

---

**TEXAS 2002 PERIODIC EMISSIONS INVENTORY  
AREA, NONROAD MOBILE, AND BIOGENIC SOURCES**

**for**

**Ozone Nonattainment Areas**

**Houston/Galveston  
Beaumont/Port Arthur  
Dallas/Fort Worth  
El Paso**

**Carbon Monoxide Nonattainment Area**

**El Paso**

**Consolidated Emissions Inventory**

**Statewide**

**Toxics Emissions Inventory**

**Statewide**

**June, 2004**

**Prepared By:**

**Texas Commission on Environmental Quality  
12124 Park 35 Circle  
Austin, Texas 78753**

---

Texas 2002 Periodic Emissions Inventory  
Area, Nonroad Mobile, Biogenic, and Toxics Sources

Table of Contents

Introduction .....	7
Area Sources .....	9
Petroleum Marketing and Transportation .....	11
Evaporative Solvent Use .....	22
Painting Operations .....	33
Stationary Source Fuel Combustion .....	37
Waste Management .....	39
Wildfires and Managed Burning .....	46
Area Source References .....	54
Nonroad Mobile Sources .....	55
Commercial Aircraft .....	57
Military Aircraft .....	58
General Aviation .....	59
Aircraft Refueling .....	60
Airport Ground Support Equipment .....	61
Agricultural Equipment .....	62
Commercial Equipment .....	63
Commercial Marine Vessels .....	64
Construction Equipment .....	66
Industrial Equipment .....	67
Oilfield Equipment .....	68
Lawn and Garden Equipment .....	69
Logging Equipment .....	70
Recreational Equipment .....	71
Recreational Marine Equipment .....	72
Locomotives .....	73
Railway Equipment .....	74
Nonroad Mobile Source References .....	75
Biogenic Sources .....	76
Map: Ozone Nonattainment Areas .....	77
Emission Summary Tables .....	78
Source Category Tables .....	96

**Tables**

Table 1. 2002 VOC Emissions: Houston/Galveston Ozone Nonattainment Area	78
Table 2. 2002 NO <sub>x</sub> Emissions: Houston/Galveston Ozone Nonattainment Area	79
Table 3. 2002 CO Emissions: Houston/Galveston Ozone Nonattainment Area	80
Table 4. 2002 VOC Emissions: Dallas/Fort Worth Ozone Nonattainment Area	81
Table 5. 2002 NO <sub>x</sub> VOC Emissions: Dallas/Fort Worth Ozone Nonattainment Area	82
Table 6. 2002 CO Emissions: Dallas/Fort Worth Ozone Nonattainment Area	83
Table 7. 2002 VOC Emissions: Beaumont/Port Arthur Ozone Nonattainment Area	84
Table 8. 2002 NO <sub>x</sub> VOC Emissions: Beaumont/Port Arthur Ozone Nonattainment Area	85
Table 9. 2002 CO Emissions: Beaumont/Port Arthur Ozone Nonattainment Area	86
Table 10. 2002 VOC Emissions: Austin Early Action Compact Area	87
Table 11. 2002 NO <sub>x</sub> Emissions: Austin Early Action Compact Area	88
Table 12. 2002 CO Emissions: Austin Early Action Compact Area	89
Table 13. 2002 VOC Emissions: San Antonio Early Action Compact Area	90
Table 14. 2002 NO <sub>x</sub> Emissions: San Antonio Early Action Compact Area	91
Table 15. 2002 CO Emissions: San Antonio Early Action Compact Area	92
Table 16. 2002 VOC Emissions: Northeast Texas Early Action Compact Area	93
Table 17. 2002 NO <sub>x</sub> Emissions: Northeast Early Action Compact Area	94
Table 18. 2002 CO Emissions: Northeast Early Action Compact Area	95
Table 19. Petroleum Marketing and Transportation Source Categories	96
Table 20. Evaporative Solvent Use Source Categories	97
Table 21. Painting Operations Source Categories	98
Table 22. Stationary Source Fuel Combustion Source Categories	99

Table 23. Waste Management Source Categories ..... 100  
Table 24. Wildfire and Managed Burning Source Categories ..... 101  
Table 25. Nonroad Mobile Source Class Categories ..... 102

**Figures**

Figure 1. Map of the Ozone Nonattainment Areas ..... 77

**Acronyms**

CARB California Air Resources Board's

CE	Control Efficiency
CERR	Consolidated Emissions Reporting Rule
CO	Carbon Monoxide
EGAS	Economic Growth Analysis System
EIIP	Emission Inventory Improvement Program
EPA	Environmental Protection Agency
GIS	Geographic Information System
HAPS	Hazardous Air Pollutants
HASTE	Houston Area Source Toxic Emissions
LTO	Landings and Take-offs
NAICS	North American Industrial Classification System
NEI	National Emissions Inventory
NMOC	Non-methane Organic Compounds
NO <sub>x</sub>	Oxides of Nitrogen
NTI	National Toxic Inventory
PEI	Periodic Emissions Inventory
PM	Particulates
RE	Rule Efficiency
RP	Rule Penetration

### **Acronyms**

SCC	Source Classification Code
-----	----------------------------

SIC	Standard Industrial Code
SO <sub>2</sub>	Sulfur Dioxide
TCEQ	Texas Commission on Environmental Quality
THC	Total Hydrocarbons
TPY	Tons Per Year
TTI	Texas Transportation Institute
TxDOT	Texas Department of Transportation
UST	Underground Storage Tanks
VOC	Volatile Organic Compounds

## **Introduction**

In accordance with the Environmental Protection Agency's (EPA) Consolidated

Emissions Reporting Rule (CERR) this section of the Texas 2002 Periodic Emissions Inventory (PEI) has been developed for reactive volatile organic compounds (VOC), oxides of nitrogen (NO<sub>x</sub>), carbon monoxide (CO), particulates (PM<sub>10</sub>) and (PM<sub>2.5</sub>), sulfur dioxide (SO<sub>2</sub>), and ammonia from area, nonroad mobile, and biogenic sources. As directed by the CERR the PEI includes statewide coverage as well as the four ozone nonattainment areas in Texas: Houston/Galveston, Beaumont/Port Arthur, Dallas/Fort Worth, and El Paso. In addition, the El Paso county CO nonattainment area emissions inventory and the statewide Toxics Emissions Inventory are incorporated in this report. Emissions are reported on an annual basis as well as a daily basis averaged over the peak seasons.

The EPA's 2002 National Emissions Inventory (NEI) was the starting point for the area and nonroad mobile sections of the 2002 PEI. NEI categories and emissions were reviewed and subsequently updated with current methodologies and activity data where it was deemed significant to do so. This resulted in the 2002 PEI being compiled from several sources of data, including work from various contracts, Texas Commission on Environmental Quality (TCEQ) staff, local Councils of Government, as well as the NEI. The EPA's Economic Growth Analysis System (EGAS), version 4.0 growth factors were used to develop 2002 categories not covered by contracted work. The NONROAD model was also used for most of the nonroad mobile categories. The following sections provide detailed information on individual area, nonroad, and biogenic. The Toxics Emissions Inventory development is discussed with each individual area and nonroad mobile category where applicable.

Further updates to the inventory will be developed by TCEQ staff and contracts. In addition, the state's five ozone near nonattainment areas will be completing 2002 inventories. Following reviews, data from these inventories will be incorporated into the statewide inventory. The 2002 biogenic inventory as developed by EPA has been accepted to represent the state's biogenic emissions inventory.

Included in this report are tables listing the area and nonroad mobile source categories and emissions summary tables. In addition, a map indicating the ozone nonattainment areas is provided.

The Area Source and Nonroad Mobile Source sections in this report provide a brief description and applied emissions calculation methodology for each area source category and nonroad mobile class. Included also on these pages are the source title, the Source Classification Code (SCC), the applicable pollutants, specific activity data sources, emission factor sources, and finally, seasonal adjustment factors and rule effectiveness. The seasonal adjustment factor provides the percentage of time a specific emission source category operates in the ozone season. A factor of "one" denotes year round operation with no seasonal distinction. The "days per week" refers to the number of days the category normally operates during the week—five, six or seven. The days per week along with the factor determine the ozone season daily emission rates. Rule Effectiveness is factored by a combination of Rule Efficiency

## Texas 2002 Periodic Emissions Inventory

(RE), Rule Penetration (RP), and Control Efficiency (CE). The results of this formula provide the effect of the rule on the selected categories' emissions.

### **Area Sources**

Area sources are those sources that are considered too small and too numerous to be handled individually in the point source emissions inventory. They are divided into two



## Texas 2002 Periodic Emissions Inventory

groups characterized by the emission mechanism: 1) evaporative emissions, and 2) fuel combustion emissions. Sources of evaporative losses include gasoline service stations, solvent use, as in dry cleaning, degreasing, surface coating operations, and leaking underground storage tanks. Fuel combustion sources include stationary source fuel combustion in residences and commercial businesses, forest fires, structural fires, and solid waste disposal by burning. The EPA's Consolidated Emissions Reporting Rule requires that the PEI include emissions of VOC, NO<sub>x</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, and ammonia. The discussion of individual sources in this report includes a list of pollutants that apply to each category. In some cases some pollutants were not calculated (e.g., ammonia). For these, the current EPA NEI data will remain in place and shall be updated when information on these pollutants become available.

This document does not address some area source categories determined to be specific sources of particulate and ammonia emissions (e.g., unpaved roads, cattle feedlots). At this time, the existing 2002 emissions data, as it appears in the EPA NEI database, will remain in place and shall be updated when information on these pollutants becomes available.

This section of the report also contains the 2002 area source Toxics Emissions Inventory. The methodologies for those categories for which toxic emissions were calculated are documented along with the criteria pollutant methodologies. The toxics emissions in this report are referred to as "hazardous air pollutants" (HAPS).

### **Emissions Calculations Methodologies**

There are two basic approaches to the development of the PEI area source emissions inventory. Specific categories have been updated using information and data that represents 2002 activities. Some of these categories benefit from contracted work completed during the past few years. This data was specifically collected for 2002 or for an earlier year with the emissions grown to 2002. These projects are documented in the References at the end of this section (page 54). Emissions from other categories were grown from the 1999 PEI to 2002 using EPA's EGAS 4.0 growth factors. Specific methodologies for individual categories are provided on the following pages.

### **Quality Assurance Measures**

Quality assurance procedures for area source emissions rely mainly upon the quality of data used for each separate category. Data such as current population figures, fuel

## Texas 2002 Periodic Emissions Inventory

usage, and material usage routinely change annually. Sources of this information were contacted during the inventory for updates. Current EPA documents were also obtained to keep abreast of changes in emission factors. Other routine efforts such as checking calculations for errors and conducting reasonableness and completeness checks were implemented.

## Texas 2002 Periodic Emissions Inventory

### Area Sources: Petroleum Marketing and Transportation

Oil and Gas Production: Onshore

SCC: 2310001000

## Texas 2002 Periodic Emissions Inventory

Pollutants: VOC, NO<sub>x</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, HAPS, and ammonia

Description: Onshore Oil and Gas Production applies to post-exploration oil and gas well extraction facilities. Emission sources from oil and gas wells are: crude oil and condensate storage tanks, compressors, heaters, dehydrators, and fugitives.

Methodology: Actual oil and gas production figures were used as throughput with surveys of equipment listed above to create profiles of oil and gas production sites<sup>1</sup>. The EPA TANK 4.0 program was used to estimate tank emissions. Typical fugitive component counts for each production field came from a survey conducted by ENVIRON Corp. for the 1999 PEI. Compressor emissions were estimated using the factor 205 hp/mmscf to yield the operating horsepower. With appropriate emission factors, emissions were calculated in terms of county totals for tons per year and average weekday ozone season tons per day. HAPS emissions for six toxic species were grown from 1999 to 2002 using the ratio of oil production in 2002 over oil production in 1999.

Activity Data Source: Actual oil and gas production statistics from the Texas Railroad Commission

Emission Factors Source: AP-42, EPA document: "Protocol for Equipment Leak Estimates."

Seasonal Adjustment: Factor = 1, seven days per week

Oil and Gas Production: Offshore

SCC: 2310002000

## Texas 2002 Periodic Emissions Inventory

Pollutants: VOC, NO<sub>x</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, and ammonia

Description: Offshore production platforms are established for pumping oil and gas from offshore wells to shore based facilities. The platforms included here are within the state jurisdiction and are generally within three nautical miles from the coast. Platforms are geographically located within blocks. Offshore Blocks comprise a grid system to identify parcels of submerged land for the Outer Continental Shelf. The blocks were created by the Office of Minerals Management Service of the U. S. Department of Interior and they have been carried over to state submerged lands as identified by the Texas General Land Office and Texas Railroad Commission.

Methodology: The platforms were associated with specific county boundaries using a geographic information system (GIS) with the gridlines for the blocks. Actual natural gas throughput data were used to calculate compressor and dehydrator emissions.

Activity Data Source: Texas General land Office for platform location; The Texas Railroad Commission for natural gas production statistics

Emission Factors Source: AP-42

Seasonal Adjustment: Factor = 1, seven days per week

Marine Loading

SCC: 2501000000

## Texas 2002 Periodic Emissions Inventory

Pollutants: VOC, HAPS

Description: The marine cargo loading source category includes the loading and transportation of various types of petroleum-based products on ships and barges. Emissions were estimated for fuel loading, ballasting and transit activities.

Methodology: The 2002 commercial vessel product tonnages were obtained from the U.S. Army Corps of Engineers' Waterborne Commerce Statistics Center. Marine cargo loading emissions were estimated by combining 2002 commercial vessel tonnages with VOC emission factors. The petroleum product tonnages were reported for ship and barge loading, ballasting, and transit for 20 Texas ports. Product tonnages were assigned to five different fuel type classifications as follows:<sup>10</sup> Crude oil, gasoline, distillate oil, residual fuel, and jet naphtha. Product tonnages were then converted to product volumes based on the product density obtained from AP-42. VOC emissions were estimated from the converted product volumes using VOC emissions factors in units of pounds of VOC per 1000 gallons transferred, ballasted, or transported.<sup>10</sup> It is assumed that transit time in each port is limited to two days; the lbs/1000 gallons-week VOC transit emission factors were multiplied by (2/7) to account for this. The ballasting emission factors were multiplied by a factor of 0.3 to account for the practice of loading a ship or barge at some fraction of capacity when ballasting.<sup>10</sup> After VOC emissions were calculated, speciation profiles obtained from the Houston Area Source Toxic Emissions (HASTE) inventory were applied to calculate HAP emissions.

