Appendix E
2007 Future Base Case EI Development

Austin-Round Rock MSA
2007 Future Year Ozone Precursor
Modeling Emissions Inventory

Early Action Compact Milestone
Technical Report

Prepared by

The Capital Area Planning Council (CAPCO)
On behalf of
The Austin-Round Rock MSA Clean Air Coalition
Austin, Texas, March 2004

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2007 Future Year Emissions Inventory

1 Introduction

1. 1 EAC Clean Air Plan

The Early Action Compact (EAC) is an agreement between EPA, TCEQ and the local elected officials in the Austin-Round Rock five-county MSA to develop a Clean Air Action Plan (CAAP) that will lead to attainment of the 8-hour ozone standard by 2007.
The Early Action Compact Task Force (EACTF), an organization of staff members from EAC government signatories, has been charged with oversight and coordination of the development of the Clean Air Plan for the Austin - Round Rock MSA (MSA). The purpose of this report is to document preparation of the 2007 emissions inventory, as a requirement of Early Action Compact, to be used in the photochemical model for assessing ozone formation in the 2007 future base case.

1.2 Projection overview

The goal in developing emission projections is to account for as many of the important variables that affect future year emissions as possible. Emission projections provide a basis for developing control strategies for State Implementation Plans (SIPs), conducting attainment analyses, and tracking progress towards meeting air quality standards. Emission projections are a function of change in activity (growth or decline) combined with changes in the emission rate or controls applicable to the source. To a large extent, projection inventories are based on forecasts of industrial growth, population growth, changes in land use patterns, and transportation growth. Changes in the emission rate of sources can be influenced by such causes as technological advances, environmental regulations, age or deterioration, how the source is operated, and fuel formulations. In general, stationary and area source projections will be based on the following equation:

$$E_{fy} = E_{by} * G * C \qquad (1.1)$$

where

E_{fy} = projection year emissions

E_{by} = base year emissions

G = growth factor

C = control factor, accounting for changes in emission factors or controls

For mobile sources, the general equation is:

$$E_{fy} = A_{by} * G * F \qquad (1.2)$$

where

E_{fy} = projection year emissions

A_{by} = base year activity

G = growth factor

F = projection year emission factor

In this equation, the projection year emission factor accounts for the effect of any new regulations as well as technological changes. There are complicating issues which go beyond the parameters explained in these two equations, so a specific projection calculation should be developed for each sector in each area. For example, within the point source sector, industry growth and the addition of new plants are often accompanied by the retirement of aging facilities. Projections should reflect this because net growth can only be determined after retirement is defined, and emission rates often differ for the new sources that replace existing ones. Note that future emissions for on road and nonroad mobile sources are calculated with the same models that were used in calculation for the base year emissions. Input parameters and activity factors have been modified from national default values in order to design a future case specific to the area of interest.

In particular future year emissions for on road mobile sources are calculated by using EPA's MOBILE6 model, and nonroad mobile sources by using EPA's NONROAD model.

Other sectors may also require such adjustments to the generalized equations listed above. The purpose of the emission projections may influence the methodology selected. If control cost analyses will be performed, source specific information may need to be retained. Grid-based air quality models also require source specific information, including location and stack parameters. Other efforts may also require county/source category level information, so that emissions can be aggregated for projection purposes. This document contains four chapters describing projection methods in more detail for point, area, on road and nonroad mobile sources respectively. Inventories are based on source classification systems that identify the sector as well as the specific process (e.g., pulverized coal-fired utility boiler, rotogravure printing, light-duty gasoline vehicles).

1.3 Austin-Round Rock MSA Summary of 2007 Emissions

The future year emission inventory is divided into five major source categories. The area source emissions inventory is developed by CAPCO with assistance from TCEQ, ERG and ENVIRON. The nonroad mobile source emissions inventory was mainly developed from EPA's NONROAD model (2002a) with the exception of locomotive, aircraft, and airport-ground support equipment emissions. On road mobile source inventories were developed by the Texas Transportation Institute for years 1999, 2002, 2005, 2007 and 2012. The 2007-point source emissions inventory was acquired from TCEQ. The biogenic source inventory was done by ENVIRON. Following is the summary of future emissions (2007 emissions inventory) for the five general source categories.

NOx Emissions [tpd]	**1999**	**2007**
Area Sources	7.82	10.24
Nonroad Mobile Sources	28.44	27.47
Onroad Mobile Sources	97.86	60.53
Point Sources	33.98	30.15
Biogenic Sources	23.06	24.92
Total Anthropogenic	**168.10**	**128.38**
Grand Total	**191.16**	**153.31**

Table 1.1 Austin-Round Rock MSA 2007 NOx Emission Summaries

VOC Emissions [tpd]	1999	2007
Area Sources	90.56	106.42
Nonroad Mobile Sources	22.49	19.88
Onroad Mobile Sources	50.19	33.79
Point Sources	3.70	4.63
Biogenic	394.06	394.06
Total Anthropogenic	**166.93**	**164.72**
Grand Total	**560.99**	**558.78**

Table 1.2 Austin-Round Rock MSA 2007 VOC Emission Summaries

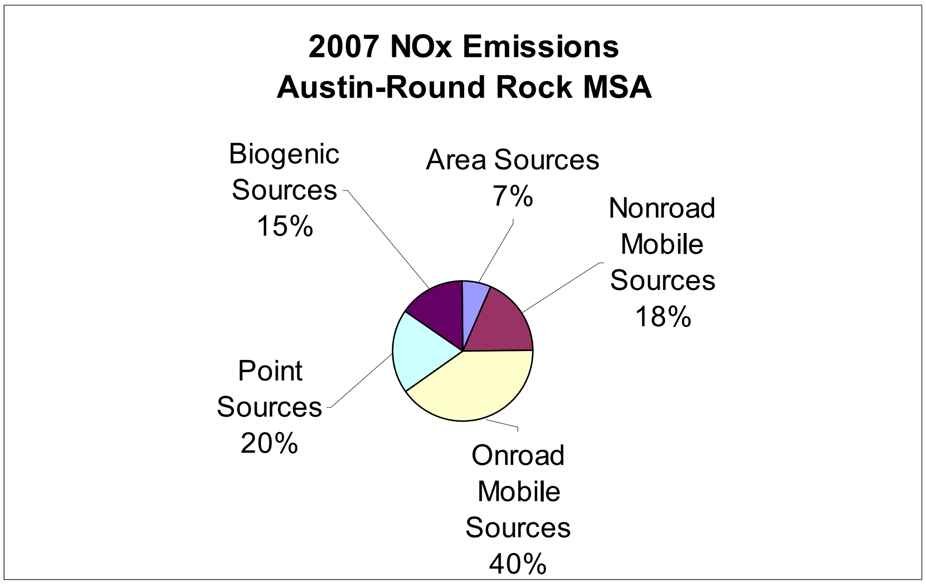


Figure 1.1 Austin-Round Rock MSA 2007 NOx Emission Pie chart

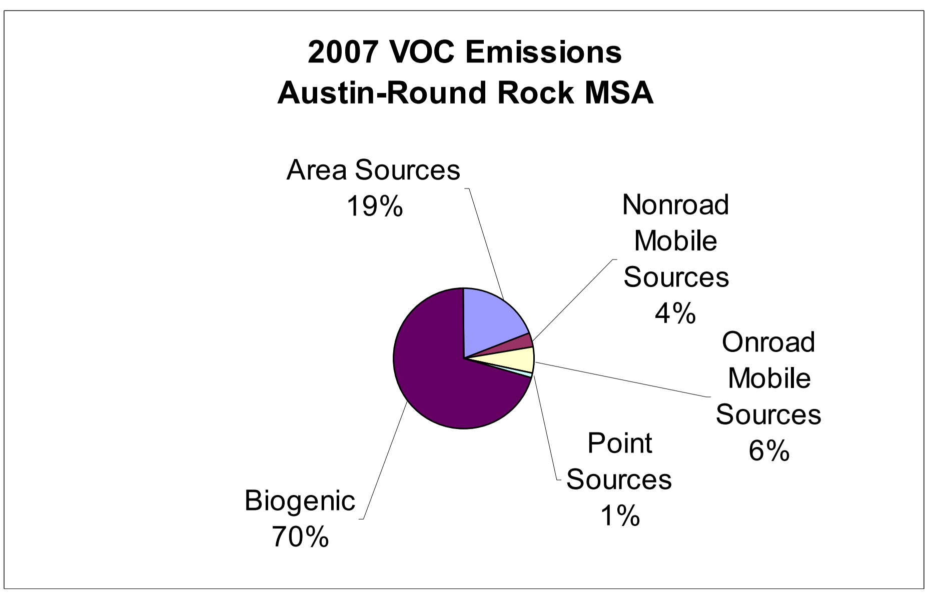


Figure 1.2 Austin-Round Rock MSA 2007 VOC Emission Pie chart

2.0 Area Sources

2.1 Area Source Overview

Area sources collectively represent individual sources that have not been inventoried as specific point or mobile sources. These sources are typically too small, numerous, or difficult to inventory using the methods for the other classes of sources. Area sources represent a collection of emission points for a specific geographic area, most commonly at the county level; however, any area can be used to define the boundaries of an area source. Area sources are both natural and manmade sources of pollution and can encompass such wide ranging activities as consumer solvents, agricultural burning, roadway paving, residential heaters, wildfires, and wind erosion. Area source emissions are typically identified at the county level by its Area Source Classification code (ASC). A complete listing of 10-digit ASCs can be found at: http://www.epa.gov/ttn/chief/scccodes.html.

Emission projections for area sources depend upon the change in source level activity and changes in the emission factor applicable to the source.

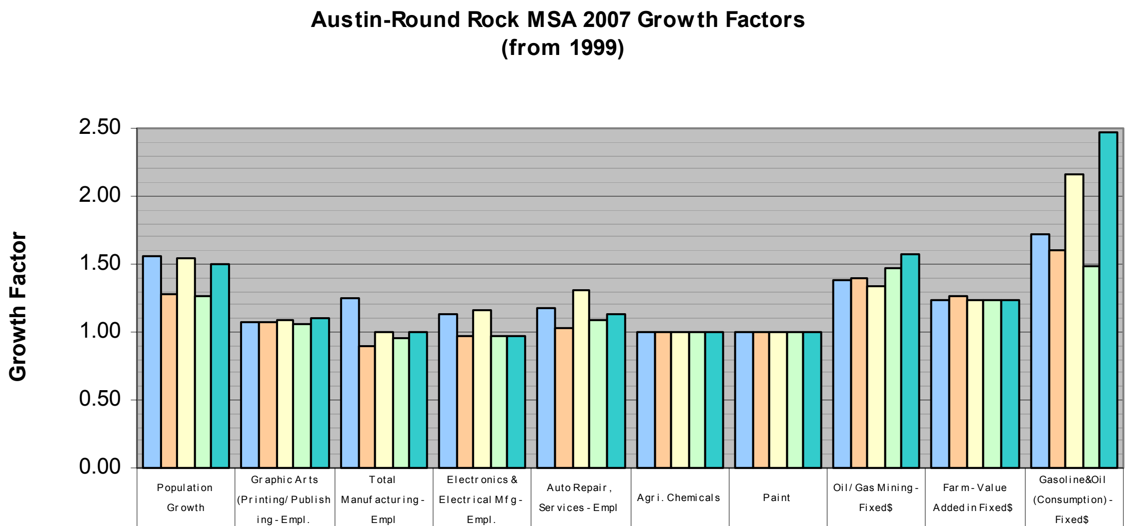
The base year activity (fuel use, employment, population) will vary depending on the source category. The growth activity indicator should align with the base year activity indicator as closely as possible. The equations 1.1 and 1.2 are only an example of the calculation for emission projections.

