REVISIONS TO THE STATE IMPLEMENTATION PLAN (SIP)
FOR THE CONTROL OF OZONE AIR POLLUTION

POST-1999 RATE-OF-PROGRESS AND ATTAINMENT DEMONSTRATION FOLLOW-UP SIP
FOR THE HOUSTON/GALVESTON OZONE NONATTAINMENT AREA

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

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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 In 1967, the Clean Air Act of Texas was superceded by a more comprehensive statute, the Texas Clean Air Act (TCAA), found in Article 4477-5, Vernon's Texas Civil Statutes.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 and 1999. 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 TNRCC. With the creation of the TNRCC, the authority over air quality is found in both parts of 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 an 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; conduct research and investigations; enter property and examine records; to prescribe monitoring requirements; to institute enforcement proceedings; to enter into contracts and execute instruments; to formulate rules; to issue orders taking into consideration factors bearing upon health, welfare, social and economic factors, and practicability and reasonableness; to conduct hearings; to establish air quality control regions; to encourage cooperation with citizens' groups and other agencies and political subdivisions of the state as well as with industries and the Federal Government; to establish and operate a system of permits for construction or modification of facilities.

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

B. Applicable Law

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

Statutes

TEXAS HEALTH & SAFETY CODE, Chapter 382	September 1, 2001

TEXAS WATER CODE September 1, 2001

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, §§ 7.051- 7.075
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	September 23, 1999
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	October 20, 1999
Chapter 101: General Air Quality Rules	October 20, 2002
Chapter 106: Permits by Rule, Subchapters A and B	October 20, 2002

Chapter 111: Control of Air Pollution from Visible Emissions and Particulate Matter (formerly known as Regulation I), except amendments effective September 16, 1996 and June 11, 2000	June 11,2000
Chapter 112: Control of Air Pollution from Sulfur Compounds (formerly known as Regulation II)	July 16, 1997
Chapter 113, §113.120, Subchapter A: Control of Air Pollution from Toxic Materials (formerly known as Regulation III)	July 9, 2000
Chapter 114: Control of Air Pollution from Motor Vehicles (formerly known as Regulation IV)	May 28, 2002
Chapter 115: Control of Air Pollution from Volatile Organic Compounds (formerly known as Regulation V)	May 16, 2002
Chapter 116: Permits for New Construction or Modification (formerly known as Regulation VI)	October 20, 2002
Chapter 117: Control of Air Pollution from Nitrogen Compounds (formerly known as Regulation VII)	April 4, 2002
Chapter 118: Control of Air Pollution Episodes (formerly known as Regulation VIII)	March 5, 2000
Chapter 122, § 122.122: Potential to Emit	September 20, 1993

SECTION VI. CONTROL STRATEGY

A. Introduction (Revised)

B. Ozone (Revised)

1. *Dallas/Fort Worth* (No change since April 2000 revision)
2. *Houston/Galveston* **(Revised)**
   - Chapter 1: General **(Revised)**
   - Chapter 2: Emissions Inventory (No change since September 2001 revision)
   - Chapter 3: Photochemical Modeling (No change since December 2000)
   - Chapter 4: Data Analysis (No change since December 2000 revision)
   - Chapter 5: Rate-of-Progress (No change since September 2001 revision)
   - Chapter 6: Required Control Strategy Elements **(Revised)**
   - Chapter 7: Future Attainment Plans **(Revised)**
3. *Beaumont/Port Arthur* (No change since April 2000 revision)
4. *El Paso* (No change since July 1996 revision)
5. *Regional Strategies* (No change since April 2000 revision)

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

I. Site Specific (No change.)

J. Mobile Sources Strategies (No change.)

1. *Inspection/Maintenance* (No change since December 2000 revision)
2. *Transportation Control Measures* (No change since May 2000 revision)
3. *Vehicle Miles Traveled* (No change since May 2000 revision)
4. *Clean Gasoline* (No change since June 1999 revision)

LIST OF ACRONYMS

ACT - Alternative Control Techniques
AFV - Alternative Fuel Vehicle
AIRS - Aerometric Information Retrieval System
APA - Administrative Procedure Act
ARACT - Alternate Reasonably Available Control Technology
ARPDB - Acid Rain Program Data Base
ASC - Area Source Categories
ASE - Alliance to Save Energy
ASM - Acceleration Simulation Mode
ATA - Airline Transport Association
ATC - Air Traffic Control
BACT - Best Available Control Technology
BEIS - Biogenic Emissions Inventory System
BEIS-2 - Biogenic Emissions Inventory System, version2
BELD - Biogenic Emissions Land Cover Database
BIF - boilers and industrial furnaces
BIOME - Biogenic Model for Emissions
BPA - Beaumont/Port Arthur
Cal LEV - California Low Emission Vehicle
CAM - Compliance Assurance Monitoring
CAMS - Continuous Air Monitoring Station
CAMx - Comprehensive Air Model with Extensions
CARB - California Air Resources Board
CARE - Clean Air Responsibility Enterprise
CB-IV HC - Carbon Bond IV Hydrocarbon
CFR - Code of Federal Regulations
CEMS - Continuous Emissions Monitoring System
CMAQ - Congestion Mitigation and Air Quality
CMSA - Consolidated Metropolitan Statistical Area
CNG - Compressed Natural Gas
CO - Carbon Monoxide
CO_2-Cardon Dioxide
COAST - Coastal Oxidant Assessment for Southeast Texas
CTG - Control Technique Guidelines
DART - Dallas Area Rapid Transit
DERC - Discrete Emission Reduction Credit
DFW - Dallas/Fort Worth
DFWN - Dallas/Fort Worth North
DFWRTM - Dallas/Fort Worth Regional Travel Model
DOW - Day of Week
DPS - Department of Public Safety
DRI - Desert Research Institute
DV - Design Value
EDFW - Extended Dallas/Fort Worth
EGAS - Economic Growth Analysis System
EGF - Electric Generating Facilities

EGR - Exhaust Gas Recirculation
E-GRID- Emissions and Generation Resource Integrated Database
EI - Emissions Inventory
EIA- Energy Information Administration
EIP- Economic Incentive Program
EIQ - Emissions Inventory Questionnaire
ELP - El Paso
EPA - U.S. Environmental Protection Agency
EPN - Emission Point Number
ERC - Emission Reduction Credit
ERCOT- Energy Reliability Council of Texas
ERG - Eastern Research Group
ETR - Employer Trip Reduction
ETS/CEM- Emissions Tracking System/Continuous Emissions Monitoring
FAA - Federal Aviation Administration
FACA - Federal Advisory Committee Act
FCAA - Federal Clean Air Act
FCIAC- Fuel Cell Initiative Advisory Committee
FERC- Federal Energy Regulatory Commission
FMVCP - Federal Motor Vehicle Control Program
FR - Federal Register
FTE - Full Time Equivalent Employee
FTP- Federal Test Procedures
FTP - File Transfer Protocol
g/hp-hr - Grams Per Horsepower-Hour
GIS - Geographic Information System
GloBEIS - Global Biogenic Emissions Inventory System
g/mi - Grams Per Mile
GPM-Gallons Per Minute
GSE - Ground Support Equipment
GVWR - Gross Vehicle Weight Rating
HAP - Hazardous Air Pollutant
HAXL - Houston Air Excellence in Leadership
HB - House Bill
HC - Hydrocarbon
HDD - Heavy-duty Diesel
HDDV - Heavy-duty Diesel Vehicle
HDEWG - Heavy Duty Engine Working Group
HDV - Heavy-duty Vehicle
HGA - Houston/Galveston
HGAC - Houston-Galveston Area Council
HON - Hazardous Organic NESHAPS
HOV - High Occupancy Vehicle
hp - Horsepower
HPMS - Highway Performance Monitoring System
HRM - Houston Regional Monitoring
HRVOC- Highly Reactive Volatile Organic Compound
ICI - Industrial, Commercial, and Institutional

IIG - Interim Implementation Guidance
IIP - Interim Implementation Plan
I/M - Inspection and Maintenance
INIT - Initial Condition Tracer
ITWS - Integrated Terminal Weather System
IWW - Industrial Wastewater
KG/HA - Kilograms/hectare
KM - Kilometer
kWh- kilowatt-hour
LBNL- Lawrence Berkeley National Laboratory
LDAR- Leak Detection And Repair
LDT - Light-Duty Truck
LED - Low Emission Diesel
LEV - Low Emission Vehicle
LNG - Liquefied Natural Gas
LSG - Low Sulfur Gasoline
m - Meter
MACT - Maximum Achievable Control Technology
MDERC - Mobile Discrete Emission Reduction Credit
MERC - Mobile Emission Reduction Credit
METT - Mass Emissions Transient Testing
MMBtu - Million British Thermal Unit
MPA - Metropolitan Planning Area
MWh-Megawatt Per Hour
MY - Model Year
NAAQS - National Ambient Air Quality Standard
NCDC - National Climatic Data Center
NCTCOG - North Central Texas Council of Governments
NEGU - Non-electric Generating Units
NERC- North American Electric Reliability Council
NESHAPS - National Emission Standards for Hazardous Air Pollutants
NET- National Air Pollutant Emission Trends
NEVES - Non-road Engine and Vehicle Emission Study
NHSDA - National Highway System Designation Act
NLEV - National Low Emission Vehicle
NNSR - Nonattainment New Source Review
NO_x - Nitrogen Oxides or Oxides of Nitrogen
NO_y - Nitrogen Species
NSR - New Source Review
NWS - National Weather Service
O_3 - Ozone
OAQPS - Office of Air Quality Planning and Standards
OBD - On-Board Diagnostics
OSAT - Ozone Apportionment Technology
OTAG - Ozone Transport Assessment Group
OTAQ - Office of Transportation and Air Quality
PAMs - Photochemical Assessment Monitoring Sites
PCA- Power Control Area

PCV - Positive Crankcase Ventilation
PEI - Periodic Emissions Inventory
PEMS- Predictive Emissions Monitoring System
PM_{10} - Particulate Matter less than 10 microns
ppb - Parts Per Billion
ppm - Parts Per Million
ppmv - Parts Per Million by Volume
PSDB - Point Source Database
PSIA - Pounds per Square Inch Absolute
PSIG- Pounds per Square Inch Gauge
PUC- Public Utility Commission
QA/QC - Quality Assurance/Quality Control
RACM- Reasonably Available Control Measure
RACT - Reasonably Available Control Technology
RAQPC - Regional Air Quality Planning Committee
RAZ - Regional Analysis Zone
RCTSS - Regional Computerized Traffic Signal System
RFG - Reformulated Gasoline
REMI - Regional Economic Modeling, Inc.
RFO - Request for Offer
ROP - Rate-of-Progress
RPM - Revolutions Per Minute
RSD - Remote Sensing Device
RVP - Reid Vapor Pressure
SAE - Society of Automotive Engineers
SAIMM - Systems Applications International Meteorological Model
SB - Senate Bill
SCAQMD - South Coast Air Quality Management District [Los Angeles area]
SCC - Source Classification Code
SCR- Selective Catalytic Reduction
SCRAM - Support Center for Regulatory Air Models
SECO- State Energy Conservation Office
SETRPC - Southeast Texas Regional Planning Commission
SIC - Standard Industrial Classification
SIP - State Implementation Plan
SITWC - Spark Ignition Three-Way Catalyst
SO_2 - Sulfur Dioxide
SO_x - Sulfur Compounds
SOCMI - Synthetic Organic Chemical Manufacturing Industry
SOS - Southern Oxidants Study
SPP- Southwest Power Pool
SULEV - Super-Ultra-Low Emission Vehicle
TAC - Texas Administrative Code
TACB - Texas Air Control Board
TAFF - Texas Alternative Fuel Fleet
TCAA - Texas Clean Air Act
TCEQ- Texas Commission on Environmental Quality (commission; formerly TNRCC)
TCF - Texas Clean Fleet

TCM - Transportation Control Measure
TERP- Texas Emission Reduction Plan
TIP - Transportation Implementation Plan
TMC - Texas Motorist's Choice
TMO - Transportation Management Organization
TNMOC - Total nonmethane organic compounds
TNRCC - Texas Natural Resource Conservation Commission (commission)
TPD- Tons Per Day
TPOD - Tons Per Ozone Day
TPY - Tons Per Year
TSP - Total Suspended Particulate
TTI - Texas Transportation Institute
TxAQS- Texas 2000 Air Quality Study
TxDOT - Texas Department of Transportation
UAM - Urban Airshed Model
UHI-Urban Heat Island
USDA - United States Department of Agriculture
USGS - United States Geological Survey
UTM - Universal Transverse Mercator
VAVR - Voluntary Accelerated Vehicle Retirement
VERP - Voluntary Emission Reduction Permit
VID - Vehicle Identification Database
VIN - Vehicle Identification Number
VIR - Vehicle Inspection Report
VMAS - Vehicle Mass Analysis System
VMEP - Voluntary Mobile Source Emissions Reduction Program
VMT - Vehicle Miles Traveled
VNR or VNRAT- VOC-NO_x ratios
VOC - Volatile Organic Compound
VRF - Vehicle Repair Form
WOE - Weight of Evidence
ZEV - Zero Emission Vehicle

VI: Ozone Control Strategy

A. INTRODUCTION

This introduction is intended to provide the reader with a broad overview of the SIP revisions that have been submitted to the EPA by the State of Texas. Some sections may be obsolete or superseded by new revisions, but have been retained for the sake of historical completeness. The reader is referred to the body of the SIP for details on the current SIP revision.

Requirements for the SIP specified in 40 CFR Part 51.12 provide that "...in any region where existing (measured or estimated) ambient levels of pollutant exceed the levels specified by an applicable national standard," the plan shall set forth a control strategy which shall provide for the degree of emission reduction necessary for attainment and maintenance of such national standard." Ambient levels of SO_2 and NO_x, as measured from 1975 through 1977, did not exceed the national standards set for these pollutants anywhere in Texas. Therefore, no control strategies for these pollutants were included in revisions to the Texas SIP submitted on April 13, 1979. Control strategies were submitted and approved for inclusion in the SIP for areas in which measured concentrations of ozone, TSP, or CO exceeded an NAAQS during the period from 1975 to 1977. On October 5, 1978, the Administrator of the EPA promulgated a lead ambient air quality standard. The FCAA Amendments of 1977 required that each state submit an implementation plan for the control of any new criteria pollutant. A SIP revision for lead was submitted in March 1981.

The control strategies submitted in 1979 provided, by December 31, 1982, the amount of emission reductions required by EPA policy to demonstrate attainment of the primary NAAQS, except for ozone, in the Harris County nonattainment area. For that area, an extension to December 31, 1987 was requested, as provided for in the FCAA Amendments of 1977.

Supplemental material, including emission inventories for VOCs and TSP submitted with the 1979 SIP revisions, is included in Appendices H and O of the 1979 SIP submittal.

Proposals to revise the Texas SIP to comply with the requirements of the FCAA Amendments of 1977 were submitted to EPA on April 13, November 2, and November 21, 1979. On December 18, 1979 (44 FR 75830-74832), EPA approved the proposed revision to the Texas SIP relating to vehicle inspection and maintenance and extended the deadline for attainment of the NAAQS for ozone in Harris County until December 31, 1987 (see Appendix Q of the 1979 SIP submittal for the full text of the extension request and the approval notice). On March 25, 1980 (45 FR 19231-19245), EPA approved and incorporated into the Texas SIP many of the remaining provisions included in the proposals submitted by the state in April and November 1979. The March 25, 1980 *Federal Register* notice also included conditional approval of a number of the proposed SIP revisions submitted by the state.

Additional proposed SIP revisions were submitted to EPA by the state on July 25, 1980 and July 20, 1981 to comply with the requirements of the March 25, 1980 conditional approvals. By May 31, 1982, all of the proposed revisions to the Texas SIP submitted to EPA in April and November 1979, July 1980, and July 1981, with the exception of provisions relating to the definition of major modification used in NSR and certain portions of the control strategy for TSP in Harris County, had been fully approved or addressed in a *Federal Register* notice proposing final approval. The NSR provisions were approved on August 13, 1984.

The FCAA Amendments of 1977 required SIPs to be revised by December 31, 1982 to provide additional emission reductions for those areas for which EPA approved extensions of the deadline for attainment of the NAAQS for ozone or CO. In 1982 the state submitted a revision to the Texas SIP to comply with the FCAA Amendments of 1977 and EPA rules for 1982 SIP revisions. Supplementary emissions inventory data and supporting documentation for the revision were included in Appendices Q through Z of the 1982 SIP submittal.

The only area in Texas receiving an extension of the attainment deadline to December 31, 1987 was Harris County for ozone. Proposals to revise the Texas SIP for Harris County were submitted to EPA on December 9, 1982. On February 3, 1983, EPA proposed to approve all portions of the plan except for the Vehicle Parameter I/M Program. On April 30, 1983, the EPA Administrator proposed sanctions for failure to submit or implement an approvable I/M program in Harris County. Senate Bill 1205 was passed on May 25, 1983 by the Texas Legislature to provide the Texas Department of Public Safety with the authority to implement enhanced vehicle inspection requirements and enforcement procedures. On August 3, 1984, EPA proposed approval of the Texas SIP pending receipt of revisions incorporating these enhanced inspection procedures and measures ensuring enforceability of the program. These additional proposed SIP revisions were adopted by the state on November 9, 1984. Final approval by EPA was published on June 26, 1985.

Although the control strategies approved by EPA in the 1979 SIP revisions were implemented in accordance with the provisions of the plan, several areas in Texas did not attain the primary NAAQS by December 31, 1982. On February 23, 1983, EPA published a *Federal Register* notice identifying those areas and expressing the intent to impose economic and growth sanctions provided in the FCAA. However, EPA reversed that policy in the November 2, 1983 *Federal Register*, deciding instead to call for supplemental SIP revisions to include sufficient additional control requirements to demonstrate attainment by December 31, 1987.

On February 24, 1984, the EPA Region 6 Administrator notified the Governor of Texas that such supplemental SIP revisions would be required within one year for ozone in Dallas, Tarrant, and El Paso Counties and CO in El Paso County. The TACB requested a 6-month extension of the deadline (to August 31, 1985) on October 19, 1984. EPA approved this request on November 16, 1984.

Proposals to revise the Texas SIP for Dallas, Tarrant, and El Paso Counties were submitted to EPA on September 30, 1985. However, the revisions for Dallas and Tarrant Counties did not provide sufficient reductions to demonstrate attainment of the ozone standard and on July 14, 1987, EPA published intent to invoke sanctions. Public officials in the two counties expressed a strong desire to provide additional control measures sufficient to satisfy requirements for an attainment demonstration.

A program of supplemental controls was taken to public hearings in late October 1987. As a result of testimony received at the hearings, a number of the controls were modified and several were deleted, but sufficient reductions were retained to demonstrate attainment by December 31, 1991. These controls were adopted by the TACB on December 18, 1987 and were submitted to EPA as proposed revisions to the SIP. Supplemental data and supporting documentation are included in Appendices AA through AO of the 1987 SIP submittal.

The FCAA Amendments of 1990 authorized EPA to designate areas failing to meet the NAAQS for ozone as nonattainment and to classify them according to severity. The four areas in Texas and their respective classifications include: HGA (severe), BPA (serious), ELP (serious), and DFW (moderate).

The FCAA Amendments required a SIP revision to be submitted for all ozone nonattainment areas classified as moderate and above by November 15, 1993, which described in part how an area intends to decrease VOC emissions by 15%, net of growth, by November 15, 1996. The amendments also required all nonattainment areas classified as serious and above to submit a revision to the SIP by November 15, 1994, which described how each area would achieve further reductions of VOC and/or NO_x in the amount of 3.0% per year averaged over three years and which includes a demonstration of attainment based on modeling results using the UAM. In addition to the 15% reduction, states were also required to prepare contingency rules that would result in an additional 3.0% reduction of either NO_x or VOC, of which up to 2.7% may be reductions in NO_x. Underlying this substitution provision is the recognition that NO_x controls may effectively reduce ozone in many areas and that the design of strategies is more efficient when the characteristic properties responsible for ozone formation and control are evaluated for each area. The primary condition to use NO_x controls as contingency measures is a demonstration through UAM modeling that these controls will be beneficial toward the reduction of ozone. These VOC and/or NO_x contingency measures would be implemented immediately should any area fall short of the 15% goal.

Texas submitted rules to meet the ROP reduction in two phases. Phase I consisted of a core set of rules comprising a significant portion of the required reductions. This phase was submitted by the original deadline of November 15, 1993. Phase II consisted of any remaining percentage toward the 15% net of growth reductions, as well as additional contingency measures to obtain an additional 3.0% of reductions. Phase II was submitted by May 15, 1994. The complete list of contingency measures was submitted by November 15, 1994. The appropriate compliance date was to be incorporated into each control measure to ensure that the required reductions would be achieved by the November 15, 1996 deadline. A commitment listing the potential rules from which the additional percentages and contingency measures were selected was submitted in conjunction with the Phase I SIP on November 15, 1993. That list of Phase II rules was intended to rank options available to the state and to identify potential rules available to meet 100% of the targeted reductions and contingencies. Only those portions of the Phase II rules needed to provide reasonable assurance of achieving the targeted reduction requirements were adopted by the commission.

The DFW and ELP areas achieved sufficient reductions with the 15% ROP SIP to demonstrate attainment by 1996. Attainment Demonstration SIP Revisions for these two areas were submitted on September 14, 1994.

The FCAA Amendments of 1990 classified the BPA area as a serious nonattainment area. The BPA nonattainment area includes Hardin, Jefferson, and Orange Counties. The BPA nonattainment area has an ozone design value of 0.16 ppm, which places the area in the serious classification.

The FCAA Amendments of 1990 required a Post-96 ROP SIP revision and accompanying rules to be submitted by November 15, 1994. According to the FCAA Amendments, this submittal had to contain an Attainment Demonstration based on UAM. Additionally, the revision had to demonstrate how the HGA and BPA nonattainment areas intended to achieve a 3% per year reduction of VOC and/or NO_x until the year 2007, and additional reductions as needed to demonstrate modeled attainment. The plan was also required to carry an additional 3% of contingency measures to be implemented if the nonattainment area fails to meet a deadline. To use NO_x reductions for all or part of the Post-96 controls or the contingency measures required a demonstration using UAM showing that NO_x controls would be beneficial in reducing ozone.