Activity Data Source: U.S. Army Corps of Engineers' Waterborne Commerce  
Statistics Center

Emission Factors Source: EIIP, AP-42

Seasonal Adjustment: Factor = 1, seven days per week

Rule Effectiveness: RE = 99%, RP = 100%, CE = 90%

Gasoline Stations: Stage 1, Balanced Submerged Filling (Underground Tank)

SCC: 2501060053

## Texas 2002 Periodic Emissions Inventory

Pollutants: VOC, HAPS

Description: The VOC emissions occur during unloading of gasoline from tanker trucks to the underground storage tanks (UST) at gas stations. The VOC emissions are a result of the displacement of vapor in the UST by the liquid gas being unloaded into the tanks. In the ozone nonattainment counties the Stage 1 controls route the displaced VOC from the UST back into the tank truck. For counties not requiring the controls the VOC is released to the atmosphere.

Methodology: The total statewide quantity of the gasoline unloaded into the UST was generated by using gasoline tax data from the Texas Comptroller's Office. Vehicle registration data by county from the Texas Department of Transportation was used to prorate the statewide quantity to individual counties.

A general formula to estimate losses due to loading petroleum liquids is used as shown in the EPA AP-42, Fifth Edition, Section 5.2.2.1.1. Selected variables, specific to the tank content in the area of study and seasonal weather data specific to the region, were used to produce unique emission factors. The emission factors generated were then used to calculate the VOC emissions during filling of underground tanks. Specific emission factors were developed for filling of USTs due to the product temperature variations experienced year round and varying Reid vapor pressures found in gasoline in the USTs in Texas counties<sup>2</sup>. HAPS emissions were calculated using the same speciation profile used for the 1999 Toxics inventory.

Activity Data Source: Texas Comptroller's Office; Texas Department of Transportation

Emission Factors Source: AP-42

Seasonal Adjustment: Factor = 1, six days per week

Rule Effectiveness: RE = 80%, RP = 95%, CE = 95%

Gasoline Stations: Stage 2, Vehicle Refueling

SCC: 2501060100

## Texas 2002 Periodic Emissions Inventory

Pollutants: VOC, HAPS

Description: This concerns emissions from gasoline being pumped into vehicles. Currently, only the 16 ozone nonattainment counties are required to have Stage 2 controls for gasoline refueling.

Methodology: The total statewide quantity of the gasoline for vehicle refueling was generated by using gasoline tax data from the Texas Comptroller's Office. Vehicle registration data by county from the Texas Department of Transportation was used to prorate the statewide quantity to individual counties. MOBILE6 refueling emission factors for each county were applied to the gasoline quantities. HAPS emissions were calculated using the same speciation profile used for the 1999 Toxics inventory.

Activity Data Source: Texas Comptroller's Office; Texas Department of Transportation

Emission Factors Source: MOBILE6

Seasonal Adjustment: Factor = 1, seven days per week

Rule Effectiveness: RE = 80%, RP = 95%, CE = 95%

Gasoline Stations: Stage 2, Spillage

SCC: 2501060103



## Texas 2002 Periodic Emissions Inventory

Pollutants: VOC, HAPS

Description: This category involves emissions resulting from the spillage of gasoline during refueling operations.

Methodology: The total statewide quantity of the gasoline for spillage was generated by using gasoline tax data from the Texas Comptroller's Office. Vehicle registration data by county from the Texas Department of Transportation was used to prorate the statewide quantity to individual counties. MOBILE6 emission factors for each county were applied to the gasoline quantities. HAPS emissions were calculated using the same speciation profile used for the 1999 Toxics inventory.

Activity Data Source: Texas Comptroller's Office; Texas Department of Transportation

Emission Factors Source: MOBILE6

Seasonal Adjustment: Factor = 1, seven days per week

Gasoline Stations: Underground Tank (Breathing and Emptying)

SCC: 2501060201

## Texas 2002 Periodic Emissions Inventory

Pollutants: VOC, HAPS

Description: These emissions result from the underground tank's diurnal breathing losses and from refueling operations.

Methodology: The total statewide quantity of the gasoline for tank breathing was generated by using gasoline tax data from the Texas Comptroller's Office. Vehicle registration data by county from the Texas Department of Transportation was used to prorate the statewide quantity to individual counties. The standard AP-42 emission factor was applied to the quantities of gasoline from each county. HAPS emissions were calculated using the same speciation profile used for the 1999 Toxics inventory.

Activity Data Source: Texas Comptroller's Office; Texas Department of Transportation

Emission Factors Source: AP-42

Seasonal Adjustment: Factor = 1, seven days per week

Gasoline Stations: Tank Truck in Transit

SCC: 2505030120

## Texas 2002 Periodic Emissions Inventory

Pollutants: VOC, HAPS

Description: This category involves the emissions from the tank trucks during delivery of gasoline to stations.

Methodology: The total statewide quantity of the gasoline for tank trucks in transit was generated by using gasoline tax data from the Texas Comptroller's Office. Vehicle registration data by county from the Texas Department of Transportation was used to prorate the statewide quantity to individual counties. The standard AP-42 emission factor was applied to the quantities of gasoline from each county.

To account for uncounted fugitives from the tank truck fuel loading operations emissions were multiplied by 1.25. HAPS emissions were calculated using the same speciation profile used for the 1999 Toxics inventory.

Activity Data Source: Texas Comptroller's Office; Texas Department of Transportation

Emission Factors Source: AP-42

Seasonal Adjustment: Factor = 1, six days per week

Rule Effectiveness: RE = 80%, RP = 95%, CE = 95%

Leaking Underground Storage Tanks

SCC: 2660000000

## Texas 2002 Periodic Emissions Inventory

Pollutants: VOC, HAPS

Description: Leaking underground storage tanks are those that have been uncovered and removed. The disturbance of the saturated soil releases VOC emissions.

Methodology: Actual numbers of tanks removed are collected by agency mandate. The emission factor of 28 pounds of VOC per tank remediation per day, developed by Radian Corporation, was used. Durations of emissions from the disturbed soil is assumed to be 30 days. HAPS emissions were calculated using the same speciation profile used for the Underground Tank (Breathing and Emptying) category.

Activity Data Source: TCEQ Petroleum Storage Tank Division

Emission Factors Source: EIIP, Radian1999 methodology for EPA

Seasonal Adjustment: Factor = 1, seven days per week

Portable Gasoline Containers

SCC: 2505000120\*

## Texas 2002 Periodic Emissions Inventory

Pollutants: VOC, HAPS

Description: These are the various portable gasoline containers used for refueling small engines such as on lawn and garden equipment and recreational boat engines. Emissions are separated into several categories: permeation, diurnal, spillage, transport, and vapor displacement. Emissions for this category are divided into residential and commercial sectors.

Methodology: Surveys were conducted for each sector. Residential allocations for the gas can emissions are based on the study Current Population Survey which provides population estimates for adults in the State of Texas. Additionally, residential gas can usage was adjusted by analyzing the number of single and duplex housing units obtained from the Texas State Data Center. Further stratification for emissions allocation used a list of lawn and garden businesses obtained from the Texas State Comptroller of Public Accounts. The number of lawn and garden commercial businesses listed in Texas is 7,797. Allocations for both residential and commercial were based on these data sources and allocated to a county level<sup>3</sup>. HAPS emissions were calculated using a speciation profile identical to the one used for Stage 2, Vehicle refueling.

Activity Data Source: ERG study<sup>3</sup>.

Emission Factors Source: ERG study<sup>3</sup>.

Seasonal Adjustment: Factor = 1, seven days per week

\* Currently, there is no SCC for this category. The one applied here is a generic SCC for gasoline storage, and it will be replaced by one more appropriate when it becomes available.

Texas 2002 Periodic Emissions Inventory  
Area Sources: Evaporative Solvent Use

Bakeries

SCC: 2302050000

## Texas 2002 Periodic Emissions Inventory

Pollutants: VOC

Description: This category covers emissions from yeast leveling at commercial bakeries. The bakery dough produces primarily ethanol.

Methodology: The 1999 emissions inventory was developed using standard EPA emission factors with per capita county populations. The 1999 emissions were grown to 2002 using the appropriate EPA EGAS 4.0 growth factors.

Activity Data Source: The 1999 emissions Inventory

Emission Factors Source: EGAS 4.0

Seasonal Adjustment: Factor = 1, seven days per week

Degreasing: Cold Cleaning

SCC: 2415300000

## Texas 2002 Periodic Emissions Inventory

Pollutants: VOC

Description: These are small (non-point source) degreasing operations that may have actual degreasing equipment with degreasing solvent in use or simple open cans of gasoline. Both are used to clean grease and other unwanted material from small metal parts.

Methodology: The 1999 emissions inventory was developed using standard EPA emission factors with the North American Industrial Classification System (NAICS) per employee populations. NAICS replaced the Standard Industrial Code (SIC) system. The 1999 emissions were grown to 2002 using the appropriate EPA EGAS 4.0 growth factors.

Activity Data Source: The 1999 emissions Inventory

Emission Factors Source: EGAS 4.0

Seasonal Adjustment: Factor = 1, six days per week

Rule Effectiveness: RE = 70%, RP = 100%, CE = 58%

Dry Cleaning

SCC: 2420000000



## Texas 2002 Periodic Emissions Inventory

Pollutants: VOC, HAPS

Description: This category concerns the emissions of VOCs from petroleum solvents (mineral spirits) used in the dry cleaning of clothing. Although perchloroethylene is the primary solvent used in cleaning, it is not an ozone precursor and, therefore, it is not reported in the emissions inventory.

Methodology: The 1999 emissions inventory was developed using standard EPA emission factors with per capita county populations. The 1999 emissions were grown to 2002 using the appropriate EPA EGAS 4.0 growth factors. HAPS emissions were grown from 1999 to 2002 using an EGAS 4.0 growth factor.

Activity Data Source: The 1999 emissions Inventory

Emission Factors Source: EGAS 4.0

Seasonal Adjustment: Factor = 1, five days per week

Rule Effectiveness: RE = 99%, RP = 90%, CE = 80%

Graphic Arts

## Texas 2002 Periodic Emissions Inventory

SCC: 2425000000

Pollutants: VOC, HAPS

Description: This source consists of small (non-point source) printing operations, including various types of printing facilities.

Methodology: In 2001 statewide surveys were conducted of small graphic arts facilities and data from these were compiled into an emissions inventory for 1999<sup>4</sup>. The 1999 emissions were grown to 2002 using the appropriate data from the U. S. Census Bureau's County Business Patterns and EPA EGAS 4.0 growth factors. HAPS emissions for six species were calculated using data from County Business Patterns and the 1999 ERG survey for the model facility.

Activity Data Source: The 1999 emissions Inventory

Emission Factors Source: EGAS 4.0

Seasonal Adjustment: Factor = 1, six days per week

Consumer/Commercial Products

## Texas 2002 Periodic Emissions Inventory

### SCC:

2460100000	All Personal Care Products
2460200000	All Household Products
2460500000	All Coatings and Related Products
2460400000	All Automotive Aftermarket Products
2460600000	All Adhesives and Sealants
2460800000	All FIFRA Related Products
2460900000	Misc Products (Not Otherwise Covered)

Pollutants: VOC, HAPS, and ammonia.

Description: Consumer products are chemically formulated products used by individuals around the home, workshop, garden, and garage that may emit VOCs during use, consumption, storage, disposal, destruction or decomposition. Commercial products include those similar in nature to consumer products and may be used in various commercial, institutional, or industrial applications. These solvent containing products are arranged into seven major consumer and commercial product categories in the 1996 Emission Inventory Improvement Program (EIIP) document.

Methodology: The 2002 consumer and commercial products inventory was based on the 1997 California Air Resources Board's (CARB) survey data by computing new per capita emission factors for the inventory from the 1997 CARB survey daily totals (tons per day) and the 1997 California population of 32,957,000 (State of California, Department of Finance, 2000). This data was converted to a per capita emission factor (lbs/year/person). Emissions were calculated using 2002 projected Texas county populations from the state Comptrollers Office and per capita emissions factors.<sup>5</sup> HAPS emissions were calculated using per capita emission factors for each toxic species and county level population. Air toxic emission factors for each of the seven consumer product classifications were obtained from 1996 EIIP document.

Activity Data Source: 2002 projected Texas county populations

## Texas 2002 Periodic Emissions Inventory

Emission Factors Source: EIIIP, Per capita emission factor (lbs/year/person)

Seasonal Adjustment: Factor = 1, seven days per week

Rule Effectiveness: RE = 99%, RP = 75%, CE = 56%

Asphalt Paving: Cutback and Emulsified

## Texas 2002 Periodic Emissions Inventory

SCC:

2461021000	Cutback Asphalt
2461022000	Emulsified Asphalt

Pollutants: VOC, HAPS

Description: This category concerns the application of all types of asphalt paving material on roadways and other paved surfaces.

Methodology: For calculating asphalt emissions, the total of asphalt cement (AC) and performance grade (PG) number of gallons was obtained from Texas Department of Transportation (TxDOT). The total amount of solvent in tons was calculated by using the following formula:

$$\text{Asphalt Mixture (gallons)} * \text{Asphalt Mixture Density (pound/gallon)} (8.5 \% \text{ solvent}) = \text{pounds of solvent emissions.}$$

In order to calculate the amount of emissions from each county, the dollar amount each county spent on county roads and bridges that was tracked by the Texas Comptroller. The following formula was used:

$$\text{Tons of all solvent} * \text{the \% of the dollar amount that each county spent on highway projects} = \text{total emissions (in tons) emitted.}$$

The same calculations were used to calculate Asphalt Emulsions and Asphalt Cutbacks. TxDOT activity for paving represents about 60 % of the paving applications statewide. Based on this assumption, TxDOT asphalt activity is increased by 40 % to estimate a statewide total<sup>6</sup>. HAPS emissions were calculated from the VOC estimates by applying speciation profiles for three toxic pollutants. The profile used is identical to the one used for 1999 PEI.

