The Alamo Area Council of Governments

# 2002 Emission Inventory for the Alamo Area Council of Governments Region

September 30, 2004

Funded in part by Texas Commission on Environmental Quality

<table>
<tr><td colspan="3">Title: 2002 Emission Inventory for the Alamo Area Council of Governments Region</td><td colspan="2">Report Date: September 2004</td></tr>
<tr><td colspan="3">Authors: Natural Resources/Transportation Department</td><td colspan="2">Type of Report:</td></tr>
<tr><td colspan="3">Performing Organization Name & Address:<br>Alamo Area Council of Governments<br>8700 Tesoro, Suite 700<br>San Antonio, Texas 78217</td><td colspan="2">Period Covered: 2002</td></tr>
<tr><td colspan="3">Sponsoring Agency Name & Address:<br>Texas Natural Resources Conservation Commission and San Antonio - Bexar County Metropolitan Planning Organization</td><td colspan="2"></td></tr>
<tr><td colspan="3">Supplementary Notes: N/A</td><td>Date of Approval:</td><td>Reference No.:</td></tr>
<tr><td colspan="5">Abstract: The 2002 Emissions Inventory (EI) produced by the Alamo Area Council of Governments (AACOG) is an extensive database listing the quantities and emission rates of volatile organic compounds, nitrous oxides, and carbon monoxides released by all major sources within the twelve county AACOG region. The 2002 EI includes a full accounting of the methodologies and models employed, data sources reviewed, and surveys analyzed to complete each of the unique EI categories reported. The six major categories of emitter sources included in the 2002 EI: Non-road sources, military/aircraft sources, area sources, biogenic sources, point sources, and on-road sources.</td></tr>
<tr><td>Related Reports: 1996 Emission Inventory for the Alamo Area Council of Governments Region;<br>1999 Emission Inventory for the Alamo Area Council of Governments Region</td><td colspan="2">Distribution Statement:<br>Alamo Area Council of Governments, Natural Resources/Transportation Department</td><td colspan="2">Permanent File:<br>Alamo Area Council of Governments, Natural Resources/Transportation Department</td></tr>
<tr><td>No. of Pages:</td><td colspan="2">Cost of Report:</td><td colspan="2">Reproduction Cost:</td></tr>
</table>

# Executive Summary

This document presents the 2002 Emissions Inventory for the 12 county region of the Alamo Area Council of Governments (AACOG). The 12 counties included in this emissions inventory are Atascosa, Bandera, Bexar, Comal, Frio, Gillespie, Guadalupe, Karnes, Kendall, Kerr, Medina and Wilson. In analyzing air quality, three critical pollutants were inventoried: Volatile Organic Compounds (VOC), Oxides of Nitrogen (NOx), and Carbon Monoxide. The source of these pollutants is broken down into six major categories for this report: Non-road mobile sources, military/airports, area sources, biogenic sources, point sources, and on-road mobile sources.

Non-road mobile sources consist of all vehicles and equipment not routinely operated on streets and highways. These include recreational boats, recreational vehicles, railroad locomotives, agricultural equipment, construction equipment, mining equipment, quarry equipment, logging equipment, lawn and garden equipment, and commercial and industrial equipment. These account for 26.1 tons per day of VOC, 295.7 tons per day of CO and 28.1 tons per day of NOx in Bexar County. Chapter 2 lists the methodologies for estimating emissions for each subcategory in non-road mobile sources. Also, a chart is provided showing a breakdown of the emissions in tons per weekday, Saturday, and Sunday.

Military/airport sources include both public and military aircraft, as well as military groundside emissions and airport support vehicles. Military/airport emissions also include on-road emissions generated on base and non-road mobile source emissions. Significant military activity is found in three counties within the AACOG region, those being Bexar, Comal, and Medina counties. Both of the large civilian airports included in the inventory, San Antonio International Airport and Stinson Municipal Airport, are located in the Bexar County. Also, there are 19 small private or civilian airports in the AACOG 12 county region. These sources account for 2.4 tons per day of VOC, 18.4 tons per day of CO and 4.2 tons per day of NOx in the Bexar County. Chapter 3 contains the methodologies used in the calculation of the inventory emissions for military and airport sources.

Area sources encompass a large number of diverse sources--everything from bakeries and breweries to asphalt paving and degreasing operations. These sources include facilities whose individual emissions do not qualify them as point sources (each facility emits less than 100 tons of VOC or NOx per year) however; collectively they can release significant quantities of pollutants. Area sources emit 69.7 tons per day of VOCs, 3.9 tons per day of CO and 8.0 tons per day of NOx in the Bexar County. These methodologies used for estimating emissions from area sources varied by subcategory. These can be found individually in the Chapter 4 of the emission inventory report.

Biogenic sources are emissions from natural sources such as vegetation and microbial activity. This is the only category that is from a non-anthropogenic source. Some example sources include trees, grasses, and emissions from soil microbes. This category accounts for 63.6 tons per day of VOCs, 15.4 tons per day of CO and 3.7 tons per day of NOx in the Bexar County. The methodology used for this category is described in the Chapter 5 of the emissions inventory report.

Point source emissions are from stationary sources such as electrical generating plants and other industrial facilities. These sources are well documented, in accordance with TNRCC rules, and emit over 100 tons of NOx or 100 tons of VOC per facility each year. This category contributes 1.6 tons of VOCs per day, 14.6 tons per day of CO and 55.7 tons per day of NOx to the inventory of emissions in the Bexar County. The Chapter 6 contains the data for point sources by company and county.

On-road mobile sources consist of vehicles operated on the streets and highways. The vehicles are broken down into gasoline and diesel powered vehicles. This category represents the largest source of emissions from non-stationary sources, producing 51.8 tons per day of VOCs, 649.1 tons per day of CO and 103.0 tons per day of NOx in the AACOG region. The methodology used for calculating these emissions and the results of the emissions calculations are provided in the Chapter 7.

Numbers of agencies contributed information to this inventory, making the preparation of this document possible. Population data for 2002 were obtained from the Texas Water Development Board and are based on the "Most Likely Scenario." Employment figures were taken from the Texas Workforce Commission Third Quarter 2001 Report. The Texas Department of Transportation (TxDOT) supplied highway vehicle registration data and developed vehicle miles traveled (VMT) estimates and vehicle travel parameters, which were used as input data for the MOBILE6 emission factors model. Texas Transportation Institute provided on-road emissions estimates for the 12 county-region. The Texas Commission on Environmental Quality (TCEQ) provided data for a number of categories including point source emissions, the location of aboveground and underground storage tanks, and auto body shop emissions methodology. This emission inventory is based on the annual and average ozone seasonal data for countywide estimation of the emissions.

# Table of Contents

## List of Tables

**Chapter 3 - Airport and Military Emissions**

**Chapter 4 - Area Sources Emissions**

**Chapter 5 - Biogenic Emissions**



**Chapter 6 - Point Source Emissions**



**Chapter 7 - On-Road Emissions**

None

## List of Figures

# CHAPTER 1 – INTRODUCTION

The Clean Air Act is the comprehensive federal law that regulates airborne emissions from area, mobile, and stationary sources across the United States. This law authorizes the U.S. Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQS) to protect public health and the environment.

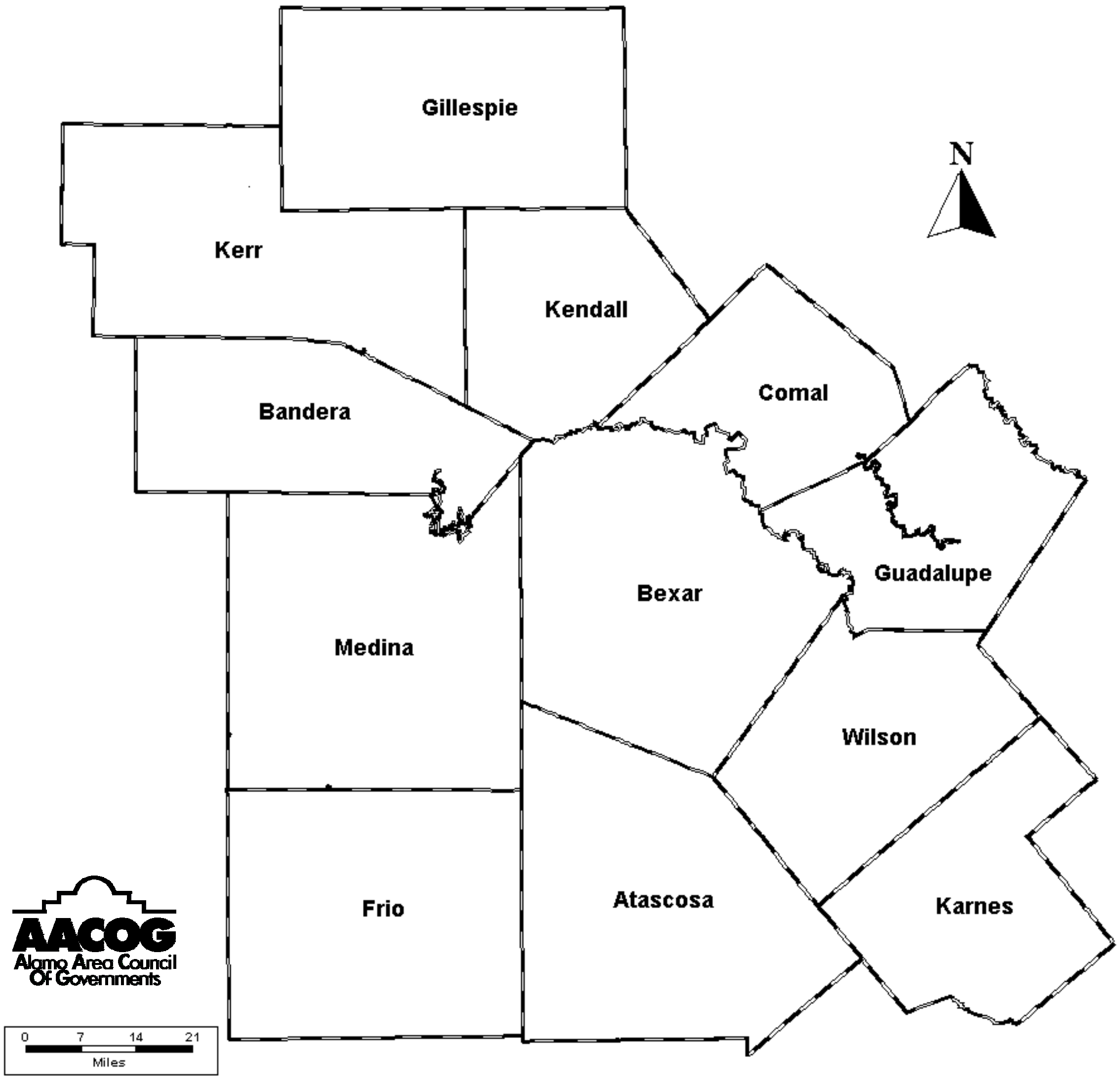
Of the many air pollutants commonly found throughout the country, the EPA has recognized six “criteria” pollutants that can injure health, harm the environment, and cause property damage. EPA refers to these pollutants as “criteria” air pollutants because the agency has regulated them by first developing health-based criteria (science-based guidelines) as the basis for setting permissible levels. The NAAQS are a listing of the threshold levels, the concentration values above which human health is put at risk, for these criteria pollutants.

In 1997, air quality monitors began to compile the three-year set of eight-hour average ozone readings required by the amended National Ambient Air Quality Standards (NAAQS). This amendment, recently upheld by the Supreme Court, sets a stricter standard intended to more aggressively protect human health and the environment. As a consequence, air quality considerations take on increased importance as regions develop plans for meeting the revised ozone standard.

The compilation of the 2002 emissions inventory for the AACOG Region required extensive research and analysis.  This emissions inventory (EI) provides a vast database of the many regional pollution sources, their emissions and emission rates.  By understanding these varied sources that together create ozone pollution, planners, political leaders and common citizens can work together to better manage them. Planning and management skills are necessary to achieve and maintain air quality.  This 2002 emissions inventory provides an important tool that will be used for the planning and management process.

An initial step in developing an EI is delineating the coverage area.  This inventory encompasses the 12 AACOG counties, which include Bexar, the most populous county of the region, and the 11 surrounding counties of Atascosa, Bandera, Comal, Frio, Gillespie, Guadalupe, Karnes, Kendall, Kerr, Medina and Wilson (see Figure 1-1).

Figure 1-1.  Map of the AACOG Region




The 2002 AACOG EI comprises six categories of emission sources.  These include biogenic sources and five anthropogenic emission sources: point, on-road, non-road, area, and airport / military sources, as described below:

- Non-road sources account for the emissions of mobile equipment that are operated in areas other than public thoroughfares.  The non-road category includes such sources as farm vehicles, construction, mining, and industrial equipment, railroad locomotives, and others.

- Airports and military installations combined constitute a fairly significant source of pollutants. These facilities are unique in the number and variety of equipment, such as aircraft, ground support equipment, ground transportation vehicles, and refueling stations, that contribute to the EI. Because of the significance of their emission contribution and the many similarities of military and airport EI techniques, the 2002 EI presents these emissions as a separate category from area, non-road and point sources. The airport/military source includes emissions from a variety of locations that include San Antonio International Airport, several smaller regional airports, and six military installations.
- Area sources are sources that are so numerous and individually produce such low levels of contaminants that identification of individual sources and their emissions is typically unwarranted.
- Biogenic sources include emissions due to the presence of vegetation and associated biology.
- Point sources are those stationary emitters individually producing enough pollution that a description of each singular source is warranted. The state of Texas, through the Texas Commission on Environmental Quality (TCEQ), maintains records of point sources.
- The on-road category is a self-descriptive term referring to the many vehicles, cars, trucks, buses, and motorcycles, traveling the regional roads and highways.

Ozone forms from the chemical reactions of air pollutants – volatile organic compounds (VOC), nitrous oxides (NOx) and, to a lesser extent, carbon monoxide (CO) – in the presence of sunlight. Therefore, the intent of this EI is to identify and quantify ozone precursor emissions as completely and accurately as possible. To accomplish this, EPA guidance was consulted and, whenever time or other constraints permitted, EPA's preferred methodology was used to develop emission estimations. This methodology typically requires the use of site-specific data, which is primarily obtained from surveys. Although surveying is a costly and time-consuming process, it ensures that specific production, operation or employment figures are used in the emission calculation process.

Once data is obtained through either the use of surveys or alternative methods, emissions are estimated and allocated to the proper biogenic or anthropogenic category. Figures 1-2 through 1-7 provide a graphical comparison of emissions of VOC, NOx and CO by source category in tons per average ozone weekday. Bexar County source categories are provided in one set of pie charts and emissions from the surrounding eleven counties are consolidated in the other set. Tables 1-1 through 1-3 list VOC, NOx and CO emissions in tons per average ozone weekday by major category for each of the 12 AACOG counties.

One of the conclusions that can be drawn from these tables is that, in the AACOG region, on-road sources are a primary contributor of VOC, NOx and CO anthropogenic emissions. In Bexar County for example, on-road sources generate 103.0 tons of NOx emissions on a typical ozone summer day. The next highest contribution comes from point sources with 55.7 tons per day, followed by non-road sources with 28.1 tons per day, military/airport sources with 4.2 tons per day, and area sources with 8.0 tons per day. With regards to anthropogenic VOC emissions, area sources produce 69.7 tons per typical ozone season day, while on-road sources produce 51.8 tons per day, non-road sources generate 26.1 tons per day, point sources produce 1.6 tons per day, and airport / military sources generate 2.4 tons.

The following chapters describe in detail the methodology used to determine emissions from the numerous sources of VOC, NOx and CO in the AACOG region. In addition, the chapters provide the results of the emission calculations for each source category in tons per year and tons per day (typical summer ozone season day).

Figure 1-2. Bexar County VOC Emissions

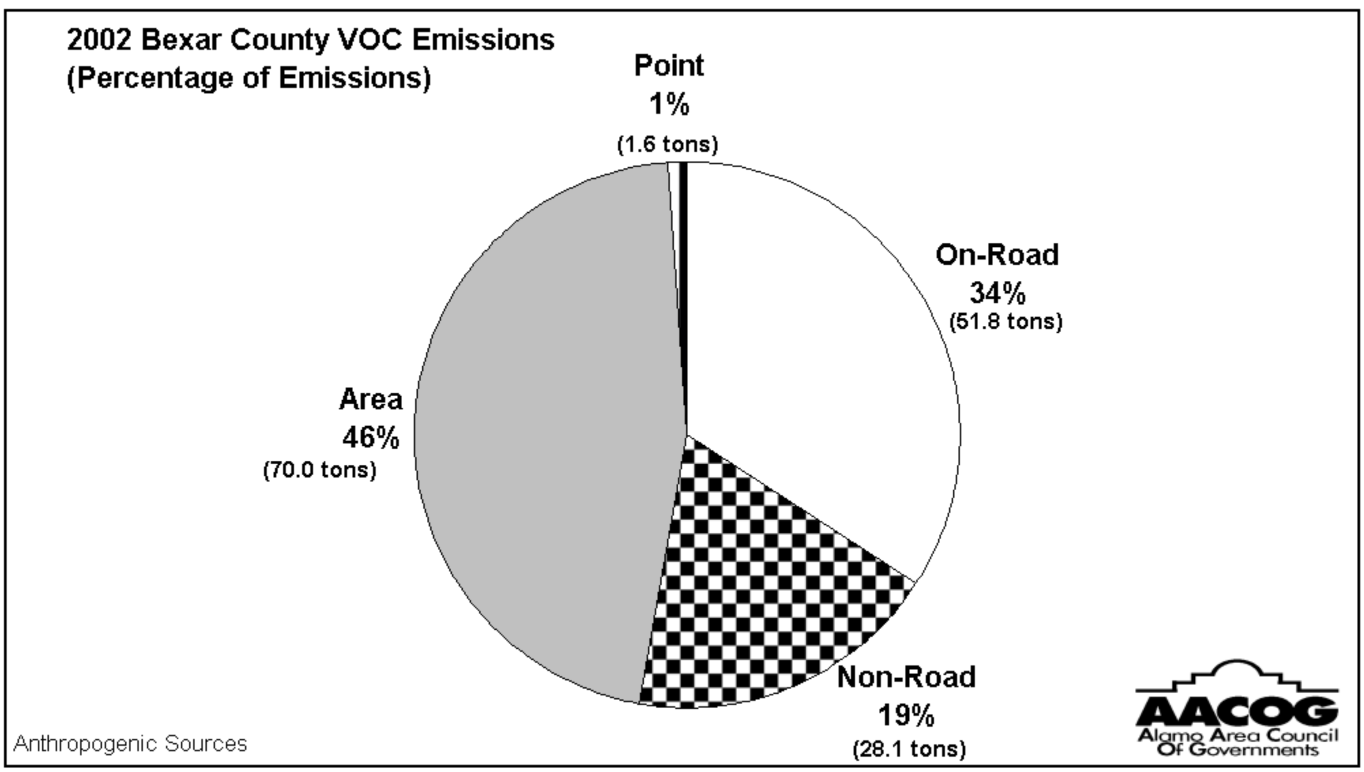


Figure 1-3. Surrounding Counties VOC Emissions

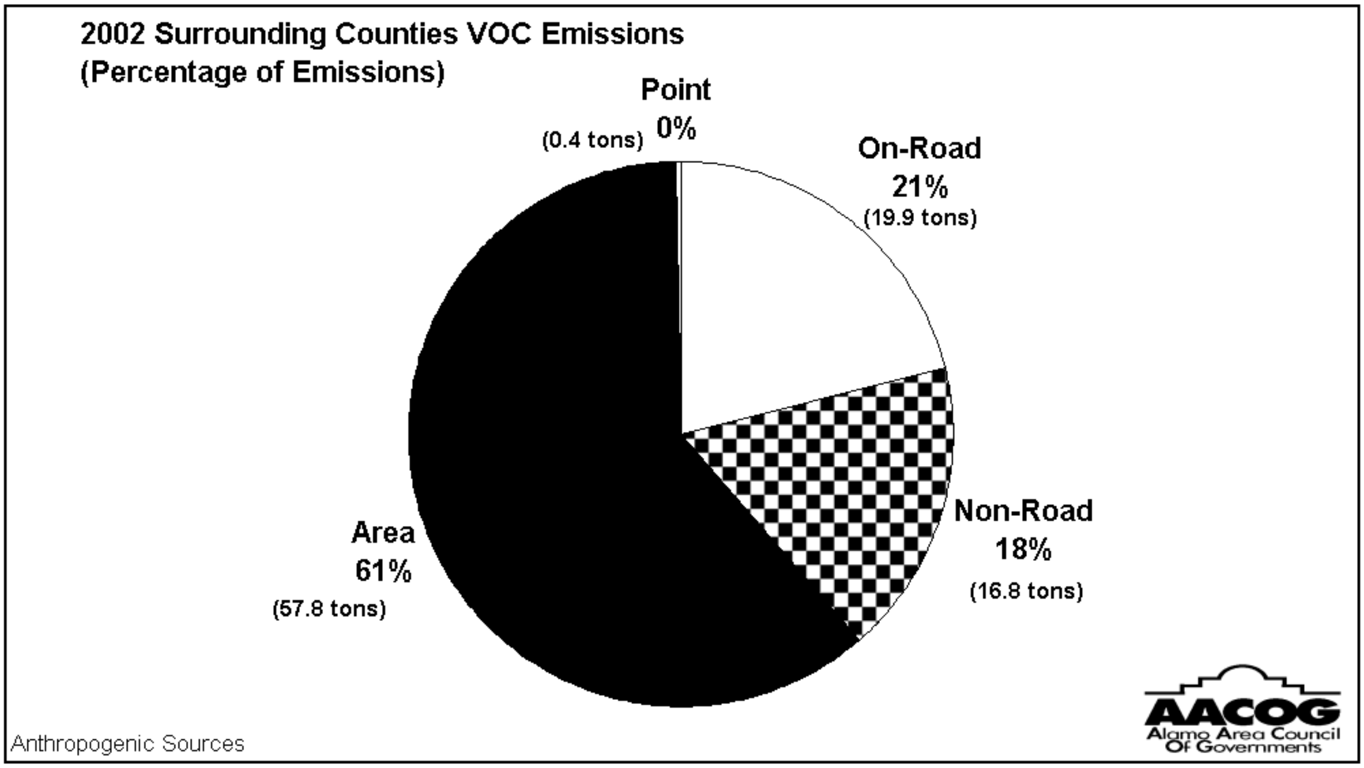



Figure 1-4. Bexar County NOx Emissions

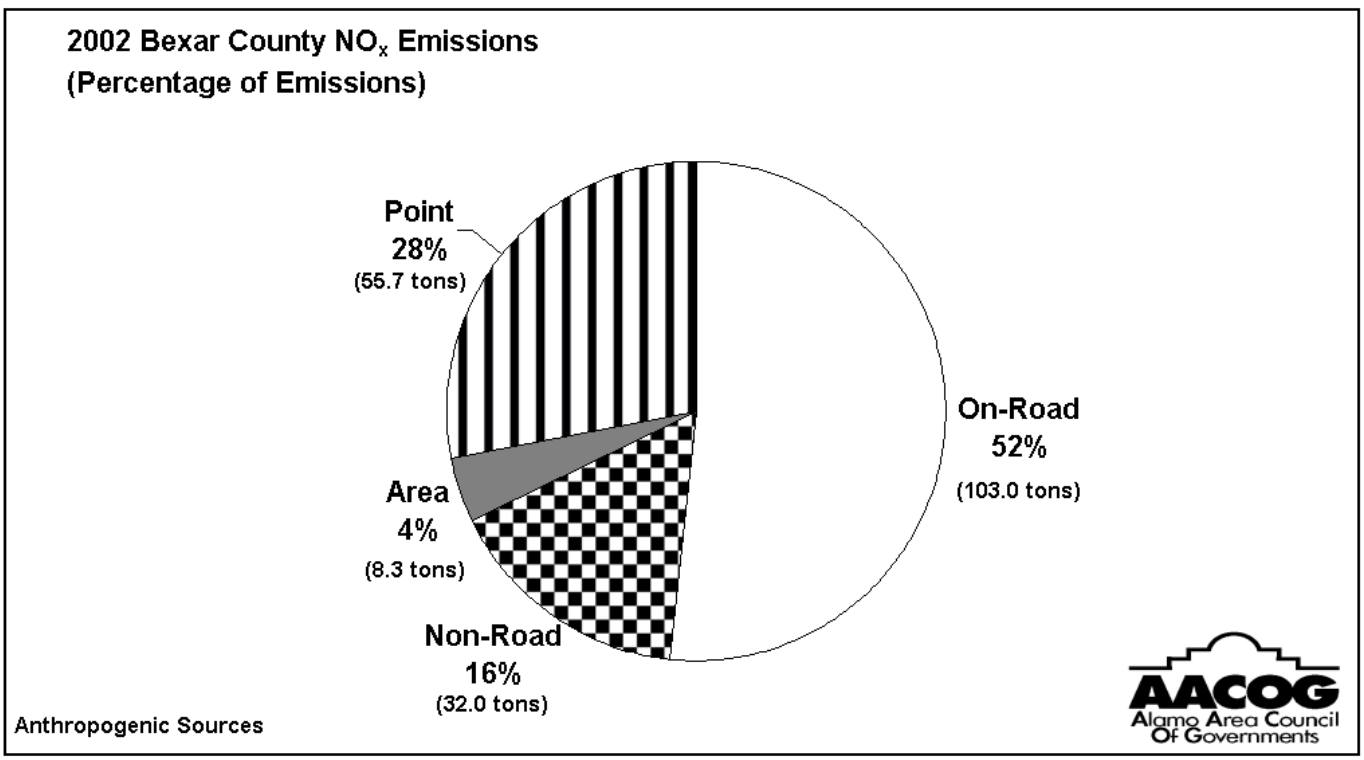


Figure 1-5. Surrounding Counties NOx Emissions

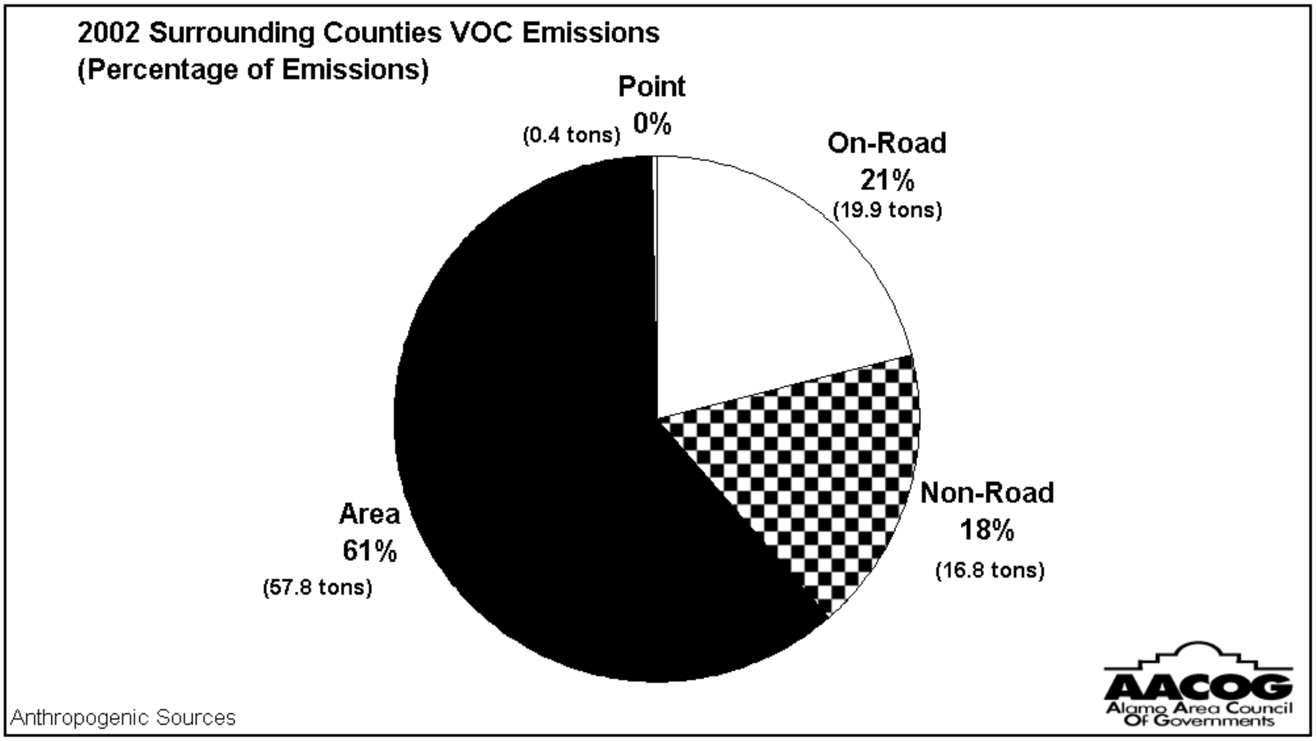



Figure 1-6. Bexar County CO Emissions

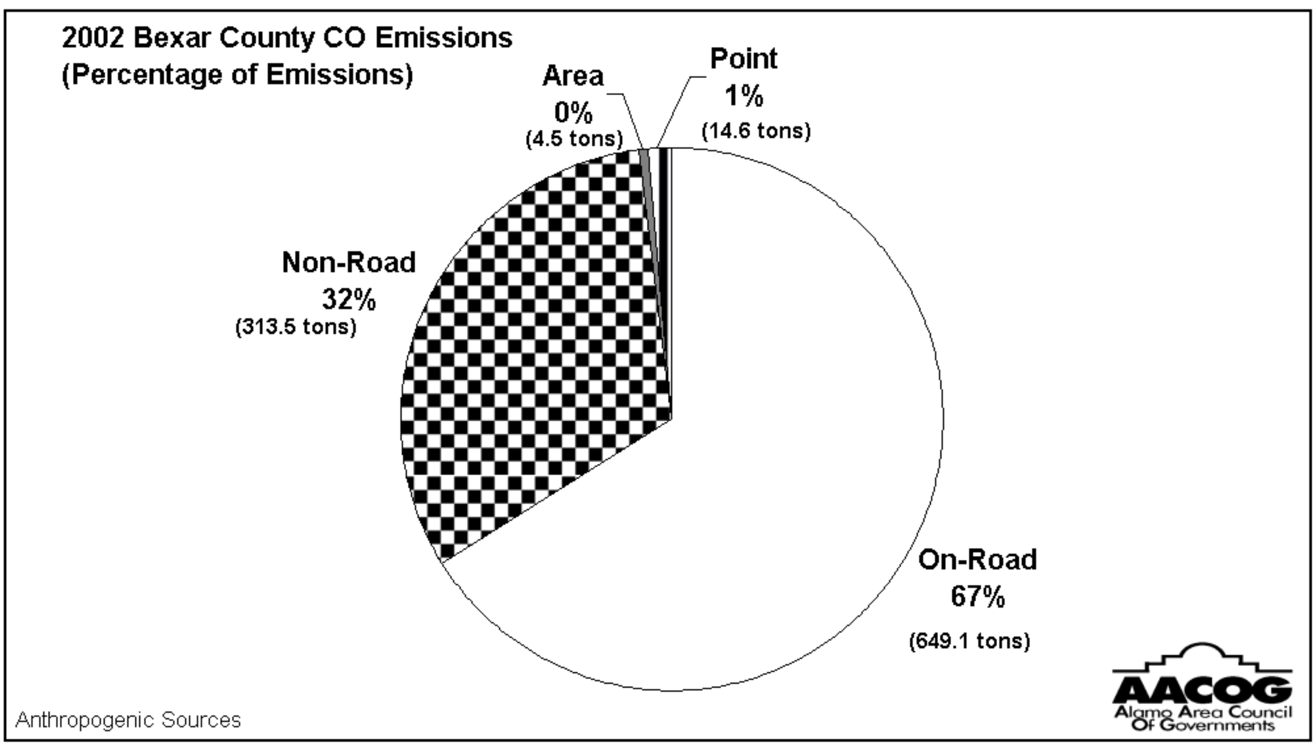


Figure 1-7. Surrounding Counties CO Emissions

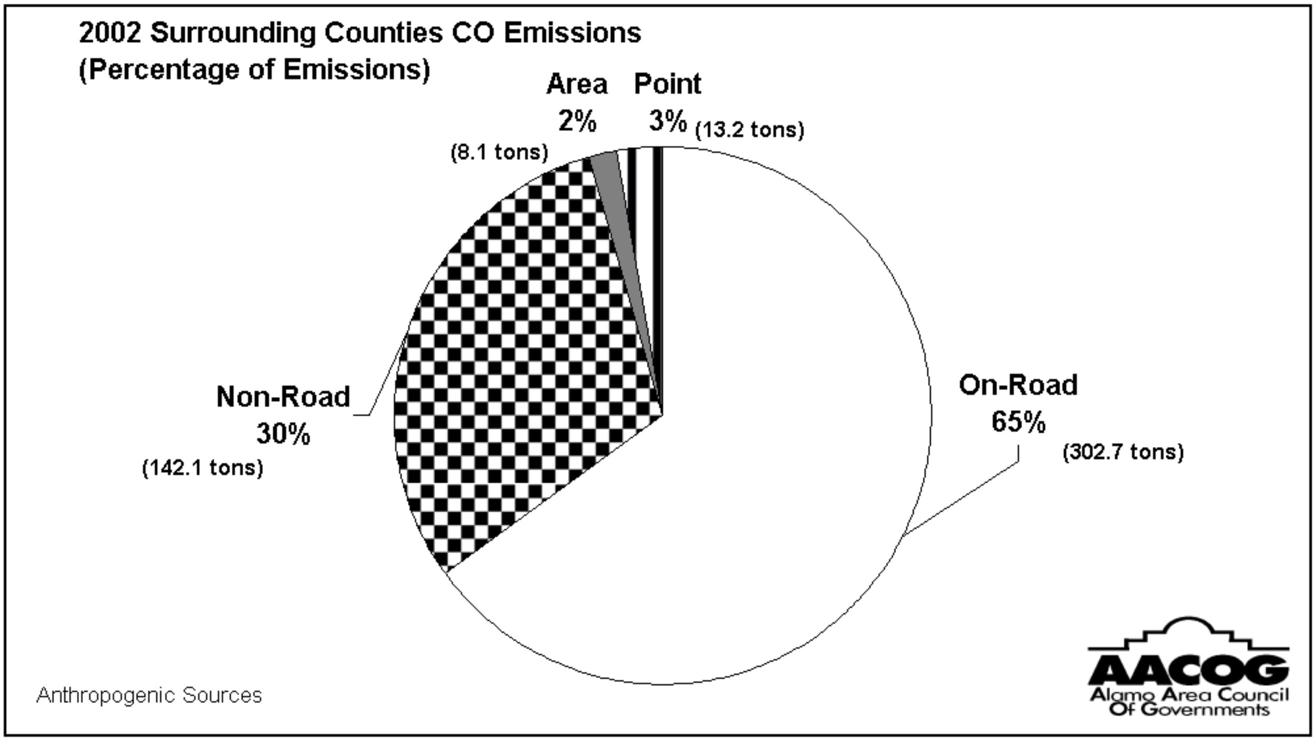


Table 1-1. 2002 VOC Emissions by Source Category for Each of the Counties (tons per day for Average Ozone Weekday)

| Category | Atascosa | Bandera | Bexar | Comal | Frio | Gillespie | Guadalupe | Karnes | Kendall | Kerr | Medina | Wilson | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| On-Road | 1.859 | 0.628 | 51.818 | 4.343 | 1.227 | 0.982 | 4.060 | 0.577 | 1.421 | 1.807 | 1.853 | 1.181 | 71.756 |
| Non-Road | 1.034 | 1.540 | 26.072 | 3.887 | 0.496 | 0.859 | 2.336 | 0.323 | 1.368 | 2.851 | 1.219 | 0.676 | 45.192 |
| Point | 0.025 | 0.007 | 1.553 | 0.063 | 0.009 | 0.000 | 0.122 | 0.157 | 0.001 | 0.000 | 0.000 | 0.001 | 1.938 |
| Airport/Military | 0.007 | 0.000 | 2.389 | 0.029 | 0.005 | 0.009 | 0.000 | 0.006 | 0.000 | 0.009 | 0.081 | 0.000 | 2.534 |
| Area | 6.994 | 0.813 | 69.714 | 4.329 | 4.757 | 1.844 | 12.037 | 2.720 | 7.741 | 2.228 | 8.454 | 5.893 | 127.524 |
| Biogenic | 72.566 | 80.973 | 63.598 | 42.042 | 85.375 | 49.316 | 38.831 | 51.516 | 49.423 | 61.105 | 95.321 | 48.360 | 738.424 |
| Total | 80.626 | 83.960 | 215.143 | 54.694 | 91.868 | 53.010 | 57.386 | 55.299 | 59.954 | 67.999 | 106.928 | 56.111 | 987.368 |

Table 1-2. 2002 NOx Emissions by Source Category for Each of the Counties (tons per day for Average Ozone Weekday)

| Category | Atascosa | Bandera | Bexar | Comal | Frio | Gillespie | Guadalupe | Karnes | Kendall | Kerr | Medina | Wilson | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| On-Road | 4.907 | 0.975 | 102.954 | 10.992 | 3.301 | 1.833 | 9.766 | 1.506 | 3.692 | 3.659 | 3.645 | 1.939 | 149.169 |
| Non-Road | 2.426 | 0.202 | 28.129 | 4.082 | 1.691 | 0.492 | 4.089 | 0.266 | 0.392 | 0.882 | 1.471 | 0.908 | 45.032 |
| Point | 0.722 | 2.771 | 55.685 | 11.436 | 0.528 | 0.000 | 4.010 | 0.070 | 0.000 | 0.000 | 0.000 | 0.000 | 75.221 |
| Airport/Military | 0.001 | 0.000 | 4.168 | 0.002 | 0.000 | 0.001 | 0.000 | 0.001 | 0.000 | 0.000 | 0.009 | 0.000 | 4.181 |
| Area | 2.248 | 0.106 | 8.031 | 0.507 | 0.822 | 0.236 | 1.969 | 1.012 | 0.161 | 0.168 | 1.266 | 1.500 | 18.026 |
| Biogenic | 5.400 | 2.713 | 3.745 | 1.590 | 5.602 | 3.440 | 2.978 | 3.723 | 2.225 | 3.757 | 5.132 | 3.891 | 44.196 |
| Total | 15.704 | 6.766 | 202.711 | 28.609 | 11.945 | 6.002 | 22.812 | 6.578 | 6.471 | 8.466 | 11.523 | 8.239 | 335.824 |

Table 1-3. 2002 CO Emissions by Source Category for Each of the Counties (tons per day for Average Ozone Weekday)

| Category | Atascosa | Bandera | Bexar | Comal | Frio | Gillespie | Guadalupe | Karnes | Kendall | Kerr | Medina | Wilson | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| On-Road | 29.234 | 8.885 | 649.056 | 65.770 | 20.733 | 15.045 | 59.814 | 8.076 | 23.533 | 27.065 | 28.403 | 16.183 | 951.797 |
| Non-Road | 10.858 | 9.905 | 295.702 | 28.574 | 4.375 | 7.751 | 27.356 | 3.866 | 8.887 | 19.440 | 10.793 | 6.676 | 434.182 |
| Point | 0.514 | 2.139 | 14.613 | 6.898 | 0.373 | 0.000 | 2.847 | 0.423 | 0.000 | 0.000 | 0.000 | 0.000 | 27.808 |
| Airport/Military | 0.060 | 0.000 | 18.414 | 0.224 | 0.046 | 0.081 | 0.000 | 0.103 | 0.000 | 0.008 | 1.533 | 0.000 | 20.469 |
| Area | 3.890 | 0.021 | 3.890 | 0.145 | 0.748 | 0.540 | 1.093 | 0.840 | 0.658 | 0.060 | 1.805 | 1.126 | 14.815 |
| Biogenic | 19.538 | 13.702 | 15.430 | 9.752 | 21.059 | 13.612 | 10.648 | 12.557 | 11.504 | 15.561 | 21.407 | 12.862 | 177.632 |
| Total | 64.094 | 34.652 | 997.105 | 111.363 | 47.335 | 37.029 | 101.757 | 25.864 | 44.582 | 62.133 | 63.941 | 36.847 | 1,626.702 |

# CHAPTER 2 – NON-ROAD EMISSIONS

## Agricultural Equipment

### Introduction

Agricultural equipment, along with other non-road engines, contribute to the air pollution problem in the AACOG region. Today's non-road engines meet modest emission requirements and therefore continue to emit large amounts of nitrogen oxides (NOx), which contribute to serious public health problems. Other ozone precursors emitted by agricultural equipment include volatile organic compounds (VOC) and carbon monoxide (CO).

Agricultural equipment emissions were inventoried by a variety of methods with the purpose of adequately quantifying the criteria pollutants emitted by various equipment types. These methods employed the use of the EPA's NONROAD 2004 model and crop data gathered from county extension offices and the USDA.

### Methodology

The 2002 AACOG Emissions Inventory includes 26 different types of equipment used for agricultural purposes in the 12-county region. Differing methodologies were employed when determining emissions for tractors and combines as compared to emissions from balers, agricultural mowers, and tillers for example. These methodologies will be explained in detail in this section.

In order to efficiently quantify emissions, crop specific data for each county was gathered. Crop information for the counties of Atascosa, Bexar, Comal, Frio, Guadalupe, Medina, and Wilson counties was obtained through the collaboration of the Texas Agricultural Extension Service County Extension Agent, from each county; the United States Department of Agriculture Farm Service Agency (USDA/FSA) director; and AACOG staff in the Farm Service office. [1] Crop acreage for the remaining AACOG counties were gathered from Volume I of the 2002 United States Department of Agriculture Census of Agriculture.[2]

---

[1] Alamo Area Council of Governments, Oct. 1999. 1996 Emission Inventory for the Alamo Area Council of Governments Region. San Antonio, Texas.

[2] United States Department of Agriculture, July 2004. National Agricultural Statistics Service, 2002. Agriculture Census: Volume I Geographic Area Series. Available online: http://www.nass.usda.gov/census/

Crop information gathered at the respective county extension offices involved the preparation of a map of each county created by AACOG staff with GIS software. The map contained the county road network along with cities, rivers, creeks and lakes. These features were necessary to orient the location of 4-km grid cells to their location on aerial photographs. The map was then overlaid with the statewide Urban Airshed Model (UAM) four-kilometer grid system with each grid cell marked with a unique numerical identifier.

The USDA/FSA maintains a complete set of aerial photographs of each county in 1:40,000 scale flown in a north to south direction with each print enlarged to approximately four square feet. The photographs were arranged in a grid that closely matched the UAM grid system making it relatively easy to relate the land usage in a photograph directly to each UAM grid square.

The aerial photograph was first matched to its corresponding grid square and the grid square boundaries established. Next, the County Agent and Director of the Farm Service Agency identified all agricultural activity ongoing in the aerial photograph using the field notes posted on the photographs and their extensive knowledge of the farm acreage and the crops cultivated to estimate the percent of land in each grid square being cultivated for:

- Sorghum
- Small Grains
- Corn
- Hay
- Peanuts
- Vegetables
- Cotton
- Other Crops (orchards, plant nursery's, etc.).

Additionally, estimates were made for each of the following which, when added to the crop information, provides an accurate account of the land usage in each grid square. The additional land uses estimated are:

- Urban development
- Range land – land left unimproved from its native condition, and
- Water – lakes.

Another source of information was soil surveys. With the AACOG map overlaid on the soil interpretive map, it became relatively easy to determine the location of known farming operations within each grid square and the exact crops cultivated within one percent of the four kilometer grid.

When necessary, a square template was cut with the inside made the exact size of the four-kilometer grid square by size to the scale of the aerial photographs. The template could be easily oriented upon the aerial photograph and only the contents of the grid square being surveyed in view. The aerial photographs were frequently marked with the cultivated fields, their size and case number making it easy for the agents to identify both the size of the cultivated fields and the crops grown on them.

The small grains, sorghum, corn and cultivated fields were first identified and sized, followed by hay meadows, then any special use land such as urban or water, and after all cultivated used defined, the remainder was determined to be "unimproved rangeland." The County Agent and the Resources Conservation Agent were almost always in agreement as to the size and use of fields.

As they determined the composition of each grid square they would dictate their estimate to a recorder who would enter the data into an Excel file such as the one below (Table 2-1):

Table 2-1. Typical Agricultural Grid Data Cell

| Cell Number | 29-48 |
|---|---|
| Range | 0.85 |
| Corn | 0.10 |
| Hay | |
| Peanuts | |
| Sorghum | 0.05 |
| Vegetables | |
| Cotton | |
| Small Grains | |
| Urban | |
| Water | |

In the cell above, the agricultural activity report shows 10% of the land in cell 29-48 was in corn production, 5% was in sorghum production, and the remainder 85% was not producing any commercial crops and was called "Range" as a default to ensure 100% of the land was accounted for.

**Agricultural Activity**

Agricultural activity involving the in-field use of farm machinery is linked to the crop being raised and the South-central Texas climate determines in which month cultivation activities occur. Each cultivation activity in this report was determined from the consensus of the agricultural experts based on their observations of farm activity over approximately the last 20 years. Table 2-2 describes the historical cultivation activity for each crop in this region.

Table 2-2. Typical Agricultural Activity by Month for the AACOG Region

| Agricultural Activity | | | | | |
|---|---|---|---|---|---|
| Crop | Plow | Plant | Fertilize | Cultivate | Harvest |
| Corn | Dec. | Feb. | Feb.-Apr. | Apr. | Jul. |
| Hay | Jan. | Mar. | Apr. | N/A | Jun.-Aug. |
| Peanuts | Apr. | Jun. | N/A | N/A | Sep.-Nov. |
| Small Grains | Sep. | Oct.-Dec. | Jan. | N/A | May |
| Sorghum | Jan. | Apr. | Mar. | May | Jul. |
| Vegetables | Activity is year around | | | | |

N/A = Not Applicable

The agents also provided information on the number of acres the average farmer could cover in one hour doing the plowing, planting, fertilizing, cultivating and harvesting operations. The following table 2-3 describes the time required to complete one acre of agricultural activity for each crop. These rates reflect the size, horsepower, and number of rows tilled by the typical tractor and combine in this region.

Table 2-3. Average Rate to Accomplish Each Agricultural Activity in the AACOG Region

| Agricultural Activity | | | | | |
|---|---|---|---|---|---|
| Crop | Plow | Plant | Fertilize | Cultivate | Harvest |
| Corn | 4 hrs/acre | 4 hrs/acre | 25 hrs/acre | 4 hrs/acre | 3 hrs/acre |
| Hay | 6 hrs/acre | 8 hrs/acre | N/A | N/A | 6 hrs/acre – cut<br>12 hrs/acre-rake<br>2 hrs/acre - bale |
| Peanuts | 5 hrs/acre | 5 hrs/acre | N/A | 8 hrs/acre | 1 hr/acre |
| Small Grains | 6 hrs/acre | 8 hrs/acre | 25 hrs/acre | N/A | 3 hrs/acre |
| Sorghum | 4 hrs/acre | 4 hrs/acre | 25 hrs/acre | 4 hrs/acre | 3 hrs/acre |
| Vegetables | Most work done by hand or small equipment | | | | |
| Cotton | No significant cotton produced in these counties | | | | |

N/A - Not Applicable

This crop specific data obtained from agricultural agents was used to calculate tractor and combine emissions.

**Off-Road Agricultural Equipment Inventory**

The NONROAD 2004 model was utilized to develop emissions for all other categories of agricultural equipment besides tractors and combines.[3] Separate runs were performed for each county to determine annual and weekday emissions.

Performing the NONROAD model runs involved entering county specific specifications in order to more accurately reflect the county's environment. One specification was the use of the appropriate Reid Vapor Pressure (RVP) used during the assessment of daily emissions during the summer months. Table 2-4 details the RVPs used for each county when estimating the ozone season daily emissions.

[3] U.S. Environmental Protection Agency, September 2004. NONROAD Model (nonroad engines, equipment, and vehicle). Available online: http://www.epa.gov/otaq/nonrdmdl.htm

Table 2-4. RVP used by the AACOG Counties During the Summer Months

| County | RVP 8.7 | RVP 7.8 |
|---|---|---|
| Atascosa | | X |
| Bandera | X | |
| Bexar | | X |
| Comal | | X |
| Frio | X | |
| Gillespie | X | |
| Guadalupe | | X |
| Karnes | | X |
| Kendall | X | |
| Kerr | X | |
| Medina | | X |
| Wilson | | X |

Other inputs entered into the NONROAD model included region specific minimum, maximum, and mean temperatures. Season specific temperatures were used to determine ozone season daily emissions and yearly specific temperatures were used to determine annual emissions.

**Tractor and Combine Emission Factors**

The NONROAD model was also utilized to develop the emission factors for the calculation of tractor and combine emissions. NONROAD runs were performed for the entire state of Texas with an RVP of 8.7 and with an RVP of 7.8. Once the runs were completed, the model's emissions output for hydrocarbons (HC), nitrogen oxides (NOx), and carbon monoxide (CO) was used along with equipment population and the average horsepower of gasoline and diesel tractors as well as diesel combines. Gasoline powered combines were not evaluated due to their very small population numbers in the state.

Average horsepower estimates for each tractor and combine engine-type were determined by taking the average number of equipment population (of each subtype of equipment) and multiplying the average population by the default average horsepower of the equipment subtype. The average horsepower for each equipment subtype was obtained from the activity file in the NONROAD model. This product was then divided by the total number of equipment, which accounts for all horsepower ranges for the equipment type.

Activity rates in hours per year and load factors were obtained from the NONROAD's default activity file. These data were then multiplied (for each different engine type) to arrive at an emission factor.

Emission Factor = (Tons/Yr. of Pollutant) x (Equipment Population) x (Activity Factor) x (Average Horsepower) x (Load Factor)

Table 2-5. Agricultural Equipment Performance and Emission Factors

| Agriculture Equipment Performance Factors | | | | | Calculated EF (g/hp-hr) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | RVP 7.8 | | | RVP 8.7 | | |
| Tractor | Avg. HP | Population | Load Factor | Activity Rate | HC EF | NOx EF | CO EF | HC EF | NOx EF | CO EF |
| 4-Stroke Tractor | 56.95 | 171.82 | 0.62 | 550 | 8.70 | 7.59 | 262.9 | 8.82 | 7.62 | 262.9 |
| Diesel Tractor | 132.04 | 92094.58 | 0.59 | 475 | 0.85 | 6.68 | 4.42 | 0.84 | 7.34 | 4.42 |
| Diesel Combine | 190.04 | 18579.65 | 0.59 | 150 | 0.84 | 12.61 | 3.35 | 0.60 | 9.57 | 3.35 |

Annual hours of equipment use were determined by multiplying the estimated number of acres for a crop with the estimated number of hours required to perform a certain action, such as cultivation or plowing. The number of hours required to complete these actions is listed in table 2-3. Tractors are used for cultivating, planting, plowing and fertilizing. Combines are used for harvesting. Once the time required to perform the activities had been determined, the hours for planting, plowing, fertilizing, and cultivating were summed to estimate total tractor use. The number of harvesting hours was used to determine combine use.

Seasonal allocation factors were applied to the annual activity rates to determine ozone season emissions. This was accomplished by identifying the agricultural activities that occurred during the ozone season. Activities that did not occur during the ozone season months were removed from the average weekday emission estimations.

Table 2-2 lists the month of the year in which agricultural activity occurs for each crop. Based on the information provided in this table, seasonal allocation factors were developed for ozone season emissions. For example, fertilization of corn only occurs during the months of February through April. Since the ozone season extends from April through October, approximately one-third of the activity is performed during ozone season. Therefore, one-third of the hours required for fertilization activity were included in the weekday ozone season emissions estimations as shown in table 2-6.

Table 2-6. Rate to Accomplish Each Agricultural Activity in the AACOG Region During Ozone Season

| Agricultural Activity | | | | | |
|---|---|---|---|---|---|
| Crop | Plow | Plant | Cultivate | Fertilize | Harvest |
| Corn | 0 hrs/acre | 0 hrs/acre | 4 hrs/acre | 8.25 hrs/acre | 3 hrs/acre |
| Hay | 0 hrs/acre | 0 hrs/acre | 0 hrs/acre | 0 hrs/acre | 6 hrs/acre – cut<br>12 hrs/acre-rake<br>2 hrs/acre - bale |
| Peanuts | 5 hrs/acre | 5 hrs/acre | 0 hrs/acre | 8 hrs/acre | 0.66 hr/acre |
| Small Grains | 6 hrs/acre | 2.64 hrs/acre | 0 hrs/acre | N/A | 3 hrs/acre |
| Sorghum | 0 hrs/acre | 4 hrs/acre | 4 hrs/acre | 4 hrs/acre | 3 hrs/acre |
| Vegetables | Most work done by hand or small equipment | | | | |
| Cotton | No significant cotton produced in these counties | | | | |

Calculating ozone season emission estimates involves using an annual activity rate. The annual activity rate for agricultural equipment is 170 days per year.

**Sample Calculation**

Comal County has 3,211 acres of sorghum farmland. By using the activity rates given in table 2-3, total hours of equipment usage can be determined.

Plowing: 3211 acres / 4 hours/acre = 803 hours
Planting: 3211 acres / 4 hours/acre = 803 hours
Cultivating: 3211 acres / 4 hours/acre = 803 hours
Fertilizing: 3211 acres / 25 hours/acre = 128 hours
Harvesting: 3211 acres / 3 hours/acre = 1,070 hours

Total time for tractor = Plowing Hrs + Planting Hrs + Cultivating Hrs + Fertilizing Hrs
803 + 803 + 803 + 128 = 2,537 hours

Total time for combine = Harvesting Hrs
= 1,070 hours

Annual NOx Emissions for Diesel Tractor
Total time for tractor x Diesel Tractor Emission Factor x LF x Avg. HP x Fuel Use Ratio
2,537 hrs x 7.33 x 0.59 x 132 x 0.9981 = 1,447,820 g/yr. NOx

Convert grams to kilograms, multiply by pounds in a kilogram, and divide by pounds per ton.
1,447,820 g/yr. / 1,000 g/kg * 2.205 lb/kg / 2,000 lb/ton = 0.19211 tons/year NOx

Daily Ozone Season Emissions
Use activity rates listed in table 2-5 to account for activity during the ozone season.

Plowing: 3,211 acres / 0 hours/acre = 0 hours
Planting: 3,211 acres / 4 hours/acre = 803 hours
Cultivating: 3,211 acres / 4 hours/acre = 803 hours
Fertilizing: 3,211 acres / 0 hours/acre = 0 hours
Harvesting: 3,211 acres / 3 hours/acre = 1,070 hours

Total time for tractor = Plowing Hrs + Planting Hrs + Cultivating Hrs + Fertilizing Hrs
0 + 803 + 803 + 0 = 1,606 hours

Ozone Season Daily VOC Emissions for 4-Stroke Gasoline Tractor
Total time for tractor x 4-Stroke Tractor Emission Factor x LF x Avg HP x Fuel Use Ratio
1,060 hrs x 8.70 x 0.62 x 57 x 0.0019 = 857 g/yr. VOC

Convert grams to kilograms, multiply by pounds in a kilogram, and divide by pounds per ton.
857 g/yr. / 1,000 g/kg * 2.205 lb/kg / 2,000 lb/ton = 0.00945 tons/ozone season VOC

Divide the ozone season tonnage by an activity rate of 170 days.
0.000945 tons/ozone season / 170 days/ozone season = 0.00001 tons/day VOC

## Construction Equipment

### Introduction

The equipment of concern in this study is diesel construction equipment. This category does not include landfill or quarry equipment. The methodologies to calculate landfill and quarry equipment emissions are discussed in other sections. The following is a list of diesel construction equipment and their corresponding source classification codes.

- 2270002003 Pavers
- 2270002009 Plate Compactors
- 2270002015 Rollers
- 2270002018 Scrapers
- 2270002021 Paving Equipment
- 2270002024 Surfacing Equipment
- 2270002027 Signal Boards/Light Plants
- 2270002030 Trenchers
- 2270002033 Bore/Drill Rigs
- 2270002036 Excavators
- 2270002039 Concrete/Industrial Saws
- 2270002042 Cement & Mortar Mixers
- 2270002045 Cranes
- 2270002048 Graders
- 2270002051 Off-highway Trucks
- 2270002054 Crushing/Proc. Equipment
- 2270002057 Rough Terrain Forklifts
- 2270002060 Rubber Tire Loaders
- 2270002063 Rubber Tire Tractor/Dozers
- 2270002066 Tractors/Loaders/Backhoes
- 2270002069 Crawler Tractor/Dozers
- 2270002072 Skid Steer Loaders
- 2270002075 Off-Highway Tractors
- 2270002078 Dumpers/Tenders
- 2270002081 Other Construction Equipment

### Methodology

The methodology used in producing construction equipment emission estimates for the AACOG region is based on a methodology developed for the Houston area and national data used in the EPA's NONROAD 2004 Emission Inventory Model. The methodology involved:

1. Developing surrogate factors to estimate diesel equipment population, usage rates, and equipment characteristics.

2. Estimating VOC, NOx, and CO annual emissions from diesel equipment by inputting local data into the NONROAD model and converting the tons/year estimate into an estimate for a typical weekday (tons/day) for the summer or ozone season.

3. Estimating VOC, NOx, and CO annual emissions from gasoline equipment by inputting local data into the NONROAD model and converting the tons/year estimate into an estimate for a typical weekday (tons/day) for the summer or ozone season.

**Step 1: Development of Surrogate Factors**

To calculate the construction equipment population, surrogate factors were used to adjust equipment populations from a Houston-Galveston study conducted by Eastern Research Group (ERG).[4] This methodology was also used in two other studies conducted by ERG for the CAPCO and DFW regions. To determine surrogate factors for the AACOG region, the Houston-Galveston data was divided into industry sectors that facilitated comparisons of industry trends and other data closely related to equipment populations. The surrogate factors are listed in table 2-7 and the methodologies to calculate the values are detailed below.

[4] Eastern Research Group, Inc. April 20, 2000. Development of a Revised Emissions Inventory for Construction Equipment in the Houston-Galveston Ozone Non-Attainment Area. Final Report. Eastern Research Group Inc.

Table 2-7. Diesel Construction Equipment – Surrogate Factors by Sector, 2002

| Sector | Method | Source | Factor |
|---|---|---|---|
| HIGHWAY | TxDOT Lettings | TxDOT | 0.3978 |
| UTILITY | 12 County AACOG Population | 2002 TWDB | 0.4184 |
| MUNICIPAL | 12 County AACOG Population | 2002 TWDB | 0.4184 |
| COMMERCIAL | Construction Employees Population (NAICS 23) | 2001 County Business Patterns | 0.3520 |
| RESIDENTIAL | Family Dwelling Building Permits | Texas A&M Real Estate Center | 0.3923 |
| RENTAL | Construction Rental Employees (NAICS 53249 & 42181) | 2001 County Business Patterns | 0.2835 |

* Full citations are provided under each section below

Highway

AACOG obtained highway construction lettings from the Texas Department of Transportation.[5]. The dollar amounts for lettings in the 12-county AACOG region were totaled and the surrogate factor was calculated.

Surrogate Factor = 2002 12-County AACOG Highway Construction Lettings / 1999 8-County Houston Highway Construction Lettings
Surrogate Factor = $250,421,750 / $629,586,701
Surrogate Factor = 0.3978

Utility

Due to time and budget limitations, AACOG was unable to collect utility bid information as was done in the Houston and Dallas studies. Alternatively, the 12 county AACOG population was used to calculate the surrogate factor. The 2002 county populations were obtained from the Texas Water Development Board.[6]

Surrogate Factor = 2002 12-County AACOG Population / 1999 8-County Houston MSA Population
Surrogate Factor = 1,878,671 / 4,490,310

[5] Texas Department of Transportation. Sept. 5, 2002. Funding Year 2002 State Expenditures by County, Finance Division, Austin, Texas.
[6] Texas Water Development Board, April 2004. Population Projections 1990-2050, Most Likely Scenario. Austin, TX.

Surrogate Factor = 0.4184

Municipal

The surrogate factor developed for municipal construction equipment was also based on population using the same methodology discussed in the Utility section above.

Commercial

Ideally, the use of non-residential building permit values from the Texas A&M Real Estate Center were to be used in the calculation of a surrogate value. However, since data beyond 1995 is no longer updated, an alternative was needed. Due to the high variations and fluctuations (on both the year-to-year and long term basis) in data for the San Antonio area prior to 1995, it was decided that no trend could be established with enough accuracy for use in this study.

The population of construction employees (NAICS 23) was used for the calculation instead. Employee populations for the 12-county AACOG region were obtained from the US Census Bureau's 2001 County Business Patterns.[7] This was the latest data available.

To avoid individual company disclosure, company-based employee population data for Chambers County in Houston was withheld from outside use. Nevertheless, an average population was calculated by using available data that broke down the number of establishments into employee population categories; 1-4, 5-9, 10-19, 20-49, 50-99, 100-249, 250-499, 500-999, and 1,000+ employees. The total population in each category was calculated by taking the midpoint employment of each employment category and multiplying it by the number of establishments. The resulting total for each category was added together to determine total county employment.

Surrogate Factor = AACOG 12 County 2001 commercial construction employees / 1999 8-County Houston MSA commercial construction employees

Surrogate Factor = 54,205 / 153,981

Surrogate Factor = 0.3520

Residential

The number of 2002 single-family dwelling permits for Bexar, Comal, Guadalupe, and Wilson were used as a comparison to calculate the factor for this category. Although the

[7] U.S. Census Bureau, April 19, 2004. County Business Patterns 2001. Available online: http://censtats.census.gov/cgi-bin/cbpnaic/cbpsel.pl . US Department of Commerce. Washington, DC.

data was not available for the other eight counties in the AACOG region, these other counties had insignificant building permits issued. The data was collected from the Texas A&M Real Estate Center.[8]

Surrogate Factor = 2002 4-County area single-family housing building permits / 1999 8-County Houston MSA single-family housing building permits

Surrogate Factor = 12,784 / 32,585

Surrogate Factor = 0.3923

Rental

To produce a surrogate factor for rental equipment, the employee populations for NAICS 42181 and 53249 were obtained for the 12-county AACOG area from the US Census Bureau's 2001 County Business Patterns.[9] This was the latest available data. The descriptions for the these industry classifications are:

NAICS 42181; Construction and Mining (Except Petroleum) Machinery and Equipment
NAICS 53249; Other Commercial and Industrial Machinery and Equipment Rental and Leasing

As with Chambers County in the commercial equipment section, some county employee totals were unavailable in order to avoid company disclosure. However, the same methodology that was used with Chambers County to calculate employee estimates was followed in this section as well.

Counties where exact employee populations were unavailable:

12-County AACOG Area

- Kendall (NAICS 42181)
- Comal (NAICS 53249)
- Guadalupe (NAICS 53249)
- Medina (NAICS 53249)

Houston

- Chambers (NAICS 42181 & 53249)
- Galveston (NAICS 42181)
- Fort Bend (NAICS 53249)
- Liberty (NAICS 53249)

[8] Real Estate Center at Texas A&M University, April 20, 2004. Metropolitan Residential Building Permit Activity, Available online: http://recenter.tamu.edu/data/bpm/

[9] U.S. Census Bureau, April 19, 2004. County Business Patterns 2001. Available online: http://censtats.census.gov/cgi-bin/cbpnaic/cbpsel.pl . US Department of Commerce. Washington, DC.

- Montgomery (NAICS 53249)

Surrogate Factor = 2001 12-County AACOG Employees (NAICS 42181 & 53249) / 1999 8-County Houston Employees (NAICS 42181 & 53249)
Surrogate Factor = 1,421 / 5,013
Surrogate Factor = 0.2835

<u>Additional Equipment Under 25 horsepower</u>
In order to maintain consistency in a comparison between construction equipment inventories, it was necessary for AACOG to add back in the less-than-25 horsepower category not included in the study. Using the same methodology utilized for the Austin area study, equipment population defaults were taken from the NONROAD 2004 model to determine the fraction of total construction equipment in the 12-County AACOG Area. According to the NONROAD file, there were 12,615 engines under 25 horsepower in Texas. Therefore, 8% of the Texas equipment population was allocated to the 12-county AACOG area.

**Step 2: Estimating Emissions of Ozone Precursors from Diesel Construction Equipment**
Once county level equipment populations were calculated, emissions of volatile organic compounds (VOC), nitrogen oxides (NOx), and carbon monoxide (CO) were calculated using NONROAD 2004. This model is used to estimate past, current, and future inventories for most nonroad equipment categories. The model produces emission estimates for all criteria pollutants, as well as carbon dioxide, down to the county level. In using the NONROAD model, the some adjustments were made for local conditions.

*Population File*
Once all surrogate factors were calculated, they were applied to spreadsheets with the Houston values for equipment population. The populations for each equipment category summed and compiled into a master spreadsheet. This master spreadsheet was then converted into the population file for the NONROAD 2004 model.

*Allocation File*
An allocation file was made to properly allocate emissions for each county. The file was created by taking the default construction allocation file for Texas (Tx_const.alo) and replacing values (dollars spent on construction) with zeros for all counties except those in the study area. The values for the AACOG region were added up and used to replace the value for the entire State of Texas state. This allowed the NONROAD model to calculate emissions for the AACOG region as a whole and distribute the emissions to each county appropriately.

*Activity File*

Because of the extensive study done in the Houston area, the same activity file was used in the San Antonio study.

**Step 3: Estimating Emissions of Ozone Precursors from Gasoline Construction Equipment**

Gasoline Construction Equipment emissions within the 12-county AACOG region were calculated through the use of the EPA's NONROAD Emission Inventory Model.[10] The model contains several parameters that can be adjusted to fit desired scenarios. For the purposes of this EI, the following parameters were used to produce a separate run for each county in the AACOG region.

*Options*

| | |
|---|---|
| Fuel RVP for gas | : Varies by County (see below) |
| Atascosa, Bandera, Bexar, Comal, Guadalupe, Wilson | : 7.8 psi |
| Frio, Gillespie, Karnes, Kerr, Kendall, Medina[11] | : 8.7 psi |
| Oxygen Weight % | : Default |
| Gas Sulfur % | : Default |
| Diesel Sulfur % | : Default |
| CNG/LPG Sulfur % | : Default |
| Minimum Temp (F) | : 69.4 |
| Maximum Temp (F) | : 87.8 |
| Average Temp (F)[12] | : 78.2 |
| Stage II Control % | : Default |

*Period*

| | |
|---|---|
| Period | : Seasonal |
| Type | : Typical Day |
| Year of Episode | : 2002 |
| Season | : Summer |
| Month | : |
| Day | : Weekday |

*Region*

| | |
|---|---|
| Region Level | : County |

---

10 U.S. Environmental Protection Agency, April 2004. National Nonroad Emissions Model: Draft Version. Ann Arbor, MI.

11 Texas Transportation Institute June 2003. San Antonio Metropolitan Statistical Area On-Road Mobile Source Modeling Emissions Inventories: 1999, 2007, and 2012. College Station, TX: TTI – The Texas A&M University System

These parameters were used for each county to produce an emissions report in tons/day for a typical summer weekday, and for each type of equipment. For the purposes of this EI the NONROAD Model was run for the 2002 summer season. For the annual total, the NONROAD model was run for an annual period with the temperatures of 58.5, 79.3, and 68.6 (F).

## Industrial Equipment

### Introduction

The 2002 industrial equipment emissions inventory includes emission estimates from the use of aerial lifts, forklifts, sweepers/scrubbers, other general industrial equipment, other material handling equipment, refrigeration units, and terminal tractors in the 12-county AACOG region. For each industrial equipment category, emissions were calculated for a variety of engine types: 2-stoke gasoline, 4-stroke gasoline, LPG, CNG, and diesel.

### Methodology

Light industrial equipment emissions were estimated using local survey data in conjunction with EPA's NONROAD model. The local data were obtained by mailing questionnaires of equipment use to businesses, government agencies, and schools throughout the AACOG region. The survey, a copy of which is attached at the end of this section, requested that the respondent provide information regarding the types and quantities of equipment in use, equipment horsepower (HP) ratings, activity levels, and other data. The results of the surveys were used to modify appropriate NONROAD files such as the equipment activity file, equipment population file, and seasonal adjustment file (table 2-8) in preparation for conducting the industrial equipment runs.

---

[12] *Ibid*.

Table 2-8. Data Obtained through Local Surveys and Corresponding NONROAD files Modified Using the Survey Data.

| NONROAD File | Factor Modified Using Survey Data |
|---|---|
| ACTIVITY.DAT | Avg Total Hrs/Yr. Use Per Unit |
| Allocation Files | No Modification |
| Deterioration Factor Files | No Modification |
| Emissions Factor Files | No Modification |
| Growth Files | No Modification |
| TX.POP | Avg. HP per Unity |
| SEASON.DAT | Weekday & Weekend Allocations |
| Technology Files | No Modification |

Prior to calculating activity levels, average HP, and temporal allocations using local data, it was determined that the response rate to the 2002 equipment survey was too low to qualify as a representative sample of the population of industrial equipment users in the AACOG region. At a 95% confidence level and 8% confidence interval (for sampling accuracy), seventy responses were needed to adequately represent the population of 128 businesses in the area that were identified as industrial equipment operators[13]. This determination was made by using the equation:

$$n = \frac{Z^2 (0.25) N}{Z^2 (0.25) + (N - 1) C^2p}$$

where,

Z = 1.96 - for a 95% confidence level

N = population size - 128

Cp = .08 - for a ± 8% confidence interval

n = sample size

therefore,

$$n = \frac{(1.96)^2 (0.25) (128)}{(1.96)^2 (0.25) + (128 - 1) (0.08)^2}$$

n = 70

[13]Texas Workforce Commission, 2002. Employment Data for 3rd quarter 2001. Austin, Texas.

AACOG received 50 responses to the 2002 industrial equipment questionnaire. In order to use an adequate number of survey responses, the 2002 data were combined with information from a similar survey conducted by AACOG in 1995. It was assumed the types of industrial equipment used by business and industry would not have changed greatly between 1995 and 2002. The 1995 survey data from companies who also responded to the 2002 survey were removed from the calculations to avoid double-counting.

**Sample Calculation**

Equipment Activity Levels:

Annual activity levels were determined for each equipment category by summing the 1995 and 2002 annual activity responses for an equipment type, and dividing the total by the number of equipment listed in the 1995 and 2002 surveys for that SCC. The local activity levels were used to update NONROAD's activity.dat file. Similarly, the average weekday and weekend hours of use were calculated by summing the weekday or weekend usage for each type of equipment listed in the survey responses and dividing by the number of equipment in that SCC category. The sample averages were calculated using the formula:

$$\check{y} = \frac{1}{n} \Sigma y_i$$

Where,

$y_i$ = observation (activity level) and

n = number of samples (equipment)

*Weekday / Weekend Allocation Factors*

To develop weekday and weekend allocation factors for NONROAD's season.dat file from the survey data, the percentage of weekday hours or weekend hours to total hours were calculated for each SCC and the resulting fraction was divided by either 5 (weekdays) or 2 (weekend days) using the formulas:

$$\frac{(\text{Average hours/weekday per SCC * 5})}{(\text{Avg hours/weekday per SCC *5}) + (\text{Avg hours/weekend day per SCC *2})} \Big/ 5$$

for weekdays and

$$\frac{(\text{Average hours/weekend day per SCC * 2})}{(\text{Avg hours/weekday per SCC *5}) + (\text{Avg hours/weekend day per SCC *2})} \Big/ 2$$

for weekend days.

As an example, the average hours of use for 4-stroke gasoline forklifts as calculated from the combined 1995 and 2002 AACOG surveys were 3.833486 hours each weekday and 1.829290 hours each weekend day. The temporal allocation factors for the 4-stroke forklifts were calculated as:

$$\frac{3.833486 * 5}{(3.833486 * 5) + (1.829290 * 2)} \Big/ 5 \quad = \text{ 0.1679438 weekday allocation factor}$$

$$\frac{1.829290 * 2}{(3.833486 * 5) + (1.829290 * 2)} \Big/ 2 \quad = \text{ 0.0801406 weekend day allocation}$$

Table 2-9 compares NONROAD's default day-of-the-week adjustment factors with those calculated from the survey data.

Table 2-9. Comparison of Default and Modified Temporal Allocation Data.

| SCC | Equipment | Engine Type | Default NONROAD Day of Week Adjustment (Mon-Fri) | Day of Week Adjustment Factor (Mon-Fri) | Default NONROAD Day of Week Adjustment (Sat-Sun) | Day of Week Adjustment Factor (Sat-Sun) |
|---|---|---|---|---|---|---|
| 2265003010 | Aerial Lifts | Gas, 4-cycle | 0.1666667 | 0.1999389 | 0.0833334 | 0.0001528 |
| 2267003010 | Aerial Lifts | LPG | 0.1666667 | No Change | 0.0833334 | No Change |
| 2270003010 | Aerial Lifts | Diesel | 0.1666667 | 0.1897917 | 0.0833334 | 0.0255207 |
| 2265003020 | Forklifts | Gas, 4-cycle | 0.1666667 | 0.1679438 | 0.0833334 | 0.0801406 |
| 2267003020 | Forklifts | LPG | 0.1666667 | 0.1797282 | 0.0833334 | 0.0506795 |
| 2268003020 | Forklifts | CNG | 0.1666667 | No Change | 0.0833334 | No Change |
| 2270003020 | Forklifts | Diesel | 0.1666667 | 0.1962715 | 0.0833334 | 0.0093212 |
| 2260003030 | Sweepers/Scrubbers | Gas, 2-cycle | 0.1666667 | No Change | 0.0833334 | No Change |
| 2265003030 | Sweepers/Scrubbers | Gas, 4-cycle | 0.1666667 | 0.1788199 | 0.0833334 | 0.0529503 |
| 2267003030 | Sweepers/Scrubbers | LPG | 0.1666667 | 0.1541158 | 0.0833334 | 0.1147106 |
| 2268003030 | Sweepers/Scrubbers | CNG | 0.1666667 | No Change | 0.0833334 | No Change |
| 2270003030 | Sweepers/Scrubbers | Diesel | 0.1666667 | 0.2000000 | 0.0833334 | 0.0000000 |
| 2260003040 | Other General Ind Equip | Gas, 2-cycle | 0.1666667 | No Change | 0.0833334 | No Change |
| 2265003040 | Other General Ind Equip | Gas, 4-cycle | 0.1666667 | No Change | 0.0833334 | No Change |
| 2267003040 | Other General Ind Equip | LPG | 0.1666667 | No Change | 0.0833334 | No Change |
| 2268003040 | Other General Ind Equip | CNG | 0.1666667 | No Change | 0.0833334 | No Change |
| 2270003040 | Other General Ind Equip | Diesel | 0.1666667 | No Change | 0.0833334 | No Change |
| 2265003050 | Other Matl Handling Eq | Gas, 4-cycle | 0.1666667 | No Change | 0.0833334 | No Change |
| 2267003050 | Other Matl Handling Eq | LPG | 0.1666667 | No Change | 0.0833334 | No Change |
| 2270003050 | Other Matl Handling Eq | Diesel | 0.1666667 | No Change | 0.0833334 | No Change |
| 2265003060 | Refrigeration | Gas, 4-cycle | 0.1428571 | No Change | 0.1428571 | No Change |
| 2268003060 | Refrigeration | CNG | 0.1428571 | No Change | 0.1428571 | No Change |
| 2270003060 | Refrigeration | Diesel | 0.1428571 | No Change | 0.1428571 | No Change |
| 2265003070 | Terminal Tractors | Gas, 4-cycle | 0.1666667 | No Change | 0.0833334 | No Change |
| 2267003070 | Terminal Tractors | LPG | 0.1666667 | No Change | 0.0833334 | No Change |
| 2268003070 | Terminal Tractors | CNG | 0.1666667 | No Change | 0.0833334 | No Change |
| 2270003070 | Terminal Tractors | Diesel | 0.1666667 | 0.1688404 | 0.0833334 | 0.0778990 |

*Average Horsepower and Equipment Population:*

Average horsepower ratings for each equipment type were determined from the survey data based on the HP ranges used in the 2004 version of the NONROAD model. The average HP ratings per range were calculated employing the same formula used to determine average equipment activity levels. NONROAD's TX_pop file was modified by changing the model's default average HP for each bin in an equipment category to the average HP within that range as calculated from the combined 1995 and 2002 survey data.

In the absence of an appropriate methodology to grow the 1995 equipment population to the year 2002, the *total* equipment population for each SCC (the sum of equipment in all HP ranges for an equipment category in NONROAD's default file) was not updated in the equipment population file. However, the population for the individual HP ranges were modified by allocating the total population for each equipment type in the default file to a horsepower bin based on the percentage of equipment in the range as determined from the 1995 and 2002 survey results. If there were no pieces of equipment listed in the 1995 or 2002 surveys for a HP range, the population for the bin was changed to 0.0.

Several types of light industrial equipment, such as CNG terminal tractors, were not reported in either the 1995 or 2002 survey results. For instances such as these, the default HP, activity levels, and daily allocation factors were left unmodified from the default data.

Table 2-10 provides a sample of the output generated for industrial equipment use in an AACOG county during 2002. The output is provided in tons of emissions per year.

Table 2-10. Estimated Annual Emissions from Industrial Equipment Operated in Medina County in 2002.

| SCC | Equipment | Engine Type | VOC (TPY) | NOx (TPY) | CO (TPY) |
|---|---|---|---|---|---|
| 2260003030 | Sweepers / Scrubbers | 2 Stroke | 0.11273 | 0.00042 | 0.25860 |
| 2260003040 | Other General Industrial Equipment | 2 Stroke | 0.00698 | 0.00003 | 0.01615 |
| 2265003010 | Aerial Lifts | 4 Stroke | 5.34525 | 5.45248 | 138.86249 |
| 2265003020 | Forklifts | 4 Stroke | 0.91420 | 0.94397 | 21.77471 |
| 2265003030 | Sweepers / Scrubbers | 4 Stroke | 1.01240 | 0.81484 | 31.16227 |
| 2265003040 | Other General Industrial Equipment | 4 Stroke | 1.86619 | 0.30461 | 49.54852 |
| 2265003050 | Other Material Handling Equipment | 4 Stroke | 0.05061 | 0.03731 | 1.67306 |
| 2265003060 | AC\Refrigeration | 4 Stroke | 0.01836 | 0.00554 | 1.04348 |
| 2265003070 | Terminal Tractors | 4 Stroke | 0.19030 | 0.20060 | 4.66133 |
| 2265010010 | Other Oil Field Equip | 4 Stroke | 0.00000 | 0.00000 | 0.00000 |
| 2267003010 | Aerial Lifts | LPG | 0.21786 | 0.80938 | 3.21011 |
| 2267003020 | Forklifts | LPG | 27.74112 | 102.24638 | 409.84438 |
| 2267003030 | Sweepers / Scrubbers | LPG | 0.79421 | 2.81839 | 11.87909 |
| 2267003040 | Other General Industrial Equipment | LPG | 0.04831 | 0.17885 | 0.71261 |
| 2267003050 | Other Material Handling Equipment | LPG | 0.01153 | 0.04287 | 0.16991 |
| 2267003070 | Terminal Tractors | LPG | 0.09832 | 0.36262 | 1.45226 |
| 2268003020 | Forklifts | CNG | 0.08887 | 5.57519 | 22.25377 |
| 2268003030 | Sweepers/Scrubbers | CNG | 0.00010 | 0.00654 | 0.02611 |
| 2268003040 | Other General Industrial Equipment | CNG | 0.00007 | 0.00421 | 0.01679 |
| 2268003060 | AC\Refrigeration | CNG | 0.00017 | 0.01080 | 0.04320 |
| 2268003070 | Terminal Tractors | CNG | 0.00042 | 0.02625 | 0.10536 |
| 2268010010 | Other Oil Field Equip | CNG | 0.00000 | 0.00000 | 0.00000 |
| 2270003010 | Aerial Lifts | Diesel | 0.70953 | 3.39066 | 2.37826 |
| 2270003020 | Forklifts | Diesel | 0.50836 | 5.21033 | 2.56717 |
| 2270003030 | Sweepers/Scrubbers | Diesel | 0.58328 | 7.69590 | 1.82755 |
| 2270003040 | Other General Industrial Equipment | Diesel | 1.39726 | 18.89595 | 5.32139 |
| 2270003050 | Other Material Handling Equipment | Diesel | 0.02344 | 0.04635 | 0.07584 |
| 2270003060 | AC\Refrigeration | Diesel | 0.90104 | 5.39993 | 3.17682 |
| 2270003070 | Terminal Tractors | Diesel | 1.09200 | 25.09970 | 8.61622 |
| 2270010010 | Other Oil Field Equip | Diesel | 0.00000 | 0.00000 | 0.00000 |
| Total | | | 43.73292 | 185.58010 | 722.67744 |

**Seasonal Adjustment**

Neither the 1995 nor 2002 surveys requested information regarding the use of equipment during the ozone season versus other times of the year. As a consequence, no adjustments were made to NONROAD's seasonal allocation factors. Therefore, the summer season weekday emission estimations in the 2002 industrial equipment inventory are based on the model's default allocations for the southwest region during June, July, and August.

**Sample Survey Questionnaire**

A sample of the questionnaire sent to businesses, government agencies, and schools throughout the 12-county AACOG region to facilitate development of the 2002 equipment emissions inventory is provided below.

**Alamo Area Council of Governments**
**Equipment Environmental Impact Survey**
**Internal Combustion Engines**

The Alamo Area Council of Governments (AACOG) is conducting a study to assess and quantify local air quality within the San Antonio Metropolitan area and contiguous counties by performing an emission inventory. AACOG has defined the study area to include Atascosa, Bandera, Bexar, Comal, Frio, Gillespie, Guadalupe, Karnes, Kendall, Kerr, Medina, and Wilson counties. Our goal is to provide better information and services to businesses and individuals, and help minimize additional regulation on the community. The purpose of this survey is to gather data on emissions produced by several types of equipment in the region.

The study area does not presently exceed Environmental Protection Agency (EPA) air quality standards. However, if the standards are exceeded in the future we will be classified as nonattainment, which will result in expensive and stringent regulations for your business and the community. By filling out this confidential survey, you will be providing valuable data that will be used to evaluate cost-effective approaches to pollution control. Thank you for taking the time to provide this information.

Instructions:

1. Please look through the equipment types shown on the following page.
2. List any of the equipment types regularly operated at your business.
3. Fill in the appropriate figures for each equipment type you listed. (Estimates are acceptable.)

If you have other internal combustion equipment that is not shown, please include it as well.

NOTE: IF YOUR BUSINESS HAS MORE EQUIPMENT THAN WILL FIT IN THE SPACE PROVIDED, PLEASE MAKE ADDITIONAL COPIES OF THE SURVEY.

*Completed surveys can be faxed to (210) 225-5937, or mailed to:*
*Alamo Area Council of Governments*
*8700 Tesoro, Suite 700*
*San Antonio, Texas 78217*
*Attn: Chris Langston*

*If you have any questions or comments, please call us at (210) 362-5270.*
***SURVEY STARTS ON THE OTHER SIDE OF THIS PAGE***

| | Internal Combustion Equipment Type | <u>Engine Type</u><br>Gasoline 2-cycle<br>Gasoline 4-cycle<br>Diesel<br>Propane<br>Natural Gas | Approx. Horse-Power Rating | Number of Units Typically Operated | Avg. No. of Hours and Time of Day Each Unit Operated (MON-FRI) | Avg. No. of Hours and Time of Day Each Unit Operated (SAT & SUN) |
|---|---|---|---|---|---|---|
| | | | **Industrial & Commercial Equipment** | | | |
| 1 | Generators | | | | | |
| 2 | Pumps | | | | | |
| 3 | Compressors | | | | | |
| 4 | Welders | | | | | |
| 5 | Pressure Washers | | | | | |
| 6 | Aerial Lifts | | | | | |
| 7 | Forklifts | | | | | |
| 8 | Sweepers/Scrubbers | | | | | |
| 9 | AC/Refrigeration | | | | | |
| 10 | Terminal Tractors | | | | | |
| 11 | Single Board Light Plants | | | | | |
| 12 | Other General Industrial or Material Handling Eqmt. Type:__________ | | | | | |

| | Internal Combustion Equipment Type | <u>Engine Type</u><br>Gasoline 2-cycle<br>Gasoline 4-cycle<br>Diesel<br>Propane<br>Natural Gas | Approx. Horse-Power Rating | Number of Units Typically Operated | Avg. No. of Hours and Time of Day Each Unit Operated (MON-FRI) | Avg. No. of Hours and Time of Day Each Unit Operated (SAT & SUN) |
|---|---|---|---|---|---|---|
| **Construction Equipment** | | | | | | |
| 1 | Bore/Drill Rigs | | | | | |
| 2 | Excavators | | | | | |
| 3 | Concrete & Mortar Mixers | | | | | |
| 4 | Cranes | | | | | |
| 5 | Graders | | | | | |
| 6 | Crushing/Processing Eqmt. | | | | | |
| 7 | Rough Terrain Forklifts | | | | | |
| 8 | Rubber Tire Loaders | | | | | |
| 9 | Other Loaders | | | | | |
| 10 | Dozers | | | | | |
| 11 | Tractors/Backhoes | | | | | |
| 12 | Scrapers | | | | | |
| 13 | Rollers | | | | | |
| 14 | Trenchers | | | | | |
| 15 | Pavers | | | | | |
| 16 | Other Construction Equipment Type: ____________ | | | | | |

## Commercial Equipment

### Introduction

The 2002 commercial equipment emissions inventory includes emission estimates from the use of generator sets, pumps, air compressors, gas compressors, welders, and pressure washers in the 12-county AACOG region. For each commercial equipment category, emissions were calculated for a variety of engine types: 2-stoke gasoline, 4-stroke gasoline, LPG, CNG and diesel.

### Methodology

Commercial equipment emissions were estimated using local survey data in conjunction with EPA's NONROAD model. The local data were obtained by mailing questionnaires of equipment use to businesses, government agencies, and schools throughout the AACOG region. The survey, a copy of which is attached at the end of this section, requested that the respondent provide information regarding the types and quantities of equipment in use, equipment horsepower (HP) ratings, activity levels, and other data. The results of the surveys were then used to modify appropriate NONROAD files such as the equipment activity file, equipment population file, and seasonal adjustment file (table 2-11) in preparation for conducting the commercial equipment runs.

Table 2-11. Data Obtained Through Local Surveys and Corresponding NONROAD Files Modified Using the Survey Data.

| NONROAD File | Factor Modified Using Survey Data |
|---|---|
| ACTIVITY.DAT | Avg Total Hrs/Yr. Use Per Unit |
| Allocation Files | No Modification |
| Deterioration Factor Files | No Modification |
| Emissions Factor Files | No Modification |
| Growth Files | No Modification |
| TX.POP | Avg. HP per Unity |
| SEASON.DAT | Weekday & Weekend Allocations |
| Technology Files | No Modification |

Prior to calculating activity levels, average HP, and temporal allocations using local data, it was determined that the response rate to the 2002 equipment survey was too low to qualify as a representative sample of the population of commercial equipment users in the AACOG region. At a 95% confidence level and 8% confidence interval (for sampling accuracy), 140 responses were needed to adequately represent the population of 1,892 businesses in the area that were identified as commercial equipment operators. This determination was made by using the equation:

$$n = \frac{Z^2 (0.25) N}{Z^2 (0.25) + (N - 1) C^2p}$$

where,

Z = 1.96 - for a 95% confidence level

N = population size - 1,892

Cp = .08 - for a ± 8% confidence interval

n = sample size

therefore,

$$n = \frac{(1.96)^2 (0.25) (1{,}892)}{(1.96)^2 (0.25) + (1{,}892 - 1) (0.08)^2}$$

n = 140

AACOG received 56 responses to the 2002 commercial equipment questionnaire. In order to use an adequate number of survey responses, AACOG staff combined the 2002 questionnaire data with information from a similar survey conducted in the region in 1995. It was assumed the types of commercial equipment used by business and industry would not have changed greatly between 1995 and 2002. The 1995 survey data from companies who also responded to the 2002 survey were removed from the calculations to avoid double-counting.

**Sample Calculation**

*Equipment Activity Levels*

Annual activity levels were determined for each equipment category by summing the 1995 and 2002 annual activity responses for an equipment type, and dividing the total by the number of equipment listed in the 1995 and 2002 surveys for that SCC. The local activity levels were used to update NONROAD's activity.dat file. Similarly, the average weekday and weekend hours of use were calculated by summing the weekday or weekend usage for each type of equipment listed in the survey responses and dividing by the number of equipment in that SCC category. The sample averages were calculated using the formula:

$$\check{y} = \frac{1}{n} \Sigma y_i$$

Where,

$y_i$ = observation (activity level) and

n = number of samples (equipment)

*Weekday / Weekend Allocation Factors*

To develop weekday and weekend allocation factors for NONROAD's season.dat file from the survey data, the percentage of weekday hours or weekend hours to total hours were calculated for each SCC and the resulting fraction was divided by either 5 (weekdays) or 2 (weekend days) using the formulas:

$$\frac{\text{(Average hours/weekday per SCC * 5)}}{\text{(Avg hours/weekday per SCC *5) + (Avg hours/weekend day per SCC *2)}} \Big/ 5$$

for weekdays and

$$\frac{\text{(Average hours/weekend day per SCC * 2)}}{\text{(Avg hours/weekday per SCC *5) + (Avg hours/weekend day per SCC *2)}} \Big/ 2$$

for weekend days.