On November 9, 1994, the state submitted a SIP revision designed to meet the 3% per year ROP requirements for the years 1997-1999. This Post-96 ROP SIP revision detailed how the BPA and HGA nonattainment areas intended to achieve these three years' reductions of VOC (or 9% net-of-growth). Most of this amount was achieved by quantifying additional reductions due to existing rules and reductions due to federally-mandated rules. Rules to achieve the further reductions needed to meet the ROP SIP goal were submitted to EPA on January 11, 1995. This submittal included modeling demonstrating progress toward attainment, using a 1999 future year emissions inventory.

On August 14, 1994, the state submitted preliminary UAM modeling results for the BPA and HGA nonattainment areas that showed the relationship between emission levels of VOC and NO_x, and ozone concentrations. This modeling was conducted with a 1999 future year emissions inventory. Based on the results of this preliminary modeling, which showed that NO_x reductions might increase ozone concentrations, on April 12, 1995 the state received a temporary §182(f) exemption from all NO_x requirements, including RACT, I/M, NO_x NSR, and transportation conformity requirements. Permanent §182(f) exemptions from all NO_x requirements were granted for DFW and ELP, and temporary exemptions until December 31, 1996 for HGA and BPA. The commission subsequently requested that EPA extend this date until December 31, 1997. EPA approved this 1-year extension on May 14, 1997.

On March 2, 1995, Mary Nichols, EPA Assistant Administrator for Air and Radiation, issued a memo which gave states some flexibility to design a phased Attainment Demonstration. It provided for an initial phase which was intended to continue progress in reducing levels of VOC and/or NO_x, while giving states an opportunity to address scientific issues such as modeling and the transport of ozone and its precursor pollutants. The second phase was designed to draw upon the results of the scientific effort and design a plan to bring the area into attainment. To constitute Phase I under this approach, the EPA guidance required that states submit the following SIP elements by December 31, 1995:

- Control strategies to achieve reductions of ozone precursors in the amount of 3% per year from the 1990 baseline EI for the years 1997, 1998, and 1999.
- UAM modeling through the year 1999, showing the effect of previously-adopted control strategies which were designed to achieve a 15% reduction in VOCs from 1990 through 1996.
- A demonstration that the state has met the VOC RACT requirements of the FCAA Amendments.
- A detailed schedule and plan for the "Phase II" portion of the attainment demonstration which will show how the nonattainment areas can attain the ozone standard by the required dates.
- An enforceable commitment to:
  - Participate in a consultative process to address regional transport;
  - Adopt additional control measures as necessary to attain the ozone NAAQS, meet ROP requirements, and eliminate significant contribution to nonattainment downwind; and
  - Identify any reductions that are needed from upwind areas to meet the NAAQS.

Texas submitted the first two of these required sections in November 1994. The remaining three, a VOC RACT demonstration, the required commitments, and a Phase II plan and schedule, were submitted on January 10, 1996 to EPA.

ROP SIP modeling was developed for the HGA nonattainment area in two phases using the UAM. The first phase of ROP modeling was the modeling submitted in January 1995, as described above. The second phase of the ROP modeling was conducted using data obtained primarily from the COAST project, an intensive 1993 field study. The COAST modeling for HGA and the associated SIP were projected to be completed by December 1996 for submittal in May of 1997. Control strategies developed

in this second phase were planned to be based on a more robust database, providing a higher degree of confidence that the strategies would result in attainment of the ozone NAAQS or target ozone value. A discussion of the schedule for the UAM modeling for the Phase II Attainment Demonstration can be found in Appendix 11-F of the January 10, 1996 submittal.

On January 29, 1996, EPA proposed a limited approval/limited disapproval for the Texas 15% ROP SIP revision. EPA proposed a limited approval because the SIP revision would result in significant emission reductions from the 1990 baseline and would, therefore, improve air quality. Simultaneously, the EPA proposed a limited disapproval because it believed that the plan failed to demonstrate sufficient reductions to meet the 15% ROP requirements. It also proposed a limited approval/disapproval of the contingency plans (designed to achieve an additional 3% of reductions if needed because a milestone is missed) along the same lines as the 15% action. EPA stated that some of the control measures submitted along with the SIP revision did not meet all of the requirements of the FCAA Amendments of 1990 and, therefore, cannot be approved. EPA further stated that it was not making a determination at this time about whether the state had met its requirements regarding RACT, or any other underlying FCAA Amendments of 1990 requirements. Finally, EPA proposed approval of the Alternate Means of Control portion of the November 9, 1994 Post-96 SIP submittal, but did not propose action on any other portion of that submittal.

Additionally, on November 29, 1995, the President signed the National Highway Systems Designation Act, which, among other things, prohibited EPA from discounting the creditable emissions from a decentralized vehicle I/M testing program if an approvable conditional I/M SIP revision was submitted to EPA within 120 days of the bill's signature. EPA's Office of Mobile Sources issued guidance stating that it would accept an interim I/M SIP proposal and Governor's letter 120 days after signature of the bill in lieu of an adopted SIP revision. The SIP proposal and letter was submitted to the EPA prior to the March 27, 1996 deadline to meet the 120-day time frame. The final I/M SIP revision (Rule Log No. 96104-114-AI), commonly referred to as the "Texas Motorist's Choice Program," was adopted by the commission on May 29, 1996 and submitted to the EPA by the state on June 25, 1996. On October 3, 1996, EPA proposed (61 FR 51651-51659) conditional interim approval of the Texas Motorist's Choice Program based upon the state's good faith estimate of emission reductions and the program's compliance with the Clean Air Act.

Part of EPA's determination that the new I/M SIP is approvable depends on the program's ability to achieve sufficient creditable VOC reductions so that the 15% ROP can still be achieved. The commission designed the revised I/M program to fit in with the other elements of the 15% SIP to achieve the full amount of creditable reductions required. The I/M program also achieves creditable reductions for the Post-96 ROP SIP.

Changes to the I/M program have had an impact on the ELP §818 Attainment Demonstration as well. This demonstration was predicated on the assumption that the I/M program would be implemented as adopted for the 15% SIP. An addendum to the §818 Demonstration shows that the basic underlying assumptions of the modeling still pertain despite the revisions to the I/M program.

The ETR program revision to the SIP and ETR rule were adopted in October 1992 by the TACB to meet the mandate established in the FCAA Amendments of 1990 (§182 (d)(1)(B)). This section of the FCAA required states with severe or extreme ozone nonattainment areas to develop and implement ETR programs in those areas. For Texas, the only area affected was the HGA area. The ETR program required large employers (those with 100 or more employees) to implement trip reduction programs that

would increase the average passenger occupancy rate of vehicles arriving at the workplace during the peak travel period by 25% above the average for the area.

Congress amended the FCAA in December of 1995 by passing House Rule 325. This amendment allows the state to require an ETR program at its discretion. It also allows a state to "remove such provisions (ETR program) from the implementation plan...if the state notifies the Administrator, in writing, that the state has undertaken, or will undertake, one or more alternative methods that will achieve emission reductions (1.81 tons/day) equivalent to those achieved by the removed...provisions." As such, large employers will no longer be mandated to implement trip reduction programs. The HGA ozone nonattainment area will, however, through the coordination of the Houston-Galveston Area Council, implement a voluntary regional initiative to reduce vehicle trips.

The 1990 Adjusted Base Year EI was submitted on November 12, 1993. It is the official inventory of all emission sources (point, area, on-road and non-road mobile) in the four nonattainment areas. There have been several changes to the EI due to changes in assumptions for certain area and non-road mobile source categories. Changes to the baseline EI have affected the target calculations and creditable assumptions made in the 15% and 9% SIPs.

In December of 1990, then-Texas Governor William Clements requested that the BPA area be reclassified as a "moderate" ozone nonattainment area in accordance with §181(a)(4) of the FCAA Amendments of 1990. That request was denied on February 13, 1991. A recent review of the original request and supporting documentation has revealed that this denial was made in error. As provided by §110(k)(6) of the Act, the EPA Administrator has the authority to reverse a decision regarding original designation if it is discovered that an error had been made.

Monitoring data from a privately-funded, special purpose monitoring network which was not included in the Aerometric Information Retrieval System database was improperly used to deny this request. Furthermore, subsequent air quality trends demonstrated that BPA is more properly classified as a moderate nonattainment area, and could attain the standard by the required date for moderate areas of November 15, 1996. Therefore, Governor Bush sent a letter and technical support to EPA on July 20, 1995, requesting that the BPA area be reclassified to moderate nonattainment status. BPA planned to demonstrate attainment one of the following ways:

- Monitored values showing attainment of the standard at state-operated monitors for the years 1994-1996, which is the time line the FCAA Amendments of 1990 specifies for moderate areas.
- UAM modeling showing attainment of the standard but for transport of ozone and/or precursors.

EPA Region 6 verified the data submitted in support of this request and concurred that it is valid. On June 3, 1996, the reclassification of the BPA area became effective. Because the area was classified as serious, it was following the SIP submittal and permitting requirements of a serious area, which included the requirements for a Post-96 SIP. With the consolidated SIP submittal, the commission removed the BPA area from the Post-96 SIPs, which became applicable to the HGA nonattainment area only.

The State of Texas, in a committal SIP revision submitted to EPA on November 15, 1992, opted out of the Federal Clean Fuel Fleet program in order to implement a fleet emission control program designed by the state. In 1994, Texas submitted the state's opt-out program in a SIP revision to the EPA and adopted rules to implement the TAFF program. In 1995, the 74th Texas Legislature modified the state's

alternative fuels program through passage of SB 200. In response to SB 200, the commission adopted regulations modifying the TAFF program to create the TCF program.

Since adoption on July 24, 1996 and subsequent submission to EPA of the TCF SIP revision, the 75th Texas Legislature modified the state's alternative program once again through passage of SB 681. Staff modified the TCF program, now called the TCF Low Emission Vehicle program, to reflect changes mandated by SB 681.

On June 29, 1994, the commission adopted a revision to the SO_2 SIP regarding emissions in Harris County. The SIP revision was required by EPA because of exceedances of the SO_2 NAAQS in 1986, 1988, and 1990. An EPA study conducted by Scientific Applications International Corporation also predicted SO_2 exceedances. On April 22, 1991, the EPA declared that portions of Harris County were potentially in nonattainment of the SO_2 NAAQS. Consequently, the HRM Corporation volunteered to find reductions in SO_2 in order to prevent being redesignated to nonattainment. HRM's efforts resulted in finding voluntary SO_2 reductions. These reductions were adopted in 13 commission Agreed Orders and were included as part of the June 29, 1994 SIP revision. The EPA approved the Harris County SO_2 SIP on March 6, 1995 (60 FR 12125).

On May 14, 1997, the commission adopted an additional revision to the Harris County SO_2 SIP to incorporate modifications to two of the 13 commission Agreed Orders. The remaining sections of the SIP remained the same. While on the scale of "minor technical corrections," the modified orders were submitted as a SIP revision because the new emission rates differ from what EPA had previously approved. The two Agreed Order modifications concerned grandfathered units at Simpson Pasadena Paper Company and Lyondell-Citgo Refining Company, Ltd. The commission approved changes to both Agreed Orders on July 24, 1996.

On May 14, 1997, the commission also adopted a revision to the SIP modifying the vehicle I/M program. This revision removed the test-on-resale component that had been included in the vehicle I/M program, as designed in July of 1996. Test-on-resale required persons selling their vehicles in the I/M core program areas to obtain emissions testing prior to the title transfer of such vehicles. Test-on-resale was not required to meet the FCAA Amendments of 1990 and did not produce additional emissions reduction benefits. The SIP revision also incorporated into the SIP the Memorandum of Understanding between the commission and the Department of Public Safety, adopted by the commission on November 20, 1996.

The FCAA Amendments of 1990 required that, for severe and above ozone nonattainment areas, states develop SIP revisions that include specific enforceable TCMs, as necessary, to offset increases in motor vehicle emissions resulting from growth in VMT or the number of vehicle trips. This SIP revision would also satisfy reductions in motor vehicle emissions consistent with the 15% ROP and the Post-1996 ROP SIPs.

Therefore, the commission developed and submitted to EPA a committal SIP revision for the HGA nonattainment area on November 13, 1992, and VMT Offset SIP revisions on November 12, 1993 and November 6, 1994, to satisfy the requirements of the 15% ROP SIP revision. The former SIP revision laid out a set of TCMs and other mobile source controls which reduced emissions below the modeled ceiling. The 1994 SIP revision did not require additional TCMs.

As a result of changes in the I/M and the ETR programs, it was necessary to do the 1997 VMT Offset SIP revision for the HGA area, which was adopted on August 6, 1997. Additional TCMs were included: high

occupancy vehicle lanes, park and ride lots, arterial traffic management systems, computer transportation management systems, and signalization. These TCMs were part of the "Super SIP" submitted to EPA on July 24, 1996.

Using the best technical guidance and engineering judgement available at the time, the State of Texas calculated emissions reductions available from the enhanced monitoring rule that was to be part of the Title V permitting program. The enhanced monitoring rule was later revised and transformed into the CAM Rule. Texas maintained that its calculation methodologies still accurately reflected the amount of creditable reductions available. EPA disagreed with the calculation methodologies used by the state and intends to disapprove the 9% SIP as a result. EPA also indicated that the emission reduction credits claimed for the Texas Clean Fuels Fleet program were not approvable due to a legislative change to the program. The state plans to submit a SIP revision for this program in a separate action, but has removed the credits claimed in the 9% SIP in this action. The State of Texas proposes to submit a revision to the 9% SIP which revises the reductions claimed by the state toward the 9% emissions target.

The State of Texas did not reapply for an extension of the NO_x §182(f) waivers for HGA and BPA as discussed previously. Therefore, on December 31, 1997, the waivers expired. The state is now required to implement several NO_x control programs. Among them is a requirement for all major NO_x sources within the area to implement RACT. The state has adopted a revised compliance date of November 15, 1999 for this program.

The commission, in a committal SIP revision adopted on June 3, 1998, and submitted to EPA on June 23, 1998, agreed to implement OBD checks as part of the I/M program by the federal deadline of January 1, 2001.

On July 29, 1998, the commission adopted regulations and a revision of the TCF SIP to set forth the LEV requirements for mass transit fleets in each of the serious and above nonattainment areas, and for local government and private fleets operated primarily within the serious and above nonattainment areas. These rules satisfy the state requirements to adopt rules to implement SB 681.

The DFW area was classified as a moderate ozone nonattainment area in accordance with the FCAA Amendments of 1990. As a moderate nonattainment area, DFW was to demonstrate, through monitoring, attainment of the 1-hour ozone standard by November 15, 1996, or face being "bumped up" to the serious classification. Air quality data from DFW ambient air quality monitors for the years 1994-96 show that the 1-hour NAAQS for ozone has been exceeded more than one day per year over this three-year period. On February 18, 1998, the EPA issued a final notice in the *Federal Register* that the DFW area was being reclassified to the serious classification for failing to attain the NAAQS for ozone. As a result of this reclassification, the EPA required that a new SIP demonstrating attainment of the ozone standard in DFW be submitted by March 20, 1999. The state submitted a SIP for DFW that included photochemical modeling showing the level of reductions needed to attain the standard by 1999, a 9% ROP target calculation for the years 1997-99, VOC RACT rules in Chapter 115 applicable to sources meeting the 50 tpy major source level, NO_x RACT rules in Chapter 117 applicable to major sources of NO_x, and amendments to Chapter 116 reinstating nonattainment new source review for NO_x. The governor submitted this SIP to EPA on March 16, 1999. Because there was not enough time to implement the rules to achieve necessary reductions of ozone precursor emissions in the DFW area by the required attainment date of November 15, 1999, the state proposed to submit in March 2000 a full attainment demonstration including a complete rule package necessary to attain the 1-hour ozone standard.

On February 24, 1999 the commission adopted a SIP revision for the DFW area which was submitted to EPA on March 16, 1999. This SIP was not only intended to demonstrate how the DFW area would attain the standard through the submission of an updated emissions inventory and photochemical modeling, but to also include a 9% ROP target calculation in order to satisfy EPA's requirement of reasonable further progress in emission reductions for the DFW area for the years 1997-99. The reductions toward ROP were short of the 9% target and the SIP lacked required modeled control strategies; therefore, a follow-up SIP was developed. More information about the follow-up submittal is addressed later in this introduction.

On May 12, 1999 the commission adopted a revision to the SIP for the Northeast Texas region which would make certain local ozone precursor emission reductions federally enforceable. This revision was submitted to EPA on June 4, 1999. Four affected companies (Norit Americas, Inc.; La Gloria Oil and Gas Company; Eastman Chemical Company, Texas Eastman Division; and ARCO Permian) in the Northeast Texas region voluntarily agreed to be subject to the implementation of enforceable emission reduction measures pursuant to Part A, Sections 2-5 of the Northeast Texas Flexible Attainment Region (FAR) Memorandum of Agreement. The FAR approach allows time for the area's control program to work, similar to contingency measures in a post-1990 maintenance agreement, prior to EPA issuing a call for a SIP revision or nonattainment redesignation. The MOA required the immediate implementation of control measures through the use of Agreed Orders, which are included in the SIP revision to make them federally enforceable.

On June 30, 1999 the commission adopted a revision to the SIP in order to incorporate cleaner gasoline rules. The cleaner gasoline is required to have a lower RVP outside the DFW and HGA areas, and a limit on the amount of sulfur in each gallon of gasoline. The RVP required in this SIP revision is 7.8 psi starting May 1, 2000. The RVP limit would be in effect every summer from May 1st through October 1st. A 7.8 psi RVP fuel is expected to reduce evaporative emissions from automobiles, off-highway gasoline powered equipment, and all gasoline storage and transfer operations. Evaporative VOC emissions from automobiles will be reduced by at least 14%. The sulfur cap requirement is 150 ppm per gallon of gasoline, starting January 1, 2004. Low sulfur gasoline is expected to reduce NO_x emissions from today's cars by 8.5% according to the EPA complex model. The rules would further provide for counties or large cities to opt into these regulations earlier than required provided that certain conditions are met. If EPA were to adopt sulfur regulations to require compliance by January 1, 2004, the commission's rules would no longer apply, allowing the federal sulfur rules to take precedence. However, areas that choose to opt-in early would continue to follow the sulfur requirements of their early compliance plan until EPA actually implemented its regulations, unless otherwise specified in the commission order.

On July 28, 1999 the commission adopted a site-specific revision to the SIP which provides for the redesignation to attainment of that portion of Collin County currently designated as nonattainment for the lead NAAQS. The revision also provides a maintenance plan for the area to ensure continued compliance. As part of the maintenance plan, the revision establishes a new contingency plan through an agreed order and replaces Agreed Board Orders 92-09(k) and 93-12 and Board Order 93-10. The revision also provides for a commitment by the commission to keep the existing monitoring network in place until the end of the maintenance period.

On October 15, 1999 the commission adopted a revision to the SIP for the DFW ozone nonattainment area. This SIP was developed in order to address the shortfall in the reductions towards the 9% ROP target and the lack of modeled control strategies from the February 24, 1999 revision. Potential emission

reduction credits were reviewed that were not claimed in the February 1999 SIP in order to make up the ROP shortfall. The focus was on VOC reductions because fewer VOC reductions would be needed to make up the shortfall compared to NO_x emission reductions. The ROP lacked about 20% of the VOC reductions needed, which amounted to 5.87 tpd. Making complete the 9% ROP portion of the SIP should allow certain transportation projects to avoid being put on hold. Elements have been identified that were not previously considered that would bring SIP emission reduction credits in order to complete the 9% ROP requirements for the years 1996-99. These technical corrections were included in the October 1999 revised SIP.

In November 1998, the HGA SIP revision submitted to EPA in May 1998 became complete by operation of law. However, EPA stated that it could not approve the SIP until specific control strategies were modeled in the attainment demonstration. EPA specified a submittal date of November 15, 1999 for this modeling. As the HGA modeling protocol evolved, the state eventually selected and modeled seven basic modeling scenarios. As part of this process, a group of HGA stakeholders worked closely with commission staff to identify local control strategies for the modeling. This modeling showed a gap in reductions necessary for attainment of the 1-hour ozone standard. The commission adopted these revisions to the SIP on October 27, 1999.

In January 1997 the commission proposed a program that, for the first time in Texas' air pollution control history, extended beyond the confines of the urbanized areas. The concept of the regional strategy was developed as a result of several major occurrences. These events include the COAST Study, participation in the OTAG process, deployment of intensive aircraft monitoring by Baylor University, and the development of regional photochemical modeling. While Texas was not involved in the OTAG SIP call requiring mandatory statewide NO_x reductions, the commission realized the importance of the role of transported ozone and/or its precursors and the need for a statewide comprehensive plan in order to assist the areas that are struggling to attain the ozone standard. The impact on several states from the smoke and haze episodes from fires in Central America during the summer of 1998 helped reinforce the fact that air pollution is capable of traveling hundreds of miles.

The purpose of the regional strategy was to reduce ozone causing compounds in the eastern half of the state in order to help reduce background levels of ozone in both nonattainment areas as well as those areas close to noncompliance for the new 8-hour ozone standard. Components of the regional strategy included support for the NLEV program, cleaner burning gasoline and stage I vapor recovery, voluntary involvement in the permitting of grandfathered facilities, and reductions from major stationary sources.