Activity Data Source: Texas Department of Transportation, Texas Comptroller's Office

## Texas 2002 Periodic Emissions Inventory

Emission Factors Source: AP-42

Seasonal Adjustment: Factor = 1.3, five days per week

Rule Effectiveness: Cutback Asphalt: RE = 80%, RP = 80%, CE = 65%

Pesticides

## Texas 2002 Periodic Emissions Inventory

SCC: 2461800000

Pollutants: VOC

Description: VOCs are emitted from pesticides and herbicides that are used on six major crops grown in Texas. The chemicals used in the pesticides and herbicides have active and inactive ingredients which produce VOC emissions. After the application of the chemicals the VOCs are released to the atmosphere.

Methodology: The agricultural crop data for six major crops were selected and associated herbicides and pesticides used were also extracted from the Texas Agricultural Department. The chemicals used for each crop were identified, and the active and inactive data were also determined and used with the EPA's Emission Inventory Improvement Program (EIIP) methodology for calculating the emission estimates. The emissions were determined as uncontrolled for all crops considered and all chemicals used.

Activity Data Source: Texas Agricultural Department

Emission Factors Source: EIIP

Seasonal Adjustment: Factor = 1.3, seven days per week

Catastrophic/Accidental Releases

## Texas 2002 Periodic Emissions Inventory

SCC: 2830000000

Pollutants: VOC

Description: This category represents those accidental spills that release VOC emissions. These are not considered to be those “upsets” at major point sources.

Methodology: The 1999 emissions were grown to 2002 using the appropriate EPA EGAS 4.0 growth factors.

Activity Data Source: The 1999 emissions Inventory

Emission Factors Source: EGAS 4.0

Seasonal Adjustment: Factor = 1, seven days per week



## Texas 2002 Periodic Emissions Inventory

### Area Sources: Painting Operations

Architectural Coatings

## Texas 2002 Periodic Emissions Inventory

SCC: 22401001000

Pollutants: VOC, HAPS

Description: This category is specific to the painting of houses and structures.

Methodology: Emissions were estimated by first calculating per capita paint usage factors for both solvent- and water-based coatings using paint shipment data from U.S. Census and national population statistics. These per capita usage factors were then multiplied by the 2002 Texas population to determine 2002 paint usage in Texas. Average VOC contents for both kinds of paints and HAP speciation profiles were obtained from the EIIP, 1995.

National paint shipment data for 2002 were obtained from the U.S. Census Bureau. National population statistics for 2002 were obtained from U.S. Census Bureau. Population statistics for Texas were obtained from Comptroller's database. The estimated per capita solvent-based coating usage factor was 0.44 gal/person-year and water-based coating usage factor was 2.05 gal/person-year. Average VOC contents of 3.87 lbs VOC per gallon of coating (solvent-based) and 0.74 lbs VOC per gallon of coating (water-based), as well as HAP speciation profiles, were obtained from inventory guidance developed by US EPA. County-level population statistics were used to allocate emissions to individual counties. Toxic emissions were calculated by applying speciation profiles to the VOC estimates.

Activity Data Source: U.S. Census Bureau

Emission Factors Source: Derived from EIIP<sup>11</sup>

Seasonal Adjustment: Factor = 1.3, seven days per week

Painting Operations

## Texas 2002 Periodic Emissions Inventory

SCC	Description	Seasonal Factor	Rule Effectiveness
2401005000	Auto Refinishing	Factor = 1, five days per week.	RE = 50%, RP = 100%, CE = 32%
2401008000	Traffic Markings	Factor = 1, seven days per week.	NA
2401015000	Factory Finished Wood	Factor = 1, five days per week.	RE = 99%, RP = 75%, CE = 56%
2401020000	Wood Furniture	Factor = 1, five days per week.	RE = 75%, RP = 20%, CE = 75%
2401025000	Metal Furniture	Factor = 1, five days per week.	NA
2401030000	Paper	Factor = 1, five days per week.	NA
2401040000	Metal Cans	Factor = 1, five days per week.	RE = 99%, RP = 75%, CE = 55%
2401025000	Metal Coils	Factor = 1, five days per week.	RE = 99%, RP = 75%, CE = 56%
2401055000	Machinery & Equipment	Factor = 1, five days per week.	RE = 99%, RP = 75%, CE = 57%
2401060000	Large Appliances	Factor = 1, five days per week.	NA
2401065000	Electronic & Electrical	Factor = 1, five days per week.	NA
2401070000	Motor Vehicles	Factor = 1, five days per week.	NA
2401075000	Aircraft	Factor = 1, five days per week.	NA
2401080000	Marine	Factor = 1, five days per week.	NA
2401085000	Railroad	Factor = 1, five days per week.	NA
2401090000	Misc. Manufacturing	Factor = 1, five days per week.	NA
2401100000	Industrial Maintenance	Factor = 1, five days per week.	NA

Pollutants: VOC, HAPS

Description: These operations include product finishes for original equipment and special purpose coatings not included in the point source inventory. These coatings will be solvent-based and water-based and may be applied by spray, brush, and roller.

Methodology: For the 1999 emissions inventory, TCEQ conducted research on the amount of coatings used by each industry sector, and VOC content data was obtained from the National Paint and Coatings Association. In addition, data for national shipments of coatings was obtained from the U.S. Department of Commerce. Emission factors from this data was applied to the North American Industrial Classification System (NAICS) employee populations for each county<sup>7</sup>. The 1999 emissions were grown to 2002 using the appropriate EPA EGAS 4.0 growth factors. HAPS emissions for Industrial maintenance coatings were grown from 1999 to 2002 using EGAS 4.0 growth factors.

## Texas 2002 Periodic Emissions Inventory

Activity Data Source: The 1999 Emissions Inventory

Emission Factors Source: EGAS 4.0

## Texas 2002 Periodic Emissions Inventory

### Area Sources: Stationary Source Fuel Combustion

Stationary Source Fuel Combustion

## Texas 2002 Periodic Emissions Inventory

SCC	Description	Seasonal Factor
2102005000	Industrial/Residual oil	Factor = 1, six days per week.
2102006000	Industrial Natural Gas	Factor = 1, six days per week.
2102007000	Industrial LPG	Factor = 1, six days per week.
2103004000	Commercial/Institutional Distillate Oil	Factor = 0.6, six days per week.
2103005000	Commercial/Institutional Residual Oil	Factor = 0.6, six days per week.
2103006000	Commercial/Institutional Natural Gas	Factor = 0.6, six days per week.
2103007000	Commercial/Institutional LPG	Factor = 0.6, six days per week.
2104001000	Residential Coal	Factor = 1, seven days per week.
2104006000	Residential Natural Gas	Factor = 0.3, seven days per week.
2104007000	Residential LPG	Factor = 0.3, seven days per week.
2104008001	Wood: Fireplaces	Factor = 0.3, seven days per week.
2104008002	Fireplace Inserts/non-EPA certified	Factor = 0.3, seven days per week.
2104008003	Fireplace Inserts/non-catalytic/EPA certified	Factor = 0.3, seven days per week.
2104008004	Fireplace Inserts/catalytic/EPA certified	Factor = 0.3, seven days per week.
2104008010	Woodstoves	Factor = 0.3, seven days per week.
2104008030	Catalytic Woodstoves	Factor = 0.3, seven days per week.
2104008050	Non-catalytic Woodstoves	Factor = 0.3, seven days per week.

Pollutants: VOC, NO<sub>x</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>

Description: These categories include small sources of fuel combustion for: home heating, cooking, and water heating; and commercial and industrial sources of heating. Various fuel types are included, although the primary fuel used is natural gas.

Methodology: The 1999 emissions were grown to 2002 using the appropriate EPA EGAS 4.0 growth factors.

Activity Data Source: The 1999 emissions Inventory

Emission Factors Source: EGAS 4.0

## Texas 2002 Periodic Emissions Inventory

### Area Sources: Waste Management

Yard Waste Burning

## Texas 2002 Periodic Emissions Inventory

SCC:

2610000100	Yard Waste: Leaves
2610000400	Yard Waste: Brush

Pollutants: VOC, NO<sub>x</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>

Description: This is the occasional burning of leaves and brush. Although not allowed in urban areas, this activity occurs in the more rural areas. It is not a primary activity of the ozone season.

Methodology: The 1999 emissions were grown to 2002 using the appropriate EPA EGAS 4.0 growth factors.

Activity Data Source: The 1999 emissions Inventory

Emission Factors Source: EGAS 4.0

Seasonal Adjustment: Factor = 0.3, seven days per week

Land Clearing Debris Burning



## Texas 2002 Periodic Emissions Inventory

SCC: 2610000500

Pollutants: VOC, NO<sub>x</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>

Description: This is the burning of vegetation from land clearing operations. It is mostly related to construction and agricultural operations, and it may occur year round.

Methodology: The 1999 emissions were grown to 2002 using the appropriate EPA EGAS 4.0 growth factors.

Activity Data Source: The 1999 emissions Inventory

Emission Factors Source: EGAS 4.0

Seasonal Adjustment: Factor = 1, seven days per week

Residential Household Waste Burning

## Texas 2002 Periodic Emissions Inventory

SCC: 2610030000

Pollutants: VOC, NO<sub>x</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>

Description: This is the occasional burning of household wastes. Although not allowed in urban areas, this activity occurs in the more rural areas.

Methodology: The 1999 emissions were grown to 2002 using the appropriate EPA EGAS 4.0 growth factors.

Activity Data Source: The 1999 emissions Inventory

Emission Factors Source: EGAS 4.0

Seasonal Adjustment: Factor = 1, seven days per week

Landfills

## Texas 2002 Periodic Emissions Inventory

SCC: 2620000000

Pollutants: VOC, HAPS, ammonia

Description: Solid Waste Landfills primarily accept household wastes. Over a period of time they produce emissions of mostly methane gas, but some VOCs are emitted. In general, after seven years from when the landfill is started, it begins to release methane and non-methane organic compounds (NMOC). It is assumed that the life of methane emissions from a landfill is about 30 years.

Methodology: The emission estimation was based on the EPA LandGEM model.

The time period considered for this EI is from 1978 to 2002. The amount of waste generated for each of the years, 1978 to 2002, was computed and then plugged into the LandGEM model to determine the total NMOC (VOC) emissions per a year. Annual total municipal solid waste data from 1986 to 2002 was obtained from Municipal Solid Waste Division of the TCEQ. The waste collected from 1978 to 1985 was estimated using per capita waste generation factors for each year obtained from a linear regression analysis of the data from 1986 to 2002 and the population data for the corresponding years. The LandGEM model was used to estimate HAPS emissions from the municipal landfill.

Activity Data Source: Municipal Solid Waste Division, TCEQ

Emission Factors Source: LandGEM model

Seasonal Adjustment: Factor = 1, seven days per week

Rule Effectiveness: RE = 99%, RP = 95%, CE = 70%

Wastewater Treatment: Public Owned

## Texas 2002 Periodic Emissions Inventory

SCC: 2630020000

Pollutants: VOC, HAPS, ammonia

Description: Publically owned waste water treatment facilities (POWT) are those municipal facilities that treat waste water.

Methodology: The EPA guidance allows a default value of  $1.1 \times 10^{-4}$  pounds of VOC per gallon of industrial wastewater discharged. Since discharge units are typically in million gallons per day, it follows that:  $(1.1 \times 10^{-4})$  (pounds of VOC per gallon of wastewater)  $\times (1 \times 10^6)$  (gallons per million gallons) = 110 (pounds of VOC emitted per million gallons of industrial wastewater). The results of this calculation provides an emission factor of 110 pounds of VOC emitted per million gallons of industrial wastewater discharged to a POWT or package plant. This factor is recommended for estimating VOC emissions from POWTs and from package plants where measured emissions data are not available.

The EPA-recommended default value is based on a total wastewater flow composed of 16 percent industrial wastewater. Therefore, for every 6.25 million gallons of wastewater discharged, 16%, or 1 million gallons of the discharge is considered industrial wastewater, which produces 110 lbs. VOC.

The data obtained from the EPA's Clear Watershed Needs Survey report gives the discharge flow rate data in average million gallons per day (MGD) for each treatment facility. The facility information includes the county name that helps to obtain total wastewater discharge flow rate for each county. The seasonal adjustment factor for VOC for this category is one, and treatment facilities operate all seven days in a week. So the average daily value was multiplied by 365 to obtain the annual discharge value for the county. The average daily discharge value was multiplied by 110 to obtain VOC emissions. Finally, this number was divided by 2000 to give the average VOC total in tons per year (TPY) per county. Total HAPS emissions from each county were calculated by multiplying the wastewater throughput by the influent concentrations of each HAP and fraction emitted (Fe) factor.

Activity Data Source: Clear Watershed Needs Survey report of EPA for all municipal wastewater treatment facilities for the year 2000

Texas 2002 Periodic Emissions Inventory

Emission Factors Source: Derived from EPA, Publication No. EPA-450/491-016

Seasonal Adjustment: Factor = 1, seven days per week

## Texas 2002 Periodic Emissions Inventory

### Area Sources: Wildfires and Managed Burning

Fires: Agricultural

SCC: 2801500000

## Texas 2002 Periodic Emissions Inventory

Pollutants: VOC, NO<sub>x</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, HAPS, ammonia

Description: These are fires used for various agricultural purposes such as land clearing, planting preparation, stubble burning, crop residue/waste burning, and burning of standing fields such as sugarcane. Very little activity takes place during the ozone season.