As an example, the average hours of use for 4-stroke gasoline welders as calculated from the combined 1995 and 2002 AACOG surveys were 1.419580 hours each weekday and 0.268116 hours each weekend day. The temporal allocation factors for the 4-stroke welders were calculated as:

$$\frac{1.419580 * 5}{(1.419580 * 5) + (0.268116 *2)} \Big/ 5 \quad = \text{ 0.185917 weekday allocation factor}$$

$$\frac{0.268116 * 2}{(1.419580 * 5) + (0.268116 *2)} \Big/ 2 \quad = \text{ 0.035121 weekend day allocation factor}$$

The table below (Table 2-12) compares NONROAD's default day-of-the-week adjustment factors with those calculated from the survey data.

Table 2-12. Comparison of Default and Modified Temporal Allocation Data.

| SCC | Equipment | Engine Type | Default NONROAD Day of Week Adjustment (Mon-Fri) | Day of Week Adjustment Factor (Mon-Fri) | Default NONROAD Day of Week Adjustment (Sat-Sun) | Day of Week Adjustment Factor (Sat-Sun) |
|---|---|---|---|---|---|---|
| 2260006005 | Generator Set | Gas, 2-cycle | 0.1666667 | No Change | 0.0833334 | No Change |
| 2265006005 | Generator Set | Gas, 4-cycle | 0.1666667 | 0.1998067 | 0.0833334 | 0.0004833 |
| 2267006005 | Generator Set | LPG | 0.1666667 | 0.2000000 | 0.0833334 | 0.0000000 |
| 2268006005 | Generator Set | CNG | 0.1666667 | No Change | 0.0833334 | No Change |
| 2270006005 | Generator Set | Diesel | 0.1666667 | 0.1995527 | 0.0833334 | 0.0011183 |
| 2260006010 | Pumps | Gas, 2-cycle | 0.1666667 | No Change | 0.0833334 | No Change |
| 2265006010 | Pumps | Gas, 4-cycle | 0.1666667 | 0.1970535 | 0.0833334 | 0.0073662 |
| 2267006010 | Pumps | LPG | 0.1666667 | No Change | 0.0833334 | No Change |
| 2268006010 | Pumps | CNG | 0.1666667 | No Change | 0.0833334 | No Change |
| 2270006010 | Pumps | Diesel | 0.1666667 | 0.2000000 | 0.0833334 | 0.0000000 |
| 2260006015 | Air Compressors | Gas, 2-cycle | 0.1666667 | No Change | 0.0833334 | No Change |
| 2265006015 | Air Compressors | Gas, 4-cycle | 0.1666667 | 0.1969462 | 0.0833334 | 0.0076346 |
| 2267006015 | Air Compressors | LPG | 0.1666667 | No Change | 0.0833334 | No Change |
| 2268006015 | Air Compressors | CNG | 0.1666667 | 0.2000000 | 0.0833334 | 0.0000000 |
| 2270006015 | Air Compressors | Diesel | 0.1666667 | 0.1993875 | 0.0833334 | 0.0015313 |
| 2268006020 | Gas Compressors | CNG | 0.1666667 | No Change | 0.0833334 | No Change |
| 2270006020 | Gas Compressors | Diesel | 0.1666667 | No Change | 0.0833334 | No Change |
| 2265006025 | Welders | Gas, 4-cycle | 0.1666667 | 0.1859517 | 0.0833334 | 0.0351207 |
| 2267006025 | Welders | LPG | 0.1666667 | 0.1940299 | 0.0833334 | 0.0149254 |
| 2270006025 | Welders | Diesel | 0.1666667 | 0.2000000 | 0.0833334 | 0.0000000 |
| 2265006030 | Pressure Washers | Gas, 4-cycle | 0.1666667 | 0.1841368 | 0.0833334 | 0.0396580 |
| 2267006030 | Pressure Washers | LPG | 0.1666667 | No Change | 0.0833334 | No Change |
| 2270006030 | Pressure Washers | Diesel | 0.1666667 | 0.2000000 | 0.0833334 | 0.0000000 |

*Average Horsepower and Equipment Population*

Average horsepower ratings for each equipment type were determined from the survey data based on the HP ranges used in the 2004 version of the NONROAD model. The average HP ratings per range were calculated employing the same formula used to determine average equipment activity levels. NONROAD's TX_pop file was modified by changing the model's default average HP for each bin in an equipment category to the average HP within that range as calculated from the combined 1995 and 2002 survey data.

In the absence of an appropriate methodology to grow the 1995 equipment population to the year 2002, the *total* equipment population for each SCC (the sum of equipment in each HP range for an equipment category in NONROAD's default file) was not updated in the equipment population file. Instead, the total population for each equipment type in the default file was allocated to a horsepower bin based on the percentage of equipment in the range as determined from the 1995 and 2002 survey results. If there were no pieces of equipment listed in the 1995 or 2002 surveys for a certain HP range, the population for the bin was changed to 0.0.

Several types of light commercial equipment, such as CNG generator sets, were not reported in either the 1995 or 2002 survey results. For instances such as these, the default HP, activity levels, and daily allocation factors were left unmodified from the default data.

Table 2-13 provides a sample of the output generated for commercial equipment use in one of the AACOG counties. The output is provided in tons of emissions per year.

Table 2-13. Estimated Annual Emissions from Commercial Equipment Operated in Medina County in 2002.

| SCC | Equipment | Engine Type | VOC (TPY) | NOx (TPY) | CO (TPY) |
|---|---|---|---|---|---|
| 2260006005 | Generator Sets | 2 Stroke | 0.20713 | 0.00074 | 0.46357 |
| 2260006010 | Pumps | 2 Stroke | 1.49699 | 0.00567 | 3.38697 |
| 2260006015 | Air Compressors | 2 Stroke | 0.00056 | 0.00000 | 0.00129 |
| 2265006005 | Generator Sets | 4 Stroke | 5.14825 | 2.84007 | 131.16210 |
| 2265006010 | Pumps | 4 Stroke | 1.25362 | 0.13758 | 27.59765 |
| 2265006015 | Air Compressors | 4 Stroke | 0.54072 | 0.12966 | 14.40990 |
| 2265006025 | Welders | 4 Stroke | 1.18509 | 0.76595 | 49.11333 |
| 2265006030 | Pressure Washers | 4 Stroke | 2.10588 | 0.49637 | 67.91393 |
| 2267006005 | Generator Sets | LPG | 0.02579 | 0.13026 | 0.33540 |
| 2267006010 | Pumps | LPG | 0.02393 | 0.11586 | 0.31593 |
| 2267006015 | Air Compressors | LPG | 0.02920 | 0.14103 | 0.38575 |
| 2267006025 | Welders | LPG | 0.04195 | 0.15619 | 0.61769 |
| 2267006030 | Pressure Washers | LPG | 0.00062 | 0.00231 | 0.00912 |
| 2268006005 | Generator Sets | CNG | 0.00683 | 0.56056 | 1.53004 |
| 2268006010 | Pumps | CNG | 0.00010 | 0.00797 | 0.02178 |
| 2268006015 | Air Compressors | CNG | 0.00043 | 0.03433 | 0.09718 |
| 2268006020 | Gas Compressors | CNG | 0.00713 | 0.41039 | 1.83618 |
| 2270006005 | Generator Sets | Diesel | 1.67600 | 12.13677 | 6.69479 |
| 2270006010 | Pumps | Diesel | 0.00234 | 0.01447 | 0.00855 |
| 2270006015 | Air Compressors | Diesel | 0.13467 | 1.08432 | 0.49806 |
| 2270006020 | Gas Compressors | Diesel | 0.00000 | 0.00000 | 0.00000 |
| 2270006025 | Welders | Diesel | 0.29068 | 0.61962 | 1.00734 |
| 2270006030 | Pressure Washers | Diesel | 0.00356 | 0.01785 | 0.01092 |
| Total | | | 14.18147 | 19.80798 | 307.41746 |

**Seasonal Adjustment**

Neither the 1995 nor 2002 surveys requested information regarding the use of equipment during the ozone season versus other times of the year. As a consequence, no adjustments were made to NONROAD's seasonal allocation factors. Therefore, the summer season weekday emission estimations in the 2002 commercial equipment inventory are based on the model's default allocations for the southwest region during June, July, and August.

**Sample Survey Questionnaire**

A sample of the questionnaire sent to businesses, government agencies, and schools throughout the 12-county AACOG region to facilitate development of the 2002 equipment emissions inventory is provided on the following pages.

**Alamo Area Council of Governments**
Equipment Environmental Impact Survey
Internal Combustion Exhaust

The Alamo Area Council of Governments (AACOG) is conducting a study to assess and quantify local air quality within the San Antonio Metropolitan area and contiguous counties by performing an emission inventory. AACOG has defined the study area to include Atascosa, Bandera, Bexar, Comal, Frio, Gillespie, Guadalupe, Karnes, Kendall, Kerr, Medina, and Wilson counties. Our goal is to provide better information and services to businesses and individuals, and help minimize additional regulation on the community. The purpose of this survey is to gather data on emissions produced by several types of equipment in the region.

The study area does not presently exceed Environmental Protection Agency (EPA) air quality standards. However, if the standards are exceeded in the future we will be classified as nonattainment, which will result in expensive and stringent regulations for your business and the community. By filling out this confidential survey, you will be providing valuable data that will be used to evaluate cost-effective approaches to pollution control. Thank you for taking the time to provide this information.

Instructions:

4. Please look through the equipment types shown on the following page.
5. List any of the equipment types regularly operated at your business.
6. Fill in the appropriate figures for each equipment type you listed. (Estimates are acceptable.)

If you have other internal combustion equipment that is not shown, please include it as well.

NOTE: IF YOUR BUSINESS HAS MORE EQUIPMENT THAN WILL FIT IN THE SPACE PROVIDED, PLEASE MAKE ADDITIONAL COPIES OF THE SURVEY.

*Completed surveys can be faxed to (210) 225-5937, or mailed to:*
*Alamo Area Council of Governments*
*8700 Tesoro, Suite 700*
*San Antonio, Texas 78217*
*Attn: Chris Langston*

*If you have any questions or comments, please call us at (210) 362-5270.*

***SURVEY STARTS ON THE OTHER SIDE OF THIS PAGE***

| | Internal Combustion Equipment Type | Engine Type<br>Gasoline 2-cycle<br>Gasoline 4-cycle<br>Diesel<br>Propane<br>Natural Gas | Approx. Horse-Power Rating | Number of Units Typically Operated | Avg. No. of Hours and Time of Day Each Unit Operated (MON-FRI) | Avg. No. of Hours and Time of Day Each Unit Operated (SAT & SUN) |
|---|---|---|---|---|---|---|
| | | | Industrial & Commercial Equipment | | | |
| 1 | Generators | | | | | |
| 2 | Pumps | | | | | |
| 3 | Compressors | | | | | |
| 4 | Welders | | | | | |
| 5 | Pressure Washers | | | | | |
| 6 | Aerial Lifts | | | | | |
| 7 | Forklifts | | | | | |
| 8 | Sweepers/Scrubbers | | | | | |
| 9 | AC/Refrigeration | | | | | |
| 10 | Terminal Tractors | | | | | |
| 11 | Single Board Light Plants | | | | | |
| 12 | Other General Industrial or Material Handling Eqmt. Type:______________ | | | | | |

| | Internal Combustion Equipment Type | Engine Type<br>Gasoline 2-cycle<br>Gasoline 4-cycle<br>Diesel<br>Propane<br>Natural Gas | Approx. Horse-Power Rating | Number of Units Typically Operated | Avg. No. of Hours and Time of Day Each Unit Operated (MON-FRI) | Avg. No. of Hours and Time of Day Each Unit Operated (SAT & SUN) |
|---|---|---|---|---|---|---|
| | **Construction Equipment** | | | | | |
| 1 | Bore/Drill Rigs | | | | | |
| 2 | Excavators | | | | | |
| 3 | Concrete & Mortar Mixers | | | | | |
| 4 | Cranes | | | | | |
| 5 | Graders | | | | | |
| 6 | Crushing/Processing Eqmt. | | | | | |
| 7 | Rough Terrain Forklifts | | | | | |
| 8 | Rubber Tire Loaders | | | | | |
| 9 | Other Loaders | | | | | |
| 10 | Dozers | | | | | |
| 11 | Tractors/Backhoes | | | | | |
| 12 | Scrapers | | | | | |
| 13 | Rollers | | | | | |
| 14 | Trenchers | | | | | |
| 15 | Pavers | | | | | |
| 16 | Other Construction Equipment Type: ____________ | | | | | |

## Landfill Equipment

### Equipment Types

The equipment of concern in this study is diesel engine landfill equipment. The following is a list of equipment types and their corresponding source classification code.

- 2270002003 Pavers
- 2270002018 Scrapers
- 2270002036 Excavators
- 2270002048 Graders
- 2270002051 Off-highway Trucks
- 2270002060 Rubber Tire Loaders
- 2270002069 Crawler Tractor/Dozers
- 2270002081 Other Construction Equipment

These equipment types are utilized for other purposes including construction projects. However, the emissions from landfill equipment were calculated separately from construction-generated emissions because of differences in engine populations, HP, and activity levels.

### Methodology

The methodology used to estimate landfill equipment emission estimates for the AACOG region relies on local data produced from surveys, equipment estimates from the Austin area, and on national data used in the EPA's NONROAD Emission Inventory Model. The methodology involves the following steps:

1. Conducting a survey of local landfill equipment activity to determine local equipment use rates and equipment characteristics.

2. Determining equipment population and activity for landfills without local data. This is accomplished by using estimated equipment populations from an Eastern Research Group (ERG)[14] study and activity use from landfills that responded to the first survey.

3. Conducting a second survey with estimations of equipment activity at each landfill. The landfills were asked to make corrections and send back the survey.

[14] Eastern Research Group, Inc. April 20, 2000. Development of a Revised Emissions Inventory for Construction Equipment in the Houston-Galveston Ozone Non-Attainment Area. Final Report. Eastern Research Group Inc.

4. Estimating VOC, NOx, and CO annual emissions by using survey responses and NONROAD model defaults and converting the tons/year estimate into an estimate for a typical weekday (tons/day), and a typical weekend day (tons/day) for the summer or ozone season.

These steps are outlined below.

**Step 1: Conduct a Survey of Local Landfill Equipment**

The preferred method for calculating equipment emissions involves conducting a survey of equipment use within the AACOG region.

The survey provided the following types of local information:

- Activity Rates (HRS) – total annual hours of use by type of equipment
- Temporal Profiles – equipment use on weekdays and equipment use on weekend days for all types of equipment
- Engine Characteristics:
  - Engine Type – gasoline 2-stroke, gasoline 4-stroke, diesel, LPG, CNG
  - Engine Horsepower – rated power of the engine

There are six active landfills or transfer stations in the AACOG region. These are listed in table 2-14. Of the six facilities, only two responded to the survey.

Table 2-14. Location of AACOG Regional Landfills and Transfer Stations, 2002.

| Permit Number | Landfill or Transfer Station Name | County |
|---|---|---|
| 0066 | WASTE MANAGEMENT OF TEXAS, INC. | Comal |
| 1410 | BFI WASTE SYSTEMS N. AMER. INC. | Bexar |
| 1506 | CITY OF KERRVILLE | Kerr |
| 1995 | CITY OF FREDERICKSBURG | Gillespie |
| 2093 | WASTE MANAGEMENT OF TEXAS, INC. | Bexar |
| 1443 | TEXAS DISPOSAL SYSTEMS LANDFILL | Bexar |

**Step 2: Determine County Level Equipment Population**

For the 4 landfills/transfer stations that did not respond to the first survey, equipment populations were estimated. To adjust for local landfill equipment data, AACOG used the CAPCO study completed by ERG[15] for equipment population and the activity rates from the AACOG survey responses.

[15] *Ibid*, p. 14.

**Step 3: Conduct a Second Survey of Landfill Equipment Activity**

After analyzing the results from the first survey and the ERG Study estimations for equipment, a second survey was sent out to the local landfills with the estimations of their equipment population, HP, and activity hours. This survey used the same format as the initial survey. The companies were asked to correct the estimations and to send the surveys back to AACOG. There was an 83 percent response rate to the second survey. The increased response rate improved equipment estimations. For the landfills that did not respond to the survey, AACOG used the equipment populations determined in Step 2.

Equipment hours were adjusted upwards to account for the difference in equipment activity between landfills and other typical construction operations. For example, dozers were typically used 3,349 hours per year at landfill sites that responded to the survey versus 829 hours per year in the default NONROAD model activity file (Table 2-15).

Table 2-15. Equipment Population, HP, and Hours per Landfill from ERG Study and AACOG Survey.

| Equipment Type | SCC | ERG Estimated No. of Units | ERG Estimated HP | AACOG Estimated HP | ERG Estimated Hours per Year | AACOG Estimated Hours per Year |
|---|---|---|---|---|---|---|
| Pavers | 2270002003 | 2 | 500 | 345 | 7200 | 3268 |
| Scrapers | 2270002018 | 1 | 250 | 341 | 2000 | 2100 |
| Excavators | 2270002036 | | | 225 | | 2088 |
| Graders | 2270002048 | 1 | 250 | 222 | 2000 | 939 |
| Off-highway Trucks | 2270002051 | 1 | 225 | 192 | 1250 | 1270 |
| Rubber Tire Loaders | 2270002060 | 1 | 125 | 166 | 2000 | 1435 |
| Crawler Tractor/Dozers | 2270002069 | 1 | 250 | 261 | 2000 | 3349 |
| Crawler Tractor/Dozers | 2270002069 | 1 | 80 | 123 | 2000 | 3260 |
| Other Construction Equipment | 2270002081 | 1 | 125 | 207 | 1250 | 3573 |

**Step 4: Estimate Emissions of Ozone Precursors**

The results from the surveys were compiled by county. Once county level equipment populations were calculated, emissions of volatile organic compounds (VOC), nitrogen oxides (NOx), and carbon monoxide (CO) were calculated using NONROAD 2004. In using the NONROAD model, some adjustments were made for local conditions.

*Population File*

The equipment population for each landfill was summed and compiled into a master spreadsheet. This master spreadsheet was then converted into the population file for the NONROAD model.

*Allocation File*

An allocation file was created to properly allocate emissions for each county. The file was made by taking the default construction allocation file for Texas (Tx_const.alo) and replacing values (dollars spent on construction) with zeros for all counties except those in the study area. The values for the AACOG region were allocated based on the number of landfills in each county. For example, Bexar had 3 of the 6 landfills; therefore this county had 50 percent of the allocation value. The county values were added up and this total was used to replace the Texas state value. This allows the NONROAD model to calculate emissions for the AACOG region as a whole and distribute the emissions to each county appropriately.

Table 2-16. Allocation of Landfill Equipment in the AACOG Region, 2002.

| Region | FIPS code | Allocation (Indicator value) | Percentage |
|---|---|---|---|
| Bexar | 48029 | 3 | 50% |
| Comal | 48091 | 1 | 17% |
| Gillispie | 48171 | 1 | 17% |
| Kerr | 48265 | 1 | 17% |
| Texas | 48000 | 6 | 100% |

*Season File*

The weekday vs. weekday adjustment factor of 0.1617191 for weekdays and 0.0957023 for weekends was calculated from the returned AACOG surveys for landfills.

March 15, 2002

[COMPANY NAME]
[STREET ADDRESS]
[CITY] [STATE] [ZIP]

**ATTENTION: OPERATIONS MANAGER**

Re: 2002 San Antonio Emissions Inventory

The Alamo Area Council of Governments (AACOG) requests your assistance in the development of a 2002, air quality emission inventory for San Antonio and the surrounding counties. AACOG is conducting this inventory in order to assess and quantify local air quality within the San Antonio Metropolitan area and contiguous counties. This inventory is especially significant because the San Antonio region currently risks being declared in non-attainment of federal air quality standards (NAAQS).

AACOG will calculate the equipment source component of this inventory from information submitted by local organizations involved in equipment activities in and around the San Antonio region using the enclosed survey. With this survey, we are requesting information on equipment used during the 2002 calendar year within Atascosa, Bandera, Bexar, Comal, Frio, Gillespie, Guadalupe, Karnes, Kendall, Kerr, Medina, and Wilson counties. The purpose of this survey is to provide better information and services to the region, as well as help minimize additional regulation on the community.

Your input is vital to this process and will serve to effect a true and correct emissions inventory for 2002 that will be delivered to the EPA. Please provide your responses on the attached survey and return it to us in the self-addressed envelope by the date indicated. The information you provide will be considered strictly confidential and unavailable to public information requests. Please submit your response by, April 19, 2002.

Thank you for your time and participation. If you have any questions or comments please feel free to contact Chris Langston at (210) 362-5270.

Regionally yours,

Al J. Notzon III
Executive Director
Enclosures (2)

| | Internal Combustion Equipment Type | Engine Type<br>Gasoline 2-cycle<br>Gasoline 4-cycle<br>Diesel<br>Propane<br>Natural Gas | Approx. Horse-Power Rating | Number of Units Typically Operated | Avg. No. of Hours and Time of Day Each Unit Operated (MON-FRI) | Avg. No. of Hours and Time of Day Each Unit Operated (SAT & SUN) |
|---|---|---|---|---|---|---|
| **Industrial & Commercial Equipment** | | | | | | |
| 1 | Generators | | | | | |
| 2 | Pumps | | | | | |
| 3 | Compressors | | | | | |
| 4 | Welders | | | | | |
| 5 | Pressure Washers | | | | | |
| 6 | Aerial Lifts | | | | | |
| 7 | Forklifts | | | | | |
| 8 | Sweepers/Scrubbers | | | | | |
| 9 | AC/Refrigeration | | | | | |
| 10 | Terminal Tractors | | | | | |
| 11 | Single Board Light Plants | | | | | |
| 12 | Other General Industrial or Material Handling Eqmt. Type:____________ | | | | | |

## Residential Lawn and Garden Equipment

### Purpose of the Residential Equipment

The residential equipment EI accomplishes two goals:

1. Provides a methodological specifications foundation that will allow for better assessment of residential lawn and garden equipment activity emissions at the county level for each county in the twelve-county AACOG area for the year 2002
2. Provides the mechanism to determine the representative emissions, which would occur on any given day in the typical residential equipment-use period, for processing in the photochemical model

Residential Lawn and Garden Equipment Inventory

This inventory takes into account the following types and categories of gasoline engine-powered equipment:

- 2260004015 2-stroke residential rotary tillers
- 2265004015 4-stroke residential rotary tillers
- 2260004020 2-stroke residential chain saw
- 2260004025 2-stroke residential trimmer/edger/brush cutter
- 2265004025 4-Stroke residential trimmer/edger/brush cutter
- 2260004030 2-stroke residential leaf blower/vacuums
- 2265004030 4-stroke residential leaf blower/vacuums
- 2265004010 4-stroke residential lawnmower
- 2265004040 4-stroke residential rear engine riding mower
- 2265004055 4-stroke residential lawn and garden tractors
- 2265004075 4-stroke residential other lawn and garden equipment

### EFs for Residential Equipment

An essential part of calculating residential equipment emissions is the use of an accurate EF for each pollutant being inventoried. In an effort to find more recent and specific EF, EPA's NONROAD 2004 Emission Inventory Model was used. [16] The EFs for residential equipment were developed using the following process:[17]

1. A 2002 NONROAD Model run for residential equipment was completed for Texas.

[16] U.S. Environmental Protection Agency, 1992. Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources. Research Triangle Park, NC., and U.S. Environmental Protection Agency, 1991. Nonroad Engine and Vehicle Emissions Study Report. Washington, DC.

2. The output from this run was used to obtain the following for all types of residential equipment:
    - VOC, CO (i.e., a colorless, odorless and tasteless gas released primarily by incomplete combustion of fossil fuels), and $NO_x$ (i.e., a group of gases released by the combustion of fossil fuels and natural sources such as forest fires, lightning and decaying vegetation) emissions in tons/year for each type of equipment
    - Equipment population (Eqmt. Pop) for each type of equipment

3. The NONROAD Model input file activity.dat, was used to obtain the following values:
    - The activity rate of each type of equipment in hours/year (hrs/yr.)
    - A load factor (LF - The average power level at which the engine operates divided by the maximum available power) for each type of equipment

4. The average horsepower (avg. hp) for each type of equipment was determined from the NONROAD Model input file Tx.pop.

5. With all the factors in place, EFs for VOC, CO, and $NO_x$ were calculated using the following formula:

    EF (g/bhp-hr) = (tons of pollutant/yr.) x (2,000 lbs./ton) x (453.6 g/lb.)/[(Eqmt. Pop) x hrs/yr.) x (Avg. Hp) x (LF)]

The resulting EFs were used in calculating emissions for each type of equipment. . For the purposes of this EI, the following parameters were used when running the NONROAD 2004 model.

*Options*

| | |
|---|---|
| Fuel RVP for gas - Varies by County (see below) | |
| Atascosa, Bandera, Bexar, Comal, Guadalupe, Wilson | : 7.8 psi |
| Frio, Gillespie, Karnes, Kerr, Kendall, Medina [18] | : 8.7 psi |
| Oxygen Weight % | : Default |
| Gas Sulfur % | : Default |
| Diesel Sulfur % | : Default |
| CNG/LPG Sulfur % | : Default |

---

[17] U.S. Environmental Protection Agency, 2000. Nonroad Emission Inventory Model. Ann Arbor, MI.

[18] Texas Transportation Institute, June 2003. San Antonio Metropolitan Statistical Area On-Road Mobile Source Modeling Emissions Inventories: 1999, 2007, and 2012. College Station, TX: TTI – The Texas A&M University System

| | |
|---|---|
| Minimum Temp (F) | : 69.4 |
| Maximum Temp (F) | : 87.8 |
| Average Temp (F)[19] | : 78.2 |
| Stage II Control % | : Default |

*Period*

| | |
|---|---|
| Period | : Seasonal |
| Type | : Typical Day |
| Year of Episode | : 2002 |
| Season | : Summer |
| Month | : |
| Day | : Weekday |

*Region*

| | |
|---|---|
| Region Level | : County |

These parameters were used for each county to produce an emissions report in tons/day for a typical summer weekday, and for each type of equipment. For the purposes of this EI, the NONROAD model was run for the 2002 summer season. To determine annual total emissions, the NONROAD model was run by selecting the annual option and using the calculated average temperatures of 58.5, 79.3, and 68.6 (F). Table 2-20 describes residential equipment parameters used in this EI:

[19] Ibid.

Table 2-17. 2002 Residential Equipment Parameters

| SCC | Equipment Type | Engine Type | Average Horsepower (HP) | Load Factor | Equipment Ratio Engine Type |
|---|---|---|---|---|---|
| 2260004015 | Rotary Tiller | 2 stroke | 2.32 | 0.4 | 0.1385 |
| 2260004020 | Chain Saw | 2 stroke | 2.11 | 0.70 | 1.0000 |
| 2260004025 | Trimmer/Edger/Brush Cutter | 2 stroke | 1.23 | 0.91 | 0.9839 |
| 2260004030 | Leafblower/Vacuum | 2 stroke | 1.36 | 0.94 | 0.9506 |
| 2265004010 | Lawn Mower | 4 stroke | 4.07 | 0.33 | 0.9494 |
| 2265004015 | Rotary Tiller | 4 stroke | 4.71 | 0.40 | 0.8615 |
| 2265004025 | Trimmer/Edger/Brush Cutter | 4 stroke | 3.30 | 0.91 | 0.0161 |
| 2265004030 | Leafblower/Vacuum | 4 stroke | 3.42 | 0.94 | 0.0494 |
| 2265004040 | Rear Engine Riding Mower | 4 stroke | 10.66 | 0.38 | 0.0506 |
| 2265004055 | Lawn & Garden Tractor | 4 stroke | 14.45 | 0.44 | 1.0000 |
| 2265004075 | Other Lawn/Garden Equipment | 4 stroke | 5.36 | 0.58 | 1.0000 |

Table 2-18 describes the daily EFs calculated for residential equipment and used in this EI. Note that VOCs are organic gases such as propane and benzene. The VOC emissions used in the EF calculations were obtained by summing the five VOC categories provided as output by the NONROAD model: exhaust, crank, diurnal, displacement, and spillage.

VOC exhaust is a class of VOC emissions escaping from the exhaust system as a result of incomplete combustion. VOC crank is a class of VOC emissions resulting from fuel vapors escaping the fueling system through an open crankcase. VOC diurnal is a class of evaporative emissions that come from the fuel tank while the vehicle is not in use.

Diurnal emissions are generated by daily temperature changes. During the day, as the fuel tank warms up, the gasoline vapor inside the tank expands and is forced out of the tank cap or any other vents in the fuel system. VOC displ is a class of VOC emissions resulting from the displacement of fuel vapors inside the fuel tank while fuel is being added to the tank.

VOC spillage is a class of VOC emissions resulting from fuel that is spilled during the refueling process. Some or all of the spilled fuel will subsequently vaporize, adding hydrocarbon compounds to the atmosphere.

Table 2-18. Calculated Daily Emission Factors (grams/hp-hr) for Residential Equipment, 2002

| SCC | Equipment Type | VOC RVP 8.7 | VOC RVP 7.8 | CO Exhaust | NOx Exhaust |
|---|---|---|---|---|---|
| 2260004015 | Rotary Tiller | 232.3 | 230.6 | 474.1 | 0.6 |
| 2260004020 | Chain Saw | 248.3 | 247.8 | 455.2 | 0.6 |
| 2260004025 | Trimmer/Edger/Brush Cutter | 236.2 | 234.5 | 472.9 | 0.6 |
| 2260004030 | Leafblower/Vacuum | 233.3 | 228.8 | 458.8 | 0.6 |
| 2265004010 | Lawn Mower | 47.3 | 46.4 | 645.3 | 3.4 |
| 2265004015 | Rotary Tiller | 49.9 | 49.2 | 646.7 | 3.4 |
| 2265004025 | Trimmer/Edger/Brush Cutter | 51.3 | 50.7 | 652.2 | 3.5 |
| 2265004030 | Leafblower/Vacuum | 48.3 | 46.6 | 649.8 | 3.5 |
| 2265004040 | Rear Engine Riding Mower | 17.9 | 16.6 | 657.6 | 3.8 |
| 2265004055 | Lawn & Garden Tractor | 15.9 | 15.2 | 651.5 | 3.9 |
| 2265004075 | Other Lawn/Garden Equipment | 32.3 | 30.9 | 655.6 | 3.3 |

**Data Gathering Methodology**

Residential equipment can be categorized as equipment operated in residential areas by commercial lawn care service providers and/or residents and landlords for the purpose of residential lawn and garden maintenance. Lawnmowers, rotary tillers, lawn and garden tractors, leaf blower/vacuums, and chainsaws are examples of this equipment category. When aggregated, residential equipment represents an important source of emissions that contribute to air pollution.

Applicable survey information for this EI was based on nformation documented in the 1996 EI for the AACOG region. For example, the foundation of the 1996 EI was a San Antonio household survey, which was based upon a model residential survey for Austin. Modifications to the survey were necessary to make it more applicable to the AACOG study area. The University of Texas at San Antonio (UTSA) was contracted to perform a random household survey. The contractors offered advice on demographic questions and the development of instructions for the surveyor. In order to be representative of the population in the study area, a Spanish language version of the survey was also used.

The telephone sampling strategy was designed to provide an equal probability that households with telephones would be contacted. A sequence of over 9,000 random four-digit numbers was generated. These numbers were assigned to three-digit telephone prefixes in 38 sectors throughout the San Antonio area in proportion to the population in these sectors and to prefixes in the surrounding counties in proportion to the population in each county.

This type of random digit dialing generates many invalid, business, fax and never-answered phone numbers, but it provides an equal likelihood of accessing all residential phones whether they are listed or unlisted. By making calls during weekday evenings, weekend days and periodic weekday afternoons, opportunities were available for all potential respondents to be included in the final sample.

An additional test survey was conducted in 2002 for Bexar County based on the same questions. An additional 853 calls were conducted with 88 responses. The test survey was conduct to determine if lawn and garden maintenance habits had changed since the first survey. The test survey resulted in no significant changes in habits and the results were added to the original survey.

Table 2-19 provides an overview of the results of the total telephone calls made. Based on 1,742 contacts that were made, 862 produced a favorable response, for almost a 50% response rate. A total of 472 respondents were successfully interviewed in Bexar County and 390 interviews were completed in the surrounding counties.

Table 2-19. Combined Results of Telephone Calls Made, 1995 and 2002

| Type/Response | Number | Percent |
|---|---|---|
| No answer | 7348 | 77.0% |
| Fax | 451 | 4.7% |
| Refused | 880 | 9.2% |
| Yes | 862 | 9.0% |
| Total | 9541 | 100.0% |

In order to make conclusions about the general population, the number of surveys required for an accurate presentation is an important concern. Since initially determining a suitable sample size is not always clear-cut, several major factors must be considered. Due to time and budget constraints, a 95% level of confidence, which is the risk of error, the researcher is willing to accept, was chosen. Similarly, the confidence interval, which determines the level of sampling accuracy, was set at +/- 5% for Bexar County and the surrounding AACOG counties, respectively. Since the population is finite, the following equation was used to select the sample size:[20]

[20] Rea, L. M. and Parker, R. A. 1992. Designing and Conducting Survey Research. Jossey-Bass Publishers: San Francisco.

$$n = Z^2 (0.25)\ N / [Z^2 (0.25) + (N-1)\ C^2_p]$$

Where,

$Z = 1.96$ (i.e., for a 95% confidence level)

$N$ = population size (i.e. 505,721 households for Bexar County and 156,122 for the 11 surrounding counties)

$C_p = .05$ (i.e., for a 5% confidence interval)

For a 5% confidence interval in Bexar County:

$$n = (1.96)^2 \times (0.25) \times 505{,}721 / (1.96)^2 \times (0.25) + (505{,}721 - 1) \times (0.05)^2$$
$$= 383.9$$

For a 5% confidence interval in surrounding counties:

$$n = (1.96)^2 \times (0.25) \times 156{,}122 / (1.96)^2 \times (0.25) + (156{,}122 - 1) \times (0.05)^2$$
$$= 383.2$$

Thus, 384 survey responses were needed in order to meet the 95% level of confidence, and the ±5% confidence interval for both Bexar and surrounding counties. There were 472 households responding to the survey in Bexar County and 390 in the surrounding counties. This number satisfies the desired number of responses. Therefore, the survey was statistically significant.

An example of the English-Spanish survey script follows:

1) Date

Date of Interview [JUST PRESS ENTER]

2) Time Call

Time Call Begins [JUST PRESS ENTER]

3) CallSheet

Call Sheet Number (Enter number from the top of the call sheet)

4) Phone

Phone Number

5) CallNumber

Number of attempts calling this phone number

6) Speak

Hello, my name is ___________. I'm calling from the University of Texas at San Antonio's Survey Research Laboratory. We are performing a residential environmental impact survey for San Antonio and surrounding counties. We would like your help in finding out how local residents use lawn and garden equipment. This will help us design programs to reduce air and water pollution. It will take less than five minutes to complete the survey. Is there someone there age 18 or older who can answer questions about lawncare? IF PHONE IS ANSWERED IN SPANISH, SAY "Excuse me I have a wrong number." HANG UP AND GIVE THE NUMBER TO A SPANISH SPEAKER.

Hola, mi nombre es _________. Estoy llamando desde la Universidad de Texas en San Antonio. Estamos haciendo un estudio de preguntas sobre el impact del media ambiente. Me gustaria su ayuda para saber como los residentes de San Antonio usan las maquinas de cortar el zacate (o hierbas). Esto nos ayudara a reducir la polucion del aire. Solo tardare unos minutos. ¿Podria contestarme estas preguntas?

7) **housecomp**

Do you live in a single-family home, a small multi-family unit, or an apartment complex?

¿Vive en casa de una sola familia, de mas que una familia, o un apartamento?

8) **lawncare**

This section of the survey is on gas-powered lawn and garden equipment:

Who does most of the lawn/garden maintenance around your home?

Este parte de las preguntas son sobre maquinas para cortar al zacate (o hierbas) que usan gasolina. ¿En su casa, quien corta el zacate (o las hierbas)?

9) **%lawnmx**

What percent of your yard work involving gasoline-powered tools (lawnmower, leaf blower, chain saw, etc.) is done on the weekend? (INCLUDING BY COMMERCIAL LAWN SERVICE)

¿Que porciento, cuando estas cortando el zacate con maquinas que usan gasolina, haces el fin de semana?

10) **lawnmow**

What kind of lawnmower is used at your home?

¿Que tipo do maquina usa usted en su casa para cortar el zacate?

11**) fuel**

For fuel, does the gasoline-powered mower use: 2-stroke blended gas or just gasoline?

¿Cuando usa la maquina, le pone: aceite con gasolina mesclado, o gasolina solo?

12) **summer**

How many hours per summer week is the gasoline-powered lawnmower used?

Cuantas horas por semana en el verano usa la maquina para cortar el zacate?

13**) leafblow**
What is your average weekly use of a gas-powered leafblower in the summer?

Cuantas horas por semana usas una maquina que usa gas, para quitar hojas?

**14) chainsaw**
What is your average weekly use of a gas-powered chainsaw during the summer?
Cuantas horas por semana usas una cierra de cadena que usa gas?

15) **tiller**
What is your average weekly use of a gas-powered tiller during the summer?

Cuantas horas por semana usas una maquina que usa gas par cultivar la tierra?

16) **othtool**
What is your average weekly use of any other gasoline-powered equipment?

[IF YES:] What kind of equipment, and how much time per week are they used?

Cuantas horas por semana usas otras maquinas para mantener la yarda, que usan gas?

[IF YES:] Como se llaman, y cuanto tiempo las usa?

17) **airqual**
What is your overall impression of San Antonio's air quality? Do you think it is bad, below average, acceptable/average, good, or excellent?

Cual es su opinion de la calidad del aire en San Antonio? Es muy malo, malo, termino medio, bueno, o excelente?

18) **source**
Compared to commercial activities, how much of the air pollution in this area do you think is due to private citizen's activities such as driving, yard equipment, home chemical use, etc.?

Cree que la polucion esta causada por los residentes con el trafico de los coches, el equipo de cortar el zacate, el uso de productos quimicos en casa, comparando con los usos comerciales?

19) **priority**

How much of a priority to you is the protection of the air quality of San Antonio and the surrounding area? would you say it is very unimportant, unimportant, moderately important (neutral), important, or extremely important?

Como es de importante la calidad del aire en San Antonio para usted? No es muy importante, no es importante, termino medio, importante, o muy importante?

20) **age**
What is your current age? (ENTER ACTUAL AGE. 89=89+; 90=DX/NA)

Finalmente, me gustaria preguntarle unas cosas sobre usted. Que es su edad?

21) **income**
Which of the following categories would you say beat describes your yearly family income:

Cuales de las seguientes categorias es el mejor descripto del sueldo al ano de su familia?

22) **educ**
What is the highest number of years of education you have completed?
[21 = DON'T KNOW/NO ANSWER]

Cuantos anos de educacion tiene?

23) **zipcode**
What is the zip code for your residence?

That's the end of the survey! Thank you for taking time to help us improve the environment of San Antonio and surrounding communities.

Que es; su distrito de postal, o "zip code"?

Eso es todo. Muchas gracias por su participacion en la ayuda a la Universidad para saber su opinion del los impactos en el aire de San Antonio.

**Integrating the Data Elements**
The following model was used to calculate the estimated residential equipment activity emission amounts:

1. Estimate the number of households in AACOG counties for 2002. This process entailed acquiring/calculating:
   - The 2000 household and population from the U.S. census
   - The 2002 population data from the Texas Water Development Board
   - The number of households in 2002 = (2000 households x 2002 population) / 2000 population

Table 2-20 illustrates the estimated population and household data for AACOG counties in 2002:[21]

Table 2-20. 2000 Household and Population Data within AACOG Region

| County | 2000 Households | 2000 Population | 2002 Households | 2002 Population |
|---|---|---|---|---|
| Atascosa | 12,816 | 38,628 | 13,272 | 40,003 |
| Bandera | 7,010 | 17,645 | 7,703 | 19,391 |
| Bexar | 488,942 | 1,392,931 | 505,721 | 1,440,732 |
| Comal | 29,066 | 78,021 | 31,316 | 84,061 |
| Frio | 4,743 | 16,252 | 4,854 | 16,634 |
| Gillespie | 8,521 | 20,814 | 8,789 | 21,469 |
| Guadalupe | 30,900 | 89,023 | 32,695 | 94,194 |
| Karnes | 4,454 | 15,446 | 4,544 | 15,757 |
| Kendall | 8,613 | 23,743 | 9,482 | 26,138 |
| Kerr | 17,813 | 43,653 | 18,270 | 44,772 |
| Medina | 12,880 | 39,304 | 13,363 | 40,778 |
| Wilson | 11,038 | 32,408 | 11,833 | 34,742 |
| Total | 636,796 | 1,807,868 | 661,842 | 1,878,671 |

2. Determine the residential to commercially-maintained residential equipment use ratio for the counties surrounding Bexar County. This process entailed:
   - Acquiring information from the responses pertaining to the surrounding counties' survey question on, "Who does the most lawn and garden maintenance around your home?"
   - Adjusting the responses to only include two categories: commercial and residential/landlord
   - Calculating the adjusted commercial use ratio by
     Adjusted commercial use ratio = commercial use ratio / (1 – N/A ratio – Don't know ratio)

[21] Texas Water Development Board, 1998. Population Projections 1990-2050, Most Likely Scenario. Austin, TX.

- Calculating the adjusted residential/landlord use ratio by
  Adjusted residential/landlord use ratio = (residential use ratio + landlord use ratio) / (1 – N/A ratio – Don't know ratio). A sample calculation follows:
  Adjusted residential use ratio = (0.8628 + 0.0349)/(1 – 0.01 – 0.01) = 0.9161

Table 2-21 illustrates the original and adjusted surrounding counties' survey responses to include commercial and residential use ratios for lawn and garden equipment.

Table 2-21. Adjusted Residential Equipment Survey Responses for Surrounding Counties

| Who does most of the lawn/garden maintenance at home? | | | | | Adjusted Commercial Use Ratio | Adjusted Residential Use Ratio |
|---|---|---|---|---|---|---|
| Choice | Survey Response | Survey Response Ratio | Adjusted Survey Response | Adjusted Survey Response Ratio | | |
| N/A | 4 | 0.0100 | 0 | 0.0000 | 0.0840 | 0.9160 |
| Commercial | 33 | 0.0823 | 33 | 0.0840 | | |
| Residential | 346 | 0.8628 | 346 | 0.8804 | | |
| Landlord | 14 | 0.0349 | 14 | 0.0356 | | |
| Don't know | 4 | 0.0100 | 0 | 0.0000 | | |
| Total | 401 | 1.0000 | 393 | 1.0000 | | |

3. Determine the residential to commercial residential equipment use ratio for Bexar County. This process entailed:

- Acquiring information from the responses pertaining to the Bexar County survey question on, "Who does the most lawn and garden maintenance around your home?"
- Adjusting the responses to only include two categories: commercial and residential/landlord
- Calculating the adjusted commercial use ratio by
  Adjusted commercial use ratio = adjusted commercial use ratio / (1 – "N/A" ratio – "Don't know" ratio)
  - Calculating the adjusted residential/landlord use ratio by
    Adjusted residential use ratio = (residential use ratio + landlord use ratio) / (1 – "N/A" ratio – "Don't know" ratio)

Table 2-22 illustrates the original and adjusted Bexar County survey responses to include commercial and residential use ratios for lawn and garden equipment.

Table 2-22. Adjusted Residential Equipment Survey Responses for Bexar County

| Who does most of the lawn/garden maintenance at home? | | | | | Adjusted Commercial Use Ratio | Adjusted Residential Use Ratio |
|---|---|---|---|---|---|---|
| Choice | Survey Response | Survey Response Ratio | Adjusted Survey Response | Adjusted Survey Response Ratio | | |
| N/A | 1 | 0.0022 | 0 | 0.0000 | 0.1787 | 0.8213 |
| Commercial | 77 | 0.1667 | 77 | 0.1787 | | |
| Residential | 333 | 0.7208 | 333 | 0.7726 | | |
| Landlord | 21 | 0.0455 | 21 | 0.0487 | | |
| Don't know | 30 | 0.0649 | 0 | 0.0000 | | |
| Total | 462 | 1.0000 | 431 | 1.0000 | | |

4. Determine the equipment use ratio and actual use (hr/yr.) for specific equipment types for the counties surrounding Bexar County. This process entailed :
   - Acquiring information from the responses pertaining to the surrounding counties' survey question on, "How many hours per summer week is the gasoline-powered lawnmower used?"
   - Calculating the specific equipment use ratio by
     Lawnmower use ratio = sum of survey time category choice responses / sum of survey time category choice responses + "Don't know" responses + "None" responses
   - Calculating the adjusted lawnmower time use ratio by
     Adjusted lawnmower time use ratio = Specific time category choice responses / (1 – None category responses – Don't know category responses)
   - Calculating the actual use (hr/yr.) by
     Actual use (hr/yr.) = (Sum of individual time category minute elements / 2) x (28 weeks/ozone year / 60 minutes) x adjusted residential lawnmower time use ratio

Table 2-23 illustrates the original and adjusted surrounding counties' lawnmower-use survey responses to include equipment use ratio and use of lawnmowers. All other categories of residential equipment and the Bexar County information in this EI underwent this same approach.

Table 2-23. Adjusted Lawnmower-use Survey Responses

<table>
<tr><th colspan="5">How many hours per summer week is the gasoline-powered lawnmower used?</th><th rowspan="2">Lawnmower Use Ratio</th><th rowspan="2">Use (hr/yr.)</th></tr>
<tr><th>Minutes per Week</th><th>Survey Response</th><th>Survey Response Ratio</th><th>Adjusted Survey Response</th><th>Adjusted Survey Response Ratio</th></tr>
<tr><td>None</td><td>3</td><td>0.0076</td><td>0</td><td>0.0000</td><td rowspan="9">0.9338</td><td>0.0000</td></tr>
<tr><td>0-15</td><td>7</td><td>0.0178</td><td>7</td><td>0.0191</td><td>0.0668</td></tr>
<tr><td>15-30</td><td>20</td><td>0.0509</td><td>20</td><td>0.0545</td><td>0.5722</td></tr>
<tr><td>30-45</td><td>30</td><td>0.0763</td><td>30</td><td>0.0817</td><td>1.4305</td></tr>
<tr><td>45-60</td><td>68</td><td>0.1730</td><td>68</td><td>0.1853</td><td>4.5395</td></tr>
<tr><td>60-90</td><td>63</td><td>0.1603</td><td>63</td><td>0.1717</td><td>6.0082</td></tr>
<tr><td>90-120</td><td>47</td><td>0.1196</td><td>47</td><td>0.1281</td><td>6.2752</td></tr>
<tr><td>120-150</td><td>51</td><td>0.1298</td><td>51</td><td>0.1390</td><td>8.7548</td></tr>
<tr><td>>150</td><td>81</td><td>0.2061</td><td>81</td><td>0.2207</td><td>15.4496</td></tr>
<tr><td>Don’t know</td><td>23</td><td>0.0585</td><td>0</td><td>0.0000</td><td rowspan="2">Total</td><td rowspan="2">43.0967</td></tr>
<tr><td>Total</td><td>393</td><td>1.0000</td><td>367</td><td>1.0000</td></tr>
</table>

5. Determine the estimated residential equipment emissions amounts (tons/day and tons/year) for specific equipment categories/types and VOC (exhaust, crank, diurnal, displacement, and spillage), CO exhaust, and NOx exhaust categories in the surrounding counties. Emission factors (EF) were calculated based on a NONROAD 2004 run. This process entailed:
   - Calculating the 2-stroke tiller VOC exhaust emissions amount (tons/day) by:
     2-stroke tiller VOC exhaust = (number of 2002 households in the county x average hp x LF x EF x total use (hr/yr.) x ton/907200 grams x equipment ratio (engine type) x residential use ratio x equipment use ratio) / 196 days per ozone year

All other categories/types of residential equipment in the surrounding counties and Bexar County in this EI underwent this same approach. The results from the trimmer/edger/brush category were combined with the “other residential equipment” category. The 1995 survey did not break out this equipment type separately from the results. The emissions from commercial lawn and garden equipment were calculated using a different methodology than that used for residential and are described in a separate section of the Emission Inventory.

## Commercial Lawn and Garden Equipment Inventory

**Purpose of the Commercial Lawn and Garden Equipment EI**

The commercial equipment EI accomplishes two goals:

1. Provides a methodological specifications foundation that will allow for better assessment of commercial lawn and garden equipment activity emissions at the county level for each county in the AACOG area for the year 2002
2. Provides the mechanism to determine the representative emissions, which would occur on any given day in the typical commercial equipment-use period.

Commercial Lawn and Garden equipment can be broken down into 7 categories:

- Golf Courses
- Public Schools
- Universities/Colleges
- Commercial Lawn and Garden Companies (both for residential properties and commercial properties)
- Non-Military Government Facilities, Parks, and Hospitals
- Cemeteries
- Airports and Military Bases (Small Airports, Commercial Airports, Army Bases, Air Force Bases)

Airports and Military Bases' lawn and garden equipment are covered under chapter 3, Airport and Military Emissions. Cemeteries lawn and garden equipment were not included because the emissions are expected to be very small, as cemeteries do not cover a large improved land area in the San Antonio region. Also, AACOG did not receive enough survey responses from cemeteries to be statistically significant. This section will cover lawn and garden equipment emissions from golf courses, public schools, universities/colleges, commercial companies, and non-military government facilities, parks, and hospitals.

This inventory takes into account the following types and categories of equipment:

- 2260004016 2-stroke commercial rotary tillers
- 2265004016 4-stroke commercial rotary tillers
- 2260004021 2-stroke commercial chain saw
- 2260004026 2-stroke commercial trimmer/Edger/Brush Cutter
- 2265004026 4-Stroke commercial trimmer/Edger/Brush Cutter
- 2260004030 2-stroke commercial leaf blower/vacuums

- 2265004030 4-stroke commercial leaf blower/vacuums
- 2260004071 2-stroke commercial turf equipment
- 2265004071 4-stroke commercial turf equipment
- 2270004071 Diesel commercial turf equipment
- 2265004011 4-stroke commercial lawnmower
- 2265004041 4-stroke commercial rear engine riding mower
- 2265004046 4-stroke commercial front mower
- 2265004051 4-Stroke commercial Shredder
- 2265004056 4-Stroke commercial Lawn and Garden Tractors
- 2270004056 Diesel commercial Lawn and Garden Tractors
- 2265004066 4-Stroke commercial Chipper/Stump Grinder
- 2267004066 LPG commercial Chipper/Stump Grinder
- 2270004066 Diesel commercial Chipper/Stump Grinder
- 2265004076 4-stroke commercial other lawn and garden equipment
- 2270004076 Diesel commercial other lawn and garden equipment

Golf Courses

**Data Gathering Methodology**

The methodology used in producing golf courses' lawn and garden equipment emission estimates for the AACOG region relies on local data produced from surveys and on national data used in EPA's NONROAD Emission Inventory Model in the absence of reliable local data. The methodology involves the following steps:

1. Conducting a survey of local golf course lawn and garden equipment activity to determine local equipment use rates and equipment characteristics.

2. Determining equipment population and activity for golf courses without local data. This was accomplished by applying an average acre to equipment ratio of those golf course sites with available equipment population data to those golf courses without data.

3. Conduct a second survey with estimations of local golf course equipment activity at each golf course. The golf courses were asked to make corrections and send back the survey.

4. Estimating VOC, NOx, and CO annual emissions by inputting local data into the NONROAD model for equipment populations and converting the tons/year

estimate into an estimate for a typical weekday (tons/day) for the summer ozone season.

**Step 1: Conduct a Survey of Equipment Activity for Local Golf Courses**

The preferred method for calculating golf course equipment emissions involves conducting a survey of equipment use within the AACOG region (a copy of which is attached to the end of this section). There are 47 large private and public golf courses in the AACOG region. Names and addresses of these companies, and the responses from these companies remained confidential through the use of proprietary codes. Due to a lack of responses, data for only two golf courses was collected.

The survey provided the following information for the two golf courses:

- Activity Rates (HRS) – total annual hours of use by type of equipment
- Temporal Profiles – equipment use on weekdays and equipment use on weekend days for all types of equipment
- Engine Characteristics:
  - Engine Type – gasoline 2-stroke, gasoline 4-stroke, diesel, LPG, CNG
  - Engine Horsepower – rated power of the engine

**Step 2: Determine County Equipment Population for Golf Courses that Have Missing Local Data.**

Aerial photography was used to determine the improved acres for each golf course that did not respond to the survey. The equipment population had to be estimated based on number of improved acres at each golf course that did not provide a survey response.

An acre to equipment ratio was calculated for golf courses by dividing the total pieces of equipment counted for each category by the total number of acres. This ratio was used to calculate estimated equipment populations for the remaining golf courses. The number of acres of a golf course was multiplied by the equipment ratio and the result was rounded to the nearest whole number.

Example:

| | |
|---|---|
| Estimates # Tractors for Golf Course "A" | = (# Acres) |
| | x (average number of Tractors per acre) |
| | = (260) x (0.00614) |
| | = 1.59649 |
| Estimated # Tractors for Golf Course "A" | = 2 |

**Step 3: Conduct a Second Survey of Equipment Activity for Golf Courses**

After analyzing aerial photographs of golf courses and calculating estimations for equipment, a second survey was sent out to the local golf courses with the estimations of their equipment population, HP, and activity hours. This survey used the same format as the initial survey. The companies were asked to correct the estimations and to send the surveys back to AACOG. There was a 17 percent response rate to the second survey. The increased response rate improved equipment estimations

**Step 4: Estimate Annual Emissions of Ozone Precursors**

Once county level equipment population was calculated, emissions of volatile organic compounds (VOC), nitrogen oxides (NOx), and carbon monoxide (CO) were calculated using NONROAD Model 2004. In using the NONROAD model, some adjustments were made for local conditions.

*Population File*

The equipment population, activity hours and horsepower for each golf course were added up and compiled into a master spreadsheet by county. The equipment population estimated from the survey was multiplied by the ratio of the activity hours from the survey over the default NONROAD model hours. The default NONROAD hours in the model were low for most equipment. In particular, front-engine mower hours were very low in the NONROAD model at only 86 hours per year. Golf courses need regular lawn maintenance and require extensive use of equipment.

Two of the three categories that had higher default hours in the NONROAD model are chain saws and chippers/stump grinders. Very often golf courses do not need to use this equipment once the course is built. A number of survey respondents indicated they only use this equipment after a flood. Once the adjustment factor was calculated, this master spreadsheet was converted into the population file for the NONROAD model. The following table 2-24 lists the breakdown for each type of equipment.

Table 2-24. Golf Course Equipment Population Estimations from the AACOG Survey.

| Golf Course Lawn and Garden Equipment | SCC | Engine Type | Estimated Equipment Population | Hours/Year per piece of equipment | NONROAD model Default Hours | Adjustment factor | New Equipment population |
|---|---|---|---|---|---|---|---|
| Chain Saws | 2260004021 | Gasoline 2-cycle | 44 | 58 | 303 | 0.19 | 8 |
| Trimmers/ Edgers/ Brush Cutters | 2260004026 | Gasoline 2-cycle | 82 | 490 | 137 | 3.57 | 293 |
| Leaf Blowers/ Vacuums | 2260004031 | Gasoline 2-cycle | 88 | 735 | 282 | 2.61 | 231 |
| Lawn Mowers | 2265004011 | Gasoline 4-cycle | 31 | 532 | 406 | 1.31 | 41 |
| Rotary Tillers | 2265004016 | Gasoline 4-cycle | 13 | 131 | 472 | 0.28 | 4 |
| Rear Engine Riding Mowers | 2265004041 | Gasoline 4-cycle | 82 | 1,421 | 569 | 2.50 | 205 |
| Front Mowers | 2265004046 | Gasoline 4-cycle | 112 | 1,258 | 86 | 14.62 | 1,638 |
| Commercial Turf Equipment/ Sod Cutters | 2265004071 | Gasoline 4-cycle | 175 | 1,282 | 682 | 1.88 | 329 |
| Commercial Mowers | 2270004046 | Diesel | 125 | 1,255 | 480 | 2.61 | 326 |
| Lawn and Garden Tractors | 2270004056 | Diesel | 57 | 794 | 433 | 1.83 | 104 |
| Chippers/ Stump/ Grinders/ Mulchers | 2270004066 | Diesel | 13 | 131 | 465 | 0.28 | 4 |
| Total | | | 821 | | | | 3,181 |

Also, the allocation file was updated with the horsepower (HP) estimates from the survey. Table 2-25 lists the default NONROAD 2004 HP and the calculated average HP from the survey responses. In almost all cases, the horsepower levels were very similar between the default values and the survey responses. However, golf courses tended to use larger front-engine mowers, commercial turf equipment and lawn and garden tractors. For the NONROAD run, equipment populations were allocated to horsepower bins based on survey responses.

Table 2-25. Golf Course Equipment HP Estimations from the AACOG Survey.

| Golf Course Lawn and Garden Equipment | Engine Type | SCC | NONROAD model Default HP | Estimated Equipment HP |
|---|---|---|---|---|
| Chain Saws | Gasoline 2-cycle | 2260004021 | 3.5 | 3.5 |
| Trimmers/ Edgers/ Brush Cutters | Gasoline 2-cycle | 2260004026 | 1.5 | 1.5 |
| Leaf Blowers/ Vacuums | Gasoline 2-cycle | 2260004031 | 2.0 | 2.0 |
| Lawn Mowers | Gasoline 4-cycle | 2265004011 | 4.1 | 3.7 |
| Rotary Tillers | Gasoline 4-cycle | 2265004016 | 4.7 | 4.7 |
| Rear Engine Riding Mowers | Gasoline 4-cycle | 2265004041 | 10.7 | 10.7 |
| Front Mowers | Gasoline 4-cycle | 2265004046 | 13.5 | 27.6 |
| Commercial Turf Equipment/ Sod Cutters | Gasoline 4-cycle | 2265004071 | 12.6 | 18.1 |
| Commercial Mowers | Diesel | 2270004046 | 29.1 | 26.0 |
| Lawn and Garden Tractors | Diesel | 2270004056 | 21.0 | 47.9 |
| Chippers/ Stump/ Grinders/ Mulchers | Diesel | 2270004066 | 143.9 | 142.4 |

*Allocation File*

An allocation file was made to properly allocate emissions for each county. The file was made by taking the default landscape allocation file for Texas (TX_LSCAP.AOL), then replacing values (employees in landscape and horticulture service) with zero for all counties except those in the study area. The values for the AACOG region were allocated based on the number of golf courses in each county. The values of the counties were added up and the total was used to replace the value for the entire State of Texas. This allowed the NONROAD model to calculate emissions for the AACOG region as a whole and distribute the emissions to each county appropriately.

Table 2-26. Allocation of Golf Course Equipment in the AACOG Region, 2002.

| FIPS | County | Total Acres (Indicator value) | Percentage |
|---|---|---|---|
| 48013 | Atascosa | 142 | 2.0% |
| 48019 | Bandera | 595 | 8.3% |
| 48029 | Bexar | 4500 | 63.1% |
| 48091 | Comal | 200 | 2.8% |
| 48163 | Frio | 0 | 0.0% |
| 48171 | Gillespie | 149 | 2.1% |
| 48187 | Guadalupe | 669 | 9.4% |
| 48255 | Karnes | 160 | 2.2% |
| 48259 | Kendall | 0 | 0.0% |
| 48265 | Kerr | 550 | 7.7% |
| 48325 | Medina | 170 | 2.4% |
| 48493 | Wilson | 0 | 0.0% |
| 48000 | AACOG | 7135 | 100.0% |

*Activity File*

Hours per year were based on the data in table 2-27 for each type of equipment calculated based on the returned surveys.

Table 2-27. Survey Results for Average Hours Usage for Weekday Golf Equipment in the AACOG Region, 2002.

| Commercial Lawn & Garden Equipment | Engine Type | Avg. # Hrs. Ea. Unit is Operated Weekday | Avg. # Hrs. Ea. Unit is Operated Weekend |
|---|---|---|---|
| Chain Saws | Gasoline 2-cycle | 0.2 | 0.1 |
| Trimmers/ Edgers/ Brush Cutters | Gasoline 2-cycle | 1.7 | 0.3 |
| Leaf Blowers/ Vacuums | Gasoline 2-cycle | 2.8 | 0.1 |
| Lawn Mowers | Gasoline 4-cycle | 1.4 | 1.3 |
| Rotary Tillers | Gasoline 4-cycle | 0.5 | 0.0 |
| Rear Engine Riding Mowers | Gasoline 4-cycle | 4.0 | 3.5 |
| Front Mowers | Gasoline 4-cycle | 4.0 | 1.7 |
| Commercial Turf Equipment/ Sod Cutters | Gasoline 4-cycle | 4.1 | 1.8 |
| Rear Engine Riding Mowers | Diesel | 4.4 | 0.8 |
| Lawn and Garden Tractors | Diesel | 2.9 | 0.3 |
| Chippers/ Stump/ Grinders/ Mulchers | Diesel | 0.5 | 0.0 |

*Season File*

A weekday versus weekend adjustment factor of 0.1743230 per weekday and 0.0641925 per weekend day was used in the calculations. The results were based on the total hours for each time period from the AACOG survey.

Alamo Area Council Of Governments

May 15, 2002

[COMPANY NAME]
[STREET ADDRESS]
[CITY] [STATE] [ZIP]

**ATTENTION: OWNER/ MAINTENANCE MANAGER**

Re: 2002 San Antonio Emissions Inventory

The Alamo Area Council of Governments (AACOG) requests your assistance in the development of a 2002, air quality emission inventory for San Antonio and the surrounding counties. AACOG is conducting this inventory in order to assess and quantify local air quality within the San Antonio Metropolitan area and contiguous counties. This inventory is especially significant because the San Antonio region currently risks being declared in non-attainment of federal air quality standards.

AACOG will calculate emissions from the commercial lawn and garden equipment using information submitted by local organizations involved in commercial lawn and garden activities in and around the San Antonio region. With this survey, we are requesting information on commercial equipment used during the 2002 calendar year within Atascosa, Bandera, Bexar, Comal, Frio, Gillespie, Guadalupe, Karnes, Kendall, Kerr, Medina, and Wilson counties. The purpose of this survey is to provide better information and services to our region, as well as help minimize additional regulation on the community.

Your input is vital to this process and will serve to effect a true and correct emissions inventory for 2002 that will be delivered to the EPA. Please provide your responses on the attached survey and return it to us in the self-addressed envelope by the date indicated. The information you provide will be considered strictly confidential and unavailable to public information requests. Please submit your response by June 19, 2002.

Thank you for your time and participation. If you have any questions or comments please feel free to contact Chris Langston at (210) 362-5270.

Regionally yours,

Al J. Notzon III
Executive Director

| | Internal Combustion Equipment Type | Engine Type<br>Gasoline 2-cycle<br>Gasoline 4-cycle<br>Diesel<br>Propane<br>Natural Gas<br>Electric | Approx. Horse-Power Rating | Number of Units Typically Operated | Avg. No. of Hours and Time of Day Each Unit Operated (MON-FRI) | Avg. No. of Hours and Time of Day Each Unit Operated (SAT & SUN) |
|---|---|---|---|---|---|---|
| **COMMERCIAL LAWN AND GARDEN EQUIPMENT** | | | | | | |
| 1 | Lawn Mowers | | | | | |
| 2 | Rear Engine Riding Mowers | | | | | |
| 3 | Front Mowers | | | | | |
| 4 | Rotary Tillers | | | | | |
| 5 | Chain Saws | | | | | |
| 6 | Chippers/Stump Grinders/Mulchers | | | | | |
| 7 | Trimmers/Edgers/ Brush Cutters | | | | | |
| 8 | Commercial Turf Equipment/ Sod Cutters | | | | | |
| 9 | Leaf Blowers/ Vacuums | | | | | |
| 10 | Lawn and Garden Tractors | | | | | |
| 11 | Shredders | | | | | |
| 12 | Other Lawn and Garden Equipment: (Please Describe): ________________ | | | | | |

Public Schools and University/Colleges

### Data Gathering Methodology

The methodology used in calculating lawn and garden equipment emission estimates for public schools and university/colleges' in the AACOG region relied on local data produced from surveys and on national data used in EPA's NONROAD Emission Inventory Model, in the absence of reliable local data. The methodology involved the following steps:

1. Conducting a survey of local public schools and university/college lawn and garden equipment activity to determine local equipment use rates and equipment characteristics.

2. Determining equipment population and activity for public schools and university/colleges without local data. For public schools, this was accomplished by applying an average number of schools in each school district to equipment ratio of those school districts with available equipment population data to those school districts without data. For universities/colleges, this was accomplished by applying an average acre to equipment ratio of those university/college sites with available equipment population data to those university/college sites without data.

3. Conducting a second survey with estimations of local public schools and university/colleges equipment activity. The public schools and universities/ colleges were asked to make corrections and send back the survey.

4. Estimating VOC, NOx, and CO annual emissions by inputting local data into the NONROAD model for equipment populations and converting the tons/year estimate into an estimate for a typical weekday (tons/day) for the summer ozone season.

### Step 1: Conduct a Survey of Local Schools Equipment Activity

The preferred method for calculating public school and university/college equipment emissions involves conducting a survey of equipment use within the AACOG region. There are 14 universities and colleges in the San Antonio region. Likewise there are 46 school districts in the AACOG region representing 608 public schools. Only school districts were included in the public school categories. Small private schools were assumed to contract out there lawn and garden equipment with commercial companies.

Names and addresses of these schools and their responses remained confidential throughout the survey process through the use of proprietary codes. The survey had excellent response rates for both categories.

The survey provided the following information for public schools and Universities/ colleges:

- Activity Rates (HRS) – total annual hours of use by type of equipment
- Temporal Profiles – equipment use on weekdays and equipment use on weekend days for all types of equipment
- Engine Characteristics:
    - Engine Type – gasoline 2-stroke, gasoline 4-stroke, diesel, LPG, CNG
    - Engine Horsepower – rated power of the engine

**Step 2: Determine County Equipment Population for Schools without Local Data.**
Aerial photography was used to determine the number of improved acres for each university/college. The equipment population estimations were based on the number of improved acres at each university/college that did not provide a survey response.

An acre to equipment ratio was created for universities/colleges by dividing the total pieces of equipment counted for each category by the total number of acres. This ratio was used to calculate estimated equipment population for the remaining university/college sites. The number of acres for a university/college was multiplied by the equipment ratio to get the estimated number of equipment pieces.

Example:

Estimates # Chainsaws for University ”A” = (# Acres)
x (average number of Chainsaws per acre)
= (114) x (0.0144)
= 1.6416
Estimated # Chainsaws for University “A” = 2

A similar method was use to calculate equipment at public schools, but it was based on the number of schools in each school district compared to the number of acres. School districts were used instead of individual schools because they often have one central maintenance department for the whole school district.

Example:

Estimates # Trimmers for School District ”A” = (# Schools)

x (average number of Trimmers per school)

= (12) x (0.8667)

= 10.4004

Estimated # Trimmers for School District “A” = 10

**Step 3: Conduct a Second Survey of Schools Equipment Activity**

After analyzing the equipment for each school district or university/college and calculating estimates of equipment, a second survey was sent out to local schools with the estimates of their equipment populations, HP, and activity hours. This survey used the same format as the initial survey. The schools were asked to correct the estimations and to send the surveys back to AACOG. There was a 42 percent response rate to the second survey. Sixty-two percent of universities/colleges responded to the survey. The increased response rate improved equipment estimations

In order to draw conclusions about this population, the goal of the survey was to receive as many responses as possible. Since a response from the total population was not realistic, determining how many responses would be necessary to accurately make conclusions about the population was an important question. Due to factors such as budget and time constraints, a 95 percent level of confidence was chosen. The level of confidence is the risk of error the researcher is willing to accept. The confidence interval, or the level of sampling accuracy, was set at ± 5%. The following equation was used to determine the number of responses needed for a 95% level of confidence, and a ± 5% confidence interval.[22]

$$n = \frac{Z^2 (0.25) N}{Z^2 (0.25) + (N - 1) C^2p}$$

where,

Z = 1.96 - for a 95% confidence level

N = population size - 621 (13 Universities/Colleges and 608 Public Schools)

Cp = 0.05 - for a ± 5% confidence level

n = sample size

therefore,

$$n = \frac{(1.96)^2 (0.25) (619)}{(1.96)^2 (0.25) + (619 - 1) (0.05)^2}$$

[22] Rea, L.M. and Parker, R.A., 1992. Designing and Conducting Survey Research. Jossey-Bass Publishers: San Francisco.

n = 237.6

Thus, 238 survey responses were needed in order to meet the 95% level of confidence, and the ±5% confidence interval. There were 259 schools responding to the survey. This number satisfies the desired number of responses.

**Step 4: Estimate Annual Emissions of Ozone Precursors**

Once county level equipment populations were determined, emissions of volatile organic compounds (VOC), nitrogen oxides (NOx), and carbon monoxide (CO) were calculated using NONROAD Model 2004. Two separate runs of the NONROAD model were completed: one run for public schools and one run for universities/colleges. In using the NONROAD model, some adjustments were made for local conditions.

*Population File*

The equipment population and horsepower for each public school and university/college were added up and compiled into a master spreadsheet by county. The equipment population estimated from the survey was multiplied by the ratio of activity hours from the survey to the default NONROAD model hours.

The default NONROAD hours in the model were low for most equipment. In particular, gasoline 4-cycle front-engine mower hours were very low in the NONROAD model at only 86 hours per year. Shredders also had low activity values in the NONROAD model at 61 hours for gasoline 4-cycle and 120 hours for diesel-powered equipment per year. Once the adjustment factor was calculated, this master spreadsheet was converted into the population file for the NONROAD model. The following table 2-28 lists the breakdown for each type of equipment.

Table 2-28 Estimations of Public Schools Equipment Population Based on AACOG Survey

| Public Schools Lawn and Garden Equipment | SCC | Engine Type | Estimated Equipment Population | Hours/Year per piece of equipment | NONROAD model Default Hours | Adjustment factor | New Equipment population |
|---|---|---|---|---|---|---|---|
| Chain Saws | 2260004021 | Gasoline 2-cycle | 57 | 232 | 303 | 0.76 | 44 |
| Trimmers/ Edgers/ Brush Cutters | 2260004026 | Gasoline 2-cycle | 529 | 1040 | 137 | 7.59 | 4017 |
| Leaf Blowers/ Vacuums | 2260004031 | Gasoline 2-cycle | 216 | 490 | 282 | 1.74 | 375 |
| Lawn Mowers | 2265004011 | Gasoline 4-cycle | 249 | 788 | 406 | 1.94 | 483 |
| Rotary Tillers | 2260004016 | Gasoline 4-cycle | 13 | 167 | 472 | 0.35 | 5 |
| Rear Engine Riding Mowers | 2265004041 | Gasoline 4-cycle | 34 | 1,454 | 569 | 2.56 | 86 |
| Front Mowers | 2265004046 | Gasoline 4-cycle | 15 | 1,386 | 86 | 16.12 | 238 |
| Shredders | 2265004051 | Gasoline 4-cycle | 7 | 1,175 | 61 | 19.25 | 138 |
| Lawn and Garden Tractors | 2265004056 | Gasoline 4-cycle | 170 | 1,122 | 721 | 1.56 | 265 |
| Commercial Turf Equipment/ Sod Cutters | 2265004071 | Gasoline 4-cycle | 5 | 1,305 | 682 | 1.91 | 10 |
| Commercial Mowers | 2270004046 | Diesel | 22 | 1,247 | 480 | 2.60 | 56 |
| Lawn and Garden Tractors | 2270004056 | Diesel | 55 | 1,042 | 433 | 2.41 | 132 |
| Chippers/ Stump/ Grinders/ Mulchers | 2270004066 | Diesel | 5 | 653 | 465 | 1.40 | 7 |
| Commercial Turf Equipment/ Sod Cutters | 2270004071 | Diesel | 5 | 1,168 | 1,068 | 1.09 | 5 |
| Shredders | 2270004051 | Diesel | 5 | 1,697 | 120 | 14.14 | 68 |
| Total | | | 1,381 | | | | 5,927 |

Table 2-29. Universities/Colleges Equipment Population Estimations from the AACOG Survey.

| University/College Lawn and Garden Equipment | 2260004021 | Gasoline 2-cycle | Estimated Equipment Population | Hours/Year per piece of equipment | NONROAD model Default Hours | Adjustment factor | New Equipment population |
|---|---|---|---|---|---|---|---|
| Chain Saws | 2260004021 | Gasoline 2-cycle | 18 | 449 | 303 | 1.48 | 26 |
| Trimmers/ Edgers/ Brush Cutters | 2260004026 | Gasoline 2-cycle | 44 | 995 | 137 | 7.26 | 320 |
| Leaf Blowers/ Vacuums | 2260004031 | Gasoline 2-cycle | 32 | 716 | 282 | 2.54 | 82 |
| Lawn Mowers | 2265004011 | Gasoline 4-cycle | 22 | 376 | 406 | 0.93 | 20 |
| Rotary Tillers | 2265004016 | Gasoline 4-cycle | 4 | 351 | 472 | 0.74 | 3 |
| Rear Engine Riding Mowers | 2265004041 | Gasoline 4-cycle | 26 | 963 | 569 | 1.69 | 45 |
| Front Mowers | 2265004046 | Gasoline 4-cycle | 7 | 715 | 86 | 8.32 | 61 |
| Lawn and Garden Tractors | 2265004056 | Gasoline 4-cycle | 3 | 701 | 721 | 0.97 | 3 |
| Other Lawn and Garden Equipment | 2265004076 | Gasoline 4-cycle | 1 | 418 | 120 | 3.48 | 5 |
| Shredders >6HP | 2265007010 | Gasoline 4-cycle | 1 | 209 | 50 | 4.18 | 6 |
| Commercial Mowers | 2270004046 | Diesel | 12 | 1,305 | 480 | 2.72 | 32 |
| Lawn and Garden Tractors | 2270004056 | Diesel | 7 | 381 | 544 | 0.70 | 5 |
| Commercial Turf Equipment/ Sod Cutters | 2270004071 | Diesel | 1 | 522 | 1,068 | 0.49 | 1 |
| Shredders | 2270007010 | Diesel | 1 | 1,044 | 61 | 17.11 | 25 |
| Total | | | 179 | | | | 634 |

Also, the allocation file was updated with the horsepower (HP) estimates from the survey. Table 2-30 and Table 2-31 list the default NONROAD 2004 HP and the calculated average HP from the survey responses. In almost all cases, the horsepower levels were very similar between the default values and the survey responses. However, public schools tended to use larger rear-engine rider mowers and shredders, but smaller lawn and garden tractors and chainsaws. Universities/colleges tended to use smaller chainsaws and larger lawn and garden tractors. For the NONROAD model run, equipment populations were allocated to horsepower bins based on survey responses.

Table 2-30. HP Estimations from the AACOG Survey for Public School Equipment.

| Public Schools Lawn and Garden Equipment | Engine Type | SCC | NONROAD's Default HP | Estimated Equipment HP |
|---|---|---|---|---|
| Chain Saws | Gasoline 2-cycle | 2260004021 | 3.5 | 2.2 |
| Trimmers/ Edgers/ Brush Cutters | Gasoline 2-cycle | 2260004026 | 1.5 | 1.4 |
| Leaf Blowers/ Vacuums | Gasoline 2-cycle | 2260004031 | 2.0 | 2.1 |
| Lawn Mowers | Gasoline 4-cycle | 2265004011 | 4.1 | 5.3 |
| Rotary Tillers | Gasoline 4-cycle | 2265004016 | 4.7 | 4.6 |
| Rear Engine Riding Mowers | Gasoline 4-cycle | 2265004041 | 10.7 | 19.6 |
| Front Mowers | Gasoline 4-cycle | 2265004046 | 13.5 | 19.0 |
| Shredders | Gasoline 4-cycle | 2265004051 | 4.2 | 38.0 |
| Lawn and Garden Tractors | Gasoline 4-cycle | 2265004056 | 14.4 | 5.7 |
| Commercial Turf Equipment/ Sod Cutters | Gasoline 4-cycle | 2265004071 | 12.6 | 25.0 |
| Commercial Mowers | Diesel | 2270004046 | 29.1 | 22.2 |
| Lawn and Garden Tractors | Diesel | 2270004056 | 21.0 | 17.8 |
| Chippers/ Stump/ Grinders/ Mulchers | Diesel | 2270004066 | 143.9 | 40.0 |
| Commercial Turf Equipment/ Sod Cutters | Diesel | 2270004071 | 48.8 | 23.4 |
| Shredders | Diesel | 2270007010 | N/A | 60.0 |

Table 2-31. University/College Equipment HP Estimations from the AACOG Survey.

| College Lawn and Garden Equipment | Engine Type | SCC | NONROAD's Default HP | Estimated Equipment HP |
|---|---|---|---|---|
| Chain Saws | Gasoline 2-cycle | 2260004021 | 3.5 | 1.8 |
| Trimmers/ Edgers/ Brush Cutters | Gasoline 2-cycle | 2260004026 | 1.5 | 1.3 |
| Leaf Blowers/ Vacuums | Gasoline 2-cycle | 2260004031 | 2.0 | 2.3 |
| Lawn Mowers | Gasoline 4-cycle | 2265004011 | 4.1 | 5.1 |
| Rotary Tillers | Gasoline 4-cycle | 2265004016 | 4.7 | 6.0 |
| Rear Engine Riding Mowers | Gasoline 4-cycle | 2265004041 | 10.7 | 16.8 |
| Front Mowers | Gasoline 4-cycle | 2265004046 | 13.5 | 13.5 |
| Lawn and Garden Tractors | Gasoline 4-cycle | 2265004056 | 14.4 | 68.0 |
| Other Lawn and Garden Equipment | Gasoline 4-cycle | 2265004076 | 5.4 | 8.0 |
| Shredders >6HP | Gasoline 4-cycle | 2265007010 | 8.6 | 8.0 |
| Commercial Mowers | Diesel | 2270004046 | 29.1 | 27.3 |
| Lawn and Garden Tractors | Diesel | 2270004056 | 21.0 | 29.6 |
| Commercial Turf Equipment (com) | Diesel | 2270004076 | 48.8 | 28.0 |
| Shredders | Diesel | 2270007010 | N/A | 200.0 |

*Allocation File*

An allocation file was created to properly allocate emissions for each county. The file was made by taking the default landscape allocation file for Texas (TX_LSCAP.AOL), and replacing values (employees in landscape and horticulture service) with zero for all counties except those in the study area. The values for the public schools in the AACOG region were allocated based on the number of schools in each county (Table 2-35 ). The values of the counties were added up and the total was used in place of the entire Texas state value. This allows the NONROAD model to calculate emissions for the AACOG region as a whole and distribute the emissions to each county appropriately.

For the university/colleges, the values were allocated based on the total number of acres in each county. The results are listed in table 2-32.

Table 2-32. Allocation of Public Schools in the AACOG Region, 2002*.[23]

| FIPS | County | Total # of Schools (Indicator value) | Percentage |
|---|---|---|---|
| 48013 | Atascosa | 28 | 4.6% |
| 48019 | Bandera | 7 | 1.2% |
| 48029 | Bexar | 396 | 65.1% |
| 48091 | Comal | 33 | 5.4% |
| 48163 | Frio | 10 | 1.6% |
| 48171 | Gillespie | 9 | 1.5% |
| 48187 | Guadalupe | 35 | 5.8% |
| 48255 | Karnes | 14 | 2.3% |
| 48259 | Kendall | 13 | 2.1% |
| 48265 | Kerr | 18 | 3.0% |
| 48325 | Medina | 20 | 3.3% |
| 48493 | Wilson | 25 | 4.1% |
| 48000 | AACOG | 608 | 100.0% |

*Military Base Schools are not included (in different category)

[23] National Center for Education Statistics , 2002. Available online: http://nces.ed.gov/ (20 July 2004)

Table 2-33. Allocation of Universities/Colleges in the AACOG Region, 2002.[24]

| FIPS | County | Total # of Acres (Indicator value) | Percentage |
|---|---|---|---|
| 48013 | Atascosa | 5 | 0.5% |
| 48019 | Bandera | 0 | 0.0% |
| 48029 | Bexar | 906 | 82.7% |
| 48091 | Comal | 0 | 0.0% |
| 48163 | Frio | 0 | 0.0% |
| 48171 | Gillespie | 0 | 0.0% |
| 48187 | Guadalupe | 184 | 16.8% |
| 48255 | Karnes | 0 | 0.0% |
| 48259 | Kendall | 0 | 0.0% |
| 48265 | Kerr | 0 | 0.0% |
| 48325 | Medina | 0 | 0.0% |
| 48493 | Wilson | 0 | 0.0% |
| 48000 | AACOG | 1095 | 100.0% |

*Activity File*

Hours per year were based on the data in table 2-34 and table 2-35 for each type of equipment calculated based on the returned surveys.

[24] *Ibid*.

Table 2-34. Weekday Survey Results for Average Hours Usage for Public School Equipment in the AACOG Region, 2002.

| Commercial Lawn & Garden Equipment | Engine Type | Avg. # Hrs. Ea. Unit is Operated Weekday | Avg. # Hrs. Ea. Unit is Operated Weekend |
|---|---|---|---|
| Chain Saws | Gasoline 2-cycle | 0.9 | 0.0 |
| Trimmers/ Edgers/ Brush Cutters | Gasoline 2-cycle | 4.0 | 0.0 |
| Leaf Blowers/ Vacuums | Gasoline 2-cycle | 1.9 | 0.0 |
| Lawn Mowers | Gasoline 4-cycle | 3.0 | 0.0 |
| Rotary Tillers | Gasoline 4-cycle | 0.7 | 0.0 |
| Rear Engine Riding Mowers | Gasoline 4-cycle | 5.6 | 0.0 |
| Front Mowers | Gasoline 4-cycle | 5.4 | 0.0 |
| Shredders | Gasoline 4-cycle | 4.5 | 0.0 |
| Lawn and Garden Tractors | Gasoline 4-cycle | 4.3 | 0.0 |
| Commercial Turf Equipment/ Sod Cutters | Gasoline 4-cycle | 5.0 | 0.0 |
| Commercial Turf Equipment/ Sod Cutters | Diesel | 4.5 | 0.0 |

Table 2-35. Survey Results for Average Hours Usage for University/College Equipment in the AACOG Region, 2002.

| Commercial Lawn & Garden Equipment | Engine Type | Avg. # Hrs. Ea. Unit is Operated Weekday | Avg. # Hrs. Ea. Unit is Operated Weekend |
|---|---|---|---|
| Chain Saws | Gasoline 2-cycle | 1.7 | 0.0 |
| Trimmers/ Edgers/ Brush Cutters | Gasoline 2-cycle | 3.8 | 0.0 |
| Leaf Blowers/ Vacuums | Gasoline 2-cycle | 2.6 | 0.3 |
| Lawn Mowers | Gasoline 4-cycle | 1.4 | 0.0 |
| Rotary Tillers | Gasoline 4-cycle | 1.3 | 0.1 |
| Rear Engine Riding Mowers | Gasoline 4-cycle | 3.5 | 0.3 |
| Front Mowers | Gasoline 4-cycle | 2.7 | 0.0 |
| Lawn and Garden Tractors | Gasoline 4-cycle | 2.7 | 0.0 |
| Other Lawn and Garden Equipment | Gasoline 4-cycle | 1.6 | 0.0 |
| Shredders >6HP | Gasoline 4-cycle | 0.8 | 0.0 |
| Commercial Mowers | Diesel | 5.0 | 0.0 |
| Lawn and Garden Tractors | Diesel | 4.3 | 0.0 |
| Commercial Turf Equipment/ Sod Cutters | Diesel | 2.0 | 0.0 |
| Shredders | Diesel | 4.0 | 0.0 |

*Season File*

The weekday vs. weekday adjustment factor of 0.2000000 for weekdays and 0.0000000 for weekends was calculated from the returned AACOG surveys for public schools. The adjustment factor for universities was 0.1923550 for weekdays and 0.0191125 for weekends. For almost all types of equipment at schools, activity only occurs on weekdays. The results were based on the total hours for each time period from the AACOG survey.

## Commercial Lawn and Garden Companies

**Data Gathering Methodology**

The methodology used in producing commercial companies' lawn and garden equipment emission estimates for the AACOG region relied on local data produced from surveys, results from an ERG survey[25], and on national data used in the EPA's NONROAD Emission Inventory Model, in the absence of reliable local data. The methodology involved the following steps:

1. Conducting a survey of commercial lawn and garden equipment activity to determine local equipment use rates and equipment characteristics.

2. Determining equipment population and activity of local commercial companies that did not respond to the survey. This was based on applying survey equipment population responses to all lawn and garden equipment companies (SIC 0782).

3. Estimating VOC, NOx, and CO annual emissions by inputting local data into the NONROAD model for equipment populations and converting the tons/year estimate into an estimate for a typical weekday (tons/day), for the summer ozone season.

**Step 1: Conduct a Survey of Commercial Companies' Equipment Activity**

The preferred method for calculating commercial companies' equipment emissions involves conducting a survey of equipment use within the AACOG region. The total number of companies were collected from the Texas Workforce commission[26] for the rural counties and the 2001 Census County Business Patterns[27] for Bexar, Comal, Guadalupe, and Wilson. The breakdown of commercial companies by county is provided in table 2-36.

[25] Rick Baker and Sam Wells, Nov. 24, 2003. Development of Commercial Lawn and Garden Emission Estimations for the state of Texas and Selected Metropolitan Areas. Prepared by Eastern Research Group and Starcrest Consulting Group for Texas Commission on Environmental Quality.
[26] Texas Workforce Commission, 2002. Employment Data for 3rd quarter 2001. Austin, Texas.
[27] US Census Bureau (last access August 30, 2004), 2001 MSA Business Patterns (NAICS) Available on-line: http://censtats.census.gov/cgi-bin/msanaic/msadetl.pl

Table 2-36. Commercial Lawn and Garden Companies in the AACOG Region.[28]

| FIPS | County | Number of Commercial Companies (SIC 0782) |
|---|---|---|
| 48013 | Atascosa | 3 |
| 48019 | Bandera | 2 |
| 48029, 48091, 48187, 48493 | Bexar, Comal, Guadalupe, Wilson | 226 |
| 48163 | Frio | 1 |
| 48171 | Gillespie | 8 |
| 48255 | Karnes | 1 |
| 48259 | Kendall | 10 |
| 48265 | Kerr | 18 |
| 48325 | Medina | 4 |
| Total | AACOG | 273 |

The survey results were checked to make sure there were no overlaps between the ERG survey and the AACOG survey. Names and addresses of these companies and their responses remained confidential throughout the survey process through the use of proprietary codes. The survey provided the following information for the commercial companies' lawn and garden equipment:

- Activity Rates (HRS) – total annual hours of use by type of equipment
- Temporal Profiles – equipment use on weekdays and equipment use on weekend days for all types of equipment
- Equipment Counts

Once the AACOG survey was completed, the results were combined with ERG results. A total of 34 companies responded to the survey (25 from AACOG Survey and 9 from ERG survey) in the AACOG region. Listed in the following table (2-37) are the results from the comgined AACOG and ERG survey data. There was a 12 percent response rate between the two surveys.

[28] Ibid.

Table 2-37. Commercial Lawn and Garden Equipment Survey Totals

| Equipment Type | Survey Equipment Counts |
|---|---|
| Lawn Mowers | 75 |
| Tillers | 10 |
| Chainsaws | 145 |
| Trimmers | 93 |
| Blowers | 96 |
| Rear Mower | 34 |
| Front Mower | 24 |
| Shredder | 3 |
| Tractor | 11 |
| Chippers | 29 |
| Turf | 2 |
| Other | 4 |
| Total | 526 |

**Step 2: Determine County Equipment Population for Commercial Companies without Local Data.**

The equipment population was estimated based on the same methodology used in the ERG report. The number of chainsaws calculated from the survey respondents was multiplied by the total number of companies in the AACOG region and divided by the total number of survey respondents.

The total equipment population was then adjusted by a factor based on the average hours of use per year from the AACOG survey data. Some equipment sources – chainsaws, front mowers, and shredders – had much higher activity rates than the NONROAD default hours.

