

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

HOUSTON-GALVESTON-BRAZORIA EIGHT-HOUR OZONE NONATTAINMENT AREA

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
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Adopted
May 23, 2007

PROJECT NO. 2006-027-SIP-NR
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EXECUTIVE SUMMARY

The Environmental Protection Agency (EPA) designated the eight-county Houston-Galveston-Brazoria (HGB) metropolitan area as nonattainment and classified it as “moderate” for the eight-hour ozone National Ambient Air Quality Standard (NAAQS) on June 15, 2004. On June 15, 2005, EPA revoked the one-hour ozone NAAQS, which preceded the eight-hour ozone standard (69 FR 23951). The Federal Clean Air Act (FCAA), 42 USC, § 7401 et seq., requires states to submit State Implementation Plan (SIP) revisions for the eight-hour ozone standard by June 15, 2007.

The HGB eight-hour ozone nonattainment area is unique and includes one of the most comprehensively-controlled industrial complexes in the world. The Texas Commission on Environmental Quality (TCEQ) has developed extensive regulations that address nitrogen oxides (NO_x), volatile organic compounds (VOC), and the sources of the most reactive ozone precursors in the HGB area, highly reactive volatile organic compounds (HRVOC).

The substance of the existing plan to control ozone formation in the HGB area centers on the following key measures.

- Approximately 80% NO_x emission reductions from point sources through the Mass Emission Cap and Trade (MECT) program.
- NO_x emission reductions from on-road and non-road sources through the vehicle inspection and maintenance (I/M) program, the Texas Emission Reduction Plan (TERP), and the Texas Low Emission Diesel (TxLED) program.
- HRVOC controls through the associated HRVOC Emission Cap and Trade (HECT) program.
- VOC controls.

(See pages 4-1 to 4-7 for a complete list of existing control measures.)

The EPA approved the one-hour ozone attainment demonstration SIP and rules including these components in the September 6, 2006, Federal Register (71 FR 52656). Rapid economic and population growth continue to create air quality challenges for the HGB area, even as the key ozone-targeting regulatory programs have reduced the number and magnitude of ozone exceedances, the area of exceedance, and the population exposed to exceedances.

This SIP revision is the first step in addressing the TCEQ’s efforts to attain the eight-hour ozone standard in the HGB area and represents the TCEQ’s best effort considering the time constraints for planning for attainment of the eight-hour ozone standard due to EPA’s delay of adoption of the implementation rules.

This revision also contains the Reasonably Available Control Technology (RACT) Analysis, Texas 2002 Periodic Emissions Inventory for the Houston-Galveston-Brazoria Ozone Nonattainment Area (EI), and additional voluntary mobile source emissions reduction (VMEP) commitments. Water heater rule amendment offsets, which are part of revisions to 30 TAC Chapter 117, are also included. The TCEQ is committed to attaining the standard as expeditiously as practicable. The TCEQ will continue developing the HGB Eight-Hour Ozone Attainment Demonstration SIP.

As a part of developing the HGB Eight-Hour Ozone Attainment Demonstration SIP revision, the TCEQ is developing a new photochemical modeling episode, which will help determine appropriate emission reductions of NO_x and/or VOC from appropriate source categories. A reasonably available control measure analysis will also be performed and all control strategies will be considered. The TCEQ

continues to evaluate potential options to further reduce precursor pollutant emissions in the HGB area. The TCEQ will also continue to work with EPA and the HGAC to assure that transportation conformity commitments can be fulfilled in a timely manner to avoid loss of transportation project funding.

This submittal contains three new control measures, summarized below in Table ExSum 1: *Eight-Hour Ozone Control Strategies for the HGB Ozone Nonattainment Area*. The first control measure, revises rules in 30 TAC Chapter 114 to add certain marine fuels to the TxLED rules. The second control measure revises rules in 30 TAC Chapter 115, to address under-estimated, unreported, or under-reported VOC emissions from storage tank floating roof landings, flash emissions, and from degassing storage tanks, transport vessels, and marine vessels with liquid heels. The Houston-Galveston Area Council (H-GAC) also committed to 2.82 tons per day (tpd) of NO_x reductions from VMEP.

Table ExSum1: Eight-Hour Ozone Control Strategies for the HGB Ozone Nonattainment Area

Measure	Description	Area(s) Affected	Start Date(s)
TxLED Marine	Adds marine distillate fuels commonly known as DMX and DMA, or Marine Gas Oil (MGO), into the definition of diesel fuels, requiring them to be TxLED compliant.	8-county area	June 24, 2007
VOC Rules on Storage and Degassing Operations	Requires controls for slotted guide poles and more stringent controls for other fittings on floating roof tanks, and control requirements or operational limitations on landing floating roof tanks. Eliminates exemption for storage tanks for crude oil or natural gas condensate, and regulates flash emissions from these tanks. Requires vapors from degassing to be vented to a control device for a longer time period, and removes exemption from degassing to control for tanks with capacity 75,000 to 1,000,000 gallons.	8-county area	January 1, 2009
VMEP	Local programs to reduce on-road emissions. See Appendix A for a full listing.	8-county area	By January 1, 2009

The TCEQ continues to use the latest technology and science to direct improvements in HGB air quality but acknowledges that the state regulatory agencies do not have legal authority to set emission standards for on-road and non-road engines. In an effort to provide innovative solutions to these significant emission sources, to date, the Texas Legislature has committed more than \$413 million to TERP, of which over \$204 million has been awarded to the HGB area, to reduce emissions by more than 22 tpd.

The TCEQ is developing new modeling episodes from 2005 and 2006. The new ozone modeling episodes will incorporate currently available EIs (e.g., 2005) and a larger quantity of ambient monitoring data from automated gas chromatographs (auto-GC) and the Texas Air Quality Study II (TexAQS II) study.

The TCEQ is committed to developing and applying the best science and technology towards addressing and reducing ozone formation in HGB and other nonattainment areas in Texas. As part of this commitment, the TCEQ, in conjunction with other state and federal organizations, conducted an exhaustive field study of ozone formation, TexAQS II, from June 2005 through September 2006. TexAQS II findings will be incorporated into SIP planning as the data is analyzed.

The TCEQ also continues to use new technology, such as infrared VOC imaging to identify and control unaddressed or under-addressed pollution sources, to investigate possible NO_x emission reduction strategies including the routine marine vessel study, and other practical methods to continue making progress in air quality improvement.

Overall, this plan revision includes the three control strategies in Table ExSum1, details regarding progress that the HGB area has made toward attainment, VOC and NO_x RACT analyses, water heater amendments and offsets, the baseline emissions inventory and ongoing efforts described in Chapter 5, the development of a new modeling episode, the continued implementation of increasingly lower engine emission levels for on-road and non-road mobile sources, and further research and consideration of additional control strategies. These efforts and realizing the full effects of implementation of the one-hour ozone control measures, will assist in developing an attainment demonstration for the eight-hour ozone standard in the HGB area.

SECTION V: LEGAL AUTHORITY

A. General

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

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

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

The TCAA specifically authorizes the TCEQ to establish the level of quality to be maintained in the state's air and to control the quality of the state's air by preparing and developing a general, comprehensive plan. The TCAA, Subchapters A - D, also authorize the TCEQ to collect information to enable the commission to develop an inventory of emissions; to conduct research and investigations; to enter property and examine records; to prescribe monitoring requirements; to institute enforcement proceedings; to enter into contracts and execute instruments; to formulate rules; to issue orders taking into consideration factors bearing upon health, welfare, social and economic factors, and practicability and reasonableness; to conduct hearings; to establish air quality control regions; to encourage cooperation with citizens' groups and other agencies and political subdivisions of the state as well as with industries and the Federal Government; 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 F, G, and H of the TCAA authorize the TCEQ to establish low emission vehicle requirements for mass transit authorities, local government fleets, and private fleets; create a mobile emissions reduction credit program; establish vehicle inspection and maintenance programs in certain

areas of the state, consistent with the requirements of the federal Clean Air Act; establish gasoline volatility and low emission diesel standards; and fund and authorize participating counties to implement low-income vehicle repair assistance, retrofit, and accelerated vehicle retirement programs.

B. Applicable Law

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

Statutes

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

TEXAS WATER CODE September 1, 2005

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

Chapter 5: Texas Natural Resource Conservation Commission

Subchapter A: General Provisions

Subchapter B: Organization of the Texas Natural Resource Conservation Commission

Subchapter C: Texas Natural Resource Conservation Commission

Subchapter D: General Powers and Duties of the Commission

Subchapter E: Administrative Provisions for Commission

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

Subchapter H: Delegation of Hearings

Subchapter I: Judicial Review

Subchapter J: Consolidated Permit Processing

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

Chapter 7: Enforcement

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

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

Subchapter C: Administrative Penalties

Subchapter E Criminal Offenses and Penalties: §§ 7.177, 7.179-7.181

Rules

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

Chapter 7, Memoranda of Understanding, §§ 7.110 and 7.119 May 2, 2002

Chapter 35, Subchapters A-C, K: Emergency and Temporary Orders and Permits; Temporary Suspension or Amendment of Permit Conditions December 10, 1998

Chapter 39, Public Notice, §§ 39.201; 39.401; 39.403(a) and (b)(8)-(10); 39.405(f)(1) and (g); 39.409; 39.411 (a), (b)(1)-(6) and (8)-(10) and (c)(1)-(6) and (d); 39.413(9), (11), (12) and (14); 39.418(a) and (b)(3) and (4); 39.419(a), (b),(d) and (e); 39.420(a), (b) and (c)(3) and (4); 39.423 (a) and (b); 39.601; 39.602; 39.603; 39.604; and 39.605 August 15, 2002

Chapter 55, Request for Contested Case Hearings; Public Comment, §§ 55.1; 55.21(a) - (d), (e)(2), (3) and (12), (f) and (g); 55.101(a), (b), (c)(6) - (8); 55.103; 55.150; 55.152(a)(1), (2) and (6) and (b); 55.154; 55.156; 55.200; 55.201(a) - (h); 55.203; 55.205; 55.206; 55.209 and 55.211	August 29, 2002
Chapter 101: General Air Quality Rules	June 23, 2005
Chapter 106: Permits by Rule, Subchapter A	June 30, 2004
Chapter 111: Control of Air Pollution from Visible Emissions and Particulate Matter	November 18, 2004
Chapter 112: Control of Air Pollution from Sulfur Compounds	July 16, 1997
Chapter 113, Standards of Performance for Hazardous Air Pollutants and for Designated Facilities and Pollutants	June 15, 2005
Chapter 114: Control of Air Pollution from Motor Vehicles	May 19, 2005
Chapter 115: Control of Air Pollution from Volatile Organic Compounds	May 5, 2005
Chapter 116: Permits for New Construction or Modification	June 15, 2005
Chapter 117: Control of Air Pollution from Nitrogen Compounds	May 19, 2005
Chapter 118: Control of Air Pollution Episodes	March 5, 2000
Chapter 122, § 122.122: Potential to Emit	December 11, 2002

SECTION VI. CONTROL STRATEGY

A. Introduction (No change)

B. Ozone (Revised)

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

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

Chapter 1: Background and Introduction

Chapter 2: (No change from the December 2004 One-Hour Ozone Attainment Demonstration)

Chapter 3: (No change from the December 2004 One-Hour Ozone Attainment Demonstration)

Chapter 4: Control Strategies and Required Elements

Chapter 5: Ongoing Work and Future Initiatives

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

4. *El Paso* (No change)

5. *Regional Strategies* (No change)

6. *Northeast Texas* (No change)

7. *Austin Area* (No change)

8. *San Antonio Area* (No change)

C. Particulate Matter (No change)

D. Carbon Monoxide (No change)

E. Lead (No change)

F. Oxides of Nitrogen (No change)

G. Sulfur Dioxide (No change)

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

I. Site Specific (No change)

J. Mobile Sources Strategies (No change)

K. Clean Air Interstate Rule (No change)

LIST OF ACRONYMS

ACT -- alternative control techniques
AF -- air-to-fuel
APU -- auxiliary power units
ARPDB -- Acid Rain Program Data Base
ATCM -- airborne toxic control measure
auto-GC -- automated gas chromatograph
BACT -- Best Available Control Technology
BCCA-AG -- Business Coalition for Clean Air-Appeal Group
BMP -- best management practices
BPA -- Beaumont-Port Arthur
Btu/hr -- British thermal units per hour
Btu/scf -- British Thermal Units per Standard Cubic Feet
CAE -- Cetane Additive Enhanced Diesel Fuel
CAIR -- Clean Air Interstate Rule
CAMx -- Comprehensive Air Model with Extensions
CARB -- California Air Resources Board
CBD -- Houston's Central Business District
CFR -- Code of Federal Regulations
CMAQ -- Congestion Mitigation and Air Quality
CO -- carbon monoxide
CTG -- Control Technique Guidelines
DECS -- Diesel Emission Control Strategy
DERC -- Discrete Emission Reduction Credits
DFW -- Dallas-Fort Worth
DPM -- Diesel Particulate Matter
DRRP -- Diesel Risk Reduction Program
DV -- design value
DVc -- current design value
DVf -- future design value
EAC -- Early Action Compact
EDMS -- Emissions and Dispersion Modeling System
E-GRID-2007 -- Emissions and Generation Resource Integrated Database
EE/RE -- Energy Efficiency/Renewable Energy
EGAS -- Economic Growth Analysis System
EGF -- electric generating facilities
EGU -- electric generating units
EI -- emissions inventory
EPA -- United States Environmental Protection Agency
EPS3 -- Emissions Processing System, version 3
ERC -- Emission Reduction Credits
ERCOT -- Electric Reliability Council of Texas
ESAD -- Emission Specification for Attainment Demonstration
ESL -- Energy Systems Laboratory, the Texas A&M University System
F -- Fahrenheit
FAA -- Federal Aviation Administration
FCAA -- Federal Clean Air Act
FCV -- fuel cell vehicle

FGR -- flue gas recirculation
FHWA -- Federal Highway Administration
FR -- Federal Register
FT -- Fischer-Tropsch Diesel Fuel
GIS -- Geographic Information System
GloBEIS -- Global Biosphere Emissions and Interactions System
gpm -- gallons per minute
GTM -- gross ton mile
HAP -- hazardous air pollutant
HARC -- Houston Advanced Research Center
HC -- hydrocarbon
HDT -- heavy-duty truck
HDDV -- heavy-duty diesel vehicle
HECT -- Highly Reactive Volatile Organic Compound Emissions Cap and Trade Program
HGB -- Houston-Galveston-Brazoria
H-GAC -- Houston-Galveston Area Council
HOV -- high occupancy vehicle
hp -- horsepower
HPMS -- Highway Performance Monitoring System
HRVOC -- highly reactive volatile organic compound
HSC -- Houston Ship Channel
IC -- internal combustion
ICI -- industrial, commercial, and institutional
IECC -- International Energy Conservation Code
I/M -- inspection and maintenance
km -- kilometer
K_{vs} -- vertical exchange coefficient
LAER -- Lowest Achievable Emission Rate
lb/MMBtu -- pound per million British thermal units
LDAR -- Leak Detection and Repair
LIDAR -- Light Detection and Ranging
LDEQ -- Louisiana Department of Environmental Quality
LDGV -- light-duty gasoline vehicle
LDT -- light-duty truck
LDV -- light-duty vehicle
LED -- low emission diesel
LEV -- low emission vehicle
LEV II -- California's Low Emission Vehicle II Program
LIRAP -- Low Income Repair and Assistance Program
LNB -- low nitrogen oxides (NO_x) burners
LNC -- low nitrogen oxides (NO_x) combustors
LNG -- liquefied natural gas
LTO -- landing and take-off
MACT -- Maximum Achievable Control Technology
Mcf -- thousand cubic feet
MCR -- mid-course review
MDPV -- medium-duty passenger vehicle
MECT -- Mass Emissions Cap and Trade Program
MM5 -- Fifth Generation Meteorological Model
MMBtu/hr -- million British thermal units per hour
MMcf -- million cubic feet

MMS -- Minerals Management Service
MOA -- Memorandum of Agreement
MON -- Miscellaneous Organic National Emission Standards for Hazardous Air Pollutants (NESHAP)
mph -- miles per hour
MVEB -- Motor Vehicle Emissions Budget
MW -- megawatts
MY -- model year
NAAQS -- National Ambient Air Quality Standard
NEGU -- non-electric generating units
NEI -- National Emissions Inventory
NESHAP -- National Emission Standards for Hazardous Air Pollutants
ng/J -- nanogram per joule
NMIM -- National Mobile Inventory Model
NOAA -- National Oceanic and Atmospheric Administration
NO_x -- nitrogen oxides
NO_y -- nitrogen species
NSCR -- non-selective catalytic reduction
NTRD -- New Technology Research and Development Program
O₃ -- ozone
OGV -- ocean-going vessel
PAYD -- pay as you drive
PBL -- planetary boundary layer
PEI -- periodic emissions inventory
PERP -- Portable Engine Registration Program
PiG -- plume-in-grid
PM -- particulate matter
PM_{2.5} -- particulate matter less than 2.5 microns
ppb -- parts per billion
ppbC -- parts per billion carbon
ppbv -- parts per billion by volume
ppm -- parts per million
PSCF -- potential source contribution factors
PSDB -- point source database
psia -- pounds per square inch absolute
PUC -- Public Utility Commission
RACT -- Reasonably Available Control Technology
RACM -- Reasonably Available Control Measure
RFP -- Reasonable Further Progress
RMSE -- root mean square error
ROP -- Rate-of-Progress
RRF -- relative reduction factor
SB -- Senate Bill
SCAQMD -- South Coast Air Quality Management District
scfm -- standard cubic feet per minute
SCR -- selective catalytic reduction
SEP -- supplemental environmental programs
SETPMTC -- Southeast Texas Photochemical Modeling Technical Committee
SIC -- Standard Industrial Classification
SIP -- State Implementation Plan
SNCR -- selective non-catalytic reduction

SOV -- single occupancy vehicle
STP -- Surface Transportation Program
SWCV -- solid waste collection vehicle
TAC -- Texas Administrative Code
TACB -- Texas Air Control Board
TCAA -- Texas Clean Air Act
TCEQ -- Texas Commission on Environmental Quality (commission)
TCM -- transportation control measure
TDM -- travel demand model
TERP -- Texas Emission Reduction Plan
TexAQS 2000 -- Texas Air Quality Study 2000
TexAQS II -- Texas Air Quality Study 2006
TKE -- turbulent kinetic energy
TNMHC -- total nonmethane hydrocarbon
TNRCC -- Texas Natural Resource Conservation Commission
tpd -- tons per day
tpy -- tons per year
TSE -- truck stop electrification
TTI -- Texas Transportation Institute
TUC -- Texas Utility Code
TxDOT -- Texas Department of Transportation
TxLED -- Texas Low Emission Diesel
USC -- United States Code
VMEP -- Voluntary Mobile Source Emissions Reduction Program
VMT -- vehicle miles traveled
VOC -- volatile organic compound
VRU -- vapor recovery unit
ZEB -- zero emission bus
ZEV -- zero emissions vehicle

HOUSTON-GALVESTON-BRAZORIA EIGHT-HOUR OZONE SIP REVISION
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CHAPTER 1: BACKGROUND AND INTRODUCTION

1.1 GENERAL

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

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

The one-hour ozone National Ambient Air Quality Standards (NAAQS), which preceded the eight-hour ozone standard, was revoked June 15, 2005 (69 FR 23951). On June 15, 2004, the EPA classified the Houston-Galveston-Brazoria (HGB) area, comprising Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller Counties as a moderate nonattainment area for the eight-hour NAAQS under the 1990 Federal Clean Air Act (FCAA) Amendments (42 United States Code (USC) §§ 7401 *et seq.*).