On July 16, 1998, EPA issued a guidance memorandum titled "Extension of Attainment Dates for Downwind Transport Areas." The guidance, referred to hereinafter as the "transport guidance," provides a means for EPA to extend the attainment date for an area affected by transported air pollution, without reclassifying ("bumping up") the area to a higher classification. The transport guidance is particularly relevant to BPA, which is downwind of the HGA area and is affected by transport from HGA. If EPA approved such a determination for BPA, the area would have until no later than November 15, 2007, the attainment date for HGA, to attain the 1-hour ozone standard. There is also mounting technical data which suggests that the DFW area is impacted by transport and high regional background levels of ozone. A modeling demonstration has been developed and shows that the air quality in the DFW area is influenced at times from the HGA area. This demonstration, if approved by the EPA, would allow EPA to determine that the area should not be bumped up from serious to severe under the conditions of the July 16, 1998 transport guidance. If approved by the EPA the new attainment date for the DFW area would be no later than November 15, 2007, the attainment date for HGA.

As a result of the transport demonstrations for BPA and DFW, the development of SIPs in Texas will be, for the first time ever, on a coordinated timeline. This coordinated planning effort will include three of the state's four 1-hour ozone nonattainment areas as well as future 8-hour ozone areas. While there is uncertainty with the 8-hour ozone standard due to a pending court case, EPA's original plan calls for designations of 8-hour areas in 2000, SIP submittals by 2003, and attainment of the 8-hour standard by 2007. This statewide comprehensive planning with 2007 as a target date will allow Texas to utilize its resources in the most efficient manner to develop control strategies to reduce air pollution not only in the urbanized areas but regionally as well.

The challenges associated with reducing pollution levels to comply with the federal standards are very great, especially in the state's two largest urban areas - DFW and HGA. Commission staff worked very closely with local entities to develop recommendations that will get the respective areas into attainment. Future attainment relies on not only the development of local and state control measures, but on future federal rules involving new technologies as well. These especially involve cleaner fuels and cleaner engines for both on-road as well as non-road mobile sources. Unfortunately, many of these federal measures will not be available until the 2004 timeframe and then time will be required to provide for turnover before they will become effective at reducing pollution levels. This would make it very difficult for any large urban nonattainment area to comply before the 2007 timeframe. As a result of federal measures, state regulations, and local initiatives it is estimated that emissions in the eastern and central part of the state that contribute to the production of ground level ozone will be reduced by approximately 100 tpd by 2001; approximately 1200 tpd by 2003; approximately 1400 tpd by 2005; and approximately 1500 tpd by 2007. Texas is committed to implementing these strategies as quickly as practicable.

In the April 2000 SIP revision for HGA the state made the following enforceable commitments : 1) to quantify the shortfall of NO_x reductions needed for attainment; 2) to list and quantify potential control measures to meet the shortfall of NO_x reductions needed for attainment; 3) to adopt the majority of the necessary rules for the HGA attainment demonstration by December 31, 2000, and to adopt the rest of the rules as expeditiously as practical, but no later than July 31, 2001; 4) to submit a Post-99 ROP analysis by December 31, 2000; 5) to perform a mid-course review by May 1, 2004; and 6) to perform new mobile source modeling, using MOBILE6, within 24 months of the model's release. In addition, if a transportation conformity analysis is to be performed between 12 months and 24 months after the MOBILE 6 release, transportation conformity will not be determined until Texas submits an MVEB which is developed using MOBILE 6 and which the EPA finds adequate. Finally, if any of the measures adopted in the SIP pertain to motor vehicles, the commission commits to recalculate and resubmit a MVEB by December 31, 2000.

The BPA area is classified as moderate, and therefore was required to attain the 1-hour ozone standard by November 15, 1996. The BPA area did not attain the standard by that date, and also did not attain the standard by November 15, 1999, the attainment date for serious areas. In determining the appropriate attainment date for an area, EPA may consider the effect of transport of ozone or its precursors from an upwind area which interferes with the downwind area's ability to attain. On April 16, 1999, EPA proposed in the *Federal Register* to allow BPA to take advantage of the transport guidance if an approvable attainment demonstration is submitted by November 15, 1999. The SIP revision, adopted by the commission on October 27, 1999 and submitted to EPA by November 15, 1999, contained results of photochemical modeling demonstrating transport from HGA to BPA, and, following EPA's transport guidance, demonstrating that BPA attains the 1-hour ozone standard. In addition, the November 1999 SIP revision contained adopted rules for IWW and batch process sources to ensure that VOC emission limits for these sources meet EPA's guidelines for RACT. Furthermore, the SIP revision included

adopted rules establishing NO_x RACT emission limits for gas-fired, lean-burn stationary internal combustion engines. These NO_x rules represented "Phase I" of a two-part revision to the BPA attainment demonstration SIP.

The April 2000 SIP revision represented "Phase II" of the BPA attainment demonstration SIP, and contained adopted rules specifying NO_x emission limits for electric utility boilers, industrial boilers, and industrial process heaters. In accordance with EPA guidance, implementation of these NO_x emission limits represented a reasonable level of control, necessary for an approvable attainment demonstration. Modeling of these Phase II reductions showed that the BPA area attains the 1-hour ozone standard, using WOE analyses.

The DFW area's attainment deadline as a serious ozone nonattainment area was November 15, 1999. In March 1999 the state submitted an attainment demonstration to EPA, however this SIP submittal did not contain the necessary rules to bring the DFW area into attainment by the November 1999 deadline. As a result, EPA issued a letter of findings that the March 1999 submittal was incomplete. This findings triggered an 18-month sanctions clock effective May 13, 1999.

The state now has mounting technical data which suggests that DFW is significantly impacted by transport and regional background levels of ozone. The reductions from the strategies needed for the HGA area and the regional rules discussed are a necessary and integral component in the strategy for DFW's attainment of the 1-hour ozone standard. The April 2000 SIP contained a modeling demonstration which showed that the air quality in the DFW area is influenced at times from the HGA area. This demonstration, if approved by EPA, would allow EPA to determine that the DFW area should not be bumped up to a more severe classification. It would also allow DFW to have until no later than November 15, 2007, the attainment date for HGA, to reach attainment.

In order to develop local control strategy options to augment federal and state programs, the DFW area established a North Texas Clean Air Steering Committee made up of local elected officials and business leaders. Specific control strategies were identified for review by technical subcommittee members. In addition, the NCTCOG hired an environmental consultant to assist with the analysis and evaluation of control strategy options. The consultant was responsible for presenting the findings of the technical subcommittees to the NCTCOG air quality policy and steering committees for final approval prior to being submitted to the state. A WOE argument was developed for DFW which consisted of several elements which, taken together, formed a compelling argument that attainment will be achieved by 2007.

On April 19, 2000 the state adopted a revision to the Northeast Texas FAR SIP. The Flexible Attainment Region Agreement requires that contingency measures be implemented as a result of exceedances of the National Ambient Air Quality Standard for ozone. As outlined in the FAR Action Plan under Part B, Contingent Measures, in the event of a subsequent violation the SIP must be revised to include quantifiable and enforceable control measures. Through the use of Agreed Orders these measures were adopted and included in the Northeast Texas FAR SIP to make them federally enforceable.

On May 3, 2000 the state adopted a revision to the TCM and VMT portions of the SIP. This revision required TCM project-specific descriptions and estimated emissions reductions to be included in the SIP and allowed nonattainment area MPOs to substitute TCMs without a SIP revision if the substitution results in equal or greater emission reductions.

On December 6, 2000 the state adopted a revision to the Houston/Galveston Post-1999 ROP and Attainment Demonstration SIP. The December 2000 submittal contained the following elements: 1) rules and photochemical modeling analyses in support of the HGA ozone attainment demonstration; 2) post-1999 ROP plans for the milestone years 2002 and 2005, and for the attainment year 2007; 3) transportation conformity MVEBs for NO_x and VOC; 4) enforceable commitments to implement further measures in support of the HGA attainment demonstration; and 5) a commitment to perform and submit a mid-course review by May 2004.

The development of the December 2000 SIP revision proved to be an extremely challenging effort, due to the magnitude of reductions needed for attainment and the shortage of readily available control options. The emission reduction requirements included as part of this SIP revision represented substantial, intensive efforts on the part of stakeholder coalitions in the HGA area, in partnership with the commission. These coalitions, involving local governmental entities, elected officials, environmental groups, industry, consultants, and the public, as well as the commission and EPA, worked diligently to identify and quantify control strategy measures for the HGA attainment demonstration.

In order for the state to have an approvable attainment demonstration, the EPA indicated that the state needed to adopt those strategies modeled in the November 1999 SIP submittal, and then adopt sufficient measures to close the remaining gap in NO_x emissions. The modeling indicated an emissions gap such that an additional 91 tpd of NO_x reductions was necessary for an approvable attainment demonstration. The HGA nonattainment area needs to ultimately reduce NO_x by more than 750 tpd to reach attainment with the 1-hour ozone standard. In addition, a VOC reduction of about 25% will also have to be achieved.

The September 2001 SIP revision for the HGA ozone nonattainment area included the following elements: 1) corrections to the ROP table/budget for the years 2002, 2005, and 2007 due to a mathematical inconsistency; 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 of Chapter 114 in situations where the operator of a leased or rented vehicle is not employed by the owner of the vehicle (the commission committed to making this change when the rule was adopted in December 2000); 3) incorporation of revisions to the clean diesel fuel rules to provide greater flexibility in complying with the requirements of the rule while preserving the emission reductions necessary to demonstrate attainment in the HGA area; 4) incorporation of a stationary diesel engine rule that was developed as a result of the state's analysis of EPA's reasonably available control measures; 5) incorporation of revisions to the point source NO_x rules; 6) incorporation of revisions to the emissions cap and trade rules; 7) the removal of the construction equipment operating restriction and the accelerated purchase requirement for Tier 2/3 heavy duty equipment; 8) the replacement of these rules with the Texas Emission Reduction Plan program; 9) the layout of the mid-course review process which details how the state will fulfill the commitment to obtain the additional emission reductions necessary to demonstrate attainment of the 1-hour ozone standard in the HGA area; and 10) replacement of 2007 Rate of Progress MVEBs to be consistent with the attainment MVEBs.

As was discussed in the December 2000 revision, the modeling resulted in a 141 ppb peak ozone level which correlated to a gap calculation of 91 tpd NO_x equivalent. An additional five tpd was added to the gap to address the diesel pull-ahead strategy that was included in the December 2000 revision, making the gap 96 tpd. EPA indicated that the state cannot take credit for the five tpd NO_x reductions associated with the diesel pull-ahead strategy because the excess emissions were not included in the emissions inventory, therefore the state cannot take credit for reducing them. The five tpd added to the gap as

additional reductions that the commission will address during the mid-course review process. The gap control measures adopted in December 2000, along with the stationary diesel engine rules included in the September revision, result in NO_x reductions of 40 tpd, which leaves a total remaining gap of 56 tpd. The state has committed to addressing this gap through the mid-course review process.

Chapter 7 of the September 2001 SIP revision included a detailed overview of the entire mid-course review process. It began with an analysis of all reasonably available control measures for both VOC and NO_x. The process then addresses the state's options for reducing NOx emissions over the next several months. Next, the anticipated results from the Texas 2000 Air Quality Study (TexAQS) as well as other expected improvements and enhancements to the science are described, including the schedule to incorporate those improvements during two phases: the first phase ending in 2002, and the second ending by mid- 2004. Finally, there is a discussion of the technologies which have been developed and are undergoing testing to quantify their reduction potential, followed by a discussion of new and innovative ideas that are currently being contemplated.

Background on the Current Revision

In January 2001, the Business Coalition for Clean Air - Appeal Group (BCCA-AG) and several regulated companies challenged the December 2000 HGA SIP and some of the associated rules. Specifically, the BCCA-AG challenged the 90% NO_x reduction requirement from stationary sources in HGA. 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, requiring the commission to perform an independent, thorough analysis of the causes of rapid ozone formation events and identify potential mitigating measures not yet identified in the HGA attainment demonstration, according to the milestones and procedures in Exhibit C (Scientific Evaluation) of the Consent Order.

In compliance with the Consent Order, the commission conducted a scientific evaluation based in large part on aircraft data collected by the Texas 2000 Air Quality Study (TexAQS). The TexAQS, a comprehensive research project conducted in August and September 2000 involving more than 40 research organizations and over 200 scientists, studied ground-level ozone air pollution in the HGA and east Texas regions. The study revealed that while NO_x emissions from industrial sources were generally correctly accounted for, industrial VOC emissions were likely significantly understated in earlier emissions inventories. The study also showed that surface monitors were insufficient in capturing the phenomenon of ozone plumes downwind of industrial facilities. On four separate days, ozone levels exceeding 125 ppb were recorded by aircraft instruments that were missed by surface monitoring equipment. The findings from the study are constantly evolving and have raised questions about the formation of high ozone in the HGA. To address these findings and to fulfill obligations resulting from the lawsuit settlement negotiations with the BCCA-AG, commission staff has focused on substituting industrial VOC controls for some of the last 10% of reductions required by industrial NO_x emission limit rules and determining which VOCs should be controlled if industrial VOC controls are found to be effective.

Results of photochemical grid modeling and analysis of ambient VOC data indicate that it is possible to achieve the same level of air quality benefits with reductions in industrial VOC emissions, combined with an overall 80% reduction in NO_x emissions from industrial sources, as would be realized with a 90% reduction in industrial NO_x emissions. This conclusion is based on results from several studies, including photochemical grid modeling of the August - September 2000 episode using a top-down emissions inventory adjustment to point source highly-reactive volatile organic compounds (HRVOCs) emissions, and analyses of ambient HRVOC measurements made by TCEQ automated gas chromatographs and

airborne canisters using the maximum incremental reactivity and hydroxyl reactivity scales. Four HRVOCs clearly play important roles in Houston's ozone formation, and these four (ethylene, propylene, 1,3-butadiene, and butenes) seem to be the best candidates for the first round of HRVOC controls.

In order to address these recent scientific findings, the commission is adopting revisions to the industrial source control requirements, one of the control strategies within the existing federally approved SIP. This revision contains new rules to reduce emissions of HRVOCs from four key industrial sources: fugitives, flares, process vents, and cooling towers. The adopted rules target HRVOCs while maintaining the integrity of the SIP. Analysis to date shows that limiting emissions of ethylene, propylene, 1,3-butadiene, and butenes in conjunction with an 80% reduction in NO_x is equivalent in terms of air quality benefit to that resulting from a 90% point source NO_x reduction requirement. As such, the HRVOC rules are performance-based, emphasizing monitoring, recordkeeping, reporting, and enforcement rather than establishing individual unit emission rates.

Technical support documentation accompanying this revision contains the supporting analysis for early results from on-going analysis examining whether reductions in emissions of HRVOCs can replace the last 10% of industrial NO_x controls with a reduction of approximately 36% in industrial HRVOC emissions, while ensuring that the air quality specified in the approved December 2000 HGA SIP continues to be met.

In order to demonstrate an equivalent air quality benefit and support a revision to the NOx strategy, the commission has been conservative in estimating VOC emissions from industrial sources and establishing the site wide cap allocation. This methodology is conservative in that, additional adjustments may be made to the inventory as the commission learns more about the relative ambient concentrations of other VOCs, thereby reducing the burden on HRVOCs necessary for attainment purposes. Similarly, the aircraft data did not account for some of the ethylene emissions, and therefore the 1:1 NO_x to VOC ratio adjustments made to the inventory are also conservative. These types of changes may be made in the future as more analysis is completed. In terms of the equivalency determination, there are conservative assumptions applied that may change with more data assessment as part of the MCR. As a full analysis of what is ultimately necessary to fully demonstrate attainment is conducted at the MCR, the commission will be evaluating a number of issues that may change the HRVOC rules, such as: which, if any, additional chemicals need to be addressed; what is the appropriate geographic scope for the regulations; what are appropriate averaging times for the chemicals of concern; and what, if any, changes need to be made to the allocation process. By establishing a compliance date approximately 18 months after the conclusion of the MCR process, the commission believes it will have ample time to make necessary adjustments and still allow industry adequate time to fully comply.

HOUSTON/GALVESTON ATTAINMENT DEMONSTRATION
TABLE OF CONTENTS

HOUSTON/GALVESTON ATTAINMENT DEMONSTRATION
LIST OF APPENDICES

HOUSTON/GALVESTON ATTAINMENT DEMONSTRATION
LIST OF TABLES

CHAPTER 1: GENERAL

1.1 BACKGROUND

The HGA ozone nonattainment area is classified as Severe-17 under the FCAA Amendments of 1990 (42 United States Code (USC) §§7401 et seq.), and therefore is required to attain the 1-hour ozone standard of 0.12 ppm by November 15, 2007. The HGA area, defined by Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller Counties, has been working to develop a demonstration of attainment in accordance with 42 USC §7410. On January 4, 1995, the state submitted the first of its Post-1996 SIP revisions for HGA.

The January 1995 SIP consisted of UAM modeling for 1988 and 1990 base case episodes, adopted rules to achieve a 9% ROP reduction in VOCs, and a commitment schedule for the remaining ROP and attainment demonstration elements. At the same time, but in a separate action, the State of Texas filed for the temporary NO_x waiver allowed by §182(f) of the FCAA. The January 1995 SIP and the NO_x waiver were based on early base case episodes which marginally exhibited model performance in accordance with EPA modeling performance standards, but which had a limited data set as inputs to the model. In 1993 and 1994, the commission was engaged in an intensive data-gathering exercise known as the COAST study. The state believed that the enhanced EI, expanded ambient air quality and meteorological monitoring, and other elements would provide a more robust data set for modeling and other analysis, which would lead to modeling results that the commission could use to better understand the nature of the ozone air quality problem in the HGA area.

Around the same time as the 1995 submittal, EPA policy regarding SIP elements and time lines went through changes. Two national programs in particular resulted in changing deadlines and requirements. The first of these programs was the OTAG. This group grew out of a March 2, 1995 memo from Mary Nichols, former EPA Assistant Administrator for Air and Radiation, that allowed states to postpone completion of their attainment demonstrations until an assessment of the role of transported ozone and precursors had been completed for the eastern half of the nation, including the eastern portion of Texas. Texas participated in this study, and it has been concluded that Texas does not significantly contribute to ozone exceedances in the Northeastern U.S. The other major national initiative impacting the SIP planning process has been the revisions to the national ozone standard. EPA promulgated a final rule on July 18, 1997 changing the ozone standard to an 8-hour standard of 0.08 ppm. In November 1996, concurrent with the proposal of the standards, EPA proposed an IIP that it believed would help areas like HGA transition from the old to the new standard. In an attempt to avoid a significant delay in planning activities, Texas began to follow this guidance, and readjusted its modeling and SIP development time lines accordingly. When the new standard was published, EPA decided not to publish the IIP, and instead stated that, for areas currently exceeding the 1-hour ozone standard, that standard would continue to apply until the area attained. The FCAA requires that HGA attain the standard by November 15, 2007.

EPA issued revised draft guidance for areas such as HGA that do not attain the 1-hour ozone standard. The commission adopted on May 6, 1998 and submitted to EPA on May 19, 1998 a revision to the HGA SIP which contained the following elements in response to EPA's guidance:

- UAM modeling based on emissions projected from a 1993 baseline out to the 2007 attainment date;
- An estimate of the level of VOC and NO_x reductions necessary to achieve the 1-hour ozone standard by 2007;
- A list of control strategies that the state could implement to attain the 1-hour ozone standard;
- A schedule for completing the other required elements of the attainment demonstration;

- A revision to the Post-1996 9% ROP SIP that remedied a deficiency that EPA believed made the previous version of that SIP unapprovable; and
- Evidence that all measures and regulations required by Subpart 2 of Title I of the FCAA to control ozone and its precursors have been adopted and implemented, or are on an expeditious schedule to be adopted and implemented.

In November 1998, the SIP revision submitted to EPA in May 1998 became complete by operation of law. However, EPA stated that it could not approve the SIP until specific control strategies were modeled in the attainment demonstration. EPA specified a submittal date of November 15, 1999 for this modeling. In a letter to EPA dated January 5, 1999, the state committed to model two strategies showing attainment.

As the HGA modeling protocol evolved, the state eventually selected and modeled seven basic modeling scenarios. As part of this process, a group of HGA stakeholders worked closely with commission staff to identify local control strategies for the modeling. These local strategies are described in Chapter 3 under Scenarios III and VI. Some of the scenarios for which the stakeholders requested evaluation included options such as California type fuel and vehicle programs as well as an ASM-equivalent I/M program. Other scenarios incorporated the estimated reductions in emissions that were expected to be achieved throughout the modeling domain as a result of the implementation of several voluntary and mandatory statewide programs adopted or planned independently of the SIP. It should be made clear that the commission did not propose that any of these strategies be included in the ultimate control strategy submitted to EPA in 2000. The need for and effectiveness of any controls which may be implemented outside the 8-county area will be evaluated on a county by county basis.

The SIP revision was adopted by the commission on October 27, 1999 and submitted to EPA by November 15, 1999, and contained the following elements:

- Photochemical modeling of potential specific control strategies for attainment of the 1-hour ozone standard in the HGA area by the attainment date of November 15, 2007;
- An analysis of seven specific modeling scenarios reflecting various combinations of federal, state, and local controls in HGA. Additional scenarios H1 and H2 build upon Scenario VIf;
- Identification of the level of reductions of VOC and NO_x necessary to attain the 1-hour ozone standard by 2007;
- A 2007 mobile source budget for transportation conformity;
- Identification of specific source categories which, if controlled, could result in sufficient VOC and/or NO_x reductions to attain the standard;
- A schedule committing to submit by April 2000 an enforceable commitment to conduct a mid-course review; and
- A schedule committing to submit modeling and adopted rules in support of the attainment demonstration by December 2000.

As the result of an agreed settlement between several environmental groups and EPA, in November 1999 EPA informed the state that an additional SIP revision was required in order to quantify additional potential reductions to fill the shortfall or “gap” needed for attainment. This “gap closure” SIP, submitted by the commission in April 2000, contained the following enforceable commitments by the state:

- To quantify the shortfall of NO_x reductions needed for attainment;
- To list and quantify potential control measures to meet the shortfall of NO_x reductions needed for attainment;

- To adopt the majority of the necessary rules for the HGA attainment demonstration by December 31, 2000, and to adopt the rest of the shortfall rules as expeditiously as practical, but no later than July 31, 2001;
- To submit a Post-99 ROP plan by December 31, 2000;
- To perform a mid-course review by May 1, 2004; and
- To perform modeling of mobile source emissions using MOBILE6, to revise the on-road mobile source budget as needed, and to submit the revised budget within 24 months of the model's release. In addition, if a conformity analysis is to be performed between 12 months and 24 months after the MOBILE6 release, the state will revise the MVEB so that the conformity analysis and the SIP MVEB are calculated on the same basis.