2.2 Growth Factors

As with point sources, area source projections can be made using local studies or surveys or through surrogate growth indicators, such as E-GAS, to approximate the rise and fall in expected activity. The most commonly used surrogate growth indicators are those parameters typically projected by local metropolitan planning organizations (MPOs) such as population, housing, land use, and employment. The Overview Chapter references several common surrogate growth indicators. Area sources rarely have detailed information based on surveys of individual emitters. Generally surrogate growth rates, as characterized by source type, must be used. While surrogate growth indicators such as GSP, employment, and population are reasonable estimators of future air pollution generating activity for traditional area source emitters (manufacturing, population-based activities), other indicators may be more appropriate for non-traditional emitters. Policy changes which may lead to increased or decreased activity in a category must also be considered. For example, future emissions from agricultural tilling will be affected by trends towards conservation tillage as well as total acres tilled. Projections of total acres tilled may not trend with agricultural earnings or GSP as operations due to changes in crop yields. The amount of prescribed burning which takes place each year is driven by the policy of Federal and State forest and land management agencies. There is currently an agreement to significantly increase the amount of prescribed burning by the year 2010. This will impact future projections of prescribed burning emissions as well as emissions from wildfires. For these nontraditional area source emitters, Federal, State, and local trade associations and agencies should be consulted to identify the best indicators of future activity. Table 3.1-1 references specific growth indicators for projecting emissions for various area source categories. 3-3

2.3 Methodology

2007 Area sources inventory for Austin-Round Rock MSA region was generated by utilizing factors for several growth indicators generated by Regional Economic Model (REMI). The growth factors and growth indicators are presented in Figure 2.1. A comprehensive list of all area source categories with corresponding growth indicators is presented in Table 2.1



	Population Growth	Graphic Arts (Printing/ Publishing - Empl.	Total Manufacturing - Empl	Electronics & Electrical Mfg - Empl.	Auto Repair, Services - Empl	Agri. Chemicals	Paint	Oil/ Gas Mining - Fixed$	Farm - Value Added in Fixed$	Gasoline&Oil (Consumption) - Fixed$
BASTROP	1.56	1.07	1.25	1.14	1.18	1.00	1.00	1.38	1.24	1.71
CALDWELL	1.28	1.07	0.89	0.97	1.02	1.00	1.00	1.39	1.27	1.60
HAYS	1.54	1.09	1.00	1.17	1.32	1.00	1.00	1.34	1.24	2.17
TRAVIS	1.27	1.06	0.96	0.97	1.08	1.00	1.00	1.47	1.24	1.48
WILLIAMSON	1.50	1.11	1.00	0.98	1.14	1.00	1.00	1.58	1.23	2.47

Economy Sector

Figure 2.1 Growth Factors used for the area source 2007 emissions inventory

The following formula was used in order to estimate 2007 area source emissions:

$$(Area\ source\ Category)_{2007\ Emissions} = (Area\ source\ Category)_{1999\ Emissions}\ x\ G\ x\ C$$

Where C is the control factor and G is the growth factor presented in Figure 2.1. Each of the area source categories was multiplied with a corresponding growth factor. Note that each county has a different set of growth factors. An exception to this process was the area source category, "Industrial Processes (Oil&Gas Production)". Zero growth (growth factor = 1) was assumed for that category due to the declining economy in this sector.

SCC Category	SCC Description	Growth Indicator
Agriculture Production	Agriculture Production - Crops (Fertilizer)	Farm - Value Added in Fixed$
	FIFRA Related Products: Other FIFRA Related Products	Farm - Value Added in Fixed$
	Pesticide Application: All Processes	Farm - Value Added in Fixed$
Fuel Storage and Transport	Aircraft Refueling: All Fuels	Population Growth
	All Storage Types: Breathing Loss	Gasoline&Oil (Consumption) - Fixed$
	Bulk Stations/Terminals: Breathing Loss	Population Growth
	Commercial/Industrial: Breathing Loss	Gasoline&Oil (Consumption) - Fixed$
Industrial Processes (Food)	Bakery Products	Population Growth
	Fermentation/Beverages: Breweries	Population Growth
	Fermentation/Beverages: Wineries	Population Growth
	Industrial Processes (Construction)	Population Growth
Industrial Processes (Oil&Gas Production)	Oil and Gas Production (All Processes - Well)	Oil/Gas Mining - Fixed$
	Oil and Gas Production (Natural Gas - Produced)	Oil/Gas Mining - Fixed$
Misc. Area Sources - Accidental Releases	All Catastrophic/Accidental Releases	Population Growth
Misc. Area Sources - Other Combustion	Agricultural Field Burning-whole field	Farm - Value Added in Fixed$
	Forest Wildfires	Population Growth
	Miscellaneous Area Sources (Motor Vehicle Fires)	Population Growth
	Prescribed Burning for Forest Management	Population Growth
	Structure Fires	Population Growth
Service Stations	Gasoline Service Stations/Stage1	Gasoline&Oil (Consumption) - Fixed$
	Gasoline Service Stations/Stage2:Total	Gasoline&Oil (Consumption) - Fixed$
	GasolineServiceStations/Stage2:Spillage	Gasoline&Oil (Consumption) - Fixed$
Solvent Utilization	Surface Coating	Population Growth
Solvent Utilization - Asphalt	All Asphalt Applications (Cutback and Emulsified)	Population Growth
	Cutback Asphalt	Population Growth
	Emulsified Asphalt	Population Growth

Table 2.1 REMI model growth indicators for the Area source category

SCC Category	SCC Description	Growth Indicator
Solvent Utilization - Degreasing	All Industries: Cold Cleaning	Total Manufacturing - Empl
	Auto Repair Services/Cold Cleaning	Auto Repair, Services - Empl
	Automotive Dealers/Cold Cleaning	Auto Repair, Services - Empl
	Dry Cleaning	Population Growth
	Electronic/Other Elec/Cold Cleaning	Electronics & Electrical Mfg - Empl.
	Electronic/Other Elec/Open Top	Population Growth
	Fabricated Metal Product/Open Top	Population Growth
	Fabricated Metal Product/Cold Clean	Population Growth
	Furniture/Fixtures/Cold Cleaning	Total Manufacturing - Empl
	Furniture/Fixtures/Open Top	Population Growth
	Industry Machinery/Equip/Cold Clean	Total Manufacturing - Empl
	Industry Machinery/Equip/Open Top	Total Manufacturing - Empl
	Instrument/Related Product/Open Top	Population Growth
	Instrument/Relate Product/Cold Clean	Population Growth
	Misc Manufacturing/Cold Cleaning	Total Manufacturing - Empl
	Misc Manufacturing/Open Top	Population Growth
	Misc Repair Services/Cold Cleaning	Total Manufacturing - Empl
	Primary Metal Industries/Open Top	Population Growth
	Primary Metal Industry/Cold Clean	Population Growth
	Transportation Equip/Cold Cleaning	Total Manufacturing - Empl
	Transportation Equip/Open Top	Population Growth
Solvent Utilization - Dry Cleaning	Coin-op Cleaners: Perchloroethylene	Population Growth
	Comm/Industrial Cleaners: Perchloroethylene	Population Growth
	Comm/Industrial Cleaners: Special Naphtha	Population Growth
Solvent Utilization - Graphic Arts	Graphic Arts	Graphic Arts (Printing/Publ. - Empl.

Table 2.1 (continue)

SCC Category	SCC Description	Growth Indicator
Solvent Utilization - Miscellaneous	Adhesive (Industrial) Application	Total Manufacturing - Empl
	All Adhesives and Sealants	Population Growth
	All Automotive Aftermarket Products	Auto Repair, Services - Empl
	All FIFRA Related Products	Population Growth
	All Household Products	Population Growth
	All Personal Care Products	Population Growth
	Consumer: Adhesives and Sealants	Population Growth
	Consumer: Auto Aftermarket Products	Auto Repair, Services - Empl
	Consumer: Household Products	Population Growth
	Consumer: Personal Care Products	Population Growth
	Electronic and Other Electrical	Population Growth
	Misc Products (Not Otherwise Covered)	Population Growth
	Rubber/Plastics	Population Growth
	Solvent-Based Maint Coat/Clean-Up &Thinning	Population Growth
Solvent Utilization - Surface Coating	All Coatings and Related Products	Population Growth
	Architectural Coatings	Population Growth
	Auto Refinishing	Auto Repair, Services - Empl
	Coating Solvents (Coatings & Rel.)	Population Growth
	Factory Finished Wood	Population Growth
	Flat Paints	Population Growth
	Industrial Maintenance Coatings	Population Growth
	Lacquers/Clear	Population Growth
	Large Appliances	Population Growth
	Machinery and Equipment	Total Manufacturing - Empl
	Marine	Population Growth

Table 2.1 (continue)

SCC Category	SCC Description	Growth Indicator
	Metal Coils	Population Growth
	Metal Furniture	Population Growth
	Miscellaneous Manufacturing	Population Growth
	Non-Flat Paints/High Gloss	Population Growth
	Non-Flat Paints/Low&Medium Gloss	Population Growth
	Other Special Purpose Coatings	Population Growth
	Paper	Population Growth
	Primers, Sealers, Undercoats	Population Growth
	Primers, Sealers, Undercoats/Quick-Dry	Population Growth
	Quick-Dry Enamels	Population Growth
	Railroad	Population Growth
	Solvent Utilization (Commercial)	Population Growth
	Solvent Utilization (Metal Cans)	Population Growth
	Solvent Utilization (Surface Coating - Motor Vehicles)	Auto Repair, Services - Empl
	Solvent Utilization (Surface Coating)	Population Growth
	Stains/Semi-Transparent	Population Growth
	Traffic Markings	Population Growth
	Wood Furniture	Population Growth
Stationary Source Fuel Combustion	Catalytic Woodstoves: General	Population Growth
	Comm/Institutional: Residual Oil	Population Growth
	Commercial/Institutional/Distillate Oil	Population Growth
	Commercial/Institutional/LPG	Population Growth
	Commercial/Institutional/Natural Gas	Population Growth

Table 2.1 (continue)