The HGB area’s hot sunny climate, large urban population, and highly concentrated industrial area provide the necessary ingredients for ozone formation: sunlight, nitrogen oxides (NO_x), and volatile organic compounds (VOC). The Houston area’s significant biogenic VOC emissions, and complex meteorology that includes land sea breeze air parcel recirculation, complicate air quality modeling.

The substance of the existing plan to control ozone formation in the HGB area centers on the following key measures.

- Approximately 80% reduction of NO_x emission from point sources through the associated Mass Emission Cap and Trade (MECT) program.
- NO_x emission reductions from on-road and non-road sources through the vehicle inspection and maintenance (I/M) program, the Texas Emission Reduction Plan (TERP), and the Texas Low Emission Diesel (TxLED) program.
- Highly reactive volatile organic compounds (HRVOC) controls through rules and the associated HRVOC Emission Cap and Trade (HECT) program.
- VOC controls through rules.

The EPA approved the HGB one-hour ozone attainment demonstration and these components and rules in the September 6, 2006, Federal Register notice (71 FR 52656). Rapid economic and population growth continue to create air quality challenges for the HGB area, even as the key ozone-targeting regulatory programs have reduced the number and magnitude of ozone exceedances, the area of exceedance, and the population exposed to exceedances.

This SIP revision is the first step in addressing the eight-hour ozone standard in the HGB area and represents the TCEQ’s best effort considering the time constraints for planning for attainment of the eight-hour ozone standard due to EPA’s late adoption of the implementation rules.

The HGB SIP development is challenged by the high concentration of industry and motor vehicles in the HGB area. Significant NO_x controls are already in place on the industrial sector in the HGB area and further controls on these sources will be costly and technically challenging.

The TCEQ contracted with the Houston-Galveston Area Council (H-GAC) to identify possible on-road and non-road mobile source control strategies and with Lamar University to identify possible area and point source control strategies. Between March and June 2006, H-GAC, Lamar University, and their subcontractor held five stakeholder meetings to give HGB-area stakeholders the opportunity to hear about and comment on the progress of the control strategy development work. They included meetings on March 22, 2006, and May 27, 2006, that focused on mobile source (on-road and non-road) control strategy development; March 28, 2006, regarding ports,

locomotives, and marine sources; and April 19, 2006, and May 24, 2006, for point and area source control strategy development.

The subcontractor for H-GAC and Lamar University, ENVIRON International, compiled draft control strategy catalogs and evaluated each potential strategy against the EPA's criteria for SIP creditability. ENVIRON then evaluated each strategy meeting the EPA criteria against a second set of criteria, including feasibility, public acceptability, emissions benefit, and cost effectiveness. After presenting the short list of strategies for public comment, ENVIRON quantified the reductions (where possible) associated with the high-ranking strategies and placed them on a final list. The TCEQ evaluated and analyzed the final list of strategies for sensitivity modeling purposes.

This revision contains the reasonably available control technology (RACT) analysis, Texas 2002 Periodic Emissions Inventory (EI) for the Houston-Galveston-Brazoria Ozone Nonattainment Area, and water heater rule amendment emission offsets. This SIP revision also includes rule revisions to 30 TAC Chapter 114 related to adding marine diesel fuels to the definition of diesel fuels that are subject to the Texas Low Emission Diesel Rule and to 30 TAC Chapter 115 related to control of under-estimated, unreported, or under-reported VOC emissions from tank landings, flash emissions, and degassing of storage tanks, transport vessels, and marine vessels with liquid heels. The TCEQ expects that compliance with the rules in 30 TAC Chapter 115, Storage of Volatile Organic Compounds for the Eight-Hour Ozone Standard will improve HGB air quality by removing many tons of VOC from the airshed. This revision also includes additional VMEP commitments.

The plan also describes ongoing efforts to develop the eight-hour ozone attainment demonstration including a new modeling episode, the continued implementation of increasingly lower federal on-road and non-road engine standards, and further research and consideration of additional control strategies, which will help determine the appropriate year for attainment of the eight-hour standard in the HGB area.

The following summaries of recent HGB-area SIP revisions are provided to give context and greater understanding of the complex issues involved in HGB's ozone challenge.

1.1.1 December 2000

The December 2000 SIP revision contains rules and photochemical modeling analyses in support of the HGB one-hour ozone attainment demonstration. The majority of the emission reductions identified in this revision were from an overall 90 percent reduction in point source NO_x, including the MECT program. A modeling analysis, showing a 141 parts per billion peak ozone level, indicated a shortfall of 91 tons per day (tpd) in NO_x emissions reductions that were necessary, but not readily available, for an approvable attainment demonstration. In addition, the revision contained post-1999 rate-of-progress (ROP) plans for the milestone years 2002 and 2005, the attainment year 2007, and transportation conformity motor vehicle emissions budgets (MVEB) for NO_x and VOC. The SIP also contained enforceable commitments to implement further measures (in support of the HGB area's attainment demonstration and to remedy the estimated 91 tpd shortfall), as well as a commitment to perform and submit a mid-course review (MCR) to EPA.

1.1.2 September 2001

The September 2001 HGB one-hour ozone SIP revision included the following elements: 1) corrections to the ROP table/budget for the years 2002, 2005, and 2007 due to a mathematical error; 2) incorporation of a change to the idling restriction control strategy clarifying that the operator of a rented or leased vehicle is responsible for compliance with the requirements in situations where the operator of a leased or rented vehicle is not employed by the owner of the vehicle; 3) incorporation of revisions to the clean diesel fuel rules to provide greater flexibility in complying with the rule requirements while preserving the emission reductions previously

represented; 4) incorporation of a stationary diesel engine rule; 5) incorporation of revisions to the point source NO_x rules; 6) incorporation of revisions to the NO_x emissions cap and trade rules; 7) removal of the construction equipment operating restriction and the accelerated purchase requirement for Tier 2/Tier 3 heavy-duty equipment; 8) replacement of the Tier 2/Tier 3 rules with the Texas Emission Reduction Plan; 9) layout of the MCR process which detailed how the state would fulfill the commitment to obtain the additional emission reductions necessary to demonstrate attainment of the one-hour ozone standard in the HGB area; and 10) replacement of 2007 ROP MVEB to be consistent with the attainment MVEB.

Despite the gap control measures adopted in December 2000 and the stationary diesel engine rules included in the September revision, an estimated 56 tpd NO_x reduction shortfall remained. The state committed to address the remaining shortfall through the MCR process. In the November 14, 2001, issue of the Federal Register, EPA approved the December 2000 and September 2001 submittals.

1.1.3 December 2002

In January 2001, the Business Coalition for Clean Air-Appeal Group (BCCA-AG) and several regulated companies challenged the December 2000 HGB SIP and some of the associated rules. Among other things, BCCA-AG contended that the last 10 percent of the NO_x emissions reductions were not cost effective and that the ozone plan would fail because the TCEQ did not account for VOC emissions associated with upset conditions. In May 2001, the parties agreed to a stay in the case, and Judge Margaret Cooper, Travis County District Court, signed a Consent Order, effective June 8, 2001. The order required the commission to perform an independent and thorough analysis of the causes of rapid ozone formation events and to identify potential mitigating measures not yet identified in the HGB attainment demonstration.

In compliance with the Consent Order, the commission conducted a scientific evaluation based in large part on aircraft data collected by the Texas Air Quality Study 2000 (TexAQS 2000). The TexAQS 2000 was a comprehensive research project, conducted in August and September 2000, involving more than 40 research organizations and over 200 scientists that studied ground-level ozone air pollution in the HGB and east Texas regions. These and other studies suggested that the HGB area's high ozone events can be attributed to, in part, the presence of significant reactivity in the airshed. An analysis of automated gas chromatograph data (Estes, 2002) revealed that four HRVOC were frequently responsible for high reactivity days: ethylene, propylene, 1,3-butadiene, and butenes. As such, these compounds were selected as the best candidates for HRVOC emission controls. Analysis showed that the ozone control strategy involving limits on emissions of ethylene, propylene, 1,3-butadiene, and butenes from industrial sources, in conjunction with an 80 percent reduction in industrial or point source NO_x, was equivalent or better in terms of air quality benefit than the previous ozone control strategy (a 90 percent point source NO_x emissions reduction requirement alone). Therefore, in December 2002, the TCEQ adopted a SIP revision that replaced the most stringent 10 percent industrial source NO_x emissions reductions with industrial source HRVOC controls. The result was an industrial source ozone control strategy that relies on an 80 percent reduction in NO_x emissions and HRVOC rules that better quantify and reduce emissions of HRVOC from four key industrial sources: fugitives, flares, process vents, and cooling towers. The HRVOC rules are performance-based and emphasize monitoring, recordkeeping, reporting, and enforcement, rather than establishing individual unit emission rates. The 2002 SIP revision exchanging the two strategies for the one strategy met the FCAA Section 110(l) requirement which allows revision of the SIP where that revision would not interfere with reasonable further progress toward attainment of the NAAQS.

1.1.4 December 2004

In December 2000, the TCEQ committed to perform a MCR to ensure attainment of the one-hour ozone standard. The MCR process provides the opportunity to update emissions inventory data, use current modeling tools, and enhance the photochemical grid modeling. The data gathered

from the TexAQS 2000 was used to improve the photochemical modeling of the HGB area. These technical improvements provided a more comprehensive understanding of the ozone challenge in Houston that is necessary to develop an attainment plan. In early 2003, as the TCEQ was preparing to move forward with the MCR, EPA announced its plans to begin implementation of the eight-hour ozone standard. On June 2, 2003, the Federal Register published EPA's proposed "Implementation Rule for the Eight-Hour Ozone Standard." In the same timeframe, EPA formalized its intentions to designate areas for the eight-hour ozone standard by April 15, 2004, requiring states to reassess their efforts and control strategies to address this new standard in a revised plan to be submitted to EPA by June 2007. Recognizing that existing one-hour nonattainment areas would soon be subject to the eight-hour ozone standard and in an effort to efficiently manage the state's limited resources, the TCEQ developed an approach that addressed the outstanding obligations under the one-hour ozone standard while beginning to analyze eight-hour ozone issues.

The TCEQ's one-hour ozone SIP commitments that were addressed in the December 2004 revision include:

- completion of a one-hour ozone MCR;
- performance of modeling;
- adoption of measures sufficient to fill the shortfall of NO_x reductions;
- adoption of measures sufficient to demonstrate attainment; and
- revision of the MVEB using the MOBILE6 model.

The December 2004 revision reflects a shift from primarily reducing industrial emissions of NO_x to reducing both industrial emissions of NO_x and point source HRVOC. This revision included measures to ensure compliance with the specific strategies to control HRVOC emissions and created the HRVOC emissions cap and trade (HECT) program. The HECT program is an annual cap and trade program to provide compliance flexibility to the Chapter 115 control requirements for flares, process vents, and cooling-tower heat exchangers. Sites subject to the program are required to possess an HRVOC allowance for each ton of HRVOC emissions. Sites have the option to trade excess HRVOC allowances on the open market. The December 2004 revision also reflected the repeal of the motor vehicle idling rules and modified certain recordkeeping requirements of the general VOC fugitive emission rules to make them apply only to sources of HRVOC fugitive emissions.

1.1.5 EPA Approval of the One-Hour Ozone Attainment Demonstration and Associated Rules

On September 6, 2006, EPA published the approval of the HGB nonattainment area one-hour ozone attainment demonstration and associated rules (71 FR 52656). The one-hour attainment SIP revision demonstrates that the HGB nonattainment area will comply with the one-hour ozone standard by 2007. The approval was published in six parts, covering the rules for the control of HRVOC, the HECT program, the MECT program for NO_x, the one-hour ozone attainment plan, the emissions credit banking and trading program, and the discrete emission credit banking and trading program.

1.1.6 One-Hour Ozone Control Strategies

Existing one-hour ozone control strategies and one-hour ozone voluntary mobile emission reduction program (VMEP) control strategies, discussed in Chapter 4, Section 4.1, show key control strategies for complying with the one-hour ozone standard in the HGB nonattainment area. Existing control strategies targeted to the one-hour standard, are expected to continue to reduce the emission of precursors to ozone in the HGB area and positively impact progress toward attainment of the eight-hour ozone standard. The one-hour and eight-hour ozone design values for the HGB area from 1991 to 2005 are illustrated in Figure 1-1: *One-Hour and Eight-Hour Ozone Design Value Trends (1991 to 2005) and HGB Area Population*. Both values decreased over the past 15 years. The 2005 one-hour design value was 169 parts per billion

(ppb), representing a 23 percent decrease from the value for 1991 (220 ppb). The 2005 eight-hour design value was 103 ppb, a 13 percent decrease from the 1991 value of 119 ppb. These decreases occurred despite a 36 percent increase in area population, as shown in the figure.

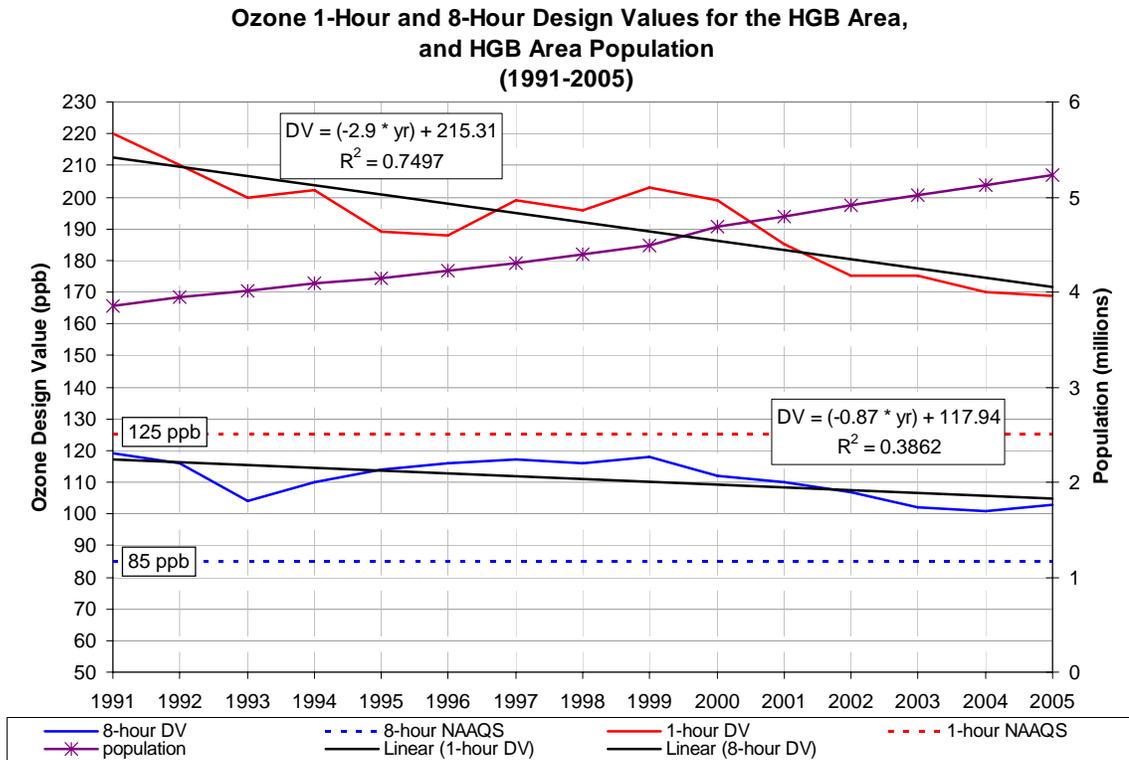


Figure 1-1: One-Hour and Eight-Hour Ozone Design Value Trends (1991 to 2005) and HGB Area Population

1.2 HEALTH EFFECTS

In 1997, EPA revised the NAAQS for ozone from a one-hour to an eight-hour standard based on scientific data that indicated that the eight-hour standard provides better protection of public health from longer-term exposures to moderate levels of ozone. To support the eight-hour ozone standard, EPA provided information that indicated that even low levels of ozone can decrease lung capacity temporarily in some healthy adults and cause inflammation of lung tissue, aggravate asthma, and make people more susceptible to respiratory illnesses such as bronchitis and pneumonia.

Children are at a higher risk from exposure to ozone, since they breathe more air per pound of body weight than adults and because children’s respiratory systems are still developing. Children also spend a considerable amount of time outdoors during summer and during the start of the school year (August-October) when the highest ozone levels are recorded. Adults most at risk to ozone exposure are outdoor workers, people outside exercising, and individuals with preexisting respiratory diseases.

1.3 PUBLIC HEARING AND COMMENT INFORMATION

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

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

The comment period ended February 12, 2007, at 5:00 p.m. 55 comments related to the proposed HGB SIP revision were received. The response to comments has been attached to this document.

Copies of the adopted SIP revision and all appendices can be obtained from the TCEQ's web site at <http://www.tceq.state.tx.us/implementation/air/sip/hgb.html#> or upon request to:

Kathy Singleton
MC 206
State Implementation Plan Team
Chief Engineer's Office
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, Texas 78711-3087

1.4 SOCIAL AND ECONOMIC CONSIDERATIONS

For a detailed explanation of the social and economic issues involved with any of the strategies, please refer to the preambles that precede each rule package accompanying this SIP.

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: PHOTOCHEMICAL MODELING

No change from the One-Hour Ozone Attainment Demonstration
December 2004

CHAPTER 3: CORROBORATIVE ANALYSIS

No change from the One-Hour Ozone Attainment Demonstration
December 2004

CHAPTER 4: CONTROL STRATEGIES AND REQUIRED ELEMENTS

4.1 OVERVIEW AND EXISTING CONTROL STRATEGIES

The Houston-Galveston-Brazoria (HGB) eight-hour ozone nonattainment area includes one of the most comprehensively controlled industrial complexes in the world. The Texas Commission on Environmental Quality (TCEQ) has developed stringent and innovative regulations that address nitrogen oxides (NO_x), volatile organic compounds (VOC), and the most reactive ozone precursors in the HGB area, highly-reactive volatile organic compounds (HRVOC). Table 4-1: *Existing One-hour Ozone Control Strategies*, lists the existing ozone control strategies that were implemented for the one-hour ozone standard in the HGB nonattainment area. As Chapter 3 demonstrates, significant ozone reductions have resulted from the implementation of one-hour ozone control strategies.