Methodology: Surveys of agricultural burning activities were conducted by the University of Texas at Austin in 1999 for the year 1997. Emissions were calculated using this survey data. This is considered to be a significant improvement over subsequent projects using national data prorated to state and county levels. Since 1997 was considered to be an average year, data for that year is being submitted to represent year 2002 until further updates can be provided<sup>9</sup>. HAPS emissions were grown from 1999 to 2002 using EGAS 4.0 growth factors.

Activity Data Source: Inventory of Air Pollutant Emissions Associated with Forest, Grassland, and Agricultural Burning in Texas<sup>9</sup>

Emission Factors Source: Derived from AP-42, EIIP

Seasonal Adjustment: Factor = 0.001, seven days per week

Fires: Wildfires

SCC: 2810001000

## Texas 2002 Periodic Emissions Inventory

Pollutants: VOC, NO<sub>x</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, HAPS, ammonia

Description: Wildfires are unwanted fires occurring in wildland areas. Their ignition is considered accidental, malicious, or of natural origin.

Methodology: Technical guidance was available from a private contractor, E. H. Pechan and Associates, Inc. for this category using the Documentation for the 2002 Nonpoint Area Source National Emission Inventory for Criteria and Hazardous Air Pollutants (January 2004 Version). This included emission factors for the majority of the criteria pollutants. The fuel consumption factor used was 3.5 tons per acre, and the State-Average Smoldering Augmentation Factor was 0.058, both from the Table 2 of the Wildfire Fuel Consumption and Smoldering Augmentation Factors. HAPS emissions were calculated using appropriate emission factors and the number of acres of land burned.

Activity Data Source: Bureau of Land Management Fire History database

Emission Factors Source: E. H. Pechan and Associates, Inc.

Seasonal Adjustment: Factor = 1, seven days per week

Fires: Slash

SCC: 2810005000



## Texas 2002 Periodic Emissions Inventory

Pollutants: VOC, NO<sub>x</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, HAPS, ammonia

Description: These are planned fires of wild biomass residues resulting from timber harvesting practices and land clearing operations.

Methodology: Surveys of slash burning activities were conducted by the University of Texas at Austin in 1999 for the year 1997. Emissions were calculated using this survey data which is considered to be a significant improvement over subsequent projects that have relied on default national data prorated to state and county levels using surrogates. Since 1997 was considered to be an average year, data for that year is being submitted to represent year 2002 until further updates can be provided<sup>9</sup>. HAPS emissions were calculated by growing the 1999 emissions to 2002 using EGAS 4.0 growth factors.

Activity Data Source: Inventory of Air Pollutant Emissions Associated with Forest, Grassland, and Agricultural Burning in Texas<sup>9</sup>

Emission Factors Source: Derived from AP-42, EIIP

Seasonal Adjustment: Factor = 1, seven days per week

Fires: Prescribed Forestland

## Texas 2002 Periodic Emissions Inventory

SCC: 2810015000

Pollutants: VOC, NO<sub>x</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, HAPS, ammonia

Description: Prescribed forestland fires are planned management fires used to control forest/understory, excluding slash burning. Very little activity takes place during the ozone season.

Methodology: Surveys of prescribed forestland burning activities were conducted by the University of Texas at Austin in 1999 for the year 1997. Emissions were calculated using this survey data which is considered to be a significant improvement over subsequent projects that have relied on default national data prorated to state and county levels using surrogates. Since 1997 was considered to be an average year, data for that year is being submitted to represent year 2002 until further updates can be provided<sup>9</sup>. HAPS emissions were calculated by growing the 1999 emissions to 2002 using EGAS 4.0 growth factors.

Activity Data Source: Inventory of Air Pollutant Emissions Associated with Forest, Grassland, and Agricultural Burning in Texas<sup>9</sup>

Emission Factors Source: Derived from AP-42, EIIP

Seasonal Adjustment: Factor = 0.001, seven days per week

Fires: Prescribed Rangeland

## Texas 2002 Periodic Emissions Inventory

SCC: 2810020000

Pollutants: VOC, NO<sub>x</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, HAPS, ammonia

Description: Prescribed rangeland fires are planned management fires used to control range and grasslands, excluding slash burning. Very little activity takes place during the ozone season.

Methodology: Surveys of prescribed rangeland burning activities were conducted by the University of Texas at Austin in 1999 for the year 1997. Emissions were calculated using this survey data which is considered to be a significant improvement over subsequent projects that have relied on default national data prorated to state and county levels using surrogates. Since 1997 was considered to be an average year, data for that year is being submitted to represent year 2002 until further updates can be provided<sup>9</sup>. HAPS emissions were calculated by growing the 1999 emissions to 2002 using EGAS 4.0 growth factors.

Activity Data Source: Inventory of Air Pollutant Emissions Associated with Forest, Grassland, and Agricultural Burning in Texas<sup>9</sup>

Emission Factors Source: Derived from AP-42, EIIP

Seasonal Adjustment: Factor = 0.001, seven days per week

Fires: Structural

## Texas 2002 Periodic Emissions Inventory

SCC: 2810030000

Pollutants: VOC, NO<sub>x</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, HAPS, ammonia

Description: Structural fires are those fires of houses and buildings. Their ignition is considered accidental, malicious, or of natural origin.

Methodology: Technical guidance was available from EIIP volume III for the category. This included emission factors for the majority of the criteria pollutants. PM<sub>2.5</sub> was derived by multiplying 0.91 against the PM<sub>10</sub> emissions per instructions from the EIIP TechReport Vol. 9. The fuel loading factor used was the default loading factor from EIIP, which is 1.15 tons per fire. HAPS emissions were grown from 1999 to 2002 using EGAS 4.0 growth factors.

Activity Data Source: Texas State Fire Marshal Office

Emission Factors Source: EIIP, AP-42

Seasonal Adjustment: Factor = 1, seven days per week

Fires: Automobiles

## Texas 2002 Periodic Emissions Inventory

SCC: 2810050000

Pollutants: VOC, NO<sub>x</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>

Description: Automobile fires are fires associated with highway vehicles. Their ignition is considered accidental, malicious, or of natural origin.

Methodology: Technical guidance was available from EIIP volume III for the category. This included emission factors for the majority of the criteria pollutants. The fuel loading factor used was the default loading factor from EIIP, which is 0.25 tons of material that can burn in a fire, based on the average weight of a vehicle being approximately 3,700 lbs.

Activity Data Source: Texas State Fire Marshal Office

Emission Factors Source: EIIP, AP-42

Seasonal Adjustment: Factor = 1, seven days per week

### Area Source References

## Texas 2002 Periodic Emissions Inventory

- <sup>1</sup> Smith, Clayton and Jerry Demo. Oil and Gas Production (East Texas 1996 EI). A method for calculating onshore oil and gas production emissions. Pollution Solutions: 1996.
- <sup>2</sup> Hardison, Karla and Bertie Fernando. Sample Calculation For Estimating Emissions From Filling Underground Storage Tanks. TCEQ: 2001.
- <sup>3</sup> Baker, Rick. Emissions from Portable Gasoline Containers In Texas. Eastern Research Group, Inc.: 2002.
- <sup>4</sup> 1999 Emissions Inventory for Texas Graphic Arts Area Sources. Eastern Research Group, Inc.: 2001.
- <sup>5</sup> Mercado, Fernando and Thomas Daniel. Derivation of 1999 Consumer and Commercial Product Per Capita Emission Factors for the State of Texas. TCEQ: 1999.
- <sup>6</sup> Hardison, Karla and Kristi Dunn. Asphalt Applications in Texas. TCEQ: 1999.
- <sup>7</sup> Torres, Melinda. Estimation of VOC Emissions for Industrial Surface Coating in Texas. TCEQ: 1999.
- <sup>8</sup> Landfill Emissions. TCEQ: 1999.
- <sup>9</sup> Allen, David and Ann Dennis. Inventory of Air Pollutant Emissions Associated with Forest, Grassland, and Agricultural Burning in Texas. University of Texas at Austin: 2000
- <sup>10</sup> Marine Vessel Loading, Ballasting, and Transit. Volume III, CHAPSter 12. EIIP, Area Source Committee. April, 2001. Website:  
[http://www.epa.gov/ttn/chief/eiip/techreport/volume03/iii12\\_apr2001.pdf](http://www.epa.gov/ttn/chief/eiip/techreport/volume03/iii12_apr2001.pdf)
- <sup>11</sup> Architectural Surface Coating. Volume III, CHAPSter 3. EIIP, Area Source Committee. November, 1995. Website:  
<http://www.epa.gov/ttn/chief/eiip/techreport/volume03/archsfc.pdf>

## Nonroad Mobile Sources

## Texas 2002 Periodic Emissions Inventory

Nonroad mobile sources are, collectively, vehicles that do not normally operate on roads and highways. These are various types of equipment propelled by combustion engines using various fuels. They are used for purposes such as in agricultural operations, construction, lawn and garden maintenance, industry, and recreation. The category also includes aircraft, locomotives, recreational boats, and commercial marine vessels. The fuels used by nonroad mobile sources are gasoline, diesel, compressed natural gas, and liquid propane gas. The Consolidated Emissions Reporting Rule requires the PEI to include emissions of VOC, NO<sub>x</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, and ammonia. The discussion of individual sources includes a list of pollutants significant to these categories. In some cases some pollutants were not calculated (e.g., ammonia). For these, the current EPA NEI data will remain in place and shall be updated when information on these pollutants becomes available.

This section of the report also contains the 2002 nonroad mobile source toxics emissions inventory. The methodologies for those categories for which toxic emissions were calculated are documented along with the criteria pollutant methodologies. The toxics in this report are referred to as "HAPS."

### **Emissions Calculations Methodologies**

For all sources except aircraft, locomotives, ground support equipment, oil field equipment, and commercial marine vessels, the EPA NONROAD model was used to develop the 2002 PEI. For those sources incorporated in the model, there are two basic approaches to the development of the PEI. Specific categories have been updated using information and data that represent 2002 activities. Some of these categories were addressed through contracted work conducted during the past few years. This data was specifically collected for 2002 or for an earlier year with the emissions grown to 2002. Data from these projects were used as updated inputs into the NONROAD2002 model. These projects are documented in the References at the end of this section (page 75). For those categories not included in special projects, the NONROAD2002 model was used to generate 2002 emissions using the model's default values. Two exceptions to this are airport ground support equipment and oilfield equipment. The NONROAD model does not accurately depict equipment populations for these categories, and emissions were calculated outside of the model, but making use of appropriate model inputs other than equipment populations.

The Emissions and Dispersion Model System was used to estimate aircraft emissions. Aircraft activity data for 2002 was used for inputs into this model. Commercial marine vessel emissions inventories were obtained from three major contracted projects, starting with the year 2000 Port of Houston study. The original study was updated and extended to other coastal counties with significant shipping activities. There was also a recent project developing emissions data from locomotive engines. The emissions data provided by this project were for 2002 and were used for the PEI.

## Texas 2002 Periodic Emissions Inventory

Specific methodologies for individual category classes of nonroad mobile equipment are provided on the following pages. In the categories covered by the Emissions Dispersion Modeling System and the NONROAD model, Emission Factors and Seasonal Adjustment are assumed to be integrated within the model and are not listed. Activity Data is similarly assumed to be integrated within the model for those categories using the model's default data.

### **Quality Assurance Measures**

Quality assurance procedures for nonroad mobile sources relies mainly upon the quality of data used for each separate category. Local, updated equipment population numbers, fuel usage, and engine types are the significant inputs that are upgraded through the contracted special projects. Ensuring the most current approved version of the NONROAD model is critical for accurate PEI development. Current EPA documents were also obtained to keep abreast of changes in emission factors. Other routine efforts such as checking calculations for errors and conducting reasonableness and completeness checks were implemented.

Commercial Aircraft



## Texas 2002 Periodic Emissions Inventory

SCC: 2275020000

Pollutants: VOC, NO<sub>x</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>

Description: Commercial aircraft includes all types of aircraft associated with major air carriers.

Methodology: Annual and daily emissions in tons for the criteria pollutants for the 2002 Periodic Emissions Inventory were estimated for the major commercial airports in Texas and the military airport bases. Activity for these airports is based on aircraft landings and take offs (LTO). This information was provided by the Federal Aviation Agency. The information from LTO's lists each type of aircraft, common engines associated with each plane type, and the number of scheduled departures for each airport.

The LTO activity for each airport was entered into the Emissions Dispersion Modeling System-version 4.2 and modeled for emissions. Emissions were calculated individually for each airport using the aircraft engine types and number of LTO's. Conversions were made from total hydrocarbons (THC) to volatile organic compounds (VOC) by using a conversion factor provided by the EPA in a memorandum to Rich Wilcox from R. Cook entitled: "Exhaust THC to VOC Correction Factors for Aircraft," July 1992.

Where major airports are situated over county boundary lines, emissions for these airports were divided evenly and allocated to each county. This procedure was performed for the Dallas-Fort Worth, Alliance, Corpus Christi, and Bush Intercontinental airports as well as others.

Activity Data Source: Federal Aviation Agency.

Military Aircraft

SCC: 2275001000

## Texas 2002 Periodic Emissions Inventory

Pollutants: VOC, NO<sub>x</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>

Description: Military aircraft includes all types of aircraft associated with U. S. Air Force bases.

Methodology: Annual and daily emissions in tons for the criteria pollutants for the 2002 Periodic Emissions Inventory were estimated for the major commercial airports in Texas and the military airport bases. Activity for these airports is based on aircraft landings and take offs (LTO). This information was provided by the Federal Aviation Agency. The information from LTO's lists each type of aircraft, common engines associated with each plane type, and the number of scheduled departures for each airport.

The LTO activity for each airport was entered into the Emissions Dispersion Modeling System-version 4.2 and modeled for emissions. Emissions were calculated individually for each airport using the aircraft engine types and number of LTO's. Conversions were made from total hydrocarbons (THC) to volatile organic compounds (VOC) by using a conversion factor provided by the EPA in a memorandum to Rich Wilcox from R. Cook entitled: "Exhaust THC to VOC Correction Factors for Aircraft," July 1992.