SCC Category	SCC Description	Growth Indicator
	Fireplace Inserts/non-EPA certified	Population Growth
	Fire place Inserts/catalytic/EPA certified	Population Growth
	Fire place Inserts/non-catalytic/EPA certify	Population Growth
	Industrial/Distillate Oil	Population Growth
	Industrial/LPG	Population Growth
	Industrial/Natural Gas	Population Growth
	Industrial/Residual Oil	Population Growth
	Non-catalytic Woodstoves: General	Population Growth
	Res:Bituminous/SubbituminousCoal	Population Growth
	Residential/Anthracite Coal	Population Growth
	Residential/Distillate Oil	Population Growth
	Residential/LPG	Population Growth
	Residential/Natural Gas	Population Growth
	Residential/Residual Oil	Population Growth
	Wood: Fireplaces	Population Growth
	Woodstoves: General	Population Growth
Storage and Transport	GasServStat/UndergroundTank:Breath&Empty	Gasoline&Oil (Consumption) - Fixed$
	Trucks in Transit	Population Growth
Waste Disposal, Treatment, and Recovery	All Categories/Land Clearing Debris	Population Growth
	Landfills	Population Growth
	Residential/Household Waste	Population Growth
	TSDFs	Population Growth
	Waste Disposal, Treatment, and Recovery	Population Growth
	Waste Disp., Treatment, and Recovery (Leaking Underground Storage)	Gasoline&Oil (Consumption) - Fixed$
	Waste Disp., Treatment, and Recovery (Wastewater)	Population Growth
	Wastewater Treatment/Public Owned	Population Growth

Table 2.1 (continue)

2.4 Control Factors

The projection year control factor for area sources should account for both changes in emissions due to new levels of control required by regulations and process modifications or technology improvements. Emitters in the manufacturing sector, such as industrial, commercial, and institutional fuel combustion, may be assigned a traditional control measure to limit emissions. However, for many area sources, conventional control methods are often inapplicable; instead, control of area source emissions may involve process modifications such as limiting agricultural burning practices, paving with emulsified asphalt or concrete, or stabilization of dirt roads. The control factors should also account for market driven process changes, such as the move toward lower-solvent or water-based paints (this can be both market and regulatory-driven) and conservation tillage. Technical documents from EPA, including Alternative Control Techniques (ACT) documents and Control Techniques Guidelines (CTG) documents, are collected at the Clean Air Technology Center on EPA's TTN web site: http://www.epa.gov/ttn/catc/products.html. ACT documents provide technical information, based on data collected from model sites, for use by State and local agencies to develop and implement regulatory programs to control emissions. The model sites in the ACT documents represent typical emitters; area-specific factors may cause discrepancies and deviations and should be accounted for when comparing ACT document costs to actual performance. CTG documents provide federal guidelines to State and local agencies to assist those areas in planning and meeting federal air quality requirements. Area source projections should account for Federal, State, and local regulations. For federally mandated controls, the EPA documents and the models referenced in the following sections will be the best available resources for determining the appropriate emission factor to apply in projected inventories. The latest regulatory actions from the Office of Air and Radiation (OAR) can be found at: http://www.epa.gov/ttn/oarpg/new.html. OAR also provides a page devoted to policy, guidance, and regulations, sorted by the Title of the Clean Air Act Amendments (CAAA) to which they apply: http://www.epa.gov/ttn/oarpg/amend.html.

The following are the categories that were adjusted with federal or state regulations.

Architectural Coating

EPA Federal Rule, Final Compliance 1999

POLLUTANT	VOC
SCC:	2401008000, 2401001000, 2401001001, 2401001005, 2401001006, 2401001010, 2401001011, 2401001015, 2401001020
[1]REDUCTION:	20%
2007 UNREGULATED [2]EI:	7.18 tpd
2007 REGULATED EI:	5.75 tpd
DIFFERENCE:	1.43 tpd

The standards will reduce nationwide emissions of VOC from architectural coating products by an estimated 103,000 Mg/yr (113,500 tpy). These reductions are compared to the 1990 baseline emissions estimate of 510,000 Mg/yr (561,000 tpy). This reduction equates to a 20% reduction, compared to the emissions that would have resulted in the absence of these standards.

[Ref. National Volatile Organic Compound Emission Standards for Architectural Coatings, http://www.epa.gov/ttn/atw/183e/aim/fr1191.txt, Page 48855]

Auto body Refinishing

EPA Federal Rule, Final Compliance 2000

POLLUTANT	VOC
SCC:	2401005000

[1] All Federal rules assumed to have 100% rule effectiveness (RP) and 100% rule penetration (RP)
[2] 2007 Emissions Inventory for the Austin MSA area (5 Counties)

[1]REDUCTION:	37%
2007 UNREGULATED EI:	0.61 tpd
2007 REGULATED EI:	0.39 tpd
DIFFERENCE:	0.22 tpd

EPA has published a policy memorandum on the creditable reductions to be assumed from the national rule for auto body refinishing. That memorandum allowed for a 37% reduction from current emissions with an assumption of 100% rule effectiveness (presuming the coating application instructions were being followed).

[Ref. Federal Register: July 7, 1998 (Volume 63, Number 129), http://www.epa.gov/fedrgstr/EPA-AIR/1998/July/Day-07/a17966.htm]

Stage I Gasoline Station Vapor Recovery Stations

Stage I Vapor Recovery systems are required in the state of Texas for all large gas station with annual throughput of 125,000 gallons and more. Large gas station with 125K throughputs will account for 37.5% of all gas sales in the Austin-Round Rock MSA area in 2007. With an emission reduction efficiency of 90% reduction, the total VOC reduction that can be expected in 2007 is calculated by the following formula:

2007 Stage I Emission Reduction = [RP] x [RE] x Efficiency =

= (37.5%) x (80%) x (90%) = 27%

Where RP - Rule Penetration (37.5%) and RE - Rule Effectiveness (80%)

Stage II Gasoline Station Vapor Recovery Stations

While Stage II vapor recovery system involving the use of technology that prevents gasoline vapors from escaping during refueling are required in other parts of the state, these systems are not required in the Austin area. Since new vehicles are already equipped with onboard vapor recovery system (OBVR), future emissions for the vehicle-refueling category will decline. According to the MOBILE6 on-road model and fleet turnover there will be more that 60% vehicles with OBVR system. Future emissions for this category were adjusted for 60% reduction in 2007 (Eastern Research Group - ERG, 2003).

Degreasing categories

Due to the TCEQ rule (115.412, 115.425 which become effective 1999) all new degreasing sources are required to be in compliance with the regulation. Emission reductions of 80% were applied to all new sources.

SCC	Description
2415300000	All Industries: Cold Cleaning
2415360000	Auto Repair Services/Cold Cleaning
2415355000	Automotive Dealers/Cold Cleaning
2415330000	Electronic/Other Elec/Cold Cleaning
2415320000	Fabricated Metal Product/Cold Clean
2415305000	Furniture/Fixtures/Cold Cleaning
2415325000	Industry Machinery/Equip/Cold Clean
2415340000	Instrument/Relate Product/Cold Clean
2415345000	Misc Manufacturing/Cold Cleaning
2415365000	Misc Repair Services/Cold Cleaning
2415310000	Primary Metal Industry/Cold Clean
2415335000	Transportation Equip/Cold Cleaning
2415130000	Electronic/Other Elec/Open Top
2415120000	Fabricated Metal Product/Open Top
2415105000	Furniture/Fixtures/Open Top
2415125000	Industry Machinery/Equip/Open Top

2415140000	Instrument/Related Product/Open Top
2415145000	Misc Manufacturing/Open Top
2415110000	Primary Metal Industries/Open Top
2415135000	Transportation Equip/Open Top

Degreasing categories

Emission reduction due to the degreasing controls:

[2007 Uncontrolled Emissions] = [1999 Emissions] x [GF]
(1)

By using (1) one can calculate degreasing emissions growth offset

[2007 State Reductions] = {2007 Uncontrolled Emissions]– [1999 Emissions]} x [CF]
(2)
= [1999 Emissions] x [GF – 1] x [CF]

[2007 Controlled Emissions] = [2007 Uncontrolled Emissions] – [2007 State Reductions]
(3)

Where GF is a 2007 growth factor for the category and CF is a TCEQ control factor (i.e. 85%).

Dry Cleaning

Information provided by ERG indicated that a majority of the dry cleaning facilities operated in the Austin-Round Rock MSA in 2007 will be PERC or other non-VOC synthetic solvents. Since PERC is no longer considered a VOC, this category essentially disappears from the ozone precursors inventory. However, it is possible there might be a shift in the industry, due to new fee issues imposed by Texas HB 1366, resulting in increased VOC solvent use. As a conservative assumption the 2007 inventory could be as high as the 1999 inventory (1,199tpy).

2.5 Other Considerations

Note that spatial issues may also impact area source projections. Urban sprawl may result in decreases in area source emissions related to farming, such as agricultural tillage and managed burning. Conversely, urban sprawl may then result in increases in other area source emissions associated with residential areas, such as dry cleaning and consumer solvent use.

2.6 Austin-Round Rock MSA Area Source Emissions Summary

The following are the NOx, VOC and CO emissions for the Area source category. Table 2.2 presents county totals for the source category for years 1999 and 2007. Figures 2.2 – 2.4 graphically present emissions in the Austin-Round Rock MSA area.

	1999			2007		
Area Sources (tpd)	VOC	NOx	CO	VOC	NOx	CO
Bastrop	4.52	0.60	1.23	5.53	0.76	1.86
Caldwell	15.29	0.54	0.75	15.75	0.67	0.95
Hays	5.47	0.54	1.25	7.67	0.78	1.88
Travis	50.60	3.17	7.57	57.04	4.22	9.58
Williamson	14.68	2.97	3.00	20.44	3.81	4.27
TOTAL (tpd)	**90.56**	**7.82**	**13.79**	**106.42**	**10.24**	**18.55**

Table 2.2 1999 and 2007 area sources emissions inventory for Austin-Round Rock MSA