Table 4-1: Existing One-Hour Ozone Control Strategies

Measure	Description	Area(s) Affected	Start Date(s)
POINT SOURCE MEASURES			
Point Source NO _x	Overall 80 percent reduction from existing industrial sources and utility power plants, implemented through a cap and trade program. Affects utility boilers, gas turbines, heaters and furnaces, stationary internal combustion engines, and industrial boilers.	8-county area	April 1, 2003, and phased in through April 1, 2007
Emissions Bank and Trade /Mass Emission Cap and Trade (MECT)	NO _x trading program for HGB area.	8-county area	January 2002; First step-down April 1, 2004
AREA/NON-ROAD MEASURES			
HRVOC Requirements	Affects fugitive, cooling tower, and vent gas control and flares, and establishes an annual emissions cap with a cap and trade program and a short-term, 1200 pounds per hour not-to-exceed limit for each site in Harris County.	8-county area	Monitoring Requirement: Jan. 31, 2006 Cap and Trade Program: Jan. 1, 2007
Federal Area/Non-Road Measures	The United States Environmental Protection Agency (EPA) has implemented a series of strategies for area and non-road sources. Some of these include the gas engine rule and marine recreational engine standards.	Nationwide	Through 2007
Texas Emission Reduction Plan (TERP) (See also on-road TERP reductions)	Provides grant funds for heavy-duty diesel engine replacement/retrofit. Replaces construction restrictions and Tier 2/3 accelerated purchase.	8-county area	January 2002
California Gasoline Engines	California standards for non-road gasoline engines 25 horsepower and larger.	Statewide	May 1, 2004

Measure	Description	Area(s) Affected	Start Date(s)
Stationary Diesel Engines	Emission standards on stationary diesel engines.	8-county area	April 1, 2002
Gas-Fired Heaters and Small Boilers	Rule limiting NO _x emissions from these small-scale residential and industrial sources.	Statewide	2002
VOC Control Measures	Additional control technology requirements for batch processes, bakeries, and offset lithographic printers.	8-county area	
Texas Low Emission Diesel (TxLED)	Requires all diesel for both on-road and non-road use to have a lower aromatic content and a higher cetane number.	110 East Texas counties	October 31, 2005
VMEP	Voluntary measures administered by the Houston-Galveston Area Council (H-GAC). (see Appendix F7 for 2004 SIP Mid-Course Review.)	8-county area	Through 2007
ON-ROAD MEASURES			
Federal On-Road Measures	The EPA has implemented a series of strategies for on-road vehicles. Some of these include Tier 1/2 vehicle standards, low sulfur diesel standards, National Low Emission Vehicle standards, and reformulated gasoline.	Nationwide	Through 2007
TERP (See also area/non-road TERP reductions)	Provides grant funds for heavy-duty diesel engine replacement/retrofit. Replaces construction restrictions and Tier 2/3 accelerated purchase.	8-county area	January 2002
Vehicle Inspection/ Maintenance	Yearly treadmill-type testing for pre-1996 vehicles and computer checks for 1996 and newer vehicles. -Begin May 1, 2002, in Harris County. -Begin May 1, 2003, in Brazoria, Fort Bend, Galveston, and Montgomery Counties.	5-county area	May 1, 2002 May 1, 2003
Speed Limit Reduction	Speed limits remain at 5 miles per hour (mph) below what was posted before May 1, 2002, where speeds were 65 mph or higher.	8-county area	September 2003
TxLED	Requires all diesel for both on-road and non-road use to have a lower aromatic content and a higher cetane number.	110 East Texas counties	Phase in began October 31, 2005

Measure	Description	Area(s) Affected	Start Date(s)
VMEP	Voluntary measures administered by the H-GAC. (see Appendix F7 for 2004 SIP Mid-Course Review.)	8-county area	Through 2007
Transportation Control Measures	Various measures in H-GAC's long-range transportation plan.	8-county area	Through 2007
OTHER			
Portable Fuel Containers Rule	Establishes new design "no spill" criteria requirements for portable fuel containers sold, offered for sale, manufactured, and/or distributed in Texas.	Statewide	December 31, 2004
Voluntary Energy Efficiency/Renewable Energy	Senate Bill (SB) 5 and SB 7 have encouraged energy efficiency and renewable energy projects. Specific credit is difficult to assign in HGB due to the MECT program.	Statewide	December 2000

A control strategy to reduce point source NO_x emissions an overall 80 percent will be fully implemented in 2007, as will HRVOC rules that better quantify and reduce emissions of HRVOC from four key industrial sources: fugitives, flares, process vents, and cooling towers. These two programs represent a regulatory structure for significant reductions in key ozone precursors in the HGB airshed and will further reduce ozone in the eight-county area.

A complicating factor in the overall ozone attainment planning picture is that the TCEQ is federally preempted from establishing mobile source emission standards. Therefore, the TCEQ directly regulates only point and area sources, accounting for approximately 45 percent (~202 tpd) of the NO_x remaining in the 2009 HGB airshed. Even when the innovative TERP for on-road and non-road mobile sources, discussed further in this chapter, is taken into account, mobile sources account for ~ 55 percent (~242 tpd) of the NO_x emissions in the projected 2009 emission inventory. See Figure 4-1: *2009 NO_x Source Category Estimates* and Figure 4-2: *2009 NO_x Emissions Directly Regulated by the TCEQ*. While the phased implementation of the federal emission standards for on-road and non-road engines will be well underway by 2009, the full emissions benefit for most engine categories will not be realized until a later date.

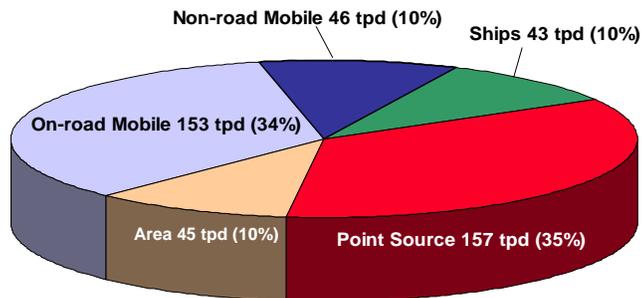


Figure 4-1: 2009 NO_x Source Category Estimates

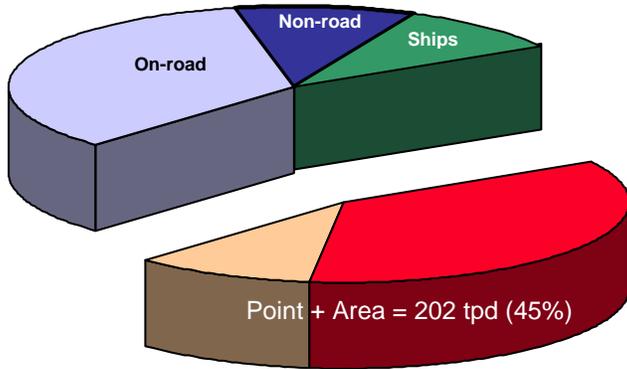


Figure 4-2: 2009 NO_x Emissions Directly Regulated by the TCEQ

The TCEQ, Houston-Galveston Area Council (H-GAC), and local leaders have worked to address on-road and non-road sources for which they cannot set emission standards. On-road and non-road measures include TERP, TxLED across East Texas, federal reformulated gasoline in the HGB area, low Reid vapor pressure gasoline in the attainment counties of East Texas, speed limit reductions, vehicle inspection and maintenance, and VMEPs. Existing controls are listed in section 4-1. This SIP revision also includes an additional 0.9 tpd of NO_x from the TxLED Marine rule and 2.82 tpd of NO_x from local area on-road VMEP measures to be implemented by 2009.

The TCEQ continues to work on control strategy development, emission inventory improvement, and improving the science of ozone formation in the HGB area. This chapter outlines both quantifiable control strategies and control strategies of a more qualitative nature that are part of this SIP revision, as well as covers the reasonably available control technology (RACT) analysis, and emission inventory updates. Chapter 5 discusses ongoing efforts by the TCEQ to improve the substance and the science of the SIP.

4.2 NO_x AND VOC CONTROL MEASURES

4.2.1 Texas Low Emission Diesel for Marine Fuels

Concurrent with this SIP revision, the commission is adopting rule revisions to the low emission fuel definitions of diesel fuel in 30 TAC Chapter 114.6(7) (project number 2006-036-114-EN). This revision requires that any fuel that is commonly or commercially known, sold, or represented as DMA, DMX, or Marine Gas Oil (MGO) that is sold for use in marine vessels in the counties listed in §114.319(b)(2) (Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller Counties), must meet low emission diesel (LED) requirements. By regulating these marine fuels the commission will be able to reduce NO_x in the HGB nonattainment counties.

DMX, DMA, 1-D, and 2-D diesel fuels are all light distillates and share many fuel parameters. Therefore, the commission does not anticipate major difficulties in the process of either changing vessels back to 1-D and 2-D or having these marine fuels tested under the LED approved test methods of §114.315.

The grades of marine fuel that are included in this revision are normally only used by harbor craft vessels (e.g. crew and supply boats, charter fishing vessels, commercial fishing vessels, ferry/excursion vessels, pilot vessels, towboat or push boats, tug boats and work boats). Ocean-going vessels will not be included in these regulations because they typically use heavier marine

residual fuels such as DMB, DMC, or other marine residual fuels that do not share the characteristics of lighter 1-D and 2-D diesel fuels.

The concurrent rulemaking revises the types of fuels for analysis in §114.315(c)(1)(C). DMX and DMA will be added to the fuel types for analysis to require that they meet specifications as set out in the International Organization for Standardization 8217 Specifications of Marine Fuels. This requirement is a quality assurance measure to ensure uniformity between candidate test fuels and fuels used by the end user in marine vessels.

The commission expects this rule to reduce NO_x by 0.9 tpd by 2009. VOC reductions from this rule are likely to be negligible because diesel fuel has low levels of VOC.

4.2.2 Control of VOC Emissions from Storage Vessels and Degassing Operations

Concurrent with this SIP revision, the commission is adopting rule revisions to 30 TAC Chapter 115 that would subject owners or operators of VOC storage tanks, transport vessels, and marine vessels located in the HGB eight-hour ozone nonattainment area to revised control, monitoring, testing, recordkeeping, and reporting requirements (project number 2006-038-115-EN). The revised requirements have been developed to reduce VOC emissions that have previously been under-reported in emissions inventories.

When the TCEQ and its research partners began the second Texas Air Quality Study (TexAQS II) in May 2005, one of the study's primary goals was to identify VOC emission sources that have been historically under-estimated, unreported, or under-reported in the TCEQ Emissions Inventory (EI) and could potentially be contributing to a discrepancy between measured and reported emissions.

TexAQS II remote sensing VOC project results indicate that certain types of storage tank emissions, including degassing, flash, and landing loss emissions, generally have been under-estimated, unreported, or under-reported in the EI. Recent data analysis, a landing loss emissions survey, and other TCEQ studies indicate that these under-estimated, unreported, or under-reported emissions could total several thousand tons per year. Under-estimated, unreported, or under-reported landing loss emissions alone in the HGB area totaled approximately 7,250 tons in 2003. This rulemaking will reduce emissions from the affected sources.

The amendments to 30 TAC, Chapter 115 include more stringent controls for tank fittings on floating roof tanks, such as slotted guidepoles and other openings in internal and external floating roofs. The circumstances under which tank landings are allowed limits convenience landings unless a control device is used to control the VOC emissions or landing loss emissions are authorized under an emission limit or cap in a permit issued under 30 TAC Chapter 116. Crude and condensate storage tanks at upstream oil and gas exploration and production sites or midstream pipeline breakout stations with uncontrolled flash emissions greater than 25 tons per year are also controlled under the rule. Control of VOC emissions from degassing operations is required for storage tanks with a nominal capacity of 75,000 gallons or more storing materials with a true vapor pressure greater than 2.6 psia, or with a nominal capacity of 250,000 gallons or more storing materials with a true vapor pressure of 0.5 psia or greater. Degassing of vapors from storage vessels, transport vessels, and marine vessels is required to vent to a control device until the VOC concentration of the vapors is reduced to less than 34,000 parts per million by volume as methane.

The amendments are described in more detail in the concurrent rule project (project number 2006-038-115-EN).

4.2.3 Voluntary Mobile Source Emission Reduction Programs (VMEP)

The Federal Clean Air Act (FCAA) Amendments of 1990 increased the responsibility of states to demonstrate progress toward attainment of the National Ambient Air Quality Standard (NAAQS). Voluntary mobile source measures have the potential to contribute, in a cost-effective manner, emission reductions needed for progress toward attainment and maintenance of the NAAQS.

Historically, federal mobile source control strategies have focused primarily on reducing emissions per mile through vehicle and fuel technology improvements. Tremendous strides have been made resulting in new light-duty vehicle emission rates that are 70 to 90 percent less than those for the 1970 model year. However, transportation emissions continue to be a significant source of air pollution due to population and employment growth as well as an increase in daily vehicle miles traveled per person. Therefore, mobile source strategies are being explored and developed that attempt to complement existing regulatory programs through voluntary, nonregulatory changes in local transportation sector activity levels or changes in vehicle and engine fleet composition.

Increasing interest by the public and business sectors in creating alternatives to traditional emission reduction strategies have resulted in a number of innovative voluntary mobile source and transportation programs. Some examples include economic and market-based incentive programs, trip reduction programs, growth management strategies, ozone action programs, and targeted public outreach. These programs attempt to gain additional emissions reductions beyond mandatory FCAA programs by engaging the public to make changes in activities that will result in reducing mobile source emissions.

Table 4-2: *Eight-Hour Ozone Voluntary Mobile Source Emission Reduction Programs* summarizes the new HGB voluntary commitments under this SIP revision. The estimated benefits listed are calculated for the year 2009 only and may not be forecasted to estimate emission reductions for any other year. Appendix A: *Voluntary Mobile Source Emission Reduction Programs for the HGB Eight-Hour SIP* more fully describes these VMEP measures. The 2.82 tpd NO_x reductions are referred to as the H-GAC reductions.

Table 4-2: Eight-Hour Ozone Voluntary Mobile Source Emission Reduction Programs

Measure	NO _x Reductions in tons per day (tpd)
Public and Private Sector Clean Fuel Fleet	2.0
Commute Solutions (5 measures)	0.77
Pooled Ownership of Vehicles	0.05
Total	2.82

4.2.4 Texas Emission Reduction Plan (TERP)

To date, the Texas Legislature has committed more than \$413 million to TERP to encourage voluntary emission reductions from on-road and non-road engines which are significant emissions sources that cannot be directly regulated by the TCEQ. Over \$200 million of that commitment has been awarded to the HGB area, to achieve more than 21 tpd in emissions reductions.

The 80th Texas Legislature is considering the appropriation of additional funds, above and beyond those already appropriated through 2007, to TERP. The commission anticipates that additional funds may be appropriated to TERP in FY 2008-2009, resulting in continued reductions in the significant emission source categories of on-road and non-road engines. This funding increase

will allow the commission to fund emission reduction projects that will help the HGB area in attaining the eight-hour ozone standard, above and beyond TERP reductions under the one-hour ozone standard.

4.2.5 Texas Low Emission Diesel for Locally Operated Locomotive Engines

Locomotive switcher engines are almost exclusively operated on a local level, and are typically used to move railcars around a yard. Since these engines are locally operated and use TxLED compliant fuel, there is an associated quantifiable local reduction in NO_x due to TxLED fuel use. These reductions will be accounted for in the HGB eight-hour ozone attainment demonstration.

4.2.6 Energy Efficiency and Renewable Energy

Energy efficiency efforts are typically programs that reduce the amount of electricity and natural gas consumed by residential, commercial, industrial, and municipal energy consumers. Examples include increased insulation in homes, installing compact fluorescent light bulbs and other high efficiency lighting, replacing motors and pumps with high efficiency units, and replacing traffic signal lights with light emitting diode fixtures. Renewable energy efforts include programs that generate energy in a less polluting manner than conventional energy production. Examples include wind energy and solar energy projects.

A variety of energy efficiency and renewable energy (EE/RE) measures potentially reduce demand for traditionally-produced electricity in the HGB area. SB 5 (77th Texas Legislature, 2001), sets goals for political subdivisions in affected counties to implement measures to reduce energy consumption by existing facilities by 5 percent each year for five years from January 1, 2002. The State Energy Conservation Office is charged with tracking the implementation of SB 5. SB 7 (76th Texas Legislature) sets goals for each electric utility to reduce projected growth in demand by 10 percent by EE/RE measures each year starting January 1, 2004. The Public Utility Commission of Texas (PUC) is in charge of this program. SB 20 (79th Texas Legislature, First Called Session) requires that the PUC work with electric utilities to assure that the target levels of renewable energy are generated within specified time frames.

The complex nature of the electrical grid makes accurately quantifying emission reductions from EE/RE projects difficult. At any given time, it is impossible to determine exactly where on the electrical grid electricity comes from for any certain electrical user. The electricity for a user could be from a power plant in west Texas, a nearby attainment county, or from within the nonattainment area. If electrical demand is reduced in the HGB nonattainment area due to these kinds of measures, then emission reductions from less electricity being produced may occur in any number of locations around the state.

As summarized in the December 2002 HGB SIP revision, staff has developed a methodology designed to estimate NO_x emission reductions resulting from EE/RE measures. This method has been improved with the support of EPA and the Energy Systems Laboratory (ESL), which is part of Texas Engineering Experiment Station of the Texas A&M University System. EPA's Emissions and Generation Resource Integrated Database (E-GRID – 2007) was used to spatially allocate the electric energy reductions in each county to electric generating units (EGU) located in the HGB counties and counties outside the HGB area. E-GRID – 2007 then estimated the EGU emissions reductions. For natural gas reductions at project sites, ESL used AP-42 emissions factors to calculate the emissions reductions. The latest projected estimate for NO_x emissions reductions in the eight-county HGB area on an ozone season day in 2009 is 5.07 tpd.

This methodology, though, does not address the complication created from the NO_x cap and trade program in the HGB area. The MECT Program caps the NO_x emissions at point sources, including EGUs, in the HGB nonattainment area. If an EGU is located within the HGB nonattainment area and demand on that EGU is reduced due to effective EE/RE programs, then the EGU may emit less NO_x than its cap allows. The EGU could then have excess NO_x

allowances that could be sold or traded in the HGB area, resulting in no net reduction in NO_x emissions. Therefore, in the HGB area, SIP-quality reductions from EE/RE cannot be directly credited in the SIP.

4.2.7 Urban Heat Island Measures

The term “urban heat island effect” refers to the observation that urban areas are hotter on average than surrounding rural areas. Urban heat island measures attempt to mitigate the occurrence of this phenomenon by decreasing the amount of heat that is absorbed into surfaces like roads, buildings, and parking lots. Examples include planting trees for shade and paving or painting surfaces with lighter colored materials or paint. In Houston, these kinds of measures are being promoted by Cool Houston!, a program at the Houston Advanced Research Center designed to help reduce urban temperatures through use of cool technologies - reflective and green roofing, paving with light colored or porous materials, and a greatly expanded forest canopy.

The overall effect of urban heat island measures must be determined in order to accurately estimate any ozone reductions for use in the SIP. Urban heat island measures may increase energy efficiency because cooler temperatures, even on a house by house scale, can reduce air conditioner use and result in reduced energy consumption at a micro level. Strategically placed trees can increase shade and provide a secondary energy efficiency benefit by reducing air conditioner use.