Table 2-38. Hours per Year from Survey and Adjustment Factor for Equipment Population

| Equipment Type | AACOG Survey Hours/Year | EPA NONROAD Model Default Hours/Year | Adjustment Factor |
|---|---|---|---|
| Lawn Mowers | 1361 | 406 | 3.353 |
| Tillers | 809 | 472 | 1.714 |
| Chainsaws | 1336 | 303 | 4.410 |
| Trimmers | 1445 | 137 | 10.545 |
| Blowers | 1111 | 282 | 3.939 |
| Rear Mower | 1200 | 569 | 2.110 |
| Front Mower | 1154 | 86 | 13.416 |
| Shredder | 1218 | 50 | 24.360 |
| Tractor | 1190 | 721 | 1.651 |
| Chippers | N/A | 465 | 1.000 |
| Turf | 365 | 682 | 0.535 |
| Other | 1566 | 61 | 25.672 |

The adjustment factor in the above table 2-38 was applied to each equipment category from the AACOG/ERG survey. Also, a 10% SWAG Factor was applied to the other equipment category based on the methodology used in the ERG study.

Example:

Estimates # Com. Chainsaws in AACOG = (Total Chainsaws) X (Total # of companies)
X Hours Adjustment Factor
/ (total number of survey respondents)
= (145 X 273 X 4.410) / (34)
Estimated # Com. Chainsaws in AACOG = 5,134

**Step 3: Estimated Annual Emissions of Ozone Precursors**

Once county level equipment populations were determined, emissions of volatile organic compounds (VOC), nitrogen oxides (NOx), and carbon monoxide (CO) were calculated using NONROAD Model 2004. In using the NONROAD model, some adjustments were made for local conditions.

*Population File*

The equipment population for each type of equipment was summed based on the AACOG and ERG survey responses. This master spreadsheet was then converted into the population file for the NONROAD model.

Table 2-39. Equipment Population Estimations from the AACOG Survey Compared to EPA's NONROAD Default Equipment Population.

| Equipment Type | EPA NONROAD Model Default Population | AACOG Estimated Population | Percent Different | ERG Results for Texas |
|---|---|---|---|---|
| Lawn Mowers | 9,108 | 2,019 | 22% | 71% |
| Tillers | 3,487 | 138 | 4% | 24% |
| Chainsaws | 4,371 | 5,134 | 117% | 137% |
| Trimmers | 11,139 | 7,875 | 71% | 58% |
| Blowers | 6,304 | 3,036 | 48% | 79% |
| Rear Mower | 291 | 576 | 198% | 804% |
| Front Mower | 3,623 | 2,585 | 71% | 29% |
| Shredder | 1,829 | 587 | 32% | 6% |
| Tractor | 2,364 | 146 | 6% | 6% |
| Chippers | 309 | 682 | 221% | 206% |
| Turf | 6,013 | 9 | 0% | 2% |
| Other | 4,371 | 3,290 | 75% | 71% |
| Total | 49,891 | 26,076 | 52% | 60% |

*Allocation File*

An allocation file was created to properly allocate emissions for each county. The file was made by taking the default landscape allocation file for Texas (TX_LSCAP.AOL), then replacing values (employees in landscape and horticulture service) with zero for all counties except those in the study area. The values for the AACOG region were allocated based on the number of companies from Table 2-42 of comptroller data provided by ERG. The values for each of the counties was added up and the total was used to replace the value for the State of Texas. This allowed the NONROAD model to calculate emissions for the AACOG region as a whole and distribute the emissions to each county appropriately.

*Season File*

A weekday versus weekend adjustment factor of 0.1933987 per weekday and 0.0165034 per weekend day was used in the calculations. The results were based on the total hours for each time period from the AACOG survey. Most commercial lawn and garden companies in the AACOG region do not operate on weekends so the default NONROAD factor is inappropriate.

## Non-Military Government Facilities, Parks, and Hospitals

**Data Gathering Methodology**

The methodology used in producing non-military government facilities, parks, and hospitals lawn and garden equipment emission estimates for the AACOG region relied on local data produced from surveys and on national data used in EPA's NONROAD 2004 Emission Inventory Model, in the absence of reliable local data. The methodology involved the following steps:

1. Conducting a survey of non-military government facilities lawn and garden equipment activity to determine local equipment use rates and equipment characteristics.

2. Estimating VOC, NOx, and CO annual emissions by using survey responses and NONROAD model defaults and converting the tons/year estimate into an estimate for a typical weekday (tons/day) for the summer ozone season.

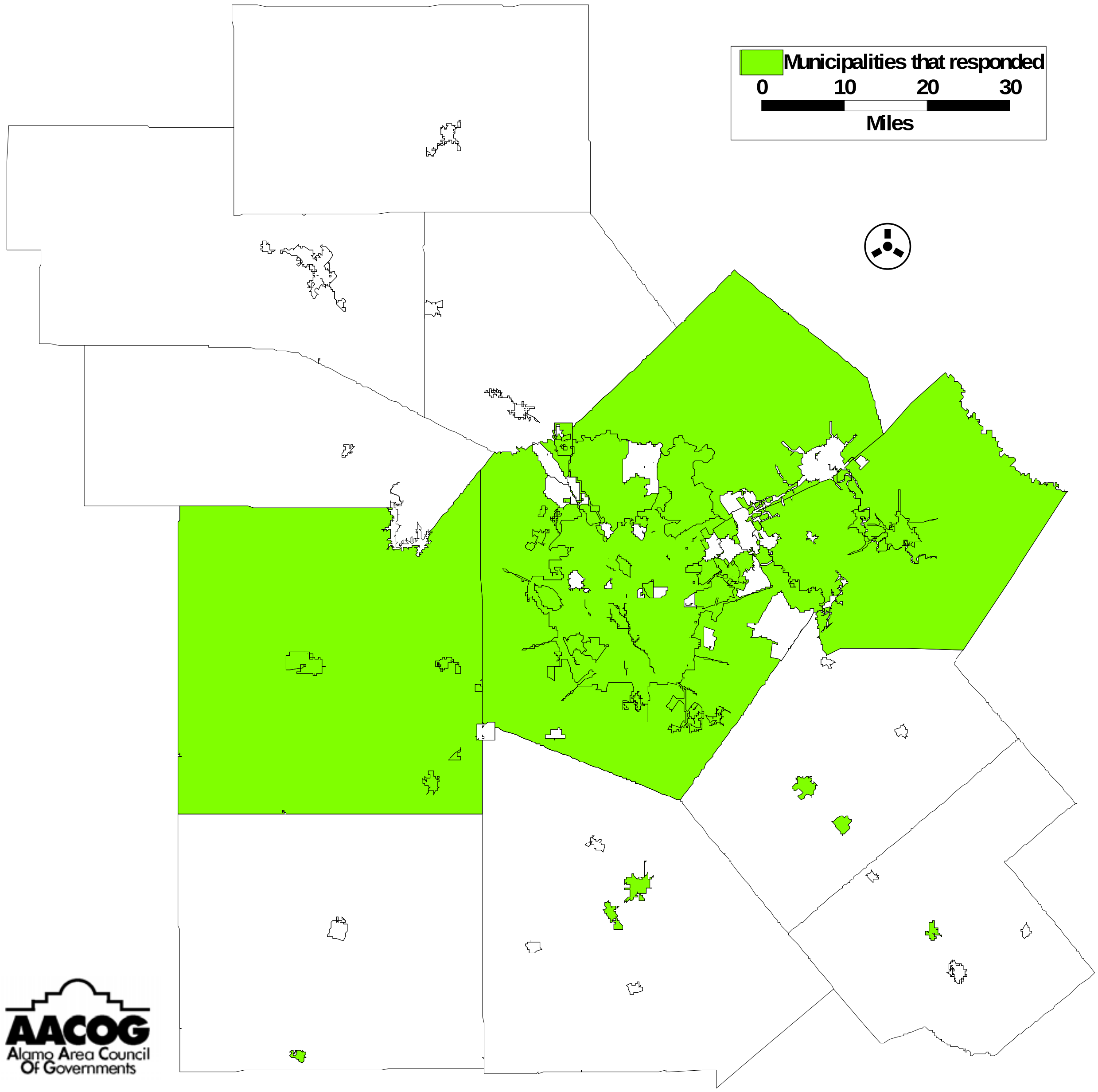
This category includes hospitals, municipality offices, parks, national wildlife areas (NWA), utilities, transportation departments, commercial parks (i.e. Sea World etc.), power plants, etc.

**Step 1: Conduct a Survey of Equipment Activity for Non-Military Government Facilities, Parks, and Hospitals**

The preferred method for calculating non-military government facilities, parks, and hospitals equipment emissions involves conducting a survey of equipment use within the AACOG region. These facilities included local municipalities, power generation companies, hospitals, commercial parks, and state parks. Names and addresses of these facilities, and the responses from these facilities remained confidential throughout the survey process through the use of proprietary codes. The survey provided the following information for non-military government facilities, parks, and hospitals lawn and garden equipment:

- Activity Rates (HRS) – total annual hours of use by type of equipment
- Temporal Profiles – equipment use on weekdays and equipment use on weekend days for all types of equipment
- Equipment Counts

Figure 2-1. Areas Covered by Municipalities that Responded to the Survey, 2004




Plot Date: September 8, 2004
Compilation Date: September 7, 2004
Source: Survey Data

For the municipal governments, 42 percent (26) responded to the survey. These governments represent 81% of the population in the AACOG region. The municipalities that responded to the survey are plotted on figure 2-1.

For other governmental entities, the results from the 2004 survey were combined with the 1995 survey because of a lack of responses to the 2004 survey. For other governmental organizations, there was a 67 percent response rate to the survey. Unfortunately, if a facility did not respond to the survey, their equipment counts were not included in the total because there was no methodology to estimate their equipment populations.

**Step 2: Estimate Annual Emissions of Ozone Precursors**

For each type of equipment for non-military governmental facilities, parks, and hospitals, VOC, NOx, and CO emissions were calculated for each category using the following formula:

Emissions (grams/yr.) for VOC, CO, and NOx = EP x HRS x HP x LF x EF

Where EP = equipment population of type A for the quarry
- HRS = annual hours of use
- HP = average rated horsepower
- LF = typical load factor
- EF = average emissions of pollutant per unit of use for Type A equipment

The values for load factor (LF), and emission factor (EF) were obtained from EPA's NONROAD Emission Inventory Model.[29] LF values were easily obtainable from the data files of this model. However, the EF values were not as easily obtainable, and thus had to be obtained through the method described below.

In an effort to find the most recent and specific equipment type emission factors, EPA's most recent version (2004) of the NONROAD Emission Inventory Model was used. The values for these factors had to be calculated by first determining all of the default values used in the model, performing a run, and then using the results of the run to work in reverse through the formula to determine what EFs were used by the model for an average ozone season day. For example, the EFs were developed through the following process:

---

[29] U.S. Environmental Protection Agency. National Nonroad Emissions Model 2004: Draft Version. Ann Arbor, MI.

1. A 2002 NONROAD Model run for commercial lawn and garden equipment was performed for the state of Texas using ozone season temperatures and yearly average temperatures.

2. The output from this run was used to obtain the following for all types of commercial lawn and garden equipment:
   - VOC, CO, and NOx emissions in tons/year for each type of equipment (the results of the run).
   - Equipment population used in the NONROAD Model for each type of equipment.

3. The NONROAD Model input file activity.dat, was used to obtain the following values:
   - The activity rate used in the NONROAD Model for each type of commercial lawn and garden equipment in hours/year (HRS).
   - The LF used in the NONROAD Model for each type of equipment.

4. The average horsepower used in the NONROAD Model for each type of equipment was determined from the input file Tx.pop.

5. With all the known factors in place, the EFs for VOC, CO, and NOx were calculated through the use of the following formula:

   EF (g/bhp-hr) = (tons/yr. of pollutant) x (2,000 lbs./ton) x (453.6 g/lb.)
   / (Eqmt. Pop) x (hrs/yr.) x (Avg. Hp) x (LF)

The resulting EFs were used in the remaining steps to calculate emissions from each type of equipment.

Returning to the formula previously outlined, annual VOC, NOx, and CO emissions were calculated for each category:

Emissions (g/yr.) for VOC, CO, and NOx = EP x HRS x HP x LF x EF

A final step in the calculation is to determine weekday versus weekend emissions. The equipment activity rates for weekdays for each piece of equipment at each facility was estimated.

**Example:**
There are an estimated 5 chainsaws at facility A. These Chainsaws are operated 4 hrs/weekdays and 1,040 hrs/yr. total. (HRS), and have a HP of 3. From the NONROAD Model, the typical LF for these chainsaws is 0.7, and the EF for NOx is 1.90 grams/hp-hr during the ozone season.

Emissions (g/yr.) for NOx = EP x HRS x HP x LF x EF
= 5 x 1,040 (hrs/yr.) x 3 (hp) x 0.7 x 1.90 (g/hp-hr)
= 20,799 (g/yr.)

This figure is then converted into tons/yr.

[(grams/yr.) / 453.6 (g/lb.)] / 2,000 (lbs./ton)
Thus 20,799 (g/yr.) = 0.0229 (tons/yr.) of NOx

The final step is to calculate emissions for an average ozone season weekday

Emissions (g/weekday) for NOx = EP x HRS x HP x LF x EF
= 5 x 4 (hrs/weekday) x 3 (hp) x 0.7 x 1.90 (g/hp-hr)
= 79.69 (g/weekday

This figure is then converted into tons/yr.

[(grams/weekday) / 453.6 (g/lb.)] / 2,000 (lbs./ton)
Thus 79.69 (g/weekday) = 0.000088 (tons/weekday) of NOx

This same procedure is then used for CO and VOCs to produce estimates of these pollutants by facility. The emission estimates are added up for each facility in a county to get a county emission total.

*Season File*
A weekday versus weekend adjustment factor was calculated separately for each piece of equipment based on the survey responses. Overall the average weekday versus weekend adjustment factor was 0.184357 per weekday and 0.039107 per weekend day.

Once the lawn and garden equipment was added up for all categories, a comparison was done between the NONROAD 2004 defaults and the results from the survey. Table 2-40 shows the breakdown by category and the results from the ERG survey. The AACOG results match closely with ERG findings for most categories. Overall, the NONROAD model over predicted the number of lawn and garden equipment in the AACOG survey. AACOG surveys indicated 80 percent of the equipment population in the defaults (ERG results indicate that the number was 60 percent, but they did not survey all the categories).

There were more rear-engine mowers and chippers in the AACOG survey then indicated by the NONROAD model. At the same time, the NONROAD model over predicted the number of tillers and turf equipment. These results do not include the lawn and garden equipment at airports or military bases. Military equipment is included in Chapter 3 – Airport and Military Base Emissions.

Table 2-40. Total Equipment Population Estimations from the AACOG Survey Compared to EPA's NONROAD Default Equipment Population.

| Equipment Type | EPA NONROAD Model Default Population | Commercial Lawn and Garden Companies | Universities / Colleges | Public Schools | Golf Courses | Government Facilities / Parks / Hospitals | Percent of NONROAD Model Population | ERG Results for Texas |
|---|---|---|---|---|---|---|---|---|
| Lawn Mowers | 9,108 | 2,019 | 20 | 484 | 41 | 170 | 30% | 71% |
| Tillers | 3,487 | 138 | 3 | 5 | 4 | 7 | 4% | 24% |
| Chainsaws | 4,371 | 5,134 | 26 | 44 | 8 | 553 | 132% | 137% |
| Trimmers | 11,139 | 7,875 | 320 | 4,026 | 293 | 2,277 | 133% | 58% |
| Blowers | 6,304 | 3,036 | 82 | 375 | 231 | 515 | 67% | 79% |
| Rear Mower | 291 | 576 | 77 | 142 | 531 | 155 | 508% | 804% |
| Front Mower | 3,623 | 2,585 | 61 | 239 | 1,638 | 225 | 131% | 29% |
| Shredder | 1,829 | 587 | 31 | 206 | 0 | 16 | 46% | 6% |
| Tractor | 2,364 | 146 | 8 | 398 | 104 | 83 | 31% | 6% |
| Chippers | 309 | 682 | 0 | 7 | 4 | 52 | 241% | 206% |
| Turf | 6,013 | 9 | 1 | 15 | 329 | 29 | 6% | 2% |
| Other | 4,371 | 3,290 | 5 | 0 | 0 | 60 | 77% | 71% |
| Total | 49,891 | 26,076 | 634 | 5,941 | 3,181 | 4,142 | 80% | 60% |

## Logging Equipment

### Introduction

There is no documentation of logging equipment usage in the 12-county AACOG region. There were searches completed on two different websites to verify the absence of logging activities in the 12-county AACOG region. EPA's website provided logging information geographically. The website indicated that logging in Texas is primarily restricted to the eastern side of the state and there were no logging activities listed for south central Texas. Similarly, the U.S. Census Bureau's website lists no logging activities in the AACOG region. A search was also conducted using a list of businesses in the 12 AACOG counties. None of the SIC codes for businesses in the region matched SIC 2411 for logging.

## Mining Equipment

### Introduction

Mining activities in the South-central Texas region include lignite mining as well as rock (primarily limestone) quarrying. However, the methodology used to calculate emissions from lignite mining equipment varied somewhat from that used for quarrying equipment. Consequently, the methodologies are documented separately. This section of the 2002 AACOG emissions inventory describes the methodology used to estimate equipment emissions at a surface (lignite) mine in Atascosa County.

### Methodology

The equipment used to operate surface mines in the region typically includes scrapers, crawler dozers, motor graders, end dumps, bottom dumps, cranes and other large off-road equipment. Mining emissions were estimated using an equipment list provided by the lignite mine operator. Other data needed for the emission calculations were either provided by mining experts or obtained from the NONROAD model, as described later in this section.

VOC, $NO_x$, and CO emission calculations for mining equipment were based on the formula:[30]

Emissions (grams/yr.) for VOC, NOx, and CO = EP x HRS x HP x LF x EF

[30] U.S. Environmental Protection Agency (November 1991). Nonroad Engine and Vehicle Emission Study Report. Washington, D.C.

Where:

| | | |
|---|---|---|
| EP | = | equipment population |
| HRS | = | annual hours of use |
| HP | = | average rated horsepower |
| LF | = | typical load factor |
| EF | = | average emissions of pollutant per unit of use |

Personnel in the lignite mining industry provided information on equipment horsepower and annual hours of equipment use. Values for typical load factor and average emissions of pollutant per unit of use were obtained from EPA's draft NONROAD Emission Inventory Model, version 2004 (US EPA, no date).[31] Load factors are listed in the model's equipment activity file. Emission factors, which are not readily available, were calculated by determining the default values used in NONROAD 2004. This was accomplished by performing a model run, then solving for the unknown value (EF) in the above formula using model output.

**Sample Calculation**

As an example of how emissions were calculated for non-road mining equipment, the following sample is provided. The information used in the sample is representative of lignite mining operations throughout the Central Texas region.

Emissions from three off-highway tractors, with horsepower ratings of 180, 460, and 520, were calculated based on year-round use. Two of the tractors are operated approximately 24 hours per day and the third is used an average of 8 hours per day. The two larger tractors are operated seven days a week, the third is used Monday through Friday. The formula for calculating $NO_x$ emissions generated by the three tractors in grams per year is as follows:

| | | |
|---|---|---|
| EP (equipment population) | = | 3 |
| HRS (annual hours of use) | = | 8 x 261 = 2,088 |
| | | 24 x 365 = 8,760 |
| | | 24 x 365 = 8,760 |
| | = | 19,608 / 3 = 6,536 hrs/yr. (avg) |
| HP (average rated horsepower) | = | 180 hp |
| | | 460 hp |
| | | 520 hp |

[31] U.S. Environmental Protection Agency (no date). NONROAD Model (nonroad engines, equipment, and vehicles). Available on-line: http://www.epa.gov/otaq/nonrdmdl.htm.

= 1160 / 3 = 387 hp

- from the NONROAD 2004 model -

LF (typical load factor) = 0.59
EF (emission factor) for $NO_x$ = 8.1944

Therefore

EP * HRS * HP * LF * EF =
3 * 6,536 * 387 * 0.59 * 8.1944 = 36,687,104 grams of $NO_x$ / year

The value in grams per year was converted into tons per year using the formula:

[(grams/year) / 453.59 grams per lb.] / 2,000 lb. per ton

= (36,687,104 / 453.59) / 2,000
= 40.44 tons/year of $NO_x$

This same procedure was used to produce estimates of VOC and CO in tons per year. The process was repeated for each piece of mobile equipment used at the mine. The results were summed by SCC.

**Seasonal and Daily Adjustments**

To determine summer season *weekday* emissions, the ton/year values were modified using daily adjustment factors. Since the mine operates year round, a seasonal adjustment is unnecessary to determine ozone season emissions. Summer (months of June, July and August) emissions were calculated as 25% of the annual totals. Weekday factors were determined using the average hours per day of use. For the off-road tractors, summer weekday emissions were calculated as listed in table 2-41.

Table 2-41. Summer Weekday Emissions for Off-Road Mining Tractors

| HP | Annual Weekday Hours | Annual Weekend Hours |
|---|---|---|
| 180 | 8 * 261 = 2,088 | 0 * 104 = 0 |
| 460 | 24 * 261 = 6,264 | 24 * 104 = 2, 496 |
| 520 | 24 * 261 = 6,264 | 24 * 104 = 2, 496 |
| Total | 14,616 | 4,992 |
| % | 74.5410 | 25.4590 |

The annual emissions in tons/year were multiplied by the seasonal factor (.25 for all categories) and weekday adjustment factor, then divided by the total number of weekdays in June, July, and August 2002 (65). Using the same example, the weekday NOx emissions for off-road tractors during the 2002 summer season were calculated as:

(Tons/year * season factor * weekday adjustment factor) / Number of weekdays in summer 2002

(40.44 tons NOx/year * 0.25 * 0.74541) / 65 days/year = 0.115940 tons NOx/day

## Quarry Equipment

### Introduction

This category consists of emissions produced from equipment used in quarry and mining activities. A variety of minerals are mined in the AACOG region: limestone, aggregate, granite, sand and gravel, and lignite. This section of the emissions inventory covers the calculation of emissions from off-road equipment.

Stationary equipment associated with the mines and quarries, including power plants and asphalt plants, are included in the point source inventory developed by TCEQ. Likewise, pickups and other vehicles registered for highway use are included in the on-road inventory; therefore, they are omitted here to avoid double counting.

Emission estimates for the Alamo Area Council of Governments (AACOG) region were calculated from local survey data and national data for diesel, liquefied petroleum gas (LPG), compressed natural gas (CNG), 2-stroke, and 4-stroke vehicles in the following categories of quarry equipment:

- 2270002018 Scrapers
- 2270002036 Excavators
- 2270002048 Graders
- 2270002051 Off-highway Trucks
- 2270002060 Rubber Tire Loaders
- 2270002066 Tractors/Loaders/Backhoes
- 2270002069 Crawler Tractor/Dozers

These are the categories used in the EPA's NONROAD Emission Inventory Model.

**Methodology**

The methodology used in producing quarry equipment emission estimates for the AACOG region is based on local data produced from aerial photography and surveys, and on national data used in EPA's NONROAD 2004 Emission Inventory Model, in the absence of reliable local data. The methodology involves:

1. Conducting a survey of local quarry equipment activity to determine local equipment population, usage rates, and equipment characteristics.

2. Analyzing aerial photography. Analysis was conducted as a result of a low response to the survey. Quarry equipment was identified and counted using available imagery of the Bexar county quarry sites.

3. Determining county equipment population for quarry sites without local data. This was accomplished by applying an average employee to equipment ratio of those quarry sites with available equipment population data to those quarry sites without data.

4. Conducting a second survey with estimations of local quarry equipment activity at each quarry. The quarries were asked to make corrections and send back the survey.

5. Estimating VOC, NOx, and CO annual emissions using survey responses and NONROAD model defaults and converting the tons/year estimate into an estimate for a typical weekday (tons/day) for the summer ozone season.

Equipment emissions were only calculated for Quarries with more than 9 employees. Smaller quarries do not have a significant amount of equipment usage. There are 28 quarries in the San Antonio region that have more then 9 employees.

Table 2-42. Allocation of Quarry Equipment in the AACOG Region, 2002

| Region | FIPS code | Number of Large Quarries* |
|---|---|---|
| Atascosa | 48013 | 1.5 |
| Bexar | 48029 | 14.0 |
| Comal | 48091 | 8.0 |
| Gillespie | 48171 | 2.0 |
| Kerr | 48265 | 1.0 |
| Medina | 48325 | 1.5 |
| 12 County Total | AACOG | 28.0 |

*Two quarries cross county boarders. For these two quarries, 50 % of the emissions were allocated to each county.

The steps used to calculate emissions are outlined below

**Step 1: Conduct a Survey of Local Quarry Equipment Activity**

The preferred method of calculating quarry equipment emissions involves conducting a survey of equipment use within the AACOG region. Due to a lack of responses, data for only two quarries was collected.

The survey provided the following information for the two quarries:

- Activity Rates (HRS) – total annual hours of use by type of equipment
- Temporal Profiles – equipment use on weekdays and equipment use on weekend days for all types of equipment
- Engine Characteristics:
  - Engine Type – gasoline 2-stroke, gasoline 4-stroke, diesel, LPG, CNG
  - Engine Horsepower – rated power of the engine

**Step 2: Analysis of aerial photography.**

Due to the sparse survey response, an analysis of aerial photography was performed. Available imagery of 6-inch resolution sufficient for analysis was restricted to Bexar County. The equipment for each quarry located in Bexar County was then identified, marked and counted.

For example, the aerial photography of one of the quarries in Bexar County shows that there were 3 scrapers, 8 excavators, 1 grader, 11 off-highway trucks, 18 rubber tire loaders, and 3 tractors/loaders/backhoes working in the quarry. These equipment counts were used in the emission estimation formulas for quarries that did not respond to the surveys.

**Step 3: Determining county equipment population for quarry sites without local data.**

The aerial photography was only available for Bexar County. For quarries outside of Bexar County, the equipment population had to be estimated based on number of employees. To estimate equipment population for the quarries outside of Bexar County, all quarries were separated into two categories:

1. Quarries that had kilns and/or asphalt plants
2. Quarries without kilns

An employee to equipment ratio was made for kiln/asphalt sites and non-kiln sites by dividing the total pieces of equipment counted for the category by the total number of employees. The ratio was then used to calculate estimated equipment populations for the remaining quarry sites. The number of employees at a quarry was multiplied by the equipment ratio and the result was rounded to the nearest whole number.

<u>Example</u>:

| | |
|---|---|
| Equipment to Employee Ratio | = Total # of Rubber Tire Loaders at sites with Kilns / Total # of Employees for sites with Kilns |
| | = 32 Rubber Tire Loaders / 541 Employees |
| | = 0.05915 Rubber Tire Loaders per employee |
| Estimated # Loaders for Quarry "A" | = (# Employees) x (Rubber Tire Loaders Ratio for sites with Kilns) |
| | = (118) x (0.05915) |
| | = 6.9797 |
| Estimated # Loaders for Quarry "A" | = 7 |

**Step 4: Conduct a Second Survey of Local Quarry Equipment Activity**

After analyzing aerial photographs of the quarries and estimating equipment, a second survey was sent out to the local quarries with the estimations of their equipment population, HP, and activity hours. This survey used the same format as the initial survey. The companies were asked to correct the estimations and to send the surveys back to AACOG. There was a 36 percent response rate to the second survey. The increased response rate improved equipment estimations. Aerial photography provided data on 32 percent of the remaining quarries. The combined response rate provided an excellent estimation of equipment population, activity, and horsepower.

**Step 5: Estimating Annual Emissions of Ozone Precursors (tons/yr.)**

For each type of equipment at each quarry, VOC, NOx, and CO emissions were calculated using the following formula:

Emissions (grams/yr.) for VOC, CO, and NOx = EP x HRS x HP x LF x EF

Where EP = equipment population of type A for the quarry
- HRS = annual hours of use
- HP = average rated horsepower
- LF = typical load factor
- EF = average emissions of pollutant per unit of use for Type A equipment

Equipment population, horsepower and annual hours of use were developed with local data described above for each quarry. In the absence of reliable local data, the values for HP were taken from the CAPCO study[32]. Table 2-43 below lists estimated HP ratings, by type of equipment used in this study, when survey responses were not available.

Table 2-43. Estimated HP by Equipment Type for San Antonio Quarries

| Equipment Category | SCC | ERG's Austin Study Estimated HP | AACOG Study Estimated HP |
|---|---|---|---|
| Off-Road Truck | 2270002051 | 400 | **411** |
| Scraper | 2270002060 | 500 | **400** |
| Motor Grader | 2270002048 | 200 | 200 |
| Excavator | 2270002036 | 500 | 500 |
| Front-end Loader | 2270002069 | 250 | **400** |
| Dozer | 2270002018 | 250 | 250 |
| Backhoe | 2270002066 | 80 | 80 |

In three cases, the off-highway trucks, scrapers, and rubber tire loaders were modified with AACOG's emission inventory data. Local surveys indicated that the values used in the CAPCO study were too low for off-road trucks and loaders, while the estimates for scrapers were too high. In all three cases, the HP was changed based on the average HP from the returned surveys.

The hours per equipment type were also updated in the NONROAD model based on the survey responses. The following table lists the hours used for equipment type when survey responses were not available. In all cases the local activity rates were greater than provided by the NONROAD model. Quarry operations tend to have longer operating hours than other facilities that use these types of equipment. Also, there is a significant amount of equipment usage on the weekends.

Table 2-44. Annual Hours of Use by Equipment Type

| Equipment Category | SCC | NONROAD Model Default Hours/year | AACOG Study Estimated Hours/Year |
|---|---|---|---|
| Trucks | 2270002051 | 1641 | **2138** |
| Loaders | 2270002060 | 761 | **1692** |
| Graders | 2270002048 | 962 | **1135** |
| Excavators | 2270002036 | 1092 | 1092 |
| Dozers | 2270002069 | 899 | **1467** |
| Scrapers | 2270002018 | 194 | **2208** |
| Backhoes | 2270002066 | 1135 | **1172** |

[32] Eastern Research Group Inc. *Diesel Construction Equipment Emissions in the Austin Region, Draft 1.4*. Eastern Research Group Inc. November 30, 2001, p. 15.

The values for load factor (LF), and emission factor (EF) were obtained from EPA's NONROAD Emission Inventory Model.[33] LF values were easily obtainable from the data files of this model. However, the EF values were not as easily obtainable, and thus had to be obtained through the method described below.

In an effort to find the most recent and specific equipment type emission factors, EPA's most recent version (2004) of the NONROAD Emission Inventory Model was used. The values for these factors had to be calculated by first determining all of the default values used in the model, performing a run, and then using the results of the run to work in reverse through the formula to determine what EFs were used by the model for an average ozone season day. For example, the EFs for quarry equipment were developed through the following process:

6. A 2002 NONROAD Model run for quarry equipment was performed for the state of Texas using ozone season temperatures. The quarry equipment is in the construction category of the model.

7. The output from this run was used to obtain the following for all types of quarry equipment:
   - VOC, CO, and NOx emissions in tons/year for each type of equipment (the results of the run).
   - Equipment population used in the NONROAD Model for each type of quarry equipment.

8. The NONROAD Model input file activity.dat, was used to obtain the following values:
   - The activity rate used in the NONROAD Model for each type of quarry equipment in hours/year (HRS).
   - The LF used in the NONROAD Model for each type of quarry equipment.

9. The average horsepower used in the NONROAD Model for each type of equipment was determined from the input file Tx.pop.

10. With all the known factors in place, the EFs for VOC, CO, and NOx were calculated through the use of the following formula:

    EF (g/bhp-hr) = (tons/yr. of pollutant) x (2,000 lbs./ton) x (453.6 g/lb.) / (Eqmt. Pop) x (hrs/yr.) x (Avg. Hp) x (LF)

---

[33] U.S. Environmental Protection Agency. National Nonroad Emissions Model 2004: Draft Version. Ann Arbor, MI.

The resulting EFs were used in the remaining steps to calculate emissions from each type of equipment.

Returning to the formula previously outlined, annual VOC, NOx, and CO emissions were calculated for each category:

Emissions (g/yr.) for VOC, CO, and NOx = EP x HRS x HP x LF x EF

A final step in the calculation was determining weekday versus weekend emissions. The equipment hours on weekdays for all survey responses were estimated and divided by the total number of hours. It was determined that 78.1 percent of the equipment hours of operation are during weekdays and 21.5 percent of the equipment hours of operation are on the weekend.

**Example:**

Continuing with our example used above, there are an estimated 7 front-end loaders at Quarry A. These front-end loaders are operated an average of 1692 hrs/yr. (HRS), and have an HP of 400. From the NONROAD Model, the typical LF for front end loaders is 0.68, and the EF for NOx is 7.2785 grams/hp-hr during the ozone season.

Emissions (g/yr.) for NOx = EP x HRS x HP x LF x EF
= 7 x 1692 (hrs/yr.) x 400 (hp) x 0.68 x 7.2785 (g/hp-hr)
= 23,448,182 (g/yr.)

This figure is then converted into tons/yr.

[(g/yr.) / 453.6 (g/lb.)] / 2,000 (lbs./ton)
Thus 23,448,182 (g/yr.) = 25.85 (tons/yr.) of NOx

The final step was to calculate emissions for an average ozone season weekday
25.85 (tons/yr.) of NOx / 261 (weekdays/year) X 0.781 (percentage of hours on weekdays) = 0.0773 (tons/weekday) of NOx.

This same procedure was used for CO and VOCs to produce estimates of these pollutants by quarry. The emission estimates were added up for each quarry in a county to get a county emission total.

Alamo Area Council Of Governments

March 15, 2002

[COMPANY NAME]
[STREET ADDRESS]
[CITY] [STATE] [ZIP]

**ATTENTION: OPERATIONS MANAGER**

Re: 2002 San Antonio Emissions Inventory

The Alamo Area Council of Governments (AACOG) requests your assistance in the development of a 2002, air quality emission inventory for San Antonio and the surrounding counties. AACOG is conducting this inventory in order to assess and quantify local air quality within the San Antonio Metropolitan area and contiguous counties. This inventory is especially significant because the San Antonio region currently risks being declared in non-attainment of federal air quality standards (NAAQS).

AACOG will calculate the equipment source component of this inventory from information submitted by local organizations involved in equipment activities in and around the San Antonio region using the enclosed survey. With this survey, we are requesting information on equipment used during the 2002 calendar year within Atascosa, Bandera, Bexar, Comal, Frio, Gillespie, Guadalupe, Karnes, Kendall, Kerr, Medina, and Wilson counties. The purpose of this survey is to provide better information and services to the region, as well as help minimize additional regulation on the community.

Your input is vital to this process and will serve to effect a true and correct emissions inventory for 2002 that will be delivered to the EPA. Please provide your responses on the attached survey and return it to us in the self-addressed envelope by the date indicated. The information you provide will be considered strictly confidential and unavailable to public information requests. Please submit your response by, April 19, 2002.

Thank you for your time and participation. If you have any questions or comments please feel free to contact Chris Langston at (210) 362-5270.

Regionally yours,

Al J. Notzon III
Executive Director

Enclosures (2)

**Alamo Area Council of Governments**
Equipment Environmental Impact Survey
Internal Combustion Engine

The Alamo Area Council of Governments (AACOG) is conducting a study to assess and quantify local air quality within the San Antonio Metropolitan area and contiguous counties by performing an emission inventory. AACOG has defined the study area to include Atascosa, Bandera, Bexar, Comal, Frio, Gillespie, Guadalupe, Karnes, Kendall, Kerr, Medina, and Wilson counties. Our goal is to provide better information and services to businesses and individuals, and help minimize additional regulation on the community. The purpose of this survey is to gather data on emissions produced by several types of equipment in the region.

The study area does not presently exceed Environmental Protection Agency (EPA) air quality standards. However, if the standards are exceeded in the future we will be classified as nonattainment, which will result in expensive and stringent regulations for your business and the community. By filling out this confidential survey, you will be providing valuable data that will be used to evaluate cost-effective approaches to pollution control. Thank you for taking the time to provide this information.

Instructions:

7. Please look through the equipment types shown on the following page.
8. List any of the equipment types regularly operated at your business.
9. Fill in the appropriate figures for each equipment type you listed. (Estimates are acceptable.)

If you have other internal combustion equipment that is not shown, please include it as well.

NOTE: IF YOUR BUSINESS HAS MORE EQUIPMENT THAN WILL FIT IN THE SPACE PROVIDED, PLEASE MAKE ADDITIONAL COPIES OF THE SURVEY.

*Completed surveys can be faxed to (210) 225-5937, or mailed to:*
*Alamo Area Council of Governments*
*8700 Tesoro, Suite 700*
*San Antonio, Texas 78217*
*Attn: Chris Langston*

*If you have any questions or comments, please call us at (210) 362-5270.*

***SURVEY STARTS ON THE OTHER SIDE OF THIS PAGE***

| | Internal Combustion Equipment Type | Engine Type<br>Gasoline 2-cycle<br>Gasoline 4-cycle<br>Diesel<br>Propane<br>Natural Gas | Approx. Horse-Power Rating | Number of Units Typically Operated | Avg. No. of Hours and Time of Day Each Unit Operated (MON-FRI) | Avg. No. of Hours and Time of Day Each Unit Operated (SAT & SUN) |
|---|---|---|---|---|---|---|
| **Construction Equipment** | | | | | | |
| 1 | Bore/Drill Rigs | | | | | |
| 2 | Excavators | | | | | |
| 3 | Concrete & Mortar Mixers | | | | | |
| 4 | Cranes | | | | | |
| 5 | Graders | | | | | |
| 6 | Crushing/Processing Eqmt. | | | | | |
| 7 | Rough Terrain Forklifts | | | | | |
| 8 | Rubber Tire Loaders | | | | | |
| 9 | Other Loaders | | | | | |
| 10 | Dozers | | | | | |
| 11 | Tractors/Backhoes | | | | | |
| 12 | Scrapers | | | | | |
| 13 | Rollers | | | | | |
| 14 | Trenchers | | | | | |
| 15 | Pavers | | | | | |
| 16 | Other Construction Equipment Type: ____________ | | | | | |

| | Internal Combustion Equipment Type | <u>Engine Type</u><br>Gasoline 2-cycle<br>Gasoline 4-cycle<br>Diesel<br>Propane<br>Natural Gas | Approx. Horse-Power Rating | Number of Units Typically Operated | Avg. No. of Hours and Time of Day Each Unit Operated (MON-FRI) | Avg. No. of Hours and Time of Day Each Unit Operated (SAT & SUN) |
|---|---|---|---|---|---|---|
| **Industrial & Commercial Equipment** | | | | | | |
| 1 | Generators | | | | | |
| 2 | Pumps | | | | | |
| 3 | Compressors | | | | | |
| 4 | Welders | | | | | |
| 5 | Pressure Washers | | | | | |
| 6 | Aerial Lifts | | | | | |
| 7 | Forklifts | | | | | |
| 8 | Sweepers/Scrubbers | | | | | |
| 9 | AC/Refrigeration | | | | | |
| 10 | Terminal Tractors | | | | | |
| 11 | Single Board Light Plants | | | | | |
| 12 | Other General Industrial or Material Handling Eqmt. Type:______________ | | | | | |

## Railroads

### Introduction

Railroad locomotives are designed to tow train cars at speeds of up to 110 miles per hour. Many locomotives are powered by a combination of diesel engines and electric generators and motors. This combination allows the diesel engines to produce a substantial amount of horsepower and the electrical current provides enough thrust to propel the locomotive to fast speeds. Diesel engines are popular in locomotive engine design due to the efficiency of the fuel. The combustion of diesel fuel within the locomotive's engine emits ground-level ozone precursors. Emissions produced by these diesel engines include HCs, CO, NOx, sulfur dioxide, and particulate matter and therefore are included in this emission inventory

### Methodology

Railroads can be separated into three classes based on size: Class I, Class II, and Class III. Locomotives within each of these classes can perform two different types of operations: line haul and yard (or switch). Class I represents the type of railroad system in the region of study. In order to determine emissions from railroad operations, the fuel consumed by line-haul and switch locomotives must be obtained and multiplied by their respective emission factor.[34]

Fuel consumption data for line-haul and switch locomotives were obtained from the Union Pacific Railroad.[35] The following are the assumptions used in deriving the fuel consumption data:

1. The fuel consumption factor is 1.323 gallons per 1,000 gross ton-miles (GTM) for the Union Pacific Railroad. This is the system average fuel consumption factor for the railroad for 1999.

2. The GTM used to calculate the fuel consumption includes locomotive weight.

3. The equation used in calculating the fuel consumption for line haul locomotives is GTM x miles of track in segment.

[34] Sierra Research, Inc., March 2004. Revised Inventory Guidance for Locomotive Emissions (DRAFT). Sacramento, California.
[35] Union Pacific Railroad, Letter and data received from Jon Germer, Manager, Environmental Field Operations-Air Quality, 2003, Omaha, Nebraska.

4. Fuel consumption for switching operations was calculated based on an equivalent number of locomotives operating 24 hours per day, 365 days per year.

The database for locomotive fuel consumption was separated between line-haul and switch locomotives. The data was presented by rail segment in each of the twelve AACOG counties. The fuel consumption for each rail segment was added together within each county in order to assess total fuel consumption in each county by operation.

For line-haul locomotives, emissions are calculated by multiplying the amount of fuel consumed in the inventory area by the appropriate emission factors, as listed in table 2-45. The emissions are then divided by 2,000 in order to convert pounds per year to tons per year.

Inventory Area Emissions = Line-haul Fuel Consumption x Emission Factor / 2,000 lbs.

Table 2-45. Line-haul Emission Factors

| Emission | Factor (lbs./yr.) |
|---|---|
| VOC | 0.0216 |
| NOx | 0.5850 |
| CO | 0.0576 |

Emissions for yard operations are calculated in a similar manner to line-haul locomotive emissions. The total fuel consumption for yard operations by switch locomotives are multiplied by the emission factors in table 2-46 and then converted to tons.

Inventory Area Emissions = Switch Fuel Consumption x Emission Factor / 2,000 lbs

Table 2-46. Switch Emission Factors

| Emission | Factor (lbs./yr.) |
|---|---|
| VOC | 0.0382 |
| NOx | 0.6584 |
| CO | 0.0693 |

Emissions from line-haul and switch locomotives were added together, providing a total emission estimate for all rail yard activities.

Sample Calculation

Comal County

Line-haul VOC Emissions (tons/yr.) = Line-haul Fuel Consumption x VOC Line-haul EF / 2,000 lbs./ton

= (1,697,870 x 0.0216 lbs./yr.) / 2,000 lbs/ton

= 18.34 tons/yr.

Switch VOC Emissions (tons/yr.) = Switch Fuel Consumption x VOC Switch EF / 2,000 lbs./ton

= (145,730 x 0.0382 lbs./yr.) / 2,000 lbs./ton

= 2.78 tons/yr.

TOTAL EMISSIONS = Line-haul VOC Emissions + Switch VOC Emissions

= 8.33 tons/yr. + 2.78 tons/yr.

= 21.12 tons/year

Railroad emissions were only counted in counties where railroads exist and are active. The following counties were included in the emission inventory: Atascosa, Bexar, Comal, Frio, Guadalupe, and Medina.

### Seasonal Adjustment

Railroad operations are uniform, occurring 7 days a week and 365 days a year.

## Railroad Maintenance Equipment

### Introduction

Railroads are subject to constant wear due to locomotives and rail cars constantly driving over the rails. Since railroads transport goods and provide services to customers that are located over large distances, railways must remain in good condition in order to ensure ongoing service of the railroad. Railroad maintenance is performed through the use of railroad maintenance equipment, which are specifically designed for repair, maintenance, and construction of rail lines including ballast handlers, rail/tie handlers, and rail straightening equipment.[36] These sorts of equipment are mobilized and travel by way of the railways. The engines used to propel the equipment down the railways emit ozone precursors, thus contributing to ozone formation.

[36] ENVIRON, August 2002. NONROAD and NONROAD-AT Training Manual. Novato, California.

**Methodology**

Emissions for railroad maintenance equipment were calculated for the AACOG counties by using EPA's NONROAD model, version 2004. The model was used to estimate exhaust and evaporative emissions for railroad maintenance equipment of various fuel types and to allocate emissions from the state to the county level based on the county's population.[37] County emissions were summed by pollutant, VOC, NOx, and CO, for each SCC category within the railroad maintenance subset of non-road equipment.

The NONROAD model enables the user to manipulate the inputs used to calculate emissions in order to better reflect the conditions within the designated geographical area. When determining the emission estimates for railroad maintenance equipment, the ambient temperatures and gasoline RVP were modified. Minimum, maximum, and average ambient temperatures for daily and annual emission calculations were determined using data from the National Weather Service. When determining the average daily ozone season emission estimate for the counties of Atascosa, Bexar, Comal, Guadalupe, and Wilson, gasoline was inputted to reflect an RVP of 7.8. The remaining counties of Bandera, Frio, and Medina use gasoline with an RVP of 8.7. The counties of Gillespie, Karnes, Kendall, and Kerr do not have railroads within their county borders thus do not have any emissions for railroad maintenance equipment.

Annual emissions were calculated for the twelve AACOG counties with gasoline using an RVP of 8.7. The remaining inputs reflected default settings.

**Sample Calculation**

Exhaust emissions for off-road vehicles are calculated in the NONROAD model using the following formula:

$$(\text{Exhaust Emissions})_i = (\text{Pop})_i(\text{Power})(\text{LF})(\text{A})(\text{EF})_i$$

where

Pop = Engine population

Power = Average power (hp)

LF = Load factor

A = Activity (hrs/yr.)

EF = Emission factor (g/hp-hr)

i = SCC, Engine Power, Model Year, and Tech type of engine/equipment (age distribution calculation)

[37] U.S. Environmental Protection Agency (Revised April 2004). Geographic Allocation of State Level Nonroad Engine Population Data to the County Level, EPA420-P-04-014, NR-014c, Office of Transportation and Air Quality.

The model also calculates evaporative emissions based on source: diurnal, displacement, or spillage.

**Seasonal Adjustment**

To determine ozone season weekday emissions, the modeling period in NONROAD's option scenario was set for summer. NONROAD applies adjustments to emissions based on month of the year, region of the country, and equipment category. In order to assess the emissions by season, the default adjustment factors were used.

## Recreational Marine Vessels

**Introduction**

The recreational marine vessel inventory includes pleasure craft powered by inboard or outboard engines, as well as personal watercraft such as jet skis. Although this subcategory of off-road vehicles encompasses a variety of engine and fuel types, most recreational marine vessels are fueled with gasoline and powered by spark-ignition engines.[38]

The 12-county AACOG region includes navigable bodies of water used for recreational purposes. Table 2-47 below lists the locations and water surface areas[39] of the primary sites where recreational boating activities occur in the region. However, boating activities occasionally take place on smaller bodies of water.

Table 2-47. Primary Locations in the AACOG Region where Recreational Marine Vessels are Operated

| Name | Region | Surface Area in Acre |
|---|---|---|
| Canyon Lake | Comal | 8,240 |
| Medina Lake | Bandera and Medina | 4,246 |
| Calaveras Lake | Bexar | 3,450 |
| Victor Braunig Lake | Bexar | 1,350 |
| Lake Dunlap | Guadalupe | 410 |
| Lake McQueeney | Guadalupe | 400 |
| Lake Placid | Guadalupe | 400 |
| Lake Nolte (Meadow Lake) | Guadalupe | 153 |

[38] U.S. Environmental Protection Agency (no date). Gasoline Boats and Personal Watercraft. Available on-line: http://www.epa.gov/otaq/marinesi.htm

[39] Texas Parks and Wildlife (no date). Texas Lake Finder. Available on-line: http://www.tpwd.state.tx.us/fish/infish/regions/index.phtml.

**Methodology**

Recreational boating emissions in AACOG region were calculated using EPA's 2004 NONROAD model. The model was used to estimate exhaust and evaporative emissions for all recreational marine categories. NONROAD allocates emissions from the state to the county level based on the surface area of navigable water.[40] County emissions were summed by pollutant, VOC, NOx, and CO, for each SCC category within the recreational marine subset of non-road equipment.

EPA allows users to modify the NONROAD model's activity, allocation, and other default data files with more representative data when available. When modifying NONROAD's internal files, the changes are typically based on local data such as that gathered through surveys or information monitored by governmental agencies. Recreational boating emissions represent a small portion of the non-road EI for the San Antonio region making survey use an impractical option. In addition, although boat sales are monitored through registration requirements, registration data are of little use for allocating watercraft emissions geographically. Most recreational marine vessels are purchased in urban areas, but often used in rural counties. As a consequence of lacking appropriate local data, the NONROAD files were left unmodified for the recreational marine model runs.

In addition to information provided in the model's data files and tables, NONROAD's emission calculations are based on modifiable inputs, such as ambient temperatures and gasoline RVP. Table 2-48 lists the inputs used in the 2002 annual NONROAD model runs and 2002 summer (ozone season) weekday runs for the 12-county AACOG region.

[40] U.S. Environmental Protection Agency (Revised April 2004). Geographic Allocation of State Level Nonroad Engine Population Data to the County Level, EPA420-P-04-014, NR-014c, Office of Transportation and Air Quality.

Table 2-48. NONROAD Model Settings for the 2002 AACOG Region Recreational Marine Vessel Runs

| Parameter | Value | | Notes |
|---|---|---|---|
| | Summer Season | Annual | |
| Fuel RVP | 7.8 | 8.7 | Atascosa, Bexar, Comal, Guadalupe, Karnes, and Wilson |
| | 8.7 | 8.7 | Bandera, Gillespie, Frio, Kendall, Kerr, and Medina |
| Oxygen weight % | 0.0 | 0.0 | Model Default |
| Gas sulfur % | 0.0339 | 0.0339 | Model Default |
| Diesel sulfur % | 0.2318 | 0.2318 | Model Default |
| CNG/LPG sulfur % | 0.003 | 0.003 | Model Default |
| Min temperature | 69.4 | 58.5 | From National Weather Service Forecast Data[41] |
| Max temperature | 87.8 | 79.3 | |
| Avg temperature | 78.2 | 68.6 | |
| Stage II controls % | 0.0 | 0.0 | Model Default |

The state began a Regional Low RVP Gasoline program on May 1, 2000.[42] The program requires that gasoline sold between June 1 and October 1 each year by retail facilities in 95 Texas counties have a maximum Reid vapor pressure of 7.8 psi. The affected region includes six AACOG counties: Atascosa, Bexar, Comal, Guadalupe, Karnes, and Wilson. Accordingly, the summer weekday runs for those six counties were conducted with an RVP of 7.8. As a conservative measure, the annual runs for the six affected counties were conducted using the higher RVP of 8.7.

**Sample Calculation**

The NONROAD model calculates exhaust emissions for off-road vehicles using the formula:

$(\text{Exhaust Emissions})_i = (\text{Pop})_i(\text{Power})(\text{LF})(\text{A})(\text{EF})_i$

where

Pop = Engine population

[41] National Weather Service Forecast Office (no date). Climate Data and Daily Records for Austin, Del Rio, and San Antonio. Available on-line: http://www.srh.noaa.gov/ewx/html/climatsum.htm
[42] Texas Commission on Environmental Quality (no date). Texas Motor Vehicle Fuel Programs – The Regional Low Reid Vapor Pressure (RVP) Gasoline Program. Available on-line: http://www.tnrcc.state.tx.us/air/ms/fuelprograms.html

Power = Average power (hp)
LF = Load factor
A = Activity (hrs/yr.)
EF = Emission factor (g/hp-hr)
i = SCC, Engine Power, Model Year, and Tech type of engine/equipment (age distribution calculation)

In addition, the model calculates evaporative emissions based on source: diurnal, displacement, or spillage.

Table 2-49 provides sample output from the NONROAD model. The output includes both exhaust and evaporative emission estimates from the operation of pleasure craft in an AACOG county in 2002. Total VOC emissions were determined by summing all VOC emission output categories including exhaust, diurnal, spillage, crankcase, and displacement.

Table 2-49. 2002 Weekday Emissions (ton per day) from Recreational Marine Vessels in Comal County during the Ozone Season

| SCC | EQUIP | CLASSIFICATION | Engine Type | CO | NOx | Total VOC |
|---|---|---|---|---|---|---|
| 2282005010 | Outboard | Pleasure Craft | 2 Stroke | 0.24490 | 0.00273 | 0.12959 |
| 2282005015 | Personal Water Craft | Pleasure Craft | 2 Stroke | 0.10659 | 0.00077 | 0.05512 |
| 2282010005 | Inboard/Sterndrive | Pleasure Craft | 4 Stroke | 0.12101 | 0.00393 | 0.01153 |
| 2282020005 | Inboard/Sterndrive | Pleasure Craft | Diesel | 0.00124 | 0.00779 | 0.00029 |
| 2282020010 | Outboards | Pleasure Craft | Diesel | 0.00002 | 0.00003 | 0.00001 |

**Seasonal Adjustment**

To determine ozone season weekday emissions, the modeling period in NONROAD's option scenario was set for summer. NONROAD applies adjustments to emissions based on month of the year, region of the country, and equipment category (SCC). For marine vessels operated in Texas (Southwest region) during the summer, the model applies usage factors for the months of June, July, and August. Thus, summer/ozone season weekday emissions for recreational boating are based on the highest usage factors of the year.

## Recreational Equipment

### Introduction

AACOG's 2002 recreational equipment inventory includes emissions from off-road motorcycles, all-terrain vehicles, golf carts, and specialty vehicles/carts. Although this subcategory of non-road equipment encompasses a variety of engine and fuel types, the AACOG inventory is primarily composed of equipment using 2-stroke and 4-stroke gasoline engines.

### Methodology

Recreational equipment emissions were calculated by county for the AACOG region using EPA's 2004 NONROAD model. The model was used to estimate exhaust and evaporative emissions for all recreational equipment categories. NONROAD allocates emissions from the state to the county level based on the number of camps and recreational vehicle parks in an area.[43] County emissions were summed by pollutant, VOC, NOx, and CO, for each SCC category within the recreational equipment subset of non-road equipment.

In addition to information provided in the model's data files and tables, NONROAD's emission calculations are based on modifiable inputs, such as ambient temperatures and gasoline RVP. Table 2-50 lists the inputs used in the 2002 annual NONROAD model runs and 2002 summer (ozone season) weekday runs for the 12-county AACOG region.

[43] U.S. Environmental Protection Agency (Revised April 2004). Geographic Allocation of State Level Nonroad Engine Population Data to the County Level, EPA420-P-04-014, NR-014c, Office of Transportation and Air Quality.

Table 2-50. NONROAD Model Settings for the 2002 AACOG Region Recreational Equipment Runs

| Parameter | Value | | Notes |
|---|---|---|---|
| | Summer Season | Annual | |
| Fuel RVP | 7.8 | 8.7 | Atascosa, Bexar, Comal, Guadalupe, Karnes, and Wilson |
| | 8.7 | 8.7 | Bandera, Gillespie, Frio, Kendall, Kerr, and Medina |
| Oxygen weight % | 0.0 | 0.0 | Model Default |
| Gas sulfur % | 0.0339 | 0.0339 | Model Default |
| Diesel sulfur % | 0.2318 | 0.2318 | Model Default |
| CNG/LPG sulfur % | 0.003 | 0.003 | Model Default |
| Min temperature | 69.4 | 58.5 | From National Weather Service Forecast Data[44] |
| Max temperature | 87.8 | 79.3 | |
| Avg temperature | 78.2 | 68.6 | |
| Stage II controls % | 0.0 | 0.0 | Model Default |

The state began a Regional Low RVP Gasoline program on May 1, 2000.[45] The program requires that gasoline sold between June 1 and October 1 each year by retail facilities in 95 Texas counties have a maximum Reid vapor pressure of 7.8 psi. The affected region includes six AACOG counties: Atascosa, Bexar, Comal, Guadalupe, Karnes, and Wilson. Accordingly, the summer weekday runs for those six counties were run with an RVP of 7.8. As a conservative measure, the annual runs for the six affected counties were conducted using the higher RVP of 8.7 since low RVP gasoline is only required four months of the year.

**Sample Calculation**

The NONROAD model calculates exhaust emissions for off-road vehicles using the formula:

$$(\text{Exhaust Emissions})_i = (\text{Pop})_i(\text{Power})(\text{LF})(\text{A})(\text{EF})_i$$

where

Pop = Engine population

[44] National Weather Service Forecast Office (no date). Climate Data and Daily Records for Austin, Del Rio, and San Antonio. Available on-line: http://www.srh.noaa.gov/ewx/html/climatsum.htm

[45] Texas Commission on Environmental Quality (no date). Texas Motor Vehicle Fuel Programs – The Regional Low Reid Vapor Pressure (RVP) Gasoline Program. Available on-line: http://www.tnrcc.state.tx.us/air/ms/fuelprograms.html

Power = Average power (hp)
LF = Load factor
A = Activity (hrs/yr.)
EF = Emission factor (g/hp-hr)
i = SCC, Engine Power, Model Year, and Tech type of engine/equipment (age distribution calculation)

In addition, the model calculates evaporative emissions based on source: diurnal, displacement, or spillage.

Table 2-51 provides sample output from the NONROAD model. The output includes both exhaust and evaporative emissions from the operation of recreational equipment calculated for an AACOG county in 2002.

Table 2-51. Weekday Emissions (tons per day) from Recreational Equipment in Kerr County during the Summer Season, 2002.

| SCC | EQUIP | CLASSIFICATION | Engine Type | CO | NOx | Total VOC |
|---|---|---|---|---|---|---|
| 2260001010 | Motorcycles: Off-Rd | Recreational Equip | 2 Stroke | 0.68556 | 0.00172 | 0.71820 |
| 2260001030 | ATVs | Recreational Equip | 2 Stroke | 0.68955 | 0.00174 | 0.72121 |
| 2260001060 | Specialty Vehicles | Recreational Equip | 2 Stroke | 0.42930 | 0.00260 | 0.01201 |
| 2265001010 | Motorcycles: Off-Rd | Recreational Equip | 4 Stroke | 0.31018 | 0.00226 | 0.02180 |
| 2265001030 | ATVs | Recreational Equip | 4 Stroke | 2.79155 | 0.02038 | 0.19688 |
| 2265001050 | Golf Carts | Recreational Equip | 4 Stroke | 0.40558 | 0.00170 | 0.00593 |
| 2265001060 | Specialty Vehicles | Recreational Equip | 4 Stroke | 0.39020 | 0.00212 | 0.01216 |
| 2267001060 | Specialty Vehicles | Recreational Equip | LPG | 0.00361 | 0.00090 | 0.00024 |
| 2270001060 | Specialty Vehicles | Recreational Equip | Diesel | 0.01361 | 0.00972 | 0.00348 |

**Seasonal Adjustment**

To determine ozone season weekday emissions, the modeling period in NONROAD's option scenario was set for summer. NONROAD applies adjustments to emissions based on month of the year, region of the country, and equipment category (SCC). For recreational marine vessels operated in Texas (Southwest region) during the summer, the model applies usage factors for the months of June, July, and August. Thus, the summer/ozone season weekday emissions for recreational equipment are based on the highest usage factors of the year.

## Non-Road Mobile Source Emissions - Atascosa County, 2002

| ATASCOSA COUNTY NON-ROAD MOBILE SOURCES | SCC Code | VOC ton/year | NOx ton/year | CO ton/year | VOC ton/day M-F | NOx ton/day M-F | CO ton/day M-F |
|---|---|---|---|---|---|---|---|
| **Construction Equipment** | | | | | | | |
| 2-Str Tampers/Rammers | 2260002006 | 1.14 | 0.01 | 3.22 | 0.00532 | 0.00007 | 0.01503 |
| 2-Str Plate Compactors | 2260002009 | 0.06 | 0.00 | 0.15 | 0.00030 | 0.00000 | 0.00070 |
| 2-Str Paving Equipment | 2260002021 | 0.08 | 0.00 | 0.18 | 0.00035 | 0.00000 | 0.00083 |
| 2-Str Signal Boards/Light Plants | 2260002027 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| 2-Str Concrete/Industrial Saws | 2260002039 | 3.12 | 0.03 | 8.67 | 0.01455 | 0.00016 | 0.04041 |
| 2-Str Crushing/Proc. Equipment | 2260002054 | 0.02 | 0.00 | 0.04 | 0.00007 | 0.00000 | 0.00017 |
| 4-Str Pavers | 2265002003 | 0.06 | 0.03 | 2.86 | 0.00027 | 0.00011 | 0.01362 |
| 4-Str Tampers/Rammers | 2265002006 | 0.00 | 0.00 | 0.02 | 0.00000 | 0.00000 | 0.00011 |
| 4-Str Plate Compactors | 2265002009 | 0.22 | 0.03 | 5.27 | 0.00103 | 0.00013 | 0.02513 |
| 4-Str Rollers | 2265002015 | 0.09 | 0.04 | 5.42 | 0.00043 | 0.00019 | 0.02584 |
| 4-Str Paving Equipment | 2265002021 | 0.30 | 0.07 | 10.31 | 0.00137 | 0.00028 | 0.04917 |
| 4-Str Surfacing Equipment | 2265002024 | 0.12 | 0.03 | 4.68 | 0.00053 | 0.00012 | 0.02230 |
| 4-Str Signal Boards/Light Plants | 2265002027 | 0.01 | 0.00 | 0.24 | 0.00004 | 0.00001 | 0.00114 |
| 4-Str Trenchers | 2265002030 | 0.24 | 0.08 | 8.79 | 0.00109 | 0.00034 | 0.04193 |
| 4-Str Bore/Drill Rigs | 2265002033 | 0.13 | 0.03 | 2.57 | 0.00061 | 0.00011 | 0.01226 |
| 4-Str Concrete/Industrial Saws | 2265002039 | 0.35 | 0.14 | 22.08 | 0.00160 | 0.00058 | 0.10526 |
| 4-Str Cement & Mortar Mixers | 2265002042 | 0.32 | 0.05 | 9.07 | 0.00144 | 0.00023 | 0.04327 |
| 4-Str Cranes | 2265002045 | 0.01 | 0.01 | 0.37 | 0.00006 | 0.00006 | 0.00175 |
| 4-Str Crushing/Proc. Equipment | 2265002054 | 0.03 | 0.01 | 1.27 | 0.00014 | 0.00004 | 0.00605 |
| 4-Str Rough Terrain Forklift | 2265002057 | 0.02 | 0.02 | 0.48 | 0.00009 | 0.00010 | 0.00229 |
| 4-Str Rubber Tire Loaders | 2265002060 | 0.05 | 0.06 | 1.15 | 0.00022 | 0.00024 | 0.00548 |
| 4-Str Tractors/Loaders/Backhoes | 2265002066 | 0.11 | 0.04 | 6.76 | 0.00050 | 0.00018 | 0.03223 |
| 4-Str Skid Steer Loaders | 2265002072 | 0.08 | 0.06 | 3.04 | 0.00037 | 0.00026 | 0.01450 |
| 4-Str Dumpers/Tenders | 2265002078 | 0.04 | 0.01 | 1.42 | 0.00019 | 0.00004 | 0.00675 |
| 4-Str Other Construction Equipment | 2265002081 | 0.02 | 0.02 | 0.40 | 0.00008 | 0.00008 | 0.00193 |
| LPG-Pavers | 2267002003 | 0.00 | 0.02 | 0.07 | 0.00002 | 0.00008 | 0.00031 |
| LPG-Rollers | 2267002015 | 0.01 | 0.03 | 0.11 | 0.00004 | 0.00013 | 0.00053 |
| LPG-Paving Equipment | 2267002021 | 0.00 | 0.00 | 0.02 | 0.00001 | 0.00002 | 0.00008 |
| LPG-Surfacing Equipment | 2267002024 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00006 |
| LPG-Trenchers | 2267002030 | 0.01 | 0.05 | 0.21 | 0.00007 | 0.00024 | 0.00096 |
| LPG-Bore/Drill Rigs | 2267002033 | 0.00 | 0.02 | 0.07 | 0.00002 | 0.00008 | 0.00032 |
| LPG-Concrete/Industrial Saws | 2267002039 | 0.01 | 0.05 | 0.20 | 0.00006 | 0.00023 | 0.00093 |
| LPG-Cranes | 2267002045 | 0.00 | 0.02 | 0.07 | 0.00002 | 0.00008 | 0.00034 |
| LPG-Crushing/Proc. Equipment | 2267002054 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00006 |
| LPG-Rough Terrain Forklifts | 2267002057 | 0.01 | 0.03 | 0.13 | 0.00004 | 0.00015 | 0.00061 |
| LPG-Rubber Tire Loaders | 2267002060 | 0.02 | 0.08 | 0.33 | 0.00010 | 0.00038 | 0.00153 |
| LPG-Tractors/Loaders/Backhoes | 2267002066 | 0.00 | 0.01 | 0.03 | 0.00001 | 0.00004 | 0.00016 |
| LPG - Skid Steer Loaders | 2267002072 | 0.02 | 0.06 | 0.23 | 0.00007 | 0.00027 | 0.00109 |
| LPG-Other Construction Equipment | 2267002081 | 0.01 | 0.03 | 0.11 | 0.00003 | 0.00013 | 0.00051 |
| CNG-Other Construction Equipment | 2268002081 | 0.00 | 0.00 | 0.00 | 0.00002 | 0.00001 | 0.00002 |
| Dsl - Pavers | 2270002003 | 0.08 | 0.93 | 0.39 | 0.00037 | 0.00433 | 0.00182 |
| Dsl - Tampers/Rammers | 2270002006 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Plate Compactors | 2270002009 | 0.00 | 0.02 | 0.01 | 0.00002 | 0.00011 | 0.00006 |
| Dsl - Rollers | 2270002015 | 0.45 | 4.50 | 2.37 | 0.00211 | 0.02098 | 0.01106 |
| Dsl - Scrapers | 2270002018 | 0.03 | 0.40 | 0.20 | 0.00014 | 0.00187 | 0.00092 |
| Dsl - Paving Equipment | 2270002021 | 0.02 | 0.23 | 0.14 | 0.00011 | 0.00105 | 0.00067 |
| Dsl - Surfacing Equipment | 2270002024 | 0.36 | 3.81 | 2.35 | 0.00167 | 0.01779 | 0.01095 |
| Dsl - Signal Boards/Light Plants | 2270002027 | 0.08 | 0.48 | 0.29 | 0.00039 | 0.00222 | 0.00135 |
| Dsl - Trenchers | 2270002030 | 0.06 | 0.44 | 0.34 | 0.00028 | 0.00206 | 0.00156 |
| Dsl - Bore/Drill Rigs | 2270002033 | 0.29 | 3.82 | 1.00 | 0.00136 | 0.01783 | 0.00468 |
| Dsl - Excavators | 2270002036 | 0.99 | 12.34 | 5.29 | 0.00463 | 0.05753 | 0.02469 |
| Dsl - Concrete/Industrial Saws | 2270002039 | 0.02 | 0.14 | 0.11 | 0.00009 | 0.00066 | 0.00051 |
| Dsl - Cement & Mortar Mixers | 2270002042 | 0.00 | 0.01 | 0.01 | 0.00001 | 0.00007 | 0.00004 |
| Dsl - Cranes | 2270002045 | 0.19 | 2.36 | 0.63 | 0.00087 | 0.01100 | 0.00293 |
| Dsl - Graders | 2270002048 | 0.27 | 3.15 | 1.28 | 0.00124 | 0.01468 | 0.00596 |
| Dsl - Off-highway Trucks | 2270002051 | 0.19 | 2.20 | 1.00 | 0.00087 | 0.01028 | 0.00468 |
| Dsl - Crushing/Proc. Equipment | 2270002054 | 0.00 | 0.01 | 0.00 | 0.00000 | 0.00003 | 0.00002 |
| Dsl - Rough Terrain Forklifts | 2270002057 | 0.11 | 0.93 | 0.60 | 0.00050 | 0.00433 | 0.00279 |
| Dsl - Rubber Tire Loaders | 2270002060 | 0.57 | 7.50 | 2.57 | 0.00266 | 0.03496 | 0.01197 |
| Dsl - Tractors/Loaders/Backhoes | 2270002066 | 2.36 | 14.42 | 10.56 | 0.01098 | 0.06725 | 0.04923 |

## Non-Road Mobile Source Emissions - Atascosa County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Skid Steer Loaders | 2270002072 | 0.69 | 2.10 | 2.69 | 0.00324 | 0.00977 | 0.01256 |
| Dsl - Off-Highway Tractors | 2270002075 | 0.00 | 0.06 | 0.03 | 0.00002 | 0.00027 | 0.00012 |
| Dsl - Dumpers/Tenders | 2270002078 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00001 |
| Dsl - Other Construction Equipment | 2270002081 | 0.13 | 1.23 | 0.75 | 0.00059 | 0.00575 | 0.00349 |
| **TOTAL** | | **13.64** | **62.24** | **132.66** | **0.06333** | **0.29001** | **0.62773** |

**Light Commercial Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Generator Sets | 2260006005 | 0.25 | 0.00 | 0.56 | 0.00079 | 0.00000 | 0.00177 |
| 2-Str Pumps | 2260006010 | 1.81 | 0.01 | 4.08 | 0.00571 | 0.00002 | 0.01295 |
| 2-Str Air Compressors | 2260006015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Generator Sets | 2265006005 | 6.21 | 3.42 | 158.17 | 0.02241 | 0.01302 | 0.60114 |
| 4-Str Pumps | 2265006010 | 1.51 | 0.17 | 33.28 | 0.00560 | 0.00062 | 0.12474 |
| 4-Str Air Compressors | 2265006015 | 0.65 | 0.16 | 17.38 | 0.00241 | 0.00059 | 0.06510 |
| 4-Str Welders | 2265006025 | 1.43 | 0.92 | 59.22 | 0.00492 | 0.00327 | 0.20949 |
| 4-Str Pressure Washers | 2265006030 | 2.54 | 0.60 | 81.90 | 0.00861 | 0.00210 | 0.28685 |
| LPG-Generator Sets | 2267006005 | 0.03 | 0.16 | 0.40 | 0.00012 | 0.00060 | 0.00154 |
| LPG-Pumps | 2267006010 | 0.03 | 0.14 | 0.38 | 0.00009 | 0.00044 | 0.00121 |
| LPG-Air Compressors | 2267006015 | 0.04 | 0.17 | 0.47 | 0.00011 | 0.00054 | 0.00147 |
| LPG-Welders | 2267006025 | 0.05 | 0.19 | 0.74 | 0.00019 | 0.00070 | 0.00275 |
| LPG-Pressure Washers | 2267006030 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00003 |
| CNG-Generator Sets | 2268006005 | 0.01 | 0.68 | 1.85 | 0.00003 | 0.00214 | 0.00585 |
| CNG-Pumps | 2268006010 | 0.00 | 0.01 | 0.03 | 0.00000 | 0.00003 | 0.00008 |
| CNG-Air Compressors | 2268006015 | 0.00 | 0.04 | 0.12 | 0.00000 | 0.00016 | 0.00045 |
| CNG-Gas Compressors | 2268006020 | 0.01 | 0.49 | 2.21 | 0.00003 | 0.00157 | 0.00702 |
| Dsl-Generator Sets | 2270006005 | 2.02 | 14.64 | 8.07 | 0.00767 | 0.05555 | 0.03064 |
| Dsl-Pumps | 2270006010 | 0.00 | 0.02 | 0.01 | 0.00001 | 0.00007 | 0.00004 |
| Dsl-Air Compressors | 2270006015 | 0.16 | 1.31 | 0.60 | 0.00062 | 0.00496 | 0.00228 |
| Dsl-Gas Compressors | 2270006020 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl-Welders | 2270006025 | 0.35 | 0.75 | 1.21 | 0.00133 | 0.00284 | 0.00462 |
| Dsl-Pressure Washers | 2270006030 | 0.00 | 0.02 | 0.01 | 0.00002 | 0.00008 | 0.00005 |
| **TOTAL** | | **17.10** | **23.89** | **370.71** | **0.06068** | **0.08930** | **1.36007** |

**Industrial Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Sweepers/Scrubbers | 2260003030 | 0.01 | 0.00 | 0.01 | 0.00002 | 0.00000 | 0.00005 |
| 2-Str Other General Industrial Eqp | 2260003040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Aerial Lifts | 2265003010 | 0.30 | 0.31 | 7.90 | 0.00113 | 0.00118 | 0.03004 |
| 4-Str Forklifts | 2265003020 | 0.05 | 0.05 | 1.24 | 0.00016 | 0.00017 | 0.00396 |
| 4-Str Sweepers/Scrubbers | 2265003030 | 0.06 | 0.05 | 1.77 | 0.00019 | 0.00016 | 0.00603 |
| 4-Str Other General Industrial Eqp | 2265003040 | 0.11 | 0.02 | 2.82 | 0.00033 | 0.00005 | 0.00894 |
| 4-Str Other Material Handling Eqp | 2265003050 | 0.00 | 0.00 | 0.10 | 0.00001 | 0.00001 | 0.00030 |
| 4-Str AC\Refrigeration | 2265003060 | 0.01 | 0.00 | 0.47 | 0.00002 | 0.00001 | 0.00128 |
| 4-Str Terminal Tractors | 2265003070 | 0.01 | 0.01 | 0.27 | 0.00003 | 0.00004 | 0.00084 |
| 4-Str Other Oil Field Eqp | 2265010010 | 3.27 | 1.03 | 221.07 | 0.00991 | 0.00291 | 0.69348 |
| LPG-Aerial Lifts | 2267003010 | 0.01 | 0.05 | 0.18 | 0.00004 | 0.00015 | 0.00058 |
| LPG - Forklifts | 2267003020 | 1.58 | 5.82 | 23.32 | 0.00540 | 0.01989 | 0.07971 |
| LPG - Sweepers/Scrubbers | 2267003030 | 0.05 | 0.16 | 0.68 | 0.00013 | 0.00047 | 0.00198 |
| LPG-Other General Industrial Equipment | 2267003040 | 0.00 | 0.01 | 0.04 | 0.00001 | 0.00003 | 0.00013 |
| LPG - Other Material Handling Equipment | 2267003050 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00003 |
| LPG - Terminal Tractors | 2267003070 | 0.01 | 0.02 | 0.08 | 0.00002 | 0.00007 | 0.00026 |
| CNG-Forklifts | 2268003020 | 0.01 | 0.32 | 1.27 | 0.00002 | 0.00101 | 0.00401 |
| CNG - Sweepers/Scrubbers | 2268003030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| CNG-Other General Industrial Equipment | 2268003040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| CNG-AC\Refrigeration | 2268003060 | 0.00 | 0.00 | 0.02 | 0.00000 | 0.00001 | 0.00005 |
| CNG-Terminal Tractors | 2268003070 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00000 | 0.00002 |
| CNG-Other Oil Field Eqp | 2268010010 | 0.09 | 5.21 | 21.58 | 0.00026 | 0.01599 | 0.06621 |
| Dsl - Aerial Lifts | 2270003010 | 0.04 | 0.19 | 0.14 | 0.00015 | 0.00070 | 0.00049 |
| Dsl - Forklifts | 2270003020 | 0.03 | 0.30 | 0.15 | 0.00011 | 0.00111 | 0.00055 |
| Dsl - Sweepers/Scrubbers | 2270003030 | 0.03 | 0.44 | 0.10 | 0.00013 | 0.00167 | 0.00040 |
| Dsl - Other General Industrial Eqp | 2270003040 | 0.08 | 1.07 | 0.30 | 0.00025 | 0.00341 | 0.00096 |
| Dsl - Other Material Handling Eqp | 2270003050 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00001 |
| Dsl - AC\Refrigertion | 2270003060 | 0.39 | 2.36 | 1.39 | 0.00107 | 0.00640 | 0.00377 |
| Dsl - Terminal Tractors | 2270003070 | 0.06 | 1.43 | 0.49 | 0.00020 | 0.00459 | 0.00157 |

## Non-Road Mobile Source Emissions - Atascosa County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Other Oil Field Eqp | 2270010010 | 1.09 | 13.85 | 4.49 | 0.00335 | 0.04250 | 0.01377 |
| **TOTAL** | | **7.28** | **32.71** | **289.88** | **0.02294** | **0.10252** | **0.91943** |

**Railroad Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Railway Maintenance | 2285002015 | 0.08 | 0.42 | 0.36 | 0.00143 | 0.00000 | 0.00123 |
| 4-Str Railway Maintenance | 2285004015 | 0.02 | 0.01 | 0.92 | 0.00002 | 0.00000 | 0.00323 |
| LPG Railway Maintenance | 2285006015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| Railroad | 2285002000 | 5.46 | 147.97 | 14.57 | 0.01497 | 0.40541 | 0.03992 |
| **TOTAL** | | **5.57** | **148.40** | **15.86** | **0.01643** | **0.40541** | **0.04439** |

**Mining Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Graders | 2270002048 | 1.10 | 14.73 | 5.13 | 0.00304 | 0.04052 | 0.01411 |
| Dsl - Off Highway Trucks | 2270002051 | 12.85 | 185.37 | 77.68 | 0.03612 | 0.52125 | 0.21842 |
| Dsl - Proc. Equipment | 2270002054 | 0.08 | 0.91 | 0.33 | 0.00022 | 0.00251 | 0.00090 |
| Dsl - Crawler Tractor/Dozers | 2270002069 | 5.24 | 67.40 | 29.24 | 0.01503 | 0.19324 | 0.08383 |
| **TOTAL** | | **19.27** | **268.42** | **112.37** | **0.05441** | **0.75752** | **0.31726** |

**Quarry Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Scrapers | 2270002018 | 0.02 | 0.33 | 0.15 | 0.00007 | 0.00099 | 0.00045 |
| Dsl - Excavators | 2270002036 | 0.09 | 1.15 | 0.43 | 0.00026 | 0.00347 | 0.00130 |
| Dsl - Graders | 2270002048 | 0.01 | 0.08 | 0.03 | 0.00002 | 0.00025 | 0.00009 |
| Dsl - Off Highway Trucks | 2270002051 | 0.55 | 7.96 | 3.34 | 0.00166 | 0.02395 | 0.01003 |
| Dsl - Rubber Tire Loaders | 2270002060 | 0.57 | 7.00 | 3.20 | 0.00170 | 0.02105 | 0.00963 |
| Dsl - Tractors/Loaders/Backhoes | 2270002066 | 0.13 | 0.57 | 0.53 | 0.00040 | 0.00172 | 0.00161 |
| Dsl - Crawler Tractors/Dozers | 2270002069 | 0.07 | 0.86 | 0.37 | 0.00020 | 0.00259 | 0.00112 |
| **TOTAL** | | **1.43** | **17.96** | **8.05** | **0.00431** | **0.05403** | **0.02422** |

**Landfill Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Pavers | 2270002003 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Scrapers | 2270002018 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Excavators | 2270002036 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Graders | 2270002048 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Off Highway Trucks | 2270002051 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Rubber Tire Loaders | 2270002060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Crawler Tractors/Dozers | 2270002069 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Const. Equipment | 2270002081 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** |

**Recreational Boating**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Outboard | 2282005010 | 15.02 | 0.33 | 29.55 | 0.03430 | 0.00072 | 0.06483 |
| Personal Water Craft | 2282005015 | 6.60 | 0.09 | 12.86 | 0.01459 | 0.00020 | 0.02822 |
| Inboard/Sterndrive | 2282010005 | 1.21 | 0.52 | 14.28 | 0.00305 | 0.00104 | 0.03203 |
| Inboard/Sterndrive | 2282020005 | 0.04 | 0.94 | 0.15 | 0.00008 | 0.00206 | 0.00033 |
| Outboards | 2282020010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00001 |
| **TOTAL** | | **22.86** | **1.88** | **56.85** | **0.05203** | **0.00404** | **0.12541** |

**Recreational Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Offroad Motorcycles | 2260001010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str ATVs | 2260001030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Specialty Vehicles / Carts | 2260001060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Offroad Motorcycles | 2265001010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str ATVs | 2265001030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Golf Carts | 2265001050 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Specialty Vehicles / Carts | 2265001060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG Specialty Vehicles / Carts | 2267001060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl- Specialty Vehicle Carts | 2270001060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |

## Non-Road Mobile Source Emissions - Atascosa County, 2002

| | | | | | | |
|---|---|---|---|---|---|---|
| **TOTAL** | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Residential Lawn & Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Res) | 2260004015 | 1.36 | 0.00 | 2.81 | 0.00697 | 0.00002 | 0.01432 |
| 2-Str Chain Saws < 6 HP (Res) | 2260004020 | 19.61 | 0.05 | 36.03 | 0.10008 | 0.00023 | 0.18382 |
| 2-Str Trimmers/Edgers/Brush Cutter (Res) | 2260004025 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Leafblowers/Vacuums (Res) | 2260004030 | 11.42 | 0.03 | 22.94 | 0.05836 | 0.00015 | 0.11706 |
| 4-Str Lawn Mowers (Res) | 2265004010 | 32.10 | 2.54 | 434.08 | 0.16268 | 0.01189 | 2.26418 |
| 4-Str Rotary Tillers <6 HP (Res) | 2265004015 | 3.70 | 0.28 | 47.30 | 0.01875 | 0.00131 | 0.24670 |
| 4-Str Trimmers/Edgers/Brush Cutters (Res) | 2265004025 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Leafblowers/Vacuums (Res) | 2265004030 | 0.31 | 0.02 | 4.14 | 0.00155 | 0.00012 | 0.02162 |
| 4-Str Rear Engine Riding Mower (Res) | 2265004040 | 1.83 | 0.45 | 71.09 | 0.00936 | 0.00213 | 0.37079 |
| 4-Str Lawn & Garden Tractors (Res) | 2265004055 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Other Lawn & Garden Equip. (Res) | 2265004075 | 13.18 | 1.53 | 272.25 | 0.06693 | 0.00716 | 1.42006 |
| **TOTAL** | | **83.51** | **4.90** | **890.63** | **0.42469** | **0.02300** | **4.63855** |

**Commercial Lawn & Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 0.04 | 0.00 | 0.09 | 0.00022 | 0.00000 | 0.00046 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 18.62 | 0.17 | 44.75 | 0.06850 | 0.00063 | 0.16461 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 8.13 | 0.03 | 17.51 | 0.04058 | 0.00016 | 0.08745 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 5.08 | 0.03 | 12.14 | 0.02536 | 0.00017 | 0.06062 |
| 2-Str Commercial Turf Equipment (Com) | 2260004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 1.31 | 0.11 | 19.59 | 0.00647 | 0.00051 | 0.09998 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.11 | 0.01 | 1.62 | 0.00055 | 0.00004 | 0.00825 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.09 | 0.01 | 1.57 | 0.00043 | 0.00004 | 0.00801 |
| 4-Str Leafblowers/Vacuums (Com) | 2265004031 | 1.03 | 0.39 | 42.50 | 0.00510 | 0.00180 | 0.21697 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 0.37 | 0.12 | 21.39 | 0.00183 | 0.00056 | 0.10921 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.20 | 0.05 | 8.41 | 0.00097 | 0.00024 | 0.04292 |
| 4-Str Shredders < 6 HP (Com) | 2265004051 | 0.11 | 0.01 | 1.51 | 0.00053 | 0.00004 | 0.00771 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 0.16 | 0.05 | 9.00 | 0.00079 | 0.00024 | 0.04596 |
| 4-Str Chippers/Stump Grinders (Com) | 2265004066 | 0.93 | 0.64 | 42.97 | 0.00455 | 0.00292 | 0.21936 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.01 | 0.00 | 0.65 | 0.00007 | 0.00002 | 0.00331 |
| 4-Str Other Lawn & Garden Equip. (Com) | 2265004076 | 0.47 | 0.05 | 9.66 | 0.00218 | 0.00025 | 0.04933 |
| LPG Chippers/Stump Grinders (Com) | 2267004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Leafblowers/Vacuums (Com) | 2270004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.38 | 1.92 | 1.22 | 0.00190 | 0.00959 | 0.00608 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.00 | 0.02 | 0.01 | 0.00002 | 0.00010 | 0.00006 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.20 | 1.60 | 0.82 | 0.00102 | 0.00799 | 0.00409 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.00 | 0.01 | 0.00 | 0.00000 | 0.00003 | 0.00001 |
| **TOTAL** | | **37.25** | **5.24** | **235.41** | **0.16109** | **0.02534** | **1.13441** |

**University/Colleges Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 0.01 | 0.00 | 0.02 | 0.00004 | 0.00000 | 0.00008 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 0.05 | 0.00 | 0.10 | 0.00023 | 0.00000 | 0.00049 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 0.02 | 0.00 | 0.05 | 0.00012 | 0.00000 | 0.00027 |
| 2-Str Commercial Turf Equipment (Com) | 2260004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractors/Loaders/Backhoe | 2265002066 | 0.00 | 0.00 | 0.02 | 0.00000 | 0.00000 | 0.00010 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.00 | 0.00 | 0.03 | 0.00001 | 0.00000 | 0.00017 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Leafblowers/Vacuums (Com) | 2265004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 0.01 | 0.00 | 0.42 | 0.00004 | 0.00001 | 0.00213 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.00 | 0.00 | 0.12 | 0.00001 | 0.00000 | 0.00060 |
| 4-Str Shredders < 6 HP (Com) | 2265004051 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00002 |
| 4-Str Chippers/Stump Grinders (Com) | 2265004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Other Lawn & Garden Equip. (Com) | 2265004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |

## Non-Road Mobile Source Emissions - Atascosa County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4-Str Tillers > 6 HP | 2265005040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| LPG Chippers/Stump Grinders (Com) | 2267004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Shredders > 6 HP | 2265007010 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00000 | 0.00002 |
| Dsl - Leafblowers/Vacuums (Com) | 2270004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.00 | 0.01 | 0.00 | 0.00001 | 0.00003 | 0.00002 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Shredders > 6 HP | 2270007010 | 0.00 | 0.01 | 0.01 | 0.00000 | 0.00003 | 0.00003 |
| **TOTAL** | | **0.10** | **0.02** | **0.79** | **0.00048** | **0.00009** | **0.00394** |

**Public Schools Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 0.00 | 0.00 | 0.01 | 0.00002 | 0.00000 | 0.00005 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 0.23 | 0.00 | 0.47 | 0.00089 | 0.00000 | 0.00177 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 7.71 | 0.02 | 16.26 | 0.03980 | 0.00012 | 0.08398 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 1.46 | 0.00 | 3.20 | 0.00755 | 0.00002 | 0.01653 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.60 | 0.05 | 9.08 | 0.00306 | 0.00024 | 0.04796 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.01 | 0.00 | 0.14 | 0.00005 | 0.00000 | 0.00072 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 0.20 | 0.07 | 11.27 | 0.00103 | 0.00032 | 0.05948 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.19 | 0.04 | 7.62 | 0.00098 | 0.00018 | 0.04025 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 1.05 | 0.09 | 16.98 | 0.00536 | 0.00042 | 0.08962 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.04 | 0.05 | 1.02 | 0.00022 | 0.00024 | 0.00536 |
| 4-Str Shredders > 6 HP | 2265007010 | 0.20 | 0.03 | 6.71 | 0.00076 | 0.00011 | 0.02608 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.02 | 0.10 | 0.06 | 0.00010 | 0.00050 | 0.00032 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.04 | 0.23 | 0.14 | 0.00023 | 0.00117 | 0.00073 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.00 | 0.02 | 0.01 | 0.00002 | 0.00011 | 0.00007 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.00 | 0.02 | 0.01 | 0.00002 | 0.00009 | 0.00005 |
| Dsl - Shredders > 6 HP | 2270007010 | 0.02 | 0.10 | 0.11 | 0.00007 | 0.00040 | 0.00041 |
| **TOTAL** | | **11.80** | **0.82** | **73.08** | **0.06015** | **0.00393** | **0.37337** |

**Golf Courses Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 0.03 | 0.00 | 0.07 | 0.00009 | 0.00000 | 0.00022 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 0.24 | 0.00 | 0.51 | 0.00108 | 0.00000 | 0.00228 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 0.39 | 0.00 | 0.84 | 0.00174 | 0.00001 | 0.00380 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.02 | 0.00 | 0.32 | 0.00010 | 0.00001 | 0.00149 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.00 | 0.00 | 0.04 | 0.00001 | 0.00000 | 0.00020 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.10 | 0.03 | 5.92 | 0.00045 | 0.00014 | 0.02724 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.55 | 0.57 | 12.12 | 0.00238 | 0.00236 | 0.05578 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.58 | 0.20 | 38.97 | 0.00257 | 0.00084 | 0.17930 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.07 | 0.29 | 0.20 | 0.00030 | 0.00130 | 0.00089 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.03 | 0.15 | 0.10 | 0.00015 | 0.00066 | 0.00044 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.00 | 0.01 | 0.01 | 0.00001 | 0.00007 | 0.00003 |
| **TOTAL** | | **2.01** | **1.26** | **59.09** | **0.00887** | **0.00539** | **0.27166** |