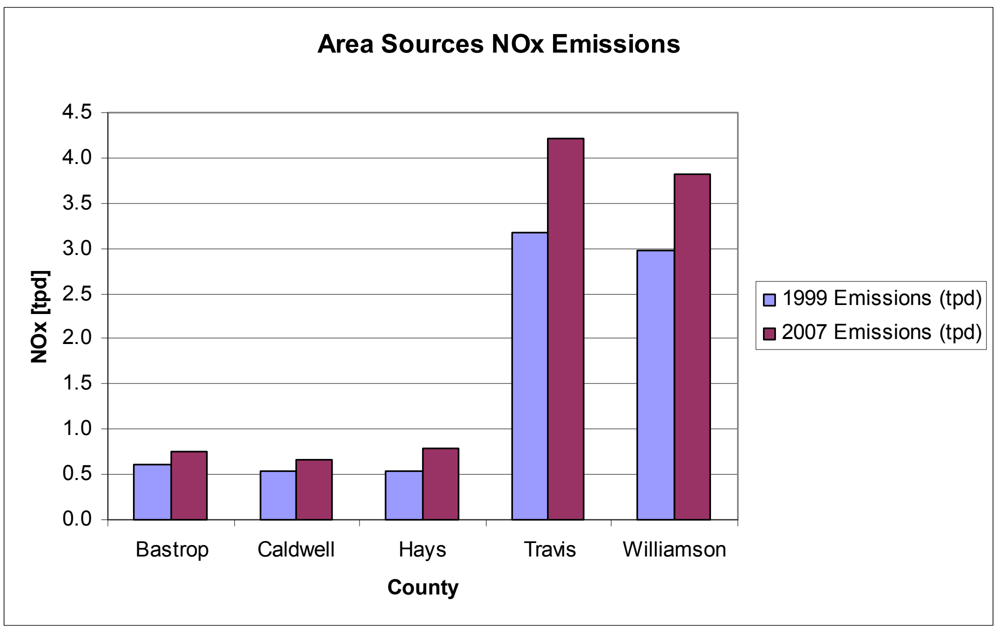


Figure 2.2 1999 and 2007 Areas sources NOx Emissions

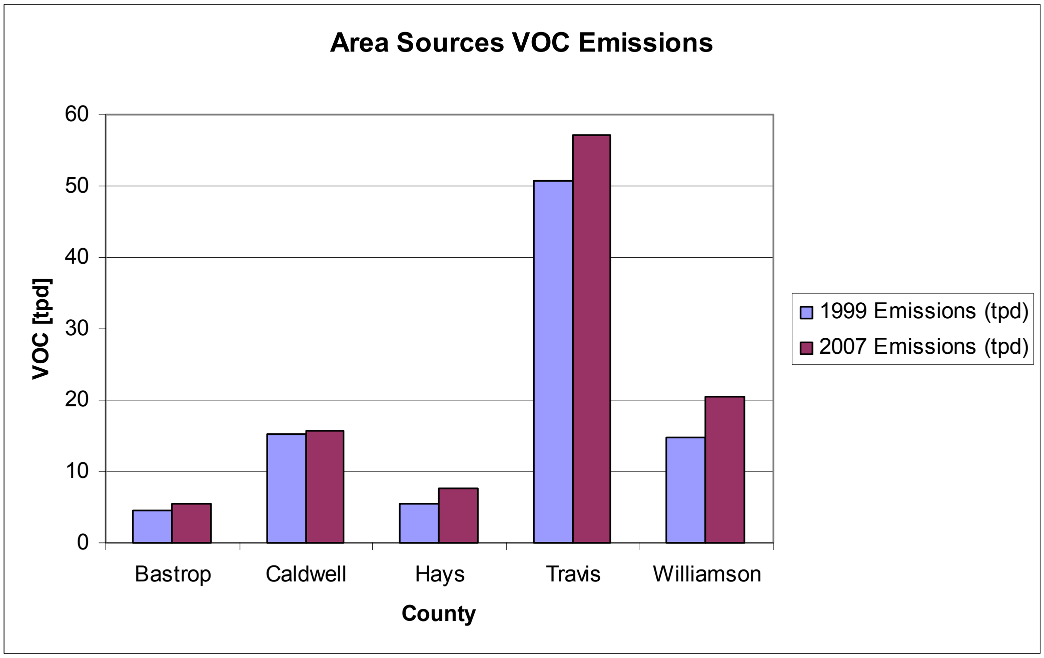


Figure 2.3 1999 and 2007 Areas sources VOC Emissions

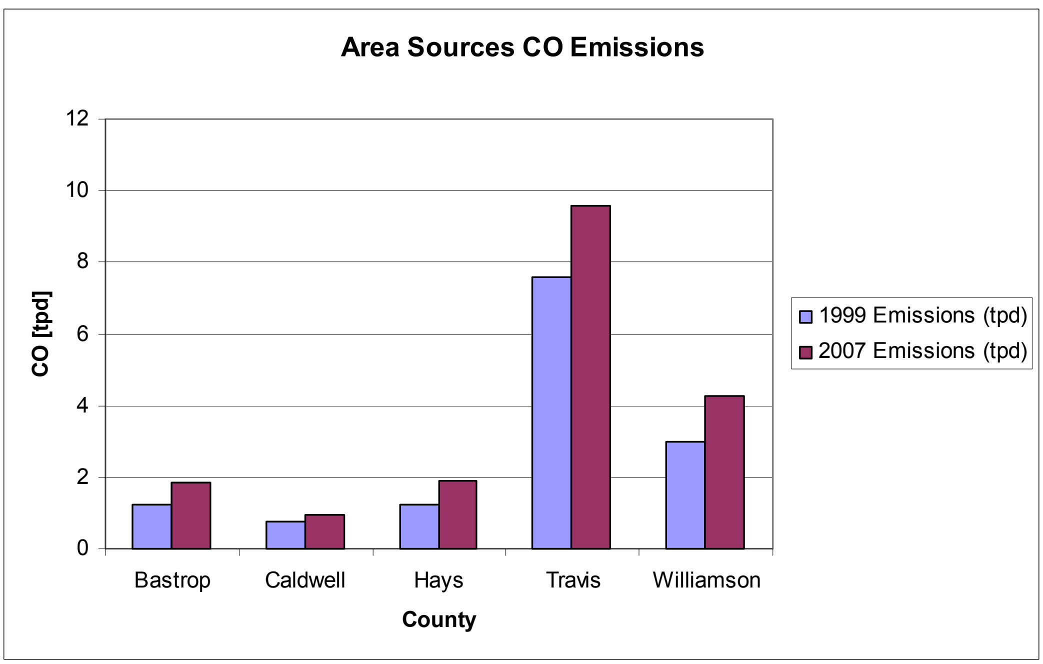


Figure 2.4 1999 and 2007 Areas sources CO Emissions

3.0 On Road Mobile Sources

3.1 Introduction to On-Road Mobile Methodology

The on-road mobile emissions are generated by the many vehicles, cars, trucks, buses, and so on, traveling the regional roads and highways. In the Austin MSA region, on-road sources are a primary contributor of VOC, NOx, and CO anthropogenic emissions. 1999 and 2007 emissions for this category were developed by the Texas Transportation Institute (TTI) using emission factors from EPA's MOBILE6 Model in conjunction with Travel Demand Model (TDM)-based vehicle miles of travel (VMT) and HPMS-based VMT[3].

3.2 Austin-Round Rock MSA 2007 Onroad Mobile Emissions Summary

The following are the NOx, VOC and CO emissions for the onroad mobile source category. Table 3.1 present county totals for the source category for years 1999 and 2007. Figures 3.1 – 3.3 present 1999 and 2007 emissions in the Austin-Round Rock MSA area. Table 3.2 presents 2007 NOx and VOC emissions by vehicle category. Figures 3.4 and 3.5 present 2007 NOx and VOC pie chart emissions by vehicle category.

[3] Austin/San Marcos Metropolitan Statistical Area On-road Mobile Source Emissions Inventories: 1995, 1999, 2002, 2005, 2007, and 2012 (Umbrella Contract 3-60200-04: Task 01) - **Final**

		Pollutant		
County	Data	CO	NOX	VOC
Bastrop	1999 Emissions (tpd)	34.12	3.95	2.54
	2007 Emissions (tpd)	20.95	2.45	1.5
Caldwell	1999 Emissions (tpd)	17.78	2.32	1.3
	2007 Emissions (tpd)	10.43	1.31	0.73
Hays	1999 Emissions (tpd)	70.52	11.4	4.85
	2007 Emissions (tpd)	42.48	5.86	2.78
Travis	1999 Emissions (tpd)	409.47	63.1	32.6
	2007 Emissions (tpd)	287.59	38.2	22
Williamson	1999 Emissions (tpd)	118.21	17.1	8.89
	2007 Emissions (tpd)	97.25	12.7	6.83
Total 1999 Emissions (tpd)		**650.1**	**97.9**	**50.2**
Total 2007 Emissions (tpd)		**458.7**	**60.5**	**33.8**