The most sophisticated studies on tree planting to date, however, show that ozone will decrease in some areas and increase in other areas if widespread tree planting occurs. With the planting of new vegetation, additional biogenic VOC emissions are created. Studies also show that increasing biogenic VOC emissions in the urban core is likely to increase ozone formation on most days because the ozone chemistry in the urban core is complex and can be VOC-limited. Additionally, if urban temperatures go down, the depth of the mixing layer may decrease, which means that emissions could be trapped in a smaller volume of air, resulting in higher concentrations of emissions and their byproducts. Further, most of the studies that estimate possible ozone reductions from measures like tree planting were done in smaller, arid cities like Sacramento, California. Results in a large, humid city such as Houston will likely differ considerably. At this time, modeling is not capable of determining the effects of urban heat island measures, like tree planting, in the HGB area using the most currently available data.

Since the science and the modeling tools are not adequate for accurately estimating ozone reductions, these measures can only be examined in a qualitative rather than a quantitative way. As the science around the effect of urban heat island measures progresses, the TCEQ will take new information into account as part of the ongoing effort to appropriately account for useful air quality improvement measures in the HGB SIP.

4.2.8 SmartWay Transport Partnership and the Blue Skyways Collaborative

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

The SmartWay Transport Partnership is a collaborative, voluntary program between the EPA and the freight transport industry that promotes strategies and technologies to help improve fleet efficiency while also reducing air emissions. Fleets participating in the SmartWay Transport Partnership commit to implementing these voluntary measures over three years, providing the EPA with annual updates of their progress throughout that period.

SmartWay carriers will typically commit to integrating fuel saving strategies and technologies into their fleet including: improved aerodynamics, single-wide tires, lighter wheels and rims, idle reduction, automatic tire inflation systems, driver training, and advanced powertrain technologies.

Unfortunately, the transient nature of freight transportation makes it difficult to isolate emissions reductions to a certain region, or even a certain state. As a result, any estimates of the impact of these technologies will largely rely on estimates of accumulated reductions based on estimated levels of overall fleet integration. Current estimates of potential fuel savings and emissions reductions that these technologies can produce are based on the results of several recent EPA studies. Ongoing research conducted by the EPA, in conjunction with the more than 300 companies already committed as SmartWay partners, should help to provide a better understanding of potential emissions reductions, while also helping to identify additional technologies and strategies that can help to improve fuel economy and reduce emissions.

Rolling resistance is estimated by the EPA to account for as much as 13 percent of a heavy-duty vehicle's fuel consumption. By reducing rolling resistance, as well as vehicle weight, the EPA believes that single-wide tires will help to improve fuel economy and reduce NO_x emissions by an average of five percent. On the other hand, aerodynamic drag accounts for most of a long-haul truck's energy losses at highway speeds. As a result, the EPA estimates that improving the aerodynamics of both a long-haul truck and its trailer can help to improve fuel economy and reduce NO_x emissions by another five percent.

The extended periods of idling typically associated with long-haul trucks will consume an average of one gallon of fuel per hour, while also generating the associated emissions. New technologies such as auxiliary power units (APU) and truck stop electrification (TSE) reduce vehicle idling by providing power for air conditioning, heating, and onboard electrical accessories, even when the vehicle is not in operation. The EPA estimates that, assuming typical idling levels, idling reduction technologies such as APU and TSE can reduce NO_x emissions by approximately ten percent.

The Blue Skyways Collaborative is a related effort, spearheaded by the EPA Region 6 office in Dallas and the Region 7 office in Kansas City, Missouri.

Partnering with the EPA through this effort are the environmental and energy agencies from the ten states along the I-35 corridor, including Texas, New Mexico, Louisiana, Arkansas, Oklahoma, Kansas, Missouri, Nebraska, Iowa, and Minnesota. In implementing the Blue Skyways Collaborative, the EPA and the participating states recognize that because air quality is often a regional concern, greater reductions are possible through cooperative efforts as opposed to individual efforts initiated independently in each state.

The primary objective of the Blue Skyways Collaborative is to improve air quality in these states by promoting innovative technologies in a variety of sectors. In addition to promoting reduction strategies through the SmartWay Partnership for freight transportation via air, water, and rail, Blue Skyways also focuses on promoting emissions reduction strategies for other on-road sources, non-road sources, and highway fueling and idling reduction infrastructure, while also promoting renewable, efficient, and alternative energy sources.

To achieve these objectives, the collaborative will try to develop partnerships among international, federal, state, and local governments, as well as non-profit organizations, environmental groups and private industries. These partnerships will identify ways to reduce emissions along the key transportation corridors by sharing technology and leveraging financial resources from a variety of sources.

4.2.9 Clean Air Interstate Rule (CAIR)

EPA projects that CAIR Phase I regional controls will improve air quality in the HGB area. Since May 2005, Texas has regulated electric generating units to a higher level of control that is "beyond" the current level for CAIR in East Texas and the HGB area. The TCEQ continues to assess federal changes to CAIR and resulting CAIR Phase II reductions that begin in 2015 to determine their impact on the HGB area as a part of the eight-hour ozone attainment demonstration SIP.

4.3 WATER HEATER RULE AMENDMENT OFFSETS

Concurrent rule project (2006-034-117-EN) amends 30 TAC Chapter 117, Subchapter E: Division 3--Multi-Region Combustion Control, Water Heaters, Small Boilers, and Process Heaters (§§117.3200-3215), to repeal the current statewide emission standard of 10 nanograms NO_x per Joule heat input (ng/J) due to the inability of water heater manufacturers to produce compliant units. Under these rules, manufacturers, distributors, retailers, and installers of natural gas-fired water heaters with a maximum rated capacity of no more than 75,000 British thermal units per hour, designated as a "Type 0 unit" in the rules, manufactured, distributed, sold, or installed on or after July 1, 2002, but no later than December 31, 2004, are required to meet an emission limit of 40 ng/J. Type 0 units manufactured, distributed, sold, or installed on or after January 1, 2007, were required to meet a 10 ng/J heat input limit. The adopted rules repeal the lower standards and reinstate the 40 ng/J emission limit in force since July 1, 2002.

House Bill (HB) 965, from the 79th Texas Legislative Session, authorized this amendment and required emission reductions to offset the loss of SIP credits due to the potential repeal of the rule. Reductions from a currently effective rule that were not claimed for the HGB one-hour ozone attainment demonstration will offset the 0.5 tpd of NO_x attributed to the water heater rule provision for the HGB area. Specifically, 30 TAC Chapter 117, Subchapter D, Division 2, was adopted in April 2000 and applies to minor sources of NO_x in the HGB area. While the rule is mentioned in the HGB SIP, specific reductions associated with the rule from sites that are not subject to the NO_x MECT program were not claimed or modeled for the HGB one-hour ozone attainment demonstration. A minimum of 0.7 tpd NO_x reductions will be achieved from these sources. This estimate is based only on gas-fired boilers subject to 30 TAC Chapter 117, Subchapter D, Division 2 that were not included in the MECT program. Furthermore, the 0.7 tpd estimate is conservative because it does not include reductions from other sources subject to this rule that were also excluded from the MECT program. These reductions will be accounted for in the eight-hour ozone attainment demonstration SIP.

4.4 REASONABLY AVAILABLE CONTROL TECHNOLOGY AND EMISSIONS INVENTORY

4.4.1 Reasonably Available Control Technology (RACT) Analysis

The HGB eight-county area is currently classified as a moderate nonattainment area for the new EPA eight-hour ozone NAAQS. Under the eight-hour ozone standard, the HGB area is required to meet the RACT mandates of the FCAA under §§172(c)(1), 182(b)(2) and 182(f). According to EPA's Final Rule to Implement the Eight-Hour Ozone NAAQS – Phase 2 (40 CFR §51.912, November 29, 2005), areas classified as moderate nonattainment or higher must demonstrate, by revision to their SIP, that their current rules fulfill eight-hour ozone RACT for all Control Technique Guidelines (CTG) categories and all non-CTG major sources of NO_x and VOC emissions. The TCEQ is demonstrating that the RACT requirements are being fulfilled in the HGB eight-hour ozone nonattainment area by (1) identifying all CTG and non-CTG major source categories of VOC and NO_x emissions within the HGB area; (2) identifying the state regulation that implements or exceeds RACT for that source category; (3) describing the basis for concluding that these regulations fulfill the RACT requirements; and (4) submitting negative declarations for categories where there are no major emission sources within the HGB area.

Appendix B: *Reasonably Available Control Technology Analysis* provides the full RACT Analysis.

4.4.2 Emissions Inventory

As required by 40 CFR 51.915, the HGB 2002 Emissions Inventory was submitted to the EPA as part of the Dallas-Fort Worth (DFW) 5 Percent Increment of Progress SIP Revision in April 2005 (Appendix A of the DFW SIP, and may be viewed at http://www.tceq.state.tx.us/implementation/air/sip/apr2005dal_iop.html.) Tables 1 and 2 of the 2002 Periodic Emissions Inventory are resubmitted as part of this SIP submittal, as Appendix F, to comply with the public comment, public notice, and public hearings requirements.

CHAPTER 5: ONGOING EFFORTS AND FUTURE INITIATIVES

The Texas Commission on Environmental Quality (TCEQ) is committed to attaining the eight-hour ozone standard in the HGB area as expeditiously as practicable and continues to work towards identifying and reducing ozone precursors. Texas is investing resources into technological research and development for advancing pollution control technology, improving the science for ozone modeling and analysis, and refining quantification of volatile organic compound (VOC) emissions. Additionally, the TCEQ is working with local area leaders to identify new measures for reducing ozone precursors. This chapter describes ongoing technical and regulatory work that will be beneficial to improving air quality in Texas and the HGB area. These efforts will assist in determining the appropriate eight-hour ozone attainment year and level of necessary emission reductions of the HGB area.

5.1 TEXAS AIR QUALITY STUDY II (TexAQS II)

The original Texas Air Quality Study (TexAQS 2000) was a comprehensive air quality study that combined the efforts of over 40 research organizations and more than 250 scientists. It provided a large part of the scientific basis for reassessing ozone formation in the Houston-Galveston-Brazoria (HGB) area, and its findings were included in the recently approved HGB one-hour ozone attainment demonstration state implementation plan (SIP) revision. The success of this study, and the outstanding questions that it raised, provided the foundation for planning for the second Texas Air Quality Study (TexAQS II).

TexAQS II was conducted between the spring of 2005 and the fall of 2006, with an intensive study period occurring between August 15 and September 30, 2006. Many unanswered questions remained after TexAQS 2000, and the TexAQS II was designed to help answer questions in several areas, including inventory validation (especially highly-reactive volatile organic compounds (HRVOC)), ozone and particulate matter transport, planetary boundary layer dynamics, nighttime chemistry, and model improvement. While a great deal of interest remains in the HGB area, the TexAQS II broadened the geographic extent of the study area from the upper Texas coast to all of eastern and central Texas (see Figure 5-1: *TexAQS II Study Area*).

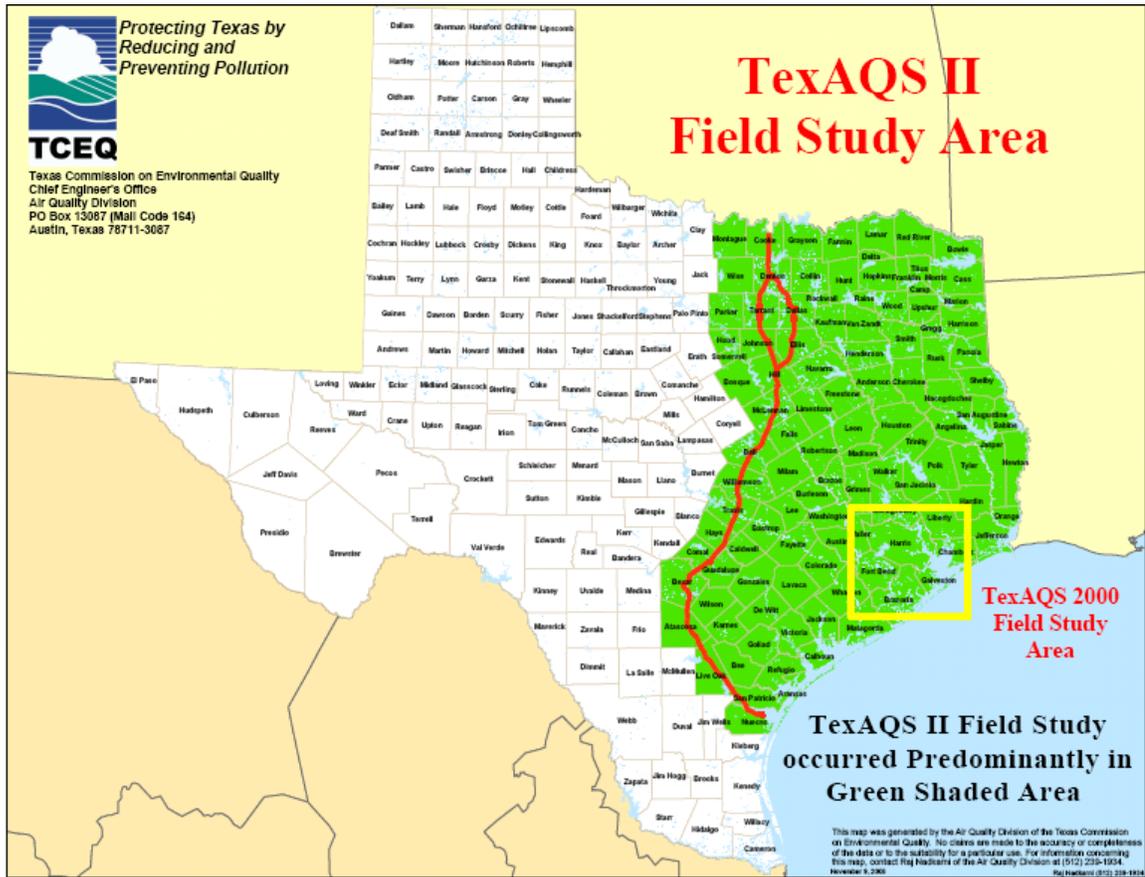


Figure 5-1: TexAQS II Study Area

5.1.1 Description of the TexAQS II

TexAQS II was one of the most extensive air quality studies ever undertaken and included participants from over a dozen federal, state, and local governmental bodies, including the National Oceanic and Atmospheric Administration (NOAA), the National Aeronautics and Space Administration, the United States Environmental Protection Agency (EPA), the National Center for Atmospheric Research, the Department of Energy, and the TCEQ. Other participants represented some thirty institutes of higher education, several research organizations, various corporations, and other organizations. In addition to the TCEQ’s routine network of meteorological and air quality monitoring equipment, measurement platforms deployed for the study included five research aircraft, NOAA’s research vessel (RV) Ronald H. Brown, a supersite atop a high-rise dormitory on the University of Houston’s campus, a network of rural monitoring stations, a network of meteorological sites including eight radar profilers, ozone sonde and guided balloon launches, tethered balloons, enhanced hydrocarbon measurements at existing monitoring locations, and a mobile instrument to measure hydrocarbon flux. Targeted compounds include ozone, carbon monoxide (CO), carbon dioxide (CO₂), sulfur dioxide (SO₂), particulates characterized by both size and species composition (nitrates, sulfates, organic and elemental carbon, crustal matter), hydroxyl radicals (OH), nitrous acid (HONO), hydroperoxyl radical (HO₂), hydrogen peroxide (H₂O₂), nitrogen oxides (NO_x), nitrogen species (NO_y), nitric acid, formaldehyde, acetaldehyde, mercury, hundreds of hydrocarbon species, including HRVOC, various peroxyacyl nitrates (PAN) compounds, and a long list of additional compounds. Figure 5-2: *The Research Vessel (RV) Ronald H. Brown and TexAQS II Instrumentation* and Figure 5-3: *The NOAA WP-3 Orion and TexAQS II Instrumentation* show, respectively, show the Ronald H. Brown with a description of the instruments deployed aboard for TexAQS II, and the NOAA WP-3 Orion aircraft, also with a description of its instrumentation for the study.

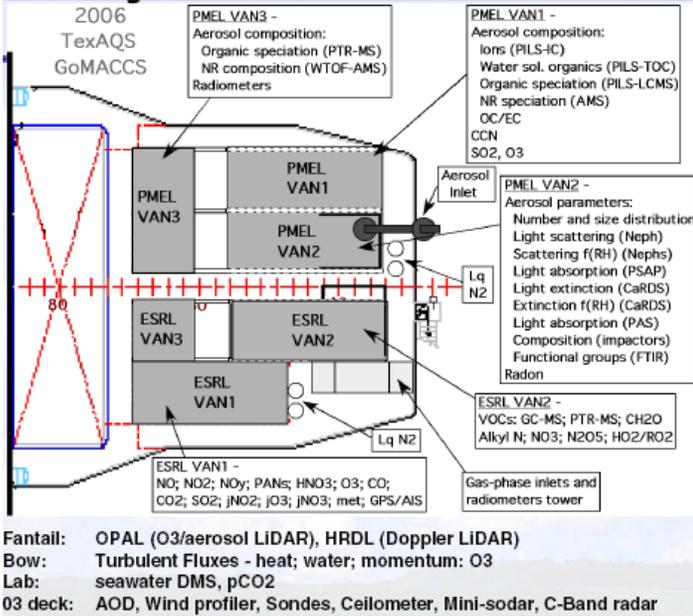


Figure 5-2: The RV Ronald H. Brown and TexAQS II Instrumentation

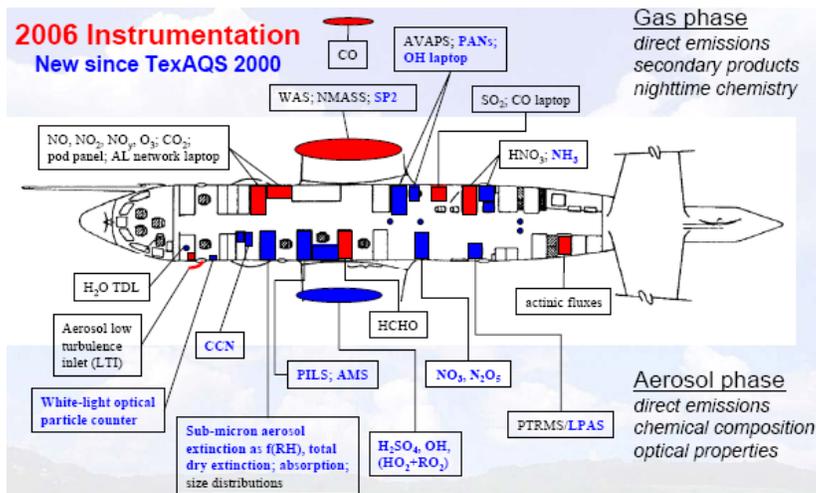
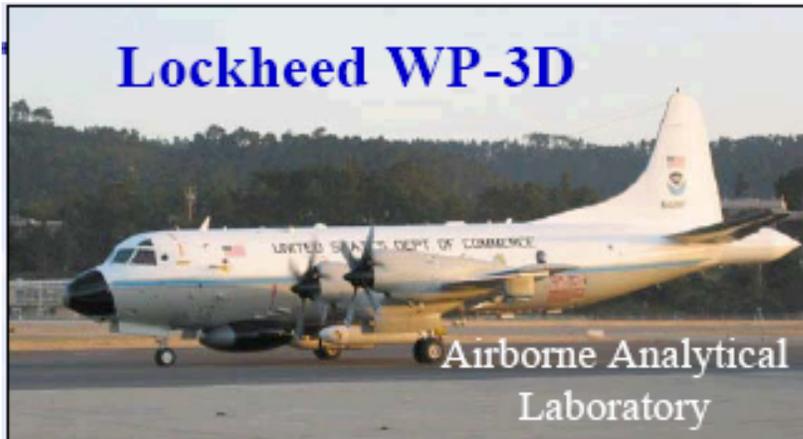


Figure 5-3: The NOAA WP-3 Orion and TexAQS II Instrumentation

5.1.2 Research Questions

The TexAQS 2000 advanced the understanding of the mechanics of ozone formation along the upper Texas coast, yet a number of questions remain unanswered. The TexAQS II was specifically designed to address SIP-related questions, including the following.