The development of the attainment demonstration SIP for the HGA area has proved to be an extremely challenging effort, due to the magnitude of reductions needed for attainment and the shortage of readily available control options. The emission reduction requirements included as part of the December 2000 SIP revision represented substantial, intensive efforts on the part of stakeholder coalitions in the HGA area, in partnership with the commission. These coalitions, involving local governmental entities, elected officials, environmental groups, industry, consultants, and the public, as well as the commission and EPA, worked diligently to identify and quantify control strategy measures for the HGA attainment demonstration.

In order for the state to have an approvable attainment demonstration, EPA indicated that the state must adopt those strategies modeled in the November 1999 SIP submittal, and then adopt sufficient measures to close the remaining gap in NO_x emissions. The modeling included in the December 2000 revision indicated an emissions gap such that an additional 91 tpd of NO_x reductions was necessary for an approvable attainment demonstration. The HGA nonattainment area will need to ultimately reduce NO_x by more than 750 tpd to reach attainment with the 1-hour ozone standard. In addition, a VOC reduction of about 25% will also have to be achieved.

The December 2000 SIP revision contained rules and photochemical modeling analyses in support of the HGA ozone attainment demonstration. In addition, the revision contained post-1999 ROP plans for the milestone years 2002 and 2005, and for the attainment year 2007, and transportation conformity MVEBs for NO_x and VOC. The SIP also contained enforceable commitments to implement further measures in support of the HGA attainment demonstration, as well as a commitment to perform and submit a mid-course review. Implementation of the rules and other control measures contained in the revision will close the gap and achieve attainment of the 1-hour ozone standard in the HGA area by November 15, 2007, the date required for attainment.

The September 2001 SIP revision for the HGA ozone nonattainment area included the following elements: 1) corrections to the ROP table/budget for the years 2002, 2005, and 2007 due to a mathematical inconsistency; 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 of Chapter 114 in situations where the operator of a leased or rented vehicle is not employed by the owner of the vehicle (the commission committed to making this change when the rule was adopted in December 2000); 3) incorporation of revisions to the clean diesel fuel rules to provide greater flexibility in complying with the requirements of the rule while preserving the emission reductions necessary to demonstrate attainment in the HGA area; 4) incorporation of a stationary diesel engine rule that was developed as a result of the state's analysis of EPA's reasonably available control measures; 5) incorporation of revisions to the point source NO_x rules; 6) incorporation of revisions to the emissions cap and trade rules; 7) the removal of the construction equipment operating restriction and the accelerated

purchase requirement for Tier 2/3 heavy duty equipment; 8) the replacement of these rules with the Texas Emission Reduction Plan program; 9) the layout of the mid-course review process which details how the state will fulfill the commitment to obtain the additional emission reductions necessary to demonstrate attainment of the 1-hour ozone standard in the HGA area; and 10) replacement of 2007 Rate of Progress MVEBs to be consistent with the attainment MVEBs.

As was discussed in the December 2000 revision, the modeling resulted in a 141 ppb peak ozone level which correlated to a gap calculation of 91 tpd NO_x equivalent. An additional five tpd was added to the gap to address the diesel pull-ahead strategy that was included in the December 2000 revision, making the gap 96 tpd. EPA has indicated that the state cannot take credit for the five tpd NO_x reductions associated with the diesel pull-ahead strategy because the excess emissions were not included in the emissions inventory, therefore the state cannot take credit for reducing them The five tpd added to the gap as additional reductions that the commission will address during the mid-course review process. The gap control measures adopted in December 2000 along with the stationary diesel engine rules included in the September revision, result in NO_x reductions of 40 tpd, which leaves a total remaining gap of 56 tpd. The state has committed to addressing this gap through the mid-course review process.

Chapter 7 of the September 2001 revision included a detailed overview of the entire mid-course review process. It began with an analysis of all reasonably available control measures for both VOC and NO_x. The process then addresses the state's options for reducing NO_x emissions over the next several months. Next, the anticipated results from the Texas 2000 study as well as other expected improvements and enhancements to the science are described, including the schedule to incorporate those improvements during two phases: the first phase ending in 2002, and the second ending by mid- 2004. Finally, there is a discussion of the technologies which have been developed and are undergoing testing to quantify their reduction potential, followed by a discussion of new and innovative ideas that are currently being contemplated.

In January 2001, the Business Coalition for Clean Air - Appeal Group (BCCA-AG) and several regulated companies challenged the December 2000 HGA SIP and some of the associated rules. Specifically, the BCCA-AG challenged the 90% NO_x reduction requirement from stationary sources in HGA. 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, requiring the commission to perform an independent, thorough analysis of the causes of rapid ozone formation events and identify potential mitigating measures not yet identified in the HGA attainment demonstration, according to the milestones and procedures in Exhibit C (Scientific Evaluation) of the Order.

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Results of photochemical grid modeling and analysis of ambient VOC data indicate that it is possible to achieve the same level of air quality benefits with reductions in industrial VOC emissions, combined with an overall 80% reduction in NO_x emissions from industrial sources, as would be realized with a 90% reduction in industrial NO_x emissions. This conclusion is based on results from several studies, including photochemical grid modeling of the August - September 2000 episode using a top-down emissions inventory adjustment to point source highly-reactive volatile organic compounds (HRVOCs) emissions, and analyses of ambient HRVOC measurements made by TCEQ automated gas chromatographs and airborne canisters using the maximum incremental reactivity and hydroxyl reactivity scales. Four HRVOCs clearly play important roles in Houston's ozone formation, and these four (ethylene, propylene, 1,3-butadiene, and butenes) seem to be the best candidates for the first round of HRVOC controls.

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Technical support documentation accompanying this revision contains the supporting analysis for early results from on-going analysis examining whether reductions in emissions of HRVOCs can replace the last 10% of industrial NO_x controls with a reduction of approximately 36% in industrial HRVOC emissions, while ensuring that the air quality specified in the approved December 2000 HGA SIP continues to be met.

In order to demonstrate an equivalent air quality benefit and support a revision to the NOx strategy, the commission has been conservative in estimating VOC emissions from industrial sources and establishing the site wide cap allocation. This methodology is conservative in that, additional adjustments may be made to the inventory as the commission learns more about the relative ambient concentrations of other VOCs, thereby reducing the burden on HRVOCs necessary for attainment purposes. Similarly, the aircraft data did not account for some of the ethylene emissions, and therefore the 1:1 NO_x to VOC ratio adjustments made to the inventory are also conservative. These types of changes may be made in the future as more analysis is completed. In terms of the equivalency determination, there are conservative assumptions applied that may change with more data assessment as part of the MCR. As a full analysis of what is ultimately necessary to fully demonstrate attainment is conducted at the MCR, the commission will be evaluating a number of issues that may change the HRVOC rules, such as: which, if any, additional chemicals need to be addressed; what is the appropriate geographic scope for the regulations; what are appropriate averaging times for the chemicals of concern; and what, if any, changes need to be made to the allocation process. By establishing a compliance date approximately 18 months after the conclusion of the MCR process, the commission believes it will have ample time to make necessary adjustments and still allow industry adequate time to fully comply.

1.2 PUBLIC HEARING INFORMATION

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

CITY	DATE	TIME	LOCATION
Austin	July 18, 2002	2:00 p.m.	TCEQ Complex 12100 Park 35 Circle Building E, Room 201S
Houston	July 22, 2002	10:00 a.m.	City Hall Council Chambers 901 Bagby
Channelview	July 22, 2002	7:00 p.m.	The Flukinger Community Center 16003 Lorenzo
Houston	August 6, 2002	10:00 a.m.	City Hall Council Chambers 901 Bagby

In addition the commission solicited comment on the Technical Support Document referenced in this SIP. The public comment period closed on August 6, 2002 .

1.3 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 proposed rule package accompanying this SIP.

1.4 FISCAL AND MANPOWER RESOURCES

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

CHAPTER 2: EMISSIONS INVENTORY

(No change from September 2001 revision)

CHAPTER 3: PHOTOCHEMICAL MODELING

(No change since December 2000 revision)

CHAPTER 4: DATA ANALYSIS

(No change since December 2000 revision)

CHAPTER 5: RATE-OF-PROGRESS

(No change from September 2001 revision)

CHAPTER 6: REQUIRED CONTROL STRATEGY ELEMENTS

6.1 OVERVIEW

The development of the attainment demonstration SIP for the HGA area has proved to be an extremely challenging effort, due to the magnitude of reductions needed for attainment and the shortage of readily available control options. Several leading-edge, innovative control technologies are now approaching an advanced state of development due to the role played by Texas stakeholders and others in aggressively pursuing new ozone control technologies. As promising as these new technologies may be, however, they alone are not yet adequate to bring the HGA area into attainment. There are test programs already initiated evaluating all of these new technologies which will provide the commission with the necessary information to base decisions on during the full continuum of the mid-course review (see Chapter 7) which is a multi-part process. Ideally, this attainment demonstration would rely upon technical solutions that provided the cleanest possible automobiles and trucks, ships, locomotives, aircraft, construction equipment, etc., within a few years' time. Unfortunately, the current state of technology, coupled with the inevitable lag time to achieve significant equipment turnover, prevents a purely technical solution from being a reality by 2007, the attainment year. For this reason, the commission must implement measures that rely on behavioral changes, in addition to technological controls.

Implementation of the rules and other control measures contained in this SIP revision will close the gap and achieve attainment of the 1-hour ozone standard in the HGA area by November 15, 2007, the date required for attainment. Table 6.1-2 provides a summary of the NO_x control strategies and reductions for the HGA attainment demonstration.

As stated at the outset of this proposal, the purpose of this revision was to determine if a certain level of reduction in HRVOCs could attain the same air quality benefit with an 80% NOx reduction strategy as was demonstrated with the approved 90% NOx reduction strategy. The commission believes it has met that determination with this revised strategy. For the purposes of this revision HRVOC will be defined as Ethylene, Propylene, 1,3 Butadiene and Butenes for Harris county and Ethylene and Propylene for the surrounding seven counties. There is still a lot of analysis that needs to be conducted between now and the MCR, particularly with regards to the contribution of other VOCs to ozone formation in the HGA nonattainment area, in order to develop the most cost effective strategy to attain the standard. Table 6.1-2 currently reflects the reductions associated with the control strategy which was based upon modeling the 1993 episode. Since the current revision was based on modeling the 2000 episode, which will be the basis for the final analysis at the MCR, the commission will revise the table at that time.

Table 6.1-2: Summary of Control Strategies and NO_x/VOC Estimated 2007 Reductions for the HGA Attainment Demonstration

Type of Measure	Description	NO_x	VOC
EXISTING FEDERAL MEASURES			
Federal on-road	Included in the December 2000/ September 2001 revisions	201	98
Federal area/non-road	Included in the December 2000/ September 2001 revisions	8	35
	Federal Measures Total	209	133
STATE			
A. Base Measures (November 1999 SIP) **1. State Rules**			
Point Source NO_x	See revised Section 6.3.1	535-586 tpd	--
Emissions Banking and Trading Program	See revised Section 6.3.2	--	--
Inspection/ Maintenance	Included in the December 2000 / September 2001 revisions	36.20 tpd	18.05
Construction Equipment Operating Restrictions	Repealed. Included in the September 2001 revision	6.7 tpd	---
Cleaner Diesel Fuel	Included in the September 2001 revision	3.98 tpd on-road 2.69 tpd non-road	--
Commercial Lawn Equipment Operating Restrictions	Included in the December 2000/ September 2001 revisions	.23 tpd NO_x shifted 12.4 tpd VOC shifted 4.6 tpd NO_x equivalent	--
VOC RACT	Included in the December 2000/ September 2001 revisions	--	--
2. Local Measures			
VMEP	Included in the December 2000/ September 2001 revisions	23	--
	Base Measures Total	**656.47**	**18.05**

Type of Measure	Description	NO_x	VOC
B. Gap Measures **1. Federal Measures**			
Energy Efficiencies	Included in the December 2000/ September 2001 revisions	3.57	–
2. State Rules			
Accelerated Purchase of Tier 2/Tier 3 Diesel Equipment	Repealed. Included in the September 2001 revision	12.20 tpd	1.86 tpd
Speed Limit Reduction	See revised Section 6.3.12	12.33 tpd	1.76
Airport Reductions	Included in the December 2000/ September 2001 revisions	5.09 tpd	--
California Spark-Ignition Engines	Included in the December 2000/ September 2001 revisions	2.80 tpd	7.58
Vehicle Idling Restrictions	Included in the December 2000/ September 2001 revision	0.48 tpd	0.19
Gas-fired Water Heaters, Small Boilers, And Process Heaters	Included in the December 2000/ September 2001 revisions	0.50 tpd	--
Stationary Diesel Engines	Included in the September 2001 revision	1.12 tpd	--
2. Local Measures			
TCMs	Included in the December 2000/ September 2001 revisions	1.06 tpd	2.13
	Gap Measures Total	39.15	13.52
	Equivalent NO_x reduced as a result of VOC reductions	1.14	
	Gap	96	
	Remaining gap to fill	56	

6.2 VOC RULE CHANGES

6.2.1 Cooling Towers

The cooling tower rules of Chapter 115, Subchapter H, Division 2 (§§115.760 - 115.769) establish new requirements for all cooling tower heat exchange systems in the Houston/Galveston area which emit, or have the potential to emit, the following highly-reactive VOCs: 1,3-butadiene; all butenes (butylenes); ethylene; and propylene. The rules apply to industrial process cooling towers and do not apply to fin-fan coolers or comfort cooling towers which are used exclusively in cooling, heating, ventilation, and air

conditioning systems. An owner or operator may not use emission reduction credits or discrete emission reduction credits in order to demonstrate compliance.

The rules specify that HRVOC emissions at each account are limited to a 24-hour rolling average as specified in Table 6-2.1, Initial HRVOC Site-Cap Allocations: Harris County, and Table 6-2.2, Initial HRVOC Site-Cap Allocations: Seven Surrounding Counties of the December 13, 2002 SIP revision.

For each cooling water heat exchange system with a design capacity to circulate 8,000 gallons per minute (gpm) or greater of cooling water, the rules require the owner or operator to install, calibrate, and operate, and maintain a continuous flow monitor on each inlet of each cooling tower. Each monitor must be calibrated on an annual basis to within ± 5.0% accuracy. When the cooling tower flow monitor is down, flow measurements must be used for the most recent 24-hour period in which the flow measurements are representative of cooling tower operations during monitor downtime. The rules further require that a continuous monitoring system to determine the total strippable VOC concentration at each inlet of each cooling tower be installed, calibrated, operated, and maintained. During out-of-order periods of the VOC monitor(s), a sample must be collected for total VOC analysis according to the TCEQ air-stripping method (TCEQ Sampling Procedures Manual, Appendix P). This sample must be collected at least three times per calendar week, with an interval of no less than 36 hours between samples. The concentration of speciated strippable VOC must be collected from each inlet of each cooling tower at least once per month. The speciated concentration of at least 90% of the total VOC on a mass basis must be determined for each sample. If the concentration of total strippable VOC is equal to or greater than 50 parts per billion by weight (ppbw), an additional sample must be collected for strippable VOC analysis from each inlet of the affected cooling tower at least once daily. The additional speciated strippable VOC sampling must continue on a daily basis until the concentration of total strippable VOC drops below 50 ppbw.

For each cooling water heat exchange system with a design capacity to circulate less than 8,000 gpm of cooling water, the rules require the owner or operator to install, calibrate, and operate, and maintain a continuous flow monitor on each inlet of each cooling tower. Each monitor must be calibrated on an annual basis to within ± 5.0% accuracy. When the cooling tower flow monitor is down, flow measurements must be used for the most recent 24-hour period in which the flow measurements are representative of cooling tower operations during monitor downtime. The total strippable VOC concentration must be determined by collecting samples from each inlet of each cooling tower at least twice per week, with an interval of not less than 48 hours between samples. The concentration of speciated strippable VOC must be collected from each inlet of each cooling tower at least once per month. The speciated concentration of at least 90% of the total VOC on a mass basis must be determined for each sample. If the concentration of total strippable VOC is equal to or greater than 50 ppbw, an additional sample must be collected for strippable VOC analysis from each inlet of the affected cooling tower at least once daily. The additional speciated strippable VOC sampling must continue on a daily basis until the concentration of total strippable VOC drops below 50 ppbw.

A monitoring quality assurance plan must be submitted as follows: 1) for cooling towers existing on or before June 30, 2004, no later than April 30, 2004; or 2) for cooling tower heat exchange systems that become subject to the requirements of this division after June 30, 2004, at least 60 days prior to being placed in HRVOC service. This plan must be submitted prior to initiating a monitoring program. Additionally, the plan must define each compound which could potentially leak through the heat exchanger and therefore directly impact the emissions of the cooling water system.

The rules require the determination of the total strippable VOC concentration in cooling tower water where a continuous monitoring system is required. Calibration must be checked weekly or more frequently, as necessary, to maintain a monitor drift of less than 3.0%.

The rules allow any account for which no stream directed to a cooling tower heat exchange system contains 5.0% or greater by weight HRVOC to be exempt from the requirements of the site-wide cap.

The owner or operator of each cooling tower heat exchange system in Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller Counties must demonstrate compliance with all requirements as soon as practicable, but no later than December 31, 2004, with the exception of the site-wide cap, for which the owner or operator must demonstrate compliance as soon as practicable, but no later than December 31, 2005.

6.2.2 Vent Gas Control and Flares

The vent gas rules of Chapter 115, Subchapter H, Division 1 (§§115.720 - 115.729) specify that any vent gas stream in HGA in which includes an HRVOC and any flare in HGA that emits or has the potential to emit HRVOC is subject to the requirements of Division 1 of Subchapter H in addition to the applicable requirements of Divisions 2 and 6 of Subchapter B and Division 1 of Subchapter D. The new section is necessary to make it clear that the requirements of the new Division 1 of Subchapter H apply in addition to, rather than in place of, the requirements of Divisions 2 and 6 of Subchapter B and Division 1 of Subchapter D. An owner or operator may not use emission reduction credits or discrete emission reduction credits in order to demonstrate compliance.

The rules specify that HRVOC emissions at each account are limited to a 24-hour rolling average as specified in Table 6-2.1, Initial HRVOC Site-Cap Allocations: Harris County, and Table 6-2.2, Initial HRVOC Site-Cap Allocations: Seven Surrounding Counties, of the *Post-1999 Rate-of-Progress and Attainment Demonstration Follow-up SIP for the Houston/Galveston Ozone Nonattainment Area* of the December 13, 2002 SIP revision. Division 2 (Flares) was deleted and the appropriate requirements incorporated in Division 1 because of the interrelationship between flares and vent gas (i.e., gas streams directed to flares are vent gas streams).

The owner or operator of a flare in HGA must continuously comply with 40 CFR §60.18(c) - (f) when HRVOC is routed to the flare. Each vent gas stream which includes an HRVOC must be tested using reference method testing. An alternative to testing is allowed for each vent equipped with a continuous emissions monitoring system (CEMS). To use this option, the CEMS must meet the monitoring requirements of 40 CFR §60.13(b), (d), (e), and (f), and must initially and at a minimum annually thereafter be subjected to a cylinder gas audit per 40 CFR Part 60, Appendix B, Performance Specification 2, Section 16 to assess system bias and ensure accuracy.

Flares must be equipped with a continuous flow monitoring system, and an on-line analyzer capable of determining HRVOCs and other potential constituents at least once every 15 minutes. In addition, the monitoring systems must operate at least 95% of the time when the flare is operational, averaged over a calendar year. The rules further specify that a sample must be taken every four hours during any period of monitor downtime. In addition, HRVOC hourly average mass emission rates and actual exit velocity of the flare must be calculated.

A test plan and quality assurance plan must be submitted as follows: 1) for flares and vent gas streams existing on or before June 30, 2004, no later than April 30, 2004; or 2) for flares/vent gas streams that

become subject to the requirements of this division after June 30, 2004, at least 60 days prior to being placed in HRVOC service.

The recordkeeping requirements for flares include: hourly records of the speciated and total HRVOC emission rates on a pounds-per-hour basis for each affected flare in order to demonstrate compliance with the site-wide cap; records of all monitoring, testing, and calibrations required by the rules; weekly records that detail all corrective actions taken (or delay in corrective action) and the estimated quantity of all HRVOC emissions; and records of each calculated net heating value of the gas stream routed to the flare and each calculated exit velocity at the flare tip. The rules also require records for flares and vent gas streams claimed exempt to ensure that these flares and vent gas streams meet the exemption criteria.

The rules require the owner or operator to update hourly the 24-hour rolling average HRVOC emissions for the site-wide cap, including cooling tower emissions from cooling towers which are subject to Subchapter H, Division 2; all continuously monitored vent gas and flare emissions; and the maximum potential emission rate from vent gas streams and flares which are not continuously monitored.

For vent gas streams, the rules require each owner or operator in Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller Counties to demonstrate compliance with the testing requirements as soon as practicable, but no later than June 30, 2004, and demonstrate compliance with all other requirements of this division (including the site-wide cap), as soon as practicable, but no later than December 31, 2005. For flares, the rules require each owner or operator in Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller Counties to demonstrate compliance with the division as soon as practicable, but no later than December 31, 2004, with the exception of the site-wide cap, for which the owner or operator must demonstrate compliance as soon as practicable, but no later than December 31, 2005.

6.2.3 Fugitive Emissions

The leak detection and repair (LDAR) rules of Chapter 115, Subchapter H, Division 4 (§§115.780 - 115.789) establish new LDAR requirements in Houston/Galveston area for each petroleum refinery; synthetic organic chemical, polymer, resin, or methyl tert-butyl ether manufacturing process; or natural gas/gasoline processing operation in which an HRVOC is a raw material, intermediate, final product, or in a waste stream. The current LDAR rules (§§115.352 115.359) continue to apply in addition to the new requirements.