Where major airports are situated over county boundary lines, emissions for these airports were divided evenly and allocated to each county.

Activity Data Source: Federal Aviation Agency.

General Aviation

SCC: 2275050000

Pollutants: VOC, NO<sub>x</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>,

## Texas 2002 Periodic Emissions Inventory

Description: General aviation aircraft are the small, privately owned and operated aircraft associated with small airports.

Methodology: In 2000 the Texas Transportation Institute (TTI) compiled a statewide inventory of general aviation airports<sup>1</sup> that was used in the 1999 PEI. This inventory was grown to year 2002. The TTI report included 1996 emissions for 260 general aviation airports in the state of Texas. These emissions were calculated using actual activity data. The report also included the projected emission inventories for 1999 and 2007. Linear regression analysis was performed on these three years of data and 2002 emissions were calculated for each airport.

Activity Data Source: Texas Transportation Institute<sup>1</sup>

Aircraft Refueling

SCC: 2275900000

Pollutants: VOC, NO<sub>x</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>

## Texas 2002 Periodic Emissions Inventory

Description: Aircraft refueling includes all types of fuels for major commercial aircraft

Methodology: The 1999 emissions inventory was developed using standard EPA emission factors with airport fuel data. The 1999 emissions were grown to 2002 using the appropriate EPA EGAS 4.0 growth factors

Activity Data Source: 1999 emissions inventory.

Emission Factors Source: EPA.

Seasonal Adjustment: Factor = 1, seven days per week

Airport Ground Support Equipment

SCC: 22xx008000

Pollutants: VOC, NO<sub>x</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>,

## Texas 2002 Periodic Emissions Inventory

Description: This category includes all the various types of vehicles used for servicing aircraft and handling baggage loading and unloading at airports.

Methodology: In 2000 the Texas Transportation Institute (TTI) compiled a statewide inventory of Ground Support Equipment for commercial airports<sup>1</sup> that was used in the 1999 PEI. The TTI report included 1996 emissions for 27 commercial airports in the state of Texas. These emissions were calculated using the EDMS software. The report also included the projected emission inventories for 1999 and 2007. Linear regression analysis was performed on these three years of data and 2002 emissions were calculated for each airport.

Activity Data Source: Texas Transportation Institute<sup>1</sup>

Agricultural Equipment

SCC: 22xx0005000\*

Pollutants: VOC, NO<sub>x</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, HAPS, ammonia

## Texas 2002 Periodic Emissions Inventory

Description: Besides the typical tractors, mowers, and combines associated with agricultural operations, this category also includes sprayers, balers, hydro power units, and irrigation sets.

Methodology: The most current version of the NONROAD model was used to generate 2002 emissions using the model's default values. Toxic emissions were calculated by applying speciation profiles to the VOC estimates. Speciation profiles used were identical to the ones used for 1999 National Toxic Inventory (NTI).

\* Generic SCCs (noted by "xx") are used throughout the remainder of this section to represent the category. There are several SCCs for each category, distinguished only by fuel type. It was determined unnecessary to list these codes here.

### Commercial Equipment

SCC: 22xx006000

Pollutants: VOC, NO<sub>x</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, HAPS, ammonia

## Texas 2002 Periodic Emissions Inventory

Description: This category is comprised of portable generator sets, pumps, welders, air compressors, and pressure washers.

Methodology: The most current version of the NONROAD model was used to generate 2002 emissions using the model's default values. HAPS emissions were calculated by applying speciation profiles to the VOC estimates. Speciation profiles used were identical to the one used for 1999 NTI.

Commercial Marine Vessels

SCC: 2280000000

Pollutants: VOC, NO<sub>x</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, and ammonia

## Texas 2002 Periodic Emissions Inventory

Description: Commercial vessels include ocean going vessels, tow boats, fishing boats, and harbor vessels.

Methodology: The 2002 emissions were estimated by updating the 1999 PEI to 2002 using data from the 2002 Waterborne Commerce of the United States Report. The 1999 PEI for marine vessels operating in the Houston Port was developed by a contractor using actual shipping inventory lists, Houston Port Authority records, Lloyds registry of ships, and other surveys and observations used to track the movements of ocean going vessels, harbor vessels and tow vessels<sup>2</sup>. Interviews with port personnel, ships captains and related entities helped to define ship speeds, throttle positions and other operating parameters.

Counties included in the 1999 survey were Harris, Galveston, Brazoria and Chambers. Other Texas ports and the intercoastal waterway were added to provide a statewide inventory of vessel emissions. Emissions from vessels in the Orange and Jefferson county ports were based on emission projection ratios of the percentage of cargo activity compared to that activity in the Houston Port. Both the Beaumont and Port Arthur ports are in Jefferson County. Beaumont has 43% and Port Arthur has 0.12% of the activity of the Houston Port. Activity data from the Corps of Engineers listing total commodities in short tons was also used to verify port tonnage, and in comparing the tonnage from Orange County with Harris and Jefferson counties. Total cargo from Orange was approximately 0.025% of the cargo from the two ports in Jefferson County.

Subsequent counties that border the Texas coast or have a major channel through them, like Victoria and Corpus Christi, were calculated in a similar manner using total cargo tons reported in the 2002 Waterborne Commerce of the United States Report for 2002. Emissions for the other coast counties were estimated using the approximate percentages of their total cargo tons relative to the Houston Port and associated emissions. When two or more counties bordered a major port, emissions were divided by the number of bordering counties. For example, San Patricio and Nueces counties each had half of the emissions estimated for the Corpus Christi area.

As an indicator of port size related to the Houston Port, listed here is the 2002 American Association of Port Authorities ranking of the Texas ports by cargo tons:

2 <sup>nd</sup> Houston Port	185,050,168 million tons
5 <sup>th</sup> Beaumont	79,130,510 million tons or 43% of the Houston activity
7 <sup>th</sup> Corpus Christi	72,000,304 million tons or 39% of the Houston activity
28 <sup>th</sup> Port Arthur	22,802,479 million tons or 12 % of the Houston activity
56 <sup>th</sup> Matagorda	9,590,150 million tons or 5% of the Houston activity
77 <sup>th</sup> Victoria	4,734,456 million tons or 2.5% of the Houston activity



## Texas 2002 Periodic Emissions Inventory

2002 Waterborne Statistics also included projections for the Intercoastal Waterway. These cargo tons were a fraction of the Houston activity.

Channel to Victoria	4,734 thousand tons (Victoria and Refugio counties)
Brownsville to Port Isabel	4,741 thousand tons (Klegberg, Kenedy, and Willacy counties)

HAPS emissions for the Harbor vessels and Tug/Tow boats were calculated by applying speciation profiles to the VOC estimates. The speciation profiles used were identical to the ones used for the 1999 NTI for distillate fuel. Emission factors, based on 1000 gallons of residual fuel consumed, were used for estimating HAPS emissions from Ocean Going Vessels.

Activity Data Source: 2002 Waterborne Commerce of the United States Report-2002.

Emission Factors Source: 1999 Periodic Emissions Inventory Report.

Seasonal Adjustment: Factor = 1, seven days per week.

### Construction Equipment

SCC: 22xx002000

Pollutants: VOC, NO<sub>x</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, HAPS, ammonia

## Texas 2002 Periodic Emissions Inventory

Description: Construction equipment includes a vast range of specialized units from the large dozers, cranes, graders, trenchers, and crushing equipment to the smaller pavers, industrial saws, and signal boards.

Methodology: The most current version of the NONROAD model was used to generate 2002 emissions using the model's updated values. Equipment populations and other data resulting from the 2000 Houston study<sup>3</sup> were used to update the model.

HAPS emissions were calculated by applying speciation profiles to the VOC estimates. Speciation profiles used were identical to the ones used for the 1999 NTI.

Activity Data Source: Development of a Revised Emissions Inventory for Construction Equipment in the Houston-Galveston Ozone Non-Attainment Area<sup>3</sup>.

Industrial Equipment

SCC: 22xx003000

Pollutants: VOC, NO<sub>x</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, HAPS, ammonia

## Texas 2002 Periodic Emissions Inventory

Description: This category includes aerial lifts, forklifts, refrigeration units, and terminal tractors.

Methodology: The most current version of the NONROAD model was used to generate 2002 emissions using the model's default values. HAPS emissions were calculated by applying speciation profiles to the VOC estimates. Speciation profiles used were identical to the ones used for the 1999 NTI.

Oilfield Equipment

SCC: 22xx010000

Pollutants: VOC, NO<sub>x</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, HAPS

## Texas 2002 Periodic Emissions Inventory

Description: This category includes various fuel combustion equipment used on and around oil well drilling rigs. Significant units that make up this category would be the large generators used for rig operations and electrical generation.

Methodology: This category is included as part of the NONROAD model. Updates to the model involve changes to county employment populations using the Census Bureau's County Business Patterns. In previous years it was determined that the NAICS code used in this document was including corporate office workers associated with the oil industry and not only actual oilfield workers. This created errors in the county estimates.

As an alternative, the actual numbers of drilling rigs located in individual counties were used as a surrogate<sup>4</sup>. Numbers of rigs were obtained from privately owned drilling rig reporting services, Baker Hughes, Inc. and RigData. Actual numbers of drilling rigs by county were used to prorate the NONROAD statewide total emissions by fuel type. HAPS emissions were calculated by applying speciation profiles to the VOC estimates. Speciation profiles used were identical to the ones used for the 1999 NTI.

Activity Data Source: Baker Hughes, Inc., RigData.

Lawn and Garden Equipment

SCC: 22xx004000

Pollutants: VOC, NO<sub>x</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, HAPS, ammonia

## Texas 2002 Periodic Emissions Inventory

Description: Lawn and garden equipment (commercial and residential) used for maintaining lawns and gardens, includes lawn mowers, lawn and garden tractors, trimmers/edgers, small chain saws, tillers, snowblowers, wood splitters, and chippers/stump grinders.

Methodology: The most current version of the NONROAD model was used to generate 2002 emissions using the model's updated values. The default model equipment populations were updated with survey data collected by the Eastern Research Group, LLC in 2003<sup>5</sup>. HAPS emissions were calculated by applying speciation profiles to the VOC estimates. Speciation profiles used were identical to the ones used for the 1999 NTI.

Activity Data Source: Eastern Research Group, LLC<sup>5</sup>.

Logging Equipment

SCC: 22xx007000

Pollutants: VOC, NO<sub>x</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, HAPS, ammonia

## Texas 2002 Periodic Emissions Inventory

Description: This category includes the larger fellers, bunchers, and skidders as well as chain saws and shredders.

Methodology: The most current version of the NONROAD model was used to generate 2002 emissions using the model's default values. HAPS emissions were calculated by applying speciation profiles to the VOC estimates. Speciation profiles used were identical to the ones used for the 1999 NTI.

Recreational Equipment

SCC: 22xx001000

Pollutants: VOC, NO<sub>x</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, HAPS, ammonia

## Texas 2002 Periodic Emissions Inventory

Description: Off-road motorcycles, golf carts, and snowmobiles are included in this category.

Methodology: The most current version of the NONROAD model was used to generate 2002 emissions using the model's default values. HAPS emissions were calculated by applying speciation profiles to the VOC estimates. Speciation profiles used were identical to the ones used for the 1999 NTI.

Recreational Marine Equipment

SCC: 2282000000

Pollutants: VOC, NO<sub>x</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, HAPS, ammonia

## Texas 2002 Periodic Emissions Inventory

Description: Recreational boats with inboard and outboard motors as well as auxiliary sailboat motors are in this category.

Methodology: The most current version of the NONROAD model was used to generate 2002 emissions using the model's updated values. The default model equipment populations were updated with survey data collected by the Eastern Research Group, LLC in 2002<sup>6</sup>. HAPS emissions were calculated by applying speciation profiles to the VOC estimates. Speciation profiles used were identical to the ones used for the 1999 NTI.

Activity Data Source: Eastern Research Group, LLC<sup>6</sup>.

Locomotives

SCC: 2285002000

Pollutants: VOC, NO<sub>x</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, HAPS, ammonia



## Texas 2002 Periodic Emissions Inventory

Description: Locomotive engines include long haul as well as yard engines.

Methodology: The Eastern Research Group conducted surveys requesting information from the three Class I railways. The emission factors used were based upon an industry average for the year 2001, without any difference between line-haul and switch engines. Fuel consumption was used to estimate emissions in terms of grams of pollution per gallon of diesel fuel, being based upon EPA emission factors associated with the 1997 Locomotive Rule. The 2001 emissions were grown to 2002 using contractor developed growth factors. HAPS emissions were estimated by applying speciation profiles to the VOC estimates. Speciation profiles used were identical to the ones used for the 1999 NTI. Acrolein and Chromium were estimated using fuel based emission factors.

Activity Data Source: Eastern Research Group, LLC<sup>7</sup>.

Emission Factors Source: Derived from EPA factors and survey data.

Seasonal Adjustment: Factor 1, seven days a week.

Railway Equipment

SCC: 228500xx15

Pollutants: VOC, NO<sub>x</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, HAPS, ammonia

## Texas 2002 Periodic Emissions Inventory

Description: This category includes all the various equipment associated with railway maintenance.

Methodology: The most current version of the NONROAD model was used to generate 2002 emissions using the model's default values. HAPS emissions were calculated by applying speciation profiles to the VOC estimates. Speciation profiles used were identical to the ones used for the 1999 NTI.

### **Nonroad Mobile Source References**

<sup>1</sup>1996, 1999, and 2007 Airport Emissions Inventory. Texas Transportation Institute: 2000.

<sup>2</sup>Houston Galveston Area Vessel Emissions Inventory. Starcrest Consulting Group, LLC: 2000.

<sup>3</sup>Development of a Revised Emissions Inventory for Construction Equipment in the Houston-Galveston Ozone Non-Attainment Area. Eastern Research Group, Inc.: 2000.

<sup>4</sup>Oilfield Equipment. TCEQ: 2002.