- Which local emissions are responsible for the production of high ozone in Houston, Dallas, and eastern and central Texas? Are different kinds of emissions responsible for transient high ozone and eight-hour-average high ozone (i.e., ≥ 84 parts per billion (ppb))?
- How do the structure and dynamics of the planetary boundary layer and lower troposphere affect ozone and aerosol concentrations in Houston, Dallas, and eastern and central Texas?
- Are HRVOC and NO_x emissions and resulting ambient concentrations still at the same levels in Houston as they were in 2000? How have they changed spatially and temporally? Are there specific locations where particularly large quantities of HRVOC are still being emitted? Are those emissions continuous or episodic? How well do the reported emissions inventories explain the observed concentrations of VOC and NO_x ?
- What distribution of anthropogenic and biogenic emissions of ozone and aerosol precursors can be inferred from observations?
- Are there sources of ozone and aerosol precursors that are not represented in the reported emissions inventories?
- How do the mesoscale chemical environments (NO_x -sensitive ozone formation vs. radical-sensitive ozone formation) vary spatially and temporally in Houston, Dallas, and

eastern Texas? Which mesoscale chemical environments are most closely associated with high ozone and aerosol?

- How do emissions from local and distant sources interact to determine the air quality in Texas? What meteorological and chemical conditions exist when elevated background ozone and aerosol from distant regions affect Texas? How high are background concentrations of ozone and aerosol, and how do they vary spatially and temporally?
- How do areas within Texas affect the air quality of nonattainment areas within Texas? How do areas outside of Texas affect the air quality of nonattainment areas within Texas?
- Why does the Statewide Air Pollution Research Center chemical mechanism give different results than Carbon Bond-IV? Which replicates the actual chemistry better?
- How well do forecast air quality models predict the observed ozone and aerosol formation? What are the implications for improvement of ozone forecasts?
- How can observation and modeling approaches be used for determining (i) the sensitivities of high ozone in the HGB nonattainment area to the precursor VOC and NO_x emissions, and (ii) the spatial/temporal variation of these sensitivities?
- What existing observational databases are suitable for evaluating and further developing meteorological models for application in the HGB area?

5.1.3 Rapid Science Synthesis

TexAQS II intensive field study was conducted during August and September when the historically highest and most frequent ozone exceedances occur in the HGB area. Additional scheduling difficulties pushed back the arrival of NOAA's best-equipped airborne platform, the WP-3 Orion, until the end of August, and its mission was not completed until mid-October.

To accelerate the synthesis of the field study data, a team of scientists was formed to provide rapid analysis for each of the SIP-relevant questions above. This project, funded by the TCEQ and led by Ellis Cowling of North Carolina State University and David Parrish of NOAA, provided an early analysis of the most important questions on October 31, 2006, and will provide additional information about the research questions through August 31, 2007, with a final report to be issued on that date. The next section summarizes the preliminary results as of October 12, 2006.

Rapid Science Synthesis Findings as of October 12, 2006

Preliminary results of the 2006 TexAQS II intensive field study were presented at the Rapid Science Synthesis Meeting on October 11-12, 2006; some of these results are presented below. The results indicate that while the magnitude of the ozone concentrations in the HGB area have been reduced, the principal cause of the highest ozone episodes remains unchanged. Further analyses of the TexAQS II data may produce more detailed conclusions and may indicate appropriate future direction for research, monitoring, and modeling.

- Ozone production efficiency from Houston industrial emissions seems to be at approximately the same level as in 2000. The industrial areas of Houston still generally produce more ozone than the urban areas of Houston.
- Measurements of the ratios of CO to NO_x seem to indicate a discrepancy between the MOBILE6 emissions model and the observed ratios.
- Direct emissions of formaldehyde seem to be minor compared to the secondary formation of formaldehyde.
- Concentrations of NO_x in power plant plumes in Houston and eastern Texas seem to be lower than in 2000, in some cases by a factor of three.
- Concentrations of ethene in the industrial areas of Houston and in Brazoria County seem to be substantially lower in 2006 than in 2000. Propene concentrations downwind of the Houston industrial areas in 2006, however, have not decreased as much as ethene.
- Peak ozone concentrations on episode days were lower in 2006 than in 2000.
- Background concentrations of ozone can vary greatly in Houston, depending upon the transport conditions, ranging from 15 ppb to > 80 ppb. Higher background ozone seems

to be related to several consecutive days of transport from the east, which occurred only for a few days during the study period.

- Ozone formed in Houston was observed to be transported within Texas to other areas.
- On a number of days, the peak ozone in the Houston area was found outside the TCEQ Houston monitoring network. This pattern occurred on days with relatively strong winds (greater than 11.2 mph) and no flow reversal.

5.1.4 More Information on TexAQS 2000 and TexAQS II

For more information on the TexAQS 2000 go to <http://www.utexas.edu/research/ceer/texaqs/>.

For more information on TexAQS II see:

http://www.tceq.state.tx.us/implementation/air/airmod/texaqs-files/TexAQS_II.html,

<http://www.utexas.edu/research/ceer/texaqsII/>, and

<http://esrl.noaa.gov/csd/2006/>.

5.2 ONGOING EFFORTS TO IDENTIFY AND REDUCE VOC EMISSIONS

5.2.1 Infrared Gas Imaging Technology

The TCEQ supports using optical gas imaging technology to detect leaks of VOC. Optical gas imaging technology has the potential to advance leak detection and repair (LDAR) work practices and enable monitoring of components that are difficult to monitor with traditional LDAR methods. The technology may also be useful in identifying sources of VOC emissions that are under-estimated, under-reported, unreported, or previously unregulated. However, the commission has technical and enforcement concerns associated with the potential regulatory implementation of this technology. A standardized method or performance specification is necessary to ensure consistent and reliable application of optical gas imaging instrumentation. Methods and specifications are also necessary to set minimum standards of performance to evaluate different potential technologies. The commission does not seek to prescriptively limit optical gas imaging to certain technologies or manufacturers. As with all new and developing measurement technologies, optical gas imaging technology has some limitations that are not completely understood at this time. Based on TCEQ staff experience with gas imaging instruments, the technology can yield highly questionable results when applied to some sources of VOC. The commission is aware that a number of companies are using optical gas imaging instruments to detect VOC leaks in their facilities. Information regarding the field experience of these companies with optical gas imaging technology would be valuable in determining initial source categories for applying the technology in any potential regulatory implementation.

5.2.2 Remote Sensing VOC Project

When the TCEQ and its research partners began TexAQS II in May 2005, one of the study's primary goals was to identify VOC emission sources that have been historically under-estimated, unreported or under-reported in the EI and could potentially be contributing to the discrepancy between measured and reported emissions.

The Remote Sensing VOC Project, one of the first TexAQS II projects, used an infrared imaging camera to observe VOC plumes from various locations around the HGB area during July 2005. The imaging was conducted from a helicopter, a boat, a passenger vehicle, and the San Jacinto Battleground Monument. The significant findings from this observational project indicate that emissions from floating roof storage tanks with landed roofs, barges, and oil field tanks generally have been unreported and thus were not included in the EI.

One result of this project was increased agency scrutiny on the landing loss emissions that occur whenever a tank is drained to a level where its roof lands on its legs or other supports. Tank-for-hire bulk terminal facilities (source identification codes 4225, 4226, and 5171) often land floating roof tanks because they empty their tanks relatively frequently. Figure 5-4: *2004 Reported VOC Emissions in the Houston Ship Channel and Surrounding Area* shows the radius around the ship

channel in which the average total annual reported VOC emissions from 2002 to 2004 was reported to be approximately 14,000 tpy. TCEQ efforts to improve unreported landing loss emissions increased the reported emissions by 6000-7000 tpy in the Houston Ship Channel area alone. Companies that were previously not accounting for tank landing VOC emissions have now submitted plans to decrease landing loss emissions. These companies are in the process of revising permits to reflect both changes in work practices and permitted emissions resulting from tank roof landings. The revised rules in 30 TAC §115.112(d)(2)(H) would also limit emissions from tank roof landings.

The TexAQS II also found that barges are emitting unreported VOC when in transit. The commission currently regulates barges while they are at dockside. In addition to dockside regulations, the TCEQ has been working with the Texas Waterway Operators Association's Tug and Tow Division to revise and improve work practices to minimize barge emissions while in transit. The Louisiana Department of Environmental Quality has also identified barges as a previously unidentified source of VOC emissions and is working to address the source category.

Oil field storage tanks were also found to be a potentially under-reported source of VOC emissions. Plumes were observed coming from 10 percent of the approximately 500 oil field storage tanks observed between Beaumont and Houston. As a result, the Houston Advanced Research Center (HARC) sponsored a project, H-51C, which measured both the flow and concentration of VOC emissions from 33 tank batteries in oil and natural gas fields located in nonattainment areas around the state. Historically, oil field tank VOC emission factors have been estimated using emission models. Using the measured data, emission factors were derived that represent the losses that occur during production. The factors, in pounds of VOC per barrel produced, account for emissions from flash, working, and breathing/standing losses. The goal is that upstream oil and gas operators may use these emission factors to more accurately estimate VOC emissions. The revised rules in 30 TAC §115.112(d)(5) require control of flash emissions equal to or greater than 25 tpy. Additional research in this area is expected, including evaluation of the extent of flash emissions at downstream storage terminals, refineries, and petrochemical plants.

Another observed source of under-reported VOC emissions is pressure tank railcars, which are railcars designed to hold gas under pressure. HARC project 51A sampled fittings on these railcars to derive a VOC emissions factor. This new factor is included in the TCEQ point source guidance for estimating emissions from tank railcars for use in the 2006 emissions inventory. Although these emissions have been historically unreported, under-reported, or under-estimated, they are relatively small compared to emissions from other unreported source categories.

Subsequent agency efforts to identify and control unreported, under-reported, or under-estimated industrial VOC sources identified the following potential sources of concern: liquid heel, tank degassing, wastewater, vacuum cleaning, stored liquid temperature, and sumps.

A liquid heel refers to stock liquid remaining in the bottom of a storage tank after it has been emptied. Liquid heels are responsible for numerous cases of under-reported, unreported, or under-estimated VOC emissions. Degassing a tank with a liquid heel results in VOC emissions because the liquid remaining in bottom of the tank continues to vaporize after the degassing process is completed and those VOC emissions vent to the atmosphere. Cleaning a tank with any liquid heel typically involves rinsing the tank with soap and water. The cleaning process produces wastewater with a significant VOC content and this wastewater typically goes to a wastewater treatment facility where the VOC emissions may evaporate to the atmosphere. Similarly, vacuum cleaning a tank with a liquid heel may result in unexpected emissions. These emissions are difficult to quantify. Revisions to 30 TAC §115.542 will help to reduce VOC emissions from degassing by requiring degassing operations to be controlled until the VOC concentration in the vapor space is less than 34,000 ppmv.

Typically sites estimate their storage tank emissions using ambient temperature, usually 68 degrees Fahrenheit (F). The temperature of a liquid is the biggest variable affecting the emissions from a storage tank. For example, gasoline at 100 degrees Fahrenheit emits significantly more VOC than gasoline at 68 degrees. Therefore, the TCEQ has revised its emissions inventory guidance to ensure that accurate temperatures are used in emissions calculations.

Sumps at marine loading facilities are a potentially significant source of under-estimated, unreported, or under-reported VOC emissions. Left-over liquid in flexible loading lines is often pumped to a sump that is linked to a slop tank (a VOC storage tank). Usually the sump is equipped with an automatic switch that empties the liquid into the slop tank when a predefined volume is reached. If the automatic switch does not engage, then the liquid evaporates out of the sump. These emissions can be reduced by a change in work practice. The TCEQ is addressing under-estimated, unreported, or under-reported emissions from this source category in the 2006 Emissions Inventory Guidelines.

This SIP revision contains a rulemaking that addresses sources of under-estimated, unreported, or under-reported VOC emissions. Section 4.2.2, Control of VOC Emissions from Storage Vessels and Degassing Operations, fully describes the rulemaking that will, among other measures, address under-reported, unreported, or under-estimated VOC emissions from tank landings; from flash emissions; and from degassing storage tanks, transport vessels, and marine vessels with liquid heels.

The TCEQ will work to continue to improve the emissions inventory in an effort to improve all aspects of the SIP.

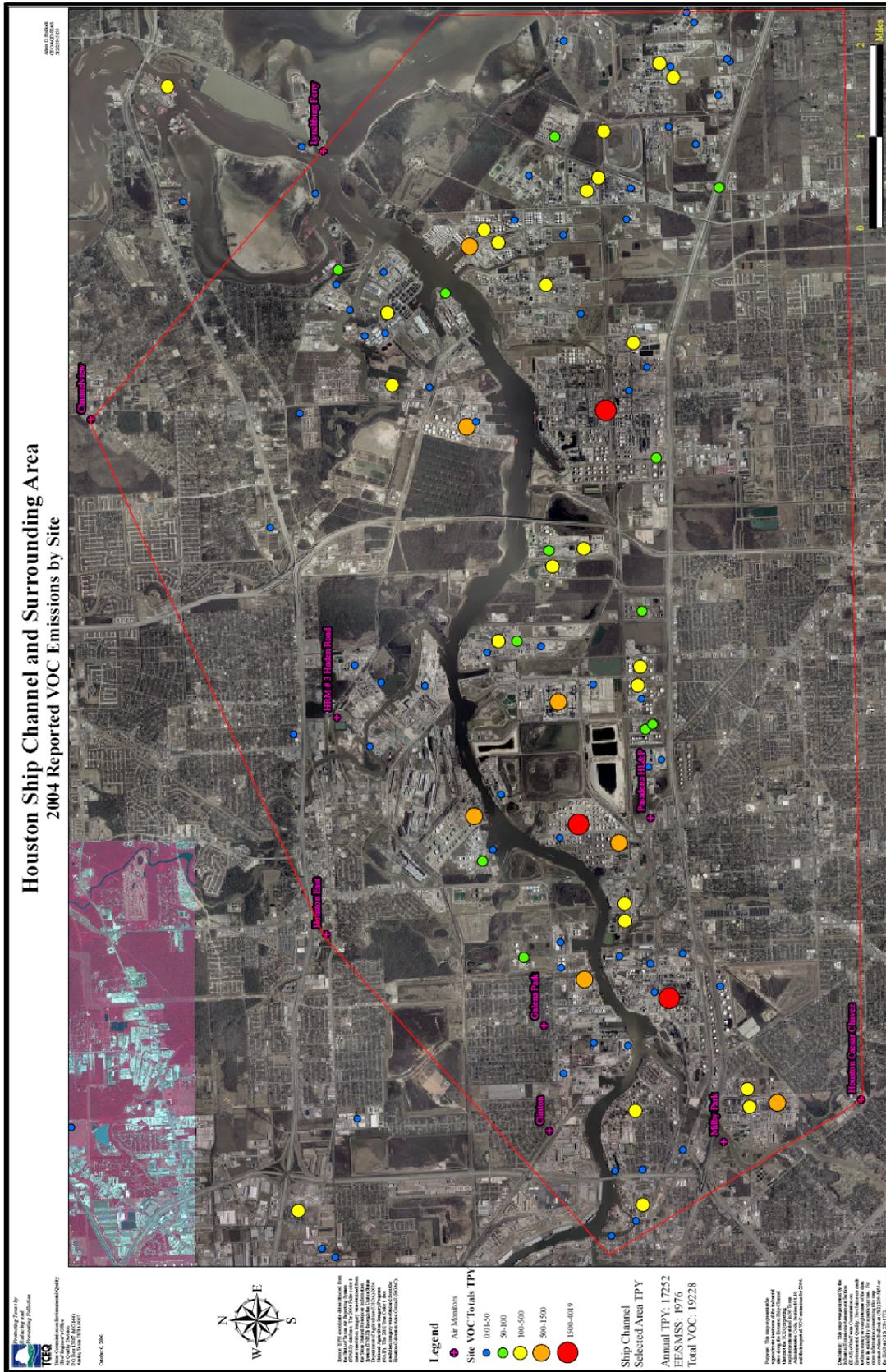


Figure 5-4: 2004 Reported VOC Emissions in the Houston Ship Channel and Surrounding Area

5.3 ONGOING EFFORTS TO REDUCE NO_x EMISSIONS

5.3.1 Routine Vessel Study

The TCEQ, with the assistance of EPA grant funds, initiated a project to identify and count marine vessels that function exclusively in the HGB area or visit the HGB via the Gulf Coast or Intracoastal Waterway at least seven times over an 18-month period. These vessels are collectively referred to as routine vessels. Following identification of the routine vessels, the study estimated emissions and quantified potential emission reductions from the routine vessel fleet. The study was completed in December 2006. The EPA, the TCEQ, other states and local stakeholders can now potentially pursue actions to reduce NO_x, VOC, and particulate matter emissions from the vessels. The first such action is to identify a “national routine fleet” that visits the HGB area and other United States ports on a regular basis, to target emission reduction efforts. Identifying the national marine fleet, would aid EPA’s Blue Skyways program. The second action is to pursue joint business, interstate, and federal partnerships to reduce emissions from these sources.

Draft Study Findings to Date

Preliminary estimates indicate that 46 percent of the routine vessels visiting the HGB area also visit other United States ports. There may be an opportunity to collaborate with other nonattainment ports to identify the national routine fleet and work with these ports to reduce vessel emissions that can benefit several areas. The EPA should play a significant role in these efforts.

Two convenient categorizations of marine vessels are ocean-going vessels and harbor craft. Ocean-going vessels include tankers, offshore service vehicles, cargo or container ships, and cruise ships. Harbor crafts include tug and tow boats and ferries. Study results are described by these categories and types.

Ocean-Going Vessels (OGV):

Tankers

Tankers are, by far, the most frequent OGV routine vessel. 227 tankers visited the Houston Ship Channel 3,045 times in an 18-month period. These vessels primarily visit private petrochemical terminals or “for hire” tank terminals. Preliminary research indicates that many of the routine vessels in this category are oil/product tankers that may visit many HGB terminals on a single trip thus “dwelling” in the ship channel; increases in dwelling increases emissions. In 2009, oil/product tankers are projected to represent 26 percent of NO_x marine emissions (11.24 tpd).

Offshore Service Vessels

The draft report identifies 174 offshore service vessels that visited the HGB area seven or more times in the 18-month window.

Cargo/Container Ships

The general cargo and container ships category includes approximately 50 routine vessels making a combined total of 1,423 port calls over the same 18-month period.