Table 3.1 Summaries of the On-Road Mobile Emissions

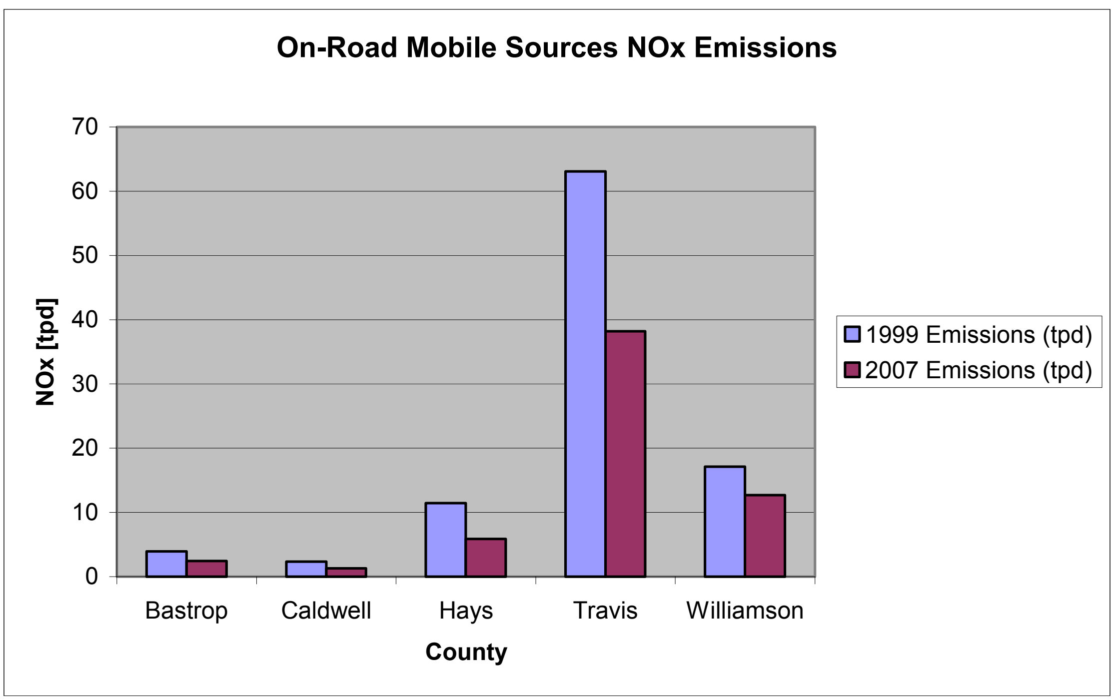


Figure 3.1 1999 and 2007 nonroad mobile sources NOx emissions

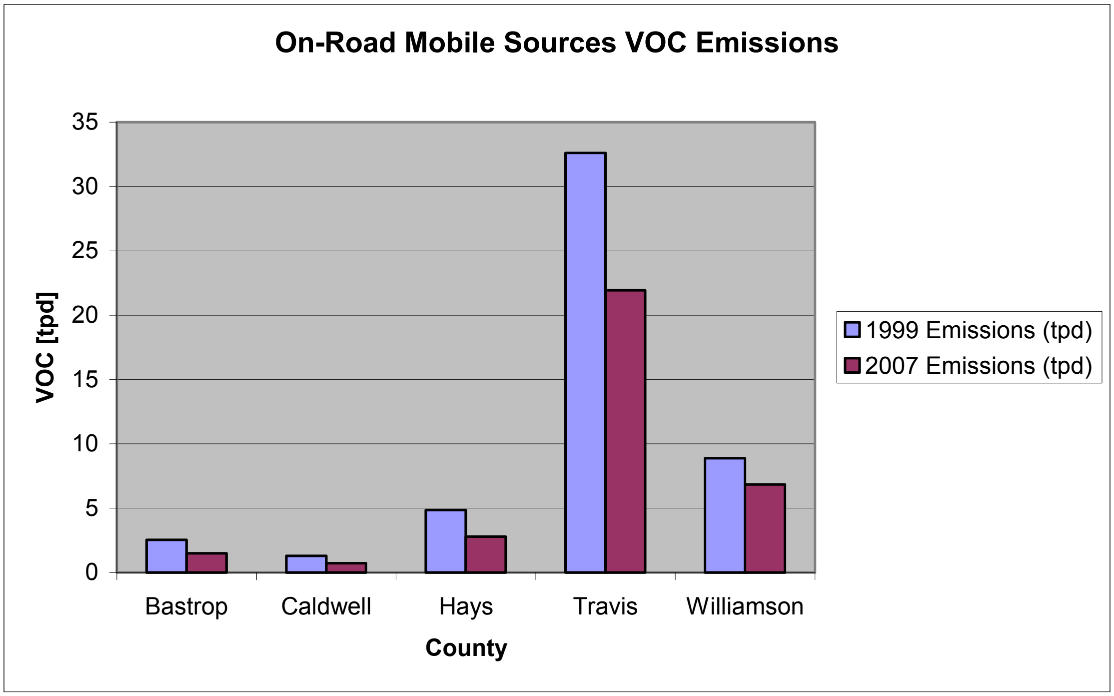


Figure 3.2 1999 and 2007 nonroad mobile sources VOC emissions

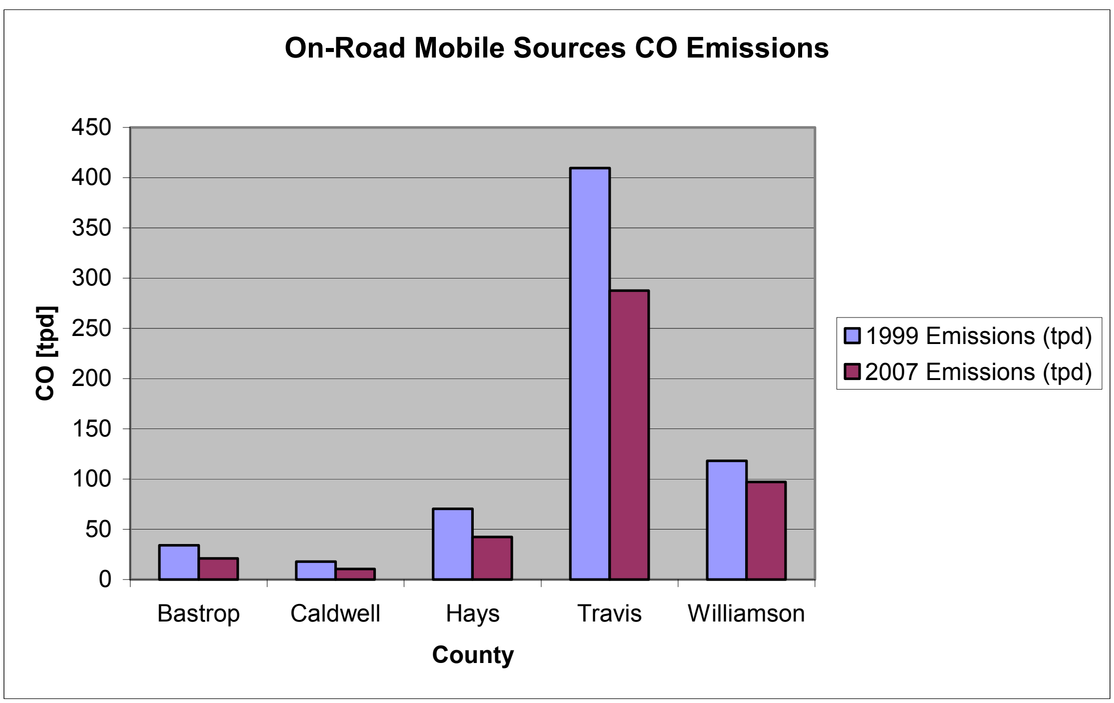


Figure 3.3 1999 and 2007 nonroad mobile sources CO emissions

	Bastrop		Caldwell		Hays		Travis		Williamson		5 County Total	
M5 Category	VOC	NOx	VOC	NOx	VOC	NOx	VOC	NOx	VOC	NOx	VOC	NOx
LDGV	0.93	0.85	0.46	0.42	1.76	1.68	13.79	12.16	4.28	3.95	21.22	19.07
LDGT1	0.41	0.43	0.20	0.21	0.73	0.80	5.76	5.80	1.83	1.93	8.94	9.17
LDGT2	0.06	0.10	0.03	0.05	0.11	0.17	0.88	1.26	0.28	0.42	1.37	1.99
HDGV	0.04	0.14	0.02	0.07	0.07	0.29	0.62	1.93	0.18	0.65	0.94	3.10
LDDV	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.01	0.01	0.03
LDDT	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.00	0.01	0.02	0.04
HDDV	0.04	0.97	0.02	0.59	0.09	3.07	0.77	18.04	0.22	6.05	1.14	28.72
MC	0.01	0.00	0.00	0.00	0.01	0.01	0.11	0.04	0.03	0.01	0.17	0.06
TOTAL	**1.50**	**2.50**	**0.73**	**1.34**	**2.78**	**6.04**	**21.95**	**39.27**	**6.83**	**13.03**	**33.79**	**62.18**

Table 3.2 2007 On-road mobile sources emissions by vehicle category

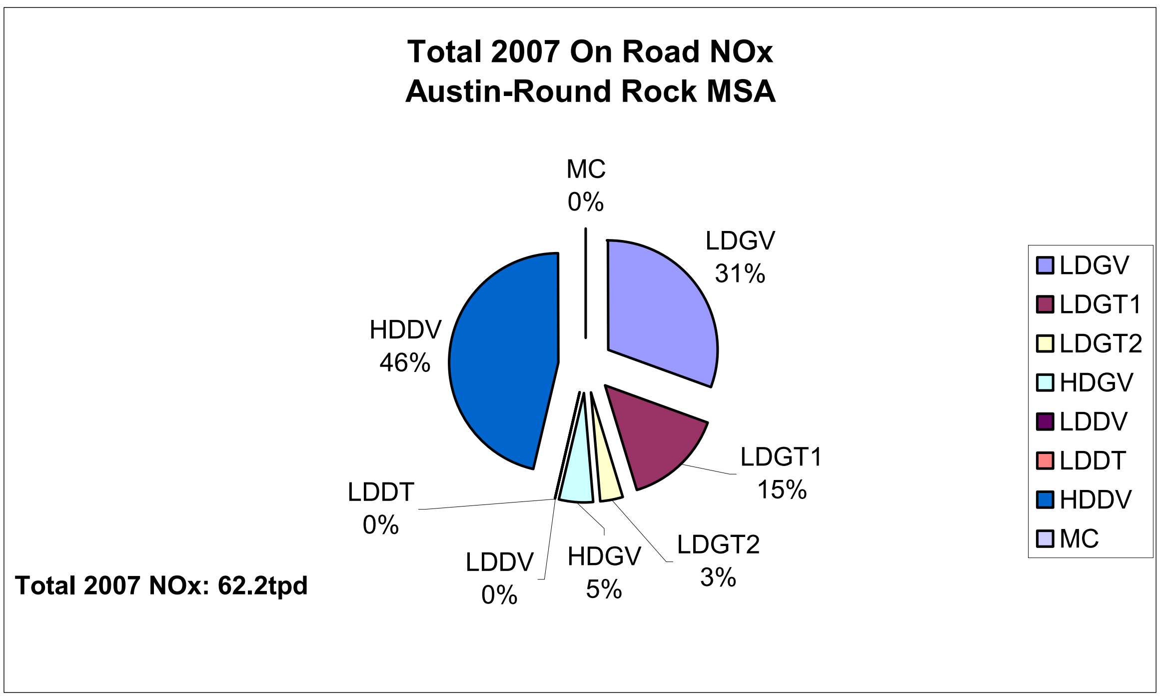


Figure 3.1 2007 NOx emissions by vehicle category

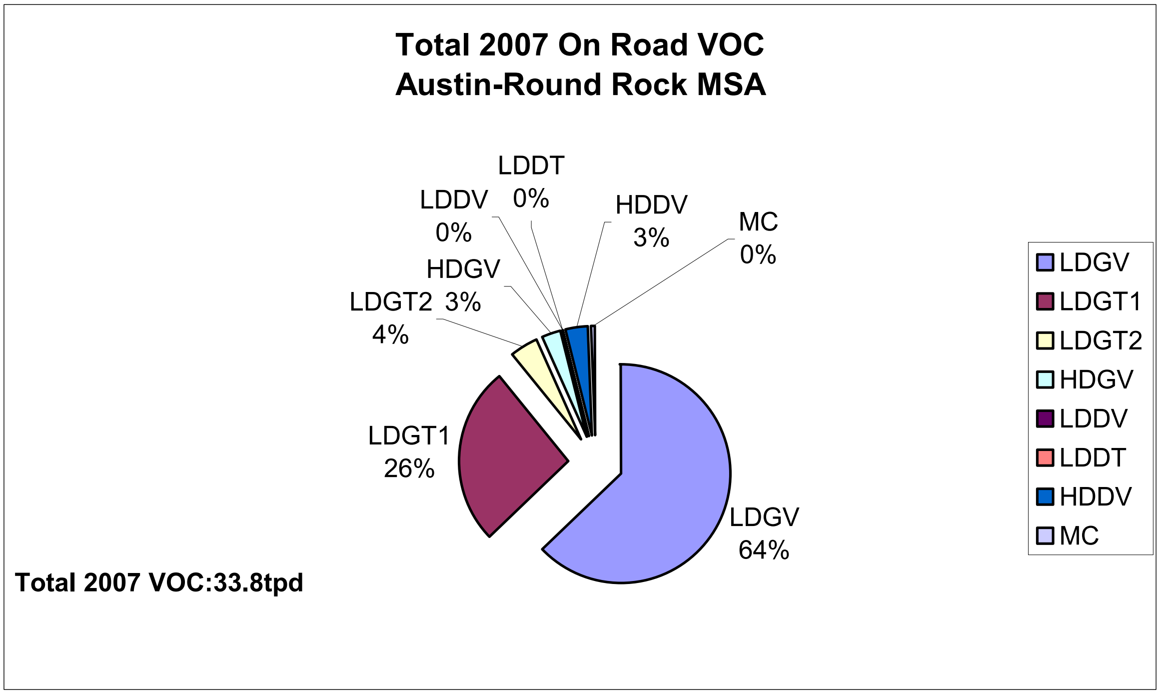


Figure 3.2 2007 VOC emissions by vehicle category

4.0 Nonroad Mobile Sources

4.1 Introduction and Scope

The future year for non-road mobile sources is 2007. Three categories were considered in Non-Road Mobile Sources: aircraft and airport GSE, locomotives, and off-road engines. Aircraft emissions estimates were based on activity data from the Texas Department of Transportation, Aviation Division. Locomotive emissions estimates relied upon data from the Railroad Commission of Texas (RCT). Off-road engines emissions were estimated from the Non-Road mobile source emissions model. Table 4.1 summarizes nonroad emissions for the five County regions.