**Government Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rotary Tillers <6 HP | 2260004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Chain Saws | 2260004021 | 1.78 | 0.02 | 4.28 | 0.00684 | 0.00006 | 0.01642 |
| Trimmers/ Edgers/ Brush Cutters | 2260004026 | 2.56 | 0.01 | 5.50 | 0.01246 | 0.00005 | 0.02683 |
| Leaf Blowers/ Vacuums | 2260004031 | 2.00 | 0.01 | 4.76 | 0.00973 | 0.00007 | 0.02322 |
| 4-Str Concrete/Industrial Saws | 2265002039 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Lawn Mowers | 2265004011 | 0.79 | 0.06 | 12.10 | 0.00384 | 0.00030 | 0.05904 |
| Rotary Tillers | 2265004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Trimmers/ Edgers/ Brush Cutters | 2265004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Leaf Blowers / Vacuums | 2265004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Rear Engine Riding Mowers | 2265004041 | 0.53 | 0.16 | 30.99 | 0.00259 | 0.00078 | 0.15117 |
| Front Mowers | 2265004046 | 0.21 | 0.05 | 8.88 | 0.00102 | 0.00024 | 0.04333 |
| Lawn and Garden Tractors | 2265004056 | 0.61 | 0.19 | 34.86 | 0.00296 | 0.00090 | 0.17008 |
| Chippers/ Stump/ Grinders/ Mulchers | 2265004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Commercial Turf Equipment/ Sod Cutters | 2265004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |

# Non-Road Mobile Source Emissions - Atascosa County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Other Lawn and Garden Equipment - Pole Saw | 2265004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Water Pumps | 2265006010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Commercial Mowers | 2270004046 | 0.02 | 0.00 | 0.83 | 0.00009 | 0.00002 | 0.00402 |
| Lawn and Garden Tractors | 2270004056 | 0.00 | 0.02 | 0.01 | 0.00002 | 0.00010 | 0.00006 |
| Chippers/ Stump/ Grinders/ Mulchers | 2270004066 | 0.00 | 0.01 | 0.01 | 0.00001 | 0.00006 | 0.00003 |
| Commercial Turf Equipment/ Sod Cutters | 2270004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Shredders | 2270007010 | 0.04 | 0.13 | 0.14 | 0.00015 | 0.00051 | 0.00056 |
| **TOTAL** | | **8.53** | **0.66** | **102.36** | **0.03971** | **0.00309** | **0.49474** |

**Agricultural Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4-Str Tractor - Corn | 2265005015 | 0.00 | 0.00 | 0.09 | 0.00001 | 0.00001 | 0.00024 |
| 4-Str Tractor - Sorghum | 2265005015 | 0.01 | 0.01 | 0.19 | 0.00000 | 0.00000 | 0.00014 |
| 4-Str Tractor - Small Grains | 2265005015 | 0.00 | 0.00 | 0.00 | 0.00006 | 0.00005 | 0.00180 |
| 4-Str Tractor - Cotton | 2265005015 | 0.00 | 0.00 | 0.04 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Peanuts | 2265005015 | 0.01 | 0.01 | 0.29 | 0.00004 | 0.00004 | 0.00130 |
| 4-Str Tractor - Hay | 2265005015 | 0.01 | 0.00 | 0.16 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Corn | 2270005015 | 0.35 | 2.88 | 1.73 | 0.00098 | 0.00725 | 0.00479 |
| Dsl Tractor - Sorghum | 2270005015 | 0.74 | 6.15 | 3.70 | 0.00059 | 0.00435 | 0.00287 |
| Dsl Tractor - Small Grain | 2270005015 | 0.00 | 0.00 | 0.00 | 0.00729 | 0.05417 | 0.03582 |
| Dsl Tractor - Cotton | 2270005015 | 0.15 | 1.28 | 0.77 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Peanuts | 2270005015 | 1.15 | 9.55 | 5.75 | 0.00525 | 0.03897 | 0.02578 |
| Dsl Tractor - Hay | 2270005015 | 0.64 | 5.30 | 3.19 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Combine - Corn | 2270005020 | 0.15 | 2.28 | 0.80 | 0.00124 | 0.01770 | 0.00470 |
| Dsl Combine - Sorghum | 2270005020 | 0.76 | 11.61 | 4.06 | 0.00055 | 0.00788 | 0.00209 |
| Dsl Combine - Small Grains | 2270005020 | 0.00 | 0.00 | 0.00 | 0.00629 | 0.09004 | 0.02391 |
| Dsl Combine - Cotton | 2270005020 | 0.07 | 1.02 | 0.36 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Combine - Peanuts | 2270005020 | 2.25 | 34.18 | 11.96 | 0.02807 | 0.40155 | 0.10662 |
| Dsl Combine - Hay | 2270005020 | 0.11 | 1.71 | 0.60 | 0.00093 | 0.01325 | 0.00352 |
| 2-Str Sprayers | 2260005035 | 0.22 | 0.00 | 0.46 | 0.00092 | 0.00000 | 0.00199 |
| 2-Str Hydro Power Units | 2260005050 | 0.03 | 0.00 | 0.07 | 0.00012 | 0.00000 | 0.00028 |
| 4-Str Balers | 2265005025 | 0.10 | 0.07 | 1.62 | 0.00037 | 0.00031 | 0.00699 |
| 4-Str Agricultural Mowers | 2265005030 | 0.03 | 0.01 | 1.33 | 0.00012 | 0.00003 | 0.00574 |
| 4-Str Sprayers | 2265005035 | 0.44 | 0.12 | 11.47 | 0.00183 | 0.00051 | 0.04937 |
| 4-Str Tillers > 6 HP | 2265005040 | 0.90 | 0.11 | 29.80 | 0.00384 | 0.00047 | 0.12822 |
| 4-Str Swathers | 2265005045 | 0.14 | 0.12 | 2.57 | 0.00053 | 0.00050 | 0.01107 |
| 4-Str Hydro Power Units | 2265005050 | 0.23 | 0.06 | 10.40 | 0.00099 | 0.00024 | 0.04475 |
| 4-Str Other Agriculture Equipment | 2265005055 | 0.19 | 0.14 | 5.27 | 0.00077 | 0.00059 | 0.02268 |
| 4-Str Irrigation Sets | 2265005060 | 0.20 | 0.20 | 4.91 | 0.00087 | 0.00086 | 0.02114 |
| LPG Hydro Power Units | 2267005050 | 0.00 | 0.01 | 0.02 | 0.00001 | 0.00003 | 0.00011 |
| LPG Other Agriculture Equipment | 2267005055 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00004 |
| LPG Irrigation Sets | 2267005060 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00003 |
| CNG Hydro Power Units | 2268005050 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| CNG Other Agriculture Equipment | 2268005055 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00004 |
| CNG Irrigation Sets | 2268005060 | 0.00 | 0.24 | 1.00 | 0.00002 | 0.00103 | 0.00432 |
| Dsl - Balers | 2270005025 | 0.01 | 0.05 | 0.04 | 0.00006 | 0.00020 | 0.00016 |
| Dsl - Agricultural Mowers | 2270005030 | 0.00 | 0.01 | 0.01 | 0.00001 | 0.00004 | 0.00003 |
| Dsl - Sprayers | 2270005035 | 0.20 | 0.76 | 0.55 | 0.00087 | 0.00325 | 0.00235 |
| Dsl - Tillers > 6 HP | 2270005040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00000 |
| Dsl - Swathers | 2270005045 | 0.09 | 0.86 | 0.34 | 0.00038 | 0.00369 | 0.00148 |
| Dsl - Hydro Power Units | 2270005050 | 0.03 | 0.19 | 0.09 | 0.00012 | 0.00082 | 0.00040 |
| Dsl - Other Agriculture Equipment | 2270005055 | 0.30 | 2.15 | 1.27 | 0.00127 | 0.00925 | 0.00546 |
| Dsl - Irrigation Sets | 2270005060 | 0.16 | 1.31 | 0.53 | 0.00070 | 0.00563 | 0.00229 |
| **TOTAL** | | **9.66** | **82.38** | **105.49** | **0.06508** | **0.66275** | **0.52253** |
| TOTAL NONROAD SOURCES | | 240.03 | 650.79 | 2,453.25 | 1.03417 | 2.42642 | 10.85771 |

## Non-Road Mobile Source Emissions - Bandera County, 2002

| BANDERA COUNTY NON-ROAD MOBILE SOURCES | SCC Code | VOC ton/year | NOx ton/year | CO ton/year | VOC ton/day M-F | NOx ton/day M-F | CO ton/day M-F |
|---|---|---|---|---|---|---|---|
| **Construction Equipment** | | | | | | | |
| 2-Str Tampers/Rammers | 2260002006 | 0.05 | 0.00 | 0.13 | 0.00021 | 0.00000 | 0.00059 |
| 2-Str Plate Compactors | 2260002009 | 0.00 | 0.00 | 0.01 | 0.00001 | 0.00000 | 0.00003 |
| 2-Str Paving Equipment | 2260002021 | 0.00 | 0.00 | 0.01 | 0.00001 | 0.00000 | 0.00003 |
| 2-Str Signal Boards/Light Plants | 2260002027 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Concrete/Industrial Saws | 2260002039 | 0.12 | 0.00 | 0.34 | 0.00057 | 0.00001 | 0.00160 |
| 2-Str Crushing/Proc. Equipment | 2260002054 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| 4-Str Pavers | 2265002003 | 0.00 | 0.00 | 0.11 | 0.00001 | 0.00000 | 0.00054 |
| 4-Str Tampers/Rammers | 2265002006 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Plate Compactors | 2265002009 | 0.01 | 0.00 | 0.21 | 0.00004 | 0.00001 | 0.00099 |
| 4-Str Rollers | 2265002015 | 0.00 | 0.00 | 0.21 | 0.00002 | 0.00001 | 0.00102 |
| 4-Str Paving Equipment | 2265002021 | 0.01 | 0.00 | 0.41 | 0.00005 | 0.00001 | 0.00194 |
| 4-Str Surfacing Equipment | 2265002024 | 0.00 | 0.00 | 0.18 | 0.00002 | 0.00000 | 0.00088 |
| 4-Str Signal Boards/Light Plants | 2265002027 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00000 | 0.00005 |
| 4-Str Trenchers | 2265002030 | 0.01 | 0.00 | 0.35 | 0.00004 | 0.00001 | 0.00166 |
| 4-Str Bore/Drill Rigs | 2265002033 | 0.01 | 0.00 | 0.10 | 0.00002 | 0.00000 | 0.00048 |
| 4-Str Concrete/Industrial Saws | 2265002039 | 0.01 | 0.01 | 0.87 | 0.00006 | 0.00002 | 0.00416 |
| 4-Str Cement & Mortar Mixers | 2265002042 | 0.01 | 0.00 | 0.36 | 0.00006 | 0.00001 | 0.00171 |
| 4-Str Cranes | 2265002045 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00000 | 0.00007 |
| 4-Str Crushing/Proc. Equipment | 2265002054 | 0.00 | 0.00 | 0.05 | 0.00001 | 0.00000 | 0.00024 |
| 4-Str Rough Terrain Forklift | 2265002057 | 0.00 | 0.00 | 0.02 | 0.00000 | 0.00000 | 0.00009 |
| 4-Str Rubber Tire Loaders | 2265002060 | 0.00 | 0.00 | 0.05 | 0.00001 | 0.00001 | 0.00022 |
| 4-Str Tractors/Loaders/Backhoes | 2265002066 | 0.00 | 0.00 | 0.27 | 0.00002 | 0.00001 | 0.00127 |
| 4-Str Skid Steer Loaders | 2265002072 | 0.00 | 0.00 | 0.12 | 0.00002 | 0.00001 | 0.00057 |
| 4-Str Dumpers/Tenders | 2265002078 | 0.00 | 0.00 | 0.06 | 0.00001 | 0.00000 | 0.00027 |
| 4-Str Other Construction Equipment | 2265002081 | 0.00 | 0.00 | 0.02 | 0.00000 | 0.00000 | 0.00008 |
| LPG-Pavers | 2267002003 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| LPG-Rollers | 2267002015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00002 |
| LPG-Paving Equipment | 2267002021 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG-Surfacing Equipment | 2267002024 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG-Trenchers | 2267002030 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00004 |
| LPG-Bore/Drill Rigs | 2267002033 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| LPG-Concrete/Industrial Saws | 2267002039 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00004 |
| LPG-Cranes | 2267002045 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| LPG-Crushing/Proc. Equipment | 2267002054 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG-Rough Terrain Forklifts | 2267002057 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00002 |
| LPG-Rubber Tire Loaders | 2267002060 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00002 | 0.00006 |
| LPG-Tractors/Loaders/Backhoes | 2267002066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| LPG - Skid Steer Loaders | 2267002072 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00004 |
| LPG-Other Construction Equipment | 2267002081 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00002 |
| CNG-Other Construction Equipment | 2268002081 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Pavers | 2270002003 | 0.00 | 0.00 | 0.00 | 0.00001 | 0.00017 | 0.00007 |
| Dsl - Tampers/Rammers | 2270002006 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Plate Compactors | 2270002009 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Rollers | 2270002015 | 0.00 | 0.00 | 0.00 | 0.00008 | 0.00083 | 0.00044 |
| Dsl - Scrapers | 2270002018 | 0.00 | 0.00 | 0.00 | 0.00001 | 0.00007 | 0.00004 |
| Dsl - Paving Equipment | 2270002021 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00004 | 0.00003 |
| Dsl - Surfacing Equipment | 2270002024 | 0.00 | 0.00 | 0.00 | 0.00007 | 0.00070 | 0.00043 |
| Dsl - Signal Boards/Light Plants | 2270002027 | 0.00 | 0.00 | 0.00 | 0.00002 | 0.00009 | 0.00005 |
| Dsl - Trenchers | 2270002030 | 0.00 | 0.00 | 0.00 | 0.00001 | 0.00008 | 0.00006 |
| Dsl - Bore/Drill Rigs | 2270002033 | 0.00 | 0.00 | 0.00 | 0.00005 | 0.00070 | 0.00018 |
| Dsl - Excavators | 2270002036 | 0.00 | 0.00 | 0.00 | 0.00018 | 0.00227 | 0.00097 |
| Dsl - Concrete/Industrial Saws | 2270002039 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00003 | 0.00002 |
| Dsl - Cement & Mortar Mixers | 2270002042 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Cranes | 2270002045 | 0.00 | 0.00 | 0.00 | 0.00003 | 0.00043 | 0.00012 |
| Dsl - Graders | 2270002048 | 0.00 | 0.00 | 0.00 | 0.00005 | 0.00058 | 0.00024 |
| Dsl - Off-highway Trucks | 2270002051 | 0.00 | 0.00 | 0.00 | 0.00003 | 0.00041 | 0.00018 |
| Dsl - Crushing/Proc. Equipment | 2270002054 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Rough Terrain Forklifts | 2270002057 | 0.00 | 0.00 | 0.00 | 0.00002 | 0.00017 | 0.00011 |
| Dsl - Rubber Tire Loaders | 2270002060 | 0.00 | 0.00 | 0.00 | 0.00010 | 0.00138 | 0.00047 |
| Dsl - Tractors/Loaders/Backhoes | 2270002066 | 0.00 | 0.00 | 0.00 | 0.00043 | 0.00265 | 0.00194 |

## Non-Road Mobile Source Emissions - Bandera County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Skid Steer Loaders | 2270002072 | 0.00 | 0.00 | 0.00 | 0.00013 | 0.00039 | 0.00050 |
| Dsl - Off-Highway Tractors | 2270002075 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00000 |
| Dsl - Dumpers/Tenders | 2270002078 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Construction Equipment | 2270002081 | 0.00 | 0.00 | 0.00 | 0.00002 | 0.00023 | 0.00014 |
| **TOTAL** | | **0.34** | **0.12** | **4.02** | **0.00251** | **0.01145** | **0.02478** |

**Light Commercial Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Generator Sets | 2260006005 | 0.04 | 0.00 | 0.10 | 0.00013 | 0.00000 | 0.00030 |
| 2-Str Pumps | 2260006010 | 0.31 | 0.00 | 0.70 | 0.00098 | 0.00000 | 0.00221 |
| 2-Str Air Compressors | 2260006015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Generator Sets | 2265006005 | 1.06 | 0.58 | 27.00 | 0.00391 | 0.00222 | 0.10263 |
| 4-Str Pumps | 2265006010 | 0.26 | 0.03 | 5.68 | 0.00096 | 0.00011 | 0.02130 |
| 4-Str Air Compressors | 2265006015 | 0.11 | 0.03 | 2.97 | 0.00041 | 0.00010 | 0.01111 |
| 4-Str Welders | 2265006025 | 0.24 | 0.16 | 10.11 | 0.00085 | 0.00056 | 0.03577 |
| 4-Str Pressure Washers | 2265006030 | 0.43 | 0.10 | 13.98 | 0.00149 | 0.00036 | 0.04897 |
| LPG-Generator Sets | 2267006005 | 0.01 | 0.03 | 0.07 | 0.00002 | 0.00010 | 0.00026 |
| LPG-Pumps | 2267006010 | 0.00 | 0.02 | 0.07 | 0.00002 | 0.00008 | 0.00021 |
| LPG-Air Compressors | 2267006015 | 0.01 | 0.03 | 0.08 | 0.00002 | 0.00009 | 0.00025 |
| LPG-Welders | 2267006025 | 0.01 | 0.03 | 0.13 | 0.00003 | 0.00012 | 0.00047 |
| LPG-Pressure Washers | 2267006030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| CNG-Generator Sets | 2268006005 | 0.00 | 0.12 | 0.32 | 0.00000 | 0.00037 | 0.00100 |
| CNG-Pumps | 2268006010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00001 |
| CNG-Air Compressors | 2268006015 | 0.00 | 0.01 | 0.02 | 0.00000 | 0.00003 | 0.00008 |
| CNG-Gas Compressors | 2268006020 | 0.00 | 0.08 | 0.38 | 0.00000 | 0.00027 | 0.00120 |
| Dsl-Generator Sets | 2270006005 | 0.35 | 2.50 | 1.38 | 0.00131 | 0.00948 | 0.00523 |
| Dsl-Pumps | 2270006010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00001 |
| Dsl-Air Compressors | 2270006015 | 0.03 | 0.22 | 0.10 | 0.00011 | 0.00085 | 0.00039 |
| Dsl-Gas Compressors | 2270006020 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl-Welders | 2270006025 | 0.06 | 0.13 | 0.21 | 0.00023 | 0.00049 | 0.00079 |
| Dsl-Pressure Washers | 2270006030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00001 |
| **TOTAL** | | **2.92** | **4.08** | **63.29** | **0.01049** | **0.01525** | **0.23221** |

**Industrial Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Sweepers/Scrubbers | 2260003030 | 0.00 | 0.00 | 0.00 | ) | 0.00000 | 0.00001 |
| 2-Str Other General Industrial Eqp | 2260003040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Aerial Lifts | 2265003010 | 0.09 | 0.09 | 2.25 | 0.00033 | 0.00034 | 0.00855 |
| 4-Str Forklifts | 2265003020 | 0.01 | 0.02 | 0.35 | 0.00005 | 0.00005 | 0.00113 |
| 4-Str Sweepers/Scrubbers | 2265003030 | 0.02 | 0.01 | 0.50 | 0.00006 | 0.00004 | 0.00172 |
| 4-Str Other General Industrial Eqp | 2265003040 | 0.03 | 0.00 | 0.80 | 0.00010 | 0.00002 | 0.00254 |
| 4-Str Other Material Handling Eqp | 2265003050 | 0.00 | 0.00 | 0.03 | 0.00000 | 0.00000 | 0.00009 |
| 4-Str AC\Refrigeration | 2265003060 | 0.00 | 0.00 | 0.20 | 0.00001 | 0.00000 | 0.00056 |
| 4-Str Terminal Tractors | 2265003070 | 0.00 | 0.00 | 0.08 | 0.00001 | 0.00001 | 0.00024 |
| 4-Str Other Oil Field Eqp | 2265010010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG-Aerial Lifts | 2267003010 | 0.00 | 0.01 | 0.05 | 0.00001 | 0.00004 | 0.00016 |
| LPG - Forklifts | 2267003020 | 0.45 | 1.65 | 6.63 | 0.00153 | 0.00566 | 0.02267 |
| LPG - Sweepers/Scrubbers | 2267003030 | 0.01 | 0.05 | 0.19 | 0.00004 | 0.00013 | 0.00056 |
| LPG-Other General Industrial Equipment | 2267003040 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00004 |
| LPG - Other Material Handling Equipment | 2267003050 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| LPG - Terminal Tractors | 2267003070 | 0.00 | 0.01 | 0.02 | 0.00001 | 0.00002 | 0.00007 |
| CNG-Forklifts | 2268003020 | 0.00 | 0.09 | 0.36 | 0.00000 | 0.00029 | 0.00114 |
| CNG - Sweepers/Scrubbers | 2268003030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| CNG-Other General Industrial Equipment | 2268003040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| CNG-AC\Refrigeration | 2268003060 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00002 |
| CNG-Terminal Tractors | 2268003070 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| CNG-Other Oil Field Eqp | 2268010010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Aerial Lifts | 2270003010 | 0.01 | 0.05 | 0.04 | 0.00004 | 0.00020 | 0.00014 |
| Dsl - Forklifts | 2270003020 | 0.01 | 0.08 | 0.04 | 0.00003 | 0.00031 | 0.00016 |
| Dsl - Sweepers/Scrubbers | 2270003030 | 0.01 | 0.12 | 0.03 | 0.00004 | 0.00047 | 0.00011 |
| Dsl - Other General Industrial Eqp | 2270003040 | 0.02 | 0.31 | 0.09 | 0.00007 | 0.00097 | 0.00027 |
| Dsl - Other Material Handling Eqp | 2270003050 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - AC\Refrigertion | 2270003060 | 0.18 | 1.09 | 0.64 | 0.00049 | 0.00295 | 0.00174 |
| Dsl - Terminal Tractors | 2270003070 | 0.02 | 0.41 | 0.14 | 0.00006 | 0.00130 | 0.00045 |

# Non-Road Mobile Source Emissions - Bandera County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Other Oil Field Eqp | 2270010010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.88** | **4.01** | **12.48** | **0.00287** | **0.01283** | **0.04238** |

**Railroad Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Railway Maintenance | 2285002015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Railway Maintenance | 2285004015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG Railway Maintenance | 2285006015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Railroad | 2285002000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Mining Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Graders | 2270002048 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Off Highway Trucks | 2270002051 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Proc. Equipment | 2270002054 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Crawler Tractor/Dozers | 2270002069 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Quarry Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Scrapers | 2270002018 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Excavators | 2270002036 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Graders | 2270002048 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Off Highway Trucks | 2270002051 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Rubber Tire Loaders | 2270002060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Tractors/Loaders/Backhoes | 2270002066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Crawler Tractors/Dozers | 2270002069 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Landfill Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Pavers | 2270002003 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Scrapers | 2270002018 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Excavators | 2270002036 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Graders | 2270002048 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Off Highway Trucks | 2270002051 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Rubber Tire Loaders | 2270002060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Crawler Tractors/Dozers | 2270002069 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Const. Equipment | 2270002081 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Recreational Boating**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Outboard | 2282005010 | 25.03 | 0.55 | 49.26 | 0.06040 | 0.00120 | 0.10804 |
| Personal Water Craft | 2282005015 | 11.00 | 0.16 | 21.44 | 0.02458 | 0.00034 | 0.04703 |
| Inboard/Sterndrive | 2282010005 | 2.01 | 0.86 | 23.81 | 0.00607 | 0.00173 | 0.05339 |
| Inboard/Sterndrive | 2282020005 | 0.06 | 1.57 | 0.25 | 0.00013 | 0.00344 | 0.00054 |
| Outboards | 2282020010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00001 |
| **TOTAL** | | **38.11** | **3.14** | **94.75** | **0.09118** | **0.00673** | **0.20901** |

**Recreational Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Offroad Motorcycles | 2260001010 | 131.20 | 0.32 | 125.45 | 0.41040 | 0.00099 | 0.39175 |
| 2-Str ATVs | 2260001030 | 131.76 | 0.32 | 126.18 | 0.41212 | 0.00100 | 0.39403 |
| 2-Str Specialty Vehicles / Carts | 2260001060 | 2.12 | 0.48 | 78.56 | 0.00686 | 0.00149 | 0.24531 |
| 4-Str Offroad Motorcycles | 2265001010 | 3.93 | 0.45 | 55.52 | 0.01246 | 0.00129 | 0.17724 |
| 4-Str ATVs | 2265001030 | 35.49 | 4.06 | 499.67 | 0.11251 | 0.01165 | 1.59517 |
| 4-Str Golf Carts | 2265001050 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Specialty Vehicles / Carts | 2265001060 | 2.21 | 0.42 | 69.84 | 0.00695 | 0.00121 | 0.22297 |
| LPG Specialty Vehicles / Carts | 2267001060 | 0.04 | 0.17 | 0.66 | 0.00014 | 0.00052 | 0.00206 |
| Dsl- Specialty Vehicle Carts | 2270001060 | 0.64 | 1.78 | 2.49 | 0.00199 | 0.00556 | 0.00778 |

## Non-Road Mobile Source Emissions - Bandera County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **TOTAL** | | **307.41** | **7.99** | **958.37** | **0.96342** | **0.02369** | **3.03631** |

**Residential Lawn & Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Res) | 2260004015 | 0.79 | 0.00 | 1.63 | 0.00421 | 0.00001 | 0.00831 |
| 2-Str Chain Saws < 6 HP (Res) | 2260004020 | 11.38 | 0.03 | 20.91 | 0.06017 | 0.00014 | 0.10669 |
| 2-Str Trimmers/Edgers/Brush Cutter (Res) | 2260004025 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Leafblowers/Vacuums (Res) | 2260004030 | 6.63 | 0.02 | 13.32 | 0.03572 | 0.00009 | 0.06795 |
| 4-Str Lawn Mowers (Res) | 2265004010 | 18.63 | 1.47 | 251.95 | 0.08990 | 0.00690 | 1.31417 |
| 4-Str Rotary Tillers <6 HP (Res) | 2265004015 | 2.15 | 0.16 | 27.45 | 0.01031 | 0.00076 | 0.14319 |
| 4-Str Trimmers/Edgers/Brush Cutters (Res) | 2265004025 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Leafblowers/Vacuums (Res) | 2265004030 | 0.18 | 0.01 | 2.41 | 0.00087 | 0.00007 | 0.01255 |
| 4-Str Rear Engine Riding Mower (Res) | 2265004040 | 1.06 | 0.26 | 41.26 | 0.00547 | 0.00124 | 0.21522 |
| 4-Str Lawn & Garden Tractors (Res) | 2265004055 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Other Lawn & Garden Equip. (Res) | 2265004075 | 7.65 | 0.89 | 158.02 | 0.03783 | 0.00415 | 0.82423 |
| **TOTAL** | | **48.47** | **2.85** | **516.94** | **0.24449** | **0.01335** | **2.69231** |

**Commercial Lawn & Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 0.16 | 0.00 | 0.33 | 0.00079 | 0.00000 | 0.00164 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 14.24 | 0.13 | 34.22 | 0.05241 | 0.00048 | 0.12588 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 6.22 | 0.02 | 13.39 | 0.03105 | 0.00012 | 0.06688 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 3.89 | 0.03 | 9.28 | 0.01941 | 0.00013 | 0.04635 |
| 2-Str Commercial Turf Equipment (Com) | 2260004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 1.00 | 0.08 | 14.98 | 0.00496 | 0.00039 | 0.07646 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.39 | 0.03 | 5.70 | 0.00195 | 0.00015 | 0.02911 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.07 | 0.01 | 1.20 | 0.00033 | 0.00003 | 0.00613 |
| 4-Str Leafblowers/Vacuums (Com) | 2265004031 | 0.79 | 0.30 | 32.50 | 0.00392 | 0.00138 | 0.16592 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 1.31 | 0.43 | 75.48 | 0.00651 | 0.00199 | 0.38535 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.71 | 0.18 | 29.66 | 0.00347 | 0.00083 | 0.15142 |
| 4-Str Shredders < 6 HP (Com) | 2265004051 | 0.38 | 0.03 | 5.33 | 0.00186 | 0.00014 | 0.02719 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 0.56 | 0.19 | 31.77 | 0.00280 | 0.00086 | 0.16218 |
| 4-Str Chippers/Stump Grinders (Com) | 2265004066 | 3.28 | 2.25 | 151.61 | 0.01624 | 0.01030 | 0.77399 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.05 | 0.02 | 2.29 | 0.00025 | 0.00007 | 0.01168 |
| 4-Str Other Lawn & Garden Equip. (Com) | 2265004076 | 1.65 | 0.19 | 34.10 | 0.00791 | 0.00089 | 0.17406 |
| LPG Chippers/Stump Grinders (Com) | 2267004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Leafblowers/Vacuums (Com) | 2270004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Front Mowers (Com) | 2270004046 | 1.52 | 7.68 | 4.86 | 0.00761 | 0.03833 | 0.02429 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.02 | 0.08 | 0.05 | 0.00008 | 0.00041 | 0.00025 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.81 | 6.39 | 3.28 | 0.00406 | 0.03192 | 0.01636 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.00 | 0.02 | 0.01 | 0.00002 | 0.00010 | 0.00006 |
| **TOTAL** | | **37.05** | **18.07** | **450.04** | **0.16562** | **0.08853** | **2.24520** |

**University/Colleges Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Commercial Turf Equipment (Com) | 2260004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractors/Loaders/Backhoe | 2265002066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Leafblowers/Vacuums (Com) | 2265004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Shredders < 6 HP (Com) | 2265004051 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Chippers/Stump Grinders (Com) | 2265004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Other Lawn & Garden Equip. (Com) | 2265004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |

## Non-Road Mobile Source Emissions - Bandera County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4-Str Tillers > 6 HP | 2265005040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG Chippers/Stump Grinders (Com) | 2267004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Shredders > 6 HP | 2265007010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Leafblowers/Vacuums (Com) | 2270004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Shredders > 6 HP | 2270007010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Public Schools Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 0.06 | 0.00 | 0.12 | 0.00022 | 0.00000 | 0.00044 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 1.93 | 0.01 | 4.07 | 0.00996 | 0.00003 | 0.02100 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 0.37 | 0.00 | 0.80 | 0.00189 | 0.00001 | 0.00413 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.15 | 0.01 | 2.27 | 0.00077 | 0.00006 | 0.01199 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.00 | 0.00 | 0.03 | 0.00001 | 0.00000 | 0.00018 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 0.05 | 0.02 | 2.82 | 0.00026 | 0.00008 | 0.01487 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.05 | 0.01 | 1.91 | 0.00025 | 0.00005 | 0.01006 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 0.26 | 0.02 | 4.24 | 0.00134 | 0.00011 | 0.02241 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.01 | 0.01 | 0.25 | 0.00006 | 0.00006 | 0.00134 |
| 4-Str Shredders > 6 HP | 2265007010 | 0.05 | 0.01 | 1.68 | 0.00019 | 0.00003 | 0.00652 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.00 | 0.02 | 0.02 | 0.00003 | 0.00012 | 0.00008 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.01 | 0.06 | 0.04 | 0.00006 | 0.00029 | 0.00018 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.00 | 0.01 | 0.00 | 0.00001 | 0.00003 | 0.00002 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00002 | 0.00001 |
| Dsl - Shredders > 6 HP | 2270007010 | 0.00 | 0.03 | 0.03 | 0.00002 | 0.00010 | 0.00010 |
| **TOTAL** | | **2.95** | **0.21** | **18.27** | **0.01506** | **0.00098** | **0.09334** |

**Golf Courses Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 0.11 | 0.00 | 0.27 | 0.00036 | 0.00000 | 0.00091 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 1.01 | 0.00 | 2.12 | 0.00453 | 0.00001 | 0.00954 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 1.62 | 0.01 | 3.54 | 0.00728 | 0.00002 | 0.01591 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.09 | 0.01 | 1.35 | 0.00040 | 0.00003 | 0.00623 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.01 | 0.00 | 0.18 | 0.00006 | 0.00000 | 0.00083 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.43 | 0.14 | 24.81 | 0.00192 | 0.00059 | 0.11414 |
| 4-Str Front Mowers (Com) | 2265004046 | 2.29 | 2.39 | 50.79 | 0.01017 | 0.00988 | 0.23372 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 2.44 | 0.85 | 163.27 | 0.01090 | 0.00353 | 0.75129 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.28 | 1.21 | 0.83 | 0.00126 | 0.00547 | 0.00374 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.14 | 0.62 | 0.41 | 0.00062 | 0.00277 | 0.00186 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.01 | 0.06 | 0.03 | 0.00003 | 0.00027 | 0.00012 |
| **TOTAL** | | **8.42** | **5.29** | **247.60** | **0.03755** | **0.02259** | **1.13829** |

**Government Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rotary Tillers <6 HP | 2260004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Chain Saws | 2260004021 | 0.41 | 0.00 | 0.99 | 0.00158 | 0.00001 | 0.00378 |
| Trimmers/ Edgers/ Brush Cutters | 2260004026 | 0.09 | 0.00 | 0.19 | 0.00043 | 0.00000 | 0.00092 |
| Leaf Blowers/ Vacuums | 2260004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Concrete/Industrial Saws | 2265002039 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Lawn Mowers | 2265004011 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Rotary Tillers | 2265004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Trimmers/ Edgers/ Brush Cutters | 2265004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Leaf Blowers / Vacuums | 2265004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Rear Engine Riding Mowers | 2265004041 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Front Mowers | 2265004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Lawn and Garden Tractors | 2265004056 | 0.02 | 0.01 | 1.28 | 0.00011 | 0.00003 | 0.00625 |
| Chippers/ Stump/ Grinders/ Mulchers | 2265004066 | 0.64 | 0.40 | 30.09 | 0.00314 | 0.00195 | 0.14679 |
| Commercial Turf Equipment/ Sod Cutters | 2265004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |

## Non-Road Mobile Source Emissions - Bandera County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Other Lawn and Garden Equipment - Pole Saw | 2265004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Water Pumps | 2265006010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Commercial Mowers | 2270004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Lawn and Garden Tractors | 2270004056 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Chippers/ Stump/ Grinders/ Mulchers | 2270004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Commercial Turf Equipment/ Sod Cutters | 2270004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Shredders | 2270007010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **1.16** | **0.41** | **32.55** | **0.00525** | **0.00200** | **0.15774** |

**Agricultural Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4-Str Tractor - Corn | 2265005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Hay | 2265005015 | 0.00104 | 0.00 | 0.03 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Peanuts | 2265005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Sorghum | 2265005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Cotton | 2265005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Small Grains | 2265005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Corn | 2270005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Hay | 2270005015 | 0.13 | 1.10 | 0.66 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Peanuts | 2270005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Sorghum | 2270005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Cotton | 2270005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Small Grain | 2270005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Combine - Corn | 2270005020 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Combine - Hay | 2270005020 | 0.02 | 0.23 | 0.12 | 0.00014 | 0.00145 | 0.00073 |
| Dsl Combine - Peanuts | 2270005020 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Combine - Sorghum | 2270005020 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Combine - Cotton | 2270005020 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Combine - Small Grains | 2270005020 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Sprayers | 2260005035 | 0.02 | 0.00 | 0.05 | 0.00010 | 0.00000 | 0.00021 |
| 2-Str Hydro Power Units | 2260005050 | 0.00 | 0.00 | 0.01 | 0.00001 | 0.00000 | 0.00003 |
| 4-Str Balers | 2265005025 | 0.01 | 0.01 | 0.17 | 0.00004 | 0.00003 | 0.00074 |
| 4-Str Agricultural Mowers | 2265005030 | 0.00 | 0.00 | 0.14 | 0.00001 | 0.00000 | 0.00061 |
| 4-Str Sprayers | 2265005035 | 0.05 | 0.01 | 1.22 | 0.00020 | 0.00005 | 0.00525 |
| 4-Str Tillers > 6 HP | 2265005040 | 0.10 | 0.01 | 3.17 | 0.00041 | 0.00005 | 0.01362 |
| 4-Str Swathers | 2265005045 | 0.02 | 0.01 | 0.27 | 0.00006 | 0.00005 | 0.00118 |
| 4-Str Hydro Power Units | 2265005050 | 0.02 | 0.01 | 1.10 | 0.00011 | 0.00003 | 0.00475 |
| 4-Str Other Agriculture Equipment | 2265005055 | 0.02 | 0.01 | 0.56 | 0.00008 | 0.00006 | 0.00241 |
| 4-Str Irrigation Sets | 2265005060 | 0.02 | 0.02 | 0.52 | 0.00009 | 0.00009 | 0.00225 |
| LPG Hydro Power Units | 2267005050 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| LPG Other Agriculture Equipment | 2267005055 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG Irrigation Sets | 2267005060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| CNG Hydro Power Units | 2268005050 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| CNG Other Agriculture Equipment | 2268005055 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| CNG Irrigation Sets | 2268005060 | 0.00 | 0.03 | 0.11 | 0.00000 | 0.00011 | 0.00046 |
| Dsl - Balers | 2270005025 | 0.00 | 0.00 | 0.00 | 0.00001 | 0.00002 | 0.00002 |
| Dsl - Agricultural Mowers | 2270005030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Sprayers | 2270005035 | 0.02 | 0.08 | 0.06 | 0.00009 | 0.00035 | 0.00025 |
| Dsl - Tillers > 6 HP | 2270005040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Swathers | 2270005045 | 0.01 | 0.09 | 0.04 | 0.00004 | 0.00039 | 0.00016 |
| Dsl - Hydro Power Units | 2270005050 | 0.00 | 0.02 | 0.01 | 0.00001 | 0.00009 | 0.00004 |
| Dsl - Other Agriculture Equipment | 2270005055 | 0.03 | 0.23 | 0.13 | 0.00014 | 0.00098 | 0.00058 |
| Dsl - Irrigation Sets | 2270005060 | 0.02 | 0.14 | 0.06 | 0.00007 | 0.00060 | 0.00024 |
| **TOTAL** | | **0.51** | **2.01** | **8.44** | **0.00162** | **0.00437** | **0.03355** |
| TOTAL NONROAD SOURCES | | 448.22 | 48.16 | 2,406.76 | 1.54006 | 0.20178 | 9.90514 |

## Non-Road Mobile Source Emissions - Bexar County, 2002

| BEXAR COUNTY NON-ROAD MOBILE SOURCES | SCC Codes | VOC ton/year | NOx ton/year | CO ton/year | VOC ton/day M-F | NOx ton/day M-F | CO ton/day M-F |
|---|---|---|---|---|---|---|---|
| **Construction Equipment** | | | | | | | |
| 2-Str Tampers/Rammers | 2260002006 | 37.48 | 0.47 | 105.71 | 0.17447 | 0.00221 | 0.49304 |
| 2-Str Plate Compactors | 2260002009 | 2.09 | 0.01 | 4.90 | 0.00970 | 0.00004 | 0.02286 |
| 2-Str Paving Equipment | 2260002021 | 2.47 | 0.01 | 5.86 | 0.01147 | 0.00004 | 0.02734 |
| 2-Str Signal Boards/Light Plants | 2260002027 | 0.02 | 0.00 | 0.04 | 0.00009 | 0.00000 | 0.00021 |
| 2-Str Concrete/Industrial Saws | 2260002039 | 102.36 | 1.13 | 284.23 | 0.47711 | 0.00529 | 1.32563 |
| 2-Str Crushing/Proc. Equipment | 2260002054 | 0.50 | 0.00 | 1.20 | 0.00231 | 0.00001 | 0.00558 |
| 4-Str Pavers | 2265002003 | 1.92 | 0.85 | 93.67 | 0.00877 | 0.00366 | 0.44666 |
| 4-Str Tampers/Rammers | 2265002006 | 0.01 | 0.00 | 0.74 | 0.00007 | 0.00002 | 0.00353 |
| 4-Str Plate Compactors | 2265002009 | 7.38 | 1.03 | 172.85 | 0.03386 | 0.00443 | 0.82419 |
| 4-Str Rollers | 2265002015 | 3.10 | 1.47 | 177.73 | 0.01415 | 0.00630 | 0.84747 |
| 4-Str Paving Equipment | 2265002021 | 9.95 | 2.18 | 338.22 | 0.04498 | 0.00932 | 1.61270 |
| 4-Str Surfacing Equipment | 2265002024 | 3.79 | 0.88 | 153.43 | 0.01733 | 0.00378 | 0.73161 |
| 4-Str Signal Boards/Light Plants | 2265002027 | 0.26 | 0.04 | 7.86 | 0.00120 | 0.00018 | 0.03749 |
| 4-Str Trenchers | 2265002030 | 7.79 | 2.59 | 288.42 | 0.03561 | 0.01108 | 1.37523 |
| 4-Str Bore/Drill Rigs | 2265002033 | 4.42 | 0.83 | 84.36 | 0.01999 | 0.00355 | 0.40227 |
| 4-Str Concrete/Industrial Saws | 2265002039 | 11.50 | 4.43 | 724.09 | 0.05262 | 0.01899 | 3.45259 |
| 4-Str Cement & Mortar Mixers | 2265002042 | 10.63 | 1.74 | 297.65 | 0.04711 | 0.00745 | 1.41924 |
| 4-Str Cranes | 2265002045 | 0.43 | 0.43 | 12.03 | 0.00194 | 0.00185 | 0.05738 |
| 4-Str Crushing/Proc. Equipment | 2265002054 | 1.02 | 0.29 | 41.64 | 0.00462 | 0.00122 | 0.19853 |
| 4-Str Rough Terrain Forklift | 2265002057 | 0.67 | 0.75 | 15.76 | 0.00301 | 0.00320 | 0.07514 |
| 4-Str Rubber Tire Loaders | 2265002060 | 1.60 | 1.85 | 37.68 | 0.00731 | 0.00792 | 0.17968 |
| 4-Str Tractors/Loaders/Backhoes | 2265002066 | 3.57 | 1.36 | 221.72 | 0.01632 | 0.00583 | 1.05722 |
| 4-Str Skid Steer Loaders | 2265002072 | 2.73 | 1.97 | 99.71 | 0.01229 | 0.00844 | 0.47545 |
| 4-Str Dumpers/Tenders | 2265002078 | 1.42 | 0.28 | 46.42 | 0.00628 | 0.00122 | 0.22132 |
| 4-Str Other Construction Equipment | 2265002081 | 0.59 | 0.65 | 13.27 | 0.00262 | 0.00277 | 0.06328 |
| LPG-Pavers | 2267002003 | 0.15 | 0.55 | 2.21 | 0.00070 | 0.00258 | 0.01030 |
| LPG-Rollers | 2267002015 | 0.25 | 0.94 | 3.75 | 0.00118 | 0.00436 | 0.01747 |
| LPG-Paving Equipment | 2267002021 | 0.04 | 0.15 | 0.58 | 0.00018 | 0.00068 | 0.00271 |
| LPG-Surfacing Equipment | 2267002024 | 0.03 | 0.10 | 0.39 | 0.00012 | 0.00046 | 0.00182 |
| LPG-Trenchers | 2267002030 | 0.46 | 1.70 | 6.77 | 0.00214 | 0.00792 | 0.03159 |
| LPG-Bore/Drill Rigs | 2267002033 | 0.15 | 0.56 | 2.22 | 0.00070 | 0.00261 | 0.01036 |
| LPG-Concrete/Industrial Saws | 2267002039 | 0.44 | 1.62 | 6.53 | 0.00206 | 0.00754 | 0.03047 |
| LPG-Cranes | 2267002045 | 0.16 | 0.60 | 2.37 | 0.00075 | 0.00278 | 0.01107 |
| LPG-Crushing/Proc. Equipment | 2267002054 | 0.03 | 0.10 | 0.39 | 0.00012 | 0.00046 | 0.00184 |
| LPG-Rough Terrain Forklifts | 2267002057 | 0.29 | 1.08 | 4.30 | 0.00136 | 0.00504 | 0.02007 |
| LPG-Rubber Tire Loaders | 2267002060 | 0.73 | 2.69 | 10.74 | 0.00339 | 0.01253 | 0.05007 |
| LPG-Tractors/Loaders/Backhoes | 2267002066 | 0.08 | 0.29 | 1.14 | 0.00036 | 0.00133 | 0.00533 |
| LPG - Skid Steer Loaders | 2267002072 | 0.52 | 1.93 | 7.67 | 0.00242 | 0.00898 | 0.03575 |
| LPG-Other Construction Equipment | 2267002081 | 0.24 | 0.90 | 3.56 | 0.00113 | 0.00418 | 0.01659 |
| CNG-Other Construction Equipment | 2268002081 | 0.14 | 0.04 | 0.14 | 0.00066 | 0.00017 | 0.00066 |
| Dsl - Pavers | 2270002003 | 2.58 | 30.47 | 12.78 | 0.01203 | 0.14210 | 0.05962 |
| Dsl - Tampers/Rammers | 2270002006 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Plate Compactors | 2270002009 | 0.13 | 0.77 | 0.46 | 0.00061 | 0.00360 | 0.00213 |
| Dsl - Rollers | 2270002015 | 14.86 | 147.57 | 77.79 | 0.06931 | 0.68828 | 0.36280 |
| Dsl - Scrapers | 2270002018 | 0.95 | 13.13 | 6.46 | 0.00445 | 0.06123 | 0.03013 |
| Dsl - Paving Equipment | 2270002021 | 0.80 | 7.41 | 4.75 | 0.00373 | 0.03454 | 0.02214 |
| Dsl - Surfacing Equipment | 2270002024 | 11.76 | 125.08 | 77.00 | 0.05485 | 0.58337 | 0.35913 |
| Dsl - Signal Boards/Light Plants | 2270002027 | 2.75 | 15.59 | 9.49 | 0.01280 | 0.07270 | 0.04424 |
| Dsl - Trenchers | 2270002030 | 1.97 | 14.46 | 10.99 | 0.00920 | 0.06744 | 0.05126 |
| Dsl - Bore/Drill Rigs | 2270002033 | 9.53 | 125.36 | 32.88 | 0.04447 | 0.58468 | 0.15337 |
| Dsl - Excavators | 2270002036 | 32.53 | 404.60 | 173.62 | 0.15173 | 1.88706 | 0.80975 |
| Dsl - Concrete/Industrial Saws | 2270002039 | 0.66 | 4.66 | 3.60 | 0.00307 | 0.02176 | 0.01681 |
| Dsl - Cement & Mortar Mixers | 2270002042 | 0.09 | 0.47 | 0.28 | 0.00040 | 0.00218 | 0.00131 |
| Dsl - Cranes | 2270002045 | 6.12 | 77.36 | 20.61 | 0.02856 | 0.36079 | 0.09612 |
| Dsl - Graders | 2270002048 | 8.73 | 103.22 | 41.90 | 0.04073 | 0.48141 | 0.19542 |
| Dsl - Off-highway Trucks | 2270002051 | 6.11 | 72.26 | 32.94 | 0.02848 | 0.33704 | 0.15362 |
| Dsl - Crushing/Proc. Equipment | 2270002054 | 0.03 | 0.20 | 0.11 | 0.00014 | 0.00095 | 0.00053 |
| Dsl - Rough Terrain Forklifts | 2270002057 | 3.50 | 30.45 | 19.63 | 0.01633 | 0.14200 | 0.09154 |
| Dsl - Rubber Tire Loaders | 2270002060 | 18.71 | 245.87 | 84.21 | 0.08724 | 1.14673 | 0.39275 |
| Dsl - Tractors/Loaders/Backhoes | 2270002066 | 77.25 | 472.98 | 346.25 | 0.36028 | 2.20596 | 1.61491 |

# Non-Road Mobile Source Emissions - Bexar County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Skid Steer Loaders | 2270002072 | 22.78 | 68.74 | 88.32 | 0.10623 | 0.32061 | 0.41194 |
| Dsl - Off-Highway Tractors | 2270002075 | 0.14 | 1.93 | 0.82 | 0.00066 | 0.00900 | 0.00383 |
| Dsl - Dumpers/Tenders | 2270002078 | 0.02 | 0.06 | 0.09 | 0.00011 | 0.00030 | 0.00042 |
| Dsl - Other Construction Equipment | 2270002081 | 4.12 | 40.41 | 24.55 | 0.01920 | 0.18849 | 0.11449 |
| **TOTAL** | | **447.52** | **2,041.52** | **4,351.49** | **2.07712** | **9.51262** | **20.58996** |

**Light Commercial Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Generator Sets | 2260006005 | 12.81 | 0.05 | 28.67 | 0.04044 | 0.00015 | 0.09090 |
| 2-Str Pumps | 2260006010 | 92.59 | 0.35 | 209.49 | 0.29288 | 0.00111 | 0.66416 |
| 2-Str Air Compressors | 2260006015 | 0.03 | 0.00 | 0.08 | 0.00011 | 0.00000 | 0.00025 |
| 4-Str Generator Sets | 2265006005 | 318.43 | 175.67 | 8,112.76 | 1.14966 | 0.66765 | 30.83393 |
| 4-Str Pumps | 2265006010 | 77.54 | 8.51 | 1,707.00 | 0.28741 | 0.03190 | 6.39833 |
| 4-Str Air Compressors | 2265006015 | 33.45 | 8.02 | 891.29 | 0.12384 | 0.03004 | 3.33902 |
| 4-Str Welders | 2265006025 | 73.30 | 47.38 | 3,037.80 | 0.25242 | 0.16758 | 10.74509 |
| 4-Str Pressure Washers | 2265006030 | 130.25 | 30.70 | 4,200.68 | 0.44154 | 0.10754 | 14.71330 |
| LPG-Generator Sets | 2267006005 | 1.59 | 8.06 | 20.75 | 0.00607 | 0.03065 | 0.07892 |
| LPG-Pumps | 2267006010 | 1.48 | 7.17 | 19.54 | 0.00469 | 0.02272 | 0.06195 |
| LPG-Air Compressors | 2267006015 | 1.81 | 8.72 | 23.86 | 0.00573 | 0.02766 | 0.07564 |
| LPG-Welders | 2267006025 | 2.59 | 9.66 | 38.21 | 0.00958 | 0.03566 | 0.14101 |
| LPG-Pressure Washers | 2267006030 | 0.04 | 0.14 | 0.56 | 0.00012 | 0.00045 | 0.00179 |
| CNG-Generator Sets | 2268006005 | 0.42 | 34.67 | 94.64 | 0.00134 | 0.10992 | 0.30003 |
| CNG-Pumps | 2268006010 | 0.01 | 0.49 | 1.35 | 0.00002 | 0.00156 | 0.00427 |
| CNG-Air Compressors | 2268006015 | 0.03 | 2.12 | 6.01 | 0.00010 | 0.00808 | 0.02287 |
| CNG-Gas Compressors | 2268006020 | 0.44 | 25.38 | 113.57 | 0.00140 | 0.08047 | 0.36006 |
| Dsl-Generator Sets | 2270006005 | 103.67 | 750.69 | 414.09 | 0.39350 | 2.84952 | 1.57183 |
| Dsl-Pumps | 2270006010 | 0.14 | 0.90 | 0.53 | 0.00055 | 0.00341 | 0.00201 |
| Dsl-Air Compressors | 2270006015 | 8.33 | 67.07 | 30.81 | 0.03159 | 0.25437 | 0.11684 |
| Dsl-Gas Compressors | 2270006020 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl-Welders | 2270006025 | 17.98 | 38.33 | 62.31 | 0.06840 | 0.14580 | 0.23704 |
| Dsl-Pressure Washers | 2270006030 | 0.22 | 1.10 | 0.68 | 0.00084 | 0.00420 | 0.00257 |
| **TOTAL** | | **877.17** | **1,225.18** | **19,014.67** | **3.11223** | **4.58043** | **69.76182** |

**Industrial Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Sweepers/Scrubbers | 2260003030 | 0.77 | 0.00 | 1.78 | 0.00245 | 0.00001 | 0.00564 |
| 2-Str Other General Industrial Eqp | 2260003040 | 0.05 | 0.00 | 0.11 | 0.00015 | 0.00000 | 0.00035 |
| 4-Str Aerial Lifts | 2265003010 | 36.75 | 37.49 | 954.68 | 0.13674 | 0.14256 | 3.63081 |
| 4-Str Forklifts | 2265003020 | 6.29 | 6.49 | 149.70 | 0.01960 | 0.02073 | 0.47823 |
| 4-Str Sweepers/Scrubbers | 2265003030 | 6.96 | 5.60 | 214.24 | 0.02324 | 0.01906 | 0.72873 |
| 4-Str Other General Industrial Eqp | 2265003040 | 12.83 | 2.09 | 340.64 | 0.04036 | 0.00664 | 1.07994 |
| 4-Str Other Material Handling Eqp | 2265003050 | 0.35 | 0.26 | 11.50 | 0.00107 | 0.00081 | 0.03647 |
| 4-Str AC\Refrigeration | 2265003060 | 0.31 | 0.09 | 17.39 | 0.00082 | 0.00025 | 0.04725 |
| 4-Str Terminal Tractors | 2265003070 | 1.31 | 1.38 | 32.05 | 0.00408 | 0.00437 | 0.10160 |
| 4-Str Other Oil Field Eqp | 2265010010 | 38.60 | 12.19 | 2,612.83 | 0.11716 | 0.03435 | 8.19607 |
| LPG-Aerial Lifts | 2267003010 | 1.50 | 5.56 | 22.07 | 0.00475 | 0.01764 | 0.06997 |
| LPG - Forklifts | 2267003020 | 190.72 | 702.94 | 2,817.67 | 0.65202 | 2.40318 | 9.63289 |
| LPG - Sweepers/Scrubbers | 2267003030 | 5.46 | 19.38 | 81.67 | 0.01601 | 0.05680 | 0.23942 |
| LPG-Other General Industrial Equipment | 2267003040 | 0.33 | 1.23 | 4.90 | 0.00105 | 0.00390 | 0.01553 |
| LPG - Other Material Handling Equipmen | 2267003050 | 0.08 | 0.29 | 1.17 | 0.00025 | 0.00093 | 0.00370 |
| LPG - Terminal Tractors | 2267003070 | 0.68 | 2.49 | 9.98 | 0.00214 | 0.00790 | 0.03165 |
| CNG-Forklifts | 2268003020 | 0.61 | 38.33 | 152.99 | 0.00194 | 0.12152 | 0.48504 |
| CNG - Sweepers/Scrubbers | 2268003030 | 0.00 | 0.04 | 0.18 | 0.00000 | 0.00014 | 0.00057 |
| CNG-Other General Industrial Equipment | 2268003040 | 0.00 | 0.03 | 0.12 | 0.00000 | 0.00009 | 0.00037 |
| CNG-AC\Refrigeration | 2268003060 | 0.00 | 0.18 | 0.72 | 0.00001 | 0.00049 | 0.00196 |
| CNG-Terminal Tractors | 2268003070 | 0.00 | 0.18 | 0.72 | 0.00001 | 0.00057 | 0.00230 |
| CNG-Other Oil Field Eqp | 2268010010 | 1.01 | 61.58 | 255.02 | 0.00310 | 0.18894 | 0.78248 |
| Dsl - Aerial Lifts | 2270003010 | 4.88 | 23.31 | 16.35 | 0.01761 | 0.08416 | 0.05903 |
| Dsl - Forklifts | 2270003020 | 3.49 | 35.82 | 17.65 | 0.01305 | 0.13373 | 0.06589 |
| Dsl - Sweepers/Scrubbers | 2270003030 | 4.01 | 52.91 | 12.56 | 0.01526 | 0.20128 | 0.04780 |
| Dsl - Other General Industrial Eqp | 2270003040 | 9.61 | 129.91 | 36.58 | 0.03045 | 0.41185 | 0.11598 |
| Dsl - Other Material Handling Eqp | 2270003050 | 0.16 | 0.32 | 0.52 | 0.00051 | 0.00101 | 0.00165 |
| Dsl - AC\Refrigertion | 2270003060 | 14.35 | 86.03 | 50.61 | 0.03901 | 0.23377 | 0.13753 |
| Dsl - Terminal Tractors | 2270003070 | 7.51 | 172.56 | 59.24 | 0.02411 | 0.55420 | 0.19025 |

## Non-Road Mobile Source Emissions - Bexar County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Other Oil Field Eqp | 2270010010 | 12.90 | 163.72 | 53.04 | 0.03957 | 0.50234 | 0.16273 |
| **TOTAL** | | **361.51** | **1,562.41** | **7,928.69** | **1.20652** | **5.15324** | **26.35182** |

**Railroad Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Railway Maintenance | 2285002015 | 3.03 | 15.29 | 13.09 | 0.05233 | 0.00000 | 0.04481 |
| 4-Str Railway Maintenance | 2285004015 | 0.82 | 0.24 | 34.21 | 0.00074 | 0.00000 | 0.11975 |
| LPG Railway Maintenance | 2285006015 | 0.01 | 0.04 | 0.15 | 0.00013 | 0.00000 | 0.00051 |
| Railroad | 2285002000 | 77.07 | 1,882.99 | 187.80 | 0.21115 | 5.15887 | 0.51452 |
| **TOTAL** | | **80.93** | **1,898.55** | **235.25** | **0.26435** | **5.15887** | **0.67960** |

**Mining Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Graders | 2270002048 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Off Highway Trucks | 2270002051 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Proc. Equipment | 2270002054 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Crawler Tractor/Dozers | 2270002069 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Quarry Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Scrapers | 2270002018 | 1.31 | 19.19 | 8.60 | 0.00394 | 0.05773 | 0.02588 |
| Dsl - Excavators | 2270002036 | 2.67 | 35.18 | 13.15 | 0.00804 | 0.10583 | 0.03956 |
| Dsl - Graders | 2270002048 | 0.27 | 3.62 | 1.26 | 0.00082 | 0.01090 | 0.00379 |
| Dsl - Off Highway Trucks | 2270002051 | 16.24 | 234.42 | 98.23 | 0.04886 | 0.70519 | 0.29550 |
| Dsl - Rubber Tire Loaders | 2270002060 | 16.87 | 208.72 | 95.43 | 0.05074 | 0.62785 | 0.28707 |
| Dsl - Tractors/Loaders/Backhoes | 2270002066 | 3.73 | 16.13 | 15.07 | 0.01123 | 0.04852 | 0.04532 |
| Dsl - Crawler Tractors/Dozers | 2270002069 | 2.20 | 28.23 | 12.25 | 0.00661 | 0.08493 | 0.03684 |
| **TOTAL** | | **43.29** | **545.50** | **243.99** | **0.13024** | **1.64095** | **0.73397** |

**Landfill Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Pavers | 2270002003 | 0.81 | 17.67 | 5.89 | 0.00333 | 0.07261 | 0.02420 |
| Dsl - Scrapers | 2270002018 | 0.48 | 9.86 | 3.18 | 0.00196 | 0.04052 | 0.01305 |
| Dsl - Excavators | 2270002036 | 0.04 | 0.65 | 0.15 | 0.00017 | 0.00267 | 0.00060 |
| Dsl - Graders | 2270002048 | 0.12 | 1.63 | 0.46 | 0.00047 | 0.00672 | 0.00188 |
| Dsl - Off Highway Trucks | 2270002051 | 0.14 | 1.99 | 0.51 | 0.00056 | 0.00817 | 0.00212 |
| Dsl - Rubber Tire Loaders | 2270002060 | 0.18 | 2.59 | 0.67 | 0.00074 | 0.01063 | 0.00275 |
| Dsl - Crawler Tractors/Dozers | 2270002069 | 0.85 | 13.17 | 3.53 | 0.00350 | 0.05414 | 0.01451 |
| Dsl - Other Const. Equipment | 2270002081 | 0.45 | 6.80 | 1.57 | 0.00185 | 0.02794 | 0.00644 |
| **TOTAL** | | **3.07** | **54.35** | **15.95** | **0.01260** | **0.22339** | **0.06555** |

**Recreational Boating**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Outboard | 2282005010 | 41.71 | 0.91 | 82.09 | 0.09529 | 0.00200 | 0.18007 |
| Personal Water Craft | 2282005015 | 18.34 | 0.26 | 35.73 | 0.04053 | 0.00057 | 0.07838 |
| Inboard/Sterndrive | 2282010005 | 3.36 | 1.43 | 39.68 | 0.00848 | 0.00289 | 0.08898 |
| Inboard/Sterndrive | 2282020005 | 0.10 | 2.61 | 0.41 | 0.00021 | 0.00573 | 0.00091 |
| Outboards | 2282020010 | 0.00 | 0.00 | 0.01 | 0.00001 | 0.00002 | 0.00002 |
| **TOTAL** | | **63.51** | **5.22** | **157.92** | **0.14452** | **0.01122** | **0.34835** |

**Recreational Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Offroad Motorcycles | 2260001010 | 131.20 | 0.32 | 125.45 | 0.40950 | 0.00099 | 0.39175 |
| 2-Str ATVs | 2260001030 | 131.76 | 0.32 | 126.18 | 0.41124 | 0.00100 | 0.39403 |
| 2-Str Specialty Vehicles / Carts | 2260001060 | 2.12 | 0.48 | 78.56 | 0.00652 | 0.00149 | 0.24531 |
| 4-Str Offroad Motorcycles | 2265001010 | 3.93 | 0.45 | 55.52 | 0.01208 | 0.00129 | 0.17724 |
| 4-Str ATVs | 2265001030 | 35.49 | 4.06 | 499.67 | 0.10910 | 0.01165 | 1.59517 |
| 4-Str Golf Carts | 2265001050 | 13.31 | 4.15 | 889.30 | 0.04108 | 0.01190 | 2.83908 |
| 4-Str Specialty Vehicles / Carts | 2265001060 | 2.21 | 0.42 | 69.84 | 0.00682 | 0.00121 | 0.22297 |
| LPG Specialty Vehicles / Carts | 2267001060 | 0.04 | 0.17 | 0.66 | 0.00014 | 0.00052 | 0.00206 |
| Dsl- Specialty Vehicle Carts | 2270001060 | 0.64 | 1.78 | 2.49 | 0.00199 | 0.00556 | 0.00778 |

## Non-Road Mobile Source Emissions - Bexar County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **TOTAL** | | **320.72** | **12.14** | **1,847.67** | **0.99845** | **0.03559** | **5.87539** |

**Residential Lawn & Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Res) | 2260004015 | 20.72 | 0.05 | 42.62 | 0.10577 | 0.00027 | 0.21745 |
| 2-Str Chain Saws < 6 HP (Res) | 2260004020 | 267.73 | 0.63 | 491.90 | 1.36642 | 0.00320 | 2.50972 |
| 2-Str Trimmers/Edgers/Brush Cutter (Res) | 2260004025 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Leafblowers/Vacuums (Res) | 2260004030 | 688.93 | 1.79 | 1,384.23 | 3.52091 | 0.00912 | 7.06238 |
| 4-Str Lawn Mowers (Res) | 2265004010 | 755.89 | 59.77 | 10,222.86 | 3.83130 | 0.28009 | 53.32303 |
| 4-Str Rotary Tillers <6 HP (Res) | 2265004015 | 56.19 | 4.23 | 718.14 | 0.28475 | 0.01985 | 3.74584 |
| 4-Str Trimmers/Edgers/Brush Cutters (Res) | 2265004025 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Leafblowers/Vacuums (Res) | 2265004030 | 18.43 | 1.49 | 250.01 | 0.09351 | 0.00697 | 1.30407 |
| 4-Str Rear Engine Riding Mower (Res) | 2265004040 | 43.19 | 10.70 | 1,674.15 | 0.22041 | 0.05015 | 8.73245 |
| 4-Str Lawn & Garden Tractors (Res) | 2265004055 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Other Lawn & Garden Equip. (Res) | 2265004075 | 285.06 | 33.02 | 5,887.31 | 1.44745 | 0.15475 | 30.70858 |
| **TOTAL** | | **2,136.14** | **111.68** | **20,671.21** | **10.87051** | **0.52440** | **107.60352** |

**Commercial Lawn & Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 1.42 | 0.00 | 2.96 | 0.00710 | 0.00002 | 0.01477 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 597.97 | 5.53 | 1,437.12 | 2.20017 | 0.02034 | 5.28686 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 261.10 | 1.03 | 562.50 | 1.30332 | 0.00514 | 2.80880 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 163.23 | 1.09 | 389.89 | 0.81461 | 0.00546 | 1.94690 |
| 2-Str Commercial Turf Equipment (Com) | 2260004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 42.03 | 3.57 | 629.02 | 0.20772 | 0.01637 | 3.21118 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 3.55 | 0.30 | 51.35 | 0.01755 | 0.00139 | 0.26212 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 2.79 | 0.29 | 50.41 | 0.01380 | 0.00131 | 0.25735 |
| 4-Str Leafblowers/Vacuums (Com) | 2265004031 | 33.07 | 12.60 | 1,365.02 | 0.16390 | 0.05778 | 6.96846 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 11.82 | 3.90 | 679.73 | 0.05809 | 0.01788 | 3.47002 |
| 4-Str Front Mowers (Com) | 2265004046 | 6.37 | 1.63 | 267.10 | 0.03089 | 0.00747 | 1.36353 |
| 4-Str Shredders < 6 HP (Com) | 2265004051 | 3.39 | 0.28 | 47.96 | 0.01670 | 0.00129 | 0.24482 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 5.08 | 1.69 | 286.07 | 0.02506 | 0.00776 | 1.46040 |
| 4-Str Chippers/Stump Grinders (Com) | 2265004066 | 29.55 | 20.22 | 1,365.26 | 0.14462 | 0.09272 | 6.96968 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.45 | 0.14 | 20.60 | 0.00219 | 0.00066 | 0.10515 |
| 4-Str Other Lawn & Garden Equip. (Com) | 2265004076 | 14.87 | 1.75 | 307.03 | 0.06935 | 0.00801 | 1.56740 |
| LPG Chippers/Stump Grinders (Com) | 2267004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Leafblowers/Vacuums (Com) | 2270004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00001 |
| Dsl - Front Mowers (Com) | 2270004046 | 12.10 | 60.91 | 38.60 | 0.06040 | 0.30417 | 0.19273 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.13 | 0.65 | 0.40 | 0.00064 | 0.00325 | 0.00202 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 6.45 | 50.72 | 26.00 | 0.03220 | 0.25328 | 0.12982 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.00 | 0.01 | 0.00 | 0.00001 | 0.00003 | 0.00002 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.03 | 0.16 | 0.09 | 0.00013 | 0.00080 | 0.00047 |
| **TOTAL** | | **1,195.38** | **166.47** | **7,527.13** | **5.16845** | **0.80513** | **36.26252** |

**University/Colleges Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 2.60 | 0.01 | 5.20 | 0.00950 | 0.00003 | 0.01901 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 11.31 | 0.03 | 23.81 | 0.05616 | 0.00017 | 0.11826 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 5.96 | 0.02 | 13.03 | 0.02958 | 0.00009 | 0.06470 |
| 2-Str Commercial Turf Equipment (Com) | 2260004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractors/Loaders/Backhoe | 2265002066 | 0.23 | 0.27 | 5.53 | 0.00095 | 0.00104 | 0.02368 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.42 | 0.05 | 7.95 | 0.00205 | 0.00021 | 0.04035 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.02 | 0.00 | 0.32 | 0.00011 | 0.00001 | 0.00163 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Leafblowers/Vacuums (Com) | 2265004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 2.04 | 0.60 | 100.75 | 0.01001 | 0.00276 | 0.51154 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.67 | 0.24 | 28.63 | 0.00324 | 0.00111 | 0.14539 |
| 4-Str Shredders < 6 HP (Com) | 2265004051 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 0.00 | 0.00 | 0.92 | 0.00012 | 0.00002 | 0.00468 |
| 4-Str Chippers/Stump Grinders (Com) | 2265004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Other Lawn & Garden Equip. (Com) | 2265004076 | 0.03 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |

## Non-Road Mobile Source Emissions - Bexar County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4-Str Tillers > 6 HP | 2265005040 | 0.01 | 0.00 | 0.35 | 0.00005 | 0.00001 | 0.00156 |
| LPG Chippers/Stump Grinders (Com) | 2267004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Shredders > 6 HP | 2265007010 | 0.06 | 0.01 | 1.42 | 0.00019 | 0.00002 | 0.00459 |
| Dsl - Leafblowers/Vacuums (Com) | 2270004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.28 | 1.21 | 0.82 | 0.00137 | 0.00602 | 0.00409 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.05 | 0.21 | 0.14 | 0.00023 | 0.00103 | 0.00069 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.01 | 0.06 | 0.03 | 0.00004 | 0.00029 | 0.00015 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Shredders > 6 HP | 2270007010 | 0.36 | 2.49 | 2.20 | 0.00116 | 0.00788 | 0.00697 |
| **TOTAL** | | **24.05** | **5.21** | **191.10** | **0.11476** | **0.02070** | **0.94730** |

**Public Schools Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 0.05 | 0.00 | 0.13 | 0.00026 | 0.00000 | 0.00067 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 3.30 | 0.01 | 6.59 | 0.01257 | 0.00004 | 0.02507 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 109.04 | 0.34 | 230.01 | 0.56283 | 0.00173 | 1.18776 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 20.71 | 0.06 | 45.27 | 0.10684 | 0.00033 | 0.23375 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 8.46 | 0.73 | 128.47 | 0.04323 | 0.00346 | 0.67822 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.13 | 0.01 | 1.94 | 0.00068 | 0.00005 | 0.01023 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 2.86 | 0.96 | 159.35 | 0.01457 | 0.00456 | 0.84124 |
| 4-Str Front Mowers (Com) | 2265004046 | 2.75 | 0.55 | 107.82 | 0.01383 | 0.00260 | 0.56921 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 14.88 | 1.26 | 240.09 | 0.07580 | 0.00595 | 1.26752 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.61 | 0.70 | 14.36 | 0.00312 | 0.00334 | 0.07583 |
| 4-Str Shredders > 6 HP | 2265007010 | 2.85 | 0.44 | 94.83 | 0.01074 | 0.00154 | 0.36882 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.28 | 1.37 | 0.87 | 0.00146 | 0.00707 | 0.00447 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.62 | 3.21 | 1.99 | 0.00319 | 0.01657 | 0.01025 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.07 | 0.29 | 0.20 | 0.00035 | 0.00150 | 0.00103 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.04 | 0.24 | 0.14 | 0.00022 | 0.00126 | 0.00074 |
| Dsl - Shredders > 6 HP | 2270007010 | 0.25 | 1.48 | 1.51 | 0.00096 | 0.00561 | 0.00575 |
| **TOTAL** | | **166.90** | **11.65** | **1,033.57** | **0.85065** | **0.05563** | **5.28056** |

**Golf Courses Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 0.83 | 0.01 | 2.07 | 0.00276 | 0.00003 | 0.00687 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 7.61 | 0.02 | 16.03 | 0.03425 | 0.00010 | 0.07215 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 12.23 | 0.04 | 26.74 | 0.05502 | 0.00017 | 0.12036 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.68 | 0.06 | 10.25 | 0.00305 | 0.00024 | 0.04714 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.09 | 0.01 | 1.37 | 0.00042 | 0.00003 | 0.00629 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 3.25 | 1.08 | 187.61 | 0.01441 | 0.00445 | 0.86327 |
| 4-Str Front Mowers (Com) | 2265004046 | 17.35 | 18.07 | 384.14 | 0.07530 | 0.07471 | 1.76762 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 18.43 | 6.46 | 1,234.82 | 0.08156 | 0.02672 | 5.68199 |
| Dsl - Front Mowers (Com) | 2270004046 | 2.12 | 9.19 | 6.29 | 0.00955 | 0.04135 | 0.02832 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 1.04 | 4.65 | 3.12 | 0.00468 | 0.02095 | 0.01405 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.05 | 0.46 | 0.20 | 0.00023 | 0.00206 | 0.00089 |
| **TOTAL** | | **63.70** | **40.05** | **1,872.63** | **0.28123** | **0.17081** | **8.60894** |

**Government Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rotary Tillers <6 HP | 2260004016 | 0.18 | 0.00 | 0.38 | 0.00074 | 0.00000 | 0.00155 |
| Chain Saws | 2260004021 | 35.96 | 0.33 | 86.37 | 0.13712 | 0.00127 | 0.32946 |
| Trimmers/ Edgers/ Brush Cutters | 2260004026 | 76.58 | 0.30 | 164.80 | 0.35811 | 0.00141 | 0.77128 |
| Leaf Blowers/ Vacuums | 2260004031 | 41.51 | 0.28 | 99.01 | 0.19703 | 0.00132 | 0.47047 |
| 4-Str Concrete/Industrial Saws | 2265002039 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| Lawn Mowers | 2265004011 | 5.82 | 0.46 | 89.57 | 0.02731 | 0.00215 | 0.42137 |
| Rotary Tillers | 2265004016 | 0.10 | 0.01 | 1.42 | 0.00041 | 0.00003 | 0.00605 |
| Trimmers/ Edgers/ Brush Cutters | 2265004026 | 0.27 | 0.03 | 4.98 | 0.00117 | 0.00011 | 0.02170 |
| Leaf Blowers / Vacuums | 2265004031 | 0.41 | 0.14 | 17.18 | 0.00141 | 0.00050 | 0.05994 |
| Rear Engine Riding Mowers | 2265004041 | 3.68 | 1.11 | 215.27 | 0.01776 | 0.00541 | 1.05017 |
| Front Mowers | 2265004046 | 1.20 | 0.28 | 50.89 | 0.00576 | 0.00136 | 0.24825 |
| Lawn and Garden Tractors | 2265004056 | 2.98 | 0.91 | 171.30 | 0.01441 | 0.00444 | 0.83569 |
| Chippers/ Stump/ Grinders/ Mulchers | 2265004066 | 0.53 | 0.33 | 24.95 | 0.00252 | 0.00159 | 0.11946 |
| Commercial Turf Equipment/ Sod Cutters | 2265004071 | 2.68 | 0.78 | 126.51 | 0.01224 | 0.00361 | 0.58310 |

# Non-Road Mobile Source Emissions - Bexar County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Other Lawn and Garden Equipment - Pole Saw | 2265004076 | 0.04 | 0.00 | 0.75 | 0.00016 | 0.00002 | 0.00342 |
| Water Pumps | 2265006010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Commercial Mowers | 2270004046 | 7.24 | 1.68 | 306.42 | 0.03317 | 0.00784 | 1.43047 |
| Lawn and Garden Tractors | 2270004056 | 0.18 | 0.93 | 0.58 | 0.00089 | 0.00449 | 0.00279 |
| Chippers/ Stump/ Grinders/ Mulchers | 2270004066 | 0.40 | 3.14 | 1.61 | 0.00194 | 0.01529 | 0.00784 |
| Commercial Turf Equipment/ Sod Cutters | 2270004071 | 0.17 | 1.34 | 0.60 | 0.00082 | 0.00655 | 0.00291 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.08 | 0.52 | 0.31 | 0.00041 | 0.00253 | 0.00150 |
| Shredders | 2270007010 | 0.06 | 0.20 | 0.22 | 0.00023 | 0.00077 | 0.00085 |
| **TOTAL** | | **180.08** | **12.76** | **1,363.10** | **0.81359** | **0.06068** | **6.36825** |

**Agricultural Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4-Str Tractor - Corn | 2265005015 | 0.00 | 0.00 | 0.14 | 0.00001 | 0.00001 | 0.00039 |
| 4-Str Tractor - Hay | 2265005015 | 0.00 | 0.00 | 0.05 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Peanuts | 2265005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Sorghum | 2265005015 | 0.00 | 0.00 | 0.06 | 0.00001 | 0.00002 | 0.00055 |
| 4-Str Tractor - Cotton | 2265005015 | 0.00 | 0.00 | 0.06 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Small Grains | 2265005015 | 0.00 | 0.00 | 0.00 | 0.00002 | 0.00002 | 0.00056 |
| Dsl Tractor - Corn | 2270005015 | 0.56 | 4.67 | 2.81 | 0.00158 | 0.01175 | 0.00777 |
| Dsl Tractor - Hay | 2270005015 | 0.20 | 1.69 | 1.02 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Peanuts | 2270005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Sorghum | 2270005015 | 0.23 | 1.92 | 1.15 | 0.00223 | 0.01659 | 0.01097 |
| Dsl Tractor - Cotton | 2270005015 | 0.25 | 2.05 | 1.24 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Small Grains | 2270005015 | 0.00 | 0.00 | 0.00 | 0.00227 | 0.01688 | 0.01116 |
| Dsl Combine - Corn | 2270005020 | 0.24 | 3.70 | 1.30 | 0.00201 | 0.02870 | 0.00762 |
| Dsl Combine - Hay | 2270005020 | 0.04 | 0.54 | 0.19 | 0.00030 | 0.00422 | 0.00112 |
| Dsl Combine - Peanuts | 2270005020 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Combine - Sorghum | 2270005020 | 0.24 | 3.62 | 1.27 | 0.00210 | 0.03009 | 0.00799 |
| Dsl Combine - Cotton | 2270005020 | 0.26 | 3.88 | 1.36 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Combine - Small Grains | 2270005020 | 0.00 | 0.00 | 0.00 | 0.00196 | 0.02805 | 0.00745 |
| 2-Str Sprayers | 2260005035 | 0.00 | 0.00 | 0.00 | 0.00093 | 0.00000 | 0.00201 |
| 2-Str Hydro Power Units | 2260005050 | 0.00 | 0.00 | 0.00 | 0.00012 | 0.00000 | 0.00028 |
| 4-Str Balers | 2265005025 | 0.00 | 0.00 | 0.00 | 0.00037 | 0.00031 | 0.00703 |
| 4-Str Agricultural Mowers | 2265005030 | 0.00 | 0.00 | 0.00 | 0.00012 | 0.00003 | 0.00578 |
| 4-Str Sprayers | 2265005035 | 0.00 | 0.00 | 0.02 | 0.00184 | 0.00052 | 0.04965 |
| 4-Str Tillers > 6 HP | 2265005040 | 0.00 | 0.00 | 0.06 | 0.00386 | 0.00048 | 0.12895 |
| 4-Str Swathers | 2265005045 | 0.00 | 0.00 | 0.01 | 0.00054 | 0.00050 | 0.01114 |
| 4-Str Hydro Power Units | 2265005050 | 0.00 | 0.00 | 0.02 | 0.00100 | 0.00024 | 0.04501 |
| 4-Str Other Agriculture Equipment | 2265005055 | 0.00 | 0.00 | 0.01 | 0.00078 | 0.00060 | 0.02281 |
| 4-Str Irrigation Sets | 2265005060 | 0.00 | 0.00 | 0.01 | 0.00087 | 0.00086 | 0.02126 |
| LPG Hydro Power Units | 2267005050 | 0.00 | 0.00 | 0.00 | 0.00001 | 0.00003 | 0.00011 |
| LPG Other Agriculture Equipment | 2267005055 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00004 |
| LPG Irrigation Sets | 2267005060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00003 |
| CNG Hydro Power Units | 2268005050 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| CNG Other Agriculture Equipment | 2268005055 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00004 |
| CNG Irrigation Sets | 2268005060 | 0.00 | 0.00 | 0.00 | 0.00002 | 0.00104 | 0.00435 |
| Dsl - Balers | 2270005025 | 0.00 | 0.00 | 0.00 | 0.00006 | 0.00020 | 0.00016 |
| Dsl - Agricultural Mowers | 2270005030 | 0.00 | 0.00 | 0.00 | 0.00001 | 0.00004 | 0.00003 |
| Dsl - Sprayers | 2270005035 | 0.00 | 0.00 | 0.00 | 0.00087 | 0.00327 | 0.00237 |
| Dsl - Tillers > 6 HP | 2270005040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00000 |
| Dsl - Swathers | 2270005045 | 0.00 | 0.00 | 0.00 | 0.00038 | 0.00371 | 0.00149 |
| Dsl - Hydro Power Units | 2270005050 | 0.00 | 0.00 | 0.00 | 0.00012 | 0.00083 | 0.00040 |
| Dsl - Other Agriculture Equipment | 2270005055 | 0.00 | 0.00 | 0.00 | 0.00128 | 0.00930 | 0.00549 |
| Dsl - Irrigation Sets | 2270005060 | 0.00 | 0.00 | 0.00 | 0.00070 | 0.00567 | 0.00230 |
| **TOTAL** | | **2.03** | **22.10** | **10.80** | **0.02637** | **0.16399** | **0.36629** |
| TOTAL NONROAD SOURCES | | 5,966.00 | 7,714.78 | 66,465.17 | 26.07160 | 28.11765 | 289.84384 |

## Non-Road Mobile Source Emissions - Comal County, 2002

| COMAL COUNTY NON-ROAD MOBILE SOURCES | SCC Codes | VOC ton/year | NOx ton/year | CO ton/year | VOC ton/day M-F | NOx ton/day M-F | CO ton/day M-F |
|---|---|---|---|---|---|---|---|
| **Construction Equipment** | | | | | | | |
| 2-Str Tampers/Rammers | 2260002006 | 2.49 | 0.03 | 7.02 | 0.01158 | 0.00015 | 0.03272 |
| 2-Str Plate Compactors | 2260002009 | 0.14 | 0.00 | 0.33 | 0.00064 | 0.00000 | 0.00152 |
| 2-Str Paving Equipment | 2260002021 | 0.16 | 0.00 | 0.39 | 0.00076 | 0.00000 | 0.00181 |
| 2-Str Signal Boards/Light Plants | 2260002027 | 0.00 | 0.00 | 0.00 | 0.00001 | 0.00000 | 0.00001 |
| 2-Str Concrete/Industrial Saws | 2260002039 | 6.79 | 0.08 | 18.86 | 0.03166 | 0.00035 | 0.08797 |
| 2-Str Crushing/Proc. Equipment | 2260002054 | 0.03 | 0.00 | 0.08 | 0.00015 | 0.00000 | 0.00037 |
| 4-Str Pavers | 2265002003 | 0.13 | 0.06 | 6.22 | 0.00058 | 0.00024 | 0.02964 |
| 4-Str Tampers/Rammers | 2265002006 | 0.00 | 0.00 | 0.05 | 0.00000 | 0.00000 | 0.00023 |
| 4-Str Plate Compactors | 2265002009 | 0.49 | 0.07 | 11.47 | 0.00225 | 0.00029 | 0.05469 |
| 4-Str Rollers | 2265002015 | 0.21 | 0.10 | 11.79 | 0.00094 | 0.00042 | 0.05624 |
| 4-Str Paving Equipment | 2265002021 | 0.66 | 0.14 | 22.44 | 0.00298 | 0.00062 | 0.10702 |
| 4-Str Surfacing Equipment | 2265002024 | 0.25 | 0.06 | 10.18 | 0.00115 | 0.00025 | 0.04855 |
| 4-Str Signal Boards/Light Plants | 2265002027 | 0.02 | 0.00 | 0.52 | 0.00008 | 0.00001 | 0.00249 |
| 4-Str Trenchers | 2265002030 | 0.52 | 0.17 | 19.14 | 0.00236 | 0.00074 | 0.09126 |
| 4-Str Bore/Drill Rigs | 2265002033 | 0.29 | 0.05 | 5.60 | 0.00133 | 0.00024 | 0.02669 |
| 4-Str Concrete/Industrial Saws | 2265002039 | 0.76 | 0.29 | 48.05 | 0.00349 | 0.00126 | 0.22911 |
| 4-Str Cement & Mortar Mixers | 2265002042 | 0.71 | 0.12 | 19.75 | 0.00313 | 0.00049 | 0.09418 |
| 4-Str Cranes | 2265002045 | 0.03 | 0.03 | 0.80 | 0.00013 | 0.00012 | 0.00381 |
| 4-Str Crushing/Proc. Equipment | 2265002054 | 0.07 | 0.02 | 2.76 | 0.00031 | 0.00008 | 0.01317 |
| 4-Str Rough Terrain Forklift | 2265002057 | 0.04 | 0.05 | 1.05 | 0.00020 | 0.00021 | 0.00499 |
| 4-Str Rubber Tire Loaders | 2265002060 | 0.11 | 0.12 | 2.50 | 0.00048 | 0.00053 | 0.01192 |
| 4-Str Tractors/Loaders/Backhoes | 2265002066 | 0.24 | 0.09 | 14.71 | 0.00108 | 0.00039 | 0.07016 |
| 4-Str Skid Steer Loaders | 2265002072 | 0.18 | 0.13 | 6.62 | 0.00082 | 0.00056 | 0.03155 |
| 4-Str Dumpers/Tenders | 2265002078 | 0.09 | 0.02 | 3.08 | 0.00042 | 0.00008 | 0.01469 |
| 4-Str Other Construction Equipment | 2265002081 | 0.04 | 0.04 | 0.88 | 0.00017 | 0.00018 | 0.00420 |
| LPG-Pavers | 2267002003 | 0.01 | 0.04 | 0.15 | 0.00005 | 0.00017 | 0.00068 |
| LPG-Rollers | 2267002015 | 0.02 | 0.06 | 0.25 | 0.00008 | 0.00029 | 0.00116 |
| LPG-Paving Equipment | 2267002021 | 0.00 | 0.01 | 0.04 | 0.00001 | 0.00005 | 0.00018 |
| LPG-Surfacing Equipment | 2267002024 | 0.00 | 0.01 | 0.03 | 0.00001 | 0.00003 | 0.00012 |
| LPG-Trenchers | 2267002030 | 0.03 | 0.11 | 0.45 | 0.00014 | 0.00053 | 0.00210 |
| LPG-Bore/Drill Rigs | 2267002033 | 0.01 | 0.04 | 0.15 | 0.00005 | 0.00017 | 0.00069 |
| LPG-Concrete/Industrial Saws | 2267002039 | 0.03 | 0.11 | 0.43 | 0.00014 | 0.00050 | 0.00202 |
| LPG-Cranes | 2267002045 | 0.01 | 0.04 | 0.16 | 0.00005 | 0.00018 | 0.00073 |
| LPG-Crushing/Proc. Equipment | 2267002054 | 0.00 | 0.01 | 0.03 | 0.00001 | 0.00003 | 0.00012 |
| LPG-Rough Terrain Forklifts | 2267002057 | 0.02 | 0.07 | 0.29 | 0.00009 | 0.00033 | 0.00133 |
| LPG-Rubber Tire Loaders | 2267002060 | 0.05 | 0.18 | 0.71 | 0.00023 | 0.00083 | 0.00332 |
| LPG-Tractors/Loaders/Backhoes | 2267002066 | 0.01 | 0.02 | 0.08 | 0.00002 | 0.00009 | 0.00035 |
| LPG - Skid Steer Loaders | 2267002072 | 0.03 | 0.13 | 0.51 | 0.00016 | 0.00060 | 0.00237 |
| LPG-Other Construction Equipment | 2267002081 | 0.02 | 0.06 | 0.24 | 0.00007 | 0.00028 | 0.00110 |
| CNG-Other Construction Equipment | 2268002081 | 0.01 | 0.00 | 0.01 | 0.00004 | 0.00001 | 0.00004 |
| Dsl - Pavers | 2270002003 | 0.17 | 2.02 | 0.85 | 0.00080 | 0.00943 | 0.00396 |
| Dsl - Tampers/Rammers | 2270002006 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Plate Compactors | 2270002009 | 0.01 | 0.05 | 0.03 | 0.00004 | 0.00024 | 0.00014 |
| Dsl - Rollers | 2270002015 | 0.99 | 9.79 | 5.16 | 0.00460 | 0.04567 | 0.02408 |
| Dsl - Scrapers | 2270002018 | 0.06 | 0.87 | 0.43 | 0.00029 | 0.00406 | 0.00200 |
| Dsl - Paving Equipment | 2270002021 | 0.05 | 0.49 | 0.31 | 0.00025 | 0.00229 | 0.00147 |
| Dsl - Surfacing Equipment | 2270002024 | 0.78 | 8.30 | 5.11 | 0.00364 | 0.03871 | 0.02383 |
| Dsl - Signal Boards/Light Plants | 2270002027 | 0.18 | 1.03 | 0.63 | 0.00085 | 0.00482 | 0.00294 |
| Dsl - Trenchers | 2270002030 | 0.13 | 0.96 | 0.73 | 0.00061 | 0.00448 | 0.00340 |
| Dsl - Bore/Drill Rigs | 2270002033 | 0.63 | 8.32 | 2.18 | 0.00295 | 0.03880 | 0.01018 |
| Dsl - Excavators | 2270002036 | 2.16 | 26.85 | 11.52 | 0.01007 | 0.12522 | 0.05373 |
| Dsl - Concrete/Industrial Saws | 2270002039 | 0.04 | 0.31 | 0.24 | 0.00020 | 0.00144 | 0.00112 |
| Dsl - Cement & Mortar Mixers | 2270002042 | 0.01 | 0.03 | 0.02 | 0.00003 | 0.00014 | 0.00009 |
| Dsl - Cranes | 2270002045 | 0.41 | 5.13 | 1.37 | 0.00190 | 0.02394 | 0.00638 |
| Dsl - Graders | 2270002048 | 0.58 | 6.85 | 2.78 | 0.00270 | 0.03195 | 0.01297 |
| Dsl - Off-highway Trucks | 2270002051 | 0.41 | 4.80 | 2.19 | 0.00189 | 0.02237 | 0.01019 |
| Dsl - Crushing/Proc. Equipment | 2270002054 | 0.00 | 0.01 | 0.01 | 0.00001 | 0.00006 | 0.00004 |
| Dsl - Rough Terrain Forklifts | 2270002057 | 0.23 | 2.02 | 1.30 | 0.00108 | 0.00942 | 0.00607 |
| Dsl - Rubber Tire Loaders | 2270002060 | 1.24 | 16.32 | 5.59 | 0.00579 | 0.07610 | 0.02606 |
| Dsl - Tractors/Loaders/Backhoes | 2270002066 | 5.13 | 31.39 | 22.98 | 0.02391 | 0.14639 | 0.10716 |

