combination of VOC and NO_x emissions reductions to achieve the 15% RFP reduction requirement. The RFP requirement is met for the attainment year if the resulting controlled RFP emissions inventory forecast is less than the target level of emissions for each pollutant.

The RFP demonstration calculations were completed for the 2017 HGB attainment year. A summary of the 2017 HGB RFP demonstration is provided in Table 3-2: *Summary of the 2017 HGB RFP Demonstration (tons per day)*. As concluded in the final row of the table, the eight-county HGB area demonstrates the required RFP emission reductions for 2017. All RFP calculations, including the required reductions and the target emissions levels, are calculated and shown in Appendix 1. Details of the emissions reductions used to calculate the creditable RFP control reductions for 2017 are documented in Chapter 4 and summarized in Table 4-1: *Summary of HGB NO_x and VOC Cumulative Emissions Reductions from Control Strategies for 2011 through 2017 (tons per day)*.

Table 3-2: Summary of the 2017 HGB RFP Demonstration (tons per day)

| Line | Description | NO _x | VOC |
|--------|---|-----------------|------------|
| Line 1 | Uncontrolled or existing controlled 2017 emissions forecast with growth | 1,018.21 | 829.50 |
| Line 2 | Creditable RFP control reductions between 2011 and 2017 | 684.12 | 313.73 |
| Line 3 | Controlled 2017 RFP emissions forecast (Line 1 minus Line 2) | 334.09 | 515.77 |
| Line 4 | Amount of NO _x reduction substitution (see Appendix 1, Sheet 3) | 0.00 | 0.00 |
| Line 5 | Controlled 2017 RFP forecast accounting for NO _x substitution (Line 3 plus Line 4) | 334.09 | 515.77 |
| Line 6 | 2017 RFP target level of emissions | 393.25 | 528.74 |
| Line 7 | Excess (+) / Shortfall (-), (Line 6 minus Line 5) | +59.16 | +12.97 |
| Line 8 | Is controlled RFP EI less than target level of emissions? | Yes | Yes |

CHAPTER 4: CONTROL MEASURES TO ACHIEVE TARGET LEVELS

4.1 OVERVIEW OF CONTROL MEASURES

This chapter describes the methods used to achieve the emissions reductions in volatile organic compounds (VOC) and nitrogen oxides (NO_x) required to demonstrate reasonable further progress (RFP) for the Houston-Galveston-Brazoria (HGB) 2008 eight-hour ozone nonattainment area (Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller Counties).

The projected emissions reductions reflect the identified federal and state emissions controls. All state control measures are codified in regulations for the State of Texas. Control measures used for RFP do not include all emissions reduction programs for the HGB area. Only the controls used to meet the HGB RFP requirements for the 2017 attainment year are presented in Table 4-1: *Summary of HGB RFP NO_x and VOC Cumulative Emissions Reductions from Control Strategies for 2011 through 2017 (tons per day)*.

Individual and total values shown in the summary tables have been extracted from the spreadsheet in Appendix 1: *Reasonable Further Progress Demonstration Spreadsheet*. All values represent the numbers rounded to two decimal places.

The on-road mobile source category emissions inventories and the corresponding on-road mobile source control strategy reductions for this proposed HGB RFP state implementation plan (SIP) revision were developed using the Motor Vehicle Emission Simulator (MOVES) 2014a model. The on-road mobile emissions estimates in this RFP SIP revision are preliminary as the schedule for the inventory development did not allow time to incorporate final on-road mobile inventories. Final on-road emissions estimates may be different than those reported in this proposal due to ongoing quality assurance activities. As a result, this narrative may change between proposal and adoption to reflect updates to the on-road mobile emissions inventories.