2007 Emissions	Tons per Day [tpd]		
COUNTY	**CO**	**NOx**	**VOC**
BASTROP	5.8	1.7	1.0
CALDWELL	4.8	1.4	0.7
HAYS	16.7	1.8	1.8
TRAVIS	299.1	16.2	12.7
WILLIAMSON	66.3	6.4	3.7
Grand Total	**392.6**	**27.5**	**19.9**

Table 4.1 Austin MSA Non-Road Mobile Emissions

4.2 Methodology and Approach

Methodologies used for estimating the non-road mobile source activity levels and emissions come from EPA's (ENVIRON) Non-Road Mobile Model (v 2002a), and previous studies from the TCEQ (formerly TNRCC). Since the Nonroad model does not calculate railroad (locomotive emissions) and airports those categories were evaluated separately. In addition to the locomotives and airport emissions, lawn and garden equipment and gas cans were estimated by survey methods and projected to 2007 beyond Nonroad model defaults.

4.3 Modeling assumptions

The modeling domain using NONROAD model was the Austin-Round Rock MSA. The modeled period was for the averaged weekday in September 2007. The average, min and max episode temperature was calculated from the TCEQ monitoring data. Each monitoring site records the ozone levels with basic meteorological data (e.g. temperature, wind speed and wind direction). The average temperature was obtained by averaging Austin monitors temperature data over every site for each day of the episode. The maximum and minimum temperature for weekday and weekend were calculated from the data. The following figures presents modeling assumptions and parameters used for the EPA nonroad model.

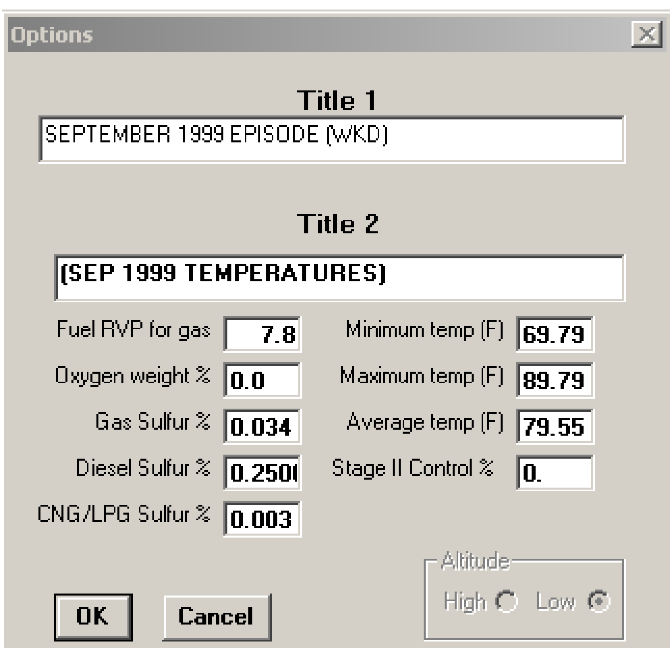


Figure 4.3 Option file assumptions

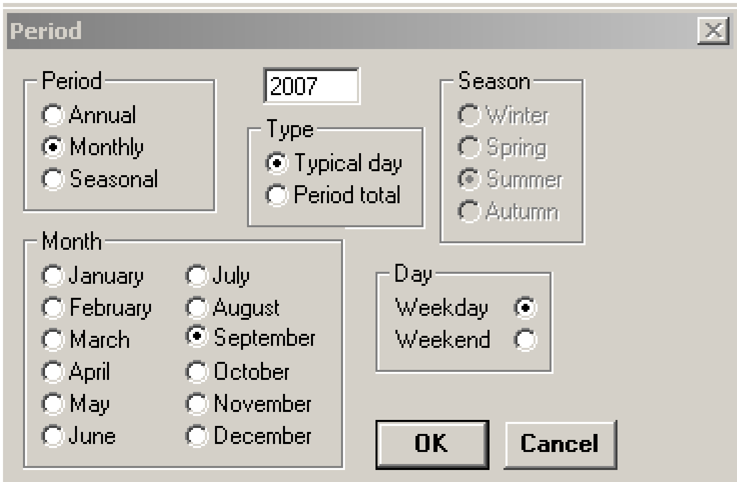


Figure 4.4 Period assumptions

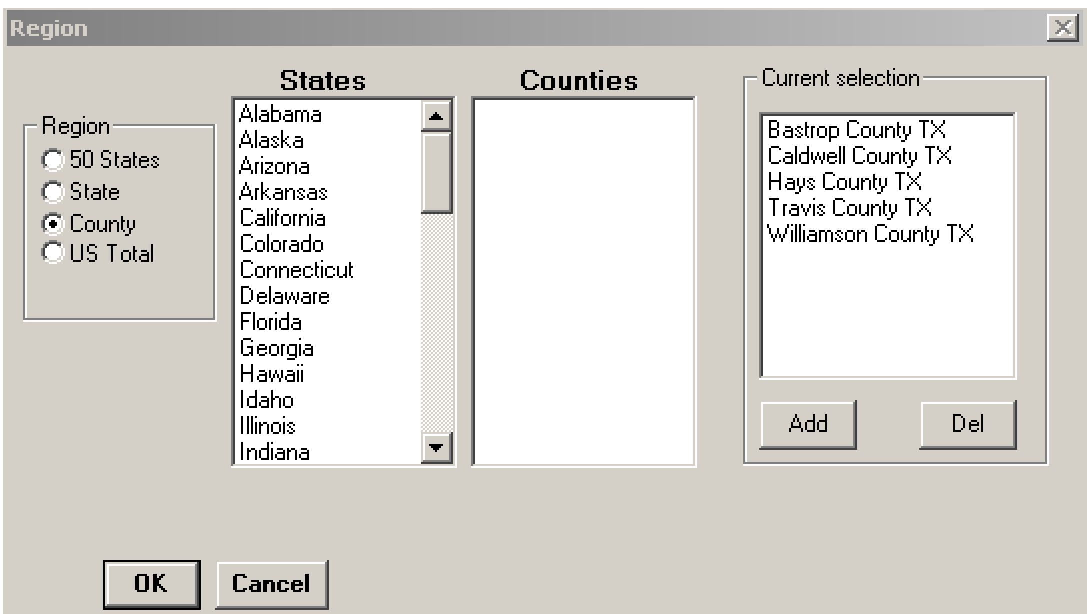


Figure 4.5 Modeling domain (Austin-Round Rock MSA)

Note that Nonroad EPS output contains emissions for a 30-day period. All emissions were re-calculated to daily values (by dividing all emissions by 30). Also note that the NONROAD model outputs total hydro-carbons (THC) instead of VOC, so additional conversion was necessary. The conversion table was provided by TCEQ.

Engine Type	TOG/THC	NMOG/THC	NMHC/THC	VOC/THC
2-Stroke Gasoline [2]	1.044	1.035	0.991	1.034
4-Stroke Gasoline [2, 3]	1.043	0.943	0.9	0.933
Diesel [4]	1.07	1.054	0.984	1.053
LPG [5]	1.099	1.019	0.92	0.995
CNG [5]	1.002	0.049	0.048	0.004

Table 4.3 THC to VOC Conversion factors

Each non-road category was grouped into one of the above categories (by engine type) and the related factor was applied in order to convert to VOC emissions.. Emissions for the locomotives (Railroad), airport, commercial lawn and garden equipment and residential gas can emissions were calculated separately. The methodologies for those categories are described in the following chapters.

4.4 Commercial Lawn and Garden Equipment

Introduction

In 2002 the Texas Natural Resource Conservation Commission (now the Texas Commission on Environmental Quality, TCEQ) tasked Eastern Research Group (ERG) to develop emissions inventory estimates for portable gasoline containers, recreational marine engines, and lawn and garden equipment operating in Texas (TNRCC Contract # 582-0-34730, Work Order # 34730-02-42). As part of this Work Order, ERG and its subcontractors Starcrest Consulting and NuStats, developed surveys to assess ownership and operation patterns for lawn and garden equipment across the state. ERG and Starcrest used the survey results to estimate tons per ozone season weekday emissions of VOC and NOx emissions for both residential and commercial uses of this equipment. Subsequent work performed by ERG for the Capital Area Planning Council (CAPCO) revised and updated the results of the initial analysis. This report describes the survey process, as well as the updated methodology and assumptions used in calculating the emission inventory for these sources.

Methodology

This study refined and updated the default NONROAD2002 model inputs for population counts for lawn & garden equipment, as the categories are defined in the NONROAD model. These categories include two and four stroke gasoline engines used in the following applications, both residential and commercial:

1. Lawnmowers
2. Chainsaws
3. Tractors (not agricultural)
4. Leaf-blowers
5. Chippers / grinders
6. Tillers
7. Shredders
8. Edgers/Trimmers/Other

ERG developed surveys to determine information on both gas can and lawn and garden equipment ownership and use. Separate surveys were developed for the residential and commercial sectors. NuStats administered Random Digit Dial surveys across all Texas households for the residential sector. NuStats also developed a random call list for all Texas companies under SIC 0782, Lawn and Garden Services, for the commercial sector survey. Over 200 residential and 125 commercial surveys were completed.

Analysis of residential results found no significant difference with the NONROAD model population assumptions, so model defaults were used for this sector. However, results from the commercial lawn and garden survey were significantly different than those in the NONROAD model. Therefore alternative population (POP) and allocation (ALO) files were developed from the survey data for the commercial sector.

Commercial survey totals were scaled up to the state level using the total number of firms registered with the Texas Comptroller's office under SIC 0782 in 2002 (8,797). In most cases the fuel splits between 2-stroke, 4-stroke, and diesel for any given equipment category were pulled from the NONROAD defaults, although survey data were used in a few instances where the subcategory survey populations were high enough to render statistically significant results. Also, NONROAD defaults were used for the following categories for equipment greater than 25 hp (not surveyed by NuStats) – leaf blowers, chippers/grinders, commercial turf, and other lawn and garden equipment. The scaled survey results were combined with the default values specified above to create a new, state-wide NONROAD POP file for commercial lawn and garden equipment. In addition, county level Texas Comptroller data was used to generate a new ALO file for NONROAD as well. NONROAD2002 was run using typical ozone season day temperatures and fuel properties to generate revised area-specific emissions estimates for the commercial lawn and garden sector, for both the 1999 base year and 2007 future control year.

4.5 Austin Area Airports And Military Installations

Future emissions for the Austin-Round Rock MSA airports were assumed to stay unchanged from 1999 base year inventory. A detailed description of the calculation methodology can be found in the 1999 Emissions Inventory for Austin-Round Rock MSA Region.

4.6 Railroads

Diesel-electric locomotives use a diesel engine and an alternator or generator to produce the electricity for powering traction motors. Emissions produced by these diesel engines include hydrocarbons, CO, NOx, sulfur dioxide, and particulate matter.

Future emissions ware generated from 1999 base case emissions. No growth was assumed. Control Factor of 43.2% reduction was applied to NOx emissions due to the Federal rules.

4.7 Residential Gas Cans

The emissions were estimated from the ERG report (reference 1999 EI milestone report). Since all emissions were estimated for the year 2002, adjustments were made to estimate 2007 emissions.

The annual growth factor of 3% was assumed by ERG in their report. Emissions for 2007 were projected and added to the base inventory. Since there is no SCC category for the portable gas cans, the estimated emissions were lumped with the Residential Lawn and Garden equipment category. Note that an adjustment for spillage contribution was performed in order to avoid double counting. Also note that state gas can totals was allocated using population for residential lawn and garden, and Comptroller data regarding the number of businesses for commercial.