The new LDAR requirements add quarterly monitoring for a variety of components that have been found to leak, yet in most cases are not currently required to be monitored. These components include: blind flanges, caps, or plugs at the end of a pipe or line containing VOC; connectors; heat exchanger heads; sight glasses; meters; gauges; sampling connections; bolted manways; hatches; agitators; sump covers; junction box vents; covers and seals on VOC water separators; and process drains.

In addition, a leak-skip option for valves is not allowed because leak-skip can allow leaks to occur for up to one year before the leak is detected. A leak-skip option is included for connectors which is based on 40 CFR 63, Subpart H (National Emission Standards for Organic Hazardous Air Pollutants for Equipment Leaks). More extensive inspection requirements are proposed for process drains, pumps, compressors, and agitators.

The LDAR requirements include attempts to repair a leaking valve through “extraordinary efforts” (such as drilling & injection of sealant) before the valve may be placed on the shutdown list. Shaft sealing systems are required for new pumps, compressors, and agitators.

In addition, an audit is required every two years by an independent third-party organization (*not* the current LDAR contractor), with a report due within 30 days of audit completion. Further, staff from the commission, EPA, or local programs may conduct an audit of the LDAR program.

Compliance with the new rules is required as soon as practicable, but no later than December 31, 2003, except that the initial independent third-party audit must be completed and the results of the audit submitted to the executive director as soon as practicable, but no later than December 31, 2004.

6.2.4 General VOC Monitoring Rules

The commission has withdrawn the proposed general VOC monitoring rules in Subchapter B, Divisions 7 and 8. In lieu of requiring this monitoring of all VOCs from individual flares, cooling towers and process vents to obtain emissions data for use in SIP planning, the commission is relying on data from not only the commission's monitoring network, but also data from additional ambient monitors that will be strategically located in HGA. This monitoring is expected to not only be a more efficient use of resources for this data gathering, but will also provide information more quickly. As described more fully in the narrative to the SIP revision and Technical Support Document (TSD) that accompany these rule amendments, the commission is committed to developing the best science possible to understand the causes of high ozone in the HGA. For the mid-course review, the commission plans to perform an in-depth analysis of the contributions of the less-reactive compounds and to perform top-down analyses similar to those used for the HRVOCs. If warranted, appropriate adjustment factors will be developed for less-reactive VOCs. As explained more fully in the SIP and TSD, the current modeling analysis indicates that emission reductions in the HRVOC alone can compensate for the change of industrial NO_x controls to 80% reductions, but additional controls on VOC sources are likely to be necessary to reach attainment. The commission will continue to study VOC data available now and in upcoming years to determine whether additional compounds should be added. To accomplish this task, the commission needs the support of and expects owners and operators of facilities in HGA which emit VOCs to participate in the ambient monitoring efforts which are scheduled to begin no later than June 1, 2003. If the ambient monitoring network is not fully and timely developed and operated such that the commission has received sufficient data for mid-course review, the commission may reconsider site-specific monitoring controls of VOC sources.

Table 6.2-1: Initial HRVOC Site-Cap Allocations:
Harris County

ALL EMISSIONS ARE IN LBS/HOUR					
ACCOUNT	OWNER	Model Adjusted Inventory for	Adjusted Total for Cooling Tower,	Control Level	Total Controlled

		Total Ethylene, Propylene, Butenes, Butadiene	Flare and Vent Emissions (80.7%)		Inventory
HG0033B	EQUISTAR CHEMICALS LP	1104.486	891.320	70.0%	267.40
HG0048L	LYONDELL CITGO REFINING L P	621.560	501.599	70.0%	150.48
HG0659W	SHELL OIL CO	555.140	447.998	68.0%	143.36
HG0770G	EQUISTAR CHEMICALS LP	460.274	371.441	68.0%	118.86
HG0665E	BP SOLVAY POLYETHYLENE N AMERICA	402.328	324.678	68.0%	103.90
HG0310V	CHEVRON CHEMICAL CO	347.406	280.357	68.0%	89.71
HG0232Q	EXXON MOBIL CORP	266.195	214.820	68.0%	68.74
HG0229F	EXXONMOBIL CHEMICAL CO	248.532	200.565	68.0%	64.18
HG0566H	PHILLIPS CHEMICAL COMPANY	204.494	165.027	68.0%	52.81
HX0055V	AMOCO CHEMICAL COMPANY	201.268	162.423	68.0%	51.98
HG0562P	TEXAS PETROCHEMICALS LP	170.968	137.971	68.0%	44.15
HG0228H	EXXON CHEMICAL CO	137.415	110.894	60.0%	44.36
HG0035U	MOBIL CHEMICAL CO	131.569	106.176	60.0%	42.47
HG0130C	VALERO REFINING TEXAS LP	125.145	100.992	60.0%	40.40
HG0036S	FINA OIL & CHEMICAL CO	124.103	100.151	60.0%	40.06
HX2334A	LINDE GAS INC	122.598	98.936	60.0%	39.57
HG0323M	MONTELL USA INC	112.482	90.773	60.0%	36.31
HG0126Q	HOECHST CELANESE CHEMICAL GROUP INC	99.411	80.225	60.0%	32.09
HG1575W	LYONDELL CHEMICAL CO	95.783	77.297	60.0%	30.92
HG0459J	LUBRIZOL CORPORATION	85.691	69.153	60.0%	27.66
HG0461W	ATOFINA CHEMICALS INC	85.549	69.038	60.0%	27.62
HG0713S	ENRON METHANOL CO	82.523	66.596	60.0%	26.64
HG0537O	LYONDELL CHEMICAL WORLDWIDE INC	81.681	65.917	60.0%	26.37
HG1996R	EQUISTAR CHEMICALS LP	68.455	55.243	60.0%	22.10
HG1269J	AMOCO CHEMICALS	66.780	53.892	60.0%	21.56
HG0076G	NEWPARK SHIPBUILDING BRADY ISLAND	66.447	53.623	60.0%	21.45
HG0218K	EI DUPONT DENEMOURS CO	64.153	51.771	60.0%	20.71
HG0825G	SUNOCO INC	58.730	47.395	60.0%	18.96
HG0175D	CROWN CENTRAL PETROLEUM CORP	54.409	43.908	60.0%	17.56
HG0262H	KINDER MORGAN LIQUIDS	46.250	37.323	60.0%	14.93
HG4662F	ATOFINA PETROCHEMICALS INC	42.369	34.192	60.0%	13.68
HG0686T	SOUTHWEST SHIPYARD LP	41.422	33.427	60.0%	13.37
HX1726J	MILLENNIUM PETROCHEMICALS INC	37.834	30.532	60.0%	12.21
HG0632T	ROHM & HAAS TEXAS	37.730	30.448	60.0%	12.18
HG0225N	ALBEMARLE CORP	34.180	27.583	60.0%	11.03
HG1939G	OXY VINYLS LP	30.906	24.941	60.0%	9.98
HG1249P	SUNOCO INCORPORATED R & M	20.806	16.790	60.0%	6.72
HG0460B	THE LUBRIZOL CORPORATION	19.664	15.869	60.0%	6.35
HG0261J	KINDER MORGAN LIQUIDS	18.975	15.313	60.0%	6.13
HG1045K	STOLTHAVEN HOUSTON INC	18.749	15.130	60.0%	6.05
HG0276T	GEORGIA GULF CHEM & VINYLS LLC	16.750	13.517	60.0%	5.41
HG0403N	INTERCONTINENTAL TERMINALS CO	16.025	12.933	60.0%	5.17
HG0426B	K M C O INCORPORATED	14.569	11.757	60.0%	4.70
HX2786H	RESOLUTION PERFORMANCE PRODUCTS	14.395	11.617	60.0%	4.65
HG0629I	VOPAK TERMINAL	14.252	11.501	60.0%	4.60

HG0289K	GOODYEAR TIRE AND RUBBER COMPANY	14.153	11.421	60.0%	4.57
HG0929Q	HALTERMANN	14.148	11.418	60.0%	4.57
HG0657D	SHELL OIL COMPANY	13.896	11.214	60.0%	4.49
HG0052U	ENGELHARD CORPORATION	13.786	11.126	60.0%	4.45
HG0717K	AKZO NOBEL CHEMICALS INC	13.569	10.950	60.0%	4.38
HG1310O	EVAL COMPANY AMERICA	10.349	8.351	50.0%	4.18
HG7698J	NOLTEX LLC	10.294	8.307	50.0%	4.15
HG0029P	LBC HOUSTON L P	8.802	7.103	50.0%	3.55
HG0564L	PETROLITE CORPORATION	8.364	6.750	50.0%	3.37
HG0319D	HALTERMANN LIMITED	8.221	6.634	50.0%	3.32
HG0037Q	AKZO NOBEL CHEMICALS INC	7.920	6.392	50.0%	3.20
HG0714Q	EOTT ENERGY LIQUIDS	7.724	6.233	50.0%	3.12
HG0486G	MERISOL USA LLC	7.316	5.904	50.0%	2.95
HG3585F	CHANNEL SHIPYARD	7.181	5.795	50.0%	2.90
HG0017W	WILLIAMS TERMINALS HOLDINGS LP	6.961	5.617	50.0%	2.81
HG0467K	MARATHON ASHLAND PIPE LINE LLC	6.765	5.460	50.0%	2.73
HG0786O	DYNEGY MIDSTREAM SERVICES LP	6.486	5.234	50.0%	2.62
HG0457N	LONZA INCORPORATED	6.249	5.043	50.0%	2.52
HG6831P	ETHYL CORPORATION	6.203	5.006	50.0%	2.50
HG3604D	GLOBAL OCTANES CORP	6.184	4.990	50.0%	2.50
HG0979B	SOUTHWEST SOLVENTS & CHEMICALS INC	6.034	4.869	50.0%	2.43
HX0029W	MEMC PASADENA INCORPORATED	5.529	4.462	50.0%	2.23
HG0245H	FMC CORPORATION	5.524	4.457	50.0%	2.23
HG1006U	ODFJELL TERMINAL INC	5.032	4.060	50.0%	2.03
HG0134R	TEXMARK CHEMICALS INC	4.752	3.835	50.0%	1.92
HG0558G	ELF ATOCHEM NORTH AMERICA INC	4.713	3.803	50.0%	1.90
HG2798Q	UNIVERSAL URETHANES INC	4.487	3.621	50.0%	1.81
HG3553S	AMOCO CHEMICAL CO	4.437	3.581	50.0%	1.79
HG0390U	ZENECA PRODUCTS	4.404	3.554	50.0%	1.78
HG0660O	EQUILON PIPELINE CO LLC	4.392	3.544	50.0%	1.77
HG7255B	WETMORE & COMPANY	4.386	3.540	50.0%	1.77
HG0512H	NATURAL GAS ODORIZING INC	4.311	3.479	50.0%	1.74
HG0669T	SOUTH COAST TERMINALS	4.286	3.459	50.0%	1.73
HG0234M	EXXON CORPORATION	3.982	3.213	50.0%	1.61
HG0813N	BASF CORPORATION	3.826	3.087	50.0%	1.54
HG0944U	ROHM AND HAAS CO-BAYPORT PLANT	3.735	3.014	50.0%	1.51
HG3043A	TM CHEMICALS LLC	3.733	3.012	50.0%	1.51
HG0941D	SOLVAY INTEROX INC	3.257	2.628	50.0%	1.31
HG4807D	HOYER USA INC	3.115	2.514	50.0%	1.26
HG1065E	KANEKA TEXAS CORP	3.059	2.469	50.0%	1.23
HG0131A	PPG INDUSTRIES INC	2.847	2.298	50.0%	1.15
HG0235K	EXXON COMPANY USA	2.640	2.131	50.0%	1.07
HG0132V	ADVANCED AROMATICS LP	2.386	1.925	50.0%	0.96
HG0288M	GOODYEAR TIRE & RUBBER CO	2.288	1.846	50.0%	0.92
	TOTALS	**6952.176**	**5610.406**		**1937.570**

Table 6.2-2: Initial HRVOC Site-Cap Allocations: Seven Surrounding Counties

ALL EMISSIONS ARE IN LBS/HOUR					
ACCOUNT	**OWNER**	**Model Adjusted Inventory for Total Ethylene, Propylene**	**Adjusted Total Cooling Tower, Flare, and Vent Emissions (88.7%)**	**Control Level**	**Total Controlled Inventory**
BL0082R	THE DOW CHEMICAL CO	713.447	632.83	70.00%	189.85
GB0004L	BP AMOCO TEXAS CITY BUSINESS UNIT	625.800	555.08	70.00%	166.53
BL0758C	CHEVRON PHILLIPS CHEMICAL CO LP	461.163	409.05	68.00%	130.90
BL0002S	AMOCO CHEMICAL CO	421.340	373.73	68.00%	119.59
GB0076J	UNION CARBIDE CORP	311.419	276.23	68.00%	88.39
GB0073P	VALERO REFINING CO TEXAS	217.646	193.05	68.00%	61.78
BL0023K	THE DOW CHEMICAL CO	105.518	93.59	60.00%	37.44
GB0060B	STERLING CHEMICALS INC	102.563	90.97	60.00%	36.39
CI0028L	EQUILON PIPELINE CO LLLC	85.984	76.27	60.00%	30.51
GB0001R	BP AMOCO CHEMICAL COMPANY	75.567	67.03	60.00%	26.81
BL0042G	PHILLIPS 66 CO	73.335	65.05	60.00%	26.02
CI0006V	ENTERPRISE TEXAS OPERATING LP	53.850	47.77	60.00%	19.11
BL0113I	EQUISTAR	52.595	46.65	60.00%	18.66
CI0025R	DIAMOND-KOCH	45.765	40.59	60.00%	16.24
BL0044C	CHEVRON PHILLIPS CHEMICAL CO LP	43.415	38.51	60.00%	15.40
CI0009P	EXXON CHEMICAL CO	42.744	37.91	60.00%	15.17
BL0038U	SOLUTIA INC	33.294	29.53	60.00%	11.81
BL0268B	EQUISTAR CHEMICALS LP	32.615	28.93	60.00%	11.57
CI0022A	DYNEGY MIDSTREAM SERVICES LP	31.137	27.62	60.00%	11.05
CI0016S	BAYER CORP	28.549	25.32	60.00%	10.13
CI0005A	KOCH HYDROCARBON CO	28.159	24.98	60.00%	9.99
CI0011F	EXXONMOBIL COMPANY	26.770	23.74	60.00%	9.50
MQ0002T	DUKE ENERGY FIELD SERVICES LP	25.800	22.88	60.00%	9.15
GB0055R	MARATHON ASHLAND PETROLEUM LLC	23.552	20.89	60.00%	8.36
CI0008R	ENTERPRISE PRODUCTS OPERATING LP	19.108	16.95	60.00%	6.78
CI0119H	UCAR PIPELINE INC	18.574	16.48	60.00%	6.59
LH0051C	EXXONMOBIL PIPELINE COMPANY	17.794	15.78	60.00%	6.31
FG0042L	CROMPTON CORP	17.265	15.31	60.00%	6.13
BL0021O	BASF CORPORATION	16.371	14.52	60.00%	5.81
CI0002G	EQUISTAR CHEMICALS LP	15.983	14.18	60.00%	5.67
BL0003Q	AMOCO CHEMICAL CO	10.527	9.34	50.00%	4.67
MQ0012Q	HUNTSMAN PETROCHEMICAL CORP	10.163	9.01	50.00%	4.51
FG0083U	SUGAR LAND BULK OIL CO	9.893	8.77	50.00%	4.39
CI0042R	CONOCO INC	9.522	8.45	50.00%	4.22
BL0022M	THE DOW CHEMICAL CO	9.512	8.44	50.00%	4.22
MQ0064U	NATURAL GAS PIPELINE CO OF AMERICA	8.852	7.85	50.00%	3.93
LH0082O	EXXON MOBIL CORPORATION	6.836	6.06	50.00%	3.03
CI0103W	KERR MCGEE OIL & GAS ONSHORE LLC	6.219	5.52	50.00%	2.76
FG0266K	AQUILA STORAGE & TRANSPORTATION CO	5.401	4.79	50.00%	2.40
GB0028U	ISP TECHNOLOGIES INC	5.233	4.64	50.00%	2.32
GB0050E	INTERCOASTAL TERMINAL INC	5.145	4.56	50.00%	2.28
CI0021C	DYNEGY MID STREAM SERVICES LP	5.039	4.47	50.00%	2.23
GB0067K	SEA LION TECHNOLOGY INC	4.348	3.86	50.00%	1.93
BL0005M	HILCORP ENERGY CO	4.324	3.84	50.00%	1.92
WB0003U	EXXON COMPANY	3.760	3.33	50.00%	1.67

CI0104U	KERR MCGEE OIL & GAS ONSHORE LLC	3.484	3.09	50.00%	1.55
FG0010B	EXXON CORP	3.285	2.91	50.00%	1.46
FG0040P	PATTERSON PETROLEUM LP	3.214	2.85	50.00%	1.43
BL0039S	NALCO EXXON ENERGY CHEMICALS LP	3.169	2.81	50.00%	1.41
LH0005J	HUNTSMAN PETROCHEMICAL CORP	3.119	2.77	50.00%	1.38
GB0077H	UNION CARBIDE CORP	2.768	2.46	50.00%	1.23
LH0060B	SUN PIPE LINE CO	2.657	2.36	50.00%	1.18
BL0035D	KEESHAN & BOST CHEMICAL CO INC	2.611	2.32	50.00%	1.16
MQ0335M	MITCHELL ENERGY CORP	2.543	2.26	50.00%	1.13
BL0045A	RHODIA RARE EARTHS INC	2.516	2.23	50.00%	1.12
BL0626U	AIR LIQUIDE AMERICA CORP	2.430	2.16	50.00%	1.08
BL0724T	TRI-UNION DEVELOPMENT CORP	2.350	2.08	50.00%	1.04
BL0725R	TRI-UNION DEVELOPMENT CORP	2.313	2.05	50.00%	1.03
	TOTALS	**3908.355**	**3466.71**		**1180.26**

6.3 NO_x RULE CHANGES

6.3.1 Point Source NO_x Rules

The changes to Chapter 117 replace the emission specifications for attainment demonstration (ESADs) applicable to stationary sources of NO_x in the Houston/Galveston with the alternate ESADs which were provided by BCCA-AG as part of the Consent Order submitted to Judge Margaret Cooper, Travis County District Court, in the lawsuit styled BCCA Appeal Group, et al v. TCEQ. The revised ESADs represent an 80% reduction in industrial point source NO_x emissions.

The changes also address the relative accuracy requirement of each NO_x monitor. Each NO_x monitor (continuous emissions monitoring system (CEMS) or predictive emissions monitoring system (PEMS)) is currently subject to the relative accuracy requirement of 40 CFR 60 or 75 monitoring requirements. For units classified as low emitters (<0.200 pound per million Btu), the proposal establishes a more restrictive relative accuracy option which will provide better confidence in the monitor's ability to make low-level measurements for NO_x.

In addition, the changes add a requirement that ammonia monitoring be applied to units which inject urea or ammonia into the exhaust stream for NO_x control in HGA. Options for ammonia slip monitoring include: 1) calculating the slip with a mass balance, as the difference between the input ammonia, measured by the ammonia injection rate, and the ammonia reacted, measured by the differential NO_x upstream and downstream of selective catalytic reduction (SCR); 2) monitoring ammonia slip more directly by splitting the exhaust sample stream, converting the ammonia to nitric oxide in one stream with a thermal oxidizer, and measuring the ammonia as the difference between the converted and unconverted samples; 3) conducting weekly ammonia sampling using stain tubes; and 4) using another method as approved by the executive director. It is desirable to minimize ammonia emissions due to the concern that significantly increased ammonia emissions will enhance formation of fine particulate matter of less than 2.5 microns ($PM_{2.5}$). Consequently, monitoring for ammonia emissions is necessary.

6.3.2 (No change from September 2001 revision)

6.3.3 (No change from December 2000 revision)

6.3.4-6.3.5 (No change from September 2001 revision)

6.3.6 - 6.3.7(No change from December 2000/September 2001 revision)

6.3.8 (No change from September 2002 revision)

6.3.9 (No change from September 2001 revision)

6.3.10 -6.3.11 (No change from December 2000 revision)

6.3.12 (No change from September 2002 revision)

6.3.13-6.3.15 (No change from December 2000 revision)

6.3.16 (No change from September 2001 revision)

6.3.17 - 6.3.19 (No change from December 2000 revision)

6.3.20-6.3.22 (No change from September 2001 revision)

6.4 PROTOCOL FOR IMPLEMENTING THE ENERGY EFFICIENCY AND TERP PROGRAMS

The commission is incorporating the methodology by which energy efficiency measures can be quantified and the protocol for the TERP program through EPA's Economic Incentive Program into the SIP. However, many issues regarding the energy efficiency program remain unresolved so no specific SIP credit will be taken for the program at this time. The Texas Legislature anticipated the need for air quality improvement programs and initiated both energy efficiency measures and the TERP program through legislation. The commission seeks to continue the development of these programs to demonstrate progress in reducing NOx emissions.

6.4.1 Energy Efficiency

Energy efficiency measures are a critical part of the commission's plan for clean air. Not only do they decrease NO_X emissions, they also produce significant reductions in other criteria pollutants such as PM, SO_2, VOC, CO, and CO_2. When combined, various efficiency measures have the potential to add up to significant energy savings as well as emission reductions thereby contributing to the overall goal of clean air in Texas.

Another benefit of energy efficiency is its ability to decrease the demand for electrical generation. However, one significant challenge is how to allocate the emission reductions on a geographic basis. Since Texas' electricity needs are primarily served by an isolated power grid controlled by The Electric Reliability Council of Texas (ERCOT), this issue can be overcome.