<sup>5</sup>Baker, Rick and Sam Wells. Development of Commercial Lawn and Garden Emissions Estimates for the State Of Texas and Selected Metropolitan Areas. Eastern Research Group, Inc. and Starcrest Consulting Group, LLC: 2003.

<sup>6</sup>Baker, Rick, Rebecca Feldman and Sam Wells. Recreational Marine Emissions Inventory. Eastern Research Group, Inc. and Starcrest Consulting Group, LLC: 2002.

<sup>7</sup>Baker, Rick and Sam Wells. Locomotive Emission Inventory: Update and Discussion. Eastern Research Group, Inc. and Starcrest Consulting Group, LLC: 2002.

## **Biogenic Sources**

On March 31, 2002 EPA's Marc Houyoux, Emission Factors and Inventory Group US/EPA OAQPS (D205-01), Research Triangle Park, NC 27711 sent the following e-mail message:

County and month-specific biogenic emissions defaults for CERR submittal

The U.S. EPA has developed county-specific biogenic emissions estimates to assist states with the biogenic emissions submittal requirement of the

Consolidated Emissions Reporting Rule (CERR). These estimates are available in an Excel spreadsheet from the CHIEF website at:

<ftp://ftp.epa.gov/EmisInventory/prelim2002nei/biogenic/>

This spreadsheet contains county-total estimates of 2002 biogenic emissions based on the BEIS3.12 model. The purpose of this spreadsheet is to provide default 2002 estimates to the states for the purpose of biogenic emissions submittals by county required by the CERR. These estimates were created using the following data:

- 1) 2001 annual meteorology
- 2) BEIS3.12 model via the Sparse Matrix Operator Kernel Emissions (SMOKE) modeling system
- 3) Recently revised BEIS3.12 emission factors file (also provided as a separate file with this spreadsheet)
- 4) BELD3 land use data (1-km original data aggregated to 36-km grid).
- 5) Post processing summation of county-total emissions from SMOKE, calculated from 36-km gridded emissions using the "land area" spatial surrogate. This means that when calculating the county-total numbers, the 36-km gridded emissions were assumed to be uniformly distributed over the grid cell for purposes of mapping to the counties.

States that accept these BEIS3.12 estimates for their CERR submittals should send an e-mail indicating that the BEIS3.12 emissions data are acceptable for 2002 CERR purposes to Phil Lorang at the U.S. EPA (lorang.phil@epa.gov). Sending this e-mail will fulfill the biogenic CERR submittal requirement.

TCEQ emissions inventory staff notified EPA of their intent to accept the EPA biogenic emissions inventory for Texas. This inventory will be stored in the TCEQ data management system for non-point source emissions data and will be made available with other sections of the emissions inventory.

In addition TCEQ staff developed an emissions inventory for ammonia emissions from forest soils. These emissions are covered in the Ammonia section of this report.

Figure 1. Texas Ozone Nonattainment Areas





Protecting Texas by  
Reducing and  
Preventing Pollution




**TCEQ**

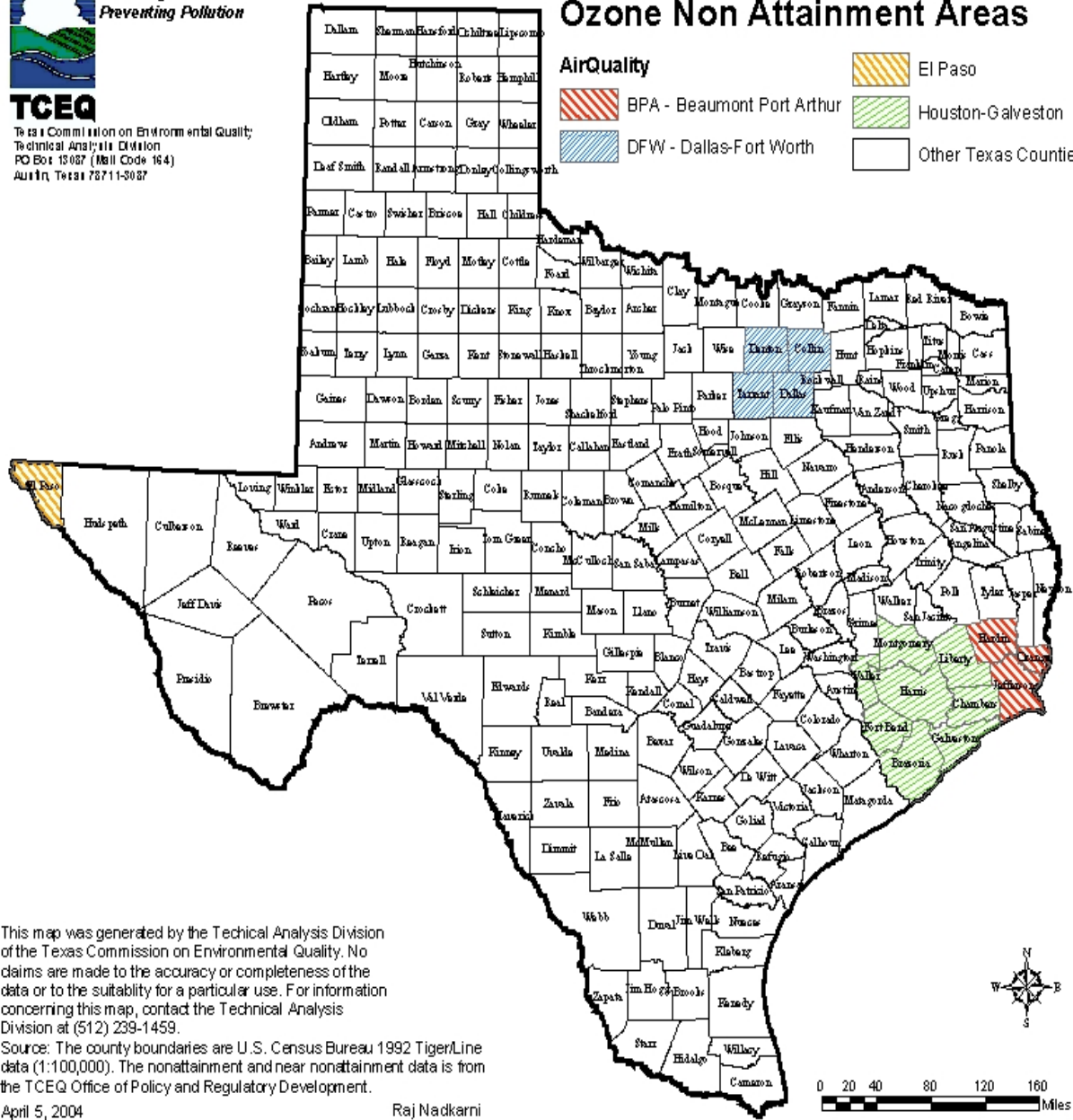
Texas Commission on Environmental Quality  
Technical Analysis Division  
PO Box 13087 (Mail Code 164)  
Austin, Texas 78711-3087

## Texas 2002 Ozone Non Attainment Areas

### Air Quality

-  BPA - Beaumont Port Arthur
-  DFW - Dallas-Fort Worth

-  El Paso
-  Houston-Galveston
-  Other Texas Counties



Texas 2002 Periodic Emissions Inventory

Table 1. 2002 VOC EMISSIONS - HOUSTON/GALVESTON OZONE NONATTAINMENT AREA

COUNTY	POINT		AREA		NONROAD MOBILE	
	TPY	TPD	TPY	TPD	TPY	TPD
BRAZORIA	6129.74	17.87	7607.35	22.35	2608.76	10.28
CHAMBERS	1867.55	5.26	1834.35	4.94	1797.90	8.18
FORT BEND	743.61	2.22	6284.77	16.72	1236.14	4.18
GALVESTON	7593.80	21.05	9882.28	27.58	4897.25	20.04
HARRIS	30473.43	86.03	51317.54	142.36	13811.24	43.23
LIBERTY	421.58	1.41	3750.01	9.94	439.20	1.57
MONTGOMERY	659.29	1.88	4928.26	12.41	1269.27	4.57
WALLER	238.25	0.66	1098.75	3.11	261.45	0.97
TOTAL	48127.25	136.38	86703.31	239.41	26321.21	93.02
	ONROAD MOBILE		BIOGENICS		TOTALS	
COUNTY	TPY	TPD	TPY	TPD	TPY	TPD
BRAZORIA	2043.96	5.43	27621.15	139.01	46010.96	194.94
CHAMBERS	799.18	2.12	13827.42	70.19	20126.40	90.69
FORT BEND	2523.63	6.72	16015.54	81.53	26803.69	111.37
GALVESTON	2216.96	5.90	8702.98	44.09	33293.27	118.65
HARRIS	30670.95	82.04	27501.24	142.06	153774.40	495.72
LIBERTY	879.09	2.34	37281.24	194.60	42771.12	209.86
MONTGOMERY	3260.90	8.67	40545.30	215.76	50663.02	243.29
WALLER	798.94	2.12	14292.37	75.11	16689.76	81.98
TOTAL	43193.61	115.34	185787.26	962.35	390132.64	1546.50

## Texas 2002 Periodic Emissions Inventory

Table 2. 2002 NOX EMISSIONS - HOUSTON/GALVESTON OZONE NONATTAINMENT AREA

COUNTY	POINT		AREA		NONROAD MOBILE	
	TPY	TPD	TPY	TPD	TPY	TPD
BRAZORIA	20853.26	56.63	2811.81	7.76	13701.99	39.80
CHAMBERS	4870.79	17.01	3066.31	8.37	626.64	2.06
FORT BEND	17588.31	54.99	2800.09	7.44	3154.92	10.13
GALVESTON	16791.17	59.34	3056.68	8.18	25429.02	70.97
HARRIS	47622.36	134.18	16894.57	43.40	91372.19	259.14
LIBERTY	727.92	2.04	1514.28	4.06	1870.02	5.58
MONTGOMERY	3503.49	11.40	2269.49	5.87	2584.28	8.26
WALLER	1065.49	2.90	622.84	1.66	516.65	1.60
TOTAL	113022.79	338.49	33036.07	86.74	139255.71	397.54
	ONROAD MOBILE		BIOGENICS		TOTALS	
COUNTY	TPY	TPD	TPY	TPD	TPY	TPD
BRAZORIA	5194.38	14.14	937.14	3.38	43498.58	121.72
CHAMBERS	2434.03	6.69	578.21	2.12	11575.98	36.25
FORT BEND	6951.01	18.98	966.12	3.42	31460.45	94.96
GALVESTON	5295.43	14.40	401.89	1.43	50974.19	154.32
HARRIS	85032.86	232.48	806.10	2.80	241728.08	671.99
LIBERTY	2169.90	5.90	383.11	1.32	6665.23	18.89
MONTGOMERY	8951.53	24.48	411.92	1.41	17720.71	51.42
WALLER	2051.23	5.60	604.82	2.09	4861.03	13.85
TOTAL	118080.37	322.67	5089.31	17.97	408484.25	1163.41

Texas 2002 Periodic Emissions Inventory

Table 3. 2002 CO EMISSIONS - HOUSTON/GALVESTON OZONE NONATTAINMENT AREA

COUNTY	POINT		AREA		NONROAD MOBILE	
	TPY	TPD	TPY	TPD	TPY	TPD
BRAZORIA	5975.22	15.99	14634.48	54.44	14716.98	56.26
CHAMBERS	3178.00	11.33	1991.96	1.87	4813.19	24.43
FORT BEND	8661.08	28.90	4172.02	6.71	13248.49	47.59
GALVESTON	7467.23	25.10	2202.01	2.96	19735.80	82.39
HARRIS	26157.83	72.26	24796.03	41.93	204968.79	684.15
LIBERTY	412.76	1.24	15682.00	38.58	3525.33	12.34
MONTGOMERY	1911.12	6.09	11151.06	19.41	11965.34	43.77
WALLER	716.54	1.97	961.99	0.75	1887.56	7.05
TOTAL	54479.78	162.88	75591.55	166.64	274861.48	957.97
	ONROAD MOBILE		BIOGENICS		TOTALS	
COUNTY	TPY	TPD	TPY	TPD	TPY	TPD
BRAZORIA	36342.67	86.90	3730.60	16.07	75399.95	229.66
CHAMBERS	16378.73	39.17	2068.93	9.16	28430.81	85.96
FORT BEND	45994.19	110.11	2616.08	11.68	74691.86	204.99
GALVESTON	36851.11	88.18	1356.44	5.92	67612.59	204.55
HARRIS	511083.09	1231.99	3518.04	15.85	770523.78	2046.17
LIBERTY	15882.21	37.97	3571.44	16.11	39073.74	106.24
MONTGOMERY	60968.92	145.85	3697.05	17.03	89693.49	232.15
WALLER	14750.82	35.26	1991.63	9.17	20308.54	54.19
TOTAL	738251.74	1775.43	22550.21	101.00	1165734.76	3163.91



Texas 2002 Periodic Emissions Inventory

Table 4. 2002 VOC EMISSIONS - DALLAS/FORT WORTH OZONE NONATTAINMENT AREA

COUNTY	POINT		AREA		NONROAD MOBILE	
	TPY	TPD	TPY	TPD	TPY	TPD
COLLIN	341.61	1.09	4789.57	15.07	2179.26	7.59
DALLAS	2601.19	8.63	25206.82	80.87	9147.4	29.33
DENTON	275.01	0.98	6125.91	19.07	1771.02	6.63
ELLIS	1995.89	5.60	2107.66	6.4	665.12	2.33
JOHNSON	251.69	0.71	2069.63	6.94	388.37	1.31
KAUFMAN	202.18	0.75	2151.41	7.42	453.21	1.64
PARKER	221.07	0.64	2638.65	7.4	335.72	1.16
ROCKWALL	0.00	0.00	602.67	1.87	367.95	1.36
TARRANT	2184.79	7.42	18262.39	59.38	5760.78	18.73
TOTAL	8073.43	25.82	63954.71	204.42	21068.83	70.08
	ONROAD MOBILE		BIOGENICS		TOTALS	
COUNTY	TPY	TPD	TPY	TPD	TPY	TPD
COLLIN	5628.84	14.61	6274.64	38.13	19213.93	76.49
DALLAS	26766.44	71.86	6191.44	36.87	69913.29	227.56
DENTON	5147.27	13.38	5109.37	30.98	18428.58	71.04
ELLIS	1605.85	4.40	22008.05	113.35	28382.58	132.08
JOHNSON	1512.31	4.23	9772.70	62.01	13994.69	75.21
KAUFMAN	1554.38	4.26	10112.13	61.72	14473.31	75.80
PARKER	1315.82	3.68	8395.44	52.74	12906.70	65.63
ROCKWALL	628.85	1.70	3900.60	23.25	5500.07	28.18
TARRANT	15718.20	43.01	7424.10	45.66	49350.27	174.20
TOTAL	59877.97	161.14	79188.48	464.72	232163.42	926.18