4.8 Austin-Round Rock MSA Nonroad Mobile Emissions Summary

Total non-road mobile emissions from the Austin MSA Area is calculated for tons/day of VOC, tons/day of NOx, and tons/day of CO during the September 1999 episode. The non-road mobile source emissions are broken by county in the area for a typical summer weekday. The following are the NOx, VOC and CO emissions for the nonroad mobile source category. Table 4.4 present county totals for the source category for years 1999 and 2007. Figures 4.6 – 4.8 graphically present those emissions in the Austin-Round Rock MSA area.

		Pollutant		
County	Data	CO	NOX	VOC
Bastrop	1999 Emissions (tpd)	4.93	1.72	0.92
	2007 Emissions (tpd)	5.78	1.66	0.99
Caldwell	1999 Emissions (tpd)	3.79	1.42	0.61
	2007 Emissions (tpd)	4.77	1.39	0.68
Hays	1999 Emissions (tpd)	8.31	1.88	1.53
	2007 Emissions (tpd)	16.69	1.84	1.77
Travis	1999 Emissions (tpd)	110.02	16.69	15.59
	2007 Emissions (tpd)	299.11	16.21	12.69
Williamson	1999 Emissions (tpd)	26.73	6.73	3.84
	2007 Emissions (tpd)	66.26	6.36	3.73
Total 1999 Emissions (tpd)		**153.77**	**28.44**	**22.49**
Total 2007 Emissions (tpd)		**392.61**	**27.47**	**19.88**

Table 4.4 1999 and 2007 Nonroad mobile emissions inventory for Austin-Round Rock MSA

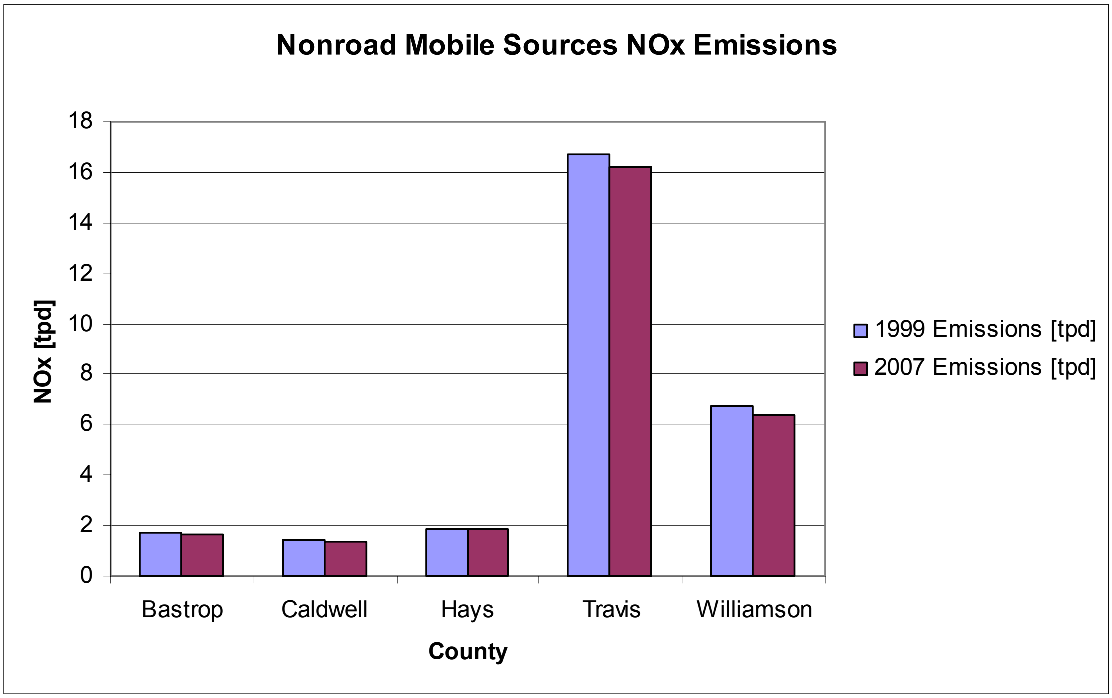


Figure 4.6 1999 and 2007 Nonroad mobile sources NOx Emissions

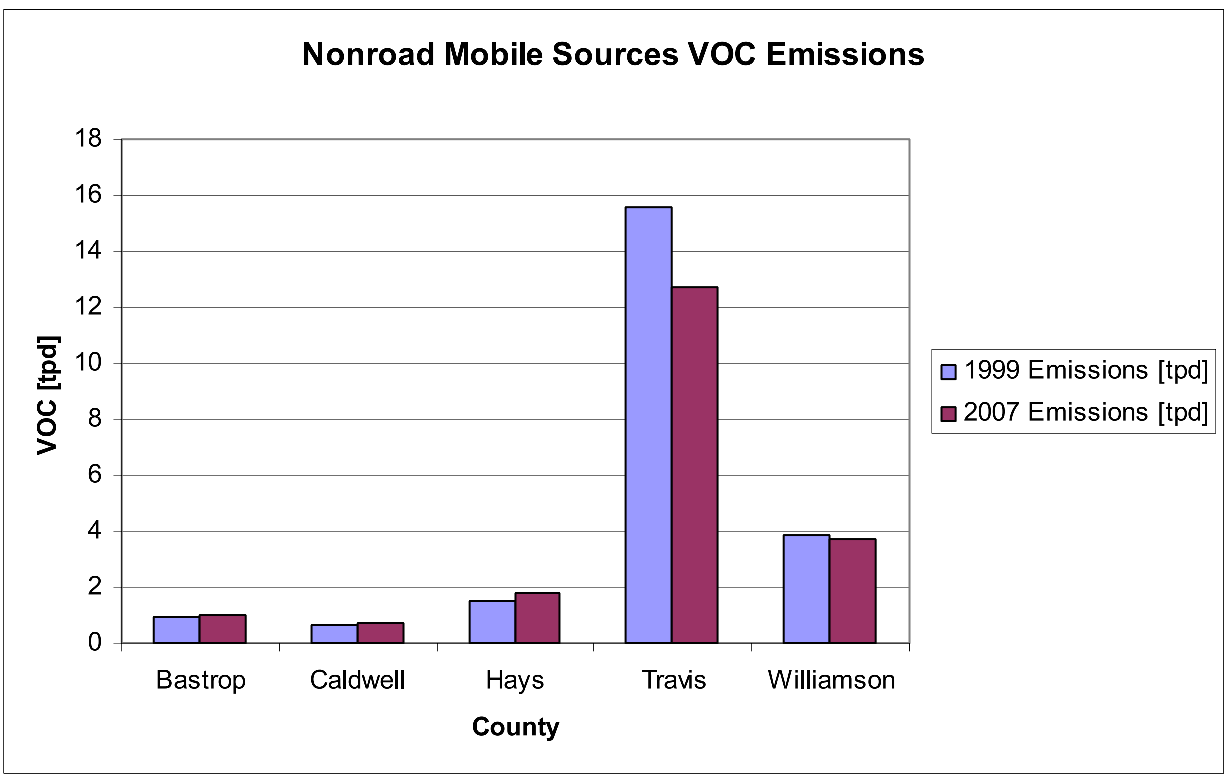


Figure 4.7 1999 and 2007 Nonroad mobile sources VOC Emissions

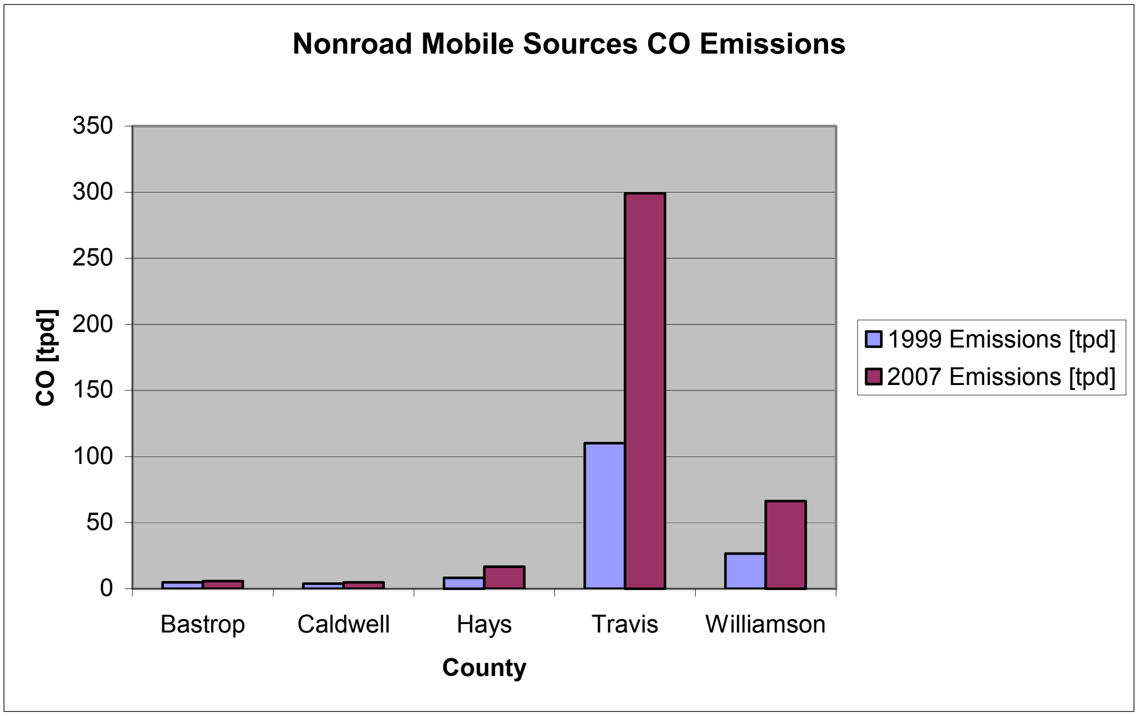


Figure 4.8 1999 and 2007 Nonroad mobile sources CO Emissions

5.0 Point Sources

5.1 Introduction

The Texas Commission on Environmental Quality (TCEQ) provided emissions data for point sources in the CAPCO region for the 1999 and 2007-point source emissions inventory. The database is divided into two sections, EGUs (e.g. electric generating units – power plants) and NEGUs (e.g. factories, industry, etc.). The point sources were sub-categorized into major point source (Annual emissions above 100 tons) and minor point source (below 100 tons of annual emissions).

Data provided includes 2007 uncontrolled emissions and a set of control files including Senate Bill 7 reductions. Major changes to the 1999 base case inventory were due to the SB7 reductions and recent Aluminum Company of America (ALCOA, Milam County, TX) settlement reduction of 90% or more. Alcoa reductions account to 54.26tpd of NOx in 2007 emissions inventory.

5.2 Austin-Round Rock MSA Point Source Emissions Summary

Austin Energy and the Lower Colorado River Authority (LCRA) provided emissions data for Electric Generating Units (EGUs) they operate in the area. The NEGU (Non-Electric Generating Units) emission totals for the five counties were provided by TCEQ. Table 5.1 provides county totals for minor and major point sources in the Austin-Round Rock MSA region. Figure 5.1 presents county totals graphically.