The Texas Legislature anticipated the need for energy efficiency programs in Texas and passed legislation to initiate such programs. The 76th Texas Legislature passed Senate Bill 7 which made a commitment to improving air quality through an energy efficiency mandate to offset future growth in the demand of energy production. The details of this plan are set out in Chapter 25 of the Public Utility Commission of Texas' rules, which require at least a 10% reduction of electric utility's growth in demand by January 1, 2004 and each year thereafter. These reductions can be achieved through energy efficiency measures or by utilizing renewable energy, such as wind power. The 77th Texas Legislature passed Senate Bill 5 which requires each political subdivision to establish a goal to reduce electricity consumption by five percent each year for five years, beginning January 1, 2002, with an annual report submitted to the State

Energy Conservation demonstrating these reductions. To meet the goals set forth by the Texas Legislature, political subdivisions may develop municipal planning requirements, energy efficiency performance standards, home energy rating programs, and Energy Star programs. The bill also provides for a grant program to be administered through the PUC to provide financial incentives for energy efficiency measures. Furthermore, SB 5 establishes new building code requirements for all new construction statewide.

The energy savings resulting from the SB7 and SB5 measures are expected to achieve reductions of NO_x emissions from electricity generators. This proposed SIP estimates county-wide NO_x reductions within the ERCOT territory. The EPA's Office of Atmospheric Programs, in coordination with the TCEQ, ERCOT and PUC, has developed a methodology for quantifying NO_x emission reductions resulting from energy savings due to energy efficiency measures. The inputs consider the amount of expected energy savings (kWh) in different areas of the state above what is expected in the baseline. The outputs are an estimate of the emission reductions at each plant within the ERCOT region, which can be summed for each county. Using Matrix Algebra, Power Control Area Generation and Interchange Data are combined into simultaneous equations to determine how much of each power control area's generation is directed to each power control area. This is the first step in quantifying emission reductions associated with energy efficiency measures. The commission plans to refine the analysis of these reductions as part of the MCR process. Furthermore, the commission is soliciting comments on the management of this program in other regions of Texas, the incorporation of this program into the cap and trade program, and solutions to any other unresolved issues. Appendix A of the proposal details the methodology through which the emission reductions were estimated.

The quantification associated with energy efficiency measures is based on the most recently available given inputs. The commission expects changes in these inputs as more information becomes available. However, the commission does not expect the basic quantification methodology to change. In an attempt to enhance the energy efficiency program in terms of potential emission reductions, , the commission encourages interested parties to develop additional programs that utilize energy efficiency measures.

6.4.2 Texas Emission Reduction Plan

The 77th Texas Legislature passed Senate Bill 5 which established the Texas Emission Reduction Plan (TERP) and instructed the TCEQ to remove the Construction Equipment Operating Restriction and the Accelerated Purchase of Tier II/III diesel equipment from the SIP. TERP is expected to result in more emission reductions than those associated with the Construction Equipment Operating Restriction and the Accelerated Purchase of Tier II/III diesel equipment. The additional reductions will assist in filling the gap in the HGA SIP. To receive credit in the SIP for TERP, TCEQ is using the Economic Incentive Program (EIP) guidance to verify the validity of the programs. Of the EIPs identified, TCEQ is utilizing the Financial Mechanism option, which is described as subsidies targeted at promoting pollution-reducing activities or products.

TERP meets the requirements of a Financial Mechanism EIP as described in EPA's EIP guidance. The commission has produced guidelines, protocol and criteria for eligible projects in accordance with the Senate Bill 5 directive of the legislature. Criteria from that guidance has been incorporated into the verification process.

The TERP program was established to provide monetary incentives for projects to improve air quality in the states' non-attainment areas. The fund consists of fees and surcharges applied to certain vehicles and equipment when they are purchased, leased, inspected, or registered in Texas. The amount of the funds available for grants during each year may vary depending upon the amount of revenue received, as well

as the appropriations made to the program. Each year, the TCEQ will issue notices and information regarding the grants, including information on the amount of funds available.

Surplus

According to the TERP guidance, an activity is not eligible if it is required by any state or federal law, rule, or regulation, memorandum of agreement, or other legally binding document. However, this restriction does not apply to an otherwise qualified activity regardless of the fact that the state implementation plan assumes that the changes in equipment, vehicles, or operations will occur, if on the date the grant is awarded the change is not required by any state, federal, law, rule, or regulation, memorandum of agreement, or other legally binding document. The program guidance outlines additional restrictions and describes other eligible activities.

Enforceable

The TERP program will require a review of each project funded. Contracts will contain provisions thatallow the state to recapture grant money for the failure to achieve emission reductions. Furthermore, if the performing party fails to comply with the requirements of the contract, the TCEQ may require that all or a portion of the reimbursement funds be returned or repaid.

The TCEQ will complete a contractor evaluation in accordance with the provision that will be outlined in the grant contract. This evaluation will be used to track the compliance and effectiveness of contractors and grant recipients in administering contacts with the TCEQ.

The commission may at any time before or after reimbursement, as necessary in its sole discretion, request additional evidence concerning costs. By doing so, the TCEQ does not waive any requirements for the reimbursement of costs. In addition, the TCEQ may audit the records and performance of the performing party against the grant activities and the administrative requirements.

The TERP grant contract will require that the performing party utilize generally accepted accounting principles. Additionally, it will entitle the TCEQ to reimbursement based on failure to achieve the expected emission reductions, monitoring activities, and/or if grant equipment is sold, traded, or transferred.

The TERP guidance also outlines the allocation of funding. The performing party will submit a request for reimbursement in accordance with the conditions of the contract documents. The TCEQ may reject the request for reimbursement if it fails to demonstrate that the costs are eligible for reimbursement or if it fails to conform to requirements of the contract documents. The performing party will have a continuing obligation to satisfy the requirements for reimbursement.

Quantifiable

Emission reductions achieved through TERP will be quantified using a dollar spent per ton of NOx reduced ratio. The quantification inputs may include baseline NOx emissions, reduced NOx emissions, percentage for time operated in eligible counties and data regarding usage based on miles travel, horsepower, load factor, or energy consumption.

All lease, purchase, repower, retrofit, and add-on activities must meet requirements related to reductions in NOx emission levels when compared to a baseline emission level. The applicant will be asked to provide information on the NOx emission standards for a baseline engine and for the engine after the completion of the activity. The TERP guidance contains the federal NOx emission standards for on-road and non-road engines, according to model-year and horsepower. These standards should be used as a baseline emissions.

The TERP guidance outlines the general approach for determining incremental costs, emission reductions and cost-effectiveness. The application forms will require the applicant to provide data on the incremental costs of each activity, the estimated NOx emission reduction, and cost-effectiveness for each activity. Emission factors, load factor, and usage pattern information will be needed in order to calculate emission reductions attributed to an activity. The contract guidance may be referenced to find information on how to determine the level of NOx emissions for new vehicle and equipment. Both of these numbers must be established in order to calculate the emission reduction potential and the cost-effectiveness of the proposed activity. In addition, the application forms will require the applicant to submit emission-reduction estimates which will be reviewed and verified by the TCEQ. If the applicants cannot provide these estimates, the TCEQ will determine the project cost effectiveness.

For a project to be eligible for TERP funding, emission testing data on technologies or products must be conducted under testing protocols approved for the EPA or CARB certification or verification programs OR conducted under a TCEQ approved test protocol. This approach will provide the most flexibility for the program while also restricting the evaluation process to those technologies or products that can provide documentation that will be acceptable to the EPA. The following test protocol be considered the minimum by which the TCEQ will accept documentation of emission reductions for consideration under the TERP.

- The manufacturer or vendor of the technology or product must be able to provide the TCEQ with emissions test data as reported by an independent emissions testing facility using the applicable Federal Test Procedures (FTP) specified in 40CFR Parts 86 or 89 for highway and nonroad engines.
- The emissions testing must consist of a minimum of three FTP tests. Each test must consist of a full FTP test with all the testing modes and variables inclusive on both the baseline technology and the candidate technology. Test sequences must be conducted in a back-to-back fashion.
- The triplicate tests are required to provide a mean emission reduction and the 95% confidence interval on that mean based on measured variability for each of the measured emissions and test parameters. For technology to be used with highway engines this minimum is satisfied with one cold start test and three hot start tests. For technology to be used with nonroad engines the minimum is satisfied with three replicates of the test sequence appropriate for the engine classification for which the technology is intended (i.e., three 8-mode tests for applicable engines, three 5-mode tests for constant speed engines, three 6-mode tests for variable speed engines under 19 kW.)
- Products that demonstrate only a small emission reduction potential would need to perform additional repeats of the testing to provide statistical significance.
- A comprehensive report of the emission testing results which have demonstrated statistically significant emissions benefits based on the test report or documentation as provided by the independent emissions testing facility that conducted the testing must be provided to the TCEQ. This report should include any results declared void or invalid by the testing facility.
- All applicable information concerning the test vehicle or engine must also be furnished including the test vehicle or engine manufacturer name, model year, vehicle identification number, engine model, engine family code, engine horsepower rating, the inertia weight, load conditions with corresponding dynamometer setting, fuel/fuel additive used, any special test requirements from the original vehicle or engine configuration, vehicle preparation information, etc.

In addition, technologies or products that have not been certified or verified by the EPA or CARB, but have documented emission reductions to the satisfaction of the TCEQ will be required to conduct annual

emissions testing to demonstrate durability of the emission reduction systems for the duration of the TERP project or until the technology or product is certified or verified by the EPA or CARB.

Permanent

Environmental benefit from projects associated with TERP will occur beyond 2007. Emission reductions achieved through this program are contractually permanent for five years and will be permanently retired. According to the established TERP guidance, emission reduction credits may not be used for an averaging, banking, or trading program.

General Equity Principle & Environmental Justice Principle

TERP is not a banking and trading program, therefore program disbenefit is not expected. By design, this plan reduces NOx emissions with a concentration on cleaner diesel engines through economic incentives such as grants and rebates. Eligible types of activities include lease or purchase of non-road equipment, repower or retrofit of non-road diesel powered equipment, on-road heavy duty diesel vehicles, use of quality fuel infrastructure project and demonstration of new technology. TCEQ staff plans to verify that emission reductions funded under this plan will benefit the community in which the emission reductions occur.

Penalty Provisions

Upon the performing party's failure to comply with the requirements of the contract documents, TCEQ may, at its own discretion, require that the performing party return or repay all or a portion of the reimbursement funds.

Procedure for Public Disclosure of Information & Provisions for Addressing Uncertainty

For auditing purposes, reports will be submitted to the state legislature in accordance with TERP legislation. The performing party must maintain the financial information and data used in the preparation or support of any request for reimbursement (direct and indirect), price or profit analysis and a copy of any cost information or analysis submitted to the TCEQ. The TCEQ, Texas State Auditor's Office, or any of their authorized representatives will have access to all such books, records, documents, and other evidence for the purpose of review, inspection, audit, excerpts, transcriptions, and/or copying during normal business hours. Furthermore, the performing party must agree to the disclosure of all information and reports resulting from access to records under this agreement.

In addition, property records of grant equipment must be maintained that describe the usage, ownership, and any other details as outlined in the grant contract. All data and other information developed under the grant agreement will be furnished to the TCEQ and will be public information except to the extent that it is exempted from public access by the Texas Public Information Act, Texas Government Code, Chapter 552.

The review of TERP mandated by the Texas Legislature will address the program uncertainties. Moreover, safeguards will be established to monitor program funding and emission reductions. Preliminary results indicate that potential TERP strategies should achieve effective control measures. Applicants of TERP funding must agree to monitor the use of grant-funded vehicles, equipment, infrastructure, fuel, and to report to the TCEQ for the life of each grant-funded activity. Grant recipients must complete the project according to the time frames explained in the grant agreement.

For information on recent TERP activities, please visit the following web site:
http://www.tnrcc.state.tx.us/oprd/sips/terp.html

CHAPTER 7: FUTURE ATTAINMENT PLANS

The development of the attainment demonstration SIP for the HGA area has proven to be an extremely challenging effort, due to the magnitude of reductions needed for attainment and the shortage of readily available control options. Several leading-edge, innovative control technologies are now approaching an advanced state of development due to the role played by Texas stakeholders and others in aggressively pursuing new ozone control technologies. As promising as these new technologies may be, however, they alone are not yet adequate to bring the HGA area into attainment. Ideally, this attainment demonstration would rely upon technical solutions that provided the cleanest possible automobiles, trucks, ships, locomotives, aircraft, construction equipment, etc., within a few years' time. Unfortunately, the current state of technology, coupled with the inevitable lag time to achieve significant equipment turnover, prevents a purely technical solution from being a reality by 2007, the attainment year. For this reason, the commission must implement measures that rely on behavioral changes, in addition to technological controls.

7.1 ENFORCEABLE COMMITMENTS

The commission believes that additional enforceable commitments are necessary to complete a fully approvable attainment demonstration which will show attainment in the HGA area by November 2007. EPA has approved the use of enforceable commitments as a mechanism for identifying potential control strategies and associated anticipated reductions under limited circumstances with certain restrictions.

In its review of the 1994 SCAQMD attainment demonstration SIP (62 FR 1155-57, 117-82), EPA stated:

> "The CAA requires that SIPs include enforceable control measures sufficient to meet rate-of-progress milestones and provide the reductions needed for attainment by the applicable CAA deadline. Where it is infeasible for a state to accomplish the necessary regulatory adoption in the short term, we have recognized that this requirement can be satisfied, to some extent, by enforceable commitments to adopt regulations in the future, since these commitments can be enforced in court by EPA or citizens.
>
> In view of the magnitude of reductions required in the South Coast and the fact that SCAQMD and CARB have already adopted in regulatory form more stringent measures than are included in most other SIPs, we approved the 1994 Ozone SIP despite its heavy reliance on commitments to adopt regulations."

EPA stated its support for enforceable commitments in the December 16, 1999 proposed conditional approval and disapproval of the attainment demonstration SIP for the HGA ozone nonattainment area.

> "EPA has recognized that in some limited circumstances, it may be appropriate to issue a full approval for a submission that consists, in part, of an enforceable commitment. Unlike the commitment for conditional approval, such an enforceable commitment can be enforced in court by EPA or citizens. In addition, this type of commitment may extend beyond one year following EPA's approval action. Thus, EPA may accept such an enforceable commitment where it is infeasible for the state to accomplish the necessary action in the short term." 64 FR 70548, 70550 (1999).

The following table outlines the enforceable commitments the commission has made in order to have a full attainment demonstration for the HGA area which shows attainment of the ozone standard by November 2007. These commitments are also discussed throughout this chapter.

Table 7.1-1 Enforceable Commitments

Commitment	**Where the commitment can be found**
The commission commits to perform a mid-course review for the HGA area (including evaluation of all modeling, inventory data, and other tools and assumptions used to develop this attainment demonstration	April 2000 SIP revision
The commission commits to submit the mid-course review as a SIP revision to EPA by May 1, 2004	April 2000 SIP revision
The commission commits to perform new mobile source modeling for the HGA area, using EPA's MOBILE6, within 24 months of the model's official release; and that if a transportation conformity analysis is to be performed between 12 and 24 months after EPA's official release of MOBILE6, transportation conformity will not be determined until Texas submits an MVEB which is developed using MOBILE6 and which EPA finds adequate	April 2000 SIP revision
The commission commits to adopt measures that achieve at least 56 tpd of NOx emission reductions in the HGA area. (The December 2000 SIP submission shows that an additional 56 tpd of NOx reductions are needed to show attainment of the 1-hour ozone NAAQS).	September 2001 SIP revision Also in Sections 7.1
The commission has identified potential measures that could achieve the reductions identified in the previous commitment without requiring additional limits on highway construction	September 2001 SIP revision Also in Section 7.1 of this revision
The commission commits to adopt measures that achieve 25% of the 56 tpd additional NOx reductions necessary and submit these adopted measures to EPA as a SIP revision by December 2002	September 2001 SIP revision
The commission commits to adopt measures that achieve the remaining additional NOx reductions needed to show attainment and submit these adopted measures to EPA as a SIP revision by May 1, 2004	September 2001 SIP revision Also in Sections 7.1 and 7.2 of this revision
The commission commits to adopt the measures needed for the shortfall NOx reductions as expeditiously as practicable	September 2001 SIP revision Also in Section 7.1 of this revision

The commission commits that the compliance dates for these adopted measures needed for the shortfall NOx reductions will be as expeditious as practicable	September 2001 SIP revision Also in Section 7.1 of this revision
The commission commits to submit any revised shortfall calculation (as opposed to the 56 tpd shortfall number) to EPA for approval. EPA's approval is required whether the commission's shortfall number is higher or lower than the presently-identified shortfall number of 56 tpd	September 2001 SIP revision Also in Sections 7.1 and 7.2 of this revision
The SIP contains a list identifying to-be-considered measures with an estimated range of projected emissions reductions. The range must provide a reasonable certainty that enough of these identified measures, if adopted, would achieve the 56 tpd of NOx reductions	September 2001 SIP revision
The commission commits to concurrently revise the MVEBs and submit them to EPA as a revision to the attainment SIP if additional controls reduce on-road motor vehicle emissions	September 2001 SIP revision Also in Section 7.1 of this revision

The commission is conducting on-going scientific evaluations of aircraft data collected by the TexAQS. Initial results revealed that while NO_x emissions from industrial sources were correctly accounted for, industrial VOC emissions were significantly understated in the emissions inventory. Results also showed that plumes from the industrial area produce ozone very rapidly due to the proximity of large industrial facilities that emit NO_x and VOC. Specifically, highly-reactive VOCs such as ethylene, propylene, 1,3-butadiene, and butenes play a significant role in ozone formation and were under reported in the emissions inventory. This study concluded that controlling industrial highly-reactive VOCs were necessary to reduce ozone concentrations.

Results of photochemical grid modeling and analysis of ambient VOC data indicate that it is possible to achieve the same level of air quality benefits with reductions in industrial VOC emissions, combined with an overall 80% reduction in NO_x emissions from industrial sources, as would be realized with a 90% reduction in industrial NO_x emissions. This conclusion is based on results from several studies, including photochemical grid modeling of the August - September 2000 episode using a top-down emissions inventory adjustment to point source highly-reactive volatile organic compounds (HRVOCs) emissions, and analyses of ambient HRVOC measurements made by TCEQ automated gas chromatographs and airborne canisters using the maximum incremental reactivity and hydroxyl reactivity scales. Four HRVOCs clearly play important roles in Houston's ozone formation, and these four (ethylene, propylene, 1,3-butadiene, and butenes) seem to be the best candidates for the first round of HRVOC controls.

In order to address these recent scientific findings, the commission is adopting revisions to the industrial source control requirements, one of the control strategies within the existing federally approved SIP. This revision contains new rules to reduce emissions of HRVOCs from four key industrial sources: fugitives, flares, process vents, and cooling towers. The adopted rules target HRVOCs while maintaining the integrity of the SIP. Analysis to date shows that limiting emissions of ethylene, propylene, 1,3-butadiene, and butenes in conjunction with an 80% reduction in NO_x is equivalent in terms of air quality benefit to that resulting from a 90% point source NO_x reduction requirement. As such, the HRVOC rules are performance-based, emphasizing monitoring, recordkeeping, reporting, and enforcement rather than establishing individual unit emission rates.

Technical support documentation accompanying this revision contains the supporting analysis for early results from on-going analysis examining whether reductions in emissions of HRVOCs can replace the last 10% of industrial NO_x controls with a reduction of approximately 36% in industrial HRVOC emissions, while ensuring that the air quality specified in the approved December 2000 HGA SIP continues to be met.

In order to demonstrate an equivalent air quality benefit and support a revision to the NOx strategy, the commission has been conservative in estimating VOC emissions from industrial sources and establishing the site wide cap allocation. This methodology is conservative in that, additional adjustments may be made to the inventory as the commission learns more about the relative ambient concentrations of other VOCs, thereby reducing the burden on HRVOCs necessary for attainment purposes. Similarly, the aircraft data did not account for some of the ethylene emissions, and therefore the 1:1 NO_x to VOC ratio adjustments made to the inventory are also conservative. These types of changes may be made in the future as more analysis is completed. In terms of the equivalency determination, there are conservative assumptions applied that may change with more data assessment as part of the MCR. As a full analysis of what is ultimately necessary to fully demonstrate attainment is conducted at the MCR, the commission will be evaluating a number of issues that may change the HRVOC rules, such as: which, if any, additional chemicals need to be addressed; what is the appropriate geographic scope for the regulations; what are appropriate averaging times for the chemicals of concern; and what, if any, changes need to be made to the allocation process. By establishing a compliance date approximately 18 months after the conclusion of the MCR process, the commission believes it will have ample time to make necessary adjustments and still allow industry adequate time to fully comply.

As was discussed in Chapter 3 of the December 2000 revision, the TCEQ photochemical modeling resulted in a 141 ppb peak ozone level. This correlated to a gap calculation of 91 tpd NO_x equivalent. However, an additional five tpd has been added to the gap to address the diesel pull-ahead strategy that was included in the December 2000 revision. EPA has indicated that the state cannot take credit for the five tpd NO_x reductions associated with the diesel pull-ahead strategy because the excess emissions were not included in the emissions inventory, therefore the state cannot take credit for reducing them. The five tpd have therefore been added to the gap as additional reductions that the commission will address during the mid-course review process. The gap control measures adopted in December 2000 along with the stationary diesel engine rule included in this revision, result in NO_x reductions of 40 tpd, which left the remaining gap of 56 tpd. In this revision the commission has identified the TERP program to achieve 25% pf the additional NO_x reductions necessary.

The commission commits to adopt measures necessary to achieve the remaining emission reductions necessary in the HGA area above and beyond those reductions already identified by the control measures listed in Chapter 6, Table 6.1-2. Additionally, as the commission completes the mid-course review process, as outlined in Section 7.2, it may show that the HGA area needs more or fewer tpd of NO_x emission reductions for attainment by November 15, 2007. Should the mid-course review show that more or fewer reductions are necessary, the commission will submit the revised reduction calculation to EPA for approval. The SIP revision submitted in May 2004 will account for those additional reductions above and beyond the 56 tpd commitment if the mid-course review shows they are necessary for attainment.