Texas 2002 Periodic Emissions Inventory

Table 5. 2002 NOX EMISSIONS - DALLAS/FORT WORTH OZONE NONATTAINMENT AREA

COUNTY	POINT		AREA		NONROAD MOBILE	
	TPY	TPD	TPY	TPD	TPY	TPD
COLLIN	611.44	2.49	640.24	1.49	3853.47	13.11
DALLAS	3785.94	15.92	6102.98	14.44	15091.6	46.78
DENTON	177.65	0.58	4227.2	11.16	2971.9	10.39
ELLIS	13334.66	37.82	78.46	0.18	2215.15	7.79
JOHNSON	1430.59	4.05	111.94	0.23	1770.75	6.41
KAUFMAN	98.84	0.35	77.51	0.16	716.63	2.53
PARKER	916.61	2.48	512.37	1.32	506.29	1.78
ROCKWALL	0.00	0.00	60.09	0.1	324.92	1.14
TARRANT	3553.29	15.36	3597.34	8.95	14856.7	46.31
TOTAL	23909.02	79.05	15408.13	38.03	42307.41	136.24
	ONROAD MOBILE		BIOGENICS		TOTALS	
COUNTY	TPY	TPD	TPY	TPD	TPY	TPD
COLLIN	10703.33	27.94	607.94	2.38	16416.42	47.41
DALLAS	54911.99	146.16	519.32	2.03	80411.83	225.33
DENTON	10808.29	28.40	297.73	1.18	18482.77	51.71
ELLIS	6443.79	17.94	184.15	0.71	22256.20	64.44
JOHNSON	3767.96	10.50	525.15	2.06	7606.39	23.25
KAUFMAN	4439.01	12.19	588.43	2.29	5920.42	17.52
PARKER	4110.13	11.58	641.11	2.51	6686.51	19.66
ROCKWALL	2785.65	7.77	348.47	1.36	3519.13	10.37
TARRANT	34165.14	92.74	592.06	2.30	56764.53	165.66
TOTAL	132135.28	355.23	4304.36	16.82	218064.20	625.37

Texas 2002 Periodic Emissions Inventory

Table 6. 2002 CO EMISSIONS - DALLAS/FORT WORTH OZONE NONATTAINMENT AREA

COUNTY	POINT		AREA		NONROAD MOBILE	
	TPY	TPD	TPY	TPD	TPY	TPD
COLLIN	967.93	2.87	3372.12	5.64	22195.22	80.57
DALLAS	1881.31	7.17	14848.42	23.89	134506.67	449.89
DENTON	291.75	0.87	2787.14	2.35	18846.59	65.89
ELLIS	8598.77	24.19	1678.52	1.99	6501.92	22.48
JOHNSON	685.41	1.95	1305.29	1.28	5376.16	17.91
KAUFMAN	75.16	0.18	1129.12	0.87	4418.32	15.83
PARKER	564.33	1.40	1769.65	0.87	4815.24	16.16
ROCKWALL	0.00	0.00	442.03	0.81	2705.04	9.82
TARRANT	1996.84	8.01	9080.92	13.18	79510.56	263.45
TOTAL	15061.50	46.64	36413.21	50.87	278875.72	942.00
	ONROAD MOBILE		BIOGENICS		TOTALS	
COUNTY	TPY	TPD	TPY	TPD	TPY	TPD
COLLIN	91332.60	202.05	1601.28	9.01	119469.15	300.14
DALLAS	436479.19	999.85	1626.99	9.01	589342.58	1489.80
DENTON	86550.38	192.94	1023.46	5.56	109499.32	267.61
ELLIS	27665.91	67.00	4310.45	20.98	48755.57	136.64
JOHNSON	23010.16	56.08	1402.67	7.76	31779.69	84.97
KAUFMAN	25130.12	60.29	1805.02	9.79	32557.74	86.97
PARKER	20765.66	50.96	1659.95	9.47	29574.83	78.86
ROCKWALL	11758.23	28.36	1006.60	5.55	15911.90	44.53
TARRANT	268819.89	632.08	1664.99	9.35	361073.20	926.07
TOTAL	991512.14	2289.61	16101.41	86.48	1337963.98	3415.60

## Texas 2002 Periodic Emissions Inventory

Table 7. 2002 VOC EMISSIONS - BEAUMONT/PORT ARTHUR OZONE NONATTAINMENT AREA

COUNTY	POINT		AREA		NONROAD MOBILE	
	TPY	TPD	TPY	TPD	TPY	TPD
HARDIN	436.14	1.28	3517.46	9.43	210.73	0.67
JEFFERSON	10869.80	32.65	16536.98	42.21	3692.50	12.96
ORANGE	3324.05	9.88	2111.46	5.58	543.24	1.95
TOTAL	14629.99	43.81	22165.90	57.22	4446.47	15.58
	ONROAD MOBILE		BIOGENICS		TOTALS	
COUNTY	TPY	TPD	TPY	TPD	TPY	TPD
HARDIN	3014.10	7.99	39726.42	205.76	46904.85	225.13
JEFFERSON	667.50	1.77	18866.56	96.16	50633.34	185.75
ORANGE	1346.50	3.57	17078.19	87.45	24403.44	108.42
TOTAL	5028.10	13.32	75671.17	389.37	121941.63	519.30

Texas 2002 Periodic Emissions Inventory

Table 8. 2002 NOX EMISSIONS - BEAUMONT/PORT ARTHUR OZONE NONATTAINMENT AREA

COUNTY	POINT		AREA		NONROAD MOBILE	
	TPY	TPD	TPY	TPD	TPY	TPD
HARDIN	395.70	1.19	1180.88	3.19	1000.82	3.12
JEFFERSON	24356.34	75.78	4109.85	10.68	39886.75	111.75
ORANGE	10433.09	32.26	793.70	2.13	1700.58	5.10
TOTAL	35185.13	109.23	6084.43	16.00	42588.15	119.96
	ONROAD MOBILE		BIOGENICS		TOTALS	
COUNTY	TPY	TPD	TPY	TPD	TPY	TPD
HARDIN	10431.20	29.73	180.83	0.64	13189.43	37.86
JEFFERSON	1387.30	3.84	589.05	2.12	70329.29	204.17
ORANGE	4323.00	12.28	246.77	0.88	17497.14	52.65
TOTAL	16141.50	45.84	1016.65	3.64	101015.86	294.68

Texas 2002 Periodic Emissions Inventory

Table 9. 2002 CO EMISSIONS - BEAUMONT/PORT ARTHUR OZONE NONATTAINMENT AREA

COUNTY	POINT		AREA		NONROAD MOBILE	
	TPY	TPD	TPY	TPD	TPY	TPD
HARDIN	295.62	0.87	7652.55	17.91	2448.43	8.01
JEFFERSON	8195.21	24.46	25768.14	29.21	22844.99	80.10
ORANGE	8221.52	22.38	5310.25	12.76	4747.65	16.58
TOTAL	16712.35	47.71	38730.94	59.88	30041.07	104.69
	ONROAD MOBILE		BIOGENICS		TOTALS	
COUNTY	TPY	TPD	TPY	TPD	TPY	TPD
HARDIN	47746.40	114.69	3440.48	15.50	61583.48	156.98
JEFFERSON	10427.60	24.97	2480.84	11.00	69716.78	169.75
ORANGE	21417.30	51.37	1712.82	7.64	41409.54	110.73
TOTAL	79591.30	191.03	7634.14	34.14	172709.80	437.46

Texas 2002 Periodic Emissions Inventory

Table 10. 2002 VOC EMISSIONS - AUSTIN EARLY ACTION COMPACT AREA

COUNTY	POINT		AREA		NONROAD MOBILE	
	TPY	TPD	TPY	TPD	TPY	TPD
BASTROP	108.58	0.35	1828.99	4.96	302.97	1.09
CALDWELL	23.13	0.07	6833.32	18.51	227.86	0.78
HAYS	313.56	0.99	1743.41	5.40	563.96	1.98
TRAVIS	353.60	0.95	15098.76	54.70	3397.27	11.23
WILLIAMSON	36.89	0.15	5427.72	18.40	976.28	3.30
TOTAL	835.76	2.51	30932.20	101.97	5468.34	18.39
	ONROAD MOBILE		BIOGENICS		TOTALS	
COUNTY	TPY	TPD	TPY	TPD	TPY	TPD
BASTROP	916.62	2.69	9765.94	51.07	12923.10	60.16
CALDWELL	461.09	1.35	6412.30	32.67	13957.70	53.37
HAYS	1800.48	4.73	8439.29	46.15	12860.70	59.25
TRAVIS	10294.45	27.06	15372.80	88.27	44516.88	182.21
WILLIAMSON	2990.35	7.86	14395.70	83.06	23826.94	112.77
TOTAL	16462.99	43.69	54386.03	301.21	108085.32	467.76

Texas 2002 Periodic Emissions Inventory

Table 11. 2002 NOX EMISSIONS - AUSTIN EARLY ACTION COMPACT AREA

COUNTY	POINT		AREA		NONROAD MOBILE	
	TPY	TPD	TPY	TPD	TPY	TPD
BASTROP	1382.83	4.20	141.08	0.32	914.19	3.03
CALDWELL	898.32	2.58	69.48	0.14	892.68	2.64
HAYS	2610.76	7.46	87.72	0.18	2098.14	7.10
TRAVIS	2355.75	8.89	1156.75	2.37	5037.67	15.93
WILLIAMSON	0.00	0.00	261.50	0.47	2591.69	8.73
TOTAL	7247.66	23.13	1716.53	3.48	11534.37	37.42
	ONROAD MOBILE		BIOGENICS		TOTALS	
COUNTY	TPY	TPD	TPY	TPD	TPY	TPD
BASTROP	1521.00	4.19	733.37	2.74	4692.47	14.48
CALDWELL	838.30	2.32	608.54	2.21	3307.32	9.90
HAYS	4088.65	11.07	580.95	2.12	9466.22	27.92
TRAVIS	20486.35	55.01	712.36	2.65	29748.88	84.85
WILLIAMSON	6231.95	16.73	985.48	3.71	10070.62	29.63
TOTAL	33166.25	89.32	3620.70	13.42	57285.51	166.77



## Texas 2002 Periodic Emissions Inventory

Table 12. 2002 CO EMISSIONS - AUSTIN EARLY ACTION COMPACT AREA

COUNTY	POINT		AREA		NONROAD MOBILE	
	TPY	TPD	TPY	TPD	TPY	TPD
BASTROP	558.48	1.59	1844.70	1.39	2270.76	8.34
CALDWELL	190.67	0.70	980.09	0.57	1796.40	6.14
HAYS	3818.40	12.04	2090.33	1.12	4141.73	14.62
TRAVIS	708.82	1.94	5749.16	5.80	43472.36	143.59
WILLIAMSON	0.00	0.00	4339.29	1.88	10715.89	37.23
TOTAL	5276.37	16.27	15003.57	10.78	62397.14	209.92
	ONROAD MOBILE		BIOGENICS		TOTALS	
COUNTY	TPY	TPD	TPY	TPD	TPY	TPD
BASTROP	14476.39	36.83	2470.56	11.91	21620.89	60.06
CALDWELL	7386.87	18.79	1866.34	8.92	12220.37	35.12
HAYS	31069.43	73.43	2096.84	10.56	43216.73	111.77
TRAVIS	156396.03	369.91	2747.19	13.91	209073.56	535.15
WILLIAMSON	48856.23	115.54	2862.16	14.78	66773.57	169.44
TOTAL	258184.95	614.50	12043.09	60.08	352905.12	911.54

Texas 2002 Periodic Emissions Inventory

Table 13. 2002 VOC EMISSIONS - SAN ANTONIO EARLY ACTION COMPACT AREA

COUNTY	POINT		AREA		NONROAD MOBILE	
	TPY	TPD	TPY	TPD	TPY	TPD
BEXAR	1473.27	4.49	32116.06	98.73	4108.79	13.04
COMAL	125.59	0.34	1495.85	4.73	844.37	3.12
GUADALUPE	182.80	0.52	6361.36	18.21	436.80	1.45
WILSON	0.00	0.00	2058.09	5.40	83.43	0.29
TOTAL	1781.66	5.35	42031.36	127.08	5473.39	17.90
	ONROAD MOBILE		BIOGENICS		TOTALS	
COUNTY	TPY	TPD	TPY	TPD	TPY	TPD
BEXAR	19261.49	51.82	12356.00	63.60	34083.30	123.61
COMAL	1616.52	4.34	7936.11	42.04	16533.59	66.57
GUADALUPE	1511.48	4.06	7716.28	38.83	11369.28	48.58
WILSON	440.07	1.18	9744.83	48.36	59471.31	199.87
TOTAL	22829.56	61.40	37753.21	192.83	121457.47	438.63