Cruise Ships

Seven cruise ships called on the Galveston Port collectively 245 times. Each ship spent an average of 432 hours in port over the 18-month period.

Harbor Crafts:

Harbor crafts include tugs, tows, and ferries. In 2009, these vessels are expected to account for 29 percent of NO_x marine emissions (12.5 tpd). Harbor vessels may remain in the HGB area 100 percent of the time, or alternatively, they may move throughout the Texas Gulf Coast area or even interstate via the Gulf Coast or the Intracoastal Waterway. The study identified at least 530 tugs and tows that remain in the HGB area most of the time. The TCEQ, together with the Texas Environmental Research Consortium (TERC), is working with the Texas Waterway Operators

Association to identify emission reductions to date, and determine areas and technologies where we can best reduce NO_x and/or VOC from the routine vessels in this sector.

Harbor vessels also pull product barges in the HGB area. These product barges have been identified by the agency as a potential source of VOC emissions. As mentioned in Section 5.1.2, the American Waterway Operators' Tug and Tow Division implemented a project to encourage industry best management practices (BMP) to reduce VOC emissions from barges. Identification of harbor vessels could also aid in recruiting these vessels to participate in the BMP program.

5.3.2 Anticipated Federal Emission Standards on Marine and Railroad Engines

The EPA is proposing new locomotive and marine diesel engine emission standards modeled after the 2007/2010 clean highway and non-road diesel engine program, with an emphasis on achieving large reductions in PM and NO_x emissions as early as possible through the use of advanced emission control technology. These new standards, which could apply as early as 2008, are based on the application of high-efficiency catalytic after-treatment technology enabled by the availability of clean diesel fuel with a sulfur content capped at 15 parts per million. The EPA estimates that the proposed new locomotive and marine engine standards will result in PM reductions of about 90 percent and NO_x reductions of about 80 percent from engines meeting these standards, compared to engines meeting the current standards. The proposed new standards are also expected to yield sizeable reductions in emissions of hydrocarbon (HC), CO, and other air toxics. The EPA is expected to publish the proposed rule in April 2007.

5.4 ONGOING EFFORTS TO CONTROL NO_x EMISSIONS

The existing HGB area NO_x point source controls in the HGB area are among the most stringent in the country. These controls include the Mass Emission Cap and Trade Program (MECT), which has a NO_x emissions cap that declines annually through 2008. The MECT Program has resulted in highly effective post-combustion controls, like selective catalytic reduction. The TCEQ continues to examine possibilities for appropriate additional technically and economically feasible NO_x control measures for point and area sources. In addition, the TCEQ and local governments continually investigate potential control measures for on-road and non-road mobile sources that can help reduce NO_x.

5.5 FUTURE WORK

The next modeling effort for the HGB area is to develop a new ozone episode (using days from 2005 and/or 2006), and the corresponding meteorological characterization and EI development are underway. In establishing a new base case episode year that is more current than 2000, emphasis will be placed on using updated control measure information where available and on replicating measured ozone and precursor concentrations. As described, TexAQS II will provide a wealth of new data and findings, which will support model performance evaluation, and further characterization of ozone formation in the HGB area. Various external organizations have begun modeling exercises using episode days from 2005 and 2006. The TCEQ will review and consider these other modeling efforts as work progresses.

Once the new base case year is established, the future year inventory will be developed and a new future year will be modeled to help determine the emissions reductions needed for the attainment demonstration. Following this determination, the TCEQ will proceed with a series of modeling runs, testing the sensitivity of the future case to reductions in emissions of various source categories and the testing of potential control strategies as needed. The TCEQ will work with stakeholders and interested parties through updates and briefings at the Southeast Texas Photochemical Modeling Committee meetings and other technical and policy workshops and meetings as appropriate.

5.6 FUTURE ATTAINMENT DATE

The TCEQ is committed to attaining the eight-hour ozone standard as expeditiously as practicable.

The ongoing efforts described in this chapter, the development of a new modeling episode, realizing the full effects of implementation of the one-hour ozone control measures, the continued implementation of increasingly lower federal engine emission requirements for on-road and non-road mobile sources, and further research and consideration of additional control strategies, will assist in developing an attainment demonstration for the eight-hour ozone standard in the HGB area.

**Response to Comments Received Regarding the
Houston-Galveston-Brazoria Eight-Hour Ozone Nonattainment Area
State Implementation Plan Revision
Proposed December 13, 2006
Adopted May 23, 2007**

The commission conducted public hearings in Houston, January 29, 2007, 2:00 p.m. and 6:00 p.m.; Dallas, January 31, 2007, 7:00 p.m.; Arlington, February 1, 2007, 2:00 p.m.; Midlothian, February 1, 2007, 6:00 p.m.; Longview, February 6, 2007, 2:00 p.m.; and in Austin, February 8, 2007, 2:00 p.m. During the comment period, which closed on February 12, 2007, the commission received comments from the Bayside Terrace Civic Club (BTCC), Citizens League for Environmental Action Now (CLEAN), Eight Hour Ozone State Implementation Plan Coalition (EOSIPC), Endangered Species Media Project (ESMP), Environmental Systems Products (ESP), Galveston Bay Conservation and Preservation Association (GBCPA), Galveston-Houston Association for Smog Prevention (GHASP), Greater Houston Partnership (GHP), Harris County Judge Robert Eckels (Harris County), Harris County Public Health and Environmental Services (HCPHES), Houston Mayor Bill White (City of Houston), Houston Sierra Club (HSC), Houston-Galveston Area Council (HGAC), Industry Professionals for Clean Air (IPCA), Mothers for Clean Air (MfCA), NRG Texas LP (NRG), State Representative Jessica Farrar (District 148), State Representative Ana E. Hernandez (District 143), Superneighborhood #22 (SUPER), Transportation Policy Council (TPC), Texas Department of Transportation (TxDOT), United States Environmental Protection Agency (EPA) and 33 individuals. Comments regarding specific rules were responded to as part of the individual rule preambles and are included in the SIP through the adoption of those rules.

RESPONSE TO COMMENTS

GENERAL

The CLEAN, EPA, GHASP, Harris County, HCPHES, City of Houston, HSC, IPCA, SUPER, MfCA, State Representative Jessica Farrar, State Representative Ana Hernandez, TPC, TxDOT and eleven individuals commented on the agency's history of failure to attain the standard and/or that this SIP doesn't show attainment of the standard. They also commented that the area should reach attainment as soon as possible.

Harris County, HCPHES, HGAC, City of Houston, and TPC, commented on requesting reclassification.

The CLEAN, HSC, IPCA, MfCA, GHASP, and an individual oppose extending the attainment deadline to 2018. Two individuals do not support extending the deadline in Houston. The HSC commented that the commission should not seek bump-up status and should accept economic sanctions.

The GHASP, HCPHES, HSC, TPC and three individuals also commented on the photochemical modeling presented in the proposal.

The commission is committed to attaining the eight-hour ozone standard in the HGB area as expeditiously as practicable and this SIP revision is the first step in achieving the eight-hour ozone standard in the HGB area.

Because the TCEQ is unable to demonstrate attainment of the eight-hour ozone standard in the HGB area by 2009, the commission removed the proposed photochemical modeling and data analysis documentation from this SIP revision. The TCEQ will continue developing the HGB Eight-Hour Ozone Attainment Demonstration SIP.

As described in the SIP narrative executive summary on pages i - iii, the state is constrained by EPA's eight-hour ozone implementation schedule, the state's inability to regulate on-road and non-road engine standards which represent a large source of emissions, a lack of readily available control measures, and the magnitude of reductions that would be needed to attain the standard by 2009.

This SIP revision contains several strategies that are expected to reduce emissions in the HGB area including revisions to rules in Chapter 114 related to adding marine diesel fuels to the definition of diesel fuel that is subject to the Low Emission Diesel Rule and in Chapter 115 related to under-estimated, unreported, or under-reported volatile organic compounds (VOC) emissions from tank landings, flash emissions, and degassing of storage tanks, transport vessels, and marine vessels with liquid heels. The TCEQ expects that the revisions to the rules in Chapter 115, Storage of Volatile Organic Compounds for the Eight-Hour Ozone Standard rules will improve HGB air quality by removing many tons of VOC from the airshed. The SIP revision also includes a Voluntary Mobile Emission Reduction Program (VMEP) commitment.

Chapter 115

HSC recommended the following specific changes to Tables I(a) and II(a) in the VOC rules for storage tanks and degassing: 1) 1.5 psia liquids should be changed to 0.5 psia; 2) all references to 25,000 gallons should be changed to 10,000 gallons; and 3) all references to 40,000 gallons should be changed to 10,000 gallons. Additional recommendations include changing the minimum control efficiencies from 90 to 95 percent, requiring control of VOC flash emissions from degassing storage tanks with a capacity equal to or greater than 10,000 gallons, and requiring control of VOC emissions from degassing storage vessels, transport vessels, and marine vessels in the HGB area by venting to a control device until VOC vapors are reduced to less than the highest definition of a tank leak or 10,000 ppm.

An individual commented that controls on storage tanks are straightforward and overdue.

After reviewing EI data, staff concluded that the emissions from fixed-roof tanks storing materials with vapor pressures between 0.5 and 1.5 pounds per square inch absolute (psia) was insignificant and that lowering the vapor pressure threshold to 0.5 psia would not provide meaningful VOC emission reductions.

Controls for smaller tanks are less cost effective than controls for larger tanks. Furthermore, based on the 2004 EI, emissions from tanks in the HGB area that would be affected by the suggested change to require controls on tanks as small as 10,000 gallons, would be less than 3 tpd. Because tanks with capacities less than 40,000 gallons storing crude oil or condensate are not required to have controls other than submerged fill, the commission is not requiring control of flash emissions from these small tanks.

The focus of the rulemaking is real VOC emission reductions. Although the rule only requires a control efficiency of 90 percent, many of the control devices in use in fact achieve reductions of 95 percent or more. The commission chooses to focus current efforts on other areas with more significant actual VOC emission reduction potential.

Emission reductions that can be achieved by requiring controlled degassing decrease as the size of the tank (and, thus, the amount of vapor space saturated with VOC) decreases. Control of degassing emissions is generally carried out by outside contractors who bring equipment to the site. The minimum charge for bringing in and operating the equipment is generally the same regardless of the size of the tank to be degassed. Thus, the cost effectiveness for controlling degassing emissions for tanks as small as 10,000 gallons is much higher than for larger tanks.

The purpose of the rule regarding control of degassing is to change the method for demonstrating when sufficient degassing had occurred and not to change the required level of degassing. The 34,000 ppmv level is based on requiring degassing control down to an equivalent partial pressure of 0.5 psia. Because no change to this level was proposed, lowering it is beyond the scope of this rulemaking.

VOLUNTARY MOBILE EMISSION REDUCTION PROGRAM

The HSC commented that in Appendix A, the description of the VMEP Program is inadequate, and lists a number of questions regarding details of the program.

The intention of this appendix is to summarize the VMEP commitments of the local area, and the level of detail provided is adequate to describe the measure and the conservative nature in which reductions were estimated. Additional information about VMEP may be found on the commission website at:

www.tceq.state.tx.us/implementation/air/sip/vmep.html

2002 PERIODIC EMISSIONS INVENTORY

EPA noted that in Section 4.5.4: Emissions Inventory (EI), the 2002 ozone season weekday EI listed in Appendix G of the proposed SIP revision does not correspond with the inventory listed in Tables 2-11 and 2-12 of the RFP SIP. EPA recommended updating the 2002 EI data for both SIPS so that they are consistent.

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

TxDOT questioned whether references to the DFW area in Section 4.5.4 of the HGB area SIP should be changed to HGB.

As stated in Appendix F: *Texas 2002 Periodic Emissions Inventory for the Houston-Galveston-Brazoria Ozone Nonattainment Area*, as required by 40 Code of Federal Regulations 51.915, the Houston-Galveston-Brazoria 2002 Emissions Inventory was submitted to the EPA as part of the Dallas-Fort Worth Five Percent IOP SIP revision in April 2005. Table G-1 and Table G-2 of the 2002 Periodic Emissions Inventory are resubmitted as part of this HGB SIP submittal to comply with the public comment, public notice, and public hearings requirements. While uncommon, SIP revisions pertaining to the entire state can be part of overall SIP revisions that are area-specific. In the case of the April 2005 DFW IOP SIP revision, the statewide periodic emissions inventory was included in the revision, but in the interest of clarity and to be certain that the public had adequate opportunity to comment, the TCEQ included Appendix F in the proposal and now submits it.

REASONABLY AVAILABLE CONTROL TECHNOLOGY (RACT) DEMONSTRATION

EPA suggested the commission certify that the emission specifications and associated control technologies in rule project number 2006-027-SIP-NR represent RACT or above for ozone pollution control. EPA requested verification that VOC RACT requirements are still being met for the following specific source categories in which the RACT determination was made many years ago: §§115.352 – 359, Fugitive Emission Control in Petroleum Refining and Petrochemical Processes; §§115.552 - 553, 115.555 - 557, and 115.559, Petroleum Dry Cleaning Systems; §§115.112 – 119, Storage of Volatile Organic Compounds; §§115.311 – 319, Process Unit Turnaround and Vacuum-producing Systems in Petroleum Refineries; §§115.131 – 139, Water Separation; and §§115.531 – 539, Pharmaceutical Manufacturing. EPA requested the commission confirm that the RACT submittal accounts for all major VOC and NO_x sources of affected sectors within the relevant counties.

The commission appreciates the comment. In the Phase II Implementation Rule published in the *Federal Register* on November 29, 2005, EPA noted in the preamble on page 71655 that current NO_x and VOC RACT guidance could continue to be used by states in making RACT determinations for the eight-hour ozone standard. Additionally, EPA stated that for areas where major sources or source categories were previously reviewed states should review, and if appropriate, accept the initial RACT analysis as meeting RACT for the eight-hour standard. Absent data indicating that the previous RACT determination was no longer appropriate, states would not need to submit a new RACT determination for those sources. In such cases, EPA indicated states should submit a certification as part of its SIP revision, with appropriate information, that these sources are already subject to SIP-approved requirements that still meet the RACT obligation. The commission has revised the RACT demonstration in the proposed SIP that documents that the emission specifications and associated control technologies represent RACT or above. The source categories in the HGB eight-hour ozone nonattainment area have been reviewed and evaluated to determine appropriate emission specifications, control requirements, and associated control technologies for those source categories. The commission determined that the controls adopted with this rulemaking are available, reasonable, and necessary to help the HGB eight-hour ozone nonattainment area make progress toward attaining the eight-hour ozone NAAQS. Moreover, the requirements in §§115.352 – 359, Fugitive Emission Control in Petroleum Refining and Petrochemical Processes, were beyond RACT when they were adopted in 1994 with a leak definition for valves of 500 ppm instead of 10,000 ppm. The commission regulates dry cleaning facilities under 30 TAC Chapter 337.

In addition, the commission has established contingency measures imposing additional control requirements for dry cleaning facilities in §§115.552 - 553, §§115.555 - 557, and §115.559. The level of control for Petroleum Dry Cleaning Systems in 30 TAC Chapters 337 and 115 still represent RACT for this emission source category. Concurrent with this SIP revision, the rules in §§115.112 – 119 for Storage of Volatile Organic Compounds are being revised to address under-reported emissions. Sections 115.311 – 319 for Process Unit Turnaround and Vacuum-producing Systems in Petroleum Refineries, §§115.131 – 139 for Water Separation, and §§115.531 – 539 for Pharmaceutical Manufacturing remain RACT for the HGB area.

EPA requested the commission identify and provide analysis of VOC and NO_x emissions from all major sources in the eight-county HGB eight-hour ozone nonattainment area.

In response to the comment, the commission provided the requested information in Appendix B, Table B-2.

EPA commented that the term “RACT” meaning reasonably available control technology is used or referred to numerous times throughout Chapter 115; however, RACT is not defined in §115.10. EPA recommended that the commission adopt EPA’s long standing definition of RACT from 44 FR 53761, September 17, 1979, as “the lowest emission limitation that a particular source can meet by applying a control technique that is reasonably available considering technological and economic feasibility.”

While the commission agrees with EPA’s definition of RACT, it disagrees with EPA’s suggested change. The term RACT is only used in Chapter 115 as a descriptor to distinguish those standards and requirements the commission has adopted for RACT purposes from those adopted for other purposes. The commission decides what is considered to be RACT for a particular source category during the evaluation phase of rulemaking. Including a definition of RACT in §115.10 would neither clarify the rule nor improve enforcement of the RACT requirements of any particular rule requirement. Therefore, the commission declines to make the suggested change.

EPA commented that on October 5, 2006, the EPA published notice of final determination and availability of control technique guidelines covering lithographic printing materials, flexible packaging printing materials, flat wood paneling coatings, and industrial cleaning solvents. EPA stated that although the current RACT SIP analysis does not need to address these new control technique guidelines the state should consider these new documents in future VOC SIP rule revisions.

The commission appreciates the comment and may consider the control technique guidelines published for these source categories in future VOC rulemakings.

WATER HEATER RULE AMENDMENT OFFSETS

EPA commented that the reductions lost by the water heater rule revision repealing the 10 ng/J standard on residential water heaters may be replaced by excess reductions obtained from minor NO_x sources under a currently effective rule provided the substitutions have not previously received SIP credit, have not been used in SIP modeling for future dates, and will not interfere with any applicable requirement concerning attainment or the CAA. EPA requested an analysis demonstrating that the identified excess emission reductions obtained in place of the reductions that would have resulted from the water heater rule comply with section 110(l) of the Act, and have not been used or credited elsewhere.

As indicated in Section 4.4 of the HGB SIP revision and in the preamble of the Chapter 117 rule revisions (31 TexReg 10543), reductions associated with 30 TAC Chapter 117, Subchapter D, Division 2 (now Subchapter D, Division 1) only include those sources that were part of the Mass Emission Cap and Trade (MECT) Program. The MECT Program includes an uncontrolled design capacity to emit 10 tpy de minimis exemption threshold. A large number of sources in the HGB area are subject to 30 TAC Chapter 117, Subchapter D, Division 2 but are exempt from the MECT Program. While this rule is included in the current approved Texas SIP, the SIP creditable reductions associated with the rule only include those sources that are subject to the MECT Program. As Table 4-1 of the HGB SIP revision shows, the 333.5 tpd reductions for point source NO_x controls were credited to the MECT Program. Boilers located at sites that are exempt from the MECT Program in the HGB area would predominately, if not exclusively, be classified as area sources and are not included in the point source inventory. The area source NO_x reductions credited under the one-hour ozone standard from controls on gas-fired heaters and small boilers is the 0.5 tpd in question from 30 TAC Chapter 117, Subchapter D, Division 1 (now Subchapter E, Division 3). Former Subchapter D, Division 1 applies to boilers, process heaters, and water heaters with a rated capacity up to 2.0 MMBtu/hr. Boilers rated at 2.0 MMBtu/hr or less are exempt from Subchapter D, Division 2; therefore, there is no possibility of potential overlap between the two regulations.