## Non-Road Mobile Source Emissions - Comal County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Skid Steer Loaders | 2270002072 | 1.51 | 4.56 | 5.86 | 0.00705 | 0.02128 | 0.02734 |
| Dsl - Off-Highway Tractors | 2270002075 | 0.01 | 0.13 | 0.05 | 0.00004 | 0.00060 | 0.00025 |
| Dsl - Dumpers/Tenders | 2270002078 | 0.00 | 0.00 | 0.01 | 0.00001 | 0.00002 | 0.00003 |
| Dsl - Other Construction Equipment | 2270002081 | 0.27 | 2.68 | 1.63 | 0.00127 | 0.01251 | 0.00760 |
| **TOTAL** | | **29.70** | **135.47** | **288.76** | **0.13784** | **0.63125** | **1.36634** |

**Light Commercial Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Generator Sets | 2260006005 | 0.74 | 0.00 | 1.66 | 0.00235 | 0.00001 | 0.00527 |
| 2-Str Pumps | 2260006010 | 5.37 | 0.02 | 12.15 | 0.01699 | 0.00006 | 0.03853 |
| 2-Str Air Compressors | 2260006015 | 0.00 | 0.00 | 0.00 | 0.00001 | 0.00000 | 0.00001 |
| 4-Str Generator Sets | 2265006005 | 18.47 | 10.19 | 470.64 | 0.06669 | 0.03873 | 1.78875 |
| 4-Pumps | 2265006010 | 4.50 | 0.49 | 99.03 | 0.01667 | 0.00185 | 0.37118 |
| 4-Str Air Compressors | 2265006015 | 1.94 | 0.47 | 51.71 | 0.00718 | 0.00174 | 0.19370 |
| 4-Str Welders | 2265006025 | 4.25 | 2.75 | 176.23 | 0.01464 | 0.00972 | 0.62335 |
| 4-Str Pressure Washers | 2265006030 | 7.56 | 1.78 | 243.69 | 0.02561 | 0.00624 | 0.85355 |
| LPG-Generator Sets | 2267006005 | 0.09 | 0.47 | 1.20 | 0.00035 | 0.00178 | 0.00458 |
| LPG-Pumps | 2267006010 | 0.09 | 0.42 | 1.13 | 0.00027 | 0.00132 | 0.00359 |
| LPG-Air Compressors | 2267006015 | 0.10 | 0.51 | 1.38 | 0.00033 | 0.00160 | 0.00439 |
| LPG-Welders | 2267006025 | 0.15 | 0.56 | 2.22 | 0.00056 | 0.00207 | 0.00818 |
| LPG-Pressure Washers | 2267006030 | 0.00 | 0.01 | 0.03 | 0.00001 | 0.00003 | 0.00010 |
| CNG-Generator Sets | 2268006005 | 0.02 | 2.01 | 5.49 | 0.00008 | 0.00638 | 0.01741 |
| CNG-Pumps | 2268006010 | 0.00 | 0.03 | 0.08 | 0.00000 | 0.00009 | 0.00025 |
| CNG-Air Compressors | 2268006015 | 0.00 | 0.12 | 0.35 | 0.00001 | 0.00047 | 0.00133 |
| CNG-Gas Compressors | 2268006020 | 0.03 | 1.47 | 6.59 | 0.00008 | 0.00467 | 0.02089 |
| Dsl-Generator Sets | 2270006005 | 6.01 | 43.55 | 24.02 | 0.02283 | 0.16531 | 0.09119 |
| Dsl-Pumps | 2270006010 | 0.01 | 0.05 | 0.03 | 0.00003 | 0.00020 | 0.00012 |
| Dsl-Air Compressors | 2270006015 | 0.48 | 3.89 | 1.79 | 0.00183 | 0.01476 | 0.00678 |
| Dsl-Gas Compressors | 2270006020 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl-Welders | 2270006025 | 1.04 | 2.22 | 3.61 | 0.00397 | 0.00846 | 0.01375 |
| Dsl-Pressure Washers | 2270006030 | 0.01 | 0.06 | 0.04 | 0.00005 | 0.00024 | 0.00015 |
| **TOTAL** | | **50.89** | **71.08** | **1,103.09** | **0.18055** | **0.26572** | **4.04705** |

**Industrial Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Sweepers/Scrubbers | 2260003030 | 0.07 | 0.00 | 0.15 | 0.00021 | 0.00000 | 0.00049 |
| 2-Str Other General Industrial Eqp | 2260003040 | 0.00 | 0.00 | 0.01 | 0.00001 | 0.00000 | 0.00003 |
| 4-Str Aerial Lifts | 2265003010 | 3.20 | 3.26 | 83.02 | 0.01189 | 0.01240 | 0.31574 |
| 4-Str Forklifts | 2265003020 | 0.55 | 0.56 | 13.02 | 0.00170 | 0.00180 | 0.04159 |
| 4-Str Sweepers/Scrubbers | 2265003030 | 0.61 | 0.49 | 18.63 | 0.00202 | 0.00166 | 0.06337 |
| 4-Str Other General Industrial Eqp | 2265003040 | 1.12 | 0.18 | 29.62 | 0.00351 | 0.00058 | 0.09391 |
| 4-Str Other Material Handling Eqp | 2265003050 | 0.03 | 0.02 | 1.00 | 0.00009 | 0.00007 | 0.00317 |
| 4-Str AC\Refrigeration | 2265003060 | 0.02 | 0.00 | 0.94 | 0.00004 | 0.00001 | 0.00254 |
| 4-Str Terminal Tractors | 2265003070 | 0.11 | 0.12 | 2.79 | 0.00036 | 0.00038 | 0.00883 |
| 4-Str Other Oil Field Eqp | 2265010010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG-Aerial Lifts | 2267003010 | 0.13 | 0.48 | 1.92 | 0.00041 | 0.00153 | 0.00608 |
| LPG - Forklifts | 2267003020 | 16.59 | 61.13 | 245.03 | 0.05670 | 0.20898 | 0.83768 |
| LPG - Sweepers/Scrubbers | 2267003030 | 0.47 | 1.68 | 7.10 | 0.00139 | 0.00494 | 0.02082 |
| LPG-Other General Industrial Equipment | 2267003040 | 0.03 | 0.11 | 0.43 | 0.00009 | 0.00034 | 0.00135 |
| LPG - Other Material Handling Equipmen | 2267003050 | 0.01 | 0.03 | 0.10 | 0.00002 | 0.00008 | 0.00032 |
| LPG - Terminal Tractors | 2267003070 | 0.06 | 0.22 | 0.87 | 0.00019 | 0.00069 | 0.00275 |
| CNG-Forklifts | 2268003020 | 0.05 | 3.33 | 13.30 | 0.00017 | 0.01057 | 0.04218 |
| CNG - Sweepers/Scrubbers | 2268003030 | 0.00 | 0.00 | 0.02 | 0.00000 | 0.00001 | 0.00005 |
| CNG-Other General Industrial Equipment | 2268003040 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00003 |
| CNG-AC\Refrigeration | 2268003060 | 0.00 | 0.01 | 0.04 | 0.00000 | 0.00003 | 0.00011 |
| CNG-Terminal Tractors | 2268003070 | 0.00 | 0.02 | 0.06 | 0.00000 | 0.00005 | 0.00020 |
| CNG-Other Oil Field Eqp | 2268010010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Aerial Lifts | 2270003010 | 0.42 | 2.03 | 1.42 | 0.00153 | 0.00732 | 0.00513 |
| Dsl - Forklifts | 2270003020 | 0.30 | 3.12 | 1.53 | 0.00113 | 0.01163 | 0.00573 |
| Dsl - Sweepers/Scrubbers | 2270003030 | 0.35 | 4.60 | 1.09 | 0.00133 | 0.01750 | 0.00416 |
| Dsl - Other General Industrial Eqp | 2270003040 | 0.84 | 11.30 | 3.18 | 0.00265 | 0.03581 | 0.01009 |
| Dsl - Other Material Handling Eqp | 2270003050 | 0.01 | 0.03 | 0.05 | 0.00004 | 0.00009 | 0.00014 |
| Dsl - AC\Refrigertion | 2270003060 | 0.81 | 4.83 | 2.84 | 0.00219 | 0.01313 | 0.00772 |
| Dsl - Terminal Tractors | 2270003070 | 0.65 | 15.01 | 5.15 | 0.00210 | 0.04819 | 0.01654 |

## Non-Road Mobile Source Emissions - Comal County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Other Oil Field Eqp | 2270010010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **26.42** | **112.56** | **433.32** | **0.08979** | **0.37780** | **1.49077** |

**Railroad Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Railway Maintenance | 2285002015 | 0.17 | 0.86 | 0.73 | 0.00294 | 0.00000 | 0.00252 |
| 4-Str Railway Maintenance | 2285004015 | 0.04 | 0.01 | 1.84 | 0.00004 | 0.00000 | 0.00644 |
| LPG Railway Maintenance | 2285006015 | 0.00 | 0.00 | 0.01 | 0.00001 | 0.00000 | 0.00003 |
| Railroad | 2285002000 | 21.12 | 497.29 | 53.94 | 0.05787 | 1.49206 | 0.14779 |
| **TOTAL** | | **21.34** | **498.16** | **56.53** | **0.06085** | **1.49206** | **0.15678** |

**Mining Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Graders | 2270002048 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Off Highway Trucks | 2270002051 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Proc. Equipment | 2270002054 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Crawler Tractor/Dozers | 2270002069 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Quarry Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Scrapers | 2270002018 | 0.83 | 12.08 | 5.41 | 0.00248 | 0.03633 | 0.01629 |
| Dsl - Excavators | 2270002036 | 1.83 | 24.15 | 9.02 | 0.00552 | 0.07264 | 0.02715 |
| Dsl - Graders | 2270002048 | 0.17 | 2.26 | 0.79 | 0.00051 | 0.00681 | 0.00237 |
| Dsl - Off Highway Trucks | 2270002051 | 10.22 | 147.54 | 61.82 | 0.03075 | 0.44383 | 0.18598 |
| Dsl - Rubber Tire Loaders | 2270002060 | 9.56 | 118.23 | 54.06 | 0.02874 | 0.35566 | 0.16262 |
| Dsl - Tractors/Loaders/Backhoes | 2270002066 | 2.86 | 12.37 | 11.55 | 0.00861 | 0.03720 | 0.03475 |
| Dsl - Crawler Tractors/Dozers | 2270002069 | 1.49 | 19.19 | 8.33 | 0.00449 | 0.05773 | 0.02504 |
| **TOTAL** | | **26.96** | **335.82** | **150.99** | **0.08110** | **1.01020** | **0.45420** |

**Landfill Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Pavers | 2270002003 | 0.27 | 5.89 | 1.96 | 0.00111 | 0.02420 | 0.00807 |
| Dsl - Scrapers | 2270002018 | 0.16 | 3.29 | 1.06 | 0.00065 | 0.01351 | 0.00435 |
| Dsl - Excavators | 2270002036 | 0.01 | 0.22 | 0.05 | 0.00006 | 0.00089 | 0.00020 |
| Dsl - Graders | 2270002048 | 0.04 | 0.54 | 0.15 | 0.00016 | 0.00224 | 0.00063 |
| Dsl - Off Highway Trucks | 2270002051 | 0.05 | 0.66 | 0.17 | 0.00019 | 0.00272 | 0.00071 |
| Dsl - Rubber Tire Loaders | 2270002060 | 0.06 | 0.86 | 0.22 | 0.00025 | 0.00354 | 0.00092 |
| Dsl - Crawler Tractors/Dozers | 2270002069 | 0.28 | 4.39 | 1.18 | 0.00117 | 0.01805 | 0.00484 |
| Dsl - Other Const. Equipment | 2270002081 | 0.15 | 2.27 | 0.52 | 0.00062 | 0.00931 | 0.00215 |
| **TOTAL** | | **1.02** | **18.12** | **5.32** | **0.00420** | **0.07446** | **0.02185** |

**Recreational Boating**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Outboard | 2282005010 | 56.73 | 1.24 | 111.65 | 0.12959 | 0.00273 | 0.24490 |
| Personal Water Craft | 2282005015 | 24.94 | 0.35 | 48.59 | 0.05512 | 0.00077 | 0.10659 |
| Inboard/Sterndrive | 2282010005 | 4.57 | 1.95 | 53.96 | 0.01153 | 0.00393 | 0.12101 |
| Inboard/Sterndrive | 2282020005 | 0.13 | 3.55 | 0.56 | 0.00029 | 0.00779 | 0.00124 |
| Outboards | 2282020010 | 0.00 | 0.00 | 0.01 | 0.00001 | 0.00003 | 0.00002 |
| **TOTAL** | | **86.38** | **7.10** | **214.78** | **0.19654** | **0.01525** | **0.47376** |

**Recreational Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Offroad Motorcycles | 2260001010 | 180.40 | 0.43 | 172.50 | 0.56306 | 0.00136 | 0.53866 |
| 2-Str ATVs | 2260001030 | 181.18 | 0.44 | 173.50 | 0.56545 | 0.00137 | 0.54179 |
| 2-Str Specialty Vehicles / Carts | 2260001060 | 2.92 | 0.66 | 108.02 | 0.00896 | 0.00205 | 0.33731 |
| 4-Str Offroad Motorcycles | 2265001010 | 5.41 | 0.62 | 76.34 | 0.01661 | 0.00177 | 0.24371 |
| 4-Str ATVs | 2265001030 | 48.80 | 5.58 | 687.04 | 0.15001 | 0.01602 | 2.19336 |
| 4-Str Golf Carts | 2265001050 | 1.90 | 0.59 | 127.04 | 0.00587 | 0.00170 | 0.40558 |
| 4-Str Specialty Vehicles / Carts | 2265001060 | 3.04 | 0.58 | 96.03 | 0.00937 | 0.00167 | 0.30658 |
| LPG Specialty Vehicles / Carts | 2267001060 | 0.06 | 0.23 | 0.91 | 0.00019 | 0.00071 | 0.00283 |
| Dsl- Specialty Vehicle Carts | 2270001060 | 0.88 | 2.45 | 3.42 | 0.00273 | 0.00764 | 0.01069 |

## Non-Road Mobile Source Emissions - Comal County, 2002

| | | | | | | |
|---|---|---|---|---|---|---|
| **TOTAL** | | **424.59** | **11.58** | **1,444.80** | **1.32226** | **0.03428** | **4.58051** |

**Residential Lawn & Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Res) | 2260004015 | 3.22 | 0.01 | 6.62 | 0.01700 | 0.00004 | 0.03379 |
| 2-Str Chain Saws < 6 HP (Res) | 2260004020 | 46.27 | 0.11 | 85.01 | 0.24417 | 0.00055 | 0.43372 |
| 2-Str Trimmers/Edgers/Brush Cutter (Res) | 2260004025 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Leafblowers/Vacuums (Res) | 2260004030 | 26.94 | 0.07 | 54.14 | 0.14239 | 0.00036 | 0.27621 |
| 4-Str Lawn Mowers (Res) | 2265004010 | 75.73 | 5.99 | 1,024.21 | 0.35813 | 0.02806 | 5.34234 |
| 4-Str Rotary Tillers <6 HP (Res) | 2265004015 | 8.73 | 0.66 | 111.60 | 0.04129 | 0.00308 | 0.58210 |
| 4-Str Trimmers/Edgers/Brush Cutters (Res) | 2265004025 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Leafblowers/Vacuums (Res) | 2265004030 | 0.72 | 0.06 | 9.78 | 0.00341 | 0.00027 | 0.05100 |
| 4-Str Rear Engine Riding Mower (Res) | 2265004040 | 4.33 | 1.07 | 167.73 | 0.02060 | 0.00502 | 0.87489 |
| 4-Str Lawn & Garden Tractors (Res) | 2265004055 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Other Lawn & Garden Equip. (Res) | 2265004075 | 31.10 | 3.60 | 642.37 | 0.14735 | 0.01689 | 3.35064 |
| **TOTAL** | | **197.05** | **11.57** | **2,101.45** | **0.97433** | **0.05428** | **10.94469** |

**Commercial Lawn & Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 0.09 | 0.00 | 0.19 | 0.00045 | 0.00000 | 0.00094 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 85.42 | 0.79 | 205.30 | 0.31431 | 0.00291 | 0.75527 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 37.30 | 0.15 | 80.36 | 0.18619 | 0.00073 | 0.40126 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 23.32 | 0.16 | 55.70 | 0.11637 | 0.00078 | 0.27813 |
| 2-Str Commercial Turf Equipment (Com) | 2260004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 6.00 | 0.51 | 89.86 | 0.02967 | 0.00234 | 0.45874 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.23 | 0.02 | 3.27 | 0.00112 | 0.00009 | 0.01669 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.40 | 0.04 | 7.20 | 0.00197 | 0.00019 | 0.03676 |
| 4-Str Leafblowers/Vacuums (Com) | 2265004031 | 4.72 | 1.80 | 195.00 | 0.02341 | 0.00825 | 0.99549 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 0.75 | 0.25 | 43.27 | 0.00370 | 0.00114 | 0.22091 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.41 | 0.10 | 17.00 | 0.00197 | 0.00048 | 0.08681 |
| 4-Str Shredders < 6 HP (Com) | 2265004051 | 0.22 | 0.02 | 3.05 | 0.00106 | 0.00008 | 0.01559 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 0.32 | 0.11 | 18.21 | 0.00160 | 0.00049 | 0.09297 |
| 4-Str Chippers/Stump Grinders (Com) | 2265004066 | 1.88 | 1.29 | 86.92 | 0.00921 | 0.00590 | 0.44371 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.03 | 0.01 | 1.31 | 0.00014 | 0.00004 | 0.00669 |
| 4-Str Other Lawn & Garden Equip. (Com) | 2265004076 | 0.95 | 0.11 | 19.55 | 0.00441 | 0.00051 | 0.09978 |
| LPG Chippers/Stump Grinders (Com) | 2267004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Leafblowers/Vacuums (Com) | 2270004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.61 | 3.05 | 1.93 | 0.00302 | 0.01523 | 0.00965 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.01 | 0.03 | 0.02 | 0.00003 | 0.00016 | 0.00010 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.32 | 2.54 | 1.30 | 0.00161 | 0.01268 | 0.00650 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.00 | 0.01 | 0.00 | 0.00001 | 0.00004 | 0.00002 |
| **TOTAL** | | **162.98** | **10.98** | **829.46** | **0.70026** | **0.05205** | **3.92601** |

**University/Colleges Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Commercial Turf Equipment (Com) | 2260004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractors/Loaders/Backhoe | 2265002066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Leafblowers/Vacuums (Com) | 2265004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Shredders < 6 HP (Com) | 2265004051 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Chippers/Stump Grinders (Com) | 2265004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Other Lawn & Garden Equip. (Com) | 2265004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |

## Non-Road Mobile Source Emissions - Comal County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4-Str Tillers > 6 HP | 2265005040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG Chippers/Stump Grinders (Com) | 2267004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Shredders > 6 HP | 2265007010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Leafblowers/Vacuums (Com) | 2270004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Shredders > 6 HP | 2270007010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Public Schools Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 0.00 | 0.00 | 0.01 | 0.00002 | 0.00000 | 0.00006 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 0.28 | 0.00 | 0.55 | 0.00105 | 0.00000 | 0.00209 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 9.09 | 0.03 | 19.17 | 0.04690 | 0.00014 | 0.09898 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 1.73 | 0.01 | 3.77 | 0.00890 | 0.00003 | 0.01948 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.70 | 0.06 | 10.71 | 0.00360 | 0.00029 | 0.05652 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.01 | 0.00 | 0.16 | 0.00006 | 0.00000 | 0.00085 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 0.24 | 0.08 | 13.28 | 0.00121 | 0.00038 | 0.07010 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.23 | 0.05 | 8.99 | 0.00115 | 0.00022 | 0.04743 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 1.24 | 0.10 | 20.01 | 0.00632 | 0.00050 | 0.10563 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.05 | 0.06 | 1.20 | 0.00026 | 0.00028 | 0.00632 |
| 4-Str Shredders > 6 HP | 2265007010 | 0.24 | 0.04 | 7.90 | 0.00089 | 0.00013 | 0.03074 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.02 | 0.11 | 0.07 | 0.00012 | 0.00059 | 0.00037 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.05 | 0.27 | 0.17 | 0.00027 | 0.00138 | 0.00085 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.01 | 0.02 | 0.02 | 0.00003 | 0.00012 | 0.00009 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.00 | 0.02 | 0.01 | 0.00002 | 0.00011 | 0.00006 |
| Dsl - Shredders > 6 HP | 2270007010 | 0.02 | 0.12 | 0.13 | 0.00008 | 0.00047 | 0.00048 |
| **TOTAL** | | **13.91** | **0.97** | **86.13** | **0.07089** | **0.00464** | **0.44005** |

**Golf Courses Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 0.04 | 0.00 | 0.09 | 0.00012 | 0.00000 | 0.00031 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 0.34 | 0.00 | 0.71 | 0.00152 | 0.00000 | 0.00321 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 0.54 | 0.00 | 1.19 | 0.00245 | 0.00001 | 0.00535 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.03 | 0.00 | 0.46 | 0.00014 | 0.00001 | 0.00210 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.00 | 0.00 | 0.06 | 0.00002 | 0.00000 | 0.00028 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.14 | 0.05 | 8.34 | 0.00064 | 0.00020 | 0.03837 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.77 | 0.80 | 17.07 | 0.00335 | 0.00332 | 0.07856 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.82 | 0.29 | 54.88 | 0.00363 | 0.00119 | 0.25253 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.09 | 0.41 | 0.28 | 0.00042 | 0.00184 | 0.00126 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.05 | 0.21 | 0.14 | 0.00021 | 0.00093 | 0.00062 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.00 | 0.02 | 0.01 | 0.00001 | 0.00009 | 0.00004 |
| **TOTAL** | | **2.83** | **1.78** | **83.23** | **0.01250** | **0.00759** | **0.38262** |

**Government Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rotary Tillers <6 HP | 2260004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Chain Saws | 2260004021 | 2.83 | 0.03 | 6.80 | 0.01066 | 0.00010 | 0.02560 |
| Trimmers/ Edgers/ Brush Cutters | 2260004026 | 2.42 | 0.01 | 5.21 | 0.01180 | 0.00005 | 0.02542 |
| Leaf Blowers/ Vacuums | 2260004031 | 5.80 | 0.04 | 13.82 | 0.02366 | 0.00016 | 0.05649 |
| 4-Str Concrete/Industrial Saws | 2265002039 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Lawn Mowers | 2265004011 | 0.23 | 0.02 | 3.50 | 0.00110 | 0.00009 | 0.01701 |
| Rotary Tillers | 2265004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Trimmers/ Edgers/ Brush Cutters | 2265004026 | 0.01 | 0.00 | 0.27 | 0.00007 | 0.00001 | 0.00131 |
| Leaf Blowers / Vacuums | 2265004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Rear Engine Riding Mowers | 2265004041 | 0.04 | 0.01 | 2.49 | 0.00021 | 0.00006 | 0.01213 |
| Front Mowers | 2265004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Lawn and Garden Tractors | 2265004056 | 0.32 | 0.10 | 18.16 | 0.00105 | 0.00032 | 0.06117 |
| Chippers/ Stump/ Grinders/ Mulchers | 2265004066 | 0.05 | 0.03 | 2.18 | 0.00022 | 0.00014 | 0.01063 |
| Commercial Turf Equipment/ Sod Cutters | 2265004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |

## Non-Road Mobile Source Emissions - Comal County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Other Lawn and Garden Equipment - Pole Saw | 2265004076 | 0.00 | 0.00 | 0.08 | 0.00002 | 0.00000 | 0.00041 |
| Water Pumps | 2265006010 | 0.05 | 0.01 | 1.43 | 0.00021 | 0.00004 | 0.00550 |
| Commercial Mowers | 2270004046 | 0.02 | 0.00 | 0.83 | 0.00009 | 0.00002 | 0.00402 |
| Lawn and Garden Tractors | 2270004056 | 0.00 | 0.02 | 0.01 | 0.00002 | 0.00010 | 0.00006 |
| Chippers/ Stump/ Grinders/ Mulchers | 2270004066 | 0.00 | 0.01 | 0.01 | 0.00001 | 0.00006 | 0.00003 |
| Commercial Turf Equipment/ Sod Cutters | 2270004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Shredders | 2270007010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **11.78** | **0.28** | **54.79** | **0.04912** | **0.00115** | **0.21980** |

**Agricultural Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4-Str Tractor - Corn | 2265005015 | 0.00 | 0.00 | 0.04 | 0.00000 | 0.00000 | 0.00010 |
| 4-Str Tractor - Hay | 2265005015 | 0.00 | 0.00 | 0.08 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Peanuts | 2265005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Sorghum | 2265005015 | 0.00 | 0.00 | 0.03 | 0.00001 | 0.00001 | 0.00018 |
| 4-Str Tractor - Cotton | 2265005015 | 0.00 | 0.00 | 0.05 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Small Grains | 2265005015 | 0.00 | 0.00 | 0.00 | 0.00001 | 0.00001 | 0.00031 |
| Dsl Tractor - Corn | 2270005015 | 0.15 | 1.22 | 0.73 | 0.00041 | 0.00307 | 0.00203 |
| Dsl Tractor - Hay | 2270005015 | 0.32 | 2.63 | 1.59 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Peanuts | 2270005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Sorghum | 2270005015 | 0.13 | 1.05 | 0.63 | 0.00073 | 0.00541 | 0.00358 |
| Dsl Tractor - Cotton | 2270005015 | 0.19 | 1.60 | 0.96 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Small Grains | 2270005015 | 0.00 | 0.00 | 0.00 | 0.00125 | 0.00925 | 0.00612 |
| Dsl Combine - Corn | 2270005020 | 0.06 | 0.97 | 0.34 | 0.00052 | 0.00750 | 0.00199 |
| Dsl Combine - Hay | 2270005020 | 0.06 | 0.85 | 0.30 | 0.00046 | 0.00658 | 0.00175 |
| Dsl Combine - Peanuts | 2270005020 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Combine - Sorghum | 2270005020 | 0.13 | 1.98 | 0.69 | 0.00069 | 0.00981 | 0.00261 |
| Dsl Combine - Cotton | 2270005020 | 0.08 | 1.27 | 0.44 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Combine - Small Grains | 2270005020 | 0.00 | 0.00 | 0.00 | 0.00108 | 0.01538 | 0.00408 |
| 2-Str Sprayers | 2260005035 | 0.03 | 0.00 | 0.07 | 0.00014 | 0.00000 | 0.00030 |
| 2-Str Hydro Power Units | 2260005050 | 0.00 | 0.00 | 0.01 | 0.00002 | 0.00000 | 0.00004 |
| 4-Str Balers | 2265005025 | 0.01 | 0.01 | 0.25 | 0.00006 | 0.00005 | 0.00106 |
| 4-Str Agricultural Mowers | 2265005030 | 0.00 | 0.00 | 0.20 | 0.00002 | 0.00000 | 0.00087 |
| 4-Str Sprayers | 2265005035 | 0.07 | 0.02 | 1.73 | 0.00028 | 0.00008 | 0.00746 |
| 4-Str Tillers > 6 HP | 2265005040 | 0.14 | 0.02 | 4.50 | 0.00058 | 0.00007 | 0.01937 |
| 4-Str Swathers | 2265005045 | 0.02 | 0.02 | 0.39 | 0.00008 | 0.00007 | 0.00167 |
| 4-Str Hydro Power Units | 2265005050 | 0.04 | 0.01 | 1.57 | 0.00015 | 0.00004 | 0.00676 |
| 4-Str Other Agriculture Equipment | 2265005055 | 0.03 | 0.02 | 0.80 | 0.00012 | 0.00009 | 0.00343 |
| 4-Str Irrigation Sets | 2265005060 | 0.03 | 0.03 | 0.74 | 0.00013 | 0.00013 | 0.00319 |
| LPG Hydro Power Units | 2267005050 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00002 |
| LPG Other Agriculture Equipment | 2267005055 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| LPG Irrigation Sets | 2267005060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| CNG Hydro Power Units | 2268005050 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| CNG Other Agriculture Equipment | 2268005055 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| CNG Irrigation Sets | 2268005060 | 0.00 | 0.04 | 0.15 | 0.00000 | 0.00016 | 0.00065 |
| Dsl - Balers | 2270005025 | 0.00 | 0.01 | 0.01 | 0.00001 | 0.00003 | 0.00002 |
| Dsl - Agricultural Mowers | 2270005030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00000 |
| Dsl - Sprayers | 2270005035 | 0.03 | 0.11 | 0.08 | 0.00013 | 0.00049 | 0.00036 |
| Dsl - Tillers > 6 HP | 2270005040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Swathers | 2270005045 | 0.01 | 0.13 | 0.05 | 0.00006 | 0.00056 | 0.00022 |
| Dsl - Hydro Power Units | 2270005050 | 0.00 | 0.03 | 0.01 | 0.00002 | 0.00012 | 0.00006 |
| Dsl - Other Agriculture Equipment | 2270005055 | 0.04 | 0.32 | 0.19 | 0.00019 | 0.00140 | 0.00082 |
| Dsl - Irrigation Sets | 2270005060 | 0.02 | 0.20 | 0.08 | 0.00011 | 0.00085 | 0.00035 |
| **TOTAL** | | **1.62** | **12.54** | **16.73** | **0.00723** | **0.06118** | **0.06941** |
| TOTAL NONROAD SOURCES | | 1,057.44 | 1,227.99 | 6,869.38 | 3.88747 | 4.08192 | 28.57385 |

## Non-Road Mobile Source Emissions - Frio County, 2002

| FRIO COUNTY NON-ROAD MOBILE SOURCES | SCC Codes | VOC ton/year | NOx ton/year | CO ton/year | VOC ton/day M-F | NOx ton/day M-F | CO ton/day M-F |
|---|---|---|---|---|---|---|---|
| **Construction Equipment** | | | | | | | |
| 2-Str Tampers/Rammers | 2260002006 | 0.40 | 0.00 | 1.12 | 0.00184 | 0.00002 | 0.00520 |
| 2-Str Plate Compactors | 2260002009 | 0.02 | 0.00 | 0.05 | 0.00010 | 0.00000 | 0.00024 |
| 2-Str Paving Equipment | 2260002021 | 0.03 | 0.00 | 0.06 | 0.00012 | 0.00000 | 0.00029 |
| 2-Str Signal Boards/Light Plants | 2260002027 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Concrete/Industrial Saws | 2260002039 | 1.08 | 0.01 | 3.00 | 0.00504 | 0.00006 | 0.01398 |
| 2-Str Crushing/Proc. Equipment | 2260002054 | 0.01 | 0.00 | 0.01 | 0.00002 | 0.00000 | 0.00006 |
| 4-Str Pavers | 2265002003 | 0.02 | 0.01 | 0.99 | 0.00009 | 0.00004 | 0.00471 |
| 4-Str Tampers/Rammers | 2265002006 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00000 | 0.00004 |
| 4-Str Plate Compactors | 2265002009 | 0.08 | 0.01 | 1.82 | 0.00036 | 0.00005 | 0.00869 |
| 4-Str Rollers | 2265002015 | 0.03 | 0.02 | 1.87 | 0.00015 | 0.00007 | 0.00894 |
| 4-Str Paving Equipment | 2265002021 | 0.10 | 0.02 | 3.57 | 0.00048 | 0.00010 | 0.01701 |
| 4-Str Surfacing Equipment | 2265002024 | 0.04 | 0.01 | 1.62 | 0.00018 | 0.00004 | 0.00772 |
| 4-Str Signal Boards/Light Plants | 2265002027 | 0.00 | 0.00 | 0.08 | 0.00001 | 0.00000 | 0.00040 |
| 4-Str Trenchers | 2265002030 | 0.08 | 0.03 | 3.04 | 0.00038 | 0.00012 | 0.01451 |
| 4-Str Bore/Drill Rigs | 2265002033 | 0.05 | 0.01 | 0.89 | 0.00021 | 0.00004 | 0.00424 |
| 4-Str Concrete/Industrial Saws | 2265002039 | 0.12 | 0.05 | 7.64 | 0.00056 | 0.00020 | 0.03642 |
| 4-Str Cement & Mortar Mixers | 2265002042 | 0.11 | 0.02 | 3.14 | 0.00051 | 0.00008 | 0.01497 |
| 4-Str Cranes | 2265002045 | 0.00 | 0.00 | 0.13 | 0.00002 | 0.00002 | 0.00061 |
| 4-Str Crushing/Proc. Equipment | 2265002054 | 0.01 | 0.00 | 0.44 | 0.00005 | 0.00001 | 0.00209 |
| 4-Str Rough Terrain Forklift | 2265002057 | 0.01 | 0.01 | 0.17 | 0.00003 | 0.00003 | 0.00079 |
| 4-Str Rubber Tire Loaders | 2265002060 | 0.02 | 0.02 | 0.40 | 0.00008 | 0.00008 | 0.00190 |
| 4-Str Tractors/Loaders/Backhoes | 2265002066 | 0.04 | 0.01 | 2.34 | 0.00017 | 0.00006 | 0.01115 |
| 4-Str Skid Steer Loaders | 2265002072 | 0.03 | 0.02 | 1.05 | 0.00013 | 0.00009 | 0.00502 |
| 4-Str Dumpers/Tenders | 2265002078 | 0.01 | 0.00 | 0.49 | 0.00007 | 0.00001 | 0.00233 |
| 4-Str Other Construction Equipment | 2265002081 | 0.01 | 0.01 | 0.14 | 0.00003 | 0.00003 | 0.00067 |
| LPG-Pavers | 2267002003 | 0.00 | 0.01 | 0.02 | 0.00001 | 0.00003 | 0.00011 |
| LPG-Rollers | 2267002015 | 0.00 | 0.01 | 0.04 | 0.00001 | 0.00005 | 0.00018 |
| LPG-Paving Equipment | 2267002021 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00003 |
| LPG-Surfacing Equipment | 2267002024 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00002 |
| LPG-Trenchers | 2267002030 | 0.00 | 0.02 | 0.07 | 0.00002 | 0.00008 | 0.00033 |
| LPG-Bore/Drill Rigs | 2267002033 | 0.00 | 0.01 | 0.02 | 0.00001 | 0.00003 | 0.00011 |
| LPG-Concrete/Industrial Saws | 2267002039 | 0.00 | 0.02 | 0.07 | 0.00002 | 0.00008 | 0.00032 |
| LPG-Cranes | 2267002045 | 0.00 | 0.01 | 0.03 | 0.00001 | 0.00003 | 0.00012 |
| LPG-Crushing/Proc. Equipment | 2267002054 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00002 |
| LPG-Rough Terrain Forklifts | 2267002057 | 0.00 | 0.01 | 0.05 | 0.00001 | 0.00005 | 0.00021 |
| LPG-Rubber Tire Loaders | 2267002060 | 0.01 | 0.03 | 0.11 | 0.00004 | 0.00013 | 0.00053 |
| LPG-Tractors/Loaders/Backhoes | 2267002066 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00006 |
| LPG - Skid Steer Loaders | 2267002072 | 0.01 | 0.02 | 0.08 | 0.00003 | 0.00009 | 0.00038 |
| LPG-Other Construction Equipment | 2267002081 | 0.00 | 0.01 | 0.04 | 0.00001 | 0.00004 | 0.00017 |
| CNG-Other Construction Equipment | 2268002081 | 0.00 | 0.00 | 0.00 | 0.00001 | 0.00000 | 0.00001 |
| Dsl - Pavers | 2270002003 | 0.03 | 0.32 | 0.13 | 0.00013 | 0.00150 | 0.00063 |
| Dsl - Tampers/Rammers | 2270002006 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Plate Compactors | 2270002009 | 0.00 | 0.01 | 0.00 | 0.00001 | 0.00004 | 0.00002 |
| Dsl - Rollers | 2270002015 | 0.16 | 1.56 | 0.82 | 0.00073 | 0.00726 | 0.00383 |
| Dsl - Scrapers | 2270002018 | 0.01 | 0.14 | 0.07 | 0.00005 | 0.00065 | 0.00032 |
| Dsl - Paving Equipment | 2270002021 | 0.01 | 0.08 | 0.05 | 0.00004 | 0.00036 | 0.00023 |
| Dsl - Surfacing Equipment | 2270002024 | 0.12 | 1.32 | 0.81 | 0.00058 | 0.00615 | 0.00379 |
| Dsl - Signal Boards/Light Plants | 2270002027 | 0.03 | 0.16 | 0.10 | 0.00014 | 0.00077 | 0.00047 |
| Dsl - Trenchers | 2270002030 | 0.02 | 0.15 | 0.12 | 0.00010 | 0.00071 | 0.00054 |
| Dsl - Bore/Drill Rigs | 2270002033 | 0.10 | 1.32 | 0.35 | 0.00047 | 0.00617 | 0.00162 |
| Dsl - Excavators | 2270002036 | 0.34 | 4.27 | 1.83 | 0.00160 | 0.01990 | 0.00854 |
| Dsl - Concrete/Industrial Saws | 2270002039 | 0.01 | 0.05 | 0.04 | 0.00003 | 0.00023 | 0.00018 |
| Dsl - Cement & Mortar Mixers | 2270002042 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00002 | 0.00001 |
| Dsl - Cranes | 2270002045 | 0.06 | 0.82 | 0.22 | 0.00030 | 0.00381 | 0.00101 |
| Dsl - Graders | 2270002048 | 0.09 | 1.09 | 0.44 | 0.00043 | 0.00508 | 0.00206 |
| Dsl - Off-highway Trucks | 2270002051 | 0.06 | 0.76 | 0.35 | 0.00030 | 0.00356 | 0.00162 |
| Dsl - Crushing/Proc. Equipment | 2270002054 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00001 |
| Dsl - Rough Terrain Forklifts | 2270002057 | 0.04 | 0.32 | 0.21 | 0.00017 | 0.00150 | 0.00097 |
| Dsl - Rubber Tire Loaders | 2270002060 | 0.20 | 2.59 | 0.89 | 0.00092 | 0.01210 | 0.00414 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Tractors/Loaders/Backhoes | 2270002066 | 0.81 | 4.99 | 3.65 | 0.00380 | 0.02327 | 0.01703 |
| Dsl - Skid Steer Loaders | 2270002072 | 0.24 | 0.73 | 0.93 | 0.00112 | 0.00338 | 0.00435 |
| Dsl - Off-Highway Tractors | 2270002075 | 0.00 | 0.02 | 0.01 | 0.00001 | 0.00009 | 0.00004 |
| Dsl - Dumpers/Tenders | 2270002078 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Construction Equipment | 2270002081 | 0.04 | 0.43 | 0.26 | 0.00020 | 0.00199 | 0.00121 |
| **TOTAL** | | **4.72** | **21.53** | **45.90** | **0.0220** | **0.1003** | **0.2172** |

**Light Commercial Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Generator Sets | 2260006005 | 0.18 | 0.00 | 0.40 | 0.00056 | 0.00000 | 0.00125 |
| 2-Str Pumps | 2260006010 | 1.28 | 0.00 | 2.89 | 0.00404 | 0.00002 | 0.00916 |
| 2-Str Air Compressors | 2260006015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Generator Sets | 2265006005 | 4.39 | 2.42 | 111.87 | 0.01621 | 0.00921 | 0.42519 |
| 4-Str Pumps | 2265006010 | 1.07 | 0.12 | 23.54 | 0.00399 | 0.00044 | 0.08823 |
| 4-Str Air Compressors | 2265006015 | 0.46 | 0.11 | 12.29 | 0.00172 | 0.00041 | 0.04604 |
| 4-Str Welders | 2265006025 | 1.01 | 0.65 | 41.89 | 0.00353 | 0.00231 | 0.14817 |
| 4-Str Pressure Washers | 2265006030 | 1.80 | 0.42 | 57.93 | 0.00619 | 0.00148 | 0.20289 |
| LPG-Generator Sets | 2267006005 | 0.02 | 0.11 | 0.29 | 0.00008 | 0.00042 | 0.00109 |
| LPG-Pumps | 2267006010 | 0.02 | 0.10 | 0.27 | 0.00006 | 0.00031 | 0.00085 |
| LPG-Air Compressors | 2267006015 | 0.02 | 0.12 | 0.33 | 0.00008 | 0.00038 | 0.00104 |
| LPG-Welders | 2267006025 | 0.04 | 0.13 | 0.53 | 0.00013 | 0.00049 | 0.00194 |
| LPG-Pressure Washers | 2267006030 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00002 |
| CNG-Generator Sets | 2268006005 | 0.01 | 0.48 | 1.31 | 0.00002 | 0.00152 | 0.00414 |
| CNG-Pumps | 2268006010 | 0.00 | 0.01 | 0.02 | 0.00000 | 0.00002 | 0.00006 |
| CNG-Air Compressors | 2268006015 | 0.00 | 0.03 | 0.08 | 0.00000 | 0.00011 | 0.00032 |
| CNG-Gas Compressors | 2268006020 | 0.01 | 0.35 | 1.57 | 0.00002 | 0.00111 | 0.00497 |
| Dsl-Generator Sets | 2270006005 | 1.43 | 10.35 | 5.71 | 0.00543 | 0.03929 | 0.02168 |
| Dsl-Pumps | 2270006010 | 0.00 | 0.01 | 0.01 | 0.00001 | 0.00005 | 0.00003 |
| Dsl-Air Compressors | 2270006015 | 0.11 | 0.92 | 0.42 | 0.00044 | 0.00351 | 0.00161 |
| Dsl-Gas Compressors | 2270006020 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl-Welders | 2270006025 | 0.25 | 0.53 | 0.86 | 0.00094 | 0.00201 | 0.00327 |
| Dsl-Pressure Washers | 2270006030 | 0.00 | 0.02 | 0.01 | 0.00001 | 0.00006 | 0.00004 |
| **TOTAL** | | **12.10** | **16.90** | **262.21** | **0.04347** | **0.06316** | **0.96200** |

**Industrial Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Sweepers/Scrubbers | 2260003030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| 2-Str Other General Industrial Eqp | 2260003040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Aerial Lifts | 2265003010 | 0.07 | 0.08 | 1.92 | 0.00028 | 0.00029 | 0.00729 |
| 4-Str Forklifts | 2265003020 | 0.01 | 0.01 | 0.30 | 0.00004 | 0.00004 | 0.00096 |
| 4-Str Sweepers/Scrubbers | 2265003030 | 0.01 | 0.01 | 0.43 | 0.00005 | 0.00004 | 0.00146 |
| 4-Str Other General Industrial Eqp | 2265003040 | 0.03 | 0.00 | 0.68 | 0.00008 | 0.00001 | 0.00217 |
| 4-Str Other Material Handling Eqp | 2265003050 | 0.00 | 0.00 | 0.02 | 0.00000 | 0.00000 | 0.00007 |
| 4-Str AC\Refrigeration | 2265003060 | 0.00 | 0.00 | 0.21 | 0.00001 | 0.00000 | 0.00056 |
| 4-Str Terminal Tractors | 2265003070 | 0.00 | 0.00 | 0.06 | 0.00001 | 0.00001 | 0.00020 |
| 4-Str Other Oil Field Eqp | 2265010010 | 1.51 | 0.48 | 102.53 | 0.00463 | 0.00135 | 0.32161 |
| LPG-Aerial Lifts | 2267003010 | 0.00 | 0.01 | 0.04 | 0.00001 | 0.00004 | 0.00014 |
| LPG - Forklifts | 2267003020 | 0.38 | 1.41 | 5.65 | 0.00131 | 0.00482 | 0.01933 |
| LPG - Sweepers/Scrubbers | 2267003030 | 0.01 | 0.04 | 0.16 | 0.00003 | 0.00011 | 0.00048 |
| LPG-Other General Industrial Equipment | 2267003040 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00003 |
| LPG - Other Material Handling Equipmen | 2267003050 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| LPG - Terminal Tractors | 2267003070 | 0.00 | 0.01 | 0.02 | 0.00000 | 0.00002 | 0.00006 |
| CNG-Forklifts | 2268003020 | 0.00 | 0.08 | 0.31 | 0.00000 | 0.00024 | 0.00097 |
| CNG - Sweepers/Scrubbers | 2268003030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| CNG-Other General Industrial Equipment | 2268003040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| CNG-AC\Refrigeration | 2268003060 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00002 |
| CNG-Terminal Tractors | 2268003070 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| CNG-Other Oil Field Eqp | 2268010010 | 0.04 | 2.42 | 10.01 | 0.00012 | 0.00741 | 0.03070 |
| Dsl - Aerial Lifts | 2270003010 | 0.01 | 0.05 | 0.03 | 0.00004 | 0.00017 | 0.00012 |
| Dsl - Forklifts | 2270003020 | 0.01 | 0.07 | 0.04 | 0.00003 | 0.00027 | 0.00013 |
| Dsl - Sweepers/Scrubbers | 2270003030 | 0.01 | 0.11 | 0.03 | 0.00003 | 0.00040 | 0.00010 |
| Dsl - Other General Industrial Eqp | 2270003040 | 0.02 | 0.26 | 0.07 | 0.00006 | 0.00083 | 0.00023 |

## Non-Road Mobile Source Emissions - Frio County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Other Material Handling Eqp | 2270003050 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - AC\Refrigertion | 2270003060 | 0.17 | 1.01 | 0.59 | 0.00046 | 0.00273 | 0.00161 |
| Dsl - Terminal Tractors | 2270003070 | 0.02 | 0.35 | 0.12 | 0.00005 | 0.00111 | 0.00038 |
| Dsl - Other Oil Field Eqp | 2270010010 | 0.51 | 6.42 | 2.08 | 0.00155 | 0.01971 | 0.00639 |
| **TOTAL** | | **2.82** | **12.81** | **125.33** | **0.00879** | **0.03963** | **0.39505** |

**Railroad Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Railway Maintenance | 2285002015 | 0.04 | 0.18 | 0.15 | 0.00061 | 0.00000 | 0.0005 |
| 4-Str Railway Maintenance | 2285004015 | 0.01 | 0.00 | 0.41 | 0.00001 | 0.00000 | 0.0014 |
| LPG Railway Maintenance | 2285006015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.0000 |
| Railroad | 2285002000 | 18.36 | 497.29 | 48.96 | 0.05031 | 1.36243 | 0.14779 |
| **TOTAL** | | **18.41** | **497.47** | **49.52** | **0.0509** | **1.3624** | **0.1497** |

**Mining Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Graders | 2270002048 | 0.00 | 0.00 | 0.00 | 0.0000 | 0.0000 | 0.0000 |
| Dsl - Off Highway Trucks | 2270002051 | 0.00 | 0.00 | 0.00 | 0.0000 | 0.0000 | 0.0000 |
| Dsl - Proc. Equipment | 2270002054 | 0.00 | 0.00 | 0.00 | 0.0000 | 0.0000 | 0.0000 |
| Dsl - Crawler Tractor/Dozers | 2270002069 | 0.00 | 0.00 | 0.00 | 0.0000 | 0.0000 | 0.0000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.0000** | **0.0000** | **0.0000** |

**Quarry Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Scrapers | 2270002018 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Excavators | 2270002036 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Graders | 2270002048 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Off Highway Trucks | 2270002051 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Rubber Tire Loaders | 2270002060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Tractors/Loaders/Backhoes | 2270002066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Crawler Tractors/Dozers | 2270002069 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Landfill Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Pavers | 2270002003 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Scrapers | 2270002018 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Excavators | 2270002036 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Graders | 2270002048 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Off Highway Trucks | 2270002051 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Rubber Tire Loaders | 2270002060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Crawler Tractors/Dozers | 2270002069 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Const. Equipment | 2270002081 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Recreational Boating**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Outboard | 2282005010 | 5.01 | 0.11 | 9.85 | 0.01208 | 0.00024 | 0.02161 |
| Personal Water Craft | 2282005015 | 2.20 | 0.03 | 4.29 | 0.00492 | 0.00007 | 0.00941 |
| Inboard/Sterndrive | 2282010005 | 0.40 | 0.17 | 4.76 | 0.00121 | 0.00035 | 0.01068 |
| Inboard/Sterndrive | 2282020005 | 0.01 | 0.31 | 0.05 | 0.00003 | 0.00069 | 0.00011 |
| Outboards | 2282020010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **7.62** | **0.63** | **18.95** | **0.01824** | **0.00135** | **0.04180** |

**Recreational Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Offroad Motorcycles | 2260001010 | 16.40 | 0.04 | 15.68 | 0.05130 | 0.00012 | 0.04897 |
| 2-Str ATVs | 2260001030 | 16.47 | 0.04 | 15.77 | 0.05152 | 0.00012 | 0.04925 |
| 2-Str Specialty Vehicles / Carts | 2260001060 | 0.27 | 0.06 | 9.82 | 0.00086 | 0.00019 | 0.03066 |
| 4-Str Offroad Motorcycles | 2265001010 | 0.49 | 0.06 | 6.94 | 0.00156 | 0.00016 | 0.02216 |
| 4-Str ATVs | 2265001030 | 4.44 | 0.51 | 62.46 | 0.01406 | 0.00146 | 0.19940 |

## Non-Road Mobile Source Emissions - Frio County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4-Str Golf Carts | 2265001050 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Specialty Vehicles / Carts | 2265001060 | 0.28 | 0.05 | 8.73 | 0.00087 | 0.00015 | 0.02787 |
| LPG Specialty Vehicles / Carts | 2267001060 | 0.01 | 0.02 | 0.08 | 0.00002 | 0.00006 | 0.00026 |
| Dsl- Specialty Vehicle Carts | 2270001060 | 0.08 | 0.22 | 0.31 | 0.00025 | 0.00069 | 0.00097 |
| **TOTAL** | | **38.43** | **1.00** | **119.80** | **0.1204** | **0.0030** | **0.3795** |

**Residential Lawn & Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Res) | 2260004015 | 0.50 | 0.00 | 1.03 | 0.00265 | 0.00001 | 0.00524 |
| 2-Str Chain Saws < 6 HP (Res) | 2260004020 | 7.17 | 0.02 | 13.18 | 0.03792 | 0.00009 | 0.06723 |
| 2-Str Trimmers/Edgers/Brush Cutter (Res) | 2260004025 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Leafblowers/Vacuums (Res) | 2260004030 | 4.18 | 0.01 | 8.39 | 0.02251 | 0.00006 | 0.04282 |
| 4-Str Lawn Mowers (Res) | 2265004010 | 11.74 | 0.93 | 158.77 | 0.05665 | 0.00435 | 0.82813 |
| 4-Str Rotary Tillers <6 HP (Res) | 2265004015 | 1.35 | 0.10 | 17.30 | 0.00650 | 0.00048 | 0.09023 |
| 4-Str Trimmers/Edgers/Brush Cutters (Res) | 2265004025 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Leafblowers/Vacuums (Res) | 2265004030 | 0.11 | 0.01 | 1.52 | 0.00055 | 0.00004 | 0.00791 |
| 4-Str Rear Engine Riding Mower (Res) | 2265004040 | 0.67 | 0.17 | 26.00 | 0.00344 | 0.00078 | 0.13562 |
| 4-Str Lawn & Garden Tractors (Res) | 2265004055 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Other Lawn & Garden Equip. (Res) | 2265004075 | 4.82 | 0.56 | 99.58 | 0.02384 | 0.00262 | 0.51939 |
| **TOTAL** | | **30.54** | **1.79** | **325.75** | **0.15406** | **0.00841** | **1.69656** |

**Commercial Lawn & Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 1.10 | 0.01 | 2.63 | 0.00403 | 0.00004 | 0.00968 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 0.48 | 0.00 | 1.03 | 0.00239 | 0.00001 | 0.00514 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 0.30 | 0.00 | 0.71 | 0.00149 | 0.00001 | 0.00357 |
| 2-Str Commercial Turf Equipment (Com) | 2260004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.08 | 0.01 | 1.15 | 0.00038 | 0.00003 | 0.00588 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.00 | 0.00 | 0.02 | 0.00001 | 0.00000 | 0.00009 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.01 | 0.00 | 0.09 | 0.00003 | 0.00000 | 0.00047 |
| 4-Str Leafblowers/Vacuums (Com) | 2265004031 | 0.06 | 0.02 | 2.50 | 0.00030 | 0.00011 | 0.01276 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 0.00 | 0.00 | 0.24 | 0.00002 | 0.00001 | 0.00124 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.00 | 0.00 | 0.10 | 0.00001 | 0.00000 | 0.00049 |
| 4-Str Shredders < 6 HP (Com) | 2265004051 | 0.00 | 0.00 | 0.02 | 0.00001 | 0.00000 | 0.00009 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 0.00 | 0.00 | 0.10 | 0.00001 | 0.00000 | 0.00052 |
| 4-Str Chippers/Stump Grinders (Com) | 2265004066 | 0.01 | 0.01 | 0.49 | 0.00005 | 0.00003 | 0.00249 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00000 | 0.00004 |
| 4-Str Other Lawn & Garden Equip. (Com) | 2265004076 | 0.01 | 0.00 | 0.11 | 0.00003 | 0.00000 | 0.00056 |
| LPG Chippers/Stump Grinders (Com) | 2267004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Leafblowers/Vacuums (Com) | 2270004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.00 | 0.01 | 0.00 | 0.00001 | 0.00003 | 0.00002 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.00 | 0.01 | 0.00 | 0.00000 | 0.00003 | 0.00001 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **2.04** | **0.07** | **9.21** | **0.00877** | **0.00030** | **0.04307** |

**University/Colleges Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Commercial Turf Equipment (Com) | 2260004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractors/Loaders/Backhoe | 2265002066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Leafblowers/Vacuums (Com) | 2265004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |

# Non-Road Mobile Source Emissions - Frio County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4-Str Shredders < 6 HP (Com) | 2265004051 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Chippers/Stump Grinders (Com) | 2265004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Other Lawn & Garden Equip. (Com) | 2265004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tillers > 6 HP | 2265005040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG Chippers/Stump Grinders (Com) | 2267004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Shredders > 6 HP | 2265007010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Leafblowers/Vacuums (Com) | 2270004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Shredders > 6 HP | 2270007010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Public Schools Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 0.00 | 0.00 | 0.00 | 0.00001 | 0.00000 | 0.00002 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 0.08 | 0.00 | 0.17 | 0.00032 | 0.00000 | 0.00063 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 2.75 | 0.01 | 5.81 | 0.01422 | 0.00004 | 0.02999 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 0.52 | 0.00 | 1.14 | 0.00270 | 0.00001 | 0.00590 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.21 | 0.02 | 3.24 | 0.00109 | 0.00009 | 0.01713 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.00 | 0.00 | 0.05 | 0.00002 | 0.00000 | 0.00026 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 0.07 | 0.02 | 4.02 | 0.00037 | 0.00012 | 0.02124 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.07 | 0.01 | 2.72 | 0.00035 | 0.00007 | 0.01437 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 0.38 | 0.03 | 6.06 | 0.00192 | 0.00015 | 0.03201 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.02 | 0.02 | 0.36 | 0.00008 | 0.00008 | 0.00191 |
| 4-Str Shredders > 6 HP | 2265007010 | 0.07 | 0.01 | 2.39 | 0.00027 | 0.00004 | 0.00931 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.01 | 0.03 | 0.02 | 0.00004 | 0.00018 | 0.00011 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.02 | 0.08 | 0.05 | 0.00008 | 0.00042 | 0.00026 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.00 | 0.01 | 0.01 | 0.00001 | 0.00004 | 0.00003 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.00 | 0.01 | 0.00 | 0.00001 | 0.00003 | 0.00002 |
| Dsl - Shredders > 6 HP | 2270007010 | 0.01 | 0.04 | 0.04 | 0.00002 | 0.00014 | 0.00015 |
| **TOTAL** | | **4.21** | **0.29** | **26.10** | **0.02151** | **0.00140** | **0.13335** |

**Golf Courses Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Government Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rotary Tillers <6 HP | 2260004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Chain Saws | 2260004021 | 0.73 | 0.01 | 1.75 | 0.00280 | 0.00003 | 0.00673 |
| Trimmers/ Edgers/ Brush Cutters | 2260004026 | 5.41 | 0.02 | 11.63 | 0.02637 | 0.00010 | 0.05675 |
| Leaf Blowers/ Vacuums | 2260004031 | 0.12 | 0.00 | 0.29 | 0.00060 | 0.00000 | 0.00143 |
| 4-Str Concrete/Industrial Saws | 2265002039 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Lawn Mowers | 2265004011 | 0.07 | 0.01 | 1.05 | 0.00033 | 0.00003 | 0.00512 |
| Rotary Tillers | 2265004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Trimmers/ Edgers/ Brush Cutters | 2265004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |

# Non-Road Mobile Source Emissions - Frio County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Leaf Blowers / Vacuums | 2265004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Rear Engine Riding Mowers | 2265004041 | 0.00 | 0.00 | 0.27 | 0.00002 | 0.00001 | 0.00133 |
| Front Mowers | 2265004046 | 0.05 | 0.01 | 2.15 | 0.00025 | 0.00006 | 0.01048 |
| Lawn and Garden Tractors | 2265004056 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Chippers/ Stump/ Grinders/ Mulchers | 2265004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Commercial Turf Equipment/ Sod Cutters | 2265004071 | 0.28 | 0.08 | 13.15 | 0.00136 | 0.00040 | 0.06414 |
| Other Lawn and Garden Equipment - Pole Saw | 2265004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Water Pumps | 2265006010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Commercial Mowers | 2270004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Lawn and Garden Tractors | 2270004056 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Chippers/ Stump/ Grinders/ Mulchers | 2270004066 | 0.00 | 0.04 | 0.02 | 0.00002 | 0.00018 | 0.00009 |
| Commercial Turf Equipment/ Sod Cutters | 2270004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Shredders | 2270007010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **6.67** | **0.17** | **30.32** | **0.03176** | **0.00080** | **0.14607** |

**Agricultural Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4-Str Tractor - Corn | 2265005015 | 0.00 | 0.00 | 0.09 | 0.00001 | 0.00001 | 0.00025 |
| 4-Str Tractor - Hay | 2265005015 | 0.00 | 0.00 | 0.06 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Peanuts | 2265005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Sorghum | 2265005015 | 0.00 | 0.00 | 0.04 | 0.00002 | 0.00002 | 0.00057 |
| 4-Str Tractor - Cotton | 2265005015 | 0.00 | 0.00 | 0.15 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Small Grains | 2265005015 | 0.00 | 0.00 | 0.00 | 0.00001 | 0.00001 | 0.00040 |
| Dsl Tractor - Corn | 2270005015 | 0.35 | 2.94 | 1.77 | 0.00098 | 0.00814 | 0.00490 |
| Dsl Tractor - Hay | 2270005015 | 0.23 | 1.88 | 1.13 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Peanuts | 2270005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Sorghum | 2270005015 | 0.16 | 1.36 | 0.82 | 0.00225 | 0.01872 | 0.01127 |
| Dsl Tractor - Cotton | 2270005015 | 0.61 | 5.03 | 3.03 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Small Grains | 2270005015 | 0.00 | 0.00 | 0.00 | 0.00159 | 0.01319 | 0.00794 |
| Dsl Combine - Corn | 2270005020 | 0.15 | 2.33 | 0.82 | 0.00090 | 0.01373 | 0.00481 |
| Dsl Combine - Hay | 2270005020 | 0.04 | 0.60 | 0.21 | 0.00023 | 0.00356 | 0.00124 |
| Dsl Combine - Peanuts | 2270005020 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Combine - Sorghum | 2270005020 | 0.26 | 3.99 | 1.40 | 0.00154 | 0.02345 | 0.00821 |
| Dsl Combine - Cotton | 2270005020 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Combine - Small Grains | 2270005020 | 0.17 | 2.58 | 0.90 | 0.00100 | 0.01515 | 0.00530 |
| 2-Str Sprayers | 2260005035 | 0.23 | 0.00 | 0.50 | 0.00050 | 0.00000 | 0.00107 |
| 2-Str Hydro Power Units | 2260005050 | 0.03 | 0.00 | 0.07 | 0.00007 | 0.00000 | 0.00015 |
| 4-Str Balers | 2265005025 | 0.11 | 0.08 | 1.74 | 0.00027 | 0.00017 | 0.00375 |
| 4-Str Agricultural Mowers | 2265005030 | 0.03 | 0.01 | 1.43 | 0.00007 | 0.00002 | 0.00308 |
| 4-Str Sprayers | 2265005035 | 0.49 | 0.13 | 12.30 | 0.00110 | 0.00028 | 0.02646 |
| 4-Str Tillers > 6 HP | 2265005040 | 0.98 | 0.12 | 31.94 | 0.00212 | 0.00025 | 0.06873 |
| 4-Str Swathers | 2265005045 | 0.16 | 0.12 | 2.76 | 0.00037 | 0.00027 | 0.00594 |
| 4-Str Hydro Power Units | 2265005050 | 0.25 | 0.06 | 11.15 | 0.00055 | 0.00013 | 0.02399 |
| 4-Str Other Agriculture Equipment | 2265005055 | 0.21 | 0.15 | 5.65 | 0.00046 | 0.00032 | 0.01216 |
| 4-Str Irrigation Sets | 2265005060 | 0.22 | 0.21 | 5.27 | 0.00048 | 0.00046 | 0.01133 |
| LPG Hydro Power Units | 2267005050 | 0.00 | 0.01 | 0.03 | 0.00000 | 0.00001 | 0.00006 |
| LPG Other Agriculture Equipment | 2267005055 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00002 |
| LPG Irrigation Sets | 2267005060 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00000 | 0.00002 |
| CNG Hydro Power Units | 2268005050 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| CNG Other Agriculture Equipment | 2268005055 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00000 | 0.00002 |
| CNG Irrigation Sets | 2268005060 | 0.00 | 0.26 | 1.08 | 0.00001 | 0.00055 | 0.00232 |
| Dsl - Balers | 2270005025 | 0.01 | 0.05 | 0.04 | 0.00003 | 0.00011 | 0.00008 |
| Dsl - Agricultural Mowers | 2270005030 | 0.00 | 0.01 | 0.01 | 0.00000 | 0.00002 | 0.00002 |
| Dsl - Sprayers | 2270005035 | 0.22 | 0.81 | 0.59 | 0.00047 | 0.00174 | 0.00126 |
| Dsl - Tillers > 6 HP | 2270005040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Swathers | 2270005045 | 0.09 | 0.92 | 0.37 | 0.00020 | 0.00198 | 0.00079 |
| Dsl - Hydro Power Units | 2270005050 | 0.03 | 0.21 | 0.10 | 0.00006 | 0.00044 | 0.00021 |
| Dsl - Other Agriculture Equipment | 2270005055 | 0.32 | 2.30 | 1.36 | 0.00068 | 0.00496 | 0.00293 |
| Dsl - Irrigation Sets | 2270005060 | 0.17 | 1.40 | 0.57 | 0.00038 | 0.00302 | 0.00123 |
| **TOTAL** | | **5.56** | **27.57** | **87.39** | **0.01637** | **0.11071** | **0.21050** |
| TOTAL NONROAD SOURCES | | 133.12 | 580.23 | 1,100.48 | 0.49628 | 1.69150 | 4.37487 |

# Non-Road Mobile Source Emissions - Gillespie County, 2002

| GILLESPIE COUNTY NON-ROAD MOBILE SOURCES | SCC Codes | VOC ton/year | NOx ton/year | CO ton/year | VOC ton/day M-F | NOx ton/day M-F | CO ton/day M-F |
|---|---|---|---|---|---|---|---|
| **Construction Equipment** | | | | | | | |
| 2-Str Tampers/Rammers | 2260002006 | 0.25 | 0.00 | 0.70 | 0.00115 | 0.00001 | 0.00325 |
| 2-Str Plate Compactors | 2260002009 | 0.01 | 0.00 | 0.03 | 0.00006 | 0.00000 | 0.00015 |
| 2-Str Paving Equipment | 2260002021 | 0.02 | 0.00 | 0.04 | 0.00008 | 0.00000 | 0.00018 |
| 2-Str Signal Boards/Light Plants | 2260002027 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Concrete/Industrial Saws | 2260002039 | 0.68 | 0.01 | 1.88 | 0.00315 | 0.00003 | 0.00875 |
| 2-Str Crushing/Proc. Equipment | 2260002054 | 0.00 | 0.00 | 0.01 | 0.00002 | 0.00000 | 0.00004 |
| 4-Str Pavers | 2265002003 | 0.01 | 0.01 | 0.62 | 0.00006 | 0.00002 | 0.00295 |
| 4-Str Tampers/Rammers | 2265002006 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00002 |
| 4-Str Plate Compactors | 2265002009 | 0.05 | 0.01 | 1.14 | 0.00022 | 0.00003 | 0.00544 |
| 4-Str Rollers | 2265002015 | 0.02 | 0.01 | 1.17 | 0.00009 | 0.00004 | 0.00559 |
| 4-Str Paving Equipment | 2265002021 | 0.07 | 0.01 | 2.23 | 0.00030 | 0.00006 | 0.01064 |
| 4-Str Surfacing Equipment | 2265002024 | 0.03 | 0.01 | 1.01 | 0.00012 | 0.00002 | 0.00483 |
| 4-Str Signal Boards/Light Plants | 2265002027 | 0.00 | 0.00 | 0.05 | 0.00001 | 0.00000 | 0.00025 |
| 4-Str Trenchers | 2265002030 | 0.05 | 0.02 | 1.90 | 0.00024 | 0.00007 | 0.00907 |
| 4-Str Bore/Drill Rigs | 2265002033 | 0.03 | 0.01 | 0.56 | 0.00013 | 0.00002 | 0.00265 |
| 4-Str Concrete/Industrial Saws | 2265002039 | 0.08 | 0.03 | 4.78 | 0.00035 | 0.00013 | 0.02278 |
| 4-Str Cement & Mortar Mixers | 2265002042 | 0.07 | 0.01 | 1.96 | 0.00032 | 0.00005 | 0.00936 |
| 4-Str Cranes | 2265002045 | 0.00 | 0.00 | 0.08 | 0.00001 | 0.00001 | 0.00038 |
| 4-Str Crushing/Proc. Equipment | 2265002054 | 0.01 | 0.00 | 0.27 | 0.00003 | 0.00001 | 0.00131 |
| 4-Str Rough Terrain Forklift | 2265002057 | 0.00 | 0.00 | 0.10 | 0.00002 | 0.00002 | 0.00050 |
| 4-Str Rubber Tire Loaders | 2265002060 | 0.01 | 0.01 | 0.25 | 0.00005 | 0.00005 | 0.00119 |
| 4-Str Tractors/Loaders/Backhoes | 2265002066 | 0.02 | 0.01 | 1.46 | 0.00011 | 0.00004 | 0.00698 |
| 4-Str Skid Steer Loaders | 2265002072 | 0.02 | 0.01 | 0.66 | 0.00008 | 0.00006 | 0.00314 |
| 4-Str Dumpers/Tenders | 2265002078 | 0.01 | 0.00 | 0.31 | 0.00004 | 0.00001 | 0.00146 |
| 4-Str Other Construction Equipment | 2265002081 | 0.00 | 0.00 | 0.09 | 0.00002 | 0.00002 | 0.00042 |
| LPG-Pavers | 2267002003 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00002 | 0.00007 |
| LPG-Rollers | 2267002015 | 0.00 | 0.01 | 0.02 | 0.00001 | 0.00003 | 0.00012 |
| LPG-Paving Equipment | 2267002021 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00002 |
| LPG-Surfacing Equipment | 2267002024 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| LPG-Trenchers | 2267002030 | 0.00 | 0.01 | 0.04 | 0.00001 | 0.00005 | 0.00021 |
| LPG-Bore/Drill Rigs | 2267002033 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00002 | 0.00007 |
| LPG-Concrete/Industrial Saws | 2267002039 | 0.00 | 0.01 | 0.04 | 0.00001 | 0.00005 | 0.00020 |
| LPG-Cranes | 2267002045 | 0.00 | 0.00 | 0.02 | 0.00000 | 0.00002 | 0.00007 |
| LPG-Crushing/Proc. Equipment | 2267002054 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| LPG-Rough Terrain Forklifts | 2267002057 | 0.00 | 0.01 | 0.03 | 0.00001 | 0.00003 | 0.00013 |
| LPG-Rubber Tire Loaders | 2267002060 | 0.00 | 0.02 | 0.07 | 0.00002 | 0.00008 | 0.00033 |
| LPG-Tractors/Loaders/Backhoes | 2267002066 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00004 |
| LPG - Skid Steer Loaders | 2267002072 | 0.00 | 0.01 | 0.05 | 0.00002 | 0.00006 | 0.00024 |
| LPG-Other Construction Equipment | 2267002081 | 0.00 | 0.01 | 0.02 | 0.00001 | 0.00003 | 0.00011 |
| CNG-Other Construction Equipment | 2268002081 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Pavers | 2270002003 | 0.02 | 0.20 | 0.08 | 0.00008 | 0.00094 | 0.00039 |
| Dsl - Tampers/Rammers | 2270002006 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Plate Compactors | 2270002009 | 0.00 | 0.01 | 0.00 | 0.00000 | 0.00002 | 0.00001 |
| Dsl - Rollers | 2270002015 | 0.10 | 0.97 | 0.51 | 0.00046 | 0.00454 | 0.00239 |
| Dsl - Scrapers | 2270002018 | 0.01 | 0.09 | 0.04 | 0.00003 | 0.00040 | 0.00020 |
| Dsl - Paving Equipment | 2270002021 | 0.01 | 0.05 | 0.03 | 0.00002 | 0.00023 | 0.00015 |
| Dsl - Surfacing Equipment | 2270002024 | 0.08 | 0.83 | 0.51 | 0.00036 | 0.00385 | 0.00237 |
| Dsl - Signal Boards/Light Plants | 2270002027 | 0.02 | 0.10 | 0.06 | 0.00008 | 0.00048 | 0.00029 |
| Dsl - Trenchers | 2270002030 | 0.01 | 0.10 | 0.07 | 0.00006 | 0.00045 | 0.00034 |
| Dsl - Bore/Drill Rigs | 2270002033 | 0.06 | 0.83 | 0.22 | 0.00029 | 0.00386 | 0.00101 |
| Dsl - Excavators | 2270002036 | 0.21 | 2.67 | 1.15 | 0.00100 | 0.01245 | 0.00534 |
| Dsl - Concrete/Industrial Saws | 2270002039 | 0.00 | 0.03 | 0.02 | 0.00002 | 0.00014 | 0.00011 |
| Dsl - Cement & Mortar Mixers | 2270002042 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00001 |
| Dsl - Cranes | 2270002045 | 0.04 | 0.51 | 0.14 | 0.00019 | 0.00238 | 0.00063 |
| Dsl - Graders | 2270002048 | 0.06 | 0.68 | 0.28 | 0.00027 | 0.00318 | 0.00129 |
| Dsl - Off-highway Trucks | 2270002051 | 0.04 | 0.48 | 0.22 | 0.00019 | 0.00222 | 0.00101 |
| Dsl - Crushing/Proc. Equipment | 2270002054 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00000 |
| Dsl - Rough Terrain Forklifts | 2270002057 | 0.02 | 0.20 | 0.13 | 0.00011 | 0.00094 | 0.00060 |
| Dsl - Rubber Tire Loaders | 2270002060 | 0.12 | 1.62 | 0.56 | 0.00058 | 0.00757 | 0.00259 |
| Dsl - Tractors/Loaders/Backhoes | 2270002066 | 0.51 | 3.12 | 2.28 | 0.00238 | 0.01456 | 0.01066 |

## Non-Road Mobile Source Emissions - Gillespie County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Skid Steer Loaders | 2270002072 | 0.15 | 0.45 | 0.58 | 0.00070 | 0.00212 | 0.00272 |
| Dsl - Off-Highway Tractors | 2270002075 | 0.00 | 0.01 | 0.01 | 0.00000 | 0.00006 | 0.00003 |
| Dsl - Dumpers/Tenders | 2270002078 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Construction Equipment | 2270002081 | 0.03 | 0.27 | 0.16 | 0.00013 | 0.00124 | 0.00076 |
| **TOTAL** | | **2.95** | **13.47** | **28.71** | **0.01374** | **0.06277** | **0.13586** |

**Light Commercial Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Generator Sets | 2260006005 | 0.27 | 0.00 | 0.61 | 0.00087 | 0.00000 | 0.00195 |
| 2-Str Pumps | 2260006010 | 1.98 | 0.01 | 4.48 | 0.00628 | 0.00002 | 0.01421 |
| 2-Str Air Compressors | 2260006015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| 4-Str Generator Sets | 2265006005 | 6.81 | 3.76 | 173.60 | 0.02515 | 0.01429 | 0.65978 |
| 4-Str Pumps | 2265006010 | 1.66 | 0.18 | 36.53 | 0.00618 | 0.00068 | 0.13691 |
| 4-Str Air Compressors | 2265006015 | 0.72 | 0.17 | 19.07 | 0.00267 | 0.00064 | 0.07145 |
| 4-Str Welders | 2265006025 | 1.57 | 1.01 | 65.00 | 0.00548 | 0.00359 | 0.22992 |
| 4-Str Pressure Washers | 2265006030 | 2.79 | 0.66 | 89.89 | 0.00961 | 0.00230 | 0.31484 |
| LPG-Generator Sets | 2267006005 | 0.03 | 0.17 | 0.44 | 0.00013 | 0.00066 | 0.00169 |
| LPG-Pumps | 2267006010 | 0.03 | 0.15 | 0.42 | 0.00010 | 0.00049 | 0.00133 |
| LPG-Air Compressors | 2267006015 | 0.04 | 0.19 | 0.51 | 0.00012 | 0.00059 | 0.00162 |
| LPG-Welders | 2267006025 | 0.06 | 0.21 | 0.82 | 0.00020 | 0.00076 | 0.00302 |
| LPG-Pressure Washers | 2267006030 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00004 |
| CNG-Generator Sets | 2268006005 | 0.01 | 0.74 | 2.03 | 0.00003 | 0.00235 | 0.00642 |
| CNG-Pumps | 2268006010 | 0.00 | 0.01 | 0.03 | 0.00000 | 0.00003 | 0.00009 |
| CNG-Air Compressors | 2268006015 | 0.00 | 0.05 | 0.13 | 0.00000 | 0.00017 | 0.00049 |
| CNG-Gas Compressors | 2268006020 | 0.01 | 0.54 | 2.43 | 0.00003 | 0.00172 | 0.00770 |
| Dsl-Generator Sets | 2270006005 | 2.22 | 16.06 | 8.86 | 0.00842 | 0.06097 | 0.03363 |
| Dsl-Pumps | 2270006010 | 0.00 | 0.02 | 0.01 | 0.00001 | 0.00007 | 0.00004 |
| Dsl-Air Compressors | 2270006015 | 0.18 | 1.44 | 0.66 | 0.00068 | 0.00544 | 0.00250 |
| Dsl-Gas Compressors | 2270006020 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl-Welders | 2270006025 | 0.38 | 0.82 | 1.33 | 0.00146 | 0.00312 | 0.00507 |
| Dsl-Pressure Washers | 2270006030 | 0.00 | 0.02 | 0.01 | 0.00002 | 0.00009 | 0.00005 |
| **TOTAL** | | **18.77** | **26.22** | **406.88** | **0.06745** | **0.09801** | **1.49276** |

**Industrial Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Sweepers/Scrubbers | 2260003030 | 0.02 | 0.00 | 0.04 | 0.00005 | 0.00000 | 0.00012 |
| 2-Str Other General Industrial Eqp | 2260003040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| 4-Str Aerial Lifts | 2265003010 | 0.76 | 0.77 | 19.70 | 0.00285 | 0.00294 | 0.07493 |
| 4-Str Forklifts | 2265003020 | 0.13 | 0.13 | 3.09 | 0.00041 | 0.00043 | 0.00987 |
| 4-Str Sweepers/Scrubbers | 2265003030 | 0.14 | 0.12 | 4.42 | 0.00049 | 0.00039 | 0.01504 |
| 4-Str Other General Industrial Eqp | 2265003040 | 0.26 | 0.04 | 7.03 | 0.00084 | 0.00014 | 0.02229 |
| 4-Str Other Material Handling Eqp | 2265003050 | 0.01 | 0.01 | 0.24 | 0.00002 | 0.00002 | 0.00075 |
| 4-Str AC\Refrigeration | 2265003060 | 0.00 | 0.00 | 0.26 | 0.00001 | 0.00000 | 0.00070 |
| 4-Str Terminal Tractors | 2265003070 | 0.03 | 0.03 | 0.66 | 0.00009 | 0.00009 | 0.00210 |
| 4-Str Other Oil Field Eqp | 2265010010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG-Aerial Lifts | 2267003010 | 0.03 | 0.11 | 0.46 | 0.00010 | 0.00036 | 0.00144 |
| LPG - Forklifts | 2267003020 | 3.94 | 14.51 | 58.15 | 0.01346 | 0.04960 | 0.19880 |
| LPG - Sweepers/Scrubbers | 2267003030 | 0.11 | 0.40 | 1.69 | 0.00033 | 0.00117 | 0.00494 |
| LPG-Other General Industrial Equipment | 2267003040 | 0.01 | 0.03 | 0.10 | 0.00002 | 0.00008 | 0.00032 |
| LPG - Other Material Handling Equipmen | 2267003050 | 0.00 | 0.01 | 0.02 | 0.00001 | 0.00002 | 0.00008 |
| LPG - Terminal Tractors | 2267003070 | 0.01 | 0.05 | 0.21 | 0.00004 | 0.00016 | 0.00065 |
| CNG-Forklifts | 2268003020 | 0.01 | 0.79 | 3.16 | 0.00004 | 0.00251 | 0.01001 |
| CNG - Sweepers/Scrubbers | 2268003030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| CNG-Other General Industrial Equipment | 2268003040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| CNG-AC\Refrigeration | 2268003060 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00003 |
| CNG-Terminal Tractors | 2268003070 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00005 |
| CNG-Other Oil Field Eqp | 2268010010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Aerial Lifts | 2270003010 | 0.10 | 0.48 | 0.34 | 0.00036 | 0.00174 | 0.00122 |
| Dsl - Forklifts | 2270003020 | 0.07 | 0.74 | 0.36 | 0.00027 | 0.00276 | 0.00136 |
| Dsl - Sweepers/Scrubbers | 2270003030 | 0.08 | 1.09 | 0.26 | 0.00031 | 0.00415 | 0.00099 |
| Dsl - Other General Industrial Eqp | 2270003040 | 0.20 | 2.68 | 0.76 | 0.00063 | 0.00850 | 0.00239 |
| Dsl - Other Material Handling Eqp | 2270003050 | 0.00 | 0.01 | 0.01 | 0.00001 | 0.00002 | 0.00003 |
| Dsl - AC\Refrigertion | 2270003060 | 0.21 | 1.28 | 0.75 | 0.00058 | 0.00348 | 0.00205 |
| Dsl - Terminal Tractors | 2270003070 | 0.15 | 3.56 | 1.22 | 0.00050 | 0.01144 | 0.00393 |

## Non-Road Mobile Source Emissions - Gillespie County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Other Oil Field Eqp | 2270010010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **6.29** | **26.85** | **102.96** | **0.02142** | **0.09003** | **0.35411** |

**Railroad Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Railway Maintenance | 2285002015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Railway Maintenance | 2285004015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG Railway Maintenance | 2285006015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Railroad | 2285002000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Mining Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Graders | 2270002048 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Off Highway Trucks | 2270002051 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Proc. Equipment | 2270002054 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Crawler Tractor/Dozers | 2270002069 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Quarry Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Scrapers | 2270002018 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Excavators | 2270002036 | 0.14 | 1.90 | 0.71 | 0.00043 | 0.00572 | 0.00214 |
| Dsl - Graders | 2270002048 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Off Highway Trucks | 2270002051 | 0.67 | 9.72 | 4.07 | 0.00203 | 0.02924 | 0.01225 |
| Dsl - Rubber Tire Loaders | 2270002060 | 0.44 | 5.49 | 2.51 | 0.00133 | 0.01651 | 0.00755 |
| Dsl - Tractors/Loaders/Backhoes | 2270002066 | 0.54 | 2.32 | 2.17 | 0.00162 | 0.00699 | 0.00653 |
| Dsl - Crawler Tractors/Dozers | 2270002069 | 0.09 | 1.13 | 0.49 | 0.00027 | 0.00341 | 0.00148 |
| **TOTAL** | | **1.89** | **20.57** | **9.96** | **0.00568** | **0.06187** | **0.02995** |

**Landfill Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Pavers | 2270002003 | 0.27 | 5.89 | 1.96 | 0.00111 | 0.02420 | 0.00807 |
| Dsl - Scrapers | 2270002018 | 0.16 | 3.29 | 1.06 | 0.00065 | 0.01351 | 0.00435 |
| Dsl - Excavators | 2270002036 | 0.01 | 0.22 | 0.05 | 0.00006 | 0.00089 | 0.00020 |
| Dsl - Graders | 2270002048 | 0.04 | 0.54 | 0.15 | 0.00016 | 0.00224 | 0.00063 |
| Dsl - Off Highway Trucks | 2270002051 | 0.05 | 0.66 | 0.17 | 0.00019 | 0.00272 | 0.00071 |
| Dsl - Rubber Tire Loaders | 2270002060 | 0.06 | 0.86 | 0.22 | 0.00025 | 0.00354 | 0.00092 |
| Dsl - Crawler Tractors/Dozers | 2270002069 | 0.28 | 4.39 | 1.18 | 0.00117 | 0.01805 | 0.00484 |
| Dsl - Other Const. Equipment | 2270002081 | 0.15 | 2.27 | 0.52 | 0.00062 | 0.00931 | 0.00215 |
| **TOTAL** | | **1.02** | **18.12** | **5.32** | **0.00420** | **0.07446** | **0.02185** |

**Recreational Boating**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Outboard | 2282005010 | 1.67 | 0.04 | 3.28 | 0.00403 | 0.00008 | 0.00720 |
| Personal Water Craft | 2282005015 | 0.73 | 0.01 | 1.43 | 0.00164 | 0.00002 | 0.00314 |
| Inboard/Sterndrive | 2282010005 | 0.13 | 0.06 | 1.59 | 0.00040 | 0.00012 | 0.00356 |
| Inboard/Sterndrive | 2282020005 | 0.00 | 0.10 | 0.02 | 0.00001 | 0.00023 | 0.00004 |
| Outboards | 2282020010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **2.54** | **0.21** | **6.32** | **0.00608** | **0.00045** | **0.01393** |

**Recreational Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Offroad Motorcycles | 2260001010 | 32.80 | 0.08 | 31.36 | 0.10260 | 0.00025 | 0.09794 |
| 2-Str ATVs | 2260001030 | 32.94 | 0.08 | 31.55 | 0.10303 | 0.00025 | 0.09851 |
| 2-Str Specialty Vehicles / Carts | 2260001060 | 0.53 | 0.12 | 19.64 | 0.00172 | 0.00037 | 0.06133 |
| 4-Str Offroad Motorcycles | 2265001010 | 0.98 | 0.11 | 13.88 | 0.00311 | 0.00032 | 0.04431 |
| 4-Str ATVs | 2265001030 | 8.87 | 1.02 | 124.92 | 0.02813 | 0.00291 | 0.39879 |
| 4-Str Golf Carts | 2265001050 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Specialty Vehicles / Carts | 2265001060 | 0.55 | 0.11 | 17.46 | 0.00174 | 0.00030 | 0.05574 |
| LPG Specialty Vehicles / Carts | 2267001060 | 0.01 | 0.04 | 0.17 | 0.00003 | 0.00013 | 0.00052 |
| Dsl- Specialty Vehicle Carts | 2270001060 | 0.16 | 0.44 | 0.62 | 0.00050 | 0.00139 | 0.00194 |

## Non-Road Mobile Source Emissions - Gillespie County, 2002

| | | | | | | |
|---|---|---|---|---|---|---|
| **TOTAL** | **76.85** | **2.00** | **239.59** | **0.24086** | **0.00592** | **0.75908** |

**Residential Lawn & Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Res) | 2260004015 | 0.90 | 0.00 | 1.86 | 0.00480 | 0.00001 | 0.00948 |
| 2-Str Chain Saws < 6 HP (Res) | 2260004020 | 12.99 | 0.03 | 23.86 | 0.06865 | 0.00016 | 0.12173 |
| 2-Str Trimmers/Edgers/Brush Cutter (Res) | 2260004025 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Leafblowers/Vacuums (Res) | 2260004030 | 7.56 | 0.02 | 15.19 | 0.04076 | 0.00010 | 0.07752 |
| 4-Str Lawn Mowers (Res) | 2265004010 | 21.25 | 1.68 | 287.45 | 0.10257 | 0.00788 | 1.49938 |
| 4-Str Rotary Tillers <6 HP (Res) | 2265004015 | 2.45 | 0.18 | 31.32 | 0.01177 | 0.00087 | 0.16337 |
| 4-Str Trimmers/Edgers/Brush Cutters (Res) | 2265004025 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Leafblowers/Vacuums (Res) | 2265004030 | 0.20 | 0.02 | 2.74 | 0.00099 | 0.00008 | 0.01431 |
| 4-Str Rear Engine Riding Mower (Res) | 2265004040 | 1.21 | 0.30 | 47.08 | 0.00624 | 0.00141 | 0.24555 |
| 4-Str Lawn & Garden Tractors (Res) | 2265004055 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Other Lawn & Garden Equip. (Res) | 2265004075 | 8.73 | 1.01 | 180.29 | 0.04316 | 0.00474 | 0.94039 |
| **TOTAL** | | **55.30** | **3.25** | **589.79** | **0.27894** | **0.01523** | **3.07174** |

**Commercial Lawn & Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 0.05 | 0.00 | 0.10 | 0.00024 | 0.00000 | 0.00049 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 20.81 | 0.19 | 50.01 | 0.07660 | 0.00071 | 0.18398 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 9.09 | 0.04 | 19.57 | 0.04538 | 0.00018 | 0.09774 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 5.68 | 0.04 | 13.57 | 0.02837 | 0.00019 | 0.06775 |
| 2-Str Commercial Turf Equipment (Com) | 2260004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 1.46 | 0.12 | 21.89 | 0.00724 | 0.00057 | 0.11174 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.12 | 0.01 | 1.72 | 0.00059 | 0.00005 | 0.00877 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.10 | 0.01 | 1.75 | 0.00048 | 0.00005 | 0.00896 |
| 4-Str Leafblowers/Vacuums (Com) | 2265004031 | 1.15 | 0.44 | 47.50 | 0.00573 | 0.00201 | 0.24249 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 0.40 | 0.13 | 22.73 | 0.00196 | 0.00060 | 0.11604 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.21 | 0.05 | 8.93 | 0.00105 | 0.00025 | 0.04560 |
| 4-Str Shredders < 6 HP (Com) | 2265004051 | 0.11 | 0.01 | 1.60 | 0.00056 | 0.00004 | 0.00819 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 0.17 | 0.06 | 9.57 | 0.00084 | 0.00026 | 0.04884 |
| 4-Str Chippers/Stump Grinders (Com) | 2265004066 | 0.99 | 0.68 | 45.66 | 0.00489 | 0.00310 | 0.23307 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.01 | 0.00 | 0.69 | 0.00007 | 0.00002 | 0.00352 |
| 4-Str Other Lawn & Garden Equip. (Com) | 2265004076 | 0.50 | 0.06 | 10.27 | 0.00238 | 0.00027 | 0.05241 |
| LPG Chippers/Stump Grinders (Com) | 2267004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Leafblowers/Vacuums (Com) | 2270004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.40 | 2.02 | 1.28 | 0.00201 | 0.01010 | 0.00640 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.00 | 0.02 | 0.01 | 0.00002 | 0.00011 | 0.00007 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.21 | 1.68 | 0.86 | 0.00107 | 0.00841 | 0.00431 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.00 | 0.01 | 0.00 | 0.00000 | 0.00003 | 0.00002 |
| **TOTAL** | | **41.46** | **5.57** | **257.72** | **0.17949** | **0.02694** | **1.24037** |

**University/Colleges Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Commercial Turf Equipment (Com) | 2260004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractors/Loaders/Backhoe | 2265002066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Leafblowers/Vacuums (Com) | 2265004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Shredders < 6 HP (Com) | 2265004051 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Chippers/Stump Grinders (Com) | 2265004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Other Lawn & Garden Equip. (Com) | 2265004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |

## Non-Road Mobile Source Emissions - Gillespie County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4-Str Tillers > 6 HP | 2265005040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG Chippers/Stump Grinders (Com) | 2267004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Shredders > 6 HP | 2265007010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Leafblowers/Vacuums (Com) | 2270004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Shredders > 6 HP | 2270007010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Public Schools Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 0.00 | 0.00 | 0.00 | 0.00001 | 0.00000 | 0.00002 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 0.08 | 0.00 | 0.15 | 0.00029 | 0.00000 | 0.00057 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 2.48 | 0.01 | 5.23 | 0.01280 | 0.00004 | 0.02699 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 0.47 | 0.00 | 1.03 | 0.00243 | 0.00001 | 0.00531 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.19 | 0.02 | 2.92 | 0.00098 | 0.00008 | 0.01541 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.00 | 0.00 | 0.04 | 0.00002 | 0.00000 | 0.00023 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 0.07 | 0.02 | 3.62 | 0.00033 | 0.00010 | 0.01912 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.06 | 0.01 | 2.45 | 0.00032 | 0.00006 | 0.01294 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 0.34 | 0.03 | 5.46 | 0.00173 | 0.00014 | 0.02881 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.01 | 0.02 | 0.33 | 0.00007 | 0.00008 | 0.00172 |
| 4-Str Shredders > 6 HP | 2265007010 | 0.06 | 0.01 | 2.16 | 0.00025 | 0.00004 | 0.00838 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.01 | 0.03 | 0.02 | 0.00003 | 0.00016 | 0.00010 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.01 | 0.07 | 0.05 | 0.00007 | 0.00038 | 0.00023 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.00 | 0.01 | 0.00 | 0.00001 | 0.00003 | 0.00002 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.00 | 0.01 | 0.00 | 0.00000 | 0.00003 | 0.00002 |
| Dsl - Shredders > 6 HP | 2270007010 | 0.01 | 0.03 | 0.03 | 0.00002 | 0.00013 | 0.00013 |
| **TOTAL** | | **3.79** | **0.26** | **23.49** | **0.01936** | **0.00126** | **0.12001** |

**Golf Courses Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 0.03 | 0.00 | 0.07 | 0.00009 | 0.00000 | 0.00023 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 0.25 | 0.00 | 0.53 | 0.00113 | 0.00000 | 0.00239 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 0.41 | 0.00 | 0.89 | 0.00182 | 0.00001 | 0.00399 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.02 | 0.00 | 0.34 | 0.00010 | 0.00001 | 0.00156 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.00 | 0.00 | 0.05 | 0.00001 | 0.00000 | 0.00021 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.11 | 0.04 | 6.21 | 0.00048 | 0.00015 | 0.02858 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.57 | 0.60 | 12.72 | 0.00255 | 0.00247 | 0.05853 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.61 | 0.21 | 40.89 | 0.00273 | 0.00088 | 0.18814 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.07 | 0.30 | 0.21 | 0.00032 | 0.00137 | 0.00094 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.03 | 0.15 | 0.10 | 0.00016 | 0.00069 | 0.00047 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.00 | 0.02 | 0.01 | 0.00001 | 0.00007 | 0.00003 |
| **TOTAL** | | **2.11** | **1.33** | **62.00** | **0.00940** | **0.00566** | **0.28505** |

**Government Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rotary Tillers <6 HP | 2260004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Chain Saws | 2260004021 | 0.01 | 0.00 | 0.03 | 0.00005 | 0.00000 | 0.00012 |
| Trimmers/ Edgers/ Brush Cutters | 2260004026 | 0.16 | 0.00 | 0.35 | 0.00079 | 0.00000 | 0.00170 |
| Leaf Blowers/ Vacuums | 2260004031 | 0.02 | 0.00 | 0.04 | 0.00009 | 0.00000 | 0.00021 |
| 4-Str Concrete/Industrial Saws | 2265002039 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Lawn Mowers | 2265004011 | 0.01 | 0.00 | 0.19 | 0.00006 | 0.00000 | 0.00094 |
| Rotary Tillers | 2265004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Trimmers/ Edgers/ Brush Cutters | 2265004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Leaf Blowers / Vacuums | 2265004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Rear Engine Riding Mowers | 2265004041 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Front Mowers | 2265004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Lawn and Garden Tractors | 2265004056 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Chippers/ Stump/ Grinders/ Mulchers | 2265004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Commercial Turf Equipment/ Sod Cutters | 2265004071 | 0.12 | 0.03 | 5.48 | 0.00057 | 0.00017 | 0.02672 |

## Non-Road Mobile Source Emissions - Gillespie County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Other Lawn and Garden Equipment - Pole Saw | 2265004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Water Pumps | 2265006010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Commercial Mowers | 2270004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Lawn and Garden Tractors | 2270004056 | 0.00 | 0.02 | 0.01 | 0.00002 | 0.00011 | 0.00007 |
| Chippers/ Stump/ Grinders/ Mulchers | 2270004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Commercial Turf Equipment/ Sod Cutters | 2270004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Shredders | 2270007010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.33** | **0.06** | **6.11** | **0.00158** | **0.00029** | **0.02976** |

**Agricultural Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4-Str Tractor - Corn | 2265005015 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00000 | 0.00004 |
| 4-Str Tractor - Hay | 2265005015 | 0.00 | 0.00 | 0.12 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Peanuts | 2265005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Sorghum | 2265005015 | 0.00 | 0.00 | 0.02 | 0.00000 | 0.00000 | 0.00008 |
| 4-Str Tractor - Cotton | 2265005015 | 0.00 | 0.00 | 0.02 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Small Grains | 2265005015 | 0.00 | 0.00 | 0.00 | 0.00001 | 0.00001 | 0.00024 |
| Dsl Tractor - Corn | 2270005015 | 0.05 | 0.42 | 0.26 | 0.00014 | 0.00117 | 0.00071 |
| Dsl Tractor - Hay | 2270005015 | 0.46 | 3.85 | 2.32 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Peanuts | 2270005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Sorghum | 2270005015 | 0.10 | 0.81 | 0.49 | 0.00031 | 0.00261 | 0.00157 |
| Dsl Tractor - Cotton | 2270005015 | 0.08 | 0.70 | 0.42 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Small Grains | 2270005015 | 0.00 | 0.00 | 0.00 | 0.00094 | 0.00780 | 0.00470 |
| Dsl Combine - Corn | 2270005020 | 0.02 | 0.34 | 0.12 | 0.00013 | 0.00198 | 0.00069 |
| Dsl Combine - Hay | 2270005020 | 0.08 | 1.24 | 0.43 | 0.00047 | 0.00731 | 0.00256 |
| Dsl Combine - Peanuts | 2270005020 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Combine - Sorghum | 2270005020 | 0.10 | 1.52 | 0.53 | 0.00021 | 0.00327 | 0.00114 |
| Dsl Combine - Cotton | 2270005020 | 0.04 | 0.56 | 0.19 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Combine - Small Grains | 2270005020 | 0.00 | 0.00 | 0.00 | 0.00058 | 0.00896 | 0.00313 |
| 2-Str Sprayers | 2260005035 | 0.13 | 0.13 | 0.13 | 0.00054 | 0.00000 | 0.00117 |
| 2-Str Hydro Power Units | 2260005050 | 0.02 | 0.02 | 0.02 | 0.00007 | 0.00000 | 0.00017 |
| 4-Str Balers | 2265005025 | 0.06 | 0.04 | 0.95 | 0.00023 | 0.00018 | 0.00411 |
| 4-Str Agricultural Mowers | 2265005030 | 0.02 | 0.00 | 0.78 | 0.00007 | 0.00002 | 0.00338 |
| 4-Str Sprayers | 2265005035 | 0.27 | 0.07 | 6.74 | 0.00110 | 0.00030 | 0.02901 |
| 4-Str Tillers > 6 HP | 2265005040 | 0.54 | 0.06 | 17.51 | 0.00227 | 0.00028 | 0.07534 |
| 4-Str Swathers | 2265005045 | 0.09 | 0.07 | 1.51 | 0.00033 | 0.00029 | 0.00651 |
| 4-Str Hydro Power Units | 2265005050 | 0.14 | 0.03 | 6.11 | 0.00059 | 0.00014 | 0.02630 |
| 4-Str Other Agriculture Equipment | 2265005055 | 0.11 | 0.08 | 3.10 | 0.00047 | 0.00035 | 0.01332 |
| 4-Str Irrigation Sets | 2265005060 | 0.12 | 0.12 | 2.89 | 0.00052 | 0.00050 | 0.01242 |
| LPG Hydro Power Units | 2267005050 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00002 | 0.00006 |
| LPG Other Agriculture Equipment | 2267005055 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00003 |
| LPG Irrigation Sets | 2267005060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00002 |
| CNG Hydro Power Units | 2268005050 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| CNG Other Agriculture Equipment | 2268005055 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00002 |
| CNG Irrigation Sets | 2268005060 | 0.00 | 0.14 | 0.59 | 0.00001 | 0.00061 | 0.00254 |
| Dsl - Balers | 2270005025 | 0.01 | 0.03 | 0.02 | 0.00003 | 0.00012 | 0.00009 |
| Dsl - Agricultural Mowers | 2270005030 | 0.00 | 0.01 | 0.00 | 0.00000 | 0.00002 | 0.00002 |
| Dsl - Sprayers | 2270005035 | 0.12 | 0.44 | 0.32 | 0.00051 | 0.00191 | 0.00138 |
| Dsl - Tillers > 6 HP | 2270005040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Swathers | 2270005045 | 0.05 | 0.50 | 0.20 | 0.00022 | 0.00217 | 0.00087 |
| Dsl - Hydro Power Units | 2270005050 | 0.02 | 0.11 | 0.05 | 0.00007 | 0.00048 | 0.00023 |
| Dsl - Other Agriculture Equipment | 2270005055 | 0.17 | 1.26 | 0.75 | 0.00075 | 0.00544 | 0.00321 |
| Dsl - Irrigation Sets | 2270005060 | 0.10 | 0.77 | 0.31 | 0.00041 | 0.00331 | 0.00134 |
| **TOTAL** | | **2.90** | **13.35** | **46.96** | **0.01100** | **0.04926** | **0.19637** |
| TOTAL NONROAD SOURCES | | 216.21 | 131.25 | 1,785.80 | 0.85920 | 0.49216 | 7.75087 |

## Non-Road Mobile Source Emissions - Guadalupe County, 2002

| GUADALUPE COUNTY<br>**NON-ROAD MOBILE SOURCES** | SCC Codes | VOC ton/year | NOx ton/year | CO ton/year | VOC ton/day M-F | NOx ton/day M-F | CO ton/day M-F |
|---|---|---|---|---|---|---|---|
| **Construction Equipment** | | | | | | | |
| 2-Str Tampers/Rammers | 2260002006 | 1.08 | 0.01 | 3.06 | 0.00505 | 0.00006 | 0.01427 |
| 2-Str Plate Compactors | 2260002009 | 0.06 | 0.00 | 0.14 | 0.00028 | 0.00000 | 0.00066 |
| 2-Str Paving Equipment | 2260002021 | 0.07 | 0.00 | 0.17 | 0.00033 | 0.00000 | 0.00079 |
| 2-Str Signal Boards/Light Plants | 2260002027 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| 2-Str Concrete/Industrial Saws | 2260002039 | 2.96 | 0.03 | 8.22 | 0.01381 | 0.00015 | 0.03836 |
| 2-Str Crushing/Proc. Equipment | 2260002054 | 0.01 | 0.00 | 0.03 | 0.00007 | 0.00000 | 0.00016 |
| 4-Str Pavers | 2265002003 | 0.06 | 0.02 | 2.71 | 0.00025 | 0.00011 | 0.01292 |
| 4-Str Tampers/Rammers | 2265002006 | 0.00 | 0.00 | 0.02 | 0.00000 | 0.00000 | 0.00010 |
| 4-Str Plate Compactors | 2265002009 | 0.21 | 0.03 | 5.00 | 0.00098 | 0.00013 | 0.02385 |
| 4-Str Rollers | 2265002015 | 0.09 | 0.04 | 5.14 | 0.00041 | 0.00018 | 0.02452 |
| 4-Str Paving Equipment | 2265002021 | 0.29 | 0.06 | 9.79 | 0.00130 | 0.00027 | 0.04666 |
| 4-Str Surfacing Equipment | 2265002024 | 0.11 | 0.03 | 4.44 | 0.00050 | 0.00011 | 0.02117 |
| 4-Str Signal Boards/Light Plants | 2265002027 | 0.01 | 0.00 | 0.23 | 0.00003 | 0.00001 | 0.00108 |
| 4-Str Trenchers | 2265002030 | 0.23 | 0.07 | 8.35 | 0.00103 | 0.00032 | 0.03979 |
| 4-Str Bore/Drill Rigs | 2265002033 | 0.13 | 0.02 | 2.44 | 0.00058 | 0.00010 | 0.01164 |
| 4-Str Concrete/Industrial Saws | 2265002039 | 0.33 | 0.13 | 20.95 | 0.00152 | 0.00055 | 0.09990 |
| 4-Str Cement & Mortar Mixers | 2265002042 | 0.31 | 0.05 | 8.61 | 0.00136 | 0.00022 | 0.04107 |
| 4-Str Cranes | 2265002045 | 0.01 | 0.01 | 0.35 | 0.00006 | 0.00005 | 0.00166 |
| 4-Str Crushing/Proc. Equipment | 2265002054 | 0.03 | 0.01 | 1.20 | 0.00013 | 0.00004 | 0.00574 |
| 4-Str Rough Terrain Forklift | 2265002057 | 0.02 | 0.02 | 0.46 | 0.00009 | 0.00009 | 0.00217 |
| 4-Str Rubber Tire Loaders | 2265002060 | 0.05 | 0.05 | 1.09 | 0.00021 | 0.00023 | 0.00520 |
| 4-Str Tractors/Loaders/Backhoes | 2265002066 | 0.10 | 0.04 | 6.42 | 0.00047 | 0.00017 | 0.03059 |
| 4-Str Skid Steer Loaders | 2265002072 | 0.08 | 0.06 | 2.89 | 0.00036 | 0.00024 | 0.01376 |
| 4-Str Dumpers/Tenders | 2265002078 | 0.04 | 0.01 | 1.34 | 0.00018 | 0.00004 | 0.00640 |
| 4-Str Other Construction Equipment | 2265002081 | 0.02 | 0.02 | 0.38 | 0.00008 | 0.00008 | 0.00183 |
| LPG-Pavers | 2267002003 | 0.00 | 0.02 | 0.06 | 0.00002 | 0.00007 | 0.00030 |
| LPG-Rollers | 2267002015 | 0.01 | 0.03 | 0.11 | 0.00003 | 0.00013 | 0.00051 |
| LPG-Paving Equipment | 2267002021 | 0.00 | 0.00 | 0.02 | 0.00001 | 0.00002 | 0.00008 |
| LPG-Surfacing Equipment | 2267002024 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00005 |
| LPG-Trenchers | 2267002030 | 0.01 | 0.05 | 0.20 | 0.00006 | 0.00023 | 0.00091 |
| LPG-Bore/Drill Rigs | 2267002033 | 0.00 | 0.02 | 0.06 | 0.00002 | 0.00008 | 0.00030 |
| LPG-Concrete/Industrial Saws | 2267002039 | 0.01 | 0.05 | 0.19 | 0.00006 | 0.00022 | 0.00088 |
| LPG-Cranes | 2267002045 | 0.00 | 0.02 | 0.07 | 0.00002 | 0.00008 | 0.00032 |
| LPG-Crushing/Proc. Equipment | 2267002054 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00005 |
| LPG-Rough Terrain Forklifts | 2267002057 | 0.01 | 0.03 | 0.12 | 0.00004 | 0.00015 | 0.00058 |
| LPG-Rubber Tire Loaders | 2267002060 | 0.02 | 0.08 | 0.31 | 0.00010 | 0.00036 | 0.00145 |
| LPG-Tractors/Loaders/Backhoes | 2267002066 | 0.00 | 0.01 | 0.03 | 0.00001 | 0.00004 | 0.00015 |
| LPG - Skid Steer Loaders | 2267002072 | 0.02 | 0.06 | 0.22 | 0.00007 | 0.00026 | 0.00103 |
| LPG-Other Construction Equipment | 2267002081 | 0.01 | 0.03 | 0.10 | 0.00003 | 0.00012 | 0.00048 |
| CNG-Other Construction Equipment | 2268002081 | 0.00 | 0.00 | 0.00 | 0.00002 | 0.00000 | 0.00002 |
| Dsl - Pavers | 2270002003 | 0.07 | 0.88 | 0.37 | 0.00035 | 0.00411 | 0.00172 |
| Dsl - Tampers/Rammers | 2270002006 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Plate Compactors | 2270002009 | 0.00 | 0.02 | 0.01 | 0.00002 | 0.00010 | 0.00006 |
| Dsl - Rollers | 2270002015 | 0.43 | 4.27 | 2.25 | 0.00201 | 0.01992 | 0.01050 |
| Dsl - Scrapers | 2270002018 | 0.03 | 0.38 | 0.19 | 0.00013 | 0.00177 | 0.00087 |
| Dsl - Paving Equipment | 2270002021 | 0.02 | 0.21 | 0.14 | 0.00011 | 0.00100 | 0.00064 |
| Dsl - Surfacing Equipment | 2270002024 | 0.34 | 3.62 | 2.23 | 0.00159 | 0.01688 | 0.01039 |
| Dsl - Signal Boards/Light Plants | 2270002027 | 0.08 | 0.45 | 0.27 | 0.00037 | 0.00210 | 0.00128 |
| Dsl - Trenchers | 2270002030 | 0.06 | 0.42 | 0.32 | 0.00027 | 0.00195 | 0.00148 |
| Dsl - Bore/Drill Rigs | 2270002033 | 0.28 | 3.63 | 0.95 | 0.00129 | 0.01692 | 0.00444 |
| Dsl - Excavators | 2270002036 | 0.94 | 11.71 | 5.02 | 0.00439 | 0.05460 | 0.02343 |
| Dsl - Concrete/Industrial Saws | 2270002039 | 0.02 | 0.13 | 0.10 | 0.00009 | 0.00063 | 0.00049 |
| Dsl - Cement & Mortar Mixers | 2270002042 | 0.00 | 0.01 | 0.01 | 0.00001 | 0.00006 | 0.00004 |
| Dsl - Cranes | 2270002045 | 0.18 | 2.24 | 0.60 | 0.00083 | 0.01044 | 0.00278 |
| Dsl - Graders | 2270002048 | 0.25 | 2.99 | 1.21 | 0.00118 | 0.01393 | 0.00565 |
| Dsl - Off-highway Trucks | 2270002051 | 0.18 | 2.09 | 0.95 | 0.00082 | 0.00975 | 0.00445 |
| Dsl - Crushing/Proc. Equipment | 2270002054 | 0.00 | 0.01 | 0.00 | 0.00000 | 0.00003 | 0.00002 |
| Dsl - Rough Terrain Forklifts | 2270002057 | 0.10 | 0.88 | 0.57 | 0.00047 | 0.00411 | 0.00265 |
| Dsl - Rubber Tire Loaders | 2270002060 | 0.54 | 7.11 | 2.44 | 0.00252 | 0.03318 | 0.01136 |
| Dsl - Tractors/Loaders/Backhoes | 2270002066 | 2.24 | 13.69 | 10.02 | 0.01042 | 0.06383 | 0.04673 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Skid Steer Loaders | 2270002072 | 0.66 | 1.99 | 2.56 | 0.00307 | 0.00928 | 0.01192 |
| Dsl - Off-Highway Tractors | 2270002075 | 0.00 | 0.06 | 0.02 | 0.00002 | 0.00026 | 0.00011 |
| Dsl - Dumpers/Tenders | 2270002078 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00001 |
| Dsl - Other Construction Equipment | 2270002081 | 0.12 | 1.17 | 0.71 | 0.00056 | 0.00545 | 0.00331 |
| **TOTAL** | | **12.95** | **59.07** | **125.91** | **0.0601** | **0.2752** | **0.5958** |

**Light Commercial Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Generator Sets | 2260006005 | 0.59 | 0.00 | 1.32 | 0.00187 | 0.00001 | 0.00419 |
| 2-Str Pumps | 2260006010 | 4.27 | 0.02 | 9.66 | 0.01351 | 0.00005 | 0.03063 |
| 2-Str Air Compressors | 2260006015 | 0.00 | 0.00 | 0.00 | 0.00001 | 0.00000 | 0.00001 |
| 4-Str Generator Sets | 2265006005 | 14.69 | 8.10 | 374.20 | 0.05303 | 0.03080 | 1.42220 |
| 4-Str Pumps | 2265006010 | 3.58 | 0.39 | 78.73 | 0.01326 | 0.00147 | 0.29512 |
| 4-Str Air Compressors | 2265006015 | 1.54 | 0.37 | 41.11 | 0.00571 | 0.00139 | 0.15401 |
| 4-Str Welders | 2265006025 | 3.38 | 2.19 | 140.12 | 0.01164 | 0.00773 | 0.49561 |
| 4-Str Pressure Washers | 2265006030 | 6.01 | 1.42 | 193.75 | 0.02037 | 0.00496 | 0.67864 |
| LPG-Generator Sets | 2267006005 | 0.07 | 0.37 | 0.96 | 0.00028 | 0.00141 | 0.00364 |
| LPG-Pumps | 2267006010 | 0.07 | 0.33 | 0.90 | 0.00022 | 0.00105 | 0.00286 |
| LPG-Air Compressors | 2267006015 | 0.08 | 0.40 | 1.10 | 0.00026 | 0.00128 | 0.00349 |
| LPG-Welders | 2267006025 | 0.12 | 0.45 | 1.76 | 0.00044 | 0.00164 | 0.00650 |
| LPG-Pressure Washers | 2267006030 | 0.00 | 0.01 | 0.03 | 0.00001 | 0.00002 | 0.00008 |
| CNG-Generator Sets | 2268006005 | 0.02 | 1.60 | 4.37 | 0.00006 | 0.00507 | 0.01384 |
| CNG-Pumps | 2268006010 | 0.00 | 0.02 | 0.06 | 0.00000 | 0.00007 | 0.00020 |
| CNG-Air Compressors | 2268006015 | 0.00 | 0.10 | 0.28 | 0.00000 | 0.00037 | 0.00105 |
| CNG-Gas Compressors | 2268006020 | 0.02 | 1.17 | 5.24 | 0.00006 | 0.00371 | 0.01661 |
| Dsl-Generator Sets | 2270006005 | 4.78 | 34.63 | 19.10 | 0.01815 | 0.13143 | 0.07250 |
| Dsl-Pumps | 2270006010 | 0.01 | 0.04 | 0.02 | 0.00003 | 0.00016 | 0.00009 |
| Dsl-Air Compressors | 2270006015 | 0.38 | 3.09 | 1.42 | 0.00146 | 0.01173 | 0.00539 |
| Dsl-Gas Compressors | 2270006020 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl-Welders | 2270006025 | 0.83 | 1.77 | 2.87 | 0.00315 | 0.00673 | 0.01093 |
| Dsl-Pressure Washers | 2270006030 | 0.01 | 0.05 | 0.03 | 0.00004 | 0.00019 | 0.00012 |
| **TOTAL** | | **40.46** | **56.51** | **877.04** | **0.14355** | **0.21127** | **3.21774** |

**Industrial Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Sweepers/Scrubbers | 2260003030 | 0.11 | 0.00 | 0.26 | 0.00036 | 0.00000 | 0.00082 |
| 2-Str Other General Industrial Eqp | 2260003040 | 0.01 | 0.00 | 0.02 | 0.00002 | 0.00000 | 0.00005 |
| 4-Str Aerial Lifts | 2265003010 | 5.35 | 5.45 | 138.86 | 0.01989 | 0.02074 | 0.52812 |
| 4-Str Forklifts | 2265003020 | 0.91 | 0.94 | 21.77 | 0.00285 | 0.00302 | 0.06956 |
| 4-Str Sweepers/Scrubbers | 2265003030 | 1.01 | 0.81 | 31.16 | 0.00338 | 0.00277 | 0.10600 |
| 4-Str Other General Industrial Eqp | 2265003040 | 1.87 | 0.30 | 49.55 | 0.00587 | 0.00097 | 0.15708 |
| 4-Str Other Material Handling Eqp | 2265003050 | 0.05 | 0.04 | 1.67 | 0.00016 | 0.00012 | 0.00530 |
| 4-Str AC\Refrigeration | 2265003060 | 0.02 | 0.01 | 1.04 | 0.00005 | 0.00002 | 0.00284 |
| 4-Str Terminal Tractors | 2265003070 | 0.19 | 0.20 | 4.66 | 0.00059 | 0.00064 | 0.01478 |
| 4-Str Other Oil Field Eqp | 2265010010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG-Aerial Lifts | 2267003010 | 0.22 | 0.81 | 3.21 | 0.00069 | 0.00257 | 0.01018 |
| LPG - Forklifts | 2267003020 | 27.74 | 102.25 | 409.84 | 0.09484 | 0.34955 | 1.40115 |
| LPG - Sweepers/Scrubbers | 2267003030 | 0.79 | 2.82 | 11.88 | 0.00233 | 0.00826 | 0.03482 |
| LPG-Other General Industrial Equipment | 2267003040 | 0.05 | 0.18 | 0.71 | 0.00015 | 0.00057 | 0.00226 |
| LPG - Other Material Handling Equipmen | 2267003050 | 0.01 | 0.04 | 0.17 | 0.00004 | 0.00014 | 0.00054 |
| LPG - Terminal Tractors | 2267003070 | 0.10 | 0.36 | 1.45 | 0.00031 | 0.00115 | 0.00460 |
| CNG-Forklifts | 2268003020 | 0.09 | 5.58 | 22.25 | 0.00028 | 0.01767 | 0.07055 |
| CNG - Sweepers/Scrubbers | 2268003030 | 0.00 | 0.01 | 0.03 | 0.00000 | 0.00002 | 0.00008 |
| CNG-Other General Industrial Equipment | 2268003040 | 0.00 | 0.00 | 0.02 | 0.00000 | 0.00001 | 0.00005 |
| CNG-AC\Refrigeration | 2268003060 | 0.00 | 0.01 | 0.04 | 0.00000 | 0.00003 | 0.00012 |
| CNG-Terminal Tractors | 2268003070 | 0.00 | 0.03 | 0.11 | 0.00000 | 0.00008 | 0.00033 |
| CNG-Other Oil Field Eqp | 2268010010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Aerial Lifts | 2270003010 | 0.71 | 3.39 | 2.38 | 0.00256 | 0.01224 | 0.00859 |
| Dsl - Forklifts | 2270003020 | 0.51 | 5.21 | 2.57 | 0.00190 | 0.01945 | 0.00958 |
| Dsl - Sweepers/Scrubbers | 2270003030 | 0.58 | 7.70 | 1.83 | 0.00222 | 0.02928 | 0.00695 |
| Dsl - Other General Industrial Eqp | 2270003040 | 1.40 | 18.90 | 5.32 | 0.00443 | 0.05991 | 0.01687 |
| Dsl - Other Material Handling Eqp | 2270003050 | 0.02 | 0.05 | 0.08 | 0.00007 | 0.00015 | 0.00024 |
| Dsl - AC\Refrigertion | 2270003060 | 0.90 | 5.40 | 3.18 | 0.00245 | 0.01467 | 0.00863 |
| Dsl - Terminal Tractors | 2270003070 | 1.09 | 25.10 | 8.62 | 0.00351 | 0.08061 | 0.02767 |

# Non-Road Mobile Source Emissions - Guadalupe County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Other Oil Field Eqp | 2270010010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **43.73** | **185.58** | **722.68** | **0.14895** | **0.62463** | **2.48778** |

**Railroad Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Railway Maintenance | 2285002015 | 0.19 | 0.96 | 0.82 | 0.00329 | 0.00000 | 0.00281 |
| 4-Str Railway Maintenance | 2285004015 | 0.05 | 0.01 | 2.05 | 0.00004 | 0.00000 | 0.00719 |
| LPG Railway Maintenance | 2285006015 | 0.00 | 0.00 | 0.01 | 0.00001 | 0.00000 | 0.00003 |
| Railroad | 2285002000 | 31.99 | 866.53 | 85.32 | 0.08766 | 2.37405 | 0.23375 |
| **TOTAL** | | **32.24** | **867.50** | **88.20** | **0.0910** | **2.3741** | **0.2438** |

**Mining Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Graders | 2270002048 | 0.00 | 0.00 | 0.00 | 0.0000 | 0.0000 | 0.0000 |
| Dsl - Off Highway Trucks | 2270002051 | 0.00 | 0.00 | 0.00 | 0.0000 | 0.0000 | 0.0000 |
| Dsl - Proc. Equipment | 2270002054 | 0.00 | 0.00 | 0.00 | 0.0000 | 0.0000 | 0.0000 |
| Dsl - Crawler Tractor/Dozers | 2270002069 | 0.00 | 0.00 | 0.00 | 0.0000 | 0.0000 | 0.0000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.0000** | **0.0000** | **0.0000** |

**Quarry Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Scrapers | 2270002018 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Excavators | 2270002036 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Graders | 2270002048 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Off Highway Trucks | 2270002051 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Rubber Tire Loaders | 2270002060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Tractors/Loaders/Backhoes | 2270002066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Crawler Tractors/Dozers | 2270002069 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Landfill Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Pavers | 2270002003 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Scrapers | 2270002018 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Excavators | 2270002036 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Graders | 2270002048 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Off Highway Trucks | 2270002051 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Rubber Tire Loaders | 2270002060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Crawler Tractors/Dozers | 2270002069 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Const. Equipment | 2270002081 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Recreational Boating**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Outboard | 2282005010 | 11.68 | 0.26 | 22.99 | 0.02668 | 0.00056 | 0.05042 |
| Personal Water Craft | 2282005015 | 5.14 | 0.07 | 10.00 | 0.01135 | 0.00016 | 0.02195 |
| Inboard/Sterndrive | 2282010005 | 0.94 | 0.40 | 11.11 | 0.00237 | 0.00081 | 0.02491 |
| Inboard/Sterndrive | 2282020005 | 0.03 | 0.73 | 0.12 | 0.00006 | 0.00160 | 0.00025 |
| Outboards | 2282020010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00000 |
| **TOTAL** | | **17.78** | **1.47** | **44.22** | **0.04046** | **0.00314** | **0.09754** |

**Recreational Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Offroad Motorcycles | 2260001010 | 16.40 | 0.04 | 15.68 | 0.05119 | 0.00012 | 0.04897 |
| 2-Str ATVs | 2260001030 | 16.47 | 0.04 | 15.77 | 0.05140 | 0.00012 | 0.04925 |
| 2-Str Specialty Vehicles / Carts | 2260001060 | 0.27 | 0.06 | 9.82 | 0.00081 | 0.00019 | 0.03066 |
| 4-Str Offroad Motorcycles | 2265001010 | 0.49 | 0.06 | 6.94 | 0.00151 | 0.00016 | 0.02216 |
| 4-Str ATVs | 2265001030 | 4.44 | 0.51 | 62.46 | 0.01364 | 0.00146 | 0.19940 |
| 4-Str Golf Carts | 2265001050 | 7.61 | 2.37 | 508.17 | 0.02347 | 0.00680 | 1.62233 |
| 4-Str Specialty Vehicles / Carts | 2265001060 | 0.28 | 0.05 | 8.73 | 0.00085 | 0.00015 | 0.02787 |
| LPG Specialty Vehicles / Carts | 2267001060 | 0.01 | 0.02 | 0.08 | 0.00002 | 0.00006 | 0.00026 |
| Dsl- Specialty Vehicle Carts | 2270001060 | 0.08 | 0.22 | 0.31 | 0.00025 | 0.00069 | 0.00097 |

# Non-Road Mobile Source Emissions - Guadalupe County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **TOTAL** | | **46.03** | **3.37** | **627.97** | **0.1431** | **0.0098** | **2.0019** |

**Residential Lawn & Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Res) | 2260004015 | 3.36 | 0.01 | 6.91 | 0.01774 | 0.00004 | 0.03528 |
| 2-Str Chain Saws < 6 HP (Res) | 2260004020 | 48.31 | 0.11 | 88.75 | 0.25492 | 0.00058 | 0.45282 |
| 2-Str Trimmers/Edgers/Brush Cutter (Res) | 2260004025 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Leafblowers/Vacuums (Res) | 2260004030 | 28.13 | 0.07 | 56.52 | 0.14866 | 0.00037 | 0.28837 |
| 4-Str Lawn Mowers (Res) | 2265004010 | 79.07 | 6.25 | 1,069.31 | 0.37390 | 0.02930 | 5.57756 |
| 4-Str Rotary Tillers <6 HP (Res) | 2265004015 | 9.12 | 0.69 | 116.51 | 0.04310 | 0.00322 | 0.60773 |
| 4-Str Trimmers/Edgers/Brush Cutters (Res) | 2265004025 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Leafblowers/Vacuums (Res) | 2265004030 | 0.75 | 0.06 | 10.21 | 0.00356 | 0.00028 | 0.05325 |
| 4-Str Rear Engine Riding Mower (Res) | 2265004040 | 4.52 | 1.12 | 175.11 | 0.02151 | 0.00525 | 0.91341 |
| 4-Str Lawn & Garden Tractors (Res) | 2265004055 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Other Lawn & Garden Equip. (Res) | 2265004075 | 32.47 | 3.76 | 670.65 | 0.15384 | 0.01763 | 3.49817 |
| **TOTAL** | | **205.72** | **12.08** | **2,193.98** | **1.01724** | **0.05667** | **11.42660** |

**Commercial Lawn & Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 0.19 | 0.00 | 0.40 | 0.00095 | 0.00000 | 0.00198 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 44.90 | 0.42 | 107.92 | 0.16521 | 0.00153 | 0.39700 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 19.61 | 0.08 | 42.24 | 0.09787 | 0.00039 | 0.21092 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 12.26 | 0.08 | 29.28 | 0.06117 | 0.00041 | 0.14620 |
| 2-Str Commercial Turf Equipment (Com) | 2260004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 3.16 | 0.27 | 47.23 | 0.01560 | 0.00123 | 0.24113 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.48 | 0.04 | 6.90 | 0.00236 | 0.00019 | 0.03520 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.21 | 0.02 | 3.79 | 0.00104 | 0.00010 | 0.01932 |
| 4-Str Leafblowers/Vacuums (Com) | 2265004031 | 2.48 | 0.95 | 102.50 | 0.01231 | 0.00434 | 0.52327 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 1.59 | 0.52 | 91.29 | 0.00780 | 0.00240 | 0.46602 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.86 | 0.22 | 35.87 | 0.00415 | 0.00100 | 0.18312 |
| 4-Str Shredders < 6 HP (Com) | 2265004051 | 0.45 | 0.04 | 6.44 | 0.00224 | 0.00017 | 0.03288 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 0.68 | 0.23 | 38.42 | 0.00337 | 0.00104 | 0.19613 |
| 4-Str Chippers/Stump Grinders (Com) | 2265004066 | 3.97 | 2.72 | 183.35 | 0.01942 | 0.01245 | 0.93602 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.06 | 0.02 | 2.77 | 0.00029 | 0.00009 | 0.01412 |
| 4-Str Other Lawn & Garden Equip. (Com) | 2265004076 | 2.00 | 0.23 | 41.23 | 0.00931 | 0.00108 | 0.21050 |
| LPG Chippers/Stump Grinders (Com) | 2267004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Leafblowers/Vacuums (Com) | 2270004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Front Mowers (Com) | 2270004046 | 1.75 | 8.80 | 5.58 | 0.00873 | 0.04394 | 0.02784 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.02 | 0.09 | 0.06 | 0.00009 | 0.00047 | 0.00029 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.93 | 7.33 | 3.76 | 0.00465 | 0.03659 | 0.01875 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.00 | 0.02 | 0.01 | 0.00002 | 0.00011 | 0.00007 |
| **TOTAL** | | **95.59** | **22.07** | **749.02** | **0.41658** | **0.10753** | **3.66078** |

**University/Colleges Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 0.40 | 0.00 | 0.80 | 0.00145 | 0.00001 | 0.00291 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 1.73 | 0.01 | 3.65 | 0.00860 | 0.00003 | 0.01810 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 0.91 | 0.00 | 1.99 | 0.00453 | 0.00001 | 0.00990 |
| 2-Str Commercial Turf Equipment (Com) | 2260004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractors/Loaders/Backhoe | 2265002066 | 0.04 | 0.04 | 0.85 | 0.00015 | 0.00016 | 0.00362 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.06 | 0.01 | 1.22 | 0.00031 | 0.00003 | 0.00618 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.00 | 0.00 | 0.05 | 0.00002 | 0.00000 | 0.00025 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Leafblowers/Vacuums (Com) | 2265004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 0.31 | 0.09 | 15.42 | 0.00153 | 0.00042 | 0.07831 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.10 | 0.04 | 4.38 | 0.00050 | 0.00017 | 0.02226 |
| 4-Str Shredders < 6 HP (Com) | 2265004051 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 0.00 | 0.00 | 0.14 | 0.00002 | 0.00000 | 0.00072 |
| 4-Str Chippers/Stump Grinders (Com) | 2265004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Other Lawn & Garden Equip. (Com) | 2265004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4-Str Tillers > 6 HP | 2265005040 | 0.00 | 0.00 | 0.05 | 0.00001 | 0.00000 | 0.00024 |
| LPG Chippers/Stump Grinders (Com) | 2267004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Shredders > 6 HP | 2265007010 | 0.01 | 0.00 | 0.22 | 0.00003 | 0.00000 | 0.00070 |
| Dsl - Leafblowers/Vacuums (Com) | 2270004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.04 | 0.19 | 0.13 | 0.00021 | 0.00092 | 0.00063 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.01 | 0.03 | 0.02 | 0.00004 | 0.00016 | 0.00011 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.00 | 0.01 | 0.00 | 0.00001 | 0.00004 | 0.00002 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Shredders > 6 HP | 2270007010 | 0.06 | 0.38 | 0.34 | 0.00018 | 0.00121 | 0.00107 |
| **TOTAL** | | **3.68** | **0.80** | **29.25** | **0.01757** | **0.00317** | **0.14501** |

**Public Schools Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 0.00 | 0.00 | 0.01 | 0.00002 | 0.00000 | 0.00006 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 0.29 | 0.00 | 0.58 | 0.00111 | 0.00000 | 0.00222 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 9.64 | 0.03 | 20.33 | 0.04974 | 0.00015 | 0.10498 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 1.83 | 0.01 | 4.00 | 0.00944 | 0.00003 | 0.02066 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.75 | 0.06 | 11.35 | 0.00382 | 0.00031 | 0.05994 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.01 | 0.00 | 0.17 | 0.00006 | 0.00000 | 0.00090 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 0.25 | 0.08 | 14.08 | 0.00129 | 0.00040 | 0.07435 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.24 | 0.05 | 9.53 | 0.00122 | 0.00023 | 0.05031 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 1.31 | 0.11 | 21.22 | 0.00670 | 0.00053 | 0.11203 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.05 | 0.06 | 1.27 | 0.00028 | 0.00030 | 0.00670 |
| 4-Str Shredders > 6 HP | 2265007010 | 0.25 | 0.04 | 8.38 | 0.00095 | 0.00014 | 0.03260 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.02 | 0.12 | 0.08 | 0.00013 | 0.00062 | 0.00040 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.05 | 0.28 | 0.18 | 0.00028 | 0.00146 | 0.00091 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.01 | 0.03 | 0.02 | 0.00003 | 0.00013 | 0.00009 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.00 | 0.02 | 0.01 | 0.00002 | 0.00011 | 0.00006 |
| Dsl - Shredders > 6 HP | 2270007010 | 0.02 | 0.13 | 0.13 | 0.00008 | 0.00050 | 0.00051 |
| **TOTAL** | | **14.75** | **1.03** | **91.35** | **0.07518** | **0.00492** | **0.46672** |

**Golf Courses Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 0.12 | 0.00 | 0.31 | 0.00041 | 0.00000 | 0.00102 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 1.13 | 0.00 | 2.38 | 0.00509 | 0.00002 | 0.01073 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 1.82 | 0.01 | 3.98 | 0.00818 | 0.00003 | 0.01789 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.10 | 0.01 | 1.52 | 0.00045 | 0.00004 | 0.00701 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.01 | 0.00 | 0.20 | 0.00006 | 0.00000 | 0.00094 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.48 | 0.16 | 27.89 | 0.00214 | 0.00066 | 0.12834 |
| 4-Str Front Mowers (Com) | 2265004046 | 2.58 | 2.69 | 57.11 | 0.01119 | 0.01111 | 0.26279 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 2.74 | 0.96 | 183.58 | 0.01213 | 0.00397 | 0.84472 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.32 | 1.37 | 0.94 | 0.00142 | 0.00615 | 0.00421 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.15 | 0.69 | 0.46 | 0.00070 | 0.00311 | 0.00209 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.01 | 0.07 | 0.03 | 0.00003 | 0.00031 | 0.00013 |
| **TOTAL** | | **9.47** | **5.95** | **278.40** | **0.04181** | **0.02539** | **1.27986** |

**Government Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rotary Tillers <6 HP | 2260004016 | 0.13 | 0.00 | 0.26 | 0.00062 | 0.00000 | 0.00129 |
| Chain Saws | 2260004021 | 6.13 | 0.06 | 14.72 | 0.02192 | 0.00020 | 0.05267 |
| Trimmers/ Edgers/ Brush Cutters | 2260004026 | 5.82 | 0.02 | 12.52 | 0.02550 | 0.00010 | 0.05492 |
| Leaf Blowers/ Vacuums | 2260004031 | 3.99 | 0.03 | 9.52 | 0.01467 | 0.00010 | 0.03503 |
| 4-Str Concrete/Industrial Saws | 2265002039 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Lawn Mowers | 2265004011 | 0.29 | 0.02 | 4.45 | 0.00141 | 0.00011 | 0.02172 |
| Rotary Tillers | 2265004016 | 0.00 | 0.00 | 0.03 | 0.00001 | 0.00000 | 0.00013 |
| Trimmers/ Edgers/ Brush Cutters | 2265004026 | 0.01 | 0.00 | 0.21 | 0.00006 | 0.00001 | 0.00103 |
| Leaf Blowers / Vacuums | 2265004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Rear Engine Riding Mowers | 2265004041 | 0.73 | 0.22 | 42.76 | 0.00353 | 0.00107 | 0.20861 |
| Front Mowers | 2265004046 | 0.19 | 0.04 | 8.06 | 0.00091 | 0.00022 | 0.03931 |
| Lawn and Garden Tractors | 2265004056 | 0.12 | 0.04 | 6.72 | 0.00057 | 0.00017 | 0.03280 |
| Chippers/ Stump/ Grinders/ Mulchers | 2265004066 | 0.13 | 0.08 | 6.15 | 0.00063 | 0.00040 | 0.03002 |
| Commercial Turf Equipment/ Sod Cutters | 2265004071 | 1.69 | 0.49 | 79.75 | 0.00659 | 0.00194 | 0.31400 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Other Lawn and Garden Equipment - Pole Saw | 2265004076 | 2.03 | 0.21 | 41.21 | 0.00947 | 0.00103 | 0.20085 |
| Water Pumps | 2265006010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Commercial Mowers | 2270004046 | 1.00 | 0.23 | 42.22 | 0.00477 | 0.00113 | 0.20573 |
| Lawn and Garden Tractors | 2270004056 | 0.04 | 3.01 | 1.54 | 0.00135 | 0.01060 | 0.00543 |
| Chippers/ Stump/ Grinders/ Mulchers | 2270004066 | 0.38 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Commercial Turf Equipment/ Sod Cutters | 2270004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Shredders | 2270007010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **22.67** | **4.46** | **270.13** | **0.09200** | **0.01708** | **1.20354** |

**Agricultural Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4-Str Tractor - Corn | 2265005015 | 0.01 | 0.01 | 0.47 | 0.00004 | 0.00004 | 0.00131 |
| 4-Str Tractor - Hay | 2265005015 | 0.01 | 0.01 | 0.21 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Peanuts | 2265005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Sorghum | 2265005015 | 0.00 | 0.00 | 0.11 | 0.00004 | 0.00004 | 0.00122 |
| 4-Str Tractor - Cotton | 2265005015 | 0.01 | 0.01 | 0.33 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Small Grains | 2265005015 | 0.00 | 0.00 | 0.00 | 0.00003 | 0.00003 | 0.00105 |
| Dsl Tractor - Corn | 2270005015 | 1.88 | 15.62 | 9.41 | 0.00529 | 0.03932 | 0.02600 |
| Dsl Tractor - Hay | 2270005015 | 0.83 | 6.94 | 4.18 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Peanuts | 2270005015 | 0.00 | 0.02 | 0.02 | 0.00001 | 0.00010 | 0.00007 |
| Dsl Tractor - Sorghum | 2270005015 | 0.43 | 3.57 | 2.15 | 0.00495 | 0.03678 | 0.02432 |
| Dsl Tractor - Cotton | 2270005015 | 1.31 | 10.85 | 6.53 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Small Grains | 2270005015 | 0.00 | 0.00 | 0.00 | 0.00424 | 0.03147 | 0.02081 |
| Dsl Combine - Corn | 2270005020 | 0.81 | 12.39 | 4.34 | 0.00671 | 0.09604 | 0.02550 |
| Dsl Combine - Hay | 2270005020 | 0.15 | 2.24 | 0.78 | 0.00121 | 0.01733 | 0.00460 |
| Dsl Combine - Peanuts | 2270005020 | 0.01 | 0.09 | 0.03 | 0.00007 | 0.00105 | 0.00028 |
| Dsl Combine - Sorghum | 2270005020 | 0.44 | 6.75 | 2.36 | 0.00466 | 0.06669 | 0.01771 |
| Dsl Combine - Cotton | 2270005020 | 0.57 | 8.60 | 3.01 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Combine - Small Grains | 2270005020 | 0.00 | 0.00 | 0.00 | 0.00366 | 0.05231 | 0.01389 |
| 2-Str Sprayers | 2260005035 | 0.27 | 0.00 | 0.59 | 0.00117 | 0.00000 | 0.00253 |
| 2-Str Hydro Power Units | 2260005050 | 0.04 | 0.00 | 0.08 | 0.00015 | 0.00000 | 0.00036 |
| 4-Str Balers | 2265005025 | 0.12 | 0.09 | 2.06 | 0.00046 | 0.00040 | 0.00888 |
| 4-Str Agricultural Mowers | 2265005030 | 0.04 | 0.01 | 1.70 | 0.00015 | 0.00004 | 0.00730 |
| 4-Str Sprayers | 2265005035 | 0.56 | 0.15 | 14.57 | 0.00232 | 0.00065 | 0.06269 |
| 4-Str Tillers > 6 HP | 2265005040 | 1.14 | 0.14 | 37.84 | 0.00487 | 0.00060 | 0.16283 |
| 4-Str Swathers | 2265005045 | 0.17 | 0.15 | 3.27 | 0.00068 | 0.00063 | 0.01406 |
| 4-Str Hydro Power Units | 2265005050 | 0.30 | 0.07 | 13.21 | 0.00126 | 0.00030 | 0.05683 |
| 4-Str Other Agriculture Equipment | 2265005055 | 0.24 | 0.18 | 6.69 | 0.00098 | 0.00075 | 0.02880 |
| 4-Str Irrigation Sets | 2265005060 | 0.26 | 0.25 | 6.24 | 0.00110 | 0.00109 | 0.02684 |
| LPG Hydro Power Units | 2267005050 | 0.00 | 0.01 | 0.03 | 0.00001 | 0.00003 | 0.00013 |
| LPG Other Agriculture Equipment | 2267005055 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00005 |
| LPG Irrigation Sets | 2267005060 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00004 |
| CNG Hydro Power Units | 2268005050 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| CNG Other Agriculture Equipment | 2268005055 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00005 |
| CNG Irrigation Sets | 2268005060 | 0.01 | 0.31 | 1.28 | 0.00002 | 0.00131 | 0.00549 |
| Dsl - Balers | 2270005025 | 0.02 | 0.06 | 0.05 | 0.00007 | 0.00025 | 0.00020 |
| Dsl - Agricultural Mowers | 2270005030 | 0.00 | 0.01 | 0.01 | 0.00001 | 0.00005 | 0.00004 |
| Dsl - Sprayers | 2270005035 | 0.26 | 0.96 | 0.69 | 0.00110 | 0.00413 | 0.00299 |
| Dsl - Tillers > 6 HP | 2270005040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00001 |
| Dsl - Swathers | 2270005045 | 0.11 | 1.09 | 0.44 | 0.00048 | 0.00468 | 0.00188 |
| Dsl - Hydro Power Units | 2270005050 | 0.03 | 0.24 | 0.12 | 0.00015 | 0.00105 | 0.00050 |
| Dsl - Other Agriculture Equipment | 2270005055 | 0.38 | 2.73 | 1.61 | 0.00162 | 0.01175 | 0.00693 |
| Dsl - Irrigation Sets | 2270005060 | 0.21 | 1.66 | 0.67 | 0.00089 | 0.00716 | 0.00290 |
| **TOTAL** | | **10.62** | **75.21** | **125.10** | **0.04844** | **0.37611** | **0.52909** |
| TOTAL NONROAD SOURCES | | 555.70 | 1,295.10 | 6,223.26 | 2.33602 | 4.08897 | 27.35608 |

# Non-Road Mobile Source Emissions - Karnes County, 2002

| KARNES COUNTY NON-ROAD MOBILE SOURCES | SCC Codes | VOC ton/year | NOx ton/year | CO ton/year | VOC ton/day M-F | NOx ton/day M-F | CO ton/day M-F |
|---|---|---|---|---|---|---|---|
| **Construction Equipment** | | | | | | | |
| 2-Str Tampers/Rammers | 2260002006 | 0.17 | 0.00 | 0.49 | 0.00080 | 0.00001 | 0.00226 |
| 2-Str Plate Compactors | 2260002009 | 0.01 | 0.00 | 0.02 | 0.00004 | 0.00000 | 0.00010 |
| 2-Str Paving Equipment | 2260002021 | 0.01 | 0.00 | 0.03 | 0.00005 | 0.00000 | 0.00013 |
| 2-Str Signal Boards/Light Plants | 2260002027 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Concrete/Industrial Saws | 2260002039 | 0.47 | 0.01 | 1.30 | 0.00219 | 0.00002 | 0.00609 |
| 2-Str Crushing/Proc. Equipment | 2260002054 | 0.00 | 0.00 | 0.01 | 0.00001 | 0.00000 | 0.00003 |
| 4-Str Pavers | 2265002003 | 0.01 | 0.00 | 0.43 | 0.00004 | 0.00002 | 0.00205 |
| 4-Str Tampers/Rammers | 2265002006 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00002 |
| 4-Str Plate Compactors | 2265002009 | 0.03 | 0.00 | 0.79 | 0.00016 | 0.00002 | 0.00378 |
| 4-Str Rollers | 2265002015 | 0.01 | 0.01 | 0.82 | 0.00006 | 0.00003 | 0.00389 |
| 4-Str Paving Equipment | 2265002021 | 0.05 | 0.01 | 1.55 | 0.00021 | 0.00004 | 0.00740 |
| 4-Str Surfacing Equipment | 2265002024 | 0.02 | 0.00 | 0.70 | 0.00008 | 0.00002 | 0.00336 |
| 4-Str Signal Boards/Light Plants | 2265002027 | 0.00 | 0.00 | 0.04 | 0.00001 | 0.00000 | 0.00017 |
| 4-Str Trenchers | 2265002030 | 0.04 | 0.01 | 1.32 | 0.00016 | 0.00005 | 0.00631 |
| 4-Str Bore/Drill Rigs | 2265002033 | 0.02 | 0.00 | 0.39 | 0.00009 | 0.00002 | 0.00185 |
| 4-Str Concrete/Industrial Saws | 2265002039 | 0.05 | 0.02 | 3.32 | 0.00024 | 0.00009 | 0.01585 |
| 4-Str Cement & Mortar Mixers | 2265002042 | 0.05 | 0.01 | 1.37 | 0.00022 | 0.00003 | 0.00652 |
| 4-Str Cranes | 2265002045 | 0.00 | 0.00 | 0.06 | 0.00001 | 0.00001 | 0.00026 |
| 4-Str Crushing/Proc. Equipment | 2265002054 | 0.00 | 0.00 | 0.19 | 0.00002 | 0.00001 | 0.00091 |
| 4-Str Rough Terrain Forklift | 2265002057 | 0.00 | 0.00 | 0.07 | 0.00001 | 0.00001 | 0.00034 |
| 4-Str Rubber Tire Loaders | 2265002060 | 0.01 | 0.01 | 0.17 | 0.00003 | 0.00004 | 0.00082 |
| 4-Str Tractors/Loaders/Backhoes | 2265002066 | 0.02 | 0.01 | 1.02 | 0.00007 | 0.00003 | 0.00485 |
| 4-Str Skid Steer Loaders | 2265002072 | 0.01 | 0.01 | 0.46 | 0.00006 | 0.00004 | 0.00218 |
| 4-Str Dumpers/Tenders | 2265002078 | 0.01 | 0.00 | 0.21 | 0.00003 | 0.00001 | 0.00102 |
| 4-Str Other Construction Equipment | 2265002081 | 0.00 | 0.00 | 0.06 | 0.00001 | 0.00001 | 0.00029 |
| LPG-Pavers | 2267002003 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00005 |
| LPG-Rollers | 2267002015 | 0.00 | 0.00 | 0.02 | 0.00001 | 0.00002 | 0.00008 |
| LPG-Paving Equipment | 2267002021 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| LPG-Surfacing Equipment | 2267002024 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| LPG-Trenchers | 2267002030 | 0.00 | 0.01 | 0.03 | 0.00001 | 0.00004 | 0.00015 |
| LPG-Bore/Drill Rigs | 2267002033 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00005 |
| LPG-Concrete/Industrial Saws | 2267002039 | 0.00 | 0.01 | 0.03 | 0.00001 | 0.00003 | 0.00014 |
| LPG-Cranes | 2267002045 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00005 |
| LPG-Crushing/Proc. Equipment | 2267002054 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| LPG-Rough Terrain Forklifts | 2267002057 | 0.00 | 0.00 | 0.02 | 0.00001 | 0.00002 | 0.00009 |
| LPG-Rubber Tire Loaders | 2267002060 | 0.00 | 0.01 | 0.05 | 0.00002 | 0.00006 | 0.00023 |
| LPG-Tractors/Loaders/Backhoes | 2267002066 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00002 |
| LPG - Skid Steer Loaders | 2267002072 | 0.00 | 0.01 | 0.04 | 0.00001 | 0.00004 | 0.00016 |
| LPG-Other Construction Equipment | 2267002081 | 0.00 | 0.00 | 0.02 | 0.00001 | 0.00002 | 0.00008 |
| CNG-Other Construction Equipment | 2268002081 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Pavers | 2270002003 | 0.01 | 0.14 | 0.06 | 0.00006 | 0.00065 | 0.00027 |
| Dsl - Tampers/Rammers | 2270002006 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Plate Compactors | 2270002009 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00002 | 0.00001 |
| Dsl - Rollers | 2270002015 | 0.07 | 0.68 | 0.36 | 0.00032 | 0.00316 | 0.00167 |
| Dsl - Scrapers | 2270002018 | 0.00 | 0.06 | 0.03 | 0.00002 | 0.00028 | 0.00014 |
| Dsl - Paving Equipment | 2270002021 | 0.00 | 0.03 | 0.02 | 0.00002 | 0.00016 | 0.00010 |
| Dsl - Surfacing Equipment | 2270002024 | 0.05 | 0.57 | 0.35 | 0.00025 | 0.00268 | 0.00165 |
| Dsl - Signal Boards/Light Plants | 2270002027 | 0.01 | 0.07 | 0.04 | 0.00006 | 0.00033 | 0.00020 |
| Dsl - Trenchers | 2270002030 | 0.01 | 0.07 | 0.05 | 0.00004 | 0.00031 | 0.00024 |
| Dsl - Bore/Drill Rigs | 2270002033 | 0.04 | 0.58 | 0.15 | 0.00020 | 0.00268 | 0.00070 |
| Dsl - Excavators | 2270002036 | 0.15 | 1.86 | 0.80 | 0.00070 | 0.00866 | 0.00372 |
| Dsl - Concrete/Industrial Saws | 2270002039 | 0.00 | 0.02 | 0.02 | 0.00001 | 0.00010 | 0.00008 |
| Dsl - Cement & Mortar Mixers | 2270002042 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00001 |
| Dsl - Cranes | 2270002045 | 0.03 | 0.36 | 0.09 | 0.00013 | 0.00166 | 0.00044 |
| Dsl - Graders | 2270002048 | 0.04 | 0.47 | 0.19 | 0.00019 | 0.00221 | 0.00090 |
| Dsl - Off-highway Trucks | 2270002051 | 0.03 | 0.33 | 0.15 | 0.00013 | 0.00155 | 0.00071 |
| Dsl - Crushing/Proc. Equipment | 2270002054 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Rough Terrain Forklifts | 2270002057 | 0.02 | 0.14 | 0.09 | 0.00007 | 0.00065 | 0.00042 |
| Dsl - Rubber Tire Loaders | 2270002060 | 0.09 | 1.13 | 0.39 | 0.00040 | 0.00526 | 0.00180 |
| Dsl - Tractors/Loaders/Backhoes | 2270002066 | 0.35 | 2.17 | 1.59 | 0.00165 | 0.01013 | 0.00741 |

## Non-Road Mobile Source Emissions - Karnes County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Skid Steer Loaders | 2270002072 | 0.10 | 0.32 | 0.41 | 0.00049 | 0.00147 | 0.00189 |
| Dsl - Off-Highway Tractors | 2270002075 | 0.00 | 0.01 | 0.00 | 0.00000 | 0.00004 | 0.00002 |
| Dsl - Dumpers/Tenders | 2270002078 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Construction Equipment | 2270002081 | 0.02 | 0.19 | 0.11 | 0.00009 | 0.00087 | 0.00053 |
| **TOTAL** | | **2.05** | **9.37** | **19.98** | **0.00954** | **0.04367** | **0.09453** |

**Light Commercial Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Generator Sets | 2260006005 | 0.13 | 0.00 | 0.29 | 0.00040 | 0.00000 | 0.00091 |
| 2-Str Pumps | 2260006010 | 0.92 | 0.00 | 2.09 | 0.00292 | 0.00001 | 0.00663 |
| 2-Str Air Compressors | 2260006015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Generator Sets | 2265006005 | 3.18 | 1.75 | 81.01 | 0.01148 | 0.00667 | 0.30790 |
| 4-Str Pumps | 2265006010 | 0.77 | 0.08 | 17.05 | 0.00287 | 0.00032 | 0.06389 |
| 4-Str Air Compressors | 2265006015 | 0.33 | 0.08 | 8.90 | 0.00124 | 0.00030 | 0.03334 |
| 4-Str Welders | 2265006025 | 0.73 | 0.47 | 30.33 | 0.00252 | 0.00167 | 0.10730 |
| 4-Str Pressure Washers | 2265006030 | 1.30 | 0.31 | 41.95 | 0.00441 | 0.00107 | 0.14692 |
| LPG-Generator Sets | 2267006005 | 0.02 | 0.08 | 0.21 | 0.00006 | 0.00031 | 0.00079 |
| LPG-Pumps | 2267006010 | 0.01 | 0.07 | 0.20 | 0.00005 | 0.00023 | 0.00062 |
| LPG-Air Compressors | 2267006015 | 0.02 | 0.09 | 0.24 | 0.00006 | 0.00028 | 0.00076 |
| LPG-Welders | 2267006025 | 0.03 | 0.10 | 0.38 | 0.00010 | 0.00036 | 0.00141 |
| LPG-Pressure Washers | 2267006030 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00000 | 0.00002 |
| CNG-Generator Sets | 2268006005 | 0.00 | 0.35 | 0.95 | 0.00001 | 0.00110 | 0.00300 |
| CNG-Pumps | 2268006010 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00002 | 0.00004 |
| CNG-Air Compressors | 2268006015 | 0.00 | 0.02 | 0.06 | 0.00000 | 0.00008 | 0.00023 |
| CNG-Gas Compressors | 2268006020 | 0.00 | 0.25 | 1.13 | 0.00001 | 0.00080 | 0.00360 |
| Dsl-Generator Sets | 2270006005 | 1.04 | 7.50 | 4.14 | 0.00393 | 0.02845 | 0.01570 |
| Dsl-Pumps | 2270006010 | 0.00 | 0.01 | 0.01 | 0.00001 | 0.00003 | 0.00002 |
| Dsl-Air Compressors | 2270006015 | 0.08 | 0.67 | 0.31 | 0.00032 | 0.00254 | 0.00117 |
| Dsl-Gas Compressors | 2270006020 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl-Welders | 2270006025 | 0.18 | 0.38 | 0.62 | 0.00068 | 0.00146 | 0.00237 |
| Dsl-Pressure Washers | 2270006030 | 0.00 | 0.01 | 0.01 | 0.00001 | 0.00004 | 0.00003 |
| **TOTAL** | | **8.76** | **12.23** | **189.88** | **0.03108** | **0.04574** | **0.69662** |

**Industrial Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Sweepers/Scrubbers | 2260003030 | 0.00 | 0.00 | 0.01 | 0.00001 | 0.00000 | 0.00002 |
| 2-Str Other General Industrial Eqp | 2260003040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Aerial Lifts | 2265003010 | 0.15 | 0.15 | 3.88 | 0.00056 | 0.00058 | 0.01475 |
| 4-Str Forklifts | 2265003020 | 0.03 | 0.03 | 0.61 | 0.00008 | 0.00008 | 0.00194 |
| 4-Str Sweepers/Scrubbers | 2265003030 | 0.03 | 0.02 | 0.87 | 0.00009 | 0.00008 | 0.00296 |
| 4-Str Other General Industrial Eqp | 2265003040 | 0.05 | 0.01 | 1.38 | 0.00016 | 0.00003 | 0.00439 |
| 4-Str Other Material Handling Eqp | 2265003050 | 0.00 | 0.00 | 0.05 | 0.00000 | 0.00000 | 0.00015 |
| 4-Str AC\Refrigeration | 2265003060 | 0.00 | 0.00 | 0.17 | 0.00001 | 0.00000 | 0.00047 |
| 4-Str Terminal Tractors | 2265003070 | 0.01 | 0.01 | 0.13 | 0.00002 | 0.00002 | 0.00041 |
| 4-Str Other Oil Field Eqp | 2265010010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG-Aerial Lifts | 2267003010 | 0.01 | 0.02 | 0.09 | 0.00002 | 0.00007 | 0.00028 |
| LPG - Forklifts | 2267003020 | 0.77 | 2.86 | 11.45 | 0.00265 | 0.00976 | 0.03914 |
| LPG - Sweepers/Scrubbers | 2267003030 | 0.02 | 0.08 | 0.33 | 0.00007 | 0.00023 | 0.00097 |
| LPG-Other General Industrial Equipment | 2267003040 | 0.00 | 0.00 | 0.02 | 0.00000 | 0.00002 | 0.00006 |
| LPG - Other Material Handling Equipmen | 2267003050 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00002 |
| LPG - Terminal Tractors | 2267003070 | 0.00 | 0.01 | 0.04 | 0.00001 | 0.00003 | 0.00013 |
| CNG-Forklifts | 2268003020 | 0.00 | 0.16 | 0.62 | 0.00001 | 0.00049 | 0.00197 |
| CNG - Sweepers/Scrubbers | 2268003030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| CNG-Other General Industrial Equipment | 2268003040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| CNG-AC\Refrigeration | 2268003060 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00000 | 0.00002 |
| CNG-Terminal Tractors | 2268003070 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| CNG-Other Oil Field Eqp | 2268010010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Aerial Lifts | 2270003010 | 0.02 | 0.09 | 0.07 | 0.00007 | 0.00034 | 0.00024 |
| Dsl - Forklifts | 2270003020 | 0.01 | 0.15 | 0.07 | 0.00005 | 0.00054 | 0.00027 |
| Dsl - Sweepers/Scrubbers | 2270003030 | 0.02 | 0.21 | 0.05 | 0.00006 | 0.00082 | 0.00019 |
| Dsl - Other General Industrial Eqp | 2270003040 | 0.04 | 0.53 | 0.15 | 0.00012 | 0.00167 | 0.00047 |
| Dsl - Other Material Handling Eqp | 2270003050 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| Dsl - AC\Refrigertion | 2270003060 | 0.15 | 0.90 | 0.53 | 0.00041 | 0.00245 | 0.00144 |
| Dsl - Terminal Tractors | 2270003070 | 0.03 | 0.70 | 0.24 | 0.00010 | 0.00225 | 0.00077 |

## Non-Road Mobile Source Emissions - Karnes County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Other Oil Field Eqp | 2270010010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **1.35** | **5.94** | **20.78** | **0.00451** | **0.01950** | **0.07111** |

**Railroad Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Railway Maintenance | 2285002015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Railway Maintenance | 2285004015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG Railway Maintenance | 2285006015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Railroad | 2285002000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Mining Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Graders | 2270002048 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Off Highway Trucks | 2270002051 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Proc. Equipment | 2270002054 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Crawler Tractor/Dozers | 2270002069 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Quarry Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Scrapers | 2270002018 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Excavators | 2270002036 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Graders | 2270002048 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Off Highway Trucks | 2270002051 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Rubber Tire Loaders | 2270002060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Tractors/Loaders/Backhoes | 2270002066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Crawler Tractors/Dozers | 2270002069 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Landfill Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Pavers | 2270002003 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Scrapers | 2270002018 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Excavators | 2270002036 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Graders | 2270002048 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Off Highway Trucks | 2270002051 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Rubber Tire Loaders | 2270002060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Crawler Tractors/Dozers | 2270002069 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Const. Equipment | 2270002081 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Recreational Boating**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Outboard | 2282005010 | 13.35 | 0.29 | 26.27 | 0.03049 | 0.00064 | 0.05762 |
| Personal Water Craft | 2282005015 | 5.87 | 0.08 | 11.43 | 0.01297 | 0.00018 | 0.02508 |
| Inboard/Sterndrive | 2282010005 | 1.07 | 0.46 | 12.70 | 0.00271 | 0.00092 | 0.02847 |
| Inboard/Sterndrive | 2282020005 | 0.03 | 0.84 | 0.13 | 0.00007 | 0.00183 | 0.00029 |
| Outboards | 2282020010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00001 |
| **TOTAL** | | **20.32** | **1.67** | **50.54** | **0.04625** | **0.00359** | **0.11147** |

**Recreational Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Offroad Motorcycles | 2260001010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str ATVs | 2260001030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Specialty Vehicles / Carts | 2260001060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Offroad Motorcycles | 2265001010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str ATVs | 2265001030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Golf Carts | 2265001050 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Specialty Vehicles / Carts | 2265001060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG Specialty Vehicles / Carts | 2267001060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl- Specialty Vehicle Carts | 2270001060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |

# Non-Road Mobile Source Emissions - Karnes County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Residential Lawn & Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Res) | 2260004015 | 0.47 | 0.00 | 0.96 | 0.00247 | 0.00001 | 0.00490 |
| 2-Str Chain Saws < 6 HP (Res) | 2260004020 | 6.71 | 0.02 | 12.33 | 0.03543 | 0.00008 | 0.06293 |
| 2-Str Trimmers/Edgers/Brush Cutter (Res) | 2260004025 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Leafblowers/Vacuums (Res) | 2260004030 | 3.91 | 0.01 | 7.85 | 0.02066 | 0.00005 | 0.04008 |
| 4-Str Lawn Mowers (Res) | 2265004010 | 10.99 | 0.87 | 148.60 | 0.05196 | 0.00407 | 0.77513 |
| 4-Str Rotary Tillers <6 HP (Res) | 2265004015 | 1.27 | 0.10 | 16.19 | 0.00599 | 0.00045 | 0.08446 |
| 4-Str Trimmers/Edgers/Brush Cutters (Res) | 2265004025 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Leafblowers/Vacuums (Res) | 2265004030 | 0.10 | 0.01 | 1.42 | 0.00050 | 0.00004 | 0.00740 |
| 4-Str Rear Engine Riding Mower (Res) | 2265004040 | 0.63 | 0.16 | 24.34 | 0.00299 | 0.00073 | 0.12694 |
| 4-Str Lawn & Garden Tractors (Res) | 2265004055 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Other Lawn & Garden Equip. (Res) | 2265004075 | 4.51 | 0.52 | 93.20 | 0.02138 | 0.00245 | 0.48615 |
| **TOTAL** | | **28.59** | **1.68** | **304.90** | **0.14137** | **0.00788** | **1.58798** |

**Commercial Lawn & Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 0.04 | 0.00 | 0.09 | 0.00021 | 0.00000 | 0.00043 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 2.19 | 0.02 | 5.26 | 0.00806 | 0.00007 | 0.01937 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 0.96 | 0.00 | 2.06 | 0.00477 | 0.00002 | 0.01029 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 0.60 | 0.00 | 1.43 | 0.00298 | 0.00002 | 0.00713 |
| 2-Str Commercial Turf Equipment (Com) | 2260004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.15 | 0.01 | 2.30 | 0.00076 | 0.00006 | 0.01176 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.10 | 0.01 | 1.51 | 0.00051 | 0.00004 | 0.00769 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.01 | 0.00 | 0.18 | 0.00005 | 0.00000 | 0.00094 |
| 4-Str Leafblowers/Vacuums (Com) | 2265004031 | 0.12 | 0.05 | 5.00 | 0.00060 | 0.00021 | 0.02553 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 0.35 | 0.11 | 19.93 | 0.00170 | 0.00052 | 0.10177 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.19 | 0.05 | 7.83 | 0.00091 | 0.00022 | 0.03999 |
| 4-Str Shredders < 6 HP (Com) | 2265004051 | 0.10 | 0.01 | 1.41 | 0.00049 | 0.00004 | 0.00718 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 0.15 | 0.05 | 8.39 | 0.00073 | 0.00023 | 0.04283 |
| 4-Str Chippers/Stump Grinders (Com) | 2265004066 | 0.87 | 0.59 | 40.04 | 0.00424 | 0.00272 | 0.20440 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.01 | 0.00 | 0.60 | 0.00006 | 0.00002 | 0.00308 |
| 4-Str Other Lawn & Garden Equip. (Com) | 2265004076 | 0.44 | 0.05 | 9.00 | 0.00203 | 0.00023 | 0.04597 |
| LPG Chippers/Stump Grinders (Com) | 2267004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Leafblowers/Vacuums (Com) | 2270004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.41 | 2.05 | 1.30 | 0.00204 | 0.01026 | 0.00650 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.00 | 0.02 | 0.01 | 0.00002 | 0.00011 | 0.00007 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.22 | 1.71 | 0.88 | 0.00109 | 0.00854 | 0.00438 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.00 | 0.01 | 0.00 | 0.00000 | 0.00003 | 0.00002 |
| **TOTAL** | | **6.90** | **4.76** | **107.24** | **0.03128** | **0.02335** | **0.53932** |

**University/Colleges Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Commercial Turf Equipment (Com) | 2260004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractors/Loaders/Backhoe | 2265002066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Leafblowers/Vacuums (Com) | 2265004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Shredders < 6 HP (Com) | 2265004051 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Chippers/Stump Grinders (Com) | 2265004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Other Lawn & Garden Equip. (Com) | 2265004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |

# Non-Road Mobile Source Emissions - Karnes County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4-Str Tillers > 6 HP | 2265005040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG Chippers/Stump Grinders (Com) | 2267004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Shredders > 6 HP | 2265007010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Leafblowers/Vacuums (Com) | 2270004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Shredders > 6 HP | 2270007010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Public Schools Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 0.00 | 0.00 | 0.00 | 0.00001 | 0.00000 | 0.00002 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 0.12 | 0.00 | 0.23 | 0.00044 | 0.00000 | 0.00089 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 3.85 | 0.01 | 8.13 | 0.01990 | 0.00006 | 0.04199 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 0.73 | 0.00 | 1.60 | 0.00378 | 0.00001 | 0.00826 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.30 | 0.03 | 4.54 | 0.00153 | 0.00012 | 0.02398 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.00 | 0.00 | 0.07 | 0.00002 | 0.00000 | 0.00036 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 0.10 | 0.03 | 5.63 | 0.00052 | 0.00016 | 0.02974 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.10 | 0.02 | 3.81 | 0.00049 | 0.00009 | 0.02012 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 0.53 | 0.04 | 8.49 | 0.00268 | 0.00021 | 0.04481 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.02 | 0.02 | 0.51 | 0.00011 | 0.00012 | 0.00268 |
| 4-Str Shredders > 6 HP | 2265007010 | 0.10 | 0.02 | 3.35 | 0.00038 | 0.00005 | 0.01304 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.01 | 0.05 | 0.03 | 0.00005 | 0.00025 | 0.00016 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.02 | 0.11 | 0.07 | 0.00011 | 0.00059 | 0.00036 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.00 | 0.01 | 0.01 | 0.00001 | 0.00005 | 0.00004 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.00 | 0.01 | 0.01 | 0.00001 | 0.00004 | 0.00003 |
| Dsl - Shredders > 6 HP | 2270007010 | 0.01 | 0.05 | 0.05 | 0.00003 | 0.00020 | 0.00020 |
| **TOTAL** | | **5.90** | **0.41** | **36.54** | **0.03007** | **0.00197** | **0.18669** |

**Golf Courses Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 0.03 | 0.00 | 0.07 | 0.00010 | 0.00000 | 0.00024 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 0.27 | 0.00 | 0.57 | 0.00122 | 0.00000 | 0.00257 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 0.43 | 0.00 | 0.95 | 0.00196 | 0.00001 | 0.00428 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.02 | 0.00 | 0.36 | 0.00011 | 0.00001 | 0.00168 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.00 | 0.00 | 0.05 | 0.00001 | 0.00000 | 0.00022 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.12 | 0.04 | 6.67 | 0.00051 | 0.00016 | 0.03069 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.62 | 0.64 | 13.66 | 0.00268 | 0.00266 | 0.06285 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.66 | 0.23 | 43.90 | 0.00290 | 0.00095 | 0.20203 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.08 | 0.33 | 0.22 | 0.00034 | 0.00147 | 0.00101 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.04 | 0.17 | 0.11 | 0.00017 | 0.00074 | 0.00050 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.00 | 0.02 | 0.01 | 0.00001 | 0.00007 | 0.00003 |
| **TOTAL** | | **2.26** | **1.42** | **66.58** | **0.01000** | **0.00607** | **0.30610** |

**Government Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rotary Tillers <6 HP | 2260004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Chain Saws | 2260004021 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Trimmers/ Edgers/ Brush Cutters | 2260004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Leaf Blowers/ Vacuums | 2260004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Concrete/Industrial Saws | 2265002039 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Lawn Mowers | 2265004011 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Rotary Tillers | 2265004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Trimmers/ Edgers/ Brush Cutters | 2265004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Leaf Blowers / Vacuums | 2265004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Rear Engine Riding Mowers | 2265004041 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Front Mowers | 2265004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Lawn and Garden Tractors | 2265004056 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Chippers/ Stump/ Grinders/ Mulchers | 2265004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Commercial Turf Equipment/ Sod Cutters | 2265004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |

## Non-Road Mobile Source Emissions - Karnes County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Other Lawn and Garden Equipment - Pole Saw | 2265004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Water Pumps | 2265006010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Commercial Mowers | 2270004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Lawn and Garden Tractors | 2270004056 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Chippers/ Stump/ Grinders/ Mulchers | 2270004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Commercial Turf Equipment/ Sod Cutters | 2270004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Shredders | 2270007010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Agricultural Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4-Str Tractor - Corn | 2265005015 | 0.01 | 0.01 | 0.18 | 0.00002 | 0.00001 | 0.00050 |
| 4-Str Tractor - Hay | 2265005015 | 0.00 | 0.00 | 0.12 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Peanuts | 2265005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Sorghum | 2265005015 | 0.00 | 0.00 | 0.02 | 0.00001 | 0.00001 | 0.00018 |
| 4-Str Tractor - Cotton | 2265005015 | 0.00 | 0.00 | 0.05 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Small Grains | 2265005015 | 0.00 | 0.00 | 0.00 | 0.00001 | 0.00001 | 0.00020 |
| Dsl Tractor - Corn | 2270005015 | 0.72 | 5.99 | 3.61 | 0.00203 | 0.01508 | 0.00997 |
| Dsl Tractor - Hay | 2270005015 | 0.47 | 3.94 | 2.37 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Peanuts | 2270005015 | 0.01 | 0.06 | 0.04 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Sorghum | 2270005015 | 0.08 | 0.67 | 0.40 | 0.00075 | 0.00555 | 0.00367 |
| Dsl Tractor - Cotton | 2270005015 | 0.20 | 1.64 | 0.99 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Small Grains | 2270005015 | 0.00 | 0.00 | 0.00 | 0.00079 | 0.00590 | 0.00390 |
| Dsl Combine - Corn | 2270005020 | 0.31 | 4.75 | 1.66 | 0.00257 | 0.03683 | 0.00978 |
| Dsl Combine - Hay | 2270005020 | 0.08 | 1.27 | 0.44 | 0.00069 | 0.00984 | 0.00261 |
| Dsl Combine - Peanuts | 2270005020 | 0.01 | 0.21 | 0.07 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Combine - Sorghum | 2270005020 | 0.08 | 1.27 | 0.44 | 0.00070 | 0.01006 | 0.00267 |
| Dsl Combine - Cotton | 2270005020 | 0.09 | 1.30 | 0.45 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Combine - Small Grains | 2270005020 | 0.00 | 0.00 | 0.00 | 0.00069 | 0.00981 | 0.00261 |
| 2-Str Sprayers | 2260005035 | 0.16 | 0.00 | 0.35 | 0.00070 | 0.00000 | 0.00153 |
| 2-Str Hydro Power Units | 2260005050 | 0.02 | 0.00 | 0.05 | 0.00009 | 0.00000 | 0.00022 |
| 4-Str Balers | 2265005025 | 0.07 | 0.06 | 1.24 | 0.00028 | 0.00024 | 0.00535 |
| 4-Str Agricultural Mowers | 2265005030 | 0.02 | 0.01 | 1.02 | 0.00009 | 0.00002 | 0.00439 |
| 4-Str Sprayers | 2265005035 | 0.34 | 0.09 | 8.77 | 0.00140 | 0.00039 | 0.03775 |
| 4-Str Tillers > 6 HP | 2265005040 | 0.69 | 0.08 | 22.79 | 0.00294 | 0.00036 | 0.09805 |
| 4-Str Swathers | 2265005045 | 0.10 | 0.09 | 1.97 | 0.00041 | 0.00038 | 0.00847 |
| 4-Str Hydro Power Units | 2265005050 | 0.18 | 0.04 | 7.95 | 0.00076 | 0.00018 | 0.03422 |
| 4-Str Other Agriculture Equipment | 2265005055 | 0.14 | 0.11 | 4.03 | 0.00059 | 0.00045 | 0.01734 |
| 4-Str Irrigation Sets | 2265005060 | 0.16 | 0.15 | 3.76 | 0.00066 | 0.00066 | 0.01616 |
| LPG Hydro Power Units | 2267005050 | 0.00 | 0.00 | 0.02 | 0.00001 | 0.00002 | 0.00008 |
| LPG Other Agriculture Equipment | 2267005055 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00003 |
| LPG Irrigation Sets | 2267005060 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00002 |
| CNG Hydro Power Units | 2268005050 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| CNG Other Agriculture Equipment | 2268005055 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00003 |
| CNG Irrigation Sets | 2268005060 | 0.00 | 0.18 | 0.77 | 0.00001 | 0.00079 | 0.00330 |
| Dsl - Balers | 2270005025 | 0.01 | 0.04 | 0.03 | 0.00004 | 0.00015 | 0.00012 |
| Dsl - Agricultural Mowers | 2270005030 | 0.00 | 0.01 | 0.01 | 0.00000 | 0.00003 | 0.00002 |
| Dsl - Sprayers | 2270005035 | 0.15 | 0.58 | 0.42 | 0.00066 | 0.00249 | 0.00180 |
| Dsl - Tillers > 6 HP | 2270005040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Swathers | 2270005045 | 0.07 | 0.65 | 0.26 | 0.00029 | 0.00282 | 0.00113 |
| Dsl - Hydro Power Units | 2270005050 | 0.02 | 0.15 | 0.07 | 0.00009 | 0.00063 | 0.00030 |
| Dsl - Other Agriculture Equipment | 2270005055 | 0.23 | 1.64 | 0.97 | 0.00097 | 0.00708 | 0.00417 |
| Dsl - Irrigation Sets | 2270005060 | 0.12 | 1.00 | 0.41 | 0.00054 | 0.00431 | 0.00175 |
| **TOTAL** | | **4.57** | **25.98** | **65.76** | **0.01880** | **0.11413** | **0.27235** |
| TOTAL NONROAD SOURCES | | 80.72 | 63.48 | 862.19 | 0.32288 | 0.26590 | 3.86617 |

## Non-Road Mobile Source Emissions - Kendall County, 2002

| KENDALL COUNTY NON-ROAD MOBILE SOURCES | SCC Codes | VOC ton/year | NOx ton/year | CO ton/year | VOC ton/day M-F | NOx ton/day M-F | CO ton/day M-F |
|---|---|---|---|---|---|---|---|
| **Construction Equipment** | | | | | | | |
| 2-Str Tampers/Rammers | 2260002006 | 0.74 | 0.01 | 2.09 | 0.00345 | 0.00004 | 0.00973 |
| 2-Str Plate Compactors | 2260002009 | 0.04 | 0.00 | 0.10 | 0.00019 | 0.00000 | 0.00045 |
| 2-Str Paving Equipment | 2260002021 | 0.05 | 0.00 | 0.12 | 0.00023 | 0.00000 | 0.00054 |
| 2-Str Signal Boards/Light Plants | 2260002027 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Concrete/Industrial Saws | 2260002039 | 2.02 | 0.02 | 5.61 | 0.00942 | 0.00010 | 0.02615 |
| 2-Str Crushing/Proc. Equipment | 2260002054 | 0.01 | 0.00 | 0.02 | 0.00005 | 0.00000 | 0.00011 |
| 4-Str Pavers | 2265002003 | 0.04 | 0.02 | 1.85 | 0.00017 | 0.00007 | 0.00881 |
| 4-Str Tampers/Rammers | 2265002006 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00000 | 0.00007 |
| 4-Str Plate Compactors | 2265002009 | 0.15 | 0.02 | 3.41 | 0.00067 | 0.00009 | 0.01626 |
| 4-Str Rollers | 2265002015 | 0.06 | 0.03 | 3.51 | 0.00028 | 0.00012 | 0.01672 |
| 4-Str Paving Equipment | 2265002021 | 0.20 | 0.04 | 6.67 | 0.00090 | 0.00018 | 0.03181 |
| 4-Str Surfacing Equipment | 2265002024 | 0.07 | 0.02 | 3.03 | 0.00034 | 0.00007 | 0.01443 |
| 4-Str Signal Boards/Light Plants | 2265002027 | 0.01 | 0.00 | 0.16 | 0.00002 | 0.00000 | 0.00074 |
| 4-Str Trenchers | 2265002030 | 0.15 | 0.05 | 5.69 | 0.00071 | 0.00022 | 0.02713 |
| 4-Str Bore/Drill Rigs | 2265002033 | 0.09 | 0.02 | 1.66 | 0.00040 | 0.00007 | 0.00793 |
| 4-Str Concrete/Industrial Saws | 2265002039 | 0.23 | 0.09 | 14.28 | 0.00105 | 0.00037 | 0.06810 |
| 4-Str Cement & Mortar Mixers | 2265002042 | 0.21 | 0.03 | 5.87 | 0.00095 | 0.00015 | 0.02799 |
| 4-Str Cranes | 2265002045 | 0.01 | 0.01 | 0.24 | 0.00004 | 0.00004 | 0.00113 |
| 4-Str Crushing/Proc. Equipment | 2265002054 | 0.02 | 0.01 | 0.82 | 0.00009 | 0.00002 | 0.00392 |
| 4-Str Rough Terrain Forklift | 2265002057 | 0.01 | 0.01 | 0.31 | 0.00006 | 0.00006 | 0.00148 |
| 4-Str Rubber Tire Loaders | 2265002060 | 0.03 | 0.04 | 0.74 | 0.00015 | 0.00016 | 0.00354 |
| 4-Str Tractors/Loaders/Backhoes | 2265002066 | 0.07 | 0.03 | 4.37 | 0.00033 | 0.00012 | 0.02085 |
| 4-Str Skid Steer Loaders | 2265002072 | 0.05 | 0.04 | 1.97 | 0.00025 | 0.00017 | 0.00938 |
| 4-Str Dumpers/Tenders | 2265002078 | 0.03 | 0.01 | 0.92 | 0.00013 | 0.00002 | 0.00437 |
| 4-Str Other Construction Equipment | 2265002081 | 0.01 | 0.01 | 0.26 | 0.00005 | 0.00005 | 0.00125 |
| LPG-Pavers | 2267002003 | 0.00 | 0.01 | 0.04 | 0.00001 | 0.00005 | 0.00020 |
| LPG-Rollers | 2267002015 | 0.01 | 0.02 | 0.07 | 0.00002 | 0.00009 | 0.00034 |
| LPG-Paving Equipment | 2267002021 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00005 |
| LPG-Surfacing Equipment | 2267002024 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00004 |
| LPG-Trenchers | 2267002030 | 0.01 | 0.03 | 0.13 | 0.00004 | 0.00016 | 0.00062 |
| LPG-Bore/Drill Rigs | 2267002033 | 0.00 | 0.01 | 0.04 | 0.00001 | 0.00005 | 0.00020 |
| LPG-Concrete/Industrial Saws | 2267002039 | 0.01 | 0.03 | 0.13 | 0.00004 | 0.00015 | 0.00060 |
| LPG-Cranes | 2267002045 | 0.00 | 0.01 | 0.05 | 0.00001 | 0.00005 | 0.00022 |
| LPG-Crushing/Proc. Equipment | 2267002054 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00004 |
| LPG-Rough Terrain Forklifts | 2267002057 | 0.01 | 0.02 | 0.08 | 0.00003 | 0.00010 | 0.00040 |
| LPG-Rubber Tire Loaders | 2267002060 | 0.01 | 0.05 | 0.21 | 0.00007 | 0.00025 | 0.00099 |
| LPG-Tractors/Loaders/Backhoes | 2267002066 | 0.00 | 0.01 | 0.02 | 0.00001 | 0.00003 | 0.00011 |
| LPG - Skid Steer Loaders | 2267002072 | 0.01 | 0.04 | 0.15 | 0.00005 | 0.00018 | 0.00071 |
| LPG-Other Construction Equipment | 2267002081 | 0.00 | 0.02 | 0.07 | 0.00002 | 0.00008 | 0.00033 |
| CNG-Other Construction Equipment | 2268002081 | 0.00 | 0.00 | 0.00 | 0.00001 | 0.00000 | 0.00001 |
| Dsl - Pavers | 2270002003 | 0.05 | 0.60 | 0.25 | 0.00024 | 0.00280 | 0.00118 |
| Dsl - Tampers/Rammers | 2270002006 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Plate Compactors | 2270002009 | 0.00 | 0.02 | 0.01 | 0.00001 | 0.00007 | 0.00004 |
| Dsl - Rollers | 2270002015 | 0.29 | 2.91 | 1.53 | 0.00137 | 0.01358 | 0.00716 |
| Dsl - Scrapers | 2270002018 | 0.02 | 0.26 | 0.13 | 0.00009 | 0.00121 | 0.00059 |
| Dsl - Paving Equipment | 2270002021 | 0.02 | 0.15 | 0.09 | 0.00007 | 0.00068 | 0.00044 |
| Dsl - Surfacing Equipment | 2270002024 | 0.23 | 2.47 | 1.52 | 0.00108 | 0.01151 | 0.00708 |
| Dsl - Signal Boards/Light Plants | 2270002027 | 0.05 | 0.31 | 0.19 | 0.00025 | 0.00143 | 0.00087 |
| Dsl - Trenchers | 2270002030 | 0.04 | 0.29 | 0.22 | 0.00018 | 0.00133 | 0.00101 |
| Dsl - Bore/Drill Rigs | 2270002033 | 0.19 | 2.47 | 0.65 | 0.00088 | 0.01153 | 0.00303 |
| Dsl - Excavators | 2270002036 | 0.64 | 7.98 | 3.42 | 0.00299 | 0.03722 | 0.01597 |
| Dsl - Concrete/Industrial Saws | 2270002039 | 0.01 | 0.09 | 0.07 | 0.00006 | 0.00043 | 0.00033 |
| Dsl - Cement & Mortar Mixers | 2270002042 | 0.00 | 0.01 | 0.01 | 0.00001 | 0.00004 | 0.00003 |
| Dsl - Cranes | 2270002045 | 0.12 | 1.53 | 0.41 | 0.00056 | 0.00712 | 0.00190 |
| Dsl - Graders | 2270002048 | 0.17 | 2.04 | 0.83 | 0.00080 | 0.00950 | 0.00385 |
| Dsl - Off-highway Trucks | 2270002051 | 0.12 | 1.43 | 0.65 | 0.00056 | 0.00665 | 0.00303 |
| Dsl - Crushing/Proc. Equipment | 2270002054 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00002 | 0.00001 |
| Dsl - Rough Terrain Forklifts | 2270002057 | 0.07 | 0.60 | 0.39 | 0.00032 | 0.00280 | 0.00181 |
| Dsl - Rubber Tire Loaders | 2270002060 | 0.37 | 4.85 | 1.66 | 0.00172 | 0.02262 | 0.00775 |
| Dsl - Tractors/Loaders/Backhoes | 2270002066 | 1.52 | 9.33 | 6.83 | 0.00711 | 0.04351 | 0.03185 |