Texas 2002 Periodic Emissions Inventory

Table 14. 2002 NOX EMISSIONS - SAN ANTONIO EARLY ACTION COMPACT AREA

COUNTY	POINT		AREA		NONROAD MOBILE	
	TPY	TPD	TPY	TPD	TPY	TPD
BEXAR	17542.94	55.11	1771.41	3.72	7915.19	24.27
COMAL	4169.39	11.44	75.41	0.15	832.78	2.63
GUADALUPE	925.93	3.73	83.72	0.16	2341.25	7.44
WILSON	0.00	0.00	39.08	0.05	196.90	0.70
TOTAL	22638.26	70.28	1969.62	4.09	11286.12	35.04
	ONROAD MOBILE		BIOGENICS		TOTALS	
COUNTY	TPY	TPD	TPY	TPD	TPY	TPD
BEXAR	36951.55	102.95	1063.40	3.74	43092.53	120.92
COMAL	3910.07	10.99	441.46	1.59	7702.43	23.91
GUADALUPE	3480.44	9.77	831.84	2.98	4548.26	13.50
WILSON	710.44	1.94	1112.06	3.89	37716.50	115.24
TOTAL	45052.50	125.65	3448.76	12.20	93059.72	273.56

Texas 2002 Periodic Emissions Inventory

Table 15. 2002 CO EMISSIONS - SAN ANTONIO EARLY ACTION COMPACT AREA

COUNTY	POINT		AREA		NONROAD MOBILE	
	TPY	TPD	TPY	TPD	TPY	TPD
BEXAR	4756.35	14.47	13714.53	22.65	60470.45	200.11
COMAL	2508.00	6.90	1519.66	1.14	5445.80	19.76
GUADALUPE	835.16	2.67	2057.83	2.39	4633.22	16.03
WILSON	0.00	0.00	1400.06	0.55	979.33	3.50
TOTAL	8099.51	24.04	18692.08	26.73	71528.80	239.39
	ONROAD MOBILE		BIOGENICS		TOTALS	
COUNTY	TPY	TPD	TPY	TPD	TPY	TPD
BEXAR	262903.33	649.06	3229.31	15.43	275606.10	692.28
COMAL	26708.84	65.77	1979.61	9.75	36214.66	96.61
GUADALUPE	24293.19	59.81	2255.17	10.65	28927.75	74.51
WILSON	6580.43	16.18	7464.09	35.83	112364.91	342.17
TOTAL	320485.79	790.82	14928.18	71.66	453113.42	1205.57

Texas 2002 Periodic Emissions Inventory

Table 16. 2002 VOC EMISSIONS - NORTHEAST TEXAS EARLY ACTION COMPACT AREA

COUNTY	POINT		AREA		NONROAD MOBILE	
	TPY	TPD	TPY	TPD	TPY	TPD
GREGG	921.64	2.73	13533.86	39.95	559.88	1.70
HARRISON	5420.76	15.13	5788.88	16.94	464.74	1.68
RUSK	587.43	1.73	9806.62	27.35	407.27	1.47
SMITH	2004.44	6.45	5152.69	17.32	957.04	3.22
UPSHUR	125.99	0.36	3174.66	8.94	168.67	0.56
TOTAL	9060.26	26.40	37456.71	110.49	2557.60	8.63
	ONROAD MOBILE		BIOGENICS		TOTALS	
COUNTY	TPY	TPD	TPY	TPD	TPY	TPD
GREGG	1588.84	4.06	17415.69	103.79	34019.91	152.23
HARRISON	1455.49	3.72	29602.07	176.06	42731.94	213.52
RUSK	876.89	2.23	27543.98	160.84	39222.19	193.62
SMITH	3138.54	8.00	24118.17	145.09	35370.88	180.09
UPSHUR	639.05	1.63	15542.03	93.64	19650.40	105.12
TOTAL	7698.81	19.64	114221.93	679.41	170995.31	844.58

Texas 2002 Periodic Emissions Inventory

Table 17. 2002 NOX EMISSIONS - NORTHEAST TEXAS EARLY ACTION COMPACT AREA

COUNTY	POINT		AREA		NONROAD MOBILE	
	TPY	TPD	TPY	TPD	TPY	TPD
GREGG	1452.05	4.95	4260.06	11.56	1590.66	4.89
HARRISON	9412.55	27.64	4541.77	12.40	1844.40	6.11
RUSK	19131.38	55.96	5914.58	16.18	1345.47	4.53
SMITH	934.59	2.76	893.78	2.27	1516.46	4.59
UPSHUR	136.19	0.38	4119.93	11.25	756.62	2.26
TOTAL	31066.76	91.69	19730.12	53.66	7053.61	22.37
	ONROAD MOBILE		BIOGENICS		TOTALS	
COUNTY	TPY	TPD	TPY	TPD	TPY	TPD
GREGG	6994.67	18.69	195.59	0.72	14493.03	40.82
HARRISON	6240.33	16.66	153.78	0.58	22192.83	63.39
RUSK	1469.31	3.69	296.71	1.10	28157.45	81.46
SMITH	7295.61	18.80	381.69	1.42	11022.13	29.83
UPSHUR	1082.31	2.72	128.23	0.48	6223.28	17.09
TOTAL	23082.23	60.56	1156.00	4.30	82088.72	232.59

Texas 2002 Periodic Emissions Inventory

Table 18. 2002 CO EMISSIONS - NORTHEAST TEXAS EARLY ACTION COMPACT AREA

COUNTY	POINT		AREA		NONROAD MOBILE	
	TPY	TPD	TPY	TPD	TPY	TPD
GREGG	1191.54	3.82	1634.49	2.29	9930.79	31.15
HARRISON	32201.23	103.64	1792.50	2.74	4590.24	15.31
RUSK	48094.92	143.08	2120.92	2.78	3826.06	13.15
SMITH	853.66	3.69	2885.97	4.28	12970.05	42.49
UPSHUR	138.97	0.38	1879.43	2.68	2231.44	7.37
TOTAL	82480.32	254.61	10313.31	14.77	33548.58	109.47
	ONROAD MOBILE		BIOGENICS		TOTALS	
COUNTY	TPY	TPD	TPY	TPD	TPY	TPD
GREGG	24540.99	54.74	1643.44	8.44	38941.25	100.44
HARRISON	23756.95	52.91	2464.35	12.59	64805.27	187.19
RUSK	13221.33	29.30	2595.32	13.05	69858.55	201.36
SMITH	50302.05	111.73	2400.38	12.41	69412.11	174.60
UPSHUR	9776.18	21.65	1481.76	7.72	15507.78	39.79
TOTAL	121597.50	270.33	10585.25	54.20	258524.96	703.38

Texas 2002 Periodic Emissions Inventory

**Table 19. PETROLEUM MARKETING AND TRANSPORTATION SOURCE CATEGORIES**

<b>SCC</b>	<b>DESCRIPTION</b>
<b>2310001000</b>	<b>Oil and Gas Production - Onshore</b>
<b>2310002000</b>	<b>Oil and Gas Production - Offshore</b>
<b>2505020000</b>	<b>Marine Loading</b>
<b>2501060053</b>	<b>Gas Stations Stage 1, Underground Tank Filling</b>
<b>2501060100</b>	<b>Gas Stations Stage 2, Vehicle Refueling</b>
<b>2501060103</b>	<b>Gas Stations Stage 2, Spillage</b>
<b>2501060201</b>	<b>Gas Stations, Underground Tank Filling, Breathing &amp; Emptying</b>
<b>2505030120</b>	<b>Tank Trucks in Transit</b>
<b>2660000000</b>	<b>Leaking Underground Storage Tanks</b>
<b>2505000120</b>	<b>Portable Gasoline Containers</b>



Texas 2002 Periodic Emissions Inventory

**Table 20. EVAPORATIVE SOLVENT USE SOURCE CATEGORIES**

<b>SCC</b>	<b>DESCRIPTION</b>
<b>2302050000</b>	<b>Bakery Products</b>
<b>2415300000</b>	<b>Degreasing: Cold Cleaning</b>
<b>2420000000</b>	<b>Dry Cleaning</b>
<b>2425000000</b>	<b>Graphics Arts</b>
<b>2460100000</b>	<b>All Personal Care Products</b>
<b>2460200000</b>	<b>All Household Products</b>
<b>2460400000</b>	<b>All Automotive Aftermarket Products</b>
<b>2460500000</b>	<b>All Coatings and Related Products</b>
<b>2460600000</b>	<b>All Adhesives and Sealants</b>
<b>2460800000</b>	<b>All FIFRA Related Products</b>
<b>2460900000</b>	<b>Miscellaneous Products</b>
<b>2461021000</b>	<b>Cutback Asphalt</b>
<b>2461022000</b>	<b>Emulsified Asphalt</b>

Texas 2002 Periodic Emissions Inventory

<b>2461850000</b>	<b>Pesticide Application</b>
<b>2830000000</b>	<b>Catastrophic/Accidental Releases</b>

**Table 21. PAINTING OPERATIONS SOURCE CATEGORIES**

<b>SCC</b>	<b>DESCRIPTION</b>
<b>2401001000</b>	<b>Architectural Coatings</b>
<b>2401005000</b>	<b>Auto Refinishing</b>
<b>2401008000</b>	<b>Traffic Markings</b>
<b>2401001500</b>	<b>Factory Finished Wood</b>
<b>2401020000</b>	<b>Wood Furniture</b>
<b>2401025000</b>	<b>Metal Furniture</b>
<b>2401030000</b>	<b>Paper</b>
<b>2401040000</b>	<b>Metal containers</b>
<b>2401045000</b>	<b>Sheet, strip, and coil</b>
<b>2401055000</b>	<b>Machinery and equipment</b>
<b>2401060000</b>	<b>Appliances</b>
<b>2401065000</b>	<b>Electrical insulation</b>
<b>2401070000</b>	<b>Motor Vehicles</b>

Texas 2002 Periodic Emissions Inventory

<b>2401075000</b>	<b>Aircraft</b>
<b>2401080000</b>	<b>Marine coatings</b>
<b>2401085000</b>	<b>Railroad</b>
<b>2401090000</b>	<b>Miscellaneous Manufacturing</b>
<b>2401100000</b>	<b>Industrial Maintenance</b>

**Table 22. STATIONARY SOURCE FUEL COMBUSTION SOURCE CATEGORIES**

<b>SCC</b>	<b>DESCRIPTION</b>
<b>2102005000</b>	<b>Industrial: Residual Oil</b>
<b>2102006000</b>	<b>Industrial: Natural Gas</b>
<b>2102007000</b>	<b>Industrial: LPG</b>
<b>2103004000</b>	<b>Commercial/Institutional: Distillate Oil</b>
<b>2103005000</b>	<b>Commercial/Institutional: Residual Oil</b>
<b>2103006000</b>	<b>Commercial/Institutional: Natural Gas</b>
<b>2103007000</b>	<b>Commercial/Institutional: LPG</b>
<b>2104001000</b>	<b>Residential: Coal</b>
<b>2104006000</b>	<b>Residential: Natural Gas</b>
<b>2104007000</b>	<b>Residential: LPG</b>
<b>2104008001</b>	<b>Wood: Fireplaces</b>
<b>2104008002</b>	<b>Fireplace Inserts: Non-EPA Certified</b>
<b>2104008003</b>	<b>Fireplace Inserts: Noncatalytic, EPA Certified</b>

Texas 2002 Periodic Emissions Inventory

<b>2104008004</b>	<b>Fireplace Inserts: Catalytic, EPA Certified</b>
<b>2104008010</b>	<b>Woodstoves: General</b>
<b>2104008030</b>	<b>Woodstoves: Catalytic</b>
<b>2104008050</b>	<b>Woodstoves: Noncatalytic</b>

**Table 23. WASTE MANAGEMENT SOURCE CATEGORIES**

<b>SCC</b>	<b>DESCRIPTION</b>
<b>2610000100</b>	<b>Yard Waste: Leaves</b>
<b>2610000400</b>	<b>Yard Waste: Brush</b>
<b>2610000500</b>	<b>Land Clearing Debris</b>
<b>2610030000</b>	<b>Residential/Household Waste</b>
<b>2620020000</b>	<b>Landfills</b>
<b>2630020000</b>	<b>Wastewater Treatment: Publically Owned</b>

Texas 2002 Periodic Emissions Inventory

**Table 24. WILDFIRES AND MANAGED BURNING SOURCE CATEGORIES**

<b>SCC</b>	<b>DESCRIPTION</b>
<b>2801500000</b>	<b>Agricultural Field Burning</b>
<b>2810001000</b>	<b>Forest Wildfires</b>
<b>2810005000</b>	<b>Slash Burning</b>
<b>2810015000</b>	<b>Prescribed Burning: Forestland</b>
<b>2810020000</b>	<b>Prescribed Burning: Rangeland</b>
<b>2810030000</b>	<b>Structure Fires</b>
<b>2810050000</b>	<b>Automobile Fires</b>

Texas 2002 Periodic Emissions Inventory

**Table 25. NONROAD MOBILE SOURCE CLASS CATEGORIES**

<b>SCC</b>	<b>DESCRIPTION</b>
<b>2275020000</b>	<b>Commercial Aircraft</b>
<b>2275001000</b>	<b>Military Aircraft</b>
<b>275050000</b>	<b>General Aviation</b>
<b>2275900000</b>	<b>Aircraft Refueling</b>
<b>22xx008000</b>	<b>Airport Ground Support Equipment</b>
<b>22xx0005000</b>	<b>Agricultural Equipment</b>
<b>22xx006000</b>	<b>Commercial Equipment</b>
<b>2280000000</b>	<b>Commercial Marine Vessels</b>
<b>22xx002000</b>	<b>Construction Equipment</b>
<b>22xx003000</b>	<b>Industrial Equipment</b>
<b>22xx010000</b>	<b>Oilfield Equipment</b>
<b>22xx004000</b>	<b>Lawn and Garden Equipment</b>

Texas 2002 Periodic Emissions Inventory

<b>22xx007000</b>	<b>Logging Equipment</b>
<b>22xx001000</b>	<b>Recreational Equipment</b>
<b>2282000000</b>	<b>Recreational Marine Equipment</b>
<b>2285002000</b>	<b>Locomotives</b>
<b>228500xx15</b>	<b>Railway Equipment</b>