The 0.7 tpd excess emissions estimated from 30 TAC Chapter 117, Subchapter D, Division 2 only include reduction estimates from gas-fired boilers located at sites exempt from the MECT Program. Boilers larger than 400,000 Btu/hr are required to be registered with the Texas Department of Licensing and Registration (TDLR). Some of the information required with this registration includes boiler rating in MMBtu/hr, fuel type, owner, business name, and location. The estimated excess reductions are based on TDLR boiler information by first excluding boilers rated at 2.0 MMBtu/hr and less, and those boilers located at those sources that were known or suspected to be subject to the MECT Program. The majority of remaining boilers were located at sites that would be extremely unlikely to exceed the 10 tpy threshold, e.g., school, hotels, office buildings, dry cleaners, large residential buildings, etc. Conservative estimates of boiler operation as well as business operation were applied to these sources to estimate boiler usage as well as exclude those boilers that would likely qualify for the low fuel usage exemption in the rule. EPA approved AP-42 emission factors were used to estimate uncontrolled NO_x emission rates and reductions were calculated based on the controlled rate of 0.036 lb/MMBtu in the effective rule.

ENERGY EFFICIENCY

City of Houston and Harris County suggested that a variety of energy efficiency measures could be implemented that could result in an estimated 5.1 tpd NO_x reductions locally. An individual asks the TCEQ to encourage solar and wind options for power generation.

The commission encourages local governments to continue to adopt energy efficiency measures and ensure the emission reductions associated with these measures are reported to the State Energy Conservation Office (SECO). SECO provides the commission with an annual report containing this information to better assist with the continued development of Texas' SIP. Choices made regarding power generation sources and methods within Texas are generally outside of the jurisdiction of TCEQ, which has authority only to regulate emissions from generating facilities.

As stated in Section 4.3.1 of the SIP, EE/RE will likely benefit the HGB airshed, but the nature of the electrical grid in a deregulated market and the MECT program in the HGB ozone nonattainment area makes quantifying emission reductions from energy efficiency projects and crediting these emission reductions in the HGB nonattainment area SIP difficult. Additionally, if the TCEQ were able to accurately *estimate* the emission reductions resulting from reduced demand in the HGB area to take numerical credit for the estimated emission reductions, the NO_x cap would need to be reduced in order to assure overall reductions in NO_x in the HGB nonattainment area. For these reasons, the TCEQ has included energy efficiency measures in the narrative portion of the SIP as a qualitative measure, rather than a quantitative one.

TxLED

LOCOMOTIVES

EPA stated its support for including the Texas Low Emission Diesel for Locally Operated Locomotive Engines initiative in the SIP, as included in Section 4.3.6 of Chapter 4, and looks forward to seeing this measure in future technical work.

The TCEQ appreciates the support. Locomotive engines that operate and refuel in the counties affected by the current low emission diesel (LED) regulations are required to use LED. The reductions attributed to locomotive engines using LED under the existing regulations will be accounted for in the eight-hour ozone attainment demonstration.

ADDITIONAL CONTROL MEASURES

GENERAL

EPA, ESP, GBCPA, GHASP, Harris County, City of Houston, HPCPHES, HSC, MfCA, State Representative Farrar, State Representative Hernandez, TPC, TxDOT, and twelve individuals commented that additional control measures should be included or considered in the SIP.

HSC requests that the TCEQ apply all SIP rules and regulations statewide.

As part of developing the HGB eight-hour ozone attainment demonstration, the commission will determine the appropriate emission reductions of NO_x and/or VOC for appropriate source categories. All reasonably available control measures will be considered, as needed, for feasibility as a part of the net process. The application on a statewide basis of the specialized, stringent regulations to which the HGB area is subject would be highly cost-prohibitive for both government and industry and is not necessary because the concentration of sources, the meteorological conditions, and many other factors are unique in the HGB area.

MOBILE SOURCES

Harris County and the City of Houston commented that since voluntary engine reflash is already credited in the model, the commission should implement voluntary engine reflash since it would result in real-world reductions of NO_x concentrations.

The commission agrees that Low-NO_x Reflash can help reduce emissions from heavy-duty diesel engines. To help promote this strategy, the TCEQ is currently working to develop a voluntary approach that will increase awareness among heavy-duty diesel fleet operators.

To determine the potential scope of any efforts to promote the Low-NO_x Reflash, the TCEQ is first working to assess how many vehicles currently on the road would qualify for a reflash. Only engines manufactured between 1993 and 1998 would be impacted by the

Low-NO_x Reflash, and one study from the EPA provides evidence that many of these vehicles may no longer be in service.

To begin laying the foundation for a voluntary approach to promoting the Low-NO_x Reflash, the TCEQ is working cooperatively with EPA Region 6 and other states partnering in the Blue Skyways Collaborative. The TCEQ is pursuing this corridor-wide approach in large part because it will offer the opportunity to address emissions from freight transport fleets that are difficult to isolate to a given region or state, while also providing opportunities to cooperate in promoting the Low NO_x Reflash to delivery fleets, school bus fleets, and other fleets that might operate locally.

Harris County and the City of Houston recommend that the commission establish a control measure for heavy-duty vehicle idling. This control measure could be established with adoption of California idling control measures which require all 2008 or later model year heavy-duty diesel trucks to be equipped with automatic idling shut-off devices. This control measure could include any combination of enabling existing state no-idling rules by municipalities through Memorandums of Agreements with the commission, and mandating or providing incentives for truck stop electrification. The estimated reduction for this control measure is 1 tpd of NO_x.

On April 26, 2006, the commission adopted locally enforceable heavy-duty vehicle idling limitation restrictions that may be enforced by local jurisdictions through a signed memorandum of agreement with the TCEQ. The TCEQ encourages local jurisdictions to enter into an agreement to enforce the restrictions, if they so desire. Further, the commission has invested in truck stop electrification in the HGB area through the TERP program and will continue its assessment of the technology. The commission made no changes to the SIP as a result of this comment.

Harris County and the City of Houston, with an understanding that State legislation may be required, recommend that the commission establish a control measure that provides additional incentives or mandates for government fleet programs. This control measure could be established by encouraging/mandating rapid turnover to newer cleaner technologies among government fleets via greater incentives and/or the adoption of California Low Emission Vehicle (LEV II) emission standards. The estimated reduction for this control measure is 1.5 tpd NO_x. HSC and Mothers for Clean Air (MfCA) also commented that TCEQ should implement the California vehicle emission standards.

The 80th Texas Legislature is considering legislation to revise the Texas Health and Safety Code to establish a low-emission vehicle program that is consistent with Phase II of the California Low-Emission Vehicle Program (Cal LEV II). This legislation would require the commission to adopt and revise rules as necessary to implement the revised statute and maintain consistency with the Cal LEV II program. The TCEQ will proceed as directed by the Legislature on this issue.

An analysis of the potential benefits of adopting CAL LEV II regulations was conducted. This analysis estimated that adopting the CAL LEV II emission standards would reduce NO_x emissions by 0.114 tons per day (tpd) and VOC emissions by 0.115 tpd in the nine-county DFW area in 2010, and reduce NO_x emissions by 2.046 tpd and VOC emissions by 2.349 tpd in 2018 over Federal Tier 2 emissions standards. The benefits are similar for the eight-county HGB area, with a reduction of 0.473 NO_x tpd and 0.433 VOC tpd in 2012, and a reduction of 1.787 NO_x tpd and 1.894 VOC tpd in 2018.

Harris County and the City of Houston, with an understanding that State legislation may be required, recommend that the commission do the following:

- establish a control measure to fully appropriate Low Income Repair and Assistance Program (LIRAP) revenues to assist with suggested program enhancements,
- make improvements to LIRAP by increasing vehicle replacement incentives,
- make improvements to the vehicle inspection/maintenance (I/M) program by increasing the stringency of the I/M program by requiring vehicles to meet a higher emission standard than that which is currently required. The estimated reduction would be 0.8 tpd NO_x by 2009 and 0.3 tpd NO_x,
- make improvements to LIRAP by allocating LIRAP and/or TERP funds to create a revolving loan program to support investments in anti-idling technologies (such as auxiliary power units and truck stop electrification) and/or SmartWay Upgrade Kits (control device/equipment). The estimated reduction would be 0.4 tpd NO_x.

The 80th Texas Legislature is considering legislation to revise the Texas Health and Safety Code to enhance the Low Income Repair, Retrofit, and Accelerated Vehicle Retirement Program (LIRAP) that provides financial assistance to eligible vehicle owners for repair or replacement of older, high-emission vehicles. The commission will proceed as directed by the Legislature on this issue.

Harris County and the City of Houston recommended that the legislature allocate necessary funding to support and expand the Clean School Bus Program.

The TCEQ is ready to implement the program at whatever level of funding is provided by the Texas Legislature.

Harris County and the City of Houston, with an understanding that State legislation may be required, recommend that the commission make improvements to the vehicle inspection/maintenance (I/M) program by increasing its stringency through decreasing the number of waivers given to non-compliant vehicles and increasing LIRAP funding. The estimated reduction is 0.2 tpd NO_x for a 1 percent waiver rate and 0.3 tpd NO_x for a 0 percent waiver rate.

Waivers are authorized by 40 CFR Part 51 and Texas Health and Safety Code 382.203 (c). Statewide, less than 0.5 percent of vehicles that fail the emissions test have been issued waivers in calendar years 2004 through 2006. Texas commitment in the I/M SIP for failing vehicle waivers is not to exceed 3 percent (EPA's default level), so the modeled waiver rate is 3 percent even though the actual waiver rate is 0.5 percent. There would be no real world benefit from changing the modeled waiver rate from 3 percent to 1 percent, but would result in a small (0.2 tpd in 2009) modeled benefit on paper.

Harris County and the City of Houston, with an understanding that local and state government administrative action may be required, recommend that the commission support adoption of a truck lane restriction program that would limit heavy-duty trucks to certain highway lanes. The estimated reduction is 0.1 tpd NO_x.

The commission supports local strategies and initiatives that can be incorporated into the SIP for improving air quality. Truck lane restrictions are within the jurisdiction of the state's Transportation Commission and TxDOT.

Harris County and the City of Houston, with an understanding that local and state government administrative action may be required, recommend providing additional incentives or mandates for government clean contracting programs by adopting TxDOT “clean contracting” principles, which provide incentives for contractors to use cleaner diesel equipment. Based on the incentives, the estimated reduction is up to 1 tpd NO_x. They also recommend including Transportation Control Measures (TCMs) in the SIP in the event that the region’s attainment date is extended; TCMs may include portions of the METRO Solutions transit plan and use of congestion pricing on toll roads.

The commission supports local strategies and initiatives that can be incorporated into the SIP for improving air quality and will include any associated emission reductions in the eight-hour ozone attainment demonstration. This SIP revision reflects such local commitments as transportation control measures and Voluntary Mobile Emission Reduction Program, to date.

Harris County and the City of Houston urged the commission to amend the SIP to include a control measure to expedite the phase-in period of the 2007 engine standards in the HGB area to 100 percent of engine sales in 2007, ahead of the 2010 timeframe, and take actions to ensure the timely development and adoption of necessary regulations for the inclusion of this control measure in the proposed SIP.

The federal emission standards for model year 2007 and newer diesel heavy-duty engines and vehicles under 40 CFR Part 86, Subpart A, allow manufacturers to phase-in the introduction of engines meeting the 2007 emissions standards up through the 2009 model year, with full compliance beginning with the 2010 model year. The commission is preempted by federal law under Section 209(a) of the Federal Clean Air Act from adopting regulations for mobile source engines that are already regulated by federal emission standards.

Harris County and the City of Houston urged the commission to publish and solicit comments on amending the SIP to include a control measure to create a Texas Diesel Testing Center to expedite development and verification of new technologies by amending the New Technology Research and Development (NTRD) Program funding to include creation of a diesel testing center and authorizing funds to go towards this project.

HB 2481, 79th Texas Legislature, in 2005 transferred the administration of the NTRD program from the TCEQ to a non-profit organization based in Houston with the funding for the program to be provided through a contract with the TCEQ. As a result, on January 3, 2006, the agency signed a contract with the Texas Environmental Research Consortium (TERC), a non-profit organization based in Houston, Texas, for administration of the NTRD Program during FY 2006 and FY 2007. The TCEQ contract provides TERC with \$17.6 million in TERP funds to implement the NTRD program for FY 2006-2007. The TERC Board selects grants for possible funding. The TCEQ reviews all grants selected by TERC to verify that the projects meet the statutory requirements. The proposed diesel testing center is not an allowable cost under the statute.

Environmental System Products (ESP) commented that the commission should consider the addition of low pressure evaporative testing for pre-1995 passenger vehicles as a control strategy. ESP states that California Air Resource Board plans to claim a savings of 14 tpd of VOCs. ESP comments that through extrapolating the real world experience of California to the areas of Texas where vehicle testing is performed more than 5 tpd of VOCs would be saved.

Harris County and the City of Houston, with an understanding that State legislation may be required, recommend that the commission make improvements to the I/M program by adopting rules to mandate the use of evaporative tank testers for the regional I/M program. This will be in use in California in 2007. California estimates VOC reduction of 14 tpd by 2010, and a vendor projects VOC reductions of 2.13 tpd for the HGB region.

Preliminary MOBILE6.2 modeling indicates VOC reductions in 2009 using an evaporative tester to be an estimated 0.68 tpd in the HGB area and 0.41 tpd of VOC in 2012. With each passing year, 1995 and older vehicles are responsible for a smaller portion of the overall vehicle miles traveled, and the VOC emission reductions also diminish. California's Air Resource Board report dated November 29, 2005, on implementing a low pressure evaporative test indicates it will increase the inspection cost by \$7.50. The increase in the cost per test with a diminishing fleet of 1995 and older vehicles does not make this a cost effective strategy for consideration.

TEXAS EMISSION REDUCTION PLAN (TERP)

Harris County and the City of Houston commented regarding the study completed by the Texas Environmental Research Consortium (TERC), indicating that NO_x reductions of 45-50 tpd may be conservatively achieved from 2008 to 2012 through the Texas Emissions Reduction Plan if it is extended to 2013 by the Texas Legislature. Harris County/City of Houston and GHASP also recommended extending TERP through at least 2013 and enhancing it through full appropriation of TERP revenue.

EPA states that a promising potential additional control is the Governor's initiative to extend TERP beyond 2008. They state that if extended, the program could reduce ozone-forming emissions in HGB by an additional 35 percent over the current program. The EPA also expressed support for the continued implementation of the TERP program and extending the benefits from the program as appropriate pending legislative action. The EPA states that full funding of the program through 2012 would ensure maximum benefits from the program.

The TCEQ is ready to continue the program beyond 2010 if extended by the legislature. Predicting the effect of extending the TERP funding beyond 2007 is difficult without knowing if funding will be available and if so, at what level.

GHASP recommends increasing the TERP cost-effectiveness limits.

The TCEQ agrees with this recommendation. For the latest round of grant funding, the commission increased the cap on non-road projects to \$10,000. Currently, the maximum cost effectiveness limit prescribed by statute is \$13,000 per ton. An increase in this cost effectiveness limit would give the TCEQ greater ability to encourage participation in the program, especially from those emission sectors with projects that do not currently meet the cost effectiveness limits.

GHASP recommends focusing CMAQ funds on on-road Class 8 Heavy Duty Diesel Vehicles. TERP can then assist by funding clean fuels or provide matching funds.

The commission agrees that use of CMAQ funds are an important tool in addressing the emissions reduction needs of the HGB area. Joint funding by TERP and CMAQ of projects has been difficult due to the different funding sources, requirements, and timing of the funding. However, the TCEQ agrees that it is important to ensure that the two funding

programs can be mutually supportive and work together to result in the maximum amount of emissions reductions.

GHASP recommends increased participation from the construction equipment category.

The commission recognizes the need for maximum participation in the TERP program from the construction equipment sector. To encourage greater participation from this sector in the latest TERP application period, the TCEQ raised the cost per ton cap on non-road projects and established preferences in selection for non-road equipment that will be used on public works projects. The commission will continue to assess ways to encourage participation from this sector.

GHASP's comment on linehaul locomotives asks about an EPA comment that the TCEQ has a project to improve Texas locomotive emissions and its results should be added to the model for the eight-hour SIP. The commenter asks if this project was completed and were the results included in the proposed SIP.

HARC completed a report called the Texas Railroad Emission Inventory Model (TREIM) and Results. The transmittal memo is dated March 9, 2006. Although the emissions summarized in this report are consistent with the modeled inventory, the report was not specifically considered in the proposed SIP. The results of the locomotive emissions project will be incorporated into the new ozone analysis being developed for future modeling of the HGB area.

GHASP's comment on Marine Emissions states that the TCEQ should revise TERP to allow funding for emission reduction projects by ocean-going ships with a high frequency of repeat visits to the Houston region.

The TCEQ agrees that emissions from ocean-going vessels are a source that has yet to be fully addressed in emissions reduction strategies. As noted in the GHASP's comments, on-vessel projects to repower or retrofit engines are difficult, given the transient nature of the vessel traffic and the barriers to ensuring that the funded project would result in long-term emissions reductions in the HGB area. Under current statute, the TERP provisions in Chapter 386 of the Texas Health and Safety Code require that projects funded under the TERP operate at least 75 percent of the time within the eligible areas. The TCEQ will continue to pursue all available alternatives to address the emissions from large vessels.

GHASP's comment on the Technology Verification Process states that unverified technologies, such as Exhaust Gas Recirculation (EGR) and a Diesel Particulate Filter (DPF) retrofit and selective catalytic reduction (SCR) systems are essential to the success of the TERP. TERP should continue to fund technology, research, development, and deployment projects for other promising near-term NO_x reduction technologies through HARC's NTRD and/or laboratories.

The TCEQ agrees that research and development of new emissions reduction technologies are important. The passage of HB 2481, 79th Texas Legislature, in 2005 transferred the administration of the NTRD program from the TCEQ to a non-profit organization based in Houston with the funding for the program to be provided through a contract with the TCEQ. As a result, on January 3, 2006, the agency signed a contract with the Texas Environmental Research Consortium (TERC), a non-profit organization based in Houston, Texas, for administration of the NTRD Program during FY06 and FY07. The TCEQ contract provides TERC with \$17.6 million in TERP funds to implement the NTRD

program for fiscal years 2006 and 2007. The TERC Board selects grants for possible funding. The TCEQ reviews all grants selected by TERC to verify that the projects meet the statutory requirements. The commission encourages TERC to consider NO_x emission reduction technologies in upcoming projects.

MfCA requested that parents from the Houston area be added to the TERP advisory board.

Members of the TERP Advisory Board are appointed by the Governor, Lieutenant Governor, and the Speaker of the Texas House of Representatives. The Lieutenant Governor has responsibility for appointing a member from the environmental community. All meetings of the TERP Advisory Board are open to the public and MfCA is welcome to attend the Board meetings and express their concerns and opinions to the Board members.

PERMITS AND ENFORCEMENT

An individual states that polluters should be held accountable. Another individual is concerned with polluters and permits. She asks the TCEQ to enforce collection of fines and standards. The TCEQ has traditionally shifted fine payment deadlines so that big industry never has to pay. An individual expressed concern about pipes carrying waste and waste storage in the Clinton Drive area. An individual requested that the TCEQ implement a better permit tracking system to help ensure that existing air quality laws are being met.