Table 5.2 provides total emissions for the power plants operated in the MSA and surrounding counties for 1999 and projected emissions for 2007.

County	NOx	VOC
Bastrop	7.65	0.56
Caldwell	2.51	0.07
Hays	8.94	1.65
Travis	11.04	2.18
Williamson	0.08	0.18
Total	**30.23**	**4.63**

Table 5.1 County Totals for Austin-Round Rock MSA 2007 Minor and Major Point Sources

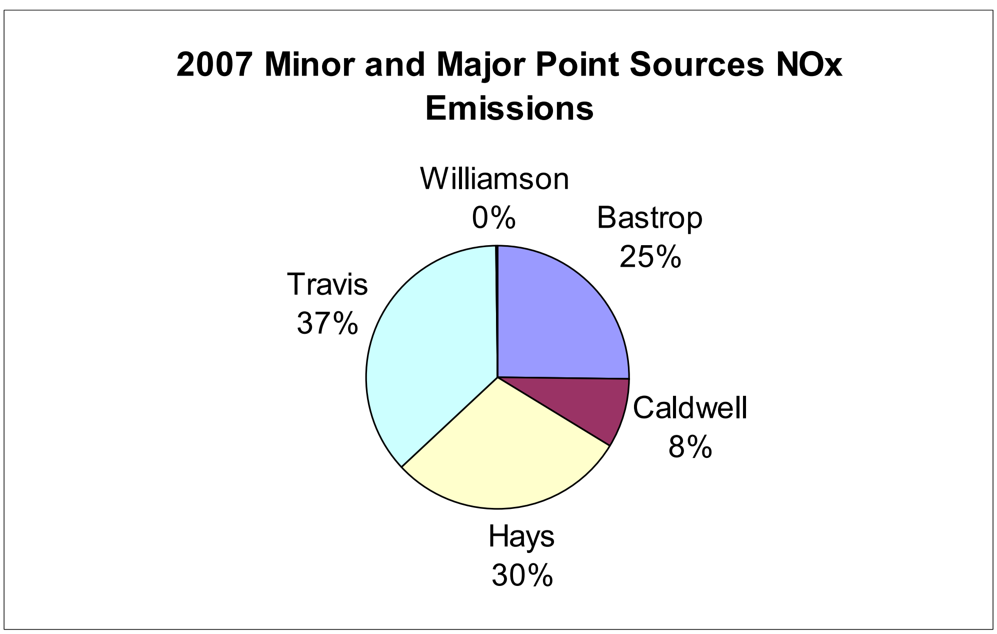


Figure 5.1 Austin-Round Rock MSA, 2007 minor and major point source emission distribution

EGU Point Source Emissions (tpd) in the MSA and Surrounding Area		1999		2007	
County	**Facility Name**	**NOx**	**VOC**	**NOx**	**VOC**
Bastrop	Sam Gideon Electric Power Plant	7.10	0.33	3.94	0.11
Bastrop	Lost Pines 1 Power Plant	n/a	n/a	1.50	0.23
Bastrop	Bastrop Clean Energy Center	n/a	n/a	2.21	0.12
Fayette	Fayette Power Project	60.82	0.55	28.12	0.78
Hays	Hays Energy Facility	n/a	n/a	3.70	0.96
Milam	Sandow Steam Electric	24.20	0.33	13.19	0.32
Travis	Decker Lake Power Plant	8.15	0.44	3.80	0.12
Travis	Holly Street Power Plant	2.88	0.12	2.98	0.01
Travis	Sand Hills	n/a	n/a	1.03	0.20
Travis	Hal C Weaver Power Plant	1.99	0.03	1.86	0.05
Total		105.14	1.80	62.32	2.91
Total MSA		**20.12**	**0.92**	**21.01**	**1.81**

Table 5.2 Point Source Emissions from EGU, Austin – Round Rock MSA and Surrounding

Austin Energy's proposed Ten-Year Strategic Plan includes an Energy (generation) Resource Plan. Under this plan, the Holly Power Plant will be retired by Dec. 31, 2007. That will effect for 1.44tpd of NOx reduction. [4]Austin Energy estimates the Decker plant will emit only 3.1tpd of NOx in 2007 (62% reduction from 1997 base line). Note that 50% NOx reduction from 1997 emission base was used for a 2007 base year emissions inventory. Any feasible reductions that are above Senate Bill 7 requirements will be modeled separately as a voluntary emission control plan. Cost-effective energy efficiency and load shifting are established as the first response toward meeting new load; and cost-effective renewable energy sources will be increased as practical to reduce generation dependency on fossil fuels, such as natural gas. As part of their resource strategy, Austin Energy has developed as an objective to make a strong commitment to renewable energy. The two measures are to achieve a renewable portfolio standard of 20% and an energy efficiency target of 15% by 2020.

[4] Phone conversation with Bob Breeze (Austin Energy), December 2003

EMISSIONS [TPD]			POLLUTANT		
COUNTY	**NAME**	**ID#**	**NOx**	**CO**	**VOC**
Bastrop	ACME BRICK COMPANY	BC0059O	0.110	0.186	0.015
	LOWER COLORADO RIVER AUTHORITY	BC0057S	0.004	0.008	0.058
	TIFFANY BRICK COMPANY LP	BC0018F	0.055	0.195	0.018
Caldwell	JL DAVIS	CA0011B	0.286	0.445	0.037
	OASIS PIPELINE CO TEXAS LP	CA0027J	2.228	0.149	0.030
Comal	APG LIME CORP	CS0020O	1.147	0.062	0.004
	SUNBELT ASPHALT AND MATERIALS IN	CS0012N			0.000
	TXI OPERATIONS LP	CS0018B	3.433	1.901	0.149
	CEMEX INC	CS0022K	8.112	4.430	0.117
	NEW BRAUNFELS GENERAL STORE INTL	CS0024G	0.000	0.000	0.044
	FLEXTRONICS ENCLOSURES INC	CS0099V	0.001	0.001	0.148
Hays	TEXAS LEHIGHCEMENT COMPANY LP	HK0014M	5.240	15.145	0.547
	SOUTHWEST TEXAS STATE UNIVERSITY	HK0036C	0.758	0.259	0.107
	SOUTHWEST SOLVENTS AND CHEMICALS	HK0051G			0.000
	PARKVIEW METAL PRODUCTS INC	HK0046W			0.033
Milam	DROSS TECH INC	MM0084M			0.000
	ALCOA INC	MM0001T	27.13	6.061	3.84
Travis	AUSTIN AMERICAN STATESMAN THE	TH0191A	0.001	0.001	0.009
	AUSTIN WHITELIME CO	TH0010I	0.938	0.457	0.024
	CAPITOL AGGREGATES INC	TH0015V	0.010	0.048	0.164
	EXXON COMPANY USA	TH0039H			0.100
	CHEVRON USA	TH0046K			0.000
	MOBIL OIL CORPORATION	TH0064I	0.000	0.000	0.000
	TYCO PRINTEDCIRCUIT GROUP LP	TH0093B	0.010		0.025
	3M MINNESOTAMINING AND MANUFACTU	TH0243G	0.148	0.420	0.030
	HART GRAPHICS	TH0203S	0.008	0.201	0.117
	AUSTIN COUNTER TOPS INC	TH0247V	0.000	0.000	0.061
	HUNTSMAN PETROCHEMICAL CORP	TH0052P	0.150	0.036	0.113
	ADVANCED MICRO DEVICES INC	TH0142N	0.229	0.166	0.165
	KOCH PIPELINE COMPANY LP	TH0310Q	0.004	0.015	0.357
	SAMSUNG ELECTRONICS	TH0602A	0.018	0.022	0.317
	MULTILAYER TEK LP	TH0700W	0.006	0.002	0.212
	WASTE MANAGEMENT OF TEXAS INC	TH0502F	0.036	0.198	0.028
	GAS RECOVERYSYSTEMS INC	TH0522W	0.000	0.000	0.057
	PRESS CORPS INC	TH0765R			0.017
Williamson	SEMINOLE PIPELINE CO	WK0148O	0.084	0.065	0.009
	LABORATORY TOPS INCORPORATED	WK0171T			0.101
	CONTEMPORARYPRODUCTS OF TEXAS IN	WK0240C			0.030
	AQUATIC INDUSTRIES INC	WK0116E			0.039
Grand Total			**50.15**	**30.47**	**7.12**

Table 5.3 Point Source Emissions from NEGU, Austin – Round Rock MSA and Surrounding Counties

Table 5.3 provides projected NEGU emission totals for 2007. The largest emitter in 1999 in the surrounding area from the NEGU Major Point Source category was the Aluminum Company of America (ALCOA). They have committed to reducing their emissions by 90% by 2007, which will have a substantial impact on the reduction for the entire category. Alcoa, Inc. will reduce its emissions from 60.061tpd in 1999 to 6.061tpd or less in 2007. Note that only 50% of the reduction was assumed for the future case modeling since 1999 episode is during September and Alcoa is required to reduce their emissions by the end of the 2007.

6.0 Biogenic Sources

6.1 Introduction

The category of biogenic sources includes volatile organic compound emissions from biomass (trees and plants) as well as NOx emissions from soil microbes. While biogenic emission sources are an important component of the inventory, methodologies for the projecting changes to this category are not readily available. In support of TCEQ's current regional scale air quality modeling efforts, ENVIRON recently developed an updated statewide county level biogenic emission inventory using the latest version of the GLOBEIS model (Yarwood et al, 2001). As part of this project, the ENVIRON team has reviewed this biogenic inventory and completed the necessary steps required to generate ozone season day biogenic emission estimates.

6.2 Austin-Round Rock MSA Biogenic Emissions Summary

Biogenic sources were estimated with zero growth in 2007. The base year was 1999. A detail description of the methodologies that were used to estimate biogenic emissions are submitted in Appendix E of the 1999 Emissions inventory document (ENVIRON calculated 1999 emissions for this source category under contract to the Texas Commission on Environmental Quality (TCEQ, former TNRCC).

Table 6.1 Biogenic emissions for the 2007, Austin-Round Rock MSA region

COUNTY	FIPS	POLLUTANT	TOTAL	UNIT
BASTROP	021	ISO	101.07	TPD
		MONO	6.9	TPD
		NOX	2.17	TPD
		OTHERVOC	15.9	TPD
		VOC	123.88	TPD
CALDWELL	055	ISO	67.23	TPD
		MONO	2.62	TPD
		NOX	4.93	TPD
		OTHERVOC	11.09	TPD
		VOC	80.95	TPD
HAYS	209	ISO	27.91	TPD
		MONO	5.05	TPD
		NOX	3.29	TPD
		OTHERVOC	16.44	TPD
		VOC	49.41	TPD
TRAVIS	453	ISO	52.19	TPD
		MONO	4.69	TPD
		NOX	4.78	TPD
		OTHERVOC	14.75	TPD
		VOC	71.63	TPD
WILLIAMSON	491	ISO	50.38	TPD
		MONO	4.28	TPD
		NOX	9.75	TPD
		OTHERVOC	13.53	TPD
		VOC	68.19	TPD

TOTAL NOx	**24.92**	TPD
TOTAL VOC	**394.06**	TPD