Table 4-1: Summary of HGB RFP NO_x and VOC Cumulative Emissions Reductions from Control Strategies for 2011 through 2017 (tons per day)

| Control Strategy Description | NO _x Reduction | VOC Reduction |
|---|------------------------------|------------------|
| Chapter 117 NO _x controls | 0.00 | 0.00 |
| Chapter 115 storage tank rule | 0.00 | 0.00 |
| Coating/printing rules | 0.00 | 0.00 |
| Portable fuel containers | 0.00 | 0.00 |
| Chapter 117 NO _x area source engine controls | 0.00 | 0.00 |
| Locomotive engine certification standards and fuel programs | 18.41 | 0.65 |
| Commercial marine vessel (CMV) engine certification standards and fuel programs | 9.39 | 0.06 |
| Small non-road spark ignition (SI) engines (Phase I) | -3.10 ¹ | 24.29 |
| Heavy duty non-road engines | 21.54 | 11.26 |
| Tiers 2 and 3 non-road diesel engines | 27.33 | 3.95 |
| Small non-road SI engines (Phase II) | 2.17 | 22.48 |
| Large non-road SI and recreational marine | 33.49 | 13.71 |
| Non-road Texas Low Emissions Diesel (TxLED) | 1.74 | 0.00 |

| Control Strategy Description | NO _x Reduction | VOC Reduction |
|---|---------------------------|---------------|
| Non-road reformulated gasoline (RFG) | 0.03 | 0.08 |
| Tier 4 non-road diesel engines | 11.41 | 0.59 |
| Diesel recreational marine | 0.00 | 0.01 |
| Small SI (Phase III) | 1.91 | 13.14 |
| Drilling rig Tier 2, 3, and 4 non-road diesel engines | 0.68 | 0.15 |
| Drilling rig low emission diesel | 0.04 | 0.01 |
| RFG with Tier 3 sulfur standard and federal ultralow sulfur diesel | 85.13 | 16.87 |
| Post-1990 Federal Motor Vehicle Control Program (FMVCP) | 464.25 | 198.54 |
| Inspection and maintenance (I/M) | 6.89 | 7.94 |
| On-road TxLED | 2.81 | 0.00 |
| Sum of reductions from projected uncontrolled or existing controlled emissions | 684.12 | 313.73 |

Note 1: The small non-road SI engine Phase 1 rule is shown to provide a substantial reduction in VOC emissions. A slight increase in NO_x emissions is due to the engine modifications required to meet the VOC and CO standards of the small non-road SI engine Phase 1 rule.

4.2 POINT SOURCE CONTROLS

Specific point source controls required by state rules and the associated emissions reductions were incorporated into the 2011 base year inventory and the 2014 analysis year inventory as appropriate according to compliance deadlines. These controls include Title 30 Texas Administrative Code (TAC) Chapter 117 reductions of NO_x emissions from electric generating units, internal combustion engines, and heaters in the HGB area and 30 TAC Chapter 115 reductions of VOC emissions, which had compliance deadlines before 2011.

Point source emissions for analysis year 2017 are summarized in Table 4-2: *HGB RFP 2017 Point Source Emissions and Reductions Summary for NO_x and VOC (tons per day)*.

Table 4-2: HGB RFP 2017 Point Source Emissions and Reductions Summary for NO_x and VOC (tons per day)

| Emissions | NO _x | VOC |
|---|-----------------|--------|
| Existing controlled emissions (specified controls implemented as of 2014) | 126.42 | 113.04 |
| RFP point source reduction | 0.00 | 0.00 |
| RFP post-2014 controlled emissions | 126.42 | 113.04 |

4.3 AREA SOURCE CONTROLS

Area source controls required by state and federal rules and the associated emissions reductions were incorporated into the 2011 base year inventory and the 2014 analysis year inventory as appropriate according to compliance deadlines. These controls include 30 TAC Chapter 117 reductions of NO_x emissions from internal combustion engines in the HGB area, which had compliance deadlines before 2011; and the federal portable fuel containers rule, which also had compliance deadlines prior to 2011.

Area source emissions for attainment year 2017 are summarized in Table 4-3: *HGB RFP 2017 Area Source Emissions and Reductions Summary for NO_x and VOC (tons per day)*.

Table 4-3: HGB RFP 2017 Area Source Emissions and Reductions Summary for NO_x and VOC (tons per day)

| Emissions | NO_x | VOC |
|--|-----------------------|------------|
| Existing controlled emissions (as of 2014) | 24.30 | 313.53 |
| RFP area source reduction | 0.00 | 0.00 |
| RFP post-2014 controlled emissions | 24.30 | 313.53 |

4.4 NON-ROAD MOBILE SOURCE CONTROLS

For most non-road mobile source categories, emissions were calculated using a Texas-specific version of the United States Environmental Protection Agency’s (EPA) NONROAD 2008a model, called the Texas NONROAD (TexN) model. Although operating the EPA’s model with all of the default surrogates is acceptable, the EPA encourages states to update the model with local, county-level data based on surveys and other relevant information. The TexN model is a software tool for developing emissions estimates for non-road mobile sources in Texas using county-specific activity data. The model allows air quality planning staff to replace the EPA’s default data with local county-level data.