Permits for construction and operation of facilities that may emit air contaminants must comply with all applicable state and federal requirements including the installation of best available control technology or better the protection of human health and the environment. The TCEQ is required to issue permits to all applicants who meet the applicable legal requirements. Both state and federal law include provisions for criminal liability and a commitment to state enforcement of environmental laws as a required component of the SIP. The public is encouraged to report possible permit violations to the TCEQ Houston regional office at 713-767-3500. The public may submit complaints by calling toll free 1-888-777-3186, by emailing complaint@tceq.state.tx.us or by submitting a complaint online at the TCEQ web site, www.tceq.state.tx.us. The commission has made no changes to the SIP in response to this comment.

Collection of fines is a priority for the agency. Major changes have been made in the last two years to increase enforcement efforts and collect fees and fines due to the agency. The agency's policy is to not process or grant permits and other agency approvals if a company has outstanding fines or fees. The policy defines how fines are calculated and provides the company with options for payment. Detailed information about the policy may be found on the TCEQ web site at www.tceq.state.tx.us/agency/delin/index.html. Regardless of the option for payment chosen, total elimination of the penalty is not allowed.

HSC stated that new types of investigations should be required to ensure compliance with the new rules. HSC considers this to be contradictory to statements in the SIP that indicate, "The state has determined that its fiscal and manpower resources are adequate and will not be adversely affected through the implementation of this plan." HSC requests that the TCEQ hire, train, and fund additional investigators. HSC stated that there is a lack of a penalty policy that deters repeat offenders. Another individual noted that there are not enough investigators currently to monitor and investigate air quality in the region.

Investigation types are regularly modified/added/deleted depending on the priorities and needs of the agency. If TCEQ determines that new SIP compliance investigation typecodes are needed, they will be added to the regions. The State of Texas considers compliance with all federal and state regulatory statutes/rules, including the SIP, a high priority. The State of Texas will, and does allocate resources to the areas that need them most and will continue to do so as priorities and needs dictate. In September 2006, the agency initiated a risk-based strategy for performing investigations of regulated entities (RE). Compliance history, as well as regional knowledge and experience are determining factors in prioritizing sites for investigation. Throughout the year, investigation planning activities are scheduled or modified, depending on the priorities and needs of the agency and the state. As a function of the agency, field investigators conduct regular investigations and records reviews of regulated entities to evaluate compliance with applicable statutes and rules, as well as the terms and conditions of any permit or other authorization for the regulated entity. Regional investigators also conduct investigations in response to complaints received from the public, which may include permit related compliance issues. Any violations of those rules of conditions will be dealt with in accordance with the TCEQ standard operating procedures of the TCEQ Field Operations and Enforcement Divisions.

An individual asks the TCEQ to halt all permitting of coal plants and shut TXU down. Five individuals are opposed to power plants.

The HGB eight-hour ozone attainment demonstration SIP, when developed, will address emissions and controls that are estimated for the future attainment year. Although several facilities are proposed, none of the power plants (except Sandow 5 and JK Spruce 2) have been permitted. Of the facilities proposed, it is impossible to know which facilities will be permitted and constructed, when they will come on line, and what their actual emissions will be. Therefore, it is inappropriate to include proposed facilities in this SIP revision.

TXU has recently indicated its intent to withdraw applications for eight of the eleven proposed facilities pending the resolution of the proposed TXU buy-out. This proposed change in the status of the permit application is another reason why the TCEQ does not factor proposed facilities that have not been permitted into the SIP. It is not within the commission's jurisdiction to regulate utilities other than to ensure that their emissions comply with applicable law and with their permit conditions.

An individual requested that the TCEQ complete a review of previously grandfathered facilities in the HGB area to determine whether or not these facilities have been properly permitted.

The previously grandfathered facilities were required to submit a permit application. Issuance of the permits will be based on a thorough review of the information as represented by the applicant. TCEQ Region office staff conduct investigations to determine compliance with the individual permit and other state and federal regulations as applicable to the type of facility defined by the permit. If the investigation or record review indicates non-compliance or if the investigator finds inconsistencies between the permit authorized operations and the actual operations at the site, the violations will be addressed in accordance with standard operating procedures.

FLARES

IPCA commented that flares are not properly represented in permitting nor adequately controlled by regulation. An individual expressed specific concerns about flares and does not agree with the

EPA's assessment of flare efficiencies. The commenter states that efficiency may be closer to 65-75 percent rather than 98 percent as the EPA claims.

The commission disagrees that flares are not properly represented in permitting nor adequately controlled by regulation. Studies dating back to 1983 have consistently shown that properly operated flares achieve VOC destruction efficiencies in excess of 98 percent. The commenter is correct that industrial-scale flares have not been tested under high wind conditions because obtaining accurate concentration readings in those circumstances is too difficult. Adding too much steam to steam-assisted flares could reduce flare efficiency but the commission is not aware of any documentation supporting the assertion that excess steam is widely used in industry. The potential impact of either of these factors on flare efficiency is reduced when the waste gas flow increases.

Many factors affect flare efficiency. Studies on EPA's claim of 98 percent efficiency indicate that flares are capable of even higher efficiencies as long as the requirements for input heating value are maintained. The commission is continuing to follow research that would allow direct measurement of flare efficiencies. The Differential Absorption Light Ranging and Direction (DIAL) project planned for this summer may look at the ability of the technology to measure flare efficiency. In the absence of compelling evidence to the contrary, the commission will continue to assume that properly operated flares achieve 98 percent efficiency or better.

Furthermore, the TCEQ HRVOC flare monitoring requirements go well beyond those required by any EPA rule, requiring continuous monitoring of heating value and the flow rate of the waste gas stream, the two most important factors influencing flare efficiency.

AMBIENT MONITORING

An individual requested ambient monitoring in Fort Bend County.

The TCEQ is currently monitoring ozone at four sites within one to five miles of Fort Bend County. These sites provide an adequate representation of air quality in Fort Bend County. Currently, there are no federal or state requirements to monitor air quality in Fort Bend County.

An individual commented that emissions monitoring is important since emissions inventories may be underreported.

The commission agrees that emissions monitoring is important. As discussed in Chapter 5, Section 5.5, emission inventories can be improved and should accurately reflect actual emissions. The TCEQ intends to improve emission estimates as a part of the eight-hour ozone attainment demonstration. The TCEQ has acknowledged that improvement is still needed in reported emissions and is spending both internal and external resources to address this. The TCEQ has several procedures in place to evaluate the accuracy of industry reported emissions including audits and investigations.

An individual is concerned that fence line monitoring isn't being done by industry.

The TCEQ recognizes the need and benefit of expanded air quality monitoring in the Houston area and as such has developed an extensive monitoring network. This includes over 30 TCEQ owned sites with 160 monitors in the HGB area. The TCEQ also receives data from numerous other sites operated by local air quality programs, industry or

through TCEQ provided Supplemental Environmental Projects. In addition, the TCEQ receives data from over a dozen industry sponsored sites in the HGB area. Some of these sites are fence-line oriented monitors and some are community or area based monitoring sites.

Even though HGB is a heavily monitored area, not every facility, fenceline, or neighborhood is routinely monitored for air quality using our fixed site network. To augment this monitoring network, the TCEQ use mobile monitors around the state to conducted intensive fence line monitoring. If a significant on-going concern is detected by mobile monitoring, TCEQ has responded with follow-up actions and in some cases required additional fixed site monitoring to be conducted.

PUBLIC AWARENESS

Two individuals request that the TCEQ deliver a tough message on TV and radio to get high visibility to: call upon every citizen in Houston to conserve energy at home, to drive less, to trade in gas-guzzlers and use mass transit; to demand more effective mass transit to demand more of businesses by policing violators and encouraging greater social responsibility; and more stringent environmental regulations and/or financial disincentives.

The TCEQ supports outreach programs to raise awareness about air quality and enhance participation among individuals, large and small businesses, government agencies, and other organizations. Depending on the scope of the campaign, print media, radio and television ads, or billboards may be used to publicize important messages about air quality. Various campaigns sponsored in part by the TCEQ in the Houston area are:

Drive Clean Across Texas – This campaign raises awareness to change attitudes about air pollution and to inspire changes in driving behavior that will help improve the air in Texas. For more information, please see the following website, www.DriveCleanAcrossTexas.org.

AirCheck Texas – This program educates vehicle owners in the Houston-Galveston and Dallas-Fort Worth area that vehicles are required to undergo emissions tests during annual safety inspections. For more information, please see the following website, www.AirCheckTexas.org.

Clean Texas - This program promotes and recognizes enhanced environmental performance achieved by its members. The TCEQ has approved regulatory and non-regulatory incentives for Clean Texas members. All members are offered recognition, technical assistance, and training opportunities. Clean Texas is open to all types of organizations, including industries, businesses, federal facilities, schools, universities, cities, counties, and community organizations. The program offers four levels of participation: Bronze, Silver, Gold, and Platinum. For more information, please see the following website, at www.cleantexas.org.

Texas Recycles Day - Texas Recycles Day is an annual, statewide, public awareness event first launched to encourage Texans to start recycling or to enhance their recycling efforts. Texas Recycles Day served as a model for America Recycles Day, the national event. Held each November 15, Texas Recycles Day is an opportunity to highlight and promote interest in recycling. On this day, thousands of citizens, businesses, civic organizations, and schools will participate in events and educational programs across the state. To join the thousands

of Texans participating in or sponsoring an event visit the website at www.tceq.state.tx.us/assistance/events/trd/TRD.html.

An individual commented that the plan is too confusing for the average citizen to understand. The commenter indicated that there was little information explaining how the goals will be attained and how measurements will be made to determine whether or not those goals had been reached. The commenter further stated that the public and the EPA have been largely excluded from the current SIP process.

The commission appreciates the comment, and acknowledges that the HGB SIP revision is complex, but has made no changes in response to this comment.

Public meetings with interested parties, including local governments, industry, environmental groups, and members of the public were held in October 2006 and in spring 2006 to discuss development of the eight-hour ozone SIP. They included meetings on October 5, 2006, regarding the TxLED marine rule; March 22, 2006, and May 27, 2006, that focused on mobile source (on-road and non-road) control strategy development; March 28, 2006, regarding ports, locomotives, and marine sources; and April 19, 2006, and May 24, 2006, for point and area source control strategy development.

The commission has complied with the requirements for public hearings and notification under 40 CFR 51.102 and 60.23, Texas Government Code, Subchapter B, Chapter 2001, and under the TCAA, THSC, § 382.017. The commission strives to give all citizens of Texas appropriate prior notification and opportunity to comment, including the ability to submit written comments. Hearing notices for this SIP revision were published in the following newspapers: *Austin American-Statesman*, December 18, 2006; *Beaumont Enterprise*, December 18, 2006; *Fort Worth Star-Telegram*, December 18, 2006; *Houston Chronicle*, December 18, 2006; *Longview News-Journal*, December 18, 2006. The SIP was filed for with the Chief Clerk's Office and posted on the TCEQ's website on November 21, 2006. Listserv subscribers received an email on this date notifying the subscribers that these items were proposals pending before the commission. The public hearing notice was filed with the *Texas Register* on December 15, 2006. On this date, another email was sent to listserv subscribers notifying the public that the commission had taken action on these proposals. The TCEQ also provided a 45 day comment period, longer than the required 30 days. These notices also directed the public to the TCEQ web site, where all SIP revision documents and notices are posted.

Information regarding the HGB SIP is available on the web at: <http://www.tceq.state.tx.us/implementation/air/sip/hgb.html#>. This site includes an executive summary memo that explains the purpose of the SIP revision.

The Southeast Texas Photochemical Modeling Committee (SETPMTC) is a TCEQ advisory group organized to assist the agency in addressing technical and scientific issues relating to air quality in the Houston/Galveston/Brazoria (HGB) and Beaumont/Port Arthur (BPA) areas. The SETPMTC includes representatives from industry, county and city government and various environmental groups. The SETPMTC meets in Houston on a regular basis to discuss data and modeling results in a technical framework. Anyone who is interested in these topics may attend this advisory group's meetings and participate in the discussion. The web address for this committee is http://www.tceq.state.tx.us/implementation/air/airmod/committee/pmtc_set.html.

In addition, information about the recent TexAQS II study and the work of the Rapid Science Synthesis Team are listed on the TexAQS II web site:

http://www.tceq.state.tx.us/implementation/air/airmod/texaqs-files/TexAQS_II.html.

On the web site the public can review presentations given by TexAQS II scientists at data analysis workshops and planning meetings. While the information presented there is sometimes in a draft form, interested parties can observe in detail how the field study was planned, how it unfolded over the summer of 2006, and how the data collected during the study are being analyzed to address questions relevant to the SIP.

The Regional Planning Air Quality Committee meets the fourth Thursday of the month at the Houston-Galveston Area Council at 1:30 p.m. Appointed by the H-GAC Board of Directors, the Regional Air Quality Planning Committee is composed of staff of local government agencies, citizen groups, and representatives of business and industry. Personnel from the TCEQ are involved as non-voting members, whose main purpose is to provide information and technical assistance to the committee. The purpose of RAQPC is to assist and advise the H-GAC, regional and local governments, transportation organizations, and other agencies on air quality issues. The public is welcome to attend.

The EPA is intimately involved in the SIP process. The preparation of SIPs is a federal requirement implemented by EPA. All proposed SIPs are submitted to EPA for review and comment, changes are made accordingly, and adopted SIPs are submitted to EPA for approval.

HSC, an individual, and MCA expressed disappointment that the Commissioners did not attend the SIP hearings.

It is not the usual practice of the commissioners to attend public hearings. The commissioners consider and approve each SIP revision before it commences and receive copies of each SIP package, including the record of the public hearings, for review before they consider the matter at agenda. Members of the public are welcome to attend agenda and speak to the commission if they so desire.

An individual commented that it would be more appropriate for the public meeting to be held on the east side of Houston where the majority of industrial emissions are located.

The commission makes every effort to hold hearings in locations and at times that are accessible and convenient to the public and is committed to encouraging public participation. These comments will be considered when future public hearings are scheduled.

SUPPORT FOR TexAQS II

TxDOT recognized improvements in air quality in the HGB area and supports the research efforts of the TexAQS II study to develop effective strategies to reach ozone attainment.

The commission appreciates the support for the TexAQS II study.

INCENTIVES

An individual commented that the current proposal does not provide industry leadership with incentives to meet the challenge of solving Houston's air pollution problems, and that it was not

rational to expect a business to voluntarily absorb the cost of abating pollution when other businesses are not required to incur this cost. The individual further commented that the CAA was originally conceived to be technology forcing and “designed to force regulated sources to develop pollution control devices that might at the time appear to be economically or technologically infeasible,” citing *Whitman v. American Trucking Assoc., Inc.*, 531 U.S. 457, 492 (2001), quoting *Union Elec. Co. v. EPA*, 427 U.S. 246, 257 (1976).

While the commission strives to encourage the development of effective and innovative pollution control devices, prescribing technology forcing emission standards in regulations that are neither economically nor technologically feasible is contrary to the TCEQ mission and agency philosophy.

HEALTH EFFECTS

GBCPA, GHASP, HSC, MfCA, State Representative Farrar, and ten individuals commented that air pollution in the HGB area has negative health effects.

The commission is committed to attaining the eight-hour ozone standard, which is a health-based standard, as expeditiously as practicable in order to adequately protect public health in accordance with the EPA's Eight-Hour Implementation Rule, EPA guidance, and the FCAA.

The primary national ambient air quality standards are those that the EPA determines are necessary, with an adequate margin of safety, to protect the public health, including sensitive members of the population such as children, the elderly, and those with existing lung or cardiovascular conditions. Some air pollutants, including ozone, can aggravate existing respiratory diseases. The primary health concerns for ozone are effects to the lungs and respiratory system. Health effects from ozone generally resolve quickly once an individual is no longer exposed to high levels.

THE ONE-HOUR STANDARD

An individual asks that the TCEQ not transition from measuring ozone under the one-hour ozone standard to the eight-hour ozone standard.

EPA received similar comments expressing concern about the protectiveness of the new eight-hour standard during the comment period for the HGB one-hour ozone attainment demonstration SIP (see 71 FR 52680-81, Sept. 6, 2006). EPA responded to them as follows in its approval of SIP revision: “As we noted in the final Phase I Rule, we determined in the 1997 NAAQS rulemaking (69 FR 23951) that we did not need to retain the one-hour standard to protect public health. Thus, in the 1997 NAAQS rulemaking, EPA concluded that the eight-hour standard would replace the one-hour standard. The issue of whether the one-hour standard is needed to protect public health has not been reopened here and indeed, should be considered only in the context of a national rulemaking reviewing the NAAQS.” The commission agrees with EPA that the merits of the eight-hour ozone standard are not open to debate in this context and are outside the scope of state authority.

Moreover, the emission control measures contained in the one-hour EPA approved SIP have not been abandoned or relaxed in the HGB area under the eight-hour ozone standard.

An individual commented that section 181 of the Federal Clean Air Act (FCAA) sets an attainment date of November 2007 for Houston using one-hour ozone design criteria and Houston failed to attain the November 2007 one-hour ozone standard by Section 181's attainment date two

years ago. The individual noted that in determining compliance with the one-hour ozone attainment date only three exceedances are allowed for the three-year period preceding the attainment date. An area violates the one-hour NAAQS if it has more than three exceedances at a monitor over a three-year period. The individual noted that by the middle of the 2005 ozone season the HGB area had already monitored four exceedances of the one-hour ozone standard. Thus, as a matter of law, Houston will fail to attain the one-hour ozone standard by the compliance deadline.

The individual further noted that even though the one-hour standard is codified in section 181 of the Act, the EPA has announced that it will not enforce the Act's consequences for extreme and severe ozone nonattainment areas that fail to make their section 181 one -hour attainment deadlines. Houston failed to meet this November 2007 deadline the same month the eight-hour standard came into effect. The EPA and TCEQ should not have the option of ignoring the clear mandates and explicit text of the CAA.

An individual commented that sanctions are mandatory under section 181(b)(4) of the FCAA. Specific control regimes of increasing strictness are established for each one-hour ozone classification category. Detailed consequences are established for failures to meet clearly established milestones by specific dates. For the areas of severe or extreme ozone pollution, section 185 of the FCAA creates a set of fees to be paid upon failure to attain the section 181 attainment deadlines. Therefore, if none of the measures implemented under section 182 clean up the ozone pollution, those actually responsible for that pollution are required to pay a fee in direct proportion to their actual responsibility. States must incorporate the fee provision of section 185 into their SIPs.

The one-hour ozone standard was revoked and the HGB area is subject to the eight-hour standard for ozone, and is under a new classification (moderate), so different requirements now apply. EPA's Ozone Implementation Rules specify how nonattainment areas are to transition from the prior standard to the new standard, and EPA has stated its intention to make no further findings regarding the one-hour ozone standard.

If the recent opinion from the United States Court of Appeals, D.C. Circuit, *South Coast Air Quality Mgmt. Dist. v. EPA*, concerning EPA's Phase I eight-hour ozone implementation rule is upheld in whole or in part, EPA will likely need to promulgate new rules and guidance to implement that decision including whether the fees required by FCAA section 185(a) would apply to moderate areas that were previously classified as severe for the one-hour standard.