The commission further commits to submit to the EPA adopted rules as SIP revisions, achieving at least the 56 tpd of NO_x emission reductions as expeditiously as practicable but no later than May 2004. The implementation of the measures will be as expeditious as practicable but no later than the beginning of the ozone season of 2007.

If the commission adopts additional control measures to reduce on-road motor vehicle emissions as a SIP revision, the commission will concurrently revise the motor vehicle emissions budget(s) for the SIP and submit such revised budget(s) to EPA as a revision to the SIP. However, this does not mean that the MVEBs contained in this revision are not fully approvable, adequate, and sufficient for transportation conformity purposes. With regard to on-road mobile source control measures, the state understands from EPA that only technology-related measures, such as I/M, cleaner fuels, and use restrictions/incentives may be included. Measures that could limit future highway construction, such as growth restrictions, may not be included. Furthermore, none of the on-road mobile source control measures identified in Section 7.5.1 of this SIP limit highway construction.

As shown in Table 7.8-1 the commission has identified 56-124 tpd of potential NO_x reductions from new technologies and programs which the commission commits to evaluating and adopting as they become more certain and available.

Table 7.1-2 Potential NO_x Reductions to Fill the Shortfall

NO_x Gap	96 tpd
Gap Measures from December 2000 revision and proposed stationary diesel engine rule	- 40 tpd
Total Gap Shortfall	= 56 tpd
Phase I mid-course review measures	14-20 tpd
Phase II mid-course review measures	+42-104 tpd
Total tons identified through innovative programs	**= 56-124 tpd**

The commission believes that this plan in its totality, including the adopted measures identified in Chapter 6 plus the process described in this chapter, will achieve the 1-hour ozone standard in the HGA area by 2007.

7.2 MID-COURSE REVIEW

As has been EPA's legal position since 1975 and the commission's policy, the SIP can be revised to adjust requirements, based upon new information, technology, or science, provided the ultimate goal of the SIP is achieved and all requirements of the federal act are met. The mid-course review is a well-defined approach that incorporates this policy. In order to ensure that the HGA area is in attainment by 2007 and that the controls to get there are the most cost-effective, technology-based solutions possible, the commission has committed to performing a mid-course review (see the commission's enforceable commitment adopted in April 2000). The mid-course review process has already begun and will continue, ultimately resulting in a SIP revision submitted to EPA by May 1, 2004. There are planned opportunities throughout the process, as described in the following pages, to incorporate the latest information and to make decisions. This effort will involve a thorough evaluation of all modeling, inventory data, and other tools and assumptions used to develop the attainment demonstration. It will also include the ongoing assessment of new technologies and innovative ideas to incorporate into the plan.

This chapter includes a detailed overview of the entire mid-course review process. It begins with an analysis of all reasonably available control measures for both VOC and NO_x. It then discusses the

expected potential actions over the coming months. Next, the anticipated results from the Texas 2000 study as well as other improvements and enhancements to the science that we expect are described. Finally, there is a discussion about the incorporation of these enhancements, and of the technologies which have been developed and are undergoing testing, during two phases: one ending in 2002, and the other by mid- 2004.

As promising as these new technologies may be, however, they alone are not yet fully developed enough to bring the HGA area into attainment. There are test programs already initiated evaluating all of these new technologies which will provide the commission with the necessary information to base decisions on during the full continuum of the mid-course review. Ideally, this attainment demonstration would rely upon technical solutions that provided the cleanest possible automobiles, trucks, ships, locomotives, aircraft, construction equipment, etc., within a few years' time. Unfortunately, the current state of technology, coupled with the inevitable lag time to achieve significant equipment turnover, prevents a purely technical solution from being a reality by 2007, the attainment year.

For this reason, the commission must implement measures that rely on behavioral changes, in addition to technological controls. The task of attaining the federal ozone standard within the schedule mandated by the FCAA leaves little choice but to leave no stone unturned in the search for additional reductions. The commission is willing to consider any and all alternatives to the attainment demonstration rules, as long as the reductions are achieved in the necessary quantity and within the proper time frame to guarantee attainment.

A problem with identifying alternative control strategies is federal preemption, prescribed by the FCAA, in controlling on-road and non-road vehicles, ships, locomotives, and aircraft, among other sources. As a result of these preemption requirements, Texas is prohibited from effectively addressing all of the sources of air pollution that must be reduced if attainment is to be achieved. This situation conflicts with the FCAA's presumed intention of having federal controls act in cooperation with state and local measures to reach attainment of air quality standards. For this reason, the state emphatically calls on EPA to accelerate its activities, which also happen to be mandated by the FCAA, in promulgating emission controls for these sources.

Furthermore, the commission asserts that the science today supports that the reductions embodied in this plan to occur by 2005 are a necessary step towards attaining the standard. Beyond that, the commission believes performance of the full mid-course review analysis may redetermine the extent to which additional reductions must occur. As noted previously, the commission commits to submitting to EPA for approval any revised shortfall calculation. Also in Section 7.1 the commission committed to adopting any additional measures necessary to achieve these reductions and submitting the adopted rules with an attainment demonstration SIP to EPA no later than May 1, 2004.

The commission believes it has identified sufficient potential reductions from new technology and programs in excess of those necessary to reach attainment. These excess reductions represent sufficient backstop measures should some technologies prove to be not as effective as anticipated. The commission also believes EPA has sufficient authority under the FCAA to ensure the state follows through with its commitments and that the identification of additional backstop measures is unnecessary.

Future Economic Growth: The commission is committed to developing an approvable attainment demonstration that achieves the significant reductions necessary to ensure attainment of the ozone standard in the HGA by 2007 and yet still maintains a robust economic growth. As a part of the ongoing review between now and May 2004, the commission will continue to evaluate the ability to modify the

SIP to incorporate additional reductions from federal programs and new technologies beyond 2007. These changes will lead to necessary revisions to the control strategies, particularly with regards to the allocations issued under the Cap and Trade program, to allow for growth in all economic sectors.

Federal Responsibilities: In order to accomplish everything necessary for a successful mid-course review, EPA will play a significant role, particularly with regards to three areas.

- **Certification** - There are a number of new technologies which EPA needs to certify. EPA's certification process has historically been cumbersome and time consuming. EPA needs to streamline this process such that the technologies that are being developed and proven can be ready for regulatory development prior to the mid-course review. EPA must complete this process prior to May 1, 2004 for as many technologies as possible. EPA must work hand in hand with the commission and stakeholders to expedite the certification and verification processes. Additionally, EPA has to certify the reduction potential from all certified technologies. This too is a time consuming process that needs to be refined and streamlined.

- **National Regulatory Changes** - EPA is contemplating a number of regulatory changes. However, historically EPA has not operated with the same constraints states must face in developing approvable attainment demonstrations. In order for the commission to have a sound technology-based SIP by 2004, EPA must move expeditiously with their programs and ensure reductions are occurring prior to the 2007 attainment date. EPA needs to work with other federal agencies (DOE, FAA, FERC, USDA) to ensure the programs are comprehensive and address all sources of emissions controlled by the federal government.

- **New Technological Advances** - Currently states are being placed in a position of fostering the development of new technologies for use in attainment demonstration SIPs. EPA must put resources towards the development of new technologies at the national level if states stand a chance of developing technology-based solutions to the attainment issues in their cities.

7.3 REASONABLY AVAILABLE CONTROL MEASURES ANALYSIS

7.3.1-7.3.3 (No change from September 2001 revision)

7.3.4 Short Term Commitments (12/00 – 10/01)

TCEQ has met all of its short term commitments as outlined in the September 2001 revision.

- The commission adopted California Not to Exceed Standards on December 19, 2001 in order to help encourage engine manufactures to adopt a single engine design for the entire country.
- The September 2001 SIP revision includes a rule that addresses NO_x emissions from stationary diesel engines.
- TCEQ has also proceeded with development of the TERP program. At this time, two rounds of projects have been funded and numerous grant proposals have been received as part of the third round of project funding.
- On May 22, 2002, the commission adopted rules requiring grandfathered facilities be permitted.

7.3.5 Additional Determination Considerations

The commission has always been fully committed to a RACM analysis that reviews all previously final control strategies at the mid-course review. The purpose of this current revision was to determine if a certain level of reduction in HRVOCs could attain the same air quality benefit with an 80% NOx reduction strategy as was demonstrated with the approved 90% NOx reduction strategy. As a part of the

analysis being conducted to inform the mid-course review process, there has been modeling analysis of retaining the 90% strategy with the HRVOC rules as described in the TSD. Based upon that analysis, the commission has determined that retaining the 90% NOx reduction strategy in conjunction with the HRVOC rules does not meet the RACM criteria of advancing the attainment date. Therefore, the last 10% of NOx emission reductions is not needed and as a result, no further RACM analysis is needed at this time. The commission disagrees that it must identify specific controls above and beyond what is already identified in the existing gap list. This SIP revision will strengthen the SIP with a combination of aggressive VOC and NOx emission controls. The commission expects that additional strategies will need to be adopted as part of the MCR in order to fulfill the enforceable commitments. The inclusion of MOBILE6 also may impact the attainment demonstration. Therefore, a new RACM analysis will be necessary and performed as part of the MCR.

7.4 BUILDING THE SCIENCE (12/00 - 5/04)

The combination of unique meteorological conditions and the large industrial complex along the upper Texas Gulf Coast has presented challenges in modeling ozone episodes in the area. The rapid formation of ozone at a limited number of monitors has been particularly difficult to replicate with the existing photochemical models, and thus a major focus of the developing science is the attempt to resolve this difficulty. This phenomenon was observed several times during the Texas 2000 Air Quality Study (TexAQS). The commission believes that TexAQS, the most comprehensive and successful air quality study conducted to date in the U.S., with over 40 research organizations and over 250 scientists, has provided and will continue to provide a large part of the scientific basis for reassessing the ozone problem in the HGA ozone nonattainment area. The commission has a long history of supporting enhancements to air quality models and associated tools and input data, and has made improving the science and tools supporting SIP development for Texas areas a top priority for the coming years. The commission is committed to working in cooperation with the regulated community, academia, research consortiums, and others to ensure that the modeling used to develop effective control strategies for the area will use the most current scientific tools and information to replicate high ozone episodes in the area.

Because the level of scientific knowledge constantly evolves, and scientists develop and conduct new research projects on short notice, a comprehensive description of ongoing or planned research projects is not provided herein. However, the TNRCC's catalog of ongoing and planned science projects relevant to the Houston ozone problem is available, and is maintained at the following TNRCC web site: http://www.tnrcc.state.tx.us/air/aqp/airquality_impscience.html#section2

The SIP proposal (June, 2002) provided a discussion of scientific plans for two phases of the mid course review. Phase I technical work has been completed, and is described in the Technical Support Document. Subsequent subsections of this chapter provide an overview of scientific plans for Phase II of the mid-course review, to be submitted in 2004. The technical work in Phase II will focus on refinements to the modeling of the TexAQS 2000 episode based on advances in the science. A time line of tasks is provided.

The commission will continually review new scientific information and update its plans and strategies as necessary. To the extent that a new piece of information or technology is available sooner than the anticipated schedule, and has a potential to impact the strategy in a significant manner, the commission will make whatever adjustments are necessary.

7.5 PHASE I MODELING: MODELING OF NEW EPISODE (FROM TEXAS 2000 AIR QUALITY STUDY), HISTORICAL 1993 EPISODE, AND OTHER ANALYSIS

7.5.1-7.5.5 (No change from September 2001 revision)

7.5.6 Rule Development

Results of photochemical grid modeling and analysis of ambient VOC data indicate that it is possible to achieve the same level of air quality benefits with reductions in industrial VOC emissions, combined with an overall 80% reduction in NO_x emissions from industrial sources, as would be realized with a 90% reduction in industrial NO_x emissions. This conclusion is based on results from several studies, including photochemical grid modeling of the August - September 2000 episode using a top-down emissions inventory adjustment to point source highly-reactive volatile organic compounds (HRVOCs) emissions, and analyses of ambient HRVOC measurements made by TCEQ automated gas chromatographs and airborne canisters using the maximum incremental reactivity and hydroxyl reactivity scales. Four HRVOCs clearly play important roles in Houston's ozone formation, and these four (ethylene, propylene, 1,3-butadiene, and butenes) seem to be the best candidates for the first round of HRVOC controls.

In order to address these recent scientific findings, the commission is adopting revisions to the industrial source control requirements, one of the control strategies within the existing federally approved SIP. This revision contains new rules to reduce emissions of HRVOCs from four key industrial sources: fugitives, flares, process vents, and cooling towers. The adopted rules target HRVOCs while maintaining the integrity of the SIP. Analysis to date shows that limiting emissions of ethylene, propylene, 1,3-butadiene, and butenes in conjunction with an 80% reduction in NO_x is equivalent in terms of air quality benefit to that resulting from a 90% point source NO_x reduction requirement. As such, the HRVOC rules are performance-based, emphasizing monitoring, recordkeeping, reporting, and enforcement rather than establishing individual unit emission rates.

Technical support documentation accompanying this revision contains the supporting analysis for early results from on-going analysis examining whether reductions in emissions of HRVOCs can replace the last 10% of industrial NO_x controls with a reduction of approximately 36% in industrial HRVOC emissions, while ensuring that the air quality specified in the approved December 2000 HGA SIP continues to be met.

In order to demonstrate an equivalent air quality benefit and support a revision to the NOx strategy, the commission has been conservative in estimating VOC emissions from industrial sources and establishing the site wide cap allocation. This methodology is conservative in that, additional adjustments may be made to the inventory as the commission learns more about the relative ambient concentrations of other VOCs, thereby reducing the burden on HRVOCs necessary for attainment purposes. Similarly, the aircraft data did not account for some of the ethylene emissions, and therefore the 1:1 NO_x to VOC ratio adjustments made to the inventory are also conservative. These types of changes may be made in the future as more analysis is completed. In terms of the equivalency determination, there are conservative assumptions applied that may change with more data assessment as part of the MCR. As a full analysis of what is ultimately necessary to fully demonstrate attainment is conducted at the MCR, the commission will be evaluating a number of issues that may change the HRVOC rules, such as: which, if any, additional chemicals need to be addressed; what is the appropriate geographic scope for the regulations; what are appropriate averaging times for the chemicals of concern; and what, if any, changes need to be made to the allocation process. By establishing a compliance date approximately 18 months after the conclusion of the MCR process, the commission believes it will have ample time to make necessary adjustments and still allow industry adequate time to fully comply.

The commission has withdrawn the proposed general VOC monitoring rules in Subchapter B, Divisions 7 and 8. In lieu of requiring this monitoring of all VOCs from individual flares, cooling towers and process vents to obtain emissions data for use in SIP planning, the commission is relying on data from not only

the commission's monitoring network, but also data from additional ambient monitors that will be strategically located in HGA. This monitoring is expected to not only be a more efficient use of resources for this data gathering, but will also provide information more quickly. As described more fully in the narrative to the SIP revision and Technical Support Document (TSD) that accompany these rule amendments, the commission is committed to developing the best science possible to understand the causes of high ozone in the HGA. For the mid-course review, the commission plans to perform an in-depth analysis of the contributions of the less-reactive compounds and to perform top-down analyses similar to those used for the HRVOCs. If warranted, appropriate adjustment factors will be developed for less-reactive VOCs. As explained more fully in the SIP and TSD, the current modeling analysis indicates that emission reductions in the HRVOC alone can compensate for the change of industrial NO_x controls to 80% reductions, but additional controls on VOC sources are likely to be necessary to reach attainment. The commission will continue to study VOC data available now and in upcoming years to determine whether additional compounds should be added. To accomplish this task, the commission needs the support of and expects owners and operators of facilities in HGA which emit VOCs to participate in the ambient monitoring efforts which are scheduled to begin no later than June 1, 2003. If the ambient monitoring network is not fully and timely developed and operated such that the commission has received sufficient data for mid-course review, the commission may reconsider site-specific monitoring controls of VOC sources.

7.6 PHASE I CONTROL MEASURES - 2002

For information on the Phase I Control Measures see Section 6.4.

7.7 PHASE II MODELING: REFINEMENTS TO THE 2000 EPISODE

7.7.1 Continued Analysis of "spike"/ Rapid Ozone Formation events

Based on the work in the first phase, the commission may continue its investigation of "spike" and/or rapid ozone formation events with an analysis that focuses on possible causal factors associated with these events (e.g., chlorine chemistry, meteorology, upsets, routine non-uniform emissions, reactivity of compounds, and routine emissions not currently contained in emissions inventories submitted to the commission).

7.7.2 Enhancements to the State-of-the-Science Photochemical Modeling

Phase II will focus on photochemical modeling refinements that may result from projects identified through the Interim Science Coordinating process. Some of the projects are described in the projects catalog referenced previously (at URL http://www.tnrcc.state.tx.us/air/aqp/airquality_impscience.html#section2) . Additional discussions of modeling refinements are also included in the Technical Support Document submitted with Phase I. For example, the modeling conducted for Phase I uses emissions gridded at 4 km, reallocated to 1 km using the CAMx flexi-nest feature. In Phase II, the commission will develop a modeling inventory fully resolved to 1 km.

7.7.3 Enhanced Base Case Inventory

Base case inventories incorporating the latest in the state-of-the science will be included in Phase II. Emissions updates will be made using new or revised emissions models, emission factors, emissions and activity data for specific sources or types of sources, and other updated information and procedures. The following provides an overview of Phase II emissions inventory plans. More detailed discussions are included in the Technical Support Document.

Point Sources

As described in Technical Support Document, several enhancements were made to the point source inventory based on results from the Texas 2000 Air Quality Study and the Special Inventory. The Special Inventory, described in Attachment 3.4 of the Technical Support Document, included a survey of 81 companies requesting information on hourly data related to deviations from routine operations during the TexAQS study period. The special emissions inventory is included in the modeling as part of the effort to better simulate the fluctuations at the monitors. Enhancements that may benefit Phase II involve unscheduled, nonuniform, and unquantified emissions, and further refinements of emissions inventories to account for large amounts of reactive hydrocarbons. As a example of this, the commission will continue to analyze data including aircraft canister samples collected in 2002 and 2003 in order to refine the identification of VOCs that play important roles in the ozone formation process.

Other tasks or activities will involve the updating of point source emissions from Phase I, including an update of emission factors and a comparison of the PSDB to other databases.

Mobile and Area Sources

The commission will implement any revisions of EPA's new on-road mobile source emission factor model, MOBILE6 to include possible humidity adjustments.

The Texas Transportation Institute (TTI) will utilize the computer software tools to allow this model to be run in conjunction with the revised local travel demand models used in urban areas for transportation planning. This will allow the development of improved travel link-based running emissions and trip start- and stop-based emissions to be located at the trip beginnings and ends.

The commission will incorporate results from several heavy duty and off road activity projects that are described in detail in the research projects catalog. Most notable is a project to characterize emissions from on-road heavy-duty diesel vehicles and off-road equipment in the Houston Ship Channel area and an evaluation of on-road heavy-duty truck population, activity and usage patterns in the Houston industrial area.

Further enhancements will be made to the implementation of EPA's new non-road mobile source emissions model, NONROAD. Broader use of the model with the local equipment activity load factors, based on local survey data, is expected for Phase II modeling. The commission plans to investigate ways for enhancing the offshore inventory.

Biogenic Sources

Considerable enhancements were made to the Texas biogenics emissions inventory through field and other studies. However, more work needs to be conducted to further enhance this inventory. For Phase II, the commission will incorporate an evaluation of the response of plant species emissions to very high temperatures during the ozone season. The commission is participating in the Houston Green project. This project could provide improvement of the input data available for biogenic emissions modeling. The project should result in a more contemporary land cover and vegetation density map for the Houston area.

7.7.4 Revised Future Case Inventory

Future case inventories for 2007 will be developed for Phase II. The future case inventories will be developed using the same procedures described for the Phase I modeling. Additional discussions of the future case inventory are included in the Technical Support Document and will be duplicated for Phase II. The commission commits to including those enhancements described in section 7.5.4 of the June 2002 proposal.

Table 7.7-1 Schedule for Phase II of the Mid-Course Review Process - Refined Modeling of the 2000 Episode

Task	Start Date	Completion Date
Enhancements to photochemical model	**Ongoing**	
Development of base case emissions inventory, including any enhancements		
Point source inventory	**January 1, 2001**	**March 1, 2003**
Mobile source inventory based on MOBILE6	**January 1, 2002**	**March 1, 2003**
Non-road mobile source inventory	**January 1, 2002**	**March 1, 2003**
Area source inventory	**January 1, 2002**	**March 1, 2003**
Biogenics updates	**January 1, 2002**	**March 1, 2003**
Development of future case inventory for 2007	**January 1, 2003**	**April 30, 2003**
Development of meteorological modeling, including enhancements	**June 1, 2002**	**March 1, 2003**
Photochemical modeling		
Base case modeling	**March 9, 2003**	**April 30, 2003**
Future base case modeling	**May 1, 2003**	**May 31, 2003**
Future case modeling of control scenarios	**June 1, 2003**	**October 31, 2003**
Rule development of any new technologies, direct substitutions, changes due to scientific advances or additional legislative direction	**November 1, 2003[1]**	**April 2004[1]**

[1]For the rule development task, the start date indicates the approximate date that the rules would be proposed, and the completion date indicates the approximate date that the rules would be adopted.

7.7.5 Enhancements to the State-of-the-Science in Meteorological Modeling

During Phase II of the Mid Course Review, refinements will be made to the existing meteorological modeling. Refinements are discussed below.

The original TexAQS 2000 modeling episode extended from August 25-September 1, 2000. As noted in the Episode Selection document (Attachment 3), the episode will be expanded so that additional meteorological scenario can be investigated and modeled.

An important refinement, if data are available in time, will be the assimilation of GOES satellite data into MM5 so that there will be an automated methodology for improving the representation of soil moisture availability. The evaluation of available soil moisture was a critical factor for MM5 modeling of the TexAQS 2000 episode during Phase I of the Mid Course Review. The Phase I modeling benefitted from the on-site presence of the State Climatologist who was able to make necessary adjustments to this key parameter based upon direct observation of conditions during the time of this study period. The use of the GOES satellite data will provide an automated means of calculating available soil moisture over a broader region than was directly observed by the State Climatologist.