## Non-Road Mobile Source Emissions - Kendall County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Skid Steer Loaders | 2270002072 | 0.45 | 1.36 | 1.74 | 0.00210 | 0.00632 | 0.00813 |
| Dsl - Off-Highway Tractors | 2270002075 | 0.00 | 0.04 | 0.02 | 0.00001 | 0.00018 | 0.00008 |
| Dsl - Dumpers/Tenders | 2270002078 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00001 |
| Dsl - Other Construction Equipment | 2270002081 | 0.08 | 0.80 | 0.48 | 0.00038 | 0.00372 | 0.00226 |
| **TOTAL** | | **8.83** | **40.27** | **85.83** | **0.04106** | **0.18764** | **0.40614** |

**Light Commercial Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Generator Sets | 2260006005 | 0.24 | 0.00 | 0.55 | 0.00077 | 0.00000 | 0.00173 |
| 2-Str Pumps | 2260006010 | 1.76 | 0.01 | 3.98 | 0.00558 | 0.00002 | 0.01263 |
| 2-Str Air Compressors | 2260006015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Generator Sets | 2265006005 | 6.06 | 3.34 | 154.31 | 0.02236 | 0.01270 | 0.58648 |
| 4-Str Pumps | 2265006010 | 1.47 | 0.16 | 32.47 | 0.00550 | 0.00061 | 0.12170 |
| 4-Str Air Compressors | 2265006015 | 0.64 | 0.15 | 16.95 | 0.00237 | 0.00057 | 0.06351 |
| 4-Str Welders | 2265006025 | 1.39 | 0.90 | 57.78 | 0.00487 | 0.00319 | 0.20438 |
| 4-Str Pressure Washers | 2265006030 | 2.48 | 0.58 | 79.90 | 0.00854 | 0.00205 | 0.27985 |
| LPG-Generator Sets | 2267006005 | 0.03 | 0.15 | 0.39 | 0.00012 | 0.00058 | 0.00150 |
| LPG-Pumps | 2267006010 | 0.03 | 0.14 | 0.37 | 0.00009 | 0.00043 | 0.00118 |
| LPG-Air Compressors | 2267006015 | 0.03 | 0.17 | 0.45 | 0.00011 | 0.00053 | 0.00144 |
| LPG-Welders | 2267006025 | 0.05 | 0.18 | 0.73 | 0.00018 | 0.00068 | 0.00268 |
| LPG-Pressure Washers | 2267006030 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00003 |
| CNG-Generator Sets | 2268006005 | 0.01 | 0.66 | 1.80 | 0.00003 | 0.00209 | 0.00571 |
| CNG-Pumps | 2268006010 | 0.00 | 0.01 | 0.03 | 0.00000 | 0.00003 | 0.00008 |
| CNG-Air Compressors | 2268006015 | 0.00 | 0.04 | 0.11 | 0.00000 | 0.00015 | 0.00043 |
| CNG-Gas Compressors | 2268006020 | 0.01 | 0.48 | 2.16 | 0.00003 | 0.00153 | 0.00685 |
| Dsl-Generator Sets | 2270006005 | 1.97 | 14.28 | 7.88 | 0.00748 | 0.05420 | 0.02990 |
| Dsl-Pumps | 2270006010 | 0.00 | 0.02 | 0.01 | 0.00001 | 0.00006 | 0.00004 |
| Dsl-Air Compressors | 2270006015 | 0.16 | 1.28 | 0.59 | 0.00060 | 0.00484 | 0.00222 |
| Dsl-Gas Compressors | 2270006020 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl-Welders | 2270006025 | 0.34 | 0.73 | 1.19 | 0.00130 | 0.00277 | 0.00451 |
| Dsl-Pressure Washers | 2270006030 | 0.00 | 0.02 | 0.01 | 0.00002 | 0.00008 | 0.00005 |
| **TOTAL** | | **16.68** | **23.30** | **361.67** | **0.05996** | **0.08712** | **1.32690** |

**Industrial Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Sweepers/Scrubbers | 2260003030 | 0.01 | 0.00 | 0.03 | 0.00004 | 0.00000 | 0.00008 |
| 2-Str Other General Industrial Eqp | 2260003040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| 4-Str Aerial Lifts | 2265003010 | 0.52 | 0.53 | 13.62 | 0.00197 | 0.00203 | 0.05181 |
| 4-Str Forklifts | 2265003020 | 0.09 | 0.09 | 2.14 | 0.00028 | 0.00030 | 0.00682 |
| 4-Str Sweepers/Scrubbers | 2265003030 | 0.10 | 0.08 | 3.06 | 0.00034 | 0.00027 | 0.01040 |
| 4-Str Other General Industrial Eqp | 2265003040 | 0.18 | 0.03 | 4.86 | 0.00058 | 0.00009 | 0.01541 |
| 4-Str Other Material Handling Eqp | 2265003050 | 0.00 | 0.00 | 0.16 | 0.00002 | 0.00001 | 0.00052 |
| 4-Str AC\Refrigeration | 2265003060 | 0.00 | 0.00 | 0.28 | 0.00001 | 0.00000 | 0.00076 |
| 4-Str Terminal Tractors | 2265003070 | 0.02 | 0.02 | 0.46 | 0.00006 | 0.00006 | 0.00145 |
| 4-Str Other Oil Field Eqp | 2265010010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG-Aerial Lifts | 2267003010 | 0.02 | 0.08 | 0.31 | 0.00007 | 0.00025 | 0.00100 |
| LPG - Forklifts | 2267003020 | 2.72 | 10.03 | 40.21 | 0.00930 | 0.03429 | 0.13747 |
| LPG - Sweepers/Scrubbers | 2267003030 | 0.08 | 0.28 | 1.17 | 0.00023 | 0.00081 | 0.00342 |
| LPG-Other General Industrial Equipment | 2267003040 | 0.00 | 0.02 | 0.07 | 0.00002 | 0.00006 | 0.00022 |
| LPG - Other Material Handling Equipmen | 2267003050 | 0.00 | 0.00 | 0.02 | 0.00000 | 0.00001 | 0.00005 |
| LPG - Terminal Tractors | 2267003070 | 0.01 | 0.04 | 0.14 | 0.00003 | 0.00011 | 0.00045 |
| CNG-Forklifts | 2268003020 | 0.01 | 0.55 | 2.18 | 0.00003 | 0.00173 | 0.00692 |
| CNG - Sweepers/Scrubbers | 2268003030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| CNG-Other General Industrial Equipment | 2268003040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| CNG-AC\Refrigeration | 2268003060 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00003 |
| CNG-Terminal Tractors | 2268003070 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00003 |
| CNG-Other Oil Field Eqp | 2268010010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Aerial Lifts | 2270003010 | 0.07 | 0.33 | 0.23 | 0.00025 | 0.00120 | 0.00084 |
| Dsl - Forklifts | 2270003020 | 0.05 | 0.51 | 0.25 | 0.00019 | 0.00191 | 0.00094 |
| Dsl - Sweepers/Scrubbers | 2270003030 | 0.06 | 0.76 | 0.18 | 0.00022 | 0.00287 | 0.00068 |
| Dsl - Other General Industrial Eqp | 2270003040 | 0.14 | 1.85 | 0.52 | 0.00043 | 0.00588 | 0.00166 |
| Dsl - Other Material Handling Eqp | 2270003050 | 0.00 | 0.00 | 0.01 | 0.00001 | 0.00001 | 0.00002 |
| Dsl - AC\Refrigertion | 2270003060 | 0.25 | 1.47 | 0.87 | 0.00067 | 0.00400 | 0.00235 |
| Dsl - Terminal Tractors | 2270003070 | 0.11 | 2.46 | 0.85 | 0.00034 | 0.00791 | 0.00271 |

## Non-Road Mobile Source Emissions - Kendall County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Other Oil Field Eqp | 2270010010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **4.45** | **19.15** | **71.64** | **0.01508** | **0.06385** | **0.24608** |

**Railroad Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Railway Maintenance | 2285002015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Railway Maintenance | 2285004015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG Railway Maintenance | 2285006015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Railroad | 2285002000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Mining Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Graders | 2270002048 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Off Highway Trucks | 2270002051 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Proc. Equipment | 2270002054 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Crawler Tractor/Dozers | 2270002069 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Quarry Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Scrapers | 2270002018 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Excavators | 2270002036 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Graders | 2270002048 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Off Highway Trucks | 2270002051 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Rubber Tire Loaders | 2270002060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Tractors/Loaders/Backhoes | 2270002066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Crawler Tractors/Dozers | 2270002069 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Landfill Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Pavers | 2270002003 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Scrapers | 2270002018 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Excavators | 2270002036 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Graders | 2270002048 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Off Highway Trucks | 2270002051 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Rubber Tire Loaders | 2270002060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Crawler Tractors/Dozers | 2270002069 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Const. Equipment | 2270002081 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Recreational Boating**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Outboard | 2282005010 | 1.67 | 0.04 | 3.28 | 0.00403 | 0.00008 | 0.00720 |
| Personal Water Craft | 2282005015 | 0.73 | 0.01 | 1.43 | 0.00164 | 0.00002 | 0.00314 |
| Inboard/Sterndrive | 2282010005 | 0.13 | 0.06 | 1.59 | 0.00040 | 0.00012 | 0.00356 |
| Inboard/Sterndrive | 2282020005 | 0.00 | 0.10 | 0.02 | 0.00001 | 0.00023 | 0.00004 |
| Outboards | 2282020010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **2.54** | **0.21** | **6.32** | **0.00608** | **0.00045** | **0.01393** |

**Recreational Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Offroad Motorcycles | 2260001010 | 98.40 | 0.24 | 94.09 | 0.30780 | 0.00074 | 0.29381 |
| 2-Str ATVs | 2260001030 | 98.82 | 0.24 | 94.64 | 0.30909 | 0.00075 | 0.29552 |
| 2-Str Specialty Vehicles / Carts | 2260001060 | 1.59 | 0.36 | 58.92 | 0.00515 | 0.00112 | 0.18398 |
| 4-Str Offroad Motorcycles | 2265001010 | 2.95 | 0.34 | 41.64 | 0.00934 | 0.00097 | 0.13293 |
| 4-Str ATVs | 2265001030 | 26.62 | 3.05 | 374.75 | 0.08438 | 0.00874 | 1.19638 |
| 4-Str Golf Carts | 2265001050 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Specialty Vehicles / Carts | 2265001060 | 1.66 | 0.32 | 52.38 | 0.00521 | 0.00091 | 0.16723 |
| LPG Specialty Vehicles / Carts | 2267001060 | 0.03 | 0.12 | 0.50 | 0.00010 | 0.00039 | 0.00155 |
| Dsl- Specialty Vehicle Carts | 2270001060 | 0.48 | 1.33 | 1.87 | 0.00149 | 0.00417 | 0.00583 |

# Non-Road Mobile Source Emissions - Kendall County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **TOTAL** | | **230.56** | **5.99** | **718.78** | **0.72257** | **0.01777** | **2.27724** |

**Residential Lawn & Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Res) | 2260004015 | 0.97 | 0.00 | 2.01 | 0.00518 | 0.00001 | 0.01023 |
| 2-Str Chain Saws < 6 HP (Res) | 2260004020 | 14.01 | 0.03 | 25.74 | 0.07407 | 0.00017 | 0.13132 |
| 2-Str Trimmers/Edgers/Brush Cutter (Res) | 2260004025 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Leafblowers/Vacuums (Res) | 2260004030 | 8.16 | 0.02 | 16.39 | 0.04397 | 0.00011 | 0.08363 |
| 4-Str Lawn Mowers (Res) | 2265004010 | 22.93 | 1.81 | 310.11 | 0.11066 | 0.00850 | 1.61757 |
| 4-Str Rotary Tillers <6 HP (Res) | 2265004015 | 2.64 | 0.20 | 33.79 | 0.01269 | 0.00093 | 0.17625 |
| 4-Str Trimmers/Edgers/Brush Cutters (Res) | 2265004025 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Leafblowers/Vacuums (Res) | 2265004030 | 0.22 | 0.02 | 2.96 | 0.00107 | 0.00008 | 0.01544 |
| 4-Str Rear Engine Riding Mower (Res) | 2265004040 | 1.31 | 0.32 | 50.79 | 0.00673 | 0.00152 | 0.26490 |
| 4-Str Lawn & Garden Tractors (Res) | 2265004055 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Other Lawn & Garden Equip. (Res) | 2265004075 | 9.42 | 1.09 | 194.50 | 0.04657 | 0.00511 | 1.01452 |
| **TOTAL** | | **59.66** | **3.50** | **636.28** | **0.30093** | **0.01643** | **3.31387** |

**Commercial Lawn & Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 0.01 | 0.00 | 0.02 | 0.00005 | 0.00000 | 0.00011 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 23.00 | 0.21 | 55.27 | 0.08466 | 0.00078 | 0.20334 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 10.04 | 0.04 | 21.63 | 0.05016 | 0.00020 | 0.10803 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 6.28 | 0.04 | 15.00 | 0.03136 | 0.00021 | 0.07488 |
| 2-Str Commercial Turf Equipment (Com) | 2260004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 1.62 | 0.14 | 24.19 | 0.00801 | 0.00063 | 0.12351 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.03 | 0.00 | 0.39 | 0.00013 | 0.00001 | 0.00197 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.11 | 0.01 | 1.94 | 0.00053 | 0.00005 | 0.00990 |
| 4-Str Leafblowers/Vacuums (Com) | 2265004031 | 1.27 | 0.48 | 52.50 | 0.00633 | 0.00222 | 0.26802 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 0.09 | 0.03 | 5.11 | 0.00044 | 0.00013 | 0.02606 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.05 | 0.01 | 2.01 | 0.00024 | 0.00006 | 0.01024 |
| 4-Str Shredders < 6 HP (Com) | 2265004051 | 0.03 | 0.00 | 0.36 | 0.00013 | 0.00001 | 0.00184 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 0.04 | 0.01 | 2.15 | 0.00019 | 0.00006 | 0.01097 |
| 4-Str Chippers/Stump Grinders (Com) | 2265004066 | 0.22 | 0.15 | 10.25 | 0.00110 | 0.00070 | 0.05235 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.00 | 0.00 | 0.15 | 0.00002 | 0.00000 | 0.00079 |
| 4-Str Other Lawn & Garden Equip. (Com) | 2265004076 | 0.11 | 0.01 | 2.31 | 0.00053 | 0.00006 | 0.01177 |
| LPG Chippers/Stump Grinders (Com) | 2267004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Leafblowers/Vacuums (Com) | 2270004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.03 | 0.13 | 0.08 | 0.00013 | 0.00067 | 0.00042 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00000 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.01 | 0.11 | 0.06 | 0.00007 | 0.00056 | 0.00029 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **42.93** | **1.40** | **193.42** | **0.18408** | **0.00636** | **0.90449** |

**University/Colleges Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Commercial Turf Equipment (Com) | 2260004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractors/Loaders/Backhoe | 2265002066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Leafblowers/Vacuums (Com) | 2265004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Shredders < 6 HP (Com) | 2265004051 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Chippers/Stump Grinders (Com) | 2265004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Other Lawn & Garden Equip. (Com) | 2265004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |

## Non-Road Mobile Source Emissions - Kendall County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4-Str Tillers > 6 HP | 2265005040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG Chippers/Stump Grinders (Com) | 2267004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Shredders > 6 HP | 2265007010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Leafblowers/Vacuums (Com) | 2270004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Shredders > 6 HP | 2270007010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Public Schools Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 0.00 | 0.00 | 0.00 | 0.00001 | 0.00000 | 0.00002 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 0.11 | 0.00 | 0.22 | 0.00041 | 0.00000 | 0.00082 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 3.58 | 0.01 | 7.55 | 0.01849 | 0.00006 | 0.03899 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 0.68 | 0.00 | 1.49 | 0.00351 | 0.00001 | 0.00767 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.28 | 0.02 | 4.22 | 0.00142 | 0.00011 | 0.02226 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.00 | 0.00 | 0.06 | 0.00002 | 0.00000 | 0.00034 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 0.09 | 0.03 | 5.23 | 0.00048 | 0.00015 | 0.02762 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.09 | 0.02 | 3.54 | 0.00046 | 0.00009 | 0.01869 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 0.49 | 0.04 | 7.88 | 0.00250 | 0.00020 | 0.04161 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.02 | 0.02 | 0.47 | 0.00010 | 0.00011 | 0.00249 |
| 4-Str Shredders > 6 HP | 2265007010 | 0.09 | 0.01 | 3.11 | 0.00035 | 0.00005 | 0.01211 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.01 | 0.04 | 0.03 | 0.00005 | 0.00023 | 0.00015 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.02 | 0.11 | 0.07 | 0.00010 | 0.00054 | 0.00034 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.00 | 0.01 | 0.01 | 0.00001 | 0.00005 | 0.00003 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.00 | 0.01 | 0.00 | 0.00001 | 0.00004 | 0.00002 |
| Dsl - Shredders > 6 HP | 2270007010 | 0.01 | 0.05 | 0.05 | 0.00003 | 0.00018 | 0.00019 |
| **TOTAL** | | **5.48** | **0.38** | **33.93** | **0.02796** | **0.00183** | **0.17335** |

**Golf Courses Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Government Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rotary Tillers <6 HP | 2260004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Chain Saws | 2260004021 | 0.46 | 0.00 | 1.11 | 0.00176 | 0.00002 | 0.00422 |
| Trimmers/ Edgers/ Brush Cutters | 2260004026 | 0.13 | 0.00 | 0.28 | 0.00064 | 0.00000 | 0.00138 |
| Leaf Blowers/ Vacuums | 2260004031 | 0.03 | 0.00 | 0.08 | 0.00017 | 0.00000 | 0.00040 |
| 4-Str Concrete/Industrial Saws | 2265002039 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Lawn Mowers | 2265004011 | 0.02 | 0.00 | 0.32 | 0.00010 | 0.00001 | 0.00157 |
| Rotary Tillers | 2265004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Trimmers/ Edgers/ Brush Cutters | 2265004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Leaf Blowers / Vacuums | 2265004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Rear Engine Riding Mowers | 2265004041 | 0.00 | 0.00 | 0.25 | 0.00002 | 0.00001 | 0.00124 |
| Front Mowers | 2265004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Lawn and Garden Tractors | 2265004056 | 0.02 | 0.01 | 1.28 | 0.00011 | 0.00003 | 0.00625 |
| Chippers/ Stump/ Grinders/ Mulchers | 2265004066 | 0.68 | 0.42 | 31.87 | 0.00332 | 0.00207 | 0.15549 |
| Commercial Turf Equipment/ Sod Cutters | 2265004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |

# Non-Road Mobile Source Emissions - Kendall County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Other Lawn and Garden Equipment - Pole Saw | 2265004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Water Pumps | 2265006010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Commercial Mowers | 2270004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Lawn and Garden Tractors | 2270004056 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Chippers/ Stump/ Grinders/ Mulchers | 2270004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Commercial Turf Equipment/ Sod Cutters | 2270004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Shredders | 2270007010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **1.35** | **0.44** | **35.20** | **0.00612** | **0.00214** | **0.17054** |

**Agricultural Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4-Str Tractor - Corn | 2265005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Hay | 2265005015 | 0.00 | 0.00 | 0.05 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Peanuts | 2265005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Sorghum | 2265005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Cotton | 2265005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Small Grains | 2265005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| Dsl Tractor - Corn | 2270005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Hay | 2270005015 | 0.21 | 1.73 | 1.73 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Peanuts | 2270005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Sorghum | 2270005015 | 0.01 | 0.04 | 0.04 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Cotton | 2270005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Small Grains | 2270005015 | 0.00 | 0.00 | 0.00 | 0.00005 | 0.00042 | 0.00042 |
| Dsl Combine - Corn | 2270005020 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Combine - Hay | 2270005020 | 0.21 | 0.56 | 0.20 | 0.00121 | 0.00328 | 0.00115 |
| Dsl Combine - Peanuts | 2270005020 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Combine - Sorghum | 2270005020 | 0.03 | 0.08 | 0.03 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Combine - Cotton | 2270005020 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Combine - Small Grains | 2270005020 | 0.00 | 0.00 | 0.00 | 0.00018 | 0.00049 | 0.00017 |
| 2-Str Sprayers | 2260005035 | 0.03 | 0.00 | 0.06 | 0.00016 | 0.00000 | 0.00034 |
| 2-Str Hydro Power Units | 2260005050 | 0.00 | 0.00 | 0.01 | 0.00002 | 0.00000 | 0.00005 |
| 4-Str Balers | 2265005025 | 0.01 | 0.01 | 0.20 | 0.00007 | 0.00005 | 0.00120 |
| 4-Str Agricultural Mowers | 2265005030 | 0.00 | 0.00 | 0.17 | 0.00002 | 0.00001 | 0.00098 |
| 4-Str Sprayers | 2265005035 | 0.06 | 0.02 | 1.44 | 0.00032 | 0.00009 | 0.00845 |
| 4-Str Tillers > 6 HP | 2265005040 | 0.11 | 0.01 | 3.75 | 0.00066 | 0.00008 | 0.02195 |
| 4-Str Swathers | 2265005045 | 0.02 | 0.01 | 0.32 | 0.00010 | 0.00008 | 0.00190 |
| 4-Str Hydro Power Units | 2265005050 | 0.03 | 0.01 | 1.31 | 0.00017 | 0.00004 | 0.00766 |
| 4-Str Other Agriculture Equipment | 2265005055 | 0.02 | 0.02 | 0.66 | 0.00014 | 0.00010 | 0.00388 |
| 4-Str Irrigation Sets | 2265005060 | 0.03 | 0.03 | 0.62 | 0.00015 | 0.00015 | 0.00362 |
| LPG Hydro Power Units | 2267005050 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00002 |
| LPG Other Agriculture Equipment | 2267005055 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| LPG Irrigation Sets | 2267005060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| CNG Hydro Power Units | 2268005050 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| CNG Other Agriculture Equipment | 2268005055 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| CNG Irrigation Sets | 2268005060 | 0.00 | 0.03 | 0.13 | 0.00000 | 0.00018 | 0.00074 |
| Dsl - Balers | 2270005025 | 0.00 | 0.01 | 0.00 | 0.00001 | 0.00003 | 0.00003 |
| Dsl - Agricultural Mowers | 2270005030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00001 |
| Dsl - Sprayers | 2270005035 | 0.03 | 0.10 | 0.07 | 0.00015 | 0.00056 | 0.00040 |
| Dsl - Tillers > 6 HP | 2270005040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Swathers | 2270005045 | 0.01 | 0.11 | 0.04 | 0.00006 | 0.00063 | 0.00025 |
| Dsl - Hydro Power Units | 2270005050 | 0.00 | 0.02 | 0.01 | 0.00002 | 0.00014 | 0.00007 |
| Dsl - Other Agriculture Equipment | 2270005055 | 0.04 | 0.27 | 0.16 | 0.00022 | 0.00158 | 0.00093 |
| Dsl - Irrigation Sets | 2270005060 | 0.02 | 0.16 | 0.07 | 0.00012 | 0.00096 | 0.00039 |
| **TOTAL** | | **0.87** | **3.22** | **11.09** | **0.00383** | **0.00890** | **0.05464** |
| TOTAL NONROAD SOURCES | | 373.36 | 97.88 | 2,154.17 | 1.36767 | 0.39249 | 8.88719 |

## Non-Road Mobile Source Emissions - Kerr County, 2002

| KERR COUNTY NON-ROAD MOBILE SOURCES | SCC Codes | VOC ton/year | NOx ton/year | CO ton/year | VOC ton/day M-F | NOx ton/day M-F | CO ton/day M-F |
|---|---|---|---|---|---|---|---|
| **Construction Equipment** | | | | | | | |
| 2-Str Tampers/Rammers | 2260002006 | 0.94 | 0.01 | 2.64 | 0.00437 | 0.00006 | 0.01232 |
| 2-Str Plate Compactors | 2260002009 | 0.05 | 0.00 | 0.12 | 0.00024 | 0.00000 | 0.00057 |
| 2-Str Paving Equipment | 2260002021 | 0.06 | 0.00 | 0.15 | 0.00029 | 0.00000 | 0.00068 |
| 2-Str Signal Boards/Light Plants | 2260002027 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| 2-Str Concrete/Industrial Saws | 2260002039 | 2.56 | 0.03 | 7.10 | 0.01193 | 0.00013 | 0.03312 |
| 2-Str Crushing/Proc. Equipment | 2260002054 | 0.01 | 0.00 | 0.03 | 0.00006 | 0.00000 | 0.00014 |
| 4-Str Pavers | 2265002003 | 0.05 | 0.02 | 2.34 | 0.00022 | 0.00009 | 0.01116 |
| 4-Str Tampers/Rammers | 2265002006 | 0.00 | 0.00 | 0.02 | 0.00000 | 0.00000 | 0.00009 |
| 4-Str Plate Compactors | 2265002009 | 0.18 | 0.03 | 4.32 | 0.00085 | 0.00011 | 0.02059 |
| 4-Str Rollers | 2265002015 | 0.08 | 0.04 | 4.44 | 0.00036 | 0.00016 | 0.02117 |
| 4-Str Paving Equipment | 2265002021 | 0.25 | 0.05 | 8.45 | 0.00114 | 0.00023 | 0.04029 |
| 4-Str Surfacing Equipment | 2265002024 | 0.09 | 0.02 | 3.83 | 0.00044 | 0.00009 | 0.01828 |
| 4-Str Signal Boards/Light Plants | 2265002027 | 0.01 | 0.00 | 0.20 | 0.00003 | 0.00000 | 0.00094 |
| 4-Str Trenchers | 2265002030 | 0.19 | 0.06 | 7.21 | 0.00090 | 0.00028 | 0.03436 |
| 4-Str Bore/Drill Rigs | 2265002033 | 0.11 | 0.02 | 2.11 | 0.00051 | 0.00009 | 0.01005 |
| 4-Str Concrete/Industrial Saws | 2265002039 | 0.29 | 0.11 | 18.09 | 0.00133 | 0.00047 | 0.08626 |
| 4-Str Cement & Mortar Mixers | 2265002042 | 0.27 | 0.04 | 7.44 | 0.00120 | 0.00019 | 0.03546 |
| 4-Str Cranes | 2265002045 | 0.01 | 0.01 | 0.30 | 0.00005 | 0.00005 | 0.00143 |
| 4-Str Crushing/Proc. Equipment | 2265002054 | 0.03 | 0.01 | 1.04 | 0.00012 | 0.00003 | 0.00496 |
| 4-Str Rough Terrain Forklift | 2265002057 | 0.02 | 0.02 | 0.39 | 0.00008 | 0.00008 | 0.00188 |
| 4-Str Rubber Tire Loaders | 2265002060 | 0.04 | 0.05 | 0.94 | 0.00018 | 0.00020 | 0.00449 |
| 4-Str Tractors/Loaders/Backhoes | 2265002066 | 0.09 | 0.03 | 5.54 | 0.00041 | 0.00015 | 0.02641 |
| 4-Str Skid Steer Loaders | 2265002072 | 0.07 | 0.05 | 2.49 | 0.00031 | 0.00021 | 0.01188 |
| 4-Str Dumpers/Tenders | 2265002078 | 0.04 | 0.01 | 1.16 | 0.00016 | 0.00003 | 0.00553 |
| 4-Str Other Construction Equipment | 2265002081 | 0.01 | 0.02 | 0.33 | 0.00007 | 0.00007 | 0.00158 |
| LPG-Pavers | 2267002003 | 0.00 | 0.01 | 0.06 | 0.00002 | 0.00006 | 0.00026 |
| LPG-Rollers | 2267002015 | 0.01 | 0.02 | 0.09 | 0.00003 | 0.00011 | 0.00044 |
| LPG-Paving Equipment | 2267002021 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00002 | 0.00007 |
| LPG-Surfacing Equipment | 2267002024 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00005 |
| LPG-Trenchers | 2267002030 | 0.01 | 0.04 | 0.17 | 0.00005 | 0.00020 | 0.00079 |
| LPG-Bore/Drill Rigs | 2267002033 | 0.00 | 0.01 | 0.06 | 0.00002 | 0.00007 | 0.00026 |
| LPG-Concrete/Industrial Saws | 2267002039 | 0.01 | 0.04 | 0.16 | 0.00005 | 0.00019 | 0.00076 |
| LPG-Cranes | 2267002045 | 0.00 | 0.01 | 0.06 | 0.00002 | 0.00007 | 0.00028 |
| LPG-Crushing/Proc. Equipment | 2267002054 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00005 |
| LPG-Rough Terrain Forklifts | 2267002057 | 0.01 | 0.03 | 0.11 | 0.00003 | 0.00013 | 0.00050 |
| LPG-Rubber Tire Loaders | 2267002060 | 0.02 | 0.07 | 0.27 | 0.00008 | 0.00031 | 0.00125 |
| LPG-Tractors/Loaders/Backhoes | 2267002066 | 0.00 | 0.01 | 0.03 | 0.00001 | 0.00003 | 0.00013 |
| LPG - Skid Steer Loaders | 2267002072 | 0.01 | 0.05 | 0.19 | 0.00006 | 0.00022 | 0.00089 |
| LPG-Other Construction Equipment | 2267002081 | 0.01 | 0.02 | 0.09 | 0.00003 | 0.00010 | 0.00041 |
| CNG-Other Construction Equipment | 2268002081 | 0.00 | 0.00 | 0.00 | 0.00002 | 0.00000 | 0.00002 |
| Dsl - Pavers | 2270002003 | 0.06 | 0.76 | 0.32 | 0.00030 | 0.00355 | 0.00149 |
| Dsl - Tampers/Rammers | 2270002006 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Plate Compactors | 2270002009 | 0.00 | 0.02 | 0.01 | 0.00002 | 0.00009 | 0.00005 |
| Dsl - Rollers | 2270002015 | 0.37 | 3.69 | 1.94 | 0.00173 | 0.01720 | 0.00906 |
| Dsl - Scrapers | 2270002018 | 0.02 | 0.33 | 0.16 | 0.00011 | 0.00153 | 0.00075 |
| Dsl - Paving Equipment | 2270002021 | 0.02 | 0.19 | 0.12 | 0.00009 | 0.00086 | 0.00055 |
| Dsl - Surfacing Equipment | 2270002024 | 0.29 | 3.13 | 1.92 | 0.00137 | 0.01458 | 0.00897 |
| Dsl - Signal Boards/Light Plants | 2270002027 | 0.07 | 0.39 | 0.24 | 0.00032 | 0.00182 | 0.00111 |
| Dsl - Trenchers | 2270002030 | 0.05 | 0.36 | 0.27 | 0.00023 | 0.00169 | 0.00128 |
| Dsl - Bore/Drill Rigs | 2270002033 | 0.24 | 3.13 | 0.82 | 0.00111 | 0.01461 | 0.00383 |
| Dsl - Excavators | 2270002036 | 0.81 | 10.11 | 4.34 | 0.00379 | 0.04715 | 0.02023 |
| Dsl - Concrete/Industrial Saws | 2270002039 | 0.02 | 0.12 | 0.09 | 0.00008 | 0.00054 | 0.00042 |
| Dsl - Cement & Mortar Mixers | 2270002042 | 0.00 | 0.01 | 0.01 | 0.00001 | 0.00005 | 0.00003 |
| Dsl - Cranes | 2270002045 | 0.15 | 1.93 | 0.51 | 0.00071 | 0.00901 | 0.00240 |
| Dsl - Graders | 2270002048 | 0.22 | 2.58 | 1.05 | 0.00102 | 0.01203 | 0.00488 |
| Dsl - Off-highway Trucks | 2270002051 | 0.15 | 1.81 | 0.82 | 0.00071 | 0.00842 | 0.00384 |
| Dsl - Crushing/Proc. Equipment | 2270002054 | 0.00 | 0.01 | 0.00 | 0.00000 | 0.00002 | 0.00001 |
| Dsl - Rough Terrain Forklifts | 2270002057 | 0.09 | 0.76 | 0.49 | 0.00041 | 0.00355 | 0.00229 |
| Dsl - Rubber Tire Loaders | 2270002060 | 0.47 | 6.14 | 2.10 | 0.00218 | 0.02865 | 0.00981 |
| Dsl - Tractors/Loaders/Backhoes | 2270002066 | 1.93 | 11.82 | 8.65 | 0.00900 | 0.05512 | 0.04035 |

## Non-Road Mobile Source Emissions - Kerr County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Skid Steer Loaders | 2270002072 | 0.57 | 1.72 | 2.21 | 0.00265 | 0.00801 | 0.01029 |
| Dsl - Off-Highway Tractors | 2270002075 | 0.00 | 0.05 | 0.02 | 0.00002 | 0.00022 | 0.00010 |
| Dsl - Dumpers/Tenders | 2270002078 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00001 |
| Dsl - Other Construction Equipment | 2270002081 | 0.10 | 1.01 | 0.61 | 0.00048 | 0.00471 | 0.00286 |
| **TOTAL** | | **11.18** | **51.01** | **108.72** | **0.05201** | **0.23768** | **0.51445** |

**Light Commercial Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Generator Sets | 2260006005 | 0.36 | 0.00 | 0.80 | 0.00114 | 0.00000 | 0.00255 |
| 2-Str Pumps | 2260006010 | 2.60 | 0.01 | 5.88 | 0.00823 | 0.00003 | 0.01863 |
| 2-Str Air Compressors | 2260006015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| 4-Str Generator Sets | 2265006005 | 8.93 | 4.93 | 227.60 | 0.03298 | 0.01873 | 0.86505 |
| 4-Str Pumps | 2265006010 | 2.18 | 0.24 | 47.89 | 0.00811 | 0.00089 | 0.17951 |
| 4-Str Air Compressors | 2265006015 | 0.94 | 0.22 | 25.01 | 0.00350 | 0.00084 | 0.09368 |
| 4-Str Welders | 2265006025 | 2.06 | 1.33 | 85.23 | 0.00719 | 0.00470 | 0.30146 |
| 4-Str Pressure Washers | 2265006030 | 3.65 | 0.86 | 117.85 | 0.01260 | 0.00302 | 0.41278 |
| LPG-Generator Sets | 2267006005 | 0.04 | 0.23 | 0.58 | 0.00017 | 0.00086 | 0.00221 |
| LPG-Pumps | 2267006010 | 0.04 | 0.20 | 0.55 | 0.00013 | 0.00064 | 0.00174 |
| LPG-Air Compressors | 2267006015 | 0.05 | 0.24 | 0.67 | 0.00016 | 0.00078 | 0.00212 |
| LPG-Welders | 2267006025 | 0.07 | 0.27 | 1.07 | 0.00027 | 0.00100 | 0.00396 |
| LPG-Pressure Washers | 2267006030 | 0.00 | 0.00 | 0.02 | 0.00000 | 0.00001 | 0.00005 |
| CNG-Generator Sets | 2268006005 | 0.01 | 0.97 | 2.66 | 0.00004 | 0.00308 | 0.00842 |
| CNG-Pumps | 2268006010 | 0.00 | 0.01 | 0.04 | 0.00000 | 0.00004 | 0.00012 |
| CNG-Air Compressors | 2268006015 | 0.00 | 0.06 | 0.17 | 0.00000 | 0.00023 | 0.00064 |
| CNG-Gas Compressors | 2268006020 | 0.01 | 0.71 | 3.19 | 0.00004 | 0.00226 | 0.01010 |
| Dsl-Generator Sets | 2270006005 | 2.91 | 21.06 | 11.62 | 0.01104 | 0.07994 | 0.04410 |
| Dsl-Pumps | 2270006010 | 0.00 | 0.03 | 0.01 | 0.00002 | 0.00010 | 0.00006 |
| Dsl-Air Compressors | 2270006015 | 0.23 | 1.88 | 0.86 | 0.00089 | 0.00714 | 0.00328 |
| Dsl-Gas Compressors | 2270006020 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl-Welders | 2270006025 | 0.50 | 1.08 | 1.75 | 0.00192 | 0.00409 | 0.00665 |
| Dsl-Pressure Washers | 2270006030 | 0.01 | 0.03 | 0.02 | 0.00002 | 0.00012 | 0.00007 |
| **TOTAL** | | **24.61** | **34.37** | **533.46** | **0.08843** | **0.12850** | **1.95718** |

**Industrial Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Sweepers/Scrubbers | 2260003030 | 0.02 | 0.00 | 0.05 | 0.00007 | 0.00000 | 0.00016 |
| 2-Str Other General Industrial Eqp | 2260003040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| 4-Str Aerial Lifts | 2265003010 | 1.02 | 1.04 | 26.54 | 0.00384 | 0.00396 | 0.10093 |
| 4-Str Forklifts | 2265003020 | 0.17 | 0.18 | 4.16 | 0.00055 | 0.00058 | 0.01329 |
| 4-Str Sweepers/Scrubbers | 2265003030 | 0.19 | 0.16 | 5.96 | 0.00065 | 0.00053 | 0.02026 |
| 4-Str Other General Industrial Eqp | 2265003040 | 0.36 | 0.06 | 9.47 | 0.00113 | 0.00018 | 0.03002 |
| 4-Str Other Material Handling Eqp | 2265003050 | 0.01 | 0.01 | 0.32 | 0.00003 | 0.00002 | 0.00101 |
| 4-Str AC\Refrigeration | 2265003060 | 0.01 | 0.00 | 0.54 | 0.00003 | 0.00001 | 0.00148 |
| 4-Str Terminal Tractors | 2265003070 | 0.04 | 0.04 | 0.89 | 0.00011 | 0.00012 | 0.00282 |
| 4-Str Other Oil Field Eqp | 2265010010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG-Aerial Lifts | 2267003010 | 0.04 | 0.15 | 0.61 | 0.00013 | 0.00049 | 0.00194 |
| LPG - Forklifts | 2267003020 | 5.30 | 19.54 | 78.32 | 0.01812 | 0.06680 | 0.26777 |
| LPG - Sweepers/Scrubbers | 2267003030 | 0.15 | 0.54 | 2.27 | 0.00044 | 0.00158 | 0.00666 |
| LPG - Other General Industrial Equipment | 2267003040 | 0.01 | 0.03 | 0.14 | 0.00003 | 0.00011 | 0.00043 |
| LPG - Other Material Handling Equipment | 2267003050 | 0.00 | 0.01 | 0.03 | 0.00001 | 0.00003 | 0.00010 |
| LPG - Terminal Tractors | 2267003070 | 0.02 | 0.07 | 0.28 | 0.00006 | 0.00022 | 0.00088 |
| CNG-Forklifts | 2268003020 | 0.02 | 1.07 | 4.25 | 0.00005 | 0.00338 | 0.01348 |
| CNG - Sweepers/Scrubbers | 2268003030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00002 |
| CNG-Other General Industrial Equipment | 2268003040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| CNG-AC\Refrigeration | 2268003060 | 0.00 | 0.01 | 0.02 | 0.00000 | 0.00002 | 0.00006 |
| CNG-Terminal Tractors | 2268003070 | 0.00 | 0.01 | 0.02 | 0.00000 | 0.00002 | 0.00006 |
| CNG-Other Oil Field Eqp | 2268010010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Aerial Lifts | 2270003010 | 0.14 | 0.65 | 0.45 | 0.00049 | 0.00234 | 0.00164 |
| Dsl - Forklifts | 2270003020 | 0.10 | 1.00 | 0.49 | 0.00036 | 0.00372 | 0.00183 |
| Dsl - Sweepers/Scrubbers | 2270003030 | 0.11 | 1.47 | 0.35 | 0.00042 | 0.00560 | 0.00133 |
| Dsl - Other General Industrial Eqp | 2270003040 | 0.27 | 3.61 | 1.02 | 0.00085 | 0.01145 | 0.00322 |
| Dsl - Other Material Handling Eqp | 2270003050 | 0.00 | 0.01 | 0.01 | 0.00001 | 0.00003 | 0.00005 |
| Dsl - AC\Refrigertion | 2270003060 | 0.45 | 2.68 | 1.58 | 0.00122 | 0.00729 | 0.00429 |
| Dsl - Terminal Tractors | 2270003070 | 0.21 | 4.80 | 1.65 | 0.00067 | 0.01541 | 0.00529 |

## Non-Road Mobile Source Emissions - Kerr County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Other Oil Field Eqp | 2270010010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **8.64** | **37.12** | **139.44** | **0.02930** | **0.12387** | **0.47905** |

**Railroad Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Railway Maintenance | 2285002015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Railway Maintenance | 2285004015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG Railway Maintenance | 2285006015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Railroad | 2285002000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Mining Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Graders | 2270002048 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Off Highway Trucks | 2270002051 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Proc. Equipment | 2270002054 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Crawler Tractor/Dozers | 2270002069 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Quarry Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Scrapers | 2270002018 | 0.02 | 0.33 | 0.15 | 0.00007 | 0.00099 | 0.00045 |
| Dsl - Excavators | 2270002036 | 0.09 | 1.15 | 0.43 | 0.00026 | 0.00347 | 0.00130 |
| Dsl - Graders | 2270002048 | 0.01 | 0.08 | 0.03 | 0.00002 | 0.00025 | 0.00009 |
| Dsl - Off Highway Trucks | 2270002051 | 0.55 | 7.96 | 3.34 | 0.00166 | 0.02395 | 0.01003 |
| Dsl - Rubber Tire Loaders | 2270002060 | 0.49 | 6.04 | 2.76 | 0.00147 | 0.01816 | 0.00830 |
| Dsl - Tractors/Loaders/Backhoes | 2270002066 | 0.13 | 0.57 | 0.53 | 0.00040 | 0.00172 | 0.00161 |
| Dsl - Crawler Tractors/Dozers | 2270002069 | 0.07 | 0.86 | 0.37 | 0.00020 | 0.00259 | 0.00112 |
| **TOTAL** | | **1.36** | **17.00** | **7.61** | **0.00408** | **0.05114** | **0.02290** |

**Landfill Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Pavers | 2270002003 | 0.27 | 5.89 | 1.96 | 0.00111 | 0.02420 | 0.00807 |
| Dsl - Scrapers | 2270002018 | 0.16 | 3.29 | 1.06 | 0.00065 | 0.01351 | 0.00435 |
| Dsl - Excavators | 2270002036 | 0.01 | 0.22 | 0.05 | 0.00006 | 0.00089 | 0.00020 |
| Dsl - Graders | 2270002048 | 0.04 | 0.54 | 0.15 | 0.00016 | 0.00224 | 0.00063 |
| Dsl - Off Highway Trucks | 2270002051 | 0.05 | 0.66 | 0.17 | 0.00019 | 0.00272 | 0.00071 |
| Dsl - Rubber Tire Loaders | 2270002060 | 0.06 | 0.86 | 0.22 | 0.00025 | 0.00354 | 0.00092 |
| Dsl - Crawler Tractors/Dozers | 2270002069 | 0.28 | 4.39 | 1.18 | 0.00117 | 0.01805 | 0.00484 |
| Dsl - Other Const. Equipment | 2270002081 | 0.15 | 2.27 | 0.52 | 0.00062 | 0.00931 | 0.00215 |
| **TOTAL** | | **1.02** | **18.12** | **5.32** | **0.00420** | **0.07446** | **0.02185** |

**Recreational Boating**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Outboard | 2282005010 | 5.01 | 0.11 | 9.85 | 0.01208 | 0.00024 | 0.02161 |
| Personal Water Craft | 2282005015 | 2.20 | 0.03 | 4.29 | 0.00492 | 0.00007 | 0.00941 |
| Inboard/Sterndrive | 2282010005 | 0.40 | 0.17 | 4.76 | 0.00121 | 0.00035 | 0.01068 |
| Inboard/Sterndrive | 2282020005 | 0.01 | 0.31 | 0.05 | 0.00003 | 0.00069 | 0.00011 |
| Outboards | 2282020010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **7.62** | **0.63** | **18.95** | **0.01824** | **0.00135** | **0.04180** |

**Recreational Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Offroad Motorcycles | 2260001010 | 229.60 | 0.55 | 219.54 | 0.71820 | 0.00172 | 0.68556 |
| 2-Str ATVs | 2260001030 | 230.59 | 0.56 | 220.82 | 0.72121 | 0.00174 | 0.68955 |
| 2-Str Specialty Vehicles / Carts | 2260001060 | 3.72 | 0.83 | 137.48 | 0.01201 | 0.00260 | 0.42930 |
| 4-Str Offroad Motorcycles | 2265001010 | 6.88 | 0.79 | 97.16 | 0.02180 | 0.00226 | 0.31018 |
| 4-Str ATVs | 2265001030 | 62.11 | 7.11 | 874.42 | 0.19688 | 0.02038 | 2.79155 |
| 4-Str Golf Carts | 2265001050 | 1.90 | 0.59 | 127.04 | 0.00593 | 0.00170 | 0.40558 |
| 4-Str Specialty Vehicles / Carts | 2265001060 | 3.87 | 0.74 | 122.22 | 0.01216 | 0.00212 | 0.39020 |
| LPG Specialty Vehicles / Carts | 2267001060 | 0.08 | 0.29 | 1.16 | 0.00024 | 0.00090 | 0.00361 |
| Dsl- Specialty Vehicle Carts | 2270001060 | 1.11 | 3.11 | 4.36 | 0.00348 | 0.00972 | 0.01361 |

## Non-Road Mobile Source Emissions - Kerr County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **TOTAL** | | **539.87** | **14.57** | **1,804.19** | **1.69192** | **0.04316** | **5.71913** |

**Residential Lawn & Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Res) | 2260004015 | 1.88 | 0.00 | 3.86 | 0.00999 | 0.00002 | 0.01971 |
| 2-Str Chain Saws < 6 HP (Res) | 2260004020 | 26.99 | 0.06 | 49.59 | 0.14271 | 0.00032 | 0.25303 |
| 2-Str Trimmers/Edgers/Brush Cutter (Res) | 2260004025 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Leafblowers/Vacuums (Res) | 2260004030 | 15.72 | 0.04 | 31.58 | 0.08472 | 0.00021 | 0.16114 |
| 4-Str Lawn Mowers (Res) | 2265004010 | 44.18 | 3.49 | 597.52 | 0.21321 | 0.01637 | 3.11672 |
| 4-Str Rotary Tillers <6 HP (Res) | 2265004015 | 5.09 | 0.38 | 65.11 | 0.02446 | 0.00180 | 0.33960 |
| 4-Str Trimmers/Edgers/Brush Cutters (Res) | 2265004025 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Leafblowers/Vacuums (Res) | 2265004030 | 0.42 | 0.03 | 5.70 | 0.00206 | 0.00016 | 0.02975 |
| 4-Str Rear Engine Riding Mower (Res) | 2265004040 | 2.52 | 0.63 | 97.85 | 0.01296 | 0.00293 | 0.51041 |
| 4-Str Lawn & Garden Tractors (Res) | 2265004055 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Other Lawn & Garden Equip. (Res) | 2265004075 | 18.15 | 2.10 | 374.76 | 0.08972 | 0.00985 | 1.95477 |
| **TOTAL** | | **114.96** | **6.75** | **1,225.99** | **0.57983** | **0.03167** | **6.38514** |

**Commercial Lawn & Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 0.15 | 0.00 | 0.32 | 0.00077 | 0.00000 | 0.00160 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 30.67 | 0.28 | 73.70 | 0.11288 | 0.00104 | 0.27112 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 13.39 | 0.05 | 28.85 | 0.06688 | 0.00026 | 0.14404 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 8.37 | 0.06 | 19.99 | 0.04181 | 0.00028 | 0.09984 |
| 2-Str Commercial Turf Equipment (Com) | 2260004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 2.16 | 0.18 | 32.26 | 0.01068 | 0.00084 | 0.16468 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.38 | 0.03 | 5.56 | 0.00191 | 0.00015 | 0.02841 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.14 | 0.01 | 2.59 | 0.00071 | 0.00007 | 0.01320 |
| 4-Str Leafblowers/Vacuums (Com) | 2265004031 | 1.70 | 0.65 | 70.00 | 0.00845 | 0.00296 | 0.35736 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 1.28 | 0.42 | 73.66 | 0.00635 | 0.00194 | 0.37604 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.69 | 0.18 | 28.95 | 0.00339 | 0.00081 | 0.14776 |
| 4-Str Shredders < 6 HP (Com) | 2265004051 | 0.37 | 0.03 | 5.20 | 0.00182 | 0.00014 | 0.02653 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 0.55 | 0.18 | 31.00 | 0.00273 | 0.00084 | 0.15826 |
| 4-Str Chippers/Stump Grinders (Com) | 2265004066 | 3.20 | 2.19 | 147.95 | 0.01585 | 0.01005 | 0.75530 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.05 | 0.02 | 2.23 | 0.00024 | 0.00007 | 0.01140 |
| 4-Str Other Lawn & Garden Equip. (Com) | 2265004076 | 1.61 | 0.19 | 33.27 | 0.00771 | 0.00087 | 0.16986 |
| LPG Chippers/Stump Grinders (Com) | 2267004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Leafblowers/Vacuums (Com) | 2270004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Front Mowers (Com) | 2270004046 | 1.43 | 7.20 | 4.56 | 0.00714 | 0.03594 | 0.02277 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.02 | 0.08 | 0.05 | 0.00008 | 0.00038 | 0.00024 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.76 | 5.99 | 3.07 | 0.00380 | 0.02993 | 0.01534 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.00 | 0.02 | 0.01 | 0.00002 | 0.00009 | 0.00006 |
| **TOTAL** | | **66.92** | **17.77** | **563.22** | **0.29320** | **0.08668** | **2.76380** |

**University/Colleges Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Commercial Turf Equipment (Com) | 2260004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractors/Loaders/Backhoe | 2265002066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Leafblowers/Vacuums (Com) | 2265004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Shredders < 6 HP (Com) | 2265004051 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Chippers/Stump Grinders (Com) | 2265004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Other Lawn & Garden Equip. (Com) | 2265004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |

## Non-Road Mobile Source Emissions - Kerr County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4-Str Tillers > 6 HP | 2265005040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG Chippers/Stump Grinders (Com) | 2267004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Shredders > 6 HP | 2265007010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Leafblowers/Vacuums (Com) | 2270004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Shredders > 6 HP | 2270007010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Public Schools Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 0.00 | 0.00 | 0.01 | 0.00001 | 0.00000 | 0.00003 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 0.15 | 0.00 | 0.30 | 0.00057 | 0.00000 | 0.00114 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 4.96 | 0.02 | 10.46 | 0.02560 | 0.00008 | 0.05399 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 0.94 | 0.00 | 2.06 | 0.00486 | 0.00002 | 0.01062 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.38 | 0.03 | 5.84 | 0.00197 | 0.00016 | 0.03083 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.01 | 0.00 | 0.09 | 0.00003 | 0.00000 | 0.00046 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 0.13 | 0.04 | 7.24 | 0.00067 | 0.00021 | 0.03824 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.13 | 0.02 | 4.90 | 0.00064 | 0.00012 | 0.02587 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 0.68 | 0.06 | 10.91 | 0.00346 | 0.00027 | 0.05761 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.03 | 0.03 | 0.65 | 0.00014 | 0.00015 | 0.00345 |
| 4-Str Shredders > 6 HP | 2265007010 | 0.13 | 0.02 | 4.31 | 0.00049 | 0.00007 | 0.01676 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.01 | 0.06 | 0.04 | 0.00007 | 0.00032 | 0.00020 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.03 | 0.15 | 0.09 | 0.00014 | 0.00075 | 0.00047 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.00 | 0.01 | 0.01 | 0.00002 | 0.00007 | 0.00005 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.00 | 0.01 | 0.01 | 0.00001 | 0.00006 | 0.00003 |
| Dsl - Shredders > 6 HP | 2270007010 | 0.01 | 0.07 | 0.07 | 0.00004 | 0.00026 | 0.00026 |
| **TOTAL** | | **7.59** | **0.53** | **46.98** | **0.03872** | **0.00253** | **0.24003** |

**Golf Courses Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 0.10 | 0.00 | 0.25 | 0.00034 | 0.00000 | 0.00084 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 0.93 | 0.00 | 1.96 | 0.00419 | 0.00001 | 0.00882 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 1.50 | 0.00 | 3.27 | 0.00673 | 0.00002 | 0.01471 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.08 | 0.01 | 1.25 | 0.00037 | 0.00003 | 0.00576 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.01 | 0.00 | 0.17 | 0.00005 | 0.00000 | 0.00077 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.40 | 0.13 | 22.93 | 0.00178 | 0.00054 | 0.10551 |
| 4-Str Front Mowers (Com) | 2265004046 | 2.12 | 2.21 | 46.95 | 0.00940 | 0.00913 | 0.21604 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 2.25 | 0.79 | 150.92 | 0.01008 | 0.00327 | 0.69447 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.26 | 1.12 | 0.77 | 0.00117 | 0.00505 | 0.00346 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.13 | 0.57 | 0.38 | 0.00057 | 0.00256 | 0.00172 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.01 | 0.06 | 0.02 | 0.00003 | 0.00025 | 0.00011 |
| **TOTAL** | | **7.79** | **4.89** | **228.88** | **0.03471** | **0.02088** | **1.05220** |

**Government Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rotary Tillers <6 HP | 2260004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Chain Saws | 2260004021 | 0.51 | 0.00 | 1.22 | 0.00195 | 0.00002 | 0.00469 |
| Trimmers/ Edgers/ Brush Cutters | 2260004026 | 0.48 | 0.00 | 1.03 | 0.00232 | 0.00001 | 0.00500 |
| Leaf Blowers/ Vacuums | 2260004031 | 0.09 | 0.00 | 0.21 | 0.00035 | 0.00000 | 0.00084 |
| 4-Str Concrete/Industrial Saws | 2265002039 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Lawn Mowers | 2265004011 | 0.01 | 0.00 | 0.14 | 0.00004 | 0.00000 | 0.00061 |
| Rotary Tillers | 2265004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Trimmers/ Edgers/ Brush Cutters | 2265004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Leaf Blowers / Vacuums | 2265004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Rear Engine Riding Mowers | 2265004041 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Front Mowers | 2265004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Lawn and Garden Tractors | 2265004056 | 0.05 | 0.02 | 2.95 | 0.00021 | 0.00006 | 0.01209 |
| Chippers/ Stump/ Grinders/ Mulchers | 2265004066 | 0.64 | 0.40 | 30.09 | 0.00314 | 0.00195 | 0.14679 |
| Commercial Turf Equipment/ Sod Cutters | 2265004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |

## Non-Road Mobile Source Emissions - Kerr County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Other Lawn and Garden Equipment - Pole Saw | 2265004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Water Pumps | 2265006010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Commercial Mowers | 2270004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Lawn and Garden Tractors | 2270004056 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Chippers/ Stump/ Grinders/ Mulchers | 2270004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Commercial Turf Equipment/ Sod Cutters | 2270004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Shredders | 2270007010 | 0.18 | 0.60 | 0.66 | 0.00070 | 0.00229 | 0.00252 |
| **TOTAL** | | **1.96** | **1.02** | **36.29** | **0.00872** | **0.00435** | **0.17254** |

**Agricultural Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4-Str Tractor - Corn | 2265005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Hay | 2265005015 | 0.00 | 0.81 | 0.05 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Peanuts | 2265005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Sorghum | 2265005015 | 0.00 | 0.03 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Cotton | 2265005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Small Grains | 2265005015 | 0.00 | 0.00 | 0.00 | 0.00004 | 0.02023 | 0.00130 |
| Dsl Tractor - Corn | 2270005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Hay | 2270005015 | 0.21 | 1.71 | 1.03 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Peanuts | 2270005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Sorghum | 2270005015 | 0.01 | 0.06 | 0.04 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Cotton | 2270005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Small Grains | 2270005015 | 0.00 | 0.00 | 0.00 | 0.00518 | 0.04302 | 0.02591 |
| Dsl Combine - Corn | 2270005020 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Combine - Hay | 2270005020 | 0.04 | 0.55 | 0.19 | 0.00021 | 0.00325 | 0.00114 |
| Dsl Combine - Peanuts | 2270005020 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Combine - Sorghum | 2270005020 | 0.01 | 0.12 | 0.04 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Combine - Cotton | 2270005020 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Combine - Small Grains | 2270005020 | 0.00 | 0.00 | 0.00 | 0.00041 | 0.00622 | 0.00218 |
| 2-Str Sprayers | 2260005035 | 0.03 | 0.00 | 0.06 | 0.00012 | 0.00000 | 0.00025 |
| 2-Str Hydro Power Units | 2260005050 | 0.00 | 0.00 | 0.01 | 0.00002 | 0.00000 | 0.00004 |
| 4-Str Balers | 2265005025 | 0.01 | 0.01 | 0.20 | 0.00005 | 0.00004 | 0.00088 |
| 4-Str Agricultural Mowers | 2265005030 | 0.00 | 0.00 | 0.17 | 0.00002 | 0.00000 | 0.00072 |
| 4-Str Sprayers | 2265005035 | 0.06 | 0.02 | 1.44 | 0.00024 | 0.00006 | 0.00622 |
| 4-Str Tillers > 6 HP | 2265005040 | 0.11 | 0.01 | 3.75 | 0.00049 | 0.00006 | 0.01614 |
| 4-Str Swathers | 2265005045 | 0.02 | 0.01 | 0.32 | 0.00007 | 0.00006 | 0.00139 |
| 4-Str Hydro Power Units | 2265005050 | 0.03 | 0.01 | 1.31 | 0.00013 | 0.00003 | 0.00563 |
| 4-Str Other Agriculture Equipment | 2265005055 | 0.02 | 0.02 | 0.66 | 0.00010 | 0.00007 | 0.00285 |
| 4-Str Irrigation Sets | 2265005060 | 0.03 | 0.03 | 0.62 | 0.00011 | 0.00011 | 0.00266 |
| LPG Hydro Power Units | 2267005050 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| LPG Other Agriculture Equipment | 2267005055 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| LPG Irrigation Sets | 2267005060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| CNG Hydro Power Units | 2268005050 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| CNG Other Agriculture Equipment | 2268005055 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| CNG Irrigation Sets | 2268005060 | 0.00 | 0.03 | 0.13 | 0.00000 | 0.00013 | 0.00054 |
| Dsl - Balers | 2270005025 | 0.00 | 0.01 | 0.00 | 0.00001 | 0.00003 | 0.00002 |
| Dsl - Agricultural Mowers | 2270005030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00000 |
| Dsl - Sprayers | 2270005035 | 0.03 | 0.10 | 0.07 | 0.00011 | 0.00041 | 0.00030 |
| Dsl - Tillers > 6 HP | 2270005040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Swathers | 2270005045 | 0.01 | 0.11 | 0.04 | 0.00005 | 0.00046 | 0.00019 |
| Dsl - Hydro Power Units | 2270005050 | 0.00 | 0.02 | 0.01 | 0.00001 | 0.00010 | 0.00005 |
| Dsl - Other Agriculture Equipment | 2270005055 | 0.04 | 0.27 | 0.16 | 0.00016 | 0.00116 | 0.00069 |
| Dsl - Irrigation Sets | 2270005060 | 0.02 | 0.16 | 0.07 | 0.00009 | 0.00071 | 0.00029 |
| **TOTAL** | | **0.68** | **4.08** | **10.40** | **0.00760** | **0.07618** | **0.06942** |
| TOTAL NONROAD SOURCES | | 794.18 | 207.87 | 4,729.46 | 2.85095 | 0.88244 | 19.43951 |

## Non-Road Mobile Source Emissions - Medina County, 2002

| MEDINA COUNTY NON-ROAD MOBILE SOURCES | SCC Codes | VOC ton/year | NOx ton/year | CO ton/year | VOC ton/day M-F | NOx ton/day M-F | CO ton/day M-F |
|---|---|---|---|---|---|---|---|
| **Construction Equipment** | | | | | | | |
| 2-Str Tampers/Rammers | 2260002006 | 0.63 | 0.01 | 1.78 | 0.00295 | 0.00004 | 0.00831 |
| 2-Str Plate Compactors | 2260002009 | 0.04 | 0.00 | 0.08 | 0.00016 | 0.00000 | 0.00039 |
| 2-Str Paving Equipment | 2260002021 | 0.04 | 0.00 | 0.10 | 0.00019 | 0.00000 | 0.00046 |
| 2-Str Signal Boards/Light Plants | 2260002027 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Concrete/Industrial Saws | 2260002039 | 1.73 | 0.02 | 4.79 | 0.00805 | 0.00009 | 0.02235 |
| 2-Str Crushing/Proc. Equipment | 2260002054 | 0.01 | 0.00 | 0.02 | 0.00004 | 0.00000 | 0.00009 |
| 4-Str Pavers | 2265002003 | 0.03 | 0.01 | 1.58 | 0.00015 | 0.00006 | 0.00753 |
| 4-Str Tampers/Rammers | 2265002006 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00000 | 0.00006 |
| 4-Str Plate Compactors | 2265002009 | 0.12 | 0.02 | 2.91 | 0.00057 | 0.00007 | 0.01390 |
| 4-Str Rollers | 2265002015 | 0.05 | 0.02 | 3.00 | 0.00024 | 0.00011 | 0.01429 |
| 4-Str Paving Equipment | 2265002021 | 0.17 | 0.04 | 5.70 | 0.00077 | 0.00016 | 0.02719 |
| 4-Str Surfacing Equipment | 2265002024 | 0.06 | 0.01 | 2.59 | 0.00029 | 0.00006 | 0.01234 |
| 4-Str Signal Boards/Light Plants | 2265002027 | 0.00 | 0.00 | 0.13 | 0.00002 | 0.00000 | 0.00063 |
| 4-Str Trenchers | 2265002030 | 0.13 | 0.04 | 4.86 | 0.00061 | 0.00019 | 0.02319 |
| 4-Str Bore/Drill Rigs | 2265002033 | 0.07 | 0.01 | 1.42 | 0.00034 | 0.00006 | 0.00678 |
| 4-Str Concrete/Industrial Saws | 2265002039 | 0.19 | 0.07 | 12.21 | 0.00090 | 0.00032 | 0.05822 |
| 4-Str Cement & Mortar Mixers | 2265002042 | 0.18 | 0.03 | 5.02 | 0.00081 | 0.00013 | 0.02393 |
| 4-Str Cranes | 2265002045 | 0.01 | 0.01 | 0.20 | 0.00003 | 0.00003 | 0.00097 |
| 4-Str Crushing/Proc. Equipment | 2265002054 | 0.02 | 0.00 | 0.70 | 0.00008 | 0.00002 | 0.00335 |
| 4-Str Rough Terrain Forklift | 2265002057 | 0.01 | 0.01 | 0.27 | 0.00005 | 0.00005 | 0.00127 |
| 4-Str Rubber Tire Loaders | 2265002060 | 0.03 | 0.03 | 0.64 | 0.00012 | 0.00013 | 0.00303 |
| 4-Str Tractors/Loaders/Backhoes | 2265002066 | 0.06 | 0.02 | 3.74 | 0.00028 | 0.00010 | 0.01783 |
| 4-Str Skid Steer Loaders | 2265002072 | 0.05 | 0.03 | 1.68 | 0.00021 | 0.00014 | 0.00802 |
| 4-Str Dumpers/Tenders | 2265002078 | 0.02 | 0.00 | 0.78 | 0.00011 | 0.00002 | 0.00373 |
| 4-Str Other Construction Equipment | 2265002081 | 0.01 | 0.01 | 0.22 | 0.00005 | 0.00005 | 0.00107 |
| LPG-Pavers | 2267002003 | 0.00 | 0.01 | 0.04 | 0.00001 | 0.00004 | 0.00017 |
| LPG-Rollers | 2267002015 | 0.00 | 0.02 | 0.06 | 0.00002 | 0.00007 | 0.00029 |
| LPG-Paving Equipment | 2267002021 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00005 |
| LPG-Surfacing Equipment | 2267002024 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00003 |
| LPG-Trenchers | 2267002030 | 0.01 | 0.03 | 0.11 | 0.00004 | 0.00013 | 0.00053 |
| LPG-Bore/Drill Rigs | 2267002033 | 0.00 | 0.01 | 0.04 | 0.00001 | 0.00004 | 0.00017 |
| LPG-Concrete/Industrial Saws | 2267002039 | 0.01 | 0.03 | 0.11 | 0.00003 | 0.00013 | 0.00051 |
| LPG-Cranes | 2267002045 | 0.00 | 0.01 | 0.04 | 0.00001 | 0.00005 | 0.00019 |
| LPG-Crushing/Proc. Equipment | 2267002054 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00003 |
| LPG-Rough Terrain Forklifts | 2267002057 | 0.00 | 0.02 | 0.07 | 0.00002 | 0.00008 | 0.00034 |
| LPG-Rubber Tire Loaders | 2267002060 | 0.01 | 0.05 | 0.18 | 0.00006 | 0.00021 | 0.00084 |
| LPG-Tractors/Loaders/Backhoes | 2267002066 | 0.00 | 0.00 | 0.02 | 0.00001 | 0.00002 | 0.00009 |
| LPG - Skid Steer Loaders | 2267002072 | 0.01 | 0.03 | 0.13 | 0.00004 | 0.00015 | 0.00060 |
| LPG-Other Construction Equipment | 2267002081 | 0.00 | 0.02 | 0.06 | 0.00002 | 0.00007 | 0.00028 |
| CNG-Other Construction Equipment | 2268002081 | 0.00 | 0.00 | 0.00 | 0.00001 | 0.00000 | 0.00001 |
| Dsl - Pavers | 2270002003 | 0.04 | 0.51 | 0.22 | 0.00020 | 0.00240 | 0.00101 |
| Dsl - Tampers/Rammers | 2270002006 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Plate Compactors | 2270002009 | 0.00 | 0.01 | 0.01 | 0.00001 | 0.00006 | 0.00004 |
| Dsl - Rollers | 2270002015 | 0.25 | 2.49 | 1.31 | 0.00117 | 0.01161 | 0.00612 |
| Dsl - Scrapers | 2270002018 | 0.02 | 0.22 | 0.11 | 0.00007 | 0.00103 | 0.00051 |
| Dsl - Paving Equipment | 2270002021 | 0.01 | 0.12 | 0.08 | 0.00006 | 0.00058 | 0.00037 |
| Dsl - Surfacing Equipment | 2270002024 | 0.20 | 2.11 | 1.30 | 0.00092 | 0.00984 | 0.00606 |
| Dsl - Signal Boards/Light Plants | 2270002027 | 0.05 | 0.26 | 0.16 | 0.00022 | 0.00123 | 0.00075 |
| Dsl - Trenchers | 2270002030 | 0.03 | 0.24 | 0.19 | 0.00016 | 0.00114 | 0.00086 |
| Dsl - Bore/Drill Rigs | 2270002033 | 0.16 | 2.11 | 0.55 | 0.00075 | 0.00986 | 0.00259 |
| Dsl - Excavators | 2270002036 | 0.55 | 6.82 | 2.93 | 0.00256 | 0.03182 | 0.01365 |
| Dsl - Concrete/Industrial Saws | 2270002039 | 0.01 | 0.08 | 0.06 | 0.00005 | 0.00037 | 0.00028 |
| Dsl - Cement & Mortar Mixers | 2270002042 | 0.00 | 0.01 | 0.00 | 0.00001 | 0.00004 | 0.00002 |
| Dsl - Cranes | 2270002045 | 0.10 | 1.30 | 0.35 | 0.00048 | 0.00608 | 0.00162 |
| Dsl - Graders | 2270002048 | 0.15 | 1.74 | 0.71 | 0.00069 | 0.00812 | 0.00330 |
| Dsl - Off-highway Trucks | 2270002051 | 0.10 | 1.22 | 0.56 | 0.00048 | 0.00568 | 0.00259 |
| Dsl - Crushing/Proc. Equipment | 2270002054 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00002 | 0.00001 |
| Dsl - Rough Terrain Forklifts | 2270002057 | 0.06 | 0.51 | 0.33 | 0.00028 | 0.00239 | 0.00154 |
| Dsl - Rubber Tire Loaders | 2270002060 | 0.32 | 4.15 | 1.42 | 0.00147 | 0.01934 | 0.00662 |
| Dsl - Tractors/Loaders/Backhoes | 2270002066 | 1.30 | 7.98 | 5.84 | 0.00608 | 0.03720 | 0.02723 |

## Non-Road Mobile Source Emissions - Medina County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Skid Steer Loaders | 2270002072 | 0.38 | 1.16 | 1.49 | 0.00179 | 0.00541 | 0.00695 |
| Dsl - Off-Highway Tractors | 2270002075 | 0.00 | 0.03 | 0.01 | 0.00001 | 0.00015 | 0.00006 |
| Dsl - Dumpers/Tenders | 2270002078 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00001 |
| Dsl - Other Construction Equipment | 2270002081 | 0.07 | 0.68 | 0.41 | 0.00032 | 0.00318 | 0.00193 |
| **TOTAL** | | **7.55** | **34.43** | **73.38** | **0.03510** | **0.16041** | **0.34721** |

**Light Commercial Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Generator Sets | 2260006005 | 0.21 | 0.00 | 0.46 | 0.00066 | 0.00000 | 0.00147 |
| 2-Str Pumps | 2260006010 | 1.50 | 0.01 | 3.39 | 0.00474 | 0.00002 | 0.01074 |
| 2-Str Air Compressors | 2260006015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Generator Sets | 2265006005 | 5.15 | 2.84 | 131.16 | 0.01900 | 0.01079 | 0.49850 |
| 4-Str Pumps | 2265006010 | 1.25 | 0.14 | 27.60 | 0.00467 | 0.00052 | 0.10344 |
| 4-Str Air Compressors | 2265006015 | 0.54 | 0.13 | 14.41 | 0.00201 | 0.00049 | 0.05398 |
| 4-Str Welders | 2265006025 | 1.19 | 0.77 | 49.11 | 0.00414 | 0.00271 | 0.17372 |
| 4-Str Pressure Washers | 2265006030 | 2.11 | 0.50 | 67.91 | 0.00726 | 0.00174 | 0.23788 |
| LPG-Generator Sets | 2267006005 | 0.03 | 0.13 | 0.34 | 0.00010 | 0.00050 | 0.00128 |
| LPG-Pumps | 2267006010 | 0.02 | 0.12 | 0.32 | 0.00008 | 0.00037 | 0.00100 |
| LPG-Air Compressors | 2267006015 | 0.03 | 0.14 | 0.39 | 0.00009 | 0.00045 | 0.00122 |
| LPG-Welders | 2267006025 | 0.04 | 0.16 | 0.62 | 0.00015 | 0.00058 | 0.00228 |
| LPG-Pressure Washers | 2267006030 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00003 |
| CNG-Generator Sets | 2268006005 | 0.01 | 0.56 | 1.53 | 0.00002 | 0.00178 | 0.00485 |
| CNG-Pumps | 2268006010 | 0.00 | 0.01 | 0.02 | 0.00000 | 0.00003 | 0.00007 |
| CNG-Air Compressors | 2268006015 | 0.00 | 0.03 | 0.10 | 0.00000 | 0.00013 | 0.00037 |
| CNG-Gas Compressors | 2268006020 | 0.01 | 0.41 | 1.84 | 0.00002 | 0.00130 | 0.00582 |
| Dsl-Generator Sets | 2270006005 | 1.68 | 12.14 | 6.69 | 0.00636 | 0.04607 | 0.02541 |
| Dsl-Pumps | 2270006010 | 0.00 | 0.01 | 0.01 | 0.00001 | 0.00006 | 0.00003 |
| Dsl-Air Compressors | 2270006015 | 0.13 | 1.08 | 0.50 | 0.00051 | 0.00411 | 0.00189 |
| Dsl-Gas Compressors | 2270006020 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl-Welders | 2270006025 | 0.29 | 0.62 | 1.01 | 0.00111 | 0.00236 | 0.00383 |
| Dsl-Pressure Washers | 2270006030 | 0.00 | 0.02 | 0.01 | 0.00001 | 0.00007 | 0.00004 |
| **TOTAL** | | **14.18** | **19.81** | **307.42** | **0.05096** | **0.07405** | **1.12787** |

**Industrial Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Sweepers/Scrubbers | 2260003030 | 0.01 | 0.00 | 0.03 | 0.00003 | 0.00000 | 0.00008 |
| 2-Str Other General Industrial Eqp | 2260003040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Aerial Lifts | 2265003010 | 0.52 | 0.53 | 13.51 | 0.00196 | 0.00202 | 0.05136 |
| 4-Str Forklifts | 2265003020 | 0.09 | 0.09 | 2.12 | 0.00028 | 0.00029 | 0.00677 |
| 4-Str Sweepers/Scrubbers | 2265003030 | 0.10 | 0.08 | 3.03 | 0.00033 | 0.00027 | 0.01031 |
| 4-Str Other General Industrial Eqp | 2265003040 | 0.18 | 0.03 | 4.82 | 0.00057 | 0.00009 | 0.01528 |
| 4-Str Other Material Handling Eqp | 2265003050 | 0.00 | 0.00 | 0.16 | 0.00002 | 0.00001 | 0.00052 |
| 4-Str AC\Refrigeration | 2265003060 | 0.01 | 0.00 | 0.48 | 0.00002 | 0.00001 | 0.00129 |
| 4-Str Terminal Tractors | 2265003070 | 0.02 | 0.02 | 0.45 | 0.00006 | 0.00006 | 0.00144 |
| 4-Str Other Oil Field Eqp | 2265010010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG-Aerial Lifts | 2267003010 | 0.02 | 0.08 | 0.31 | 0.00007 | 0.00025 | 0.00099 |
| LPG - Forklifts | 2267003020 | 2.70 | 9.94 | 39.86 | 0.00922 | 0.03400 | 0.13627 |
| LPG - Sweepers/Scrubbers | 2267003030 | 0.08 | 0.27 | 1.16 | 0.00023 | 0.00080 | 0.00339 |
| LPG - Other General Industrial Equipment | 2267003040 | 0.00 | 0.02 | 0.07 | 0.00001 | 0.00006 | 0.00022 |
| LPG - Other Material Handling Equipment | 2267003050 | 0.00 | 0.00 | 0.02 | 0.00000 | 0.00001 | 0.00005 |
| LPG - Terminal Tractors | 2267003070 | 0.01 | 0.04 | 0.14 | 0.00003 | 0.00011 | 0.00045 |
| CNG-Forklifts | 2268003020 | 0.01 | 0.54 | 2.16 | 0.00003 | 0.00172 | 0.00686 |
| CNG - Sweepers/Scrubbers | 2268003030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| CNG-Other General Industrial Equipment | 2268003040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| CNG-AC\Refrigeration | 2268003060 | 0.00 | 0.00 | 0.02 | 0.00000 | 0.00001 | 0.00005 |
| CNG-Terminal Tractors | 2268003070 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00003 |
| CNG-Other Oil Field Eqp | 2268010010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Aerial Lifts | 2270003010 | 0.07 | 0.33 | 0.23 | 0.00025 | 0.00119 | 0.00084 |
| Dsl - Forklifts | 2270003020 | 0.05 | 0.51 | 0.25 | 0.00018 | 0.00189 | 0.00093 |
| Dsl - Sweepers/Scrubbers | 2270003030 | 0.06 | 0.75 | 0.18 | 0.00022 | 0.00285 | 0.00068 |
| Dsl - Other General Industrial Eqp | 2270003040 | 0.14 | 1.84 | 0.52 | 0.00043 | 0.00583 | 0.00164 |
| Dsl - Other Material Handling Eqp | 2270003050 | 0.00 | 0.00 | 0.01 | 0.00001 | 0.00001 | 0.00002 |
| Dsl - AC\Refrigertion | 2270003060 | 0.40 | 2.39 | 1.41 | 0.00109 | 0.00651 | 0.00383 |
| Dsl - Terminal Tractors | 2270003070 | 0.11 | 2.44 | 0.84 | 0.00034 | 0.00784 | 0.00269 |

## Non-Road Mobile Source Emissions - Medina County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Other Oil Field Eqp | 2270010010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **4.57** | **19.92** | **71.78** | **0.01539** | **0.06585** | **0.24600** |

**Railroad Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Railway Maintenance | 2285002015 | 0.08 | 0.43 | 0.36 | 0.00146 | 0.00000 | 0.00125 |
| 4-Str Railway Maintenance | 2285004015 | 0.02 | 0.01 | 0.94 | 0.00002 | 0.00000 | 0.00327 |
| LPG Railway Maintenance | 2285006015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| Railroad | 2285002000 | 10.39 | 281.28 | 27.70 | 0.02845 | 0.77064 | 0.07588 |
| **TOTAL** | | **10.49** | **281.72** | **29.00** | **0.02994** | **0.77064** | **0.08041** |

**Mining Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Graders | 2270002048 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Off Highway Trucks | 2270002051 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Proc. Equipment | 2270002054 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Crawler Tractor/Dozers | 2270002069 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Quarry Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Scrapers | 2270002018 | 0.06 | 0.93 | 0.42 | 0.00019 | 0.00280 | 0.00125 |
| Dsl - Excavators | 2270002036 | 0.32 | 4.20 | 1.57 | 0.00096 | 0.01263 | 0.00472 |
| Dsl - Graders | 2270002048 | 0.02 | 0.24 | 0.08 | 0.00005 | 0.00072 | 0.00025 |
| Dsl - Off Highway Trucks | 2270002051 | 2.05 | 29.55 | 12.38 | 0.00616 | 0.08890 | 0.03725 |
| Dsl - Rubber Tire Loaders | 2270002060 | 1.80 | 22.21 | 10.16 | 0.00540 | 0.06682 | 0.03055 |
| Dsl - Tractors/Loaders/Backhoes | 2270002066 | 0.50 | 2.17 | 2.03 | 0.00151 | 0.00653 | 0.00610 |
| Dsl - Crawler Tractors/Dozers | 2270002069 | 0.26 | 3.35 | 1.45 | 0.00078 | 0.01008 | 0.00437 |
| **TOTAL** | | **5.01** | **62.65** | **28.09** | **0.01506** | **0.18847** | **0.08450** |

**Landfill Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Pavers | 2270002003 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Scrapers | 2270002018 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Excavators | 2270002036 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Graders | 2270002048 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Off Highway Trucks | 2270002051 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Rubber Tire Loaders | 2270002060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Crawler Tractors/Dozers | 2270002069 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Const. Equipment | 2270002081 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Recreational Boating**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Outboard | 2282005010 | 28.36 | 0.62 | 55.82 | 0.06846 | 0.00136 | 0.12245 |
| Personal Water Craft | 2282005015 | 12.47 | 0.18 | 24.30 | 0.02786 | 0.00039 | 0.05330 |
| Inboard/Sterndrive | 2282010005 | 2.28 | 0.97 | 26.98 | 0.00687 | 0.00196 | 0.06051 |
| Inboard/Sterndrive | 2282020005 | 0.07 | 1.78 | 0.28 | 0.00015 | 0.00390 | 0.00062 |
| Outboards | 2282020010 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00002 | 0.00001 |
| **TOTAL** | | **43.19** | **3.55** | **107.39** | **0.10334** | **0.00763** | **0.23688** |

**Recreational Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Offroad Motorcycles | 2260001010 | 32.80 | 0.08 | 31.36 | 0.10260 | 0.00025 | 0.09794 |
| 2-Str ATVs | 2260001030 | 32.94 | 0.08 | 31.55 | 0.10303 | 0.00025 | 0.09851 |
| 2-Str Specialty Vehicles / Carts | 2260001060 | 0.53 | 0.12 | 19.64 | 0.00172 | 0.00037 | 0.06133 |
| 4-Str Offroad Motorcycles | 2265001010 | 0.98 | 0.11 | 13.88 | 0.00311 | 0.00032 | 0.04431 |
| 4-Str ATVs | 2265001030 | 8.87 | 1.02 | 124.92 | 0.02813 | 0.00291 | 0.39879 |
| 4-Str Golf Carts | 2265001050 | 1.90 | 0.59 | 127.04 | 0.00593 | 0.00170 | 0.40558 |
| 4-Str Specialty Vehicles / Carts | 2265001060 | 0.55 | 0.11 | 17.46 | 0.00174 | 0.00030 | 0.05574 |
| LPG Specialty Vehicles / Carts | 2267001060 | 0.01 | 0.04 | 0.17 | 0.00003 | 0.00013 | 0.00052 |
| Dsl- Specialty Vehicle Carts | 2270001060 | 0.16 | 0.44 | 0.62 | 0.00050 | 0.00139 | 0.00194 |

## Non-Road Mobile Source Emissions - Medina County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **TOTAL** | | **78.75** | **2.59** | **366.64** | **0.24678** | **0.00762** | **1.16466** |

**Residential Lawn & Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Res) | 2260004015 | 1.37 | 0.00 | 2.83 | 0.00730 | 0.00002 | 0.01442 |
| 2-Str Chain Saws < 6 HP (Res) | 2260004020 | 19.74 | 0.05 | 36.28 | 0.10438 | 0.00024 | 0.18508 |
| 2-Str Trimmers/Edgers/Brush Cutter (Res) | 2260004025 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Leafblowers/Vacuums (Res) | 2260004030 | 11.50 | 0.03 | 23.10 | 0.06197 | 0.00015 | 0.11786 |
| 4-Str Lawn Mowers (Res) | 2265004010 | 32.32 | 2.56 | 437.05 | 0.15595 | 0.01197 | 2.27967 |
| 4-Str Rotary Tillers <6 HP (Res) | 2265004015 | 3.73 | 0.28 | 47.62 | 0.01789 | 0.00132 | 0.24839 |
| 4-Str Trimmers/Edgers/Brush Cutters (Res) | 2265004025 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Leafblowers/Vacuums (Res) | 2265004030 | 0.31 | 0.02 | 4.17 | 0.00151 | 0.00012 | 0.02176 |
| 4-Str Rear Engine Riding Mower (Res) | 2265004040 | 1.85 | 0.46 | 71.57 | 0.00948 | 0.00214 | 0.37333 |
| 4-Str Lawn & Garden Tractors (Res) | 2265004055 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Other Lawn & Garden Equip. (Res) | 2265004075 | 13.27 | 1.54 | 274.11 | 0.06563 | 0.00721 | 1.42978 |
| **TOTAL** | | **84.08** | **4.94** | **896.73** | **0.42411** | **0.02316** | **4.67030** |

**Commercial Lawn & Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 0.05 | 0.00 | 0.11 | 0.00026 | 0.00000 | 0.00054 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 18.62 | 0.17 | 44.75 | 0.06853 | 0.00063 | 0.16461 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 8.13 | 0.03 | 17.51 | 0.04061 | 0.00016 | 0.08745 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 5.08 | 0.03 | 12.14 | 0.02538 | 0.00017 | 0.06062 |
| 2-Str Commercial Turf Equipment (Com) | 2260004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 1.31 | 0.11 | 19.59 | 0.00648 | 0.00051 | 0.09998 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.13 | 0.01 | 1.87 | 0.00064 | 0.00005 | 0.00956 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.09 | 0.01 | 1.57 | 0.00043 | 0.00004 | 0.00801 |
| 4-Str Leafblowers/Vacuums (Com) | 2265004031 | 1.03 | 0.39 | 42.50 | 0.00513 | 0.00180 | 0.21697 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 0.43 | 0.14 | 24.80 | 0.00214 | 0.00065 | 0.12659 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.23 | 0.06 | 9.74 | 0.00114 | 0.00027 | 0.04974 |
| 4-Str Shredders < 6 HP (Com) | 2265004051 | 0.12 | 0.01 | 1.75 | 0.00061 | 0.00005 | 0.00893 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 0.19 | 0.06 | 10.44 | 0.00092 | 0.00028 | 0.05328 |
| 4-Str Chippers/Stump Grinders (Com) | 2265004066 | 1.08 | 0.74 | 49.81 | 0.00533 | 0.00338 | 0.25426 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.02 | 0.01 | 0.75 | 0.00008 | 0.00002 | 0.00384 |
| 4-Str Other Lawn & Garden Equip. (Com) | 2265004076 | 0.54 | 0.06 | 11.20 | 0.00260 | 0.00029 | 0.05718 |
| LPG Chippers/Stump Grinders (Com) | 2267004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Leafblowers/Vacuums (Com) | 2270004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.45 | 2.28 | 1.44 | 0.00226 | 0.01138 | 0.00721 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.00 | 0.02 | 0.02 | 0.00002 | 0.00012 | 0.00008 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.24 | 1.90 | 0.97 | 0.00120 | 0.00947 | 0.00486 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.00 | 0.01 | 0.00 | 0.00000 | 0.00003 | 0.00002 |
| **TOTAL** | | **37.74** | **6.05** | **250.95** | **0.16378** | **0.02932** | **1.21371** |

**University/Colleges Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Commercial Turf Equipment (Com) | 2260004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractors/Loaders/Backhoe | 2265002066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Leafblowers/Vacuums (Com) | 2265004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Shredders < 6 HP (Com) | 2265004051 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Chippers/Stump Grinders (Com) | 2265004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Other Lawn & Garden Equip. (Com) | 2265004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |

# Non-Road Mobile Source Emissions - Medina County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4-Str Tillers > 6 HP | 2265005040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG Chippers/Stump Grinders (Com) | 2267004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Shredders > 6 HP | 2265007010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Leafblowers/Vacuums (Com) | 2270004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Shredders > 6 HP | 2270007010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Public Schools Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 0.00 | 0.00 | 0.01 | 0.00001 | 0.00000 | 0.00003 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 0.17 | 0.00 | 0.33 | 0.00064 | 0.00000 | 0.00127 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 5.51 | 0.02 | 11.62 | 0.02844 | 0.00009 | 0.05999 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 1.05 | 0.00 | 2.29 | 0.00540 | 0.00002 | 0.01181 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.43 | 0.04 | 6.49 | 0.00219 | 0.00017 | 0.03425 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.01 | 0.00 | 0.10 | 0.00003 | 0.00000 | 0.00052 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 0.14 | 0.05 | 8.05 | 0.00074 | 0.00023 | 0.04249 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.14 | 0.03 | 5.45 | 0.00071 | 0.00013 | 0.02875 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 0.75 | 0.06 | 12.13 | 0.00384 | 0.00030 | 0.06402 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.03 | 0.04 | 0.73 | 0.00016 | 0.00017 | 0.00383 |
| 4-Str Shredders > 6 HP | 2265007010 | 0.14 | 0.02 | 4.79 | 0.00054 | 0.00008 | 0.01863 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.01 | 0.07 | 0.04 | 0.00007 | 0.00036 | 0.00023 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.03 | 0.16 | 0.10 | 0.00016 | 0.00084 | 0.00052 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.00 | 0.01 | 0.01 | 0.00002 | 0.00008 | 0.00005 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.00 | 0.01 | 0.01 | 0.00001 | 0.00006 | 0.00004 |
| Dsl - Shredders > 6 HP | 2270007010 | 0.01 | 0.07 | 0.08 | 0.00005 | 0.00028 | 0.00029 |
| **TOTAL** | | **8.43** | **0.59** | **52.20** | **0.04302** | **0.00281** | **0.26670** |

**Golf Courses Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 0.03 | 0.00 | 0.08 | 0.00010 | 0.00000 | 0.00026 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 0.29 | 0.00 | 0.61 | 0.00129 | 0.00000 | 0.00273 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 0.46 | 0.00 | 1.01 | 0.00208 | 0.00001 | 0.00455 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.03 | 0.00 | 0.39 | 0.00012 | 0.00001 | 0.00178 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.00 | 0.00 | 0.05 | 0.00002 | 0.00000 | 0.00024 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.12 | 0.04 | 7.09 | 0.00055 | 0.00017 | 0.03261 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.66 | 0.68 | 14.51 | 0.00291 | 0.00282 | 0.06678 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.70 | 0.24 | 46.65 | 0.00311 | 0.00101 | 0.21465 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.08 | 0.35 | 0.24 | 0.00036 | 0.00156 | 0.00107 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.04 | 0.18 | 0.12 | 0.00018 | 0.00079 | 0.00053 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.00 | 0.02 | 0.01 | 0.00001 | 0.00008 | 0.00003 |
| **TOTAL** | | **2.41** | **1.51** | **70.74** | **0.01073** | **0.00645** | **0.32523** |

**Government Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rotary Tillers <6 HP | 2260004016 | 0.11 | 0.00 | 0.24 | 0.00056 | 0.00000 | 0.00116 |
| Chain Saws | 2260004021 | 4.77 | 0.04 | 11.45 | 0.01829 | 0.00017 | 0.04393 |
| Trimmers/ Edgers/ Brush Cutters | 2260004026 | 4.30 | 0.02 | 9.25 | 0.02095 | 0.00008 | 0.04510 |
| Leaf Blowers/ Vacuums | 2260004031 | 0.24 | 0.00 | 0.58 | 0.00119 | 0.00001 | 0.00284 |
| 4-Str Concrete/Industrial Saws | 2265002039 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Lawn Mowers | 2265004011 | 0.30 | 0.02 | 4.69 | 0.00148 | 0.00012 | 0.02282 |
| Rotary Tillers | 2265004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Trimmers/ Edgers/ Brush Cutters | 2265004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Leaf Blowers / Vacuums | 2265004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Rear Engine Riding Mowers | 2265004041 | 0.00 | 0.00 | 0.27 | 0.00002 | 0.00001 | 0.00133 |
| Front Mowers | 2265004046 | 0.24 | 0.05 | 10.03 | 0.00116 | 0.00027 | 0.04892 |
| Lawn and Garden Tractors | 2265004056 | 0.19 | 0.06 | 10.72 | 0.00091 | 0.00028 | 0.05231 |
| Chippers/ Stump/ Grinders/ Mulchers | 2265004066 | 1.25 | 0.78 | 58.39 | 0.00609 | 0.00379 | 0.28485 |
| Commercial Turf Equipment/ Sod Cutters | 2265004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |

## Non-Road Mobile Source Emissions - Medina County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Other Lawn and Garden Equipment - Pole Saw | 2265004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Water Pumps | 2265006010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Commercial Mowers | 2270004046 | 0.02 | 0.00 | 0.83 | 0.00009 | 0.00002 | 0.00402 |
| Lawn and Garden Tractors | 2270004056 | 0.09 | 0.43 | 0.27 | 0.00042 | 0.00211 | 0.00131 |
| Chippers/ Stump/ Grinders/ Mulchers | 2270004066 | 0.11 | 0.86 | 0.44 | 0.00054 | 0.00422 | 0.00216 |
| Commercial Turf Equipment/ Sod Cutters | 2270004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Shredders | 2270007010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **11.62** | **2.28** | **107.15** | **0.05170** | **0.01107** | **0.51076** |

**Agricultural Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4-Str Tractor - Corn | 2265005015 | 0.00 | 0.00 | 0.08 | 0.00001 | 0.00001 | 0.00022 |
| 4-Str Tractor - Hay | 2265005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Peanuts | 2265005015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| 4-Str Tractor - Sorghum | 2265005015 | 0.00 | 0.00 | 0.05 | 0.00001 | 0.00001 | 0.00024 |
| 4-Str Tractor - Cotton | 2265005015 | 0.00 | 0.00 | 0.06 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Small Grains | 2265005015 | 0.00 | 0.00 | 0.00 | 0.00001 | 0.00001 | 0.00044 |
| Dsl Tractor - Corn | 2270005015 | 0.31 | 2.58 | 1.55 | 0.00087 | 0.00649 | 0.00429 |
| Dsl Tractor - Hay | 2270005015 | 0.01 | 0.11 | 0.07 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Peanuts | 2270005015 | 0.01 | 0.07 | 0.04 | 0.00004 | 0.00027 | 0.00018 |
| Dsl Tractor - Sorghum | 2270005015 | 0.18 | 1.49 | 0.90 | 0.00096 | 0.00711 | 0.00470 |
| Dsl Tractor - Cotton | 2270005015 | 0.25 | 2.10 | 1.26 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Small Grains | 2270005015 | 0.00 | 0.00 | 0.00 | 0.00177 | 0.01314 | 0.00869 |
| Dsl Combine - Corn | 2270005020 | 0.13 | 2.05 | 0.72 | 0.00111 | 0.01586 | 0.00421 |
| Dsl Combine - Hay | 2270005020 | 0.00 | 0.04 | 0.01 | 0.00002 | 0.00027 | 0.00007 |
| Dsl Combine - Peanuts | 2270005020 | 0.02 | 0.23 | 0.08 | 0.00019 | 0.00275 | 0.00073 |
| Dsl Combine - Sorghum | 2270005020 | 0.19 | 2.82 | 0.99 | 0.00090 | 0.01290 | 0.00343 |
| Dsl Combine - Cotton | 2270005020 | 0.11 | 1.66 | 0.58 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Combine - Small Grains | 2270005020 | 0.00 | 0.00 | 0.00 | 0.00153 | 0.02184 | 0.00580 |
| 2-Str Sprayers | 2260005035 | 0.34 | 0.00 | 0.73 | 0.00145 | 0.00000 | 0.00314 |
| 2-Str Hydro Power Units | 2260005050 | 0.04 | 0.00 | 0.10 | 0.00019 | 0.00000 | 0.00044 |
| 4-Str Balers | 2265005025 | 0.17 | 0.11 | 2.56 | 0.00062 | 0.00049 | 0.01100 |
| 4-Str Agricultural Mowers | 2265005030 | 0.05 | 0.01 | 2.10 | 0.00019 | 0.00005 | 0.00904 |
| 4-Str Sprayers | 2265005035 | 0.72 | 0.19 | 18.05 | 0.00295 | 0.00081 | 0.07767 |
| 4-Str Tillers > 6 HP | 2265005040 | 1.43 | 0.17 | 46.88 | 0.00609 | 0.00074 | 0.20173 |
| 4-Str Swathers | 2265005045 | 0.23 | 0.18 | 4.05 | 0.00089 | 0.00078 | 0.01742 |
| 4-Str Hydro Power Units | 2265005050 | 0.37 | 0.09 | 16.36 | 0.00157 | 0.00037 | 0.07041 |
| 4-Str Other Agriculture Equipment | 2265005055 | 0.31 | 0.22 | 8.29 | 0.00125 | 0.00093 | 0.03568 |
| 4-Str Irrigation Sets | 2265005060 | 0.33 | 0.31 | 7.73 | 0.00138 | 0.00135 | 0.03325 |
| LPG Hydro Power Units | 2267005050 | 0.00 | 0.01 | 0.04 | 0.00001 | 0.00004 | 0.00017 |
| LPG Other Agriculture Equipment | 2267005055 | 0.00 | 0.00 | 0.02 | 0.00000 | 0.00002 | 0.00007 |
| LPG Irrigation Sets | 2267005060 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00005 |
| CNG Hydro Power Units | 2268005050 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| CNG Other Agriculture Equipment | 2268005055 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00006 |
| CNG Irrigation Sets | 2268005060 | 0.01 | 0.38 | 1.58 | 0.00003 | 0.00163 | 0.00680 |
| Dsl - Balers | 2270005025 | 0.02 | 0.07 | 0.06 | 0.00009 | 0.00031 | 0.00025 |
| Dsl - Agricultural Mowers | 2270005030 | 0.00 | 0.01 | 0.01 | 0.00001 | 0.00006 | 0.00005 |
| Dsl - Sprayers | 2270005035 | 0.32 | 1.19 | 0.86 | 0.00137 | 0.00512 | 0.00370 |
| Dsl - Tillers > 6 HP | 2270005040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00001 |
| Dsl - Swathers | 2270005045 | 0.14 | 1.35 | 0.54 | 0.00060 | 0.00580 | 0.00233 |
| Dsl - Hydro Power Units | 2270005050 | 0.04 | 0.30 | 0.14 | 0.00018 | 0.00130 | 0.00062 |
| Dsl - Other Agriculture Equipment | 2270005055 | 0.47 | 3.38 | 2.00 | 0.00200 | 0.01456 | 0.00859 |
| Dsl - Irrigation Sets | 2270005060 | 0.26 | 2.06 | 0.84 | 0.00110 | 0.00887 | 0.00360 |
| **TOTAL** | | **6.46** | **23.20** | **119.34** | **0.02940** | **0.12393** | **0.51905** |
| TOTAL NONROAD SOURCES | | 314.48 | 463.23 | 2,480.81 | 1.21931 | 1.47141 | 10.79327 |

# Non-Road Mobile Source Emissions - Wilson County, 2002

| WILSON COUNTY NON-ROAD MOBILE SOURCES | SCC Codes | VOC ton/year | NOx ton/year | CO ton/year | VOC ton/day M-F | NOx ton/day M-F | CO ton/day M-F |
|---|---|---|---|---|---|---|---|
| **Construction Equipment** | | | | | | | |
| 2-Str Tampers/Rammers | 2260002006 | 0.19 | 0.00 | 0.54 | 0.00089 | 0.00001 | 0.00250 |
| 2-Str Plate Compactors | 2260002009 | 0.01 | 0.00 | 0.02 | 0.00005 | 0.00000 | 0.00012 |
| 2-Str Paving Equipment | 2260002021 | 0.01 | 0.00 | 0.03 | 0.00006 | 0.00000 | 0.00014 |
| 2-Str Signal Boards/Light Plants | 2260002027 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Concrete/Industrial Saws | 2260002039 | 0.52 | 0.01 | 1.44 | 0.00242 | 0.00003 | 0.00673 |
| 2-Str Crushing/Proc. Equipment | 2260002054 | 0.00 | 0.00 | 0.01 | 0.00001 | 0.00000 | 0.00003 |
| 4-Str Pavers | 2265002003 | 0.01 | 0.00 | 0.48 | 0.00004 | 0.00002 | 0.00227 |
| 4-Str Tampers/Rammers | 2265002006 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00002 |
| 4-Str Plate Compactors | 2265002009 | 0.04 | 0.01 | 0.88 | 0.00017 | 0.00002 | 0.00418 |
| 4-Str Rollers | 2265002015 | 0.02 | 0.01 | 0.90 | 0.00007 | 0.00003 | 0.00430 |
| 4-Str Paving Equipment | 2265002021 | 0.05 | 0.01 | 1.72 | 0.00023 | 0.00005 | 0.00818 |
| 4-Str Surfacing Equipment | 2265002024 | 0.02 | 0.00 | 0.78 | 0.00009 | 0.00002 | 0.00371 |
| 4-Str Signal Boards/Light Plants | 2265002027 | 0.00 | 0.00 | 0.04 | 0.00001 | 0.00000 | 0.00019 |
| 4-Str Trenchers | 2265002030 | 0.04 | 0.01 | 1.46 | 0.00018 | 0.00006 | 0.00698 |
| 4-Str Bore/Drill Rigs | 2265002033 | 0.02 | 0.00 | 0.43 | 0.00010 | 0.00002 | 0.00204 |
| 4-Str Concrete/Industrial Saws | 2265002039 | 0.06 | 0.02 | 3.67 | 0.00027 | 0.00010 | 0.01752 |
| 4-Str Cement & Mortar Mixers | 2265002042 | 0.05 | 0.01 | 1.51 | 0.00024 | 0.00004 | 0.00720 |
| 4-Str Cranes | 2265002045 | 0.00 | 0.00 | 0.06 | 0.00001 | 0.00001 | 0.00029 |
| 4-Str Crushing/Proc. Equipment | 2265002054 | 0.01 | 0.00 | 0.21 | 0.00002 | 0.00001 | 0.00101 |
| 4-Str Rough Terrain Forklift | 2265002057 | 0.00 | 0.00 | 0.08 | 0.00002 | 0.00002 | 0.00038 |
| 4-Str Rubber Tire Loaders | 2265002060 | 0.01 | 0.01 | 0.19 | 0.00004 | 0.00004 | 0.00091 |
| 4-Str Tractors/Loaders/Backhoes | 2265002066 | 0.02 | 0.01 | 1.13 | 0.00008 | 0.00003 | 0.00536 |
| 4-Str Skid Steer Loaders | 2265002072 | 0.01 | 0.01 | 0.51 | 0.00006 | 0.00004 | 0.00241 |
| 4-Str Dumpers/Tenders | 2265002078 | 0.01 | 0.00 | 0.24 | 0.00003 | 0.00001 | 0.00112 |
| 4-Str Other Construction Equipment | 2265002081 | 0.00 | 0.00 | 0.07 | 0.00001 | 0.00001 | 0.00032 |
| LPG-Pavers | 2267002003 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00005 |
| LPG-Rollers | 2267002015 | 0.00 | 0.00 | 0.02 | 0.00001 | 0.00002 | 0.00009 |
| LPG-Paving Equipment | 2267002021 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| LPG-Surfacing Equipment | 2267002024 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| LPG-Trenchers | 2267002030 | 0.00 | 0.01 | 0.03 | 0.00001 | 0.00004 | 0.00016 |
| LPG-Bore/Drill Rigs | 2267002033 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00005 |
| LPG-Concrete/Industrial Saws | 2267002039 | 0.00 | 0.01 | 0.03 | 0.00001 | 0.00004 | 0.00015 |
| LPG-Cranes | 2267002045 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00006 |
| LPG-Crushing/Proc. Equipment | 2267002054 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| LPG-Rough Terrain Forklifts | 2267002057 | 0.00 | 0.01 | 0.02 | 0.00001 | 0.00003 | 0.00010 |
| LPG-Rubber Tire Loaders | 2267002060 | 0.00 | 0.01 | 0.05 | 0.00002 | 0.00006 | 0.00025 |
| LPG-Tractors/Loaders/Backhoes | 2267002066 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00003 |
| LPG - Skid Steer Loaders | 2267002072 | 0.00 | 0.01 | 0.04 | 0.00001 | 0.00005 | 0.00018 |
| LPG-Other Construction Equipment | 2267002081 | 0.00 | 0.00 | 0.02 | 0.00001 | 0.00002 | 0.00008 |
| CNG-Other Construction Equipment | 2268002081 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Pavers | 2270002003 | 0.01 | 0.15 | 0.06 | 0.00006 | 0.00072 | 0.00030 |
| Dsl - Tampers/Rammers | 2270002006 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Plate Compactors | 2270002009 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00002 | 0.00001 |
| Dsl - Rollers | 2270002015 | 0.08 | 0.75 | 0.39 | 0.00035 | 0.00349 | 0.00184 |
| Dsl - Scrapers | 2270002018 | 0.00 | 0.07 | 0.03 | 0.00002 | 0.00031 | 0.00015 |
| Dsl - Paving Equipment | 2270002021 | 0.00 | 0.04 | 0.02 | 0.00002 | 0.00018 | 0.00011 |
| Dsl - Surfacing Equipment | 2270002024 | 0.06 | 0.63 | 0.39 | 0.00028 | 0.00296 | 0.00182 |
| Dsl - Signal Boards/Light Plants | 2270002027 | 0.01 | 0.08 | 0.05 | 0.00006 | 0.00037 | 0.00022 |
| Dsl - Trenchers | 2270002030 | 0.01 | 0.07 | 0.06 | 0.00005 | 0.00034 | 0.00026 |
| Dsl - Bore/Drill Rigs | 2270002033 | 0.05 | 0.64 | 0.17 | 0.00023 | 0.00297 | 0.00078 |
| Dsl - Excavators | 2270002036 | 0.17 | 2.05 | 0.88 | 0.00077 | 0.00958 | 0.00411 |
| Dsl - Concrete/Industrial Saws | 2270002039 | 0.00 | 0.02 | 0.02 | 0.00002 | 0.00011 | 0.00009 |
| Dsl - Cement & Mortar Mixers | 2270002042 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00001 |
| Dsl - Cranes | 2270002045 | 0.03 | 0.39 | 0.10 | 0.00014 | 0.00183 | 0.00049 |
| Dsl - Graders | 2270002048 | 0.04 | 0.52 | 0.21 | 0.00021 | 0.00244 | 0.00099 |
| Dsl - Off-highway Trucks | 2270002051 | 0.03 | 0.37 | 0.17 | 0.00014 | 0.00171 | 0.00078 |
| Dsl - Crushing/Proc. Equipment | 2270002054 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Rough Terrain Forklifts | 2270002057 | 0.02 | 0.15 | 0.10 | 0.00008 | 0.00072 | 0.00046 |
| Dsl - Rubber Tire Loaders | 2270002060 | 0.09 | 1.25 | 0.43 | 0.00044 | 0.00582 | 0.00199 |
| Dsl - Tractors/Loaders/Backhoes | 2270002066 | 0.39 | 2.40 | 1.76 | 0.00183 | 0.01119 | 0.00819 |

## Non-Road Mobile Source Emissions - Wilson County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Skid Steer Loaders | 2270002072 | 0.12 | 0.35 | 0.45 | 0.00054 | 0.00163 | 0.00209 |
| Dsl - Off-Highway Tractors | 2270002075 | 0.00 | 0.01 | 0.00 | 0.00000 | 0.00005 | 0.00002 |
| Dsl - Dumpers/Tenders | 2270002078 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Construction Equipment | 2270002081 | 0.02 | 0.21 | 0.12 | 0.00010 | 0.00096 | 0.00058 |
| **TOTAL** | | **2.27** | **10.36** | **22.08** | **0.01054** | **0.04827** | **0.10448** |

**Light Commercial Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Generator Sets | 2260006005 | 0.12 | 0.00 | 0.27 | 0.00038 | 0.00000 | 0.00086 |
| 2-Str Pumps | 2260006010 | 0.88 | 0.00 | 1.99 | 0.00279 | 0.00001 | 0.00632 |
| 2-Str Air Compressors | 2260006015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Generator Sets | 2265006005 | 3.03 | 1.67 | 77.15 | 0.01093 | 0.00635 | 0.29324 |
| 4-Str Pumps | 2265006010 | 0.74 | 0.08 | 16.23 | 0.00273 | 0.00030 | 0.06085 |
| 4-Str Air Compressors | 2265006015 | 0.32 | 0.08 | 8.48 | 0.00118 | 0.00029 | 0.03175 |
| 4-Str Welders | 2265006025 | 0.70 | 0.45 | 28.89 | 0.00240 | 0.00159 | 0.10219 |
| 4-Str Pressure Washers | 2265006030 | 1.24 | 0.29 | 39.95 | 0.00420 | 0.00102 | 0.13993 |
| LPG-Generator Sets | 2267006005 | 0.02 | 0.08 | 0.20 | 0.00006 | 0.00029 | 0.00075 |
| LPG-Pumps | 2267006010 | 0.01 | 0.07 | 0.19 | 0.00004 | 0.00022 | 0.00059 |
| LPG-Air Compressors | 2267006015 | 0.02 | 0.08 | 0.23 | 0.00005 | 0.00026 | 0.00072 |
| LPG-Welders | 2267006025 | 0.02 | 0.09 | 0.36 | 0.00009 | 0.00034 | 0.00134 |
| LPG-Pressure Washers | 2267006030 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00000 | 0.00002 |
| CNG-Generator Sets | 2268006005 | 0.00 | 0.33 | 0.90 | 0.00001 | 0.00105 | 0.00285 |
| CNG-Pumps | 2268006010 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00004 |
| CNG-Air Compressors | 2268006015 | 0.00 | 0.02 | 0.06 | 0.00000 | 0.00008 | 0.00022 |
| CNG-Gas Compressors | 2268006020 | 0.00 | 0.24 | 1.08 | 0.00001 | 0.00077 | 0.00342 |
| Dsl-Generator Sets | 2270006005 | 0.99 | 7.14 | 3.94 | 0.00374 | 0.02710 | 0.01495 |
| Dsl-Pumps | 2270006010 | 0.00 | 0.01 | 0.01 | 0.00001 | 0.00003 | 0.00002 |
| Dsl-Air Compressors | 2270006015 | 0.08 | 0.64 | 0.29 | 0.00030 | 0.00242 | 0.00111 |
| Dsl-Gas Compressors | 2270006020 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl-Welders | 2270006025 | 0.17 | 0.36 | 0.59 | 0.00065 | 0.00139 | 0.00225 |
| Dsl-Pressure Washers | 2270006030 | 0.00 | 0.01 | 0.01 | 0.00001 | 0.00004 | 0.00002 |
| **TOTAL** | | **8.34** | **11.65** | **180.83** | **0.02960** | **0.04356** | **0.66345** |

**Industrial Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Sweepers/Scrubbers | 2260003030 | 0.01 | 0.00 | 0.01 | 0.00002 | 0.00000 | 0.00004 |
| 2-Str Other General Industrial Eqp | 2260003040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Aerial Lifts | 2265003010 | 0.29 | 0.30 | 7.55 | 0.00108 | 0.00113 | 0.02870 |
| 4-Str Forklifts | 2265003020 | 0.05 | 0.05 | 1.18 | 0.00015 | 0.00016 | 0.00378 |
| 4-Str Sweepers/Scrubbers | 2265003030 | 0.06 | 0.04 | 1.69 | 0.00018 | 0.00015 | 0.00576 |
| 4-Str Other General Industrial Eqp | 2265003040 | 0.10 | 0.02 | 2.69 | 0.00032 | 0.00005 | 0.00854 |
| 4-Str Other Material Handling Eqp | 2265003050 | 0.00 | 0.00 | 0.09 | 0.00001 | 0.00001 | 0.00029 |
| 4-Str AC\Refrigeration | 2265003060 | 0.01 | 0.00 | 0.39 | 0.00002 | 0.00001 | 0.00107 |
| 4-Str Terminal Tractors | 2265003070 | 0.01 | 0.01 | 0.25 | 0.00003 | 0.00003 | 0.00080 |
| 4-Str Other Oil Field Eqp | 2265010010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG-Aerial Lifts | 2267003010 | 0.01 | 0.04 | 0.17 | 0.00004 | 0.00014 | 0.00055 |
| LPG - Forklifts | 2267003020 | 1.51 | 5.56 | 22.27 | 0.00515 | 0.01899 | 0.07613 |
| LPG - Sweepers/Scrubbers | 2267003030 | 0.04 | 0.15 | 0.65 | 0.00013 | 0.00045 | 0.00189 |
| LPG - Other General Industrial Equipment | 2267003040 | 0.00 | 0.01 | 0.04 | 0.00001 | 0.00003 | 0.00012 |
| LPG - Other Material Handling Equipment | 2267003050 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00003 |
| LPG - Terminal Tractors | 2267003070 | 0.01 | 0.02 | 0.08 | 0.00002 | 0.00006 | 0.00025 |
| CNG-Forklifts | 2268003020 | 0.00 | 0.30 | 1.21 | 0.00002 | 0.00096 | 0.00383 |
| CNG - Sweepers/Scrubbers | 2268003030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| CNG-Other General Industrial Equipment | 2268003040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| CNG-AC\Refrigeration | 2268003060 | 0.00 | 0.00 | 0.02 | 0.00000 | 0.00001 | 0.00004 |
| CNG-Terminal Tractors | 2268003070 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00000 | 0.00002 |
| CNG-Other Oil Field Eqp | 2268010010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Aerial Lifts | 2270003010 | 0.04 | 0.18 | 0.13 | 0.00014 | 0.00067 | 0.00047 |
| Dsl - Forklifts | 2270003020 | 0.03 | 0.28 | 0.14 | 0.00010 | 0.00106 | 0.00052 |
| Dsl - Sweepers/Scrubbers | 2270003030 | 0.03 | 0.42 | 0.10 | 0.00012 | 0.00159 | 0.00038 |
| Dsl - Other General Industrial Eqp | 2270003040 | 0.08 | 1.03 | 0.29 | 0.00024 | 0.00325 | 0.00092 |
| Dsl - Other Material Handling Eqp | 2270003050 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00001 |
| Dsl - AC\Refrigertion | 2270003060 | 0.34 | 2.01 | 1.19 | 0.00091 | 0.00547 | 0.00322 |
| Dsl - Terminal Tractors | 2270003070 | 0.06 | 1.36 | 0.47 | 0.00019 | 0.00438 | 0.00150 |

## Non-Road Mobile Source Emissions - Wilson County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Other Oil Field Eqp | 2270010010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **2.67** | **11.81** | **40.63** | **0.00889** | **0.03863** | **0.13888** |

**Railroad Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Railway Maintenance | 2285002015 | 0.07 | 0.36 | 0.31 | 0.00123 | 0.00105 | 0.00000 |
| 4-Str Railway Maintenance | 2285004015 | 0.02 | 0.01 | 0.78 | 0.00002 | 0.00272 | 0.00000 |
| LPG Railway Maintenance | 2285006015 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00000 |
| Railroad | 2285002000 | 0.44 | 12.00 | 1.18 | 0.00121 | 0.03288 | 0.00324 |
| **TOTAL** | | **0.53** | **12.36** | **2.27** | **0.00246** | **0.03665** | **0.00324** |

**Mining Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Graders | 2270002048 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Off Highway Trucks | 2270002051 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Proc. Equipment | 2270002054 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Crawler Tractor/Dozers | 2270002069 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Quarry Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Scrapers | 2270002018 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Excavators | 2270002036 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Graders | 2270002048 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Off Highway Trucks | 2270002051 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Rubber Tire Loaders | 2270002060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Tractors/Loaders/Backhoes | 2270002066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Crawler Tractors/Dozers | 2270002069 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Landfill Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Pavers | 2270002003 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Scrapers | 2270002018 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Excavators | 2270002036 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Graders | 2270002048 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Off Highway Trucks | 2270002051 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Rubber Tire Loaders | 2270002060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Crawler Tractors/Dozers | 2270002069 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Const. Equipment | 2270002081 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Recreational Boating**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Outboard | 2282005010 | 5.01 | 0.11 | 9.85 | 0.01143 | 0.00024 | 0.02161 |
| Personal Water Craft | 2282005015 | 2.20 | 0.03 | 4.29 | 0.00486 | 0.00007 | 0.00941 |
| Inboard/Sterndrive | 2282010005 | 0.40 | 0.17 | 4.76 | 0.00102 | 0.00035 | 0.01068 |
| Inboard/Sterndrive | 2282020005 | 0.01 | 0.31 | 0.05 | 0.00003 | 0.00069 | 0.00011 |
| Outboards | 2282020010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **7.62** | **0.63** | **18.95** | **0.01734** | **0.00135** | **0.04180** |

**Recreational Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Offroad Motorcycles | 2260001010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str ATVs | 2260001030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Specialty Vehicles / Carts | 2260001060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Offroad Motorcycles | 2265001010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str ATVs | 2265001030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Golf Carts | 2265001050 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Specialty Vehicles / Carts | 2265001060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG Specialty Vehicles / Carts | 2267001060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl- Specialty Vehicle Carts | 2270001060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |

## Non-Road Mobile Source Emissions - Wilson County, 2002

| | | | | | | |
|---|---|---|---|---|---|---|
| **TOTAL** | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Residential Lawn & Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Res) | 2260004015 | 1.22 | 0.00 | 2.50 | 0.00642 | 0.00002 | 0.01277 |
| 2-Str Chain Saws < 6 HP (Res) | 2260004020 | 17.48 | 0.04 | 32.12 | 0.09226 | 0.00021 | 0.16388 |
| 2-Str Trimmers/Edgers/Brush Cutter (Res) | 2260004025 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Leafblowers/Vacuums (Res) | 2260004030 | 10.18 | 0.03 | 20.46 | 0.05380 | 0.00013 | 0.10437 |
| 4-Str Lawn Mowers (Res) | 2265004010 | 28.62 | 2.26 | 387.00 | 0.13532 | 0.01060 | 2.01864 |
| 4-Str Rotary Tillers <6 HP (Res) | 2265004015 | 3.30 | 0.25 | 42.17 | 0.01560 | 0.00117 | 0.21995 |
| 4-Str Trimmers/Edgers/Brush Cutters (Res) | 2265004025 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Leafblowers/Vacuums (Res) | 2265004030 | 0.27 | 0.02 | 3.69 | 0.00129 | 0.00010 | 0.01927 |
| 4-Str Rear Engine Riding Mower (Res) | 2265004040 | 1.64 | 0.41 | 63.38 | 0.00778 | 0.00190 | 0.33058 |
| 4-Str Lawn & Garden Tractors (Res) | 2265004055 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Other Lawn & Garden Equip. (Res) | 2265004075 | 11.75 | 1.36 | 242.72 | 0.05568 | 0.00638 | 1.26606 |
| **TOTAL** | | **74.46** | **4.37** | **794.05** | **0.36816** | **0.02051** | **4.13552** |

**Commercial Lawn & Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 0.00 | 0.00 | 0.01 | 0.00002 | 0.00000 | 0.00004 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 8.76 | 0.08 | 21.06 | 0.03224 | 0.00030 | 0.07746 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 3.83 | 0.02 | 8.24 | 0.01910 | 0.00008 | 0.04115 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 2.39 | 0.02 | 5.71 | 0.01194 | 0.00008 | 0.02853 |
| 2-Str Commercial Turf Equipment (Com) | 2260004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.62 | 0.05 | 9.22 | 0.00304 | 0.00024 | 0.04705 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.01 | 0.00 | 0.15 | 0.00005 | 0.00000 | 0.00075 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.04 | 0.00 | 0.74 | 0.00020 | 0.00002 | 0.00377 |
| 4-Str Leafblowers/Vacuums (Com) | 2265004031 | 0.48 | 0.18 | 20.00 | 0.00240 | 0.00085 | 0.10210 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 0.03 | 0.01 | 1.94 | 0.00017 | 0.00005 | 0.00993 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.02 | 0.00 | 0.76 | 0.00009 | 0.00002 | 0.00390 |
| 4-Str Shredders < 6 HP (Com) | 2265004051 | 0.01 | 0.00 | 0.14 | 0.00005 | 0.00000 | 0.00070 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 0.01 | 0.00 | 0.82 | 0.00007 | 0.00002 | 0.00418 |
| 4-Str Chippers/Stump Grinders (Com) | 2265004066 | 0.08 | 0.06 | 3.91 | 0.00041 | 0.00027 | 0.01994 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.00 | 0.00 | 0.06 | 0.00001 | 0.00000 | 0.00030 |
| 4-Str Other Lawn & Garden Equip. (Com) | 2265004076 | 0.04 | 0.00 | 0.88 | 0.00020 | 0.00002 | 0.00448 |
| LPG Chippers/Stump Grinders (Com) | 2267004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Leafblowers/Vacuums (Com) | 2270004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.01 | 0.05 | 0.03 | 0.00005 | 0.00025 | 0.00016 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.01 | 0.04 | 0.02 | 0.00003 | 0.00021 | 0.00011 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **16.35** | **0.53** | **73.69** | **0.07006** | **0.00242** | **0.34457** |

**University/Colleges Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Commercial Turf Equipment (Com) | 2260004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractors/Loaders/Backhoe | 2265002066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Leafblowers/Vacuums (Com) | 2265004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Shredders < 6 HP (Com) | 2265004051 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Chippers/Stump Grinders (Com) | 2265004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Other Lawn & Garden Equip. (Com) | 2265004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |

# Non-Road Mobile Source Emissions - Wilson County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4-Str Tillers > 6 HP | 2265005040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG Chippers/Stump Grinders (Com) | 2267004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Shredders > 6 HP | 2265007010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Leafblowers/Vacuums (Com) | 2270004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Shredders > 6 HP | 2270007010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Public Schools Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Rotary Tillers <6 HP (Com) | 2260004016 | 0.00 | 0.00 | 0.01 | 0.00002 | 0.00000 | 0.00004 |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 0.21 | 0.00 | 0.42 | 0.00079 | 0.00000 | 0.00158 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 6.88 | 0.02 | 14.52 | 0.03553 | 0.00011 | 0.07498 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 1.31 | 0.00 | 2.86 | 0.00674 | 0.00002 | 0.01476 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.53 | 0.05 | 8.11 | 0.00273 | 0.00022 | 0.04282 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.01 | 0.00 | 0.12 | 0.00004 | 0.00000 | 0.00065 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 0.18 | 0.06 | 10.06 | 0.00092 | 0.00029 | 0.05311 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.17 | 0.03 | 6.81 | 0.00087 | 0.00016 | 0.03593 |
| 4-Str Lawn & Garden Tractors (Com)) | 2265004056 | 0.94 | 0.08 | 15.16 | 0.00479 | 0.00038 | 0.08002 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.04 | 0.04 | 0.91 | 0.00020 | 0.00021 | 0.00479 |
| 4-Str Shredders > 6 HP | 2265007010 | 0.18 | 0.03 | 5.99 | 0.00068 | 0.00010 | 0.02328 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.02 | 0.09 | 0.05 | 0.00009 | 0.00045 | 0.00028 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.04 | 0.20 | 0.13 | 0.00020 | 0.00105 | 0.00065 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.00 | 0.02 | 0.01 | 0.00002 | 0.00009 | 0.00007 |
| Dsl - Commercial Turf Equipment (Com) | 2270004071 | 0.00 | 0.02 | 0.01 | 0.00001 | 0.00008 | 0.00005 |
| Dsl - Shredders > 6 HP | 2270007010 | 0.02 | 0.09 | 0.10 | 0.00006 | 0.00035 | 0.00036 |
| **TOTAL** | | **10.54** | **0.74** | **65.25** | **0.05370** | **0.00351** | **0.33337** |

**Golf Courses Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Trimmers/Edgers/Brush Cutter (Com) | 2260004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Rotary Tillers <6 HP (Com) | 2265004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **0.00** | **0.00** | **0.00** | **0.00000** | **0.00000** | **0.00000** |

**Government Lawn and Garden Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rotary Tillers <6 HP | 2260004016 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Chain Saws | 2260004021 | 2.33 | 0.02 | 5.60 | 0.00890 | 0.00008 | 0.02137 |
| Trimmers/ Edgers/ Brush Cutters | 2260004026 | 4.88 | 0.02 | 10.49 | 0.02377 | 0.00009 | 0.05119 |
| Leaf Blowers/ Vacuums | 2260004031 | 0.33 | 0.00 | 0.78 | 0.00160 | 0.00001 | 0.00382 |
| 4-Str Concrete/Industrial Saws | 2265002039 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Lawn Mowers | 2265004011 | 1.08 | 0.08 | 16.66 | 0.00383 | 0.00030 | 0.05908 |
| Rotary Tillers | 2265004016 | 0.03 | 0.00 | 0.41 | 0.00013 | 0.00001 | 0.00200 |
| Trimmers/ Edgers/ Brush Cutters | 2265004026 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Leaf Blowers / Vacuums | 2265004031 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Rear Engine Riding Mowers | 2265004041 | 0.40 | 0.12 | 23.20 | 0.00191 | 0.00058 | 0.11319 |
| Front Mowers | 2265004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Lawn and Garden Tractors | 2265004056 | 0.10 | 0.03 | 5.55 | 0.00047 | 0.00014 | 0.02705 |
| Chippers/ Stump/ Grinders/ Mulchers | 2265004066 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Commercial Turf Equipment/ Sod Cutters | 2265004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |

## Non-Road Mobile Source Emissions - Wilson County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Other Lawn and Garden Equipment - Pole Saw | 2265004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Water Pumps | 2265006010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Commercial Mowers | 2270004046 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Lawn and Garden Tractors | 2270004056 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Chippers/ Stump/ Grinders/ Mulchers | 2270004066 | 0.00 | 0.01 | 0.00 | 0.00000 | 0.00003 | 0.00001 |
| Commercial Turf Equipment/ Sod Cutters | 2270004071 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Dsl - Other Lawn & Garden Equipment (Com) | 2270004076 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Shredders | 2270007010 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL** | | **9.14** | **0.28** | **62.70** | **0.04061** | **0.00125** | **0.27772** |

**Agricultural Equipment**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4-Str Tractor - Corn | 2265005015 | 0.01 | 0.01 | 0.29 | 0.00002 | 0.00002 | 0.00080 |
| 4-Str Tractor - Hay | 2265005015 | 0.01 | 0.01 | 0.21 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Peanuts | 2265005015 | 0.01 | 0.01 | 0.21 | 0.00003 | 0.00003 | 0.00094 |
| 4-Str Tractor - Sorghum | 2265005015 | 0.00 | 0.00 | 0.15 | 0.00005 | 0.00005 | 0.00169 |
| 4-Str Tractor - Cotton | 2265005015 | 0.01 | 0.01 | 0.45 | 0.00000 | 0.00000 | 0.00000 |
| 4-Str Tractor - Small Grains | 2265005015 | 0.00 | 0.00 | 0.00 | 0.00004 | 0.00004 | 0.00145 |
| Dsl Tractor - Corn | 2270005015 | 1.15 | 9.52 | 5.73 | 0.00323 | 0.02396 | 0.01584 |
| Dsl Tractor - Hay | 2270005015 | 0.82 | 6.80 | 4.10 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Peanuts | 2270005015 | 0.83 | 6.91 | 4.16 | 0.00380 | 0.02822 | 0.01867 |
| Dsl Tractor - Sorghum | 2270005015 | 0.59 | 4.93 | 2.97 | 0.00684 | 0.05076 | 0.03357 |
| Dsl Tractor - Cotton | 2270005015 | 1.80 | 14.97 | 9.02 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Tractor - Small Grains | 2270005015 | 0.00 | 0.00 | 0.00 | 0.00585 | 0.04345 | 0.02874 |
| Dsl Combine - Corn | 2270005020 | 0.50 | 7.55 | 2.64 | 0.00409 | 0.05851 | 0.01554 |
| Dsl Combine - Hay | 2270005020 | 0.14 | 2.19 | 0.77 | 0.00119 | 0.01699 | 0.00451 |
| Dsl Combine - Peanuts | 2270005020 | 1.63 | 24.75 | 8.66 | 0.02033 | 0.29078 | 0.07721 |
| Dsl Combine - Sorghum | 2270005020 | 0.61 | 9.32 | 3.26 | 0.00643 | 0.09205 | 0.02444 |
| Dsl Combine - Cotton | 2270005020 | 0.78 | 11.87 | 4.16 | 0.00000 | 0.00000 | 0.00000 |
| Dsl Combine - Small Grains | 2270005020 | 0.00 | 0.00 | 0.00 | 0.00505 | 0.07223 | 0.01918 |
| 2-Str Sprayers | 2260005035 | 0.27 | 0.00 | 0.59 | 0.00116 | 0.00000 | 0.00252 |
| 2-Str Hydro Power Units | 2260005050 | 0.04 | 0.00 | 0.08 | 0.00015 | 0.00000 | 0.00036 |
| 4-Str Balers | 2265005025 | 0.12 | 0.09 | 2.05 | 0.00046 | 0.00040 | 0.00884 |
| 4-Str Agricultural Mowers | 2265005030 | 0.04 | 0.01 | 1.69 | 0.00015 | 0.00004 | 0.00726 |
| 4-Str Sprayers | 2265005035 | 0.56 | 0.15 | 14.50 | 0.00231 | 0.00065 | 0.06241 |
| 4-Str Tillers > 6 HP | 2265005040 | 1.14 | 0.14 | 37.67 | 0.00485 | 0.00060 | 0.16209 |
| 4-Str Swathers | 2265005045 | 0.17 | 0.15 | 3.25 | 0.00068 | 0.00063 | 0.01400 |
| 4-Str Hydro Power Units | 2265005050 | 0.29 | 0.07 | 13.15 | 0.00125 | 0.00030 | 0.05658 |
| 4-Str Other Agriculture Equipment | 2265005055 | 0.24 | 0.17 | 6.66 | 0.00098 | 0.00075 | 0.02867 |
| 4-Str Irrigation Sets | 2265005060 | 0.26 | 0.25 | 6.21 | 0.00110 | 0.00109 | 0.02672 |
| LPG Hydro Power Units | 2267005050 | 0.00 | 0.01 | 0.03 | 0.00001 | 0.00003 | 0.00013 |
| LPG Other Agriculture Equipment | 2267005055 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00005 |
| LPG Irrigation Sets | 2267005060 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00004 |
| CNG Hydro Power Units | 2268005050 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| CNG Other Agriculture Equipment | 2268005055 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00001 | 0.00005 |
| CNG Irrigation Sets | 2268005060 | 0.01 | 0.30 | 1.27 | 0.00002 | 0.00131 | 0.00546 |
| Dsl - Balers | 2270005025 | 0.02 | 0.06 | 0.05 | 0.00007 | 0.00025 | 0.00020 |
| Dsl - Agricultural Mowers | 2270005030 | 0.00 | 0.01 | 0.01 | 0.00001 | 0.00005 | 0.00004 |
| Dsl - Sprayers | 2270005035 | 0.26 | 0.96 | 0.69 | 0.00110 | 0.00411 | 0.00297 |
| Dsl - Tillers > 6 HP | 2270005040 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00001 |
| Dsl - Swathers | 2270005045 | 0.11 | 1.08 | 0.43 | 0.00048 | 0.00466 | 0.00187 |
| Dsl - Hydro Power Units | 2270005050 | 0.03 | 0.24 | 0.12 | 0.00015 | 0.00104 | 0.00050 |
| Dsl - Other Agriculture Equipment | 2270005055 | 0.37 | 2.72 | 1.60 | 0.00161 | 0.01170 | 0.00690 |
| Dsl - Irrigation Sets | 2270005060 | 0.21 | 1.66 | 0.67 | 0.00088 | 0.00712 | 0.00289 |
| **TOTAL** | | **13.03** | **106.93** | **137.53** | **0.07438** | **0.71187** | **0.63312** |
| TOTAL NONROAD SOURCES | | 144.95 | 159.67 | 1,397.98 | 0.67574 | 0.90802 | 6.67615 |

## Chapter 3 - AIRPORT AND MILITARY EMISSIONS

The Airport/Military section of this EI contains emissions for airports, US Armed Forces installations, or former installations within the AACOG 12 county region. These emissions were either provided by the facility or calculated based on information that was provided from other sources. The smaller airparks and municipal airports are included in the Small Airports section at the end of this chapter.

### Introduction

Airports and/or military posts are considered special generators of emissions. They are responsible for maintaining their own facilities. The data from these sources is not readily available and, in the case of military posts, can be classified for a length of time. AACOG must rely on data provided by the facility. For example, military data at Brooks, Camp Bullis, Fort Sam Houston, Lackland AFB/Kelly Field, and Randolph AFB, were extracted from Emission Inventories developed for each military post.

Data was requested from the non-military facilities by survey, email, and phone. In some cases where information was unknown or not supplied, estimations were calculated using Environmental Protection Agency (EPA) approved methods.

## Brooks City-Base

**Introduction**
Brooks City-Base (formerly Brooks Air Force Base), Texas is located in southeast Bexar County and is approximately 10 miles from downtown San Antonio. Headquartered at Brooks, the 311th Human Systems Wing (HSW) is the Air Force advocate for integrating and maintaining personnel in Air Force systems and operations. Its mission is to protect and enhance human capabilities and human-systems performance ranging from the individual to combatant command forces. HSW has four areas of responsibility: Aerospace Medicine, Crew Systems, Human Resources, and Environment, Safety and Occupational Health.

In 1997, the City-Base concept, in which the city of San Antonio would take on infrastructure responsibilities in exchange for business opportunities and community development, was developed and presented to Air Force Materiel Command. The plan involved transferring the base to municipal hands, securing private business and academic tenants for some buildings at Brooks, and maintaining Air Force access to those resources necessary to fulfill its mission.

On July 22, 2002, the City of San Antonio assumed control of the newly named Brooks City-Base. The creation of the city-base was the first of its kind in which the Air Force remained as a tenant but forfeited the responsibility of managing the overall base infrastructure.

Property leased by the United States Air Force (USAF) at Brooks City-Base is used as the home of the 311 Human Systems Wing which is the USAF's agent for human-centered research, development, acquisition, education, and operational support at both the individual and Total Force levels. Other partners located at Brooks City-Base but not under the 311 HSW, are the Air Force Medical Support Agency, the Human Effectiveness Directorate of the Air Force Research Laboratory, and the Air Force Center for Environmental Excellence.[1]

<u>Area Sources</u>
Area emissions data were obtained from the 2002 Air Emissions Inventory produced by URS Corporation[2] for the 311 Human Systems Wing. This report documents methodologies and emissions from ten source categories identified at the base:

- External Combustion
- Fuel Dispensing
- Fuel Storage
- Fume Hoods
- Miscellaneous Chemical Usage

---

[1] Kamalpour, Hamid, 311th Human Systems Wing, personal conversation.
[2] URS Corporation, 2003. <u>Air Emissions Inventory for 2002 Operations at the 311th Human Systems Wing Brooks City Base</u>. Austin, Texas.

- Ozone Depleting Compounds (ODC)
- Pathological Waste Incinerator
- Stationary Internal Combustion (Standby Generators)
- Welding
- Woodworking

Results are presented in table 3-1.

Table 3-1. Annual Tonnage of Area Source Emissions for 311 HSW and Non-HSW at Brooks, 2002

| Source Category | Source Description | Building | Source Operator/Tenant | VOC | $NO_x$ | CO |
|---|---|---|---|---|---|---|
| **311 HSW Sources** | | | | | | |
| External Combustion | Base wide | - | 311 HSW | 0.27 | 4.92 | 3.84 |
| | Boiler Plant | 165 | 311 HSW | 0.06 | 1.14 | 0.96 |
| Fuel Dispensing | Military Service Station | 1107 | 311 HSW | 0.04 | 0.00 | 0.00 |
| Fuel Storage | Military Service Station | 1107 | 311 HSW | 0.99 | 0.00 | 0.00 |
| | Boiler Plant | 165 | 311 HSW | 0.00 | 0.00 | 0.00 |
| Fume Hoods | From Laboratories | - | 311 HSW | 1.10 | 0.00 | 0.00 |
| Miscellaneous Chemical Use | Base-wide | - | 311 HSW | 2.45 | 0.00 | 0.00 |
| Ozone Depleting Compounds | Base-wide | - | 311 HSW | 0.00 | 0.00 | 0.00 |
| Pathological Waste Incinerator | Pathological Waste Incinerator | 1174 | 311 HSW | 0.00 | 0.01 | 0.01 |
| Stationary Internal Combustion | Base Sources | - | 311 HSW | 0.15 | 1.89 | 0.41 |
| Welding | Medical Welding Shop | 167 | 311 HSW | 0.00 | 0.00 | 0.00 |
| | Civil Engineering Welding Shop | 1164 | 311 HSW | 0.00 | 0.00 | 0.00 |
| Woodworking | Medical Maintenance Woodshop | 167 | 311 HSW | 0.00 | 0.00 | 0.00 |
| | Packing and Crating Woodshop | 1150 | 311 HSW | 0.00 | 0.00 | 0.00 |
| | Frame Shop | 1154 | 311 HSW | 0.00 | 0.00 | 0.00 |
| | Civil Engineering Woodshop (Cyclone) | 1164 | 311 HSW | 0.00 | 0.00 | 0.00 |
| 311 HSW Title V Totals: | | | | 5.06 | 7.96 | 5.22 |
| **Non-311 HSW Sources** | | | | | | |
| External Combustion | Boiler Plant | 165 | San Antonio Water System | 0.06 | 0.98 | 0.82 |
| Fuel Dispensing | AAFES Service Station | 706 | AAFES | 3.14 | 0.00 | 0.00 |
| Fuel Storage | Boiler Plant | 165 | San Antonio Water System | 0.85 | 0.00 | 0.00 |
| | AAFES Station | 706 | AAFES | 2.45 | 0.00 | 0.00 |
| Welding | Civil Engineering Welding Shop | 1164 | Grubb & Ellis (Air Stream) | 0.00 | 0.00 | 0.00 |
| Woodworking | Civil Engineering Woodshop | 1164 | Grubb & Ellis (Air Stream) | 0.00 | 0.00 | 0.00 |
| Non - 311 HSW Totals: | | | | 6.50 | 0.98 | 0.82 |
| ***TOTAL EMISSIONS*** | | | | 11.56 | 8.94 | 6.04 |

The emissions in table 3-1 are summarized in table 3 –2, which lists total emissions of criteria pollutants by source category.

Table 3-2. Annual Tonnage of Criteria Pollutants by Source Category at Brooks, 2002

| Source | VOC | NOx | CO |
|---|---|---|---|
| External Combustion | 0.39 | 7.04 | 5.62 |
| Fuel Dispensing | 3.18 | 0.00 | 0.00 |
| Fuel6 Storage | 4.29 | 0.00 | 0.00 |
| Fume Hoods | 1.10 | 0.00 | 0.00 |
| Miscellaneous Chemical Use | 2.45 | 0.00 | 0.00 |
| Ozone Depleting Compounds | 0.00 | 0.00 | 0.00 |
| Pathological Waste Incinerator | 0.00 | 0.01 | 0.01 |
| Stationary Internal Combustion | 0.15 | 1.89 | 0.41 |
| Welding | 0.00 | 0.00 | 0.00 |
| Woodworking | 0.00 | 0.00 | 0.00 |
| Total | 11.56 | 8.94 | 6.04 |

**On-Road Sources**

On-Road or mobile sources include motor vehicles that are licensed to operate on roadways of the Brooks base. To calculate mobile source emissions, first the 2002 emission factors for various speeds were generated, using EPA's MOBILE6 model. After reviewing the Base's roadway map, a trip length of 1.2 miles and speed of 35 mile/hour were determined as the averages for the base. The traffic counts at Brooks' gates for 1998, the most recent year of record, were used to estimate the total vehicle miles traveled (VMT) on the base. The emission factors for MOBILE6's "All Veh" category, which represents averages for all vehicles, were applied to this VMT to generate total emissions attributed to vehicles entering each gate. To determine daily emissions, yearly emissions were divided by 261 days/year. The West gate was assumed closed for this analysis. The results of these calculations are provided in table 3-3.

Table 3-3. Annual and Daily Mobile Source Emissions for Brooks, 2002

| Roadway | Traffic Volume Daily | Length mi | VOC | NOx | CO | VOC | NOx | CO |
|---|---|---|---|---|---|---|---|---|
| | | | (tons/year) | | | (tons/day) | | |
| HSW Gate | 1,500 | 1.2 | 0.98 | 1.57 | 10.62 | 0.004 | 0.006 | 0.041 |
| Main Gate | 5,250 | 1.2 | 3.41 | 5.50 | 37.18 | 0.013 | 0.021 | 0.142 |
| Total | 6,750 | NA | 4.39 | 7.07 | 47.81 | 0.017 | 0.027 | 0.183 |

**Results**

Table 3-4 lists total emissions by source at Brooks City-Base. Daily emissions were quantified by dividing the tons/year emissions by 261 days/year, achieving a Monday – Friday daily emissions total.

Table 3-4. Total Emissions by Source for Brooks City-Base, 2002

| Source Category | VOC | NOx | CO | VOC | NOx | CO |
|---|---|---|---|---|---|---|
| | tons/year | | | tons/day (Mon. – Fri.) | | |
| Nonroad (mobile) | 4.39 | 7.07 | 47.81 | 0.01682 | 0.02709 | 0.18318 |
| Area | 11.56 | 8.94 | 6.04 | 0.04429 | 0.03425 | 0.02314 |
| Total Emissions | 15.95 | 16.01 | 53.85 | 0.06111 | 0.06134 | 0.20632 |

## Camp Bullis

### Introduction

The US Army's Camp Bullis is a 27,880-acre military reservation located in Bexar County, Texas 18 miles northwest of downtown San Antonio. The camp consists of training facilities, temporary barracks, firing ranges, and maneuvering areas. Camp Bullis provides facilities for all branches of the Armed Forces, except the Coast Guard. The Texas National Guard also uses these facilities.

### Methodology

All data, methodologies, and emission estimates provided in this section were prepared by Dickson Consulting Group, LLC in their draft 2003 Emissions Inventory for Camp Bullis[3] (the final version is not yet available). Since 2002 data was unavailable, the draft 2003 EI was used, as it was closest to the net inventory timeframe. While the Dickson Group documented emissions for other criteria and HAP pollutants, discussions in this section are limited to VOC, NOx, and CO emissions.

<u>Area Sources</u>

Area Sources are stationary sources of relatively low emissions that are generated by such activities as fuel storage, the application of surface coating, and use of boilers and furnaces. Methodologies for estimating emissions from these sources are discussed in the section that follows. Sample calculations for each source are included. The area sources covered in the Dickson EI for Camp Bullis are:

- Boilers and Furnaces
- Degreasing Operations
- Fuel Storage and Dispensing
- Generators
- Woodworking and Fabrication

This section discusses the methods used to calculate both actual and potential emissions for each emissions source category. The annual emissions are actual emissions and the daily are potential emissions estimated for an ozone-season day. For these daily emissions, it was assumed that all operations were running at a maximum and thus, these emissions may be higher than the actual daily emissions.

*Boilers and Furnaces*

Camp Bullis previously relied on kerosene for heating purposes. Currently, propane is the

[3] Dickson Consulting Group, LLC., 2003. <u>2003 Emissions Inventory for U.S. Army – Camp Bullis, Texas</u>, TCEQ Account Number BG-0771-O

primary fuel used for heating. Propane is cleaner burning and can be stored in small tanks next to the building it services. In 2003 the camp consumed 153,450 gallons of propane. Emissions from boilers and furnaces were calculated by multiplying the total gallons of propane by an appropriate emissions factor.[4]

*Sample Calculation*

VOC Emissions Calculated for Propane Heaters:

| | |
|---|---|
| Fuel Usage: | 152,654 gal. |
| Emission Factor: | 0.5 lbs./1,000 gal. |

| | | | | | |
|---|---|---|---|---|---|
| VOC Emissions | = (152,654 gal. | × | 0.5 lbs. | / | 1,000 lbs.) |
| | = (76.327 lbs./yr.) | / | 2,000 lbs./ton | | |
| | = 0.03816 tons/yr. | | | | |

The annual boiler and furnace emissions for 2002 are located in table 3-4. Daily rates were calculated using a seasonal emissions factor to account for typical ozone season days.

Degreasing Operations

VOCs are the main pollutants produced by degreasing operations. Camp Bullis had only three degreasing facilities in 2003. The solvent in use at the time, "BrakeThru," is a low volatility solvent. The facilities are located in the Motor Pool with 30-gallon capacity basins.

No records were kept on amounts of solvent used during the year, so VOC emissions were based on the solvent loss rate, VOC content, and density. On-site personnel estimated that no more than 5 gallons of solvent was lost between solvent changings; thus, a loss rate of 5-gallons-per-unit was used by Dickson in calculating emissions.

*Sample Calculation*

Calculation for VOC Emissions:

| | |
|---|---|
| Unit Type: | Cold Cleaner |
| Solvent Type: | BrakeThru |
| Solvent Loss: | 5 gal./yr. |
| VOC Content: | 100% |
| Density: | 7.91 lbs./gal. |

| | | | | |
|---|---|---|---|---|
| VOC Emissions | = | (5 gal./yr. | × | 7.91 lbs./gal.) |
| | = | [39.55 lbs./yr.] | / | 2,000 lbs./ton |
| | = | 0.01978 tons/yr. | | |

[4] Environmental Protection Agency (EPA), 1992. Compilation of Air Pollutant Emission Factors. Record number: AP-42.

Annual and daily estimated emission rates are listed in Table 3-5. The daily rates were determined using a seasonal adjustment factor to calculate typical emissions for an ozone season day.

Fuel Storage and Dispensing Operations

Fuel storage and dispensing is another source of VOC emissions. Camp Bullis has reduced the number of Army controlled gasoline and diesel facilities. These facilities service military vehicles and equipment that are operated on post. Two underground 10,000-gallon tanks service all vehicles and equipment, and one 500-gallon aboveground tank services the emergency power generator.

Actual emissions from the fuel storage tanks were estimated using the tank fuel throughputs and EPA's Tanks 4.09 emission calculation program. Potential emissions are assumed to be equal to actual emissions. The annual and daily emissions for this category are located in table 3-5.

*Sample Calculation*

VOC Emissions for Dispensing and Handling:

| | |
|---|---|
| Amount of Fuel Handled: | 101,311.1 gal. |
| Dispensing emissions factor: | 11.7 lbs./1,000 gal. handled |
| Loading/Transit emissions factor: | 12.0 lbs./1,000 gal. handled |

*Vehicle Refueling Losses (uncontrolled displacement and spillage):*

| | | | | | | |
|---|---|---|---|---|---|---|
| VOC Emissions | = | (101,311.1 gal./yr. | × | 11.7 lbs. | / | 1,000 gal.) |
| | = | (1,185.3398 lbs./yr.)/ | | 2,000 lbs./ton | | |
| | = | 0.59267 tons/yr. | | | | |

*Loading and Transit Losses:*

| | | | | | | |
|---|---|---|---|---|---|---|
| VOC Emissions | = | (50,181.1 gal./yr. | × | 12.0 lbs | / | 1,000 gal.) |
| | = | (602.1732 lbs./yr.) | / | 2,000 lbs./ton | | |
| | = | 0.30109 tons/yr. | | | | |

Generators

Camp Bullis had 11 fixed-site generators that were used for an emergency power source for critical activities (hospitals/clinics) or combat training operations in 2003. In addition to emergency situations, the generators were also operated periodically for testing. The testing schedule was part of a fixed maintenance schedule.

Fort Sam Houston Public Works Business Center (PWBC) provided data for these diesel-fired units. Emissions were based on hours of operation, power ratings, and emission factors.

Annual and daily emissions for generators are located in table 3-5.

*Sample Calculation*
CO emissions from diesel-fired generators:
Power Rating: 400 kW
Hours of Operation: 52 hr./yr.
CO Emission Factor: 4.06 g CO/kW-hr

$$\begin{aligned} \text{CO Emissions} &= (4.06 \text{ g/kW-hr} \times 400 \text{ kW} \times 52 \text{ hr./yr.} \times 1 \text{ lb} / 454 \text{ g}) \\ &= (186.00881 \text{ lbs./yr.}) / 2{,}000 \text{ lbs./ton} \\ &= 0.09300 \text{ tons/yr.} \end{aligned}$$

Woodworking and Fabrication
The wood shop at Camp Bullis is used to repair firing range targets and backstops and consists of saws and sanders vented to a dust collection system. This system was estimated to collect no more than 660 gallons of sawdust in 2003.

The main pollutant produced by woodworking is Particulate Matter (PM). No sample calculation is included for woodworking, since no VOC, NOx, or CO emissions were produced according to the Dickson Group calculations.

**Results**
The total estimated actual emissions of criteria pollutants from Camp Bullis for calendar year 2002 and the estimated daily emissions (based on a typical ozone season day) are presented, by pollutant, in table 3-5.

Table 3-5. Total Reported Emissions by Source Category for Camp Bullis, 2003[5]

| Source Category | VOC | $NO_x$ | CO | VOC | $NO_x$ | CO |
|---|---|---|---|---|---|---|
| | (tons/year) | | | (tons/day) | | |
| Boilers and Furnaces | 0.04 | 1.07 | 0.15 | 0.00000 | 0.00000 | 0.00000 |
| Degreasing Operations | 0.06 | 0.00 | 0.00 | 0.00024 | 0.00000 | 0.00000 |
| Fuel Storage / Dispensing | 0.08 | 0.00 | 0.00 | 0.00021 | 0.00000 | 0.00000 |
| Generators | 0.05 | 0.67 | 0.14 | 0.00450 | 0.00367 | 0.01197 |
| Woodworking & Fabrication | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| TOTAL | 0.23 | 1.74 | 0.29 | 0.00495 | 0.00367 | 0.01197 |

[5] Dickson Consulting Group, LLC., 2003. 2003 Emissions Inventory for U.S. Army – Camp Bullis, Texas, TCEQ Account Number BG-0771-O (Section 4: Table 3 & Table 4)

## Canyon Lake Recreation Center

### Introduction

Canyon Lake Recreational Center (CLRC) is located in Comal County, Texas, southeast of Canyon Lake near the spillway. The center is approximately 30 miles northeast of downtown San Antonio and 10 miles north-northwest of New Braunfels. The center does not house any troops, but provides recreational facilities to local organizations, military personnel, and their families.

### Methodology

This section discusses the methods used to calculate both actual and potential emissions for each emissions source category. The data required to complete the 2002 EI was furnished through the Public Affairs Office at Fort Sam Houston. The data provided by the Public Affairs Office was for calendar year 1995, but was updated based on 2004 data provided by the staff at CLRC (closest available data to the 2002 EI-year). The data provided by the Public Affairs Office was an equipment list containing:

- Type of equipment
- Engine Type
- Approximate horse-power rating
- Number of units typically operated
- Average number of hours & time of day typically operated (Mon. – Fri.)
- Average number of hours & time of day typically operated (Sat. – Sun.)

The reported equipment was as follows:

- 2 Chainsaws: 2-cycle, 3.5 hp, 0.5 hrs 8am – 5pm, Mon. – Fri.
- 1 Lawnmower: 4-cycle, 4.1 hp, 1.0 hrs 8am – 5pm, Mon. – Fri.
- 1 Welder: electric
- 1 tractor: diesel, 50hp, 1.5 hrs (Mon. – Fri.), 0.5 hrs (Sat. – Sun.), 8am – 5pm

The emissions were calculated by AACOG staff using EPA emission factors, horsepower (hp) ratings, load factors, equipment populations, and seasonal adjustments. Electric equipment, such as the welder, is assumed to have no emissions caused by operation. Annual and daily emissions are provided in table 3-6.

Table 3-6. Total Emissions for Reported Equipment at Canyon Lake Recreational Center, 2004

| Source Category | VOC | $NO_x$ | CO | VOC | $NO_x$ | CO |
|---|---|---|---|---|---|---|
| | (tons/year) | | | (tons/day) | | |
| Chainsaws | 0.12881 | 0.00119 | 0.30958 | 0.00029 | 0.00000 | 0.00069 |
| Lawnmower | 0.08076 | 0.00630 | 1.23564 | 0.00018 | 0.00001 | 0.00276 |
| Welder | n/a | n/a | n/a | n/a | n/a | n/a |
| Tractor | 0.01978 | 0.08549 | 0.07986 | 0.00004 | 0.00016 | 0.00015 |
| TOTAL | 0.22827 | 0.09298 | 1.62508 | 0.00050 | 0.00018 | 0.00360 |

## Fort Sam Houston

### Introduction

The US Army's Fort San Houston, known locally as Fort Sam, is a 3,265-acre military reservation located in Bexar County, Texas 3 miles northeast of downtown San Antonio. The fort is headquarters for the US Army Medical Command and the location of the Army Medical Department Center and School. Fort Sam Houston is also home to the 5$^{th}$ US Army. All data, methodologies, and emission estimates were prepared by Dickson Consulting Group, LLC. in the Texas Commission on Environmental Quality (TCEQ) 2002 Initial Emissions Inventory for U.S. Army – Fort Sam Houston.[6] The Dickson Group reported other critical and HAP pollutants; this chapter includes just the VOC, NOx, and CO emissions.

### Methodology

Area Sources

Area Sources are stationary sources of relatively low emissions that are generated by such activities as fuel storage, the application of surface coating, and use of boilers and furnaces. Methodologies for these sources are discussed in the Methodologies section that follows. Generic sample calculations for each source are included, but do not reflect actual emissions at Fort Sam Houston. The area sources covered in the initial EI by Dickson are:

- Boilers and Furnaces
- Degreasing Operations
- Fuel Storage and Dispensing
- Generators
- Misc. VOC Sources
- Surface Coating

This section discusses the methods used to calculate both actual and potential emissions for each emissions source category. Emission factors used for these calculations are from the EPA's AP-42[7] document.

Boilers and Furnaces

Actual emissions for over 2,600 boilers, furnaces, and hot water heaters were calculated using emission factors based on fuel consumption. The total fuel consumption was 301,534,400 $ft^3$ of natural gas.

[6] Dickson Consulting Group, LLC., 2003. Texas Commission on Environmental Quality (TCEQ) 2002 Initial Emissions Inventory for U.S. Army – Fort Sam Houston, Texas, TCEQ Account Number BG-0070-O
[7] EPA, 1992. Compilation of Air Pollutant Emission Factors. Record number: AP-42.

*Sample Calculation*

VOC Emissions Calculated for Natural Gas Combustion:

| | |
|---|---|
| Fuel Usage: | 728,542,000 $ft^3$ |
| Emission Factor: | 7.3 lbs./1,000,000 $ft^3$ |

VOC Emissions = (728,542,000 $ft^3$/year × 7.3 lbs./ 1,000,000 $ft^3$)
= (5,318.4 lbs./yr.) / 2,000 lbs./ton
= 2.6592 tons/yr.

The annual boiler and furnace emissions for 2002 are located in Table 3-7. Daily rates were calculated using a seasonal emissions factor based on Table 6 from the Dickson report; this table contains monthly natural gas consumption.

Degreasing Operations

VOCs are the main pollutant produced by degreasing operations. Fort Sam had only three degreasing facilities in 2002 and they used "Safety-Kleen" solvent. The Golf Course maintenance section and Reserve Equipment Concentration Site operate these facilities with 30-gal. dip tanks.

VOC emission calculations were based on the amount of solvent used, VOC content, solvent density and emissions reduction factor. An emissions reduction factor of 48% was applied due to the following conditions regarding the operation of facilities:

- Units enclosed
- Solid fluid streams
- Proper drainage
- Properly used
- Solvent reclamation capacity

*Sample Calculation*

Calculation for VOC Emissions:

| | |
|---|---|
| Unit Type: | Cold Cleaner |
| Solvent Type: | Safety-Kleen |
| Solvent Used: | 18 gal./yr. |
| VOC Content: | 100% |
| Density: | 7.91 lbs./gal. |
| Emissions Reduction Factor: | 0.48 |

VOC Emissions = [18 gal./yr. × 7.91 lbs./gal. × (1 - 0.48)]
= [74.0376 lbs./yr.] / 2,000 lbs./ton
= 0.03702 tons/yr.

Annual and daily estimated emission rates are contained in Table 3-7. The daily rates were determined using a seasonal adjustment factor to calculate typical emissions for an ozone season day.

<u>Fuel Storage and Dispensing Operations</u>

Fuel storage and dispensing is another main source of VOC emissions. Fort Sam has reduced the number of Army controlled gasoline and diesel facilities. These facilities primarily service military vehicles and equipment that are operated on post. Four tanks serve the emergency power generators at the Brooke Army Medical Center (BAMC), also located on post. In addition, the golf course has two aboveground tanks.

Data for calculating these emissions was provided by the golf course and the Readiness and Logistics Business Center (RLBC). Actual emissions from the fuel storage tanks were estimated using the tank fuel throughputs and EPA's Tanks 4.09 emission calculation program. Potential emissions are assumed to be equal to actual emissions.

*Sample Calculation*

VOC Emissions for Dispensing and Handling:

| | |
|---|---|
| Amount of Fuel Handled: | 101,311.1 gal. |
| Dispensing emissions factor: | 11.7 lbs./1,000 gal. handled |
| Loading/Transit emissions factor: | 12.0 lbs./1,000 gal. handled |

*Vehicle Refueling Losses (uncontrolled displacement and spillage):*

| | | | | | | |
|---|---|---|---|---|---|---|
| VOC Emissions | = | (101,311.1 gal./yr. | × | 11.7 lbs | / | 1,000 gal.) |
| | = | (1,185.3398 lbs./yr.)/ | | 2,000 lbs./ton | | |
| | = | 0.59267 tons/yr. | | | | |

*Loading and Transit Losses:*

| | | | | | | |
|---|---|---|---|---|---|---|
| VOC Emissions: | = | (50,181.1 gal./yr. | × | 12.0 lbs. | / | 1,000 gal.) |
| | = | (602.1732 lbs./yr.) | / | 2,000 lbs./ton | | |
| | = | 0.30109 tons/yr. | | | | |

These emissions are also located in Table 3-7.

<u>Generators</u>

Generators are used for an emergency power source for critical activities (hospitals/clinics) or combat training operations. In addition to emergency situations, the generators were also operated periodically for testing. The testing schedule was part of a fixed maintenance schedule.

The Public Works Business Center (PWBC) provided data for these diesel-fired units. Emissions were based on hours of operation, power ratings, and emission factors.

*Sample Calculation*
CO emissions from diesel-fired generators:
Power Rating: 400 kW
Hours of Operation: 52 hr./yr.
CO Emission Factor: 4.06 g CO/kW-hr

CO Emissions = (4.06 g/kW-hr × 400 kW × 52 hr./yr × 1 lb. / 454 g.)
= (186.00881 lbs./yr.) / 2,000 lbs./ton
= 0.09300 tons/yr.

<u>Miscellaneous Volatile Organic Compound Sources</u>
The miscellaneous emitters consist of various solvents, cleaners, and aerosol spray paint used in 2002. Dickson Consulting Group interviewed managers from the diagnostic laboratories, radiology operations, and RLBC Maintenance Section and all available records were checked. Results were compared with the 1998 inventory to estimate 1998 inventory accuracy and to estimate any VOC emission trends. As a result, some sources were eliminated and others were reduced, as significant measures have been taken to lower these emissions. An example of this was the use of digital imagery instead of photo-processed imagery.

Material Safety Data Sheets (MSDS) were used to determine VOC content and density of each chemical.

*Sample Calculation*
VOC emissions from a laboratory source:
Annual usage: 6.5 gal./yr.
Chemical Density: 6.58 lbs./gal.
% VOC: 100

VOC Emissions = (6.5 gal./yr. × 6.58 lbs./gal. × 1)
= (42.77 lbs./yr.) / 2,000 lbs./ton
= 0.02139 tons/yr.

<u>Surface Coating Operations</u>
Fort Sam Houston had only two paint spray booths operating in 2002, one by RLBC Maintenance Division and one by RLBC Training Development/Fabrication Shop. These are both small operations creating minimal VOC emissions.

For these emissions, the MSDS were also used to provide VOC content. Emissions were determined by multiplying the VOC content by the amount used.

*Sample Calculation*
VOC emissions from paint booth operations:

Solvent Used: 4.5 gal./yr.
VOC Content: 3.95 lbs./gal.

| | | | |
|---|---|---|---|
| VOC Emissions | = | (4.5 gal./yr. | $\times$ 3.95 lbs./gal.) |
| | = | (17.775 lbs./yr.) / | 2,000 lbs./ton |
| | = | 0.00889 tons/yr. | |

**Results**

The total estimated actual emissions of criteria pollutants from Fort Sam Houston for calendar year 2002 and the estimated daily emissions (based on a typical ozone season day) are presented, by pollutant, in table 3-7.

Table 3-7. Total Reported Emissions by Source for Fort Sam Houston, 2002

| Source Category | VOC | $NO_x$ | CO | VOC | $NO_x$ | CO |
|---|---|---|---|---|---|---|
| | (tons/year) | | | (tons/day) | | |
| Boilers and Furnaces[8] | 1.21 | 22.09 | 18.55 | 0.00132 | 0.02401 | 0.02017 |
| Degreasing Operations[9] | 0.82 | 0.00 | 0.00 | 0.00226 | 0.00000 | 0.00000 |
| Fuel Storage / Dispensing[10] | 0.92 | 0.00 | 0.00 | 0.00247 | 0.00000 | 0.00000 |
| Generators[11] | 0.06 | 7.16 | 1.54 | 0.00157 | 0.01945 | 0.00419 |
| Misc. VOC[12] | 2.38 | 0.0 | 0.00 | 0.00652 | 0.00000 | 0.00000 |
| Surface Coating[13] | 0.57 | 0.0000 | 0.00 | 0.00157 | 0.00000 | 0.00000 |
| TOTAL | 5.91 | 22.0926 | 18.56 | 0.24229 | 0.02426 | 0.00569 |

[8] Dickson Consulting Group, LLC., 2003. Texas Commission on Environmental Quality (TCEQ) 2002 Initial Emissions Inventory for U.S. Army – Fort Sam Houston, Texas, TCEQ Account Number BG-0070-O (Table 3 & Table 4).
[9] *Ibid*. Table 7.
[10] *Ibid*. Table 12.
[11] *Ibid*. Table 14 & Table 15.
[12] *Ibid*. Table 16 & Table 17.
[13] *Ibid*. Table 19 & Table 21.

## Lackland Air Force Base And Kelly Air Field

### Introduction

Lackland Air Force Base is located in Bexar County, Texas, in the west southwestern part of the City of San Antonio. The base is home to the 37th Training Wing whose primary mission is to provide training to new recruits entering the Air Force. The personnel that work at Lackland consist of 27,574 military personnel and 8,566 civilian personnel, for a total of 36,140 total employees.

The Air Emissions Inventory conducted by MACTEC[14] contained methodologies and emission estimates for Lackland AFB for the calendar year of 2002 and is the source of data for the Lackland and Randolph AFBs in this chapter. In 2001, a large section of the former Kelly AFB was incorporated into Lackland; thus, emissions for current military and civilian aircraft operations, ground support equipment, etc. operated at the Kelly Air Field were also included. The methodology and results for the mobile source portion of this air emissions inventory were calculated using the same methodology as Randolph AFB. For this section, mobile sources encompass both air and ground emitters.

### Methodology

Due to time constraints and the lack of electronic versions of equipment/data sets, the Lackland section is a brief overview. Please refer to the Randolph AFB section for more detail on how the emissions were calculated or for examples of equipment types and other data sets. The Lackland data is not the same as that of Randolph, but for the purposes of describing the methodologies used, it can be referenced, as emissions were calculated in the same way.

Aircraft Flight Operations

All the flight operations at Lackland AFB are conducted at the Kelly Air Field, once part of Kelly AFB. These operations occur within 100 miles of Lackland and are below the mixing level (approx. 3000 feet). To calculate emissions, estimates were made concerning aspects of flight such as, takeoff, level flight, approach, and landing. Taxiing and idle before and after flight were also included in emission calculations. These aspects are combined into what are called sorties. The base's two tenant units, the 149th Fighter Wing and 433rd Fighter Wing, account for most of these emissions; but additional emissions are caused by transient and commercial aircraft visiting Lackland.

Information concerning aircraft type, engine type, types of sorties, number of sorties, engine power settings used during phases of sorties and typical duration in each of those power

[14] MACTEC Engineering and Consulting, Inc., 2003. Air Emissions Inventories for Multiple AETC Installations (Draft), Contract No.F41624-03-D-8606/003.

settings was provided by unit personnel. Emission factors are dependent on engine type and size. To calculate emission estimates, the emission factor is multiplied by the hours of operation. A sample calculation is provided in the Randolph AFB section of this EI. Table 3-8 contains VOC, NOx, and CO emissions for all aircraft accounted for by Lackland AFB.

Table 3-8. Aircraft Emissions by Organization and Aircraft Type - Lackland AFB 2002[15]

| Aircraft | VOC | $NO_X$ | CO | VOC | $NO_X$ | CO |
|---|---|---|---|---|---|---|
| | Emissions (tons/yr.) | | | Emissions (tons/day) | | |
| **149th Flying Training Wing:** | | | | | | |
| F-16 | 1.75 | 24.09 | 34.06 | 0.00670 | 0.09230 | 0.13048 |
| 149th Flying Training Wing Total | 1.75 | 24.09 | 34.06 | 0.00670 | 0.09230 | 0.13048 |
| **433rd Flying Training Wing:** | | | | | | |
| C-5 | 24.09 | 242.30 | 101.55 | 0.09231 | 0.92834 | 0.38910 |
| 433rd Flying Training Wing Total | 24.09 | 242.30 | 101.55 | 0.09231 | 0.92834 | 0.38910 |
| **Transient Alert:** | | | | | | |
| 707 | 3.85 | 0.61 | 4.88 | 0.01476 | 0.00234 | 0.01868 |
| 747 | 1.90 | 2.42 | 4.60 | 0.00730 | 0.00926 | 0.01763 |
| A-10 | 0.18 | 0.04 | 0.81 | 0.00070 | 0.00015 | 0.00310 |
| AV-8 | 0.21 | 0.07 | 1.23 | 0.00082 | 0.00027 | 0.00470 |
| C-12 | 0.23 | 0.01 | 0.27 | 0.00088 | 0.00006 | 0.00105 |
| C-130 | 0.33 | 2.06 | 0.80 | 0.00127 | 0.00789 | 0.00307 |
| C-141 | 2.73 | 0.38 | 3.13 | 0.01047 | 0.00147 | 0.01201 |
| C-17 | 0.08 | 2.11 | 0.86 | 0.00032 | 0.00809 | 0.00328 |
| C-21 | 0.05 | 0.10 | 0.32 | 0.00021 | 0.00039 | 0.00122 |
| C-5 | 0.19 | 0.99 | 0.66 | 0.00074 | 0.00380 | 0.00252 |
| C-9 | 0.39 | 2.37 | 1.74 | 0.00148 | 0.00907 | 0.00665 |
| F-111 | 0.04 | 0.02 | 0.09 | 0.00017 | 0.00008 | 0.00034 |
| F-14 | 0.09 | 0.47 | 0.38 | 0.00034 | 0.00179 | 0.00146 |
| F-15 | 0.52 | 0.99 | 1.76 | 0.00199 | 0.00378 | 0.00676 |
| F-16 | 0.09 | 1.40 | 1.70 | 0.00035 | 0.00535 | 0.00653 |
| F-18 | 2.36 | 0.68 | 5.38 | 0.00905 | 0.00259 | 0.02061 |
| F-4 | 0.06 | 0.12 | 0.43 | 0.00023 | 0.00044 | 0.00163 |
| KC-135 | 5.82 | 1.04 | 6.96 | 0.02229 | 0.00399 | 0.02668 |
| SW-4 | 0.45 | 0.04 | 0.37 | 0.00173 | 0.00015 | 0.00140 |
| T-1A | 0.63 | 0.07 | 0.90 | 0.00241 | 0.00027 | 0.00346 |
| T-34 | 0.01 | 0.04 | 0.09 | 0.00002 | 0.00014 | 0.00035 |
| T-37 | 0.40 | 0.08 | 4.68 | 0.00155 | 0.00029 | 0.01791 |
| T-38 | 3.31 | 0.79 | 38.41 | 0.01269 | 0.00302 | 0.14717 |
| T-43 | 0.00 | 0.03 | 0.02 | 0.00002 | 0.00010 | 0.00007 |
| T-44 | 0.00 | 0.02 | 0.04 | 0.00001 | 0.00007 | 0.00013 |
| T-45 | 0.04 | 0.16 | 0.23 | 0.00013 | 0.00060 | 0.00090 |
| T-6 | 0.06 | 0.02 | 0.19 | 0.00024 | 0.00007 | 0.00074 |
| UH-1 | 0.01 | 0.01 | 0.03 | 0.00004 | 0.00004 | 0.00013 |
| Transient Alert Total | 24.07 | 17.11 | 80.96 | 0.09220 | 0.06556 | 0.31020 |
| TOTAL EMISSIONS | 49.91 | 283.50 | 216.57 | 0.19121 | 1.08620 | 0.82978 |

[15] *Ibid*. Note: Emissions estimates from Table 3.3-12 (p. 3-30) were converted by AACOG staff from pounds/year to tons/year.

Ground Mobile Sources

The ground mobile sources can be divided into two distinct groups: on-road and non-road. On-road sources include motor vehicles, which are licensed to operate on roads and highways. Nonroad mobile sources include specialty vehicles such as landscaping, construction, or industrial equipment.

On-Road

The on-road mobile sources portion of the Lackland emissions inventory is broken down into the following two categories:

- Military owned and operated vehicles (GOV)
- Non-military vehicles (POV) - dependant vehicles, commuter and visiting vehicles, and commercial vehicles

The total vehicle miles traveled (VMT) for on-road sources were estimated and EPA's MOBILE6 was used to estimate the emission factors for each vehicle. MOBILE6 calculates the emission factors for volatile organic compounds (VOC), oxides of nitrogen ($NO_x$), and carbon monoxide (CO). For more details on how these emissions were calculated see the methodology part of the Randolph section of this report.

Military Owned and Operated Vehicles (GOV)

Vehicle specific information was gathered from the Vehicle Master List, the General Services Administration (GSA) Vehicle List, the Air National Guard, and other tenants operating GOV (bus contractors and the grounds maintenance contractors). Table 3-9 contains the 2002 annual estimated emissions by fleet.

Table 3-9. Estimated GOV On-road Emissions (tons/year) by Fleet List Totals[16]

| Fleet | VOC | $NO_x$ | CO |
|---|---|---|---|
| Vehicle Master List | 11.3630 | 21.2460 | 78.4030 |
| GSA Vehicle List | 1.1130 | 0.5905 | 10.0455 |
| Air National Guard | 0.5240 | 1.0395 | 3.8350 |
| Contractor Operated Buses | 1.0620 | 11.8635 | 3.8350 |
| Ground Maintenance Contractor | 0.5605 | 0.2655 | 4.8535 |
| Total Emissions | 14.6225 | 35.0050 | 100.9720 |

[16] *Ibid*. Note: Subtotals taken from Table 3.6-13 (pp. 3-83 – 3-84) and converted from pounds/year to tons/year.

Privately Owned Vehicles (POV)

In the absence of a detailed list maintained by Lackland for this category, MACTEC estimated VMT using an algorithm based on many different factors. The VMT by POV on Lackland were determined by a short-term study in which on-base activity was analyzed. On-base POV account for the following:

- On-base portion of commutes to and from work by personnel living off base
- Commute to and from work by personnel living on-base
- Employees driving to lunch
- Military dependents and retirees driving on-base
- Air show and graduation attendees
- Contractors driving on-base

The MACTEC estimated values for miles per year traveled by these groups. Table 3-10 contains the on-base POV figures by group.

Table 3-10. Estimated Miles per Year Traveled by POV On-base for Lackland AFB[17]

| On-base Group Estimated | Miles/Year |
|---|---|
| Employees Commute to Work from On-base Housing | 409,130 |
| Employees Commute to Work from Off-base Housing | 17,733,150 |
| Employees Driving to Lunch | 13,606,710 |
| Dependents from On-base Housing | 1,189,900 |
| Dependents from Off-base Housing | 2,782,936 |
| Retirees Driving On Base | 702,000 |
| Graduation Visitors | 100,000 |
| Air Show Visitors | 700,000 |
| Contractors Driving On Base | 176,955 |

National fleet data was used to estimate other data needed for MOBILE6 input. For more details on how this was done, refer to the POV part of the Randolph AFB section of this EI.

*POV Results*

The resulting emissions from the AEI developed by MACTEC were converted from pounds per year to tons per year. The results were summed by vehicle category in Table 3-11.

[17] *Ibid*. Totals are from Table 3.7-1 (p. 3-91).

Table 3-11. On-Base POV Activities Emissions Estimates (tons/year) for Randolph AFB, 2002[18]

| Vehicle Category | MOBILE6 Vehicle Class | VOC | NOX | CO |
|---|---|---|---|---|
| Passenger Cars | LDGV | 58.6935 | 28.8345 | 422.8715 |
| | LDDV | 0.0173 | 0.0316 | 0.0391 |
| Buses | HDDBS | 0.1170 | 1.5090 | 0.3770 |
| Light Trucks | LDGT1 | 32.7515 | 16.5140 | 304.0420 |
| Truck Tractors | HDGV5 | 0.7550 | 0.8670 | 5.8905 |
| | HDDV5 | 0.0555 | 0.7520 | 0.2060 |
| Other Single Unit Trucks | HDGV2B | 2.9540 | 4.8120 | 22.1455 |
| | HDDV2B | 0.0855 | 1.1025 | 0.3245 |
| Motorcycles | MC | 2.3120 | 0.8860 | 11.6880 |
| Total | | 97.7413 | 55.3086 | 767.5841 |

*On-Road Results*

The GOV totals and the POV totals were summed, providing the on-road emission totals for Lackland AFB in 2002, table 3 -12.

Table 3-12. Total Estimated On-road Emissions for Lackland AFB, 2002

| Type | VOC | NOX | CO |
|---|---|---|---|
| GOV Emissions | 14.6225 | 35.005 | 100.972 |
| POV Emissions | 97.7413 | 55.3086 | 767.5841 |
| Total | 112.3638 | 90.3136 | 868.5561 |

Nonroad

This category includes recreational, construction, industrial, agricultural, commercial, logging, and lawn/garden equipment.

To calculate non-road emissions, MACTEC used the following parameters:

- ER = engine rating (hp)
- LF = load factor (%)
- HO = hours of operation (hrs/yr.)
- EF = emissions factor (g/hp-hr.)

[18] *Ibid*. Note: Emissions estimates from Table 3.7-9 (p. 3-97) were converted by AACOG staff from pounds/year to tons/year.

The equation used to calculate emissions was:

Emissions (lbs./yr.) = ER x LF x HO x EF

An exception to employing this methodology was the calculation used for non-road motorcycle and all terrain vehicle (ATV) emission estimations. The units for the emissions factor (g/hr.) do not account for engine ratings for these vehicles. Thus, the equation used for motorcycles and ATVs was the same as other non-road categories minus the engine rating parameter:

Emissions (lbs./yr.) = LF x HO x EF

The Information needed to calculate emissions came from the following sources:

- Vehicle Master List: 37 LRS/LGRV (Logistics Readiness Squadron's Vehicle Management Flight) and 433 MXS (433rd Airlift Wing Maintenance Squadron)
- Individual Organizational Lists: 149 ANG, 37 CES (AMU 1), 37 CES (AMU 2), 37 CES (AMU 3), 37 CES (AMU 5), 37 CES (Vertical Shop), 37 CES/CECS (Saber), 37 CES/CEOHH (Heavy Equipment), CES/CEOIE (Electrical Shop), CES/CEOIG Power Production), CES/CEOMS (Self Help), 37 SVS/SVBG (Golf Courses), Family Housing, and Ground Maintenance Contractor (Goodwill and TRDI)

*Vehicle Master List*

Information for the registered government-owned equipment on the vehicle master list was used to obtain the data needed to calculate emissions. The 1991 EPA study[19] provided load factors. Table 3-13 contains the total emissions (in tons) calculated for these registered non-road vehicles.

Table 3-13. Estimated Annual Nonroad Emissions from Vehicle Master List Vehicles, 2002[20]

| Master List - Organizations | VOC | NOx | CO |
|---|---|---|---|
| | tons/year | | |
| 37 LRS/LGRV | 1.24600 | 6.42350 | 10.23400 |
| 433 MXS | 3.02450 | 16.30650 | 19.97050 |
| TOTAL | 4.27050 | 22.73000 | 30.20450 |

*Other Nonroad Vehicles*

The information about other non-road vehicles was obtained through interviews conducted by MACTEC with fleet managers at Lackland. The other non-road vehicles include golf course

[19] EPA, 1991. Nonroad Engine and Vehicle Study – Report. Office of Mobile Sources.

[20] MACTEC Engineering and Consulting, Inc., 2003. Air Emissions Inventories for Multiple AETC Installations (Draft), Contract No.F41624-03-D-8606/003. Note: Emissions estimates from Table 3.8-10 (pp. 3-145 – 3-148) were totaled and converted by AACOG staff from pounds/year to tons/year.

maintenance equipment, landscaping equipment, and heavy industrial equipment. In each case, the fleet manager estimated the number of each type of unit in the fleet, determined the horsepower rating and the fuel type, and estimated the number of hours per day that each unit operated.

Using these estimates and the load factors and emissions factors from EPA's report for these vehicles, total annual emissions were calculated. Table 3-14 shows total emissions calculated for landscaping equipment, golf course maintenance equipment, and heavy industrial equipment by organization. The total emissions for these vehicles are, in some cases, larger than the estimates for the registered off-road vehicles. This is primarily due to discrepancies between the hourly usage data given in the registered vehicle list and the estimates given by the fleet managers. In some cases, the fleet managers may have overestimated the hourly usage of the equipment.

*Nonroad Results*

The results were combined by non-road vehicle fleet. Also shown are the VOC, NOx, and CO totals and the percentage of emissions contributed to the total by each of the non-road vehicle fleets. Table 3-15 contains these combined results.

Table 3-14. Estimated Annual Nonroad Emissions from Other Vehicles, 2002[21]

| Organization | VOC | NOx | CO |
|---|---|---|---|
| | tons/year | | |
| 149 ANG | 0.41300 | 0.01710 | 3.65300 |
| 37 CES (AMU 1) | 0.00129 | 0.00493 | 0.00357 |
| 37 CES (AMU 2) | 0.19450 | 0.01100 | 1.83650 |
| 37 CES (AMU 3) | 0.03955 | 0.01450 | 1.38200 |
| 37 CES (AMU 5) | 0.29550 | 0.03300 | 5.50900 |
| 37 CES (Vertical Shop) | 3.51250 | 0.08550 | 21.60250 |
| 37 CES/CECS (Saber) | 0.30200 | 1.17900 | 1.29100 |
| 37 CES/CEOHH (Heavy Equipment) | 2.57100 | 1.08250 | 53.79250 |
| CES/CEOIE (Electrical Shop) | 0.07150 | 0.00026 | 0.19750 |
| CES/CEOIG (Power Production) | 0.00117 | 0.00446 | 0.00323 |
| CES/CEOMS (Self Help) | 1.19550 | 0.01500 | 5.24500 |
| 37 SVS/SVBG (Golf Courses) | 3.47250 | 2.48350 | 84.85950 |
| Family Housing | 1.08900 | 0.05850 | 12.63700 |
| Ground Maintenance Contractor: Goodwill | 28.42150 | 7.96100 | 117.54000 |
| Ground Maintenance Contractor: TRDI | 5.32750 | 2.78450 | 54.18950 |
| TOTAL | 46.90800 | 15.73475 | 363.74180 |

[21] *Ibid*. Note: Emissions estimates from Table 3.8-10 (pp. 3-149 – 3-155) were totaled and converted by AACOG staff from pounds/year to tons/year.

Table 3-15. Total Estimated Annual Nonroad Emissions for Lackland AFB, 2002

| Equipment by Source | VOC | NOx | CO |
|---|---|---|---|
| Vehicle Master List Nonroad Equipment | 4.27050 | 22.73000 | 30.20450 |
| Other Nonroad Equipment | 46.90800 | 15.73475 | 363.74180 |
| Nonroad Total | 51.17850 | 38.46475 | 393.94630 |

Aerospace Ground Equipment Operations

This category as described in the AEI by MACTEC includes emissions produced by aerospace grounds equipment (AGE) such as air compressors, floodlights, bomb lifts, turbines, generators, heaters, etc.

Emissions from AGE were calculated by multiplying the amount of fuel used by the emissions factor. The emissions for AGE are presented in table 3-16. The example in the AEI is as follows:

| | |
|---|---|
| Equipment description: | Air Compressor, MC-11 |
| Fuel type: | JP-8 |
| Quantity of fuel consumed: | 192 gal./yr. |
| JP-8l fuel heating value: | 125,750 Btu/gal. [0.12575 MMBtu/ga.] |
| Emission factor ID: | 1 |
| CO emission factor: | 2.07 lb./MMBtu |

CO emissions = (192 gal./yr.) (0