Because emissions for airports, commercial marine vessels (CMV), and locomotives are not included in either the NONROAD model or the TexN model, the emissions for these categories are estimated using other EPA-approved methods and guidance. Although emissions for drilling rigs are included in the NONROAD model, alternate emissions estimates were developed for that source category in order to develop more accurate inventories. The equipment populations for drilling rigs were set to zero in the TexN model to avoid double counting emissions from these sources.

Emissions reductions required by state and federal rules for the 2017 attainment year were calculated as detailed in the following sections. Summaries of all non-road mobile source RFP emissions inventories and control strategy reductions are presented in Table 4-4: *HGB RFP 2017 Non-Road Mobile Source Emissions and Reductions Summary for NO_x and VOC (tons per day)*.

Table 4-4: HGB RFP 2017 Non-Road Mobile Source Emissions and Reductions Summary for NO_x and VOC (tons per day)

| Emissions | NO_x | VOC |
|---|-----------------------|------------|
| Uncontrolled emissions | 210.26 | 123.21 |
| RFP non-road source reduction | 123.29 | 89.63 |
| RFP controlled (post-control) emissions | 86.97 | 33.58 |

4.4.1 NONROAD Model Categories

For this HGB RFP SIP revision, the TexN model was run using county-specific population and activity files, where available. The effects of federal and state control programs were evaluated. The TexN model was run for ozone season daily emissions for the 2011 and 2017 analysis years.

To evaluate RFP requirements, a series of TexN model runs was performed for both controlled and uncontrolled scenarios for each federal and state control program and each analysis year. The applicable federal and state rules that were modeled are located in Section 4.1: *Overview of Control Measures*. The emissions inventories developed include county-level ozone season day controlled and uncontrolled emissions estimates for the 2011 and 2017 analysis years for the HGB nonattainment area.

Emissions reductions from individual federal and state controls for non-road equipment were calculated by subtracting the controlled (post-control) emissions estimates from the uncontrolled emissions estimates.

4.4.2 Non-Road Categories Not Included in the EPA's NONROAD Model

Emissions from the non-road mobile sources that are not estimated using the TexN model include CMVs, locomotives, aircraft and ground support equipment (GSE), and drilling rigs used in upstream oil and gas exploration activities. Emissions for those source categories were calculated using alternate EPA-approved methods and guidance.

4.4.2.1 Drilling Rigs

The 2014 emissions inventory for drilling rig diesel engines was developed as part of a statewide emissions inventory improvement study. Drilling activity data were obtained from the Railroad Commission of Texas (RRC) and through a survey of oil and gas exploration and production companies, which was used to develop improved drilling rig emissions characterization profiles. The uncontrolled and controlled drilling rig emissions characterization profiles from this study were combined with 2014 drilling activity data obtained from the RRC to develop the 2014 inventory.

Documentation of methods and procedures used in developing the drilling rig diesel engine emissions inventories can be found in Appendix 6: *2014 Statewide Drilling Rig Emissions Inventory with Updated Trends Inventories*.

Emissions trends were developed by projecting oil and gas production data for 2014 to base year 2011 and the 2017 attainment year using the growth factors from Appendix 3: *Growth Factors for Area and Point Sources*. Emissions reductions from individual federal and state controls for these specific types of non-road equipment were calculated by subtracting the controlled (post-control) emissions estimates from the uncontrolled emissions estimates.

4.4.2.2 Commercial Marine Vessels and Locomotives

Controlled emissions for CMVs were based on emissions factors developed by Eastern Research Group, Inc. (ERG) with guidance from the EPA which took into account fleet turnover and the implementation of state and federal regulatory programs. Uncontrolled emissions were based on a separate set of emissions factors that excluded adjustments for fleet turnover and the implementation of state and federal regulatory programs. Documentation of methods and procedures used in developing the CMV emissions inventories can be found in Appendix 8: *2014 Texas Statewide Commercial Marine Vessel Emissions Inventory and 2008 through 2040 Trend Inventories*.

The locomotive emissions inventory was developed by ERG under contract with the Texas Commission on Environmental Quality (TCEQ) and includes line haul and yard data from all Class I, II, and III locomotive activity and emissions by rail segment. Controlled emissions for locomotive sources were determined by applying activity adjustment factors by source classification code and emissions rate adjustment factors. The emissions rate adjustment factors were obtained from the [EPA's Emission Factors for Locomotives Fact Sheet](http://www.epa.gov/otaq/regs/nonroad/locomotv/420f09025.pdf) (<http://www.epa.gov/otaq/regs/nonroad/locomotv/420f09025.pdf>). Documentation of methods and procedures used by ERG in developing the locomotive emissions inventories can be found in Appendix 7: *2014 Texas Statewide Locomotive Emissions Inventory and 2008 through 2040 Trend Inventories*. The emissions inventories developed include county-level ozone season day controlled and uncontrolled emissions estimates for 2011 and 2017.

4.4.2.3 Airports

Emissions for aircraft and GSE were calculated using the Federal Aviation Administration Emissions and Dispersion Modeling System, version 5.1.3. The TCEQ calculated the updated controlled analysis year emissions from the information provided by ERG in Appendix 9: *Aircraft Emissions Inventory for Texas Statewide 2014 AERR Inventory and 2008 through 2040 Trend Analysis Years*. Control strategies for airport emissions included emission reductions from GSE and auxiliary power unit electric conversions.

4.5 ON-ROAD MOBILE SOURCE CONTROLS

The on-road mobile source category emissions inventories, and the corresponding on-road mobile source control strategy reductions, for this HGB RFP SIP revision were developed using the MOVES2014a model. The TCEQ recently completed development of 2011, 2017, and 2018 on-road emission inventories for the HGB area. The inventories were completed under a contract with the Texas A&M Transportation Institute. The on-road mobile emissions estimates in this proposed RFP SIP revision are preliminary as the schedule for the inventory development did not allow time to incorporate final on-road mobile inventories. Final on-road emission estimates may be different than those reported in this proposal due to ongoing quality assurance activities. As a result, this narrative may change between proposal and adoption to reflect updates to the on-road mobile emissions inventories.

4.5.1 HGB RFP On-Road Mobile Source Control Strategies

The on-road mobile emissions inventories for each HGB RFP analysis year were developed using emission factors that reflect all control strategies for each analysis year. The controls that were modeled include: pre-1990 Federal Motor Vehicle Control Program (FMVCP), post-1990 FMVCP, summer RFG, the HGB vehicle inspection and maintenance (I/M) program, the lower sulfur gasoline associated with Tier 3 FMVCP, and Texas Low Emissions Diesel (TxLED). The Tier 3 FMVCP and corresponding lower sulfur gasoline rule was finalized in March 2014 and will begin implementation in 2017. A summary of the HGB on-road mobile source control strategies used for the RFP SIP revision are presented in Table 4-5: *Summary of 2017 RFP HGB On-Road Mobile Control Strategies*.

For RFP analyses, the requirement to calculate and account for non-creditable emissions reductions due to pre-1990 FMVCP reductions was removed under the EPA's *Implementation of the 2008 National Ambient Air Quality Standards for Ozone: State Implementation Plan Requirements; Final Rule*. The RFP analyses presented in this SIP revision do not include any of the RFP elements or non-creditable effects related to the pre-1990 FMVCP. The on-road mobile control strategy reduction summaries and documentation do not include quantification of the pre-1990 FMVCP as a separate reduction.

Table 4-5: Summary of 2017 RFP HGB On-Road Mobile Control Strategies

| Control Program Description | Additional Information | Year Control Program Started | Creditable for RFP |
|--|---|--|---------------------------|
| Pre-1990 FMVCP | Pre-1990 control | Pre-1990 | No |
| 1992 Federal Controls on Gasoline Volatility | Pre-1990 control. Maximum Reid Vapor Pressure of 7.8 pounds per square inch. | 1992 | No |
| I/M Program | Brazoria, Fort Bend, Galveston, Harris, and Montgomery Counties | 1997 | Yes |
| Tier 1, FMVCP | Included in MOVES post-1990 FMVCP | 1994 | Yes |
| RFG | Eight HGB counties | 1995 for phase one, 2000 for phase two | Yes |
| National Low Emission Vehicle Program | Included in MOVES post-1990 FMVCP | 2001 | Yes |
| Tier 2, FMVCP | Phased in from 2004 to 2009. Included in MOVES post-1990 FMVCP. | 2004 | Yes |
| TxLED | 15 parts per million (ppm) maximum for sulfur. Low aromatic hydrocarbon and high cetane number to control NO _x . | 2006 | Yes |
| Federal Low-Sulfur Highway Diesel | 15 ppm maximum sulfur content | 2006 | Yes |
| 2007 Heavy Duty FMVCP | Phased in from 2007 to 2010. Included in MOVES post-1990 FMVCP. | 2007 | Yes |
| Tier 3, FMVCP | Phased in from 2017 to 2025. Included in MOVES post-1990 FMVCP. | 2017 | Yes |
| Tier 3, Low Sulfur Gasoline | A part of the Tier 3 FMVCP lowers the limit on gasoline sulfur content; also improves the performance of Tier 2 equipment | 2017 | Yes |

4.5.2 On-Road Mobile Source Control Strategy Reductions

The projected mobile source emissions inventories documented in Appendix 10: *Development of On-Road Emission Inventories for the Years 2011, 2017, and 2018* includes quantification of emissions reductions for all federal and state on-road mobile source control rules for the attainment year for the HGB nonattainment area. A summary of the on-road mobile control scenarios included in the 2011, 2017, and 2018 RFP emissions inventories is presented in Table 4-6: *Control Programs Modeled for each RFP Control Scenario*. The summary of 2017 uncontrolled emissions, control program reductions, and controlled (post-control) emissions for on-road mobile sources in the HGB nonattainment area may be found in Table 4-7: *HGB RFP 2017 On-Road Mobile Source Emissions and Reductions Summary for NO_x and VOC (tons per day)*.

Table 4-6: Control Programs Modeled for each RFP Control Scenario

| Control Scenario Description | Controls Modeled |
|---|--|
| Control Scenario 1 Uncontrolled Emissions (pre-1990 controls only) | Pre-1990 FMVCP and 1992 federal controls on gasoline volatility |
| Control Scenario 2 | Add: Federal RFG with Tier 3 sulfur levels and federal ultralow sulfur diesel |
| Control Scenario 3 | Add: Post-1990 FMVCP (Tier 1 FMVCP, Tier 2 FMVCP, 2007 heavy duty diesel FMVCP, Tier 3 FMVCP) |
| Control Scenario 4 | Add: HGB I/M program: modeled for Brazoria, Fort Bend, Galveston, Harris, and Montgomery Counties |
| Control Scenario 5 RFP Post-Control Emissions | Add: TxLED program, 15 ppm maximum for sulfur, low aromatic hydrocarbons, and high cetane number to control NO _x |

Table 4-7: HGB RFP 2017 On-Road Mobile Source Emissions and Reductions Summary for NO_x and VOC (tons per day)

| Inventory or Control Strategy Description | NO_x | VOC |
|---|-----------------------|------------|
| 2017 uncontrolled emissions | 657.23 | 279.72 |
| On-road RFG with Tier 3 sulfur and federal ultralow sulfur diesel | 85.13 | 16.87 |
| Post-1990 FMVCP | 464.25 | 198.54 |
| HGB I/M program | 6.89 | 7.94 |
| On-road TxLED | 2.81 | 0.00 |
| 2017 RFP controlled (post-control) emissions | 98.15 | 56.37 |

4.6 CONTINGENCY MEASURES

In the event of an RFP failure, contingency control measures estimated to reduce emissions by an additional 3% between each RFP analysis year and the next calendar year are required. The RFP requirements include a 3% contingency demonstration for the one-year period after each RFP analysis year and the one-year period after the attainment year. For this SIP revision, the only RFP analysis year is the attainment year; therefore the attainment year contingency satisfies the RFP analysis year contingency requirement. As with the 15% 2011 through 2017 reduction requirement, the 3% contingency requirement is based on the RFP base year emissions and may be met using VOC and/or NO_x reductions. This section contains an attainment year RFP contingency demonstration based on the 2017 attainment year.

The on-road mobile source category emissions inventories and the corresponding on-road mobile source control strategy reductions for contingency analysis for this RFP SIP revision were developed using the MOVES2014a model. The on-road mobile emissions estimates in this proposed RFP SIP revision are preliminary as the schedule for the inventory development did not allow time to incorporate final on-road mobile inventories. Final on-road emissions estimates may be different than those reported in this proposal. As a result, the SIP narrative may change between proposal and adoption to reflect updates to the on-road mobile emissions inventories.

The 3% attainment year RFP contingency analysis is based on a 2% reduction in NO_x, and a 1% reduction in VOC, to be achieved between 2017 and 2018. Emissions inventory analyses were performed on the fleet turnover effects for the federal emissions certification programs for on-road vehicles. The emissions reductions for the year between 2017 and 2018 were estimated for those programs. Controlled (post-control) emissions reductions not previously used in the 2017 RFP demonstration may also be used to satisfy contingency requirements, so the excess emissions reductions from the 2017 RFP demonstration are included in the contingency analysis. This RFP SIP revision provides for a motor vehicle emissions budget (MVEB) safety margin using some of the excess emissions reductions from the 2017 RFP demonstration; those emissions are subtracted from the amount available to demonstrate RFP contingency for the 2017 attainment year. The MVEB safety margin has been set to use 40% of the excess NO_x reductions and 90% of the excess VOC reductions and is reflected in the calculation. A summary of the 2017 attainment year RFP contingency analysis is provided in Table 4-8: *HGB RFP Contingency Demonstration for the 2017 Attainment Year (tons per day)*.

The analysis demonstrates that the attainment year RFP contingency reductions exceed the 3% reduction requirement; therefore, the RFP contingency requirement is fulfilled for the HGB area.

Table 4-8: HGB RFP Contingency Demonstration for the 2017 Attainment Year (tons per day unless otherwise noted)

| Line | Contingency Demonstration Description | NO_x | VOC |
|---------------|---|-----------------------|--------------|
| Line 1 | 2011 base year (BY) emissions inventory | 459.94 | 531.40 |
| Line 2 | Percent for 2017 attainment year contingency calculation (total of 3%) | 2.00% | 1.00% |
| Line 3 | Required contingency reductions between 2017 and 2018 (BY emissions inventory multiplied by contingency percent: Line 1 multiplied by Line 2) | 9.20 | 5.31 |
| | Control reductions to meet contingency requirements | NO_x | VOC |
| Line 4 | Excess reductions from 2017 RFP demonstration (from Table 3-2: <i>Summary of the 2017 HGB RFP Demonstration [tons per day]</i>) | 59.16 | 12.97 |
| Line 5 | Subtract 2017 RFP demonstration MVEB safety margin from excess reductions from 2018 RFP demonstration (see Appendix 1: <i>Reasonable Further Progress Demonstration Spreadsheet</i> , Sheet 10) | -23.66 | -11.67 |
| Line 6 | On-road FMVCP, I/M, RFG, and TxLED reductions | 24.35 | 8.78 |
| Line 7 | Total RFP demonstration contingency reductions (sum of Line 4, Line 5, and Line 6) | 59.85 | 10.08 |
| Line 8 | Contingency Excess (+) or Shortfall (-) (Line 7 minus Line 3) | +50.65 | +4.77 |

CHAPTER 5: MOTOR VEHICLE EMISSIONS BUDGETS

5.1 INTRODUCTION

The Houston-Galveston-Brazoria (HGB) reasonable further progress (RFP) state implementation plan (SIP) revision establishes motor vehicle emissions budgets (MVEB), setting the allowable on-road mobile emissions an area can produce while continuing to demonstrate RFP. The HGB RFP MVEBs are calculated by subtracting the on-road mobile source control strategies emissions reductions necessary to demonstrate RFP from the uncontrolled, projected on-road mobile source emissions for RFP analysis years. Local transportation planning organizations use the MVEBs to demonstrate that projected emissions from transportation plans, programs, and projects are equal to or less than the MVEBs, as required by the federal transportation conformity rule.

The on-road mobile source category emissions inventories and the corresponding MVEBs for this HGB RFP SIP revision were developed using the latest version of the United States Environmental Protection Agency's (EPA) Motor Vehicle Emission Simulator (MOVES) 2014 model, MOVES2014a. The Texas Commission on Environmental Quality (TCEQ), working with the Texas A&M Transportation Institute (TTI), recently completed development of 2011, 2017, and 2018 on-road emission inventories using MOVES2014a for the HGB area. The planning assumptions, fleet characteristics, and vehicle miles traveled estimates were updated to incorporate the latest available information at the time the inventories and MVEBs were developed. The on-road mobile emissions estimates in this SIP revision are preliminary as the schedule for the inventory development did not allow time to incorporate final on-road mobile inventories at proposal. Final on-road emission estimates and MVEBs may be different than those reported in this proposal due to ongoing quality assurance activities. As a result, this narrative may change between proposal and adoption to reflect updates to the on-road mobile emissions inventories.

5.2 OVERVIEW OF METHODOLOGIES AND ASSUMPTIONS

The TCEQ developed updated on-road mobile source emissions inventories and control strategy reductions estimates using the latest planning assumptions and the EPA's MOVES2014a emissions factor model. Updated emissions inventory development included development of a 2011 base year emissions inventory, uncontrolled emissions inventories for 2017 and 2018, controlled emissions inventories for 2017 and 2018, and control strategies reduction estimates for RFP analysis and contingency years 2017, and 2018. The TCEQ contracted TTI to develop the RFP emissions inventories and control strategies reductions. Detailed documentation of the on-road mobile emissions inventory development is provided in the TTI contractor report in Appendix 10: *Development of On-Road Emission Inventories for the Years 2011, 2017, and 2018*.

5.3 MOTOR VEHICLE EMISSIONS BUDGETS FOR RFP ANALYSIS YEARS

The RFP MVEBs reflect the on-road mobile source emissions inventories for RFP analysis years, the on-road mobile source reductions strategies used to demonstrate RFP, and a transportation conformity safety margin, if one is used. A transportation conformity safety margin is allowed when there is an excess of emissions reductions beyond those required to demonstrate RFP. The amount of the safety margin must be

less than the total in excess emissions reductions for nitrogen oxides (NO_x) and volatile organic compounds (VOC); therefore, even if the safety margin is used for a transportation conformity determination, the HGB 2008 eight-hour ozone nonattainment area will meet the 2008 eight-hour ozone standard RFP requirements for all RFP analysis years. Summaries of the MVEB calculations for 2017 are presented in Table 5-1: *2017 RFP Motor Vehicle Emissions Budgets for the HGB Eight-County Ozone Nonattainment Area (tons per day)*.

Details for MVEB calculations are documented in Appendix 1: *Reasonable Further Progress Demonstration Spreadsheet*. The RFP control strategy produces more than the required emissions reductions for the 2017 attainment year. Some of the excess in emissions reductions for the 2017 attainment year are used to provide an MVEB safety margin of 24.11% for NO_x and 20.71% for VOC. These percentage safety margins represent 40% of the excess NO_x reductions and 90% of the excess VOC reductions. These safety margins are less than the total emissions reductions needed for the RFP demonstration; therefore, even if this safety margin is used, the HGB area will still demonstrate RFP for 2017.

Table 5-1: 2017 RFP Motor Vehicle Emissions Budgets for the HGB Eight-County Ozone Nonattainment Area (tons per day)

| Control Strategy Description | NO_x | VOC |
|---|-----------------------|--------------|
| 2017 on-road emissions projection without post-1990 Federal Clean Air Act (FCAA) controls | 657.23 | 279.72 |
| Federal Motor Vehicle Control Program, inspection and maintenance, reformulated gasoline, and on-road Texas low emission diesel | 559.08 | 223.35 |
| 2017 on-road emissions projection with post-1990 FCAA controls (uncontrolled emissions inventory minus control reductions) | 98.15 | 56.37 |
| Add transportation conformity safety margin | 23.66 | 11.67 |
| 2017 RFP MVEBs with safety margin | 121.81 | 68.04 |

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Appendices Available Upon Request

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