Also, for the originally modeled episode and the extended modeling periods, various additional meteorological model configurations will be evaluated. An example is the investigation of investigating different choices of cumulus parameterizations to better reflect the convective activity that was prominent during the extended episode periods. Another example is the use of new land/surface models to directly calculate available soil moisture and planetary boundary layer.

7.8 PHASE II CONTROL MEASURES - 2004

Table 7.8-1 Estimated Reductions from Phase II Mid-Course Review Commitments - 2004

Measure	Estimated Reductions*
Innovative Technology Measures	
Gasoline Additives	11-20
Diesel Emulsion	4-10
Commercial and Residential A.C. ozone reduction system	3-13
NO_x reduction systems	6-15
Diesel I/M	4-5
Additional Gasoline Sulfur Controls	1-2
Fuel Cells	1-5
Innovative Idea Measures	
Marine loading emissions	12-33
Episodic controls	
Reductions in VMT associated with commuting	
Pricing policies to encourage reductions in VMT	
Reductions at ports and airports	
Use of new technology and the internet to further reduce emissions	

Urban heat island/cool cities reductions	
Voluntary Stationary Emission Reduction Program	
Funding for transit programs	
Energy Efficiency Measures	
Economic Incentives	
Incentives for Cleaner Vehicles and/or Vehicle Fleets	
TOTAL REDUCTIONS IN 2004	42-103

*The commission recognizes the potential for overlap with the emission reductions targeted from some of these measures. The low range of the estimated reductions takes this into account. The commission is developing the proper protocol to assure that no double counting of reductions will occur.

Gasoline Additives

Fuel and engine performance have long been supplemented through a variety of additives. One of the first additives blended into gasoline at the pump as long ago as the 1920's was tetraethyl lead which resulted in a fuel commonly called leaded gas. The purpose of the lead was to 1) protect against very rapid wear of valve seats, and 2) reduce knock. Due to toxicity and because it will damage catalytic convertors, lead in gasoline has been prohibited in the U.S. for many years. Presently, cars designed for lead-free gas are built with hardened valve seats for more durability.

Currently, gasoline contains additives to reduce knock, inhibit corrosion and rust as well as improve performance. Further, performance additives include detergents, dispersants, anti-icers, combustion enhancers/modifiers, fluidizer oils and flow improvers.

As of January 1, 1995 all gasoline marketed in the United States must contain an EPA approved additive package with a detergent. Detergent in gasoline is critical to keep the fuel nozzles of injectors clear of varnish, gums and other deposits that can clog them. A clogged injector will result in incomplete combustion and then higher tail pipe emissions of raw hydrocarbons and so more pollution. In addition, detergents will minimize carbon deposits on valves, pistons and piston rings so the engine will operate more closely to its design capability and thereby emit fewer pollutants, and derive more potential energy from the gasoline consumed.

Research and development of gasoline additives is ongoing. The Infineum USA L.P. has developed a product called Vektron 6913 which, based on available evidence, seems to have a significant effect on NO_x emissions from gasoline powered vehicles. Vektron 6913 is registered with EPA as a gasoline additive containing a detergent. Historically gasoline additives blended in the fuel at the refinery have been used as anti-freeze and to enhance performance through reduction of carbon deposits and other harmful residues on fuel injectors, rings, pistons and valves.

Fleet tests with a variety of car and light truck models of various ages have indicated a 10% reduction in NO_x emissions as compared to results from use of RFG Phase 2 base gasoline as a control. A report entitled “Vektron 6913 Gasoline Additive NO_x Evaluation Fleet Test Program” prepared by the Southwest Research Institute of San Antonio details the research design and methods utilized for the

study of Vektron 6913. At present, Infineum is working with the EPA to get NOx reductions achieved from using Vektron 6913 in gasoline quantified and verified.

Therefore, the commission feels it is reasonable to plan for the adoption of a gasoline additive strategy for the HGA area by 2004.

Air Conditioning

One of the control strategies proposed by the commission on August 9, 2000 was a requirement for ozone reducing technology in residential and commercial air conditioning units, supplied or installed after January 1, 2002. This new technology involves applying a paint-like coating to the surface of a heat exchanger (i.e., the outdoor coils and fins of an air conditioning condenser) to convert ozone-laden air, which passes across the coated surface, to oxygen.

Throughout the comment period the commission received indications that further analysis of this technology was necessary before a regulation was put into place. The commission has conducted a study at a test site in Houston, which was financed by the catalyst manufacturer, to determine the ozone reduction efficiency of this technology.

The commission is of the understanding that the catalyst manufacturer will work with the air conditioning manufacturers to conduct additional studies throughout the summer of 2001 and could be in a position of determining the efficacy of this technology early in 2004.

Diesel Emulsion

Diesel emulsion fuel is an emergent fuel technology that relies on a water-in-fuel mixture to lower NO_x and PM emissions. The water content lowers flame temperature by absorbing latent heat in the combustion chamber, using the same principle of thermodynamics as injecting water into a turbine. Additionally, the water slightly delays combustion which reduces particulate formation. There are three components to diesel emulsion fuels: 1) diesel fuel; 2) water, usually 10% to 20% by volume; and 3) a diesel emulsion additive which encapsulates the water in the fuel. The diesel emulsion fuel can be blended by the diesel emulsion fuel distributor or blended on site using a specialized blending unit.

Several companies are currently developing a diesel emulsion fuel, including Lubrizol, Clean Diesel Technologies, and CITGO. The City of Houston and the Port of Houston have worked on a variety of testing applications involving diesel emulsions. Early indications are that diesel emulsion fuels could reduce NOx by 15-30% and PM by 20-60%. In January 2001, the California Air Resources Board formally verified that Lubrizol's PuriNOx emulsion fuel achieves a 14% reduction in NOx and 63% reduction in PM. The EPA is working to have a fuels verification protocol available by the summer 2002.

Lubrizol is currently involved in the EPA fuel registration process; registration of the fuel is a prerequisite to on-highway usage. Tier 1 health effects documentation has already been submitted to EPA by Lubrizol. Tier 2 health effects testing is nearing completion and is expected to be submitted in summer/fall 2002. Until the emulsion is registered, Lubrizol is introducing its product into on-highway applications pursuant to the research, development and test exemption to the registration requirement. EPA registration is not required for off-highway applications.

On June 15, 2001, the Governor of Texas signed legislation to provide tax relief on the water portion of diesel fuel emulsions. This tax relief helps lower the price of diesel emulsion fuels to more closely match existing diesel fuel. Lubrizol is currently pursuing tax relief for the water portion of PuriNOx at the federal level.

EPA and Lubrizol have indicated that emulsion fuels may be registered for on-highway use as early as the end of 2002. However, Sunset legislation passed in the 77th legislative session precludes the TCEQ from setting more stringent fuel standards than those adopted by the EPA before January 1, 2004. Therefore, the commission feels it is reasonable to plan for the adoption of a diesel emulsion strategy for the HGA area in 2004.

Diesel NO_x Reduction Systems

This strategy would require owners or operators of on-road or non-road vehicles or equipment manufactured prior to model year 1997 having a heavy-duty on-road or non-road engine and fueled by gasoline, diesel, diesel emulsion fuel or any alternate fuel to use exhaust systems that will achieve an 80% reduction in NO_x emissions from what the engine would emit without the exhaust system. Examples of exhaust systems that could be used include NO_x adsorbers, methane catalysts, diesel oxidation catalysts, selective catalyst reduction, lean NO_x catalysts, and other exhaust after-treatment systems. Numerous other studies are also being conducted on various reduction systems. Some examples of such studies are described below.

The City of Houston recently completed a diesel fuels and retrofit field demonstration. The City evaluated a cross-section of technologies on a range of in-use fleet vehicles to evaluate the emission reduction potential and cost effectiveness of various control technologies. Testing occurred in the summer of 2000 through the fall of 2001 and involved three baseline tests and three controlled tests. The retrofit technologies met the project's technical objectives of a 50-75% reduction in NOx and a 25-33% reduction in PM. The City of Houston now plans to retrofit more of its fleet with some of the more effective products.

The EPA has an existing protocol in place to verify emissions from retrofit devices: the draft Generic Verification Protocol for Diesel Exhaust Catalysts, Particulate Filters, and Engine Modification Control Technologies for Highway and Nonroad Use Diesel Engines. According to the EPA, several retrofit technologies are currently being processed through this protocol. Additionally, the EPA is developing a generic verification protocol for determination of emissions reductions from selective catalytic reduction (SCR) control technologies for highway, nonroad, and stationary diesel engines. This protocol is anticipated to be available by summer 2002.

The establishment of emissions verification protocols by mid-2002 will expedite the availability of verified retrofit technologies. Therefore, the commission feels it is reasonable to plan for the adoption of a NO_x reduction system strategy for the HGA area by 2004.

Diesel I/M

The commission hired a consultant to review the possible benefits of a heavy-duty diesel I/M program for the HGA area. The consultant reviewed in-use data from the National Renewable Energy Lab's alternative fuel vehicle database, from Southwest Research Institute, from the Colorado School of Mines, and from Parsons Engineering Science in Sydney, Australia. They also reviewed previous reports on the viability of HDD I/M, such as Radian's report to CARB done in 1989, and EF&EE's report to EPA done in 1998. From those sources the consultant developed the following conclusions.

Older vehicles with no NO_x control (model years 1989 and older) will not benefit significantly from I/M. They emit NO_x at inherently lower levels than their certification cutpoints. High NO_x emitters will undoubtedly occur in that technology group, but those will likely be few and far between. By 2007 vehicles in this age group have relatively low mileage accumulations and generate less than 10% of total

HDDV NO_x emissions. Therefore, even if a benefit were feasible from these engines, absolute tpd reductions would be quite low due to ever decreasing activity.

For 1990-1998 model years, the data are highly influenced by the NO_x defeat devices. With that in mind the consultant assumed that a high-emitting vehicle in this age group would have emissions about the same level as the uncontrolled engines. The consultant believes that they would actually fail at higher NO_x levels than the uncontrolled engines, but this cannot be proven due to the defeat devices. Therefore, the in-use data show that repairing the high emitters to a cutpoint of 1.5 times the certification level would give approximately 8% reduction in fleet average emissions.

For 1999-2001 model years there is no in-use data to use at this time, so the same assumptions were applied as those in the 1990-1998 model year category.

For 2002-2007 model years (i.e. engines meeting the 2004 standards) the consultant referred to a recent report by Chris Weaver for EPA. Mr. Weaver estimated that all vehicles in this range would have EGR as the main NO_x reduction strategy. He also estimated that about 20% of those vehicles would have an EGR system failure during their lifetime. Since the EGR systems will be a relatively new technology, and because engines will accumulate close to 40% of their lifetime mileage by age 6 (according to MOBILE5), a 10% aggregate fail rate through 2007 was assumed. As EGR will typically reduce engine-out NO_x by 50% in diesels, an I/M repair benefit of 50% per vehicle was assumed.

A by-model-year output from MOBILE5b was used for Harris County to estimate the gram per mile emission factors and the relative contribution of the different model year groups for this calculation. VMT was taken from TTI's latest estimates. Once benefits were estimated in tpd for Harris County, the benefits were extrapolated to the remaining counties using VMT ratios.

In addition, in-use testing of HDDVs will become especially important as the 2007 engines are introduced, due to their reliance on after-treatment devices. This will not impact I/M benefit estimates for the 2007 year, however.

In Fall 2001, the EPA established a Heavy-Duty Vehicle In-Use Testing Workgroup as part of the Clean Air Act Advisory Committee. This workgroup will evaluate various Diesel I/M methods, identify effective test procedures, and quantify emissions reductions for the potential use in State Implementation Plans.

In March 2002, CARB proposed a Clean Air Plan which includes plans to expand their existing Diesel I/M program, which currently measures excess smoke, to measure NOx and possibly reactive organic gases (ROG) and other emissions by 2004. CARB has recently completed an in-use Diesel I/M demonstration project in California using new procedures and test methods that allow for the measurement of NOx.

Based on advancements in testing procedures and technology, the commission feels it is reasonable to plan for the adoption of a Diesel I/M strategy for the HGA area by 2004.

Fuel Cells - based on NO_x analysis

A fuel cell can use hydrogen in either a liquid or compressed form and will yield zero toxic emissions with water as the by-product of generation. Hydrogen is abundant from any number or sources, many of which are regarded as renewable. Reformers are able to extract hydrogen from any fuel containing

hydrogen, such as gasoline or methane. Some emissions are produced, but at lower levels than from an internal combustion engine.

In addition to providing an alternative power for motor vehicles , fuel cell technology also has applications as a large stationary power source.

The State Energy Conservation Office (SECO) and Railroad Commission recently received a $500,000 grant from the Department of Energy to fund a fuel cell demonstration project in San Antonio. TxDOT and TCEQ will participate in this project to demonstrate the viability of stationary fuel cells using propane as a carrier fuel.

HB 2845 was passed in the 77th Legislature. This Bill directs the State Energy Conservation Office (SECO) to develop a plan for the acceleration of fuel cell commercialization in Texas. This bill requires SECO to appoint a Fuel Cell Initiative Advisory Committee (FCIAC) to help develop the plan and report to the legislature on the viability of the fuel cell industry in Texas now and in the future. The Public Utility Commission has circulated a plan for fostering stationary fuel cell power generation pursuant to HB 2845. This plan would create a Fuel Cell Production Incentive Fund to provide per kilowatt-hour incentives for fuel cell produced power. If implemented, 1,000 megawatts of generating capacity from fuel cell technologies will be installed in Texas by January 1, 2010 (400 megawatts by 2007). Rough estimates show an equivalent NO_x savings of 3.4 tpd statewide from 1000 megawatts of fuel cell generated energy.

Due to legislative and other developments, Therefore, it is reasonable to plan for the adoption of a fuel cell strategy for the HGA area by 2004.

Dockside Emissions

Based on analysis of applicable statutes and regulations, the commission's Environmental Law Division has determined that dockside vessel emissions should be included in federal permit applicability determinations and are subject to full state NSR permit review.

The commission's Air Permits Division has developed a plan to address this issue. For federal permit applicability (Prevention of Significant Deterioration, Nonattainment, and Title V), their proposal is no different than current EPA guidance and regulations concerning vessel emissions. The plan would simply clarify those requirements. However, for state NSR, the plan significantly changes the current practice. Current practice is to evaluate dockside vessel emissions only for impacts review when onshore facilities are new or modified. A complete state NSR permit review will subject dockside vessel emissions to best available control technology review, maximum allowable emission limitations, monitoring, testing, and recordkeeping requirements, in addition to impacts review.

As a result of this plan, reductions in VOC emissions in all gulf coast counties should be expected.

Episodic Releases

Some portion of the emissions in the HGA area can be attributed to upset and maintenance activities. The extent of those emissions and any potential measures that can be put in place to help control those emissions is of great interest to the commission. The commission is currently conducting outreach workshops with the regulated community throughout Texas to help facilities start their own in-house program to reduce emissions from process upset and maintenance activities. This includes an explanation of the rules that were adopted by the commission in June 2000. These rules covered emission reporting,

permit implications, and enforcement actions. The workshops also include discussions on the difference between upset emissions and emissions associated with maintenance activities.

As these regulations are implemented, and recordkeeping and reporting requirements become effective, the commission will begin to get a better understanding of the extent of the emissions and how we could begin to account for those emissions.

VMT Reduction Strategies

The relative importance to ozone formation of automobile-generated emissions is affected in large part by growth in vehicles miles traveled (VMT). Although growth in VMT is somewhat mitigated in future years by newer, cleaner vehicles, it is a strong predictor of vehicle emissions. Reducing the number of vehicles on the road and the length of trips, especially single-occupant vehicles during peak periods, is the goal of VMT reduction strategies. Examples include teleworking, enhanced transit service, and bicycle and pedestrian facilities. Additional options could include decentralized, satellite offices so employees live closer to work; university traffic reduction strategies; regional transit authorities to facilitate mass transit use by suburban communities; and ride matching and car sharing.

Pricing Policies to Encourage VMT Reductions

Travel choices depend on a host of factors including price. Transportation pricing strategies can reduce the growth of VMT. For example, use-based car insurance, recently enacted by the Texas Legislature, would charge owners for how much they drive rather than a fixed price; the Texas Insurance Commissioner approved rules January 23, 2002. The rules allow drivers to purchase a certain number of miles, depending on how many miles they typically drive. Additional examples include mortgages and tax incentives that reward homebuyers for locating in areas that minimize travel requirements; parking cash-outs where employees can "cash out" the value of free parking benefits for more take-home pay or a transit subsidy; and tax breaks for businesses locating near mass transit.

Reductions at Airports

Additional measures that could be implemented at airports include: 1) reduced idling on runways; and 2) congestion pricing.

Use of Technology to Help Reduce Emissions

Technology innovations can also reduce VMT while adding convenience. Examples include provision of government services online such as jury impaneling, auto registration, drivers license renewal, and . paying property taxes. Use of the internet could reduce commuting and provides the public with new conveniences.

Urban Heat Island/Cool Cities Program

Temperatures in heavily urbanized areas are higher than in rural areas due to the heat-retaining properties of urban surfaces, such as roofing and paving, and lack of vegetation. Experiments and modeling studies for urban areas suggest that urban temperatures can be reduced by changing the reflectivity of roofs, pavements and other surfaces, and by extensive tree planting. Modeling has also shown that reduced temperatures may have the potential to reduce ozone concentrations by slowing the reactivity rate. In addition, trees provide shade that cools urban surfaces, reducing the need for air conditioning and associated power plant emissions. Trees cool the air by absorbing solar energy to use for photosynthesis and trees cool the air by evaporating water from their leaves. Tree canopies directly absorb ozone and nitrogen oxides in a process called dry deposition, which, with increased tree cover could further decrease ozone concentrations. Cooler temperatures also decrease the evaporative emissions from sources such as vehicle fuel tanks.

The Heat Island Group of Lawrence Berkeley National Laboratory (LBNL) has shown from various modeling studies in several areas of the U.S. that reducing urban core temperatures can affect local ozone production. Their studies indicate that the use of highly reflective anthropogenic surfaces (roofs and pavement) and increased urban forests have benefits in terms of energy demand (reduced building-level cooling and urban-level peaking), local meteorology (heat exposure), and air quality (reduced photochemical smog). LBNL has undertaken a detailed modeling study to assess the potential benefits of increased surface albedo and urban vegetation in the Houston, Texas area. A single episode in September, 1993 was evaluated using the MM5 model to simulate meteorological fields and the CAMx model to simulate photochemistry.

LBNL has performed analysis using MM5 and CAMx numerous times in an attempt to achieve acceptable model performance that ensures a proper simulation of the base year. This is an important step to establish confidence that the modeling system not only replicates the historical conditions in September 1993, but will also respond appropriately to various control scenarios. ENVIRON and EPA provided recommendations to LBNL to improve meteorological and air quality model performance. ENVIRON has evaluated the effects of two levels of urban heat island implementation on 2007 ozone levels in the Houston area according to MM5 and CAMx simulations performed by LBNL. CAMx was used to model the response of future year air quality to various urban heat island control strategies, based upon TCEQ's projected 2007 SIP emissions inventory. The purpose of this modeling is to provide information on the feasibility of incorporating urban heat island mitigation measures into the 1-hour ozone SIP for Houston.

Meteorological modeling conducted for the Houston region to date has shown that heat island mitigation measures could have a cooling effect that is sufficient to reduce ozone in the region. However, modeling these measures also reveals uncertainties due to difficulties with required modeling regimes. The heat island measures included in this modeling increased the region's tree canopy and changed the reflectivity of roofing and paved surfaces within available technology boundaries and aggressive market penetration rates. The commission intends to coordinate with stakeholders to identify existing UHI measures and to develop additional programs as part of the MCR process. Contingent upon the future model performance and the feasibility of implementing model assumptions, the commission feels that it is reasonable to plan for the adoption of urban heat island strategies for the HGA by 2004.

Voluntary Stationary Emission Reductions Program

On January 19, 2001 EPA issued guidelines for states that want to take credit for voluntary emission reduction efforts. The policy, which only applies to stationary sources, allows states to take credit for up to 3% of the reductions needed for a particular area. The major targets of this policy are small area sources that are not already regulated under the FCAA. The measures could be continuous, seasonal, for retail/consumer measures, or episodic.

Some examples of stationary source voluntary measures include: retail operators agreeing not to sell high emitting VOC products during the ozone season; no paint days during periods of high predicted ozone concentrations; programs to reduce electricity usage; and applying new or innovative emission reduction approaches such as pollution prevention or process changes to sources not currently required to be controlled. The commission will work with EPA and the HGA area to develop appropriate programs that could be incorporated into the plan.

Funding for Transit Programs

Any of the increased fees or taxes associated with the measures previously mentioned could also be used to help fund transit programs

Energy Efficiencies
In an effort to pursue innovative strategies, the commission is proposing energy efficiency measures in this revision ahead of the committed deadline of May 2004. The proposed energy efficiency measures are discussed in detail in Section 6.4.

Economic Incentives
In addition to economic incentive measures associated with the TERP program, there may be other measures which may become rules or other types of enforceable measures in the future to complete the attainment demonstration. Local stakeholders in the HGA area and other entities have expressed an interest in the creation of programs designed to provide incentives for the achievement of earlier and/or greater reductions than anticipated from currently proposed control measures. Such incentive programs could be effective technology-forcing tools to obtain substantial innovation and ozone reductions, in the most cost-efficient manner possible.

Incentives for Cleaner Vehicles and/or Vehicle Fleets
Examples of this type of incentive include: 1) tying annual auto registration fees to pollution levels so that individuals with cleaner vehicles would payer lower fees; 2) adjusting the sales tax on vehicles to a sharply graduated tax with a lower percentage tax charged to cleaner vehicles and a higher percentage on dirtier vehicles; and 3) waiving parking meter payments for low emitting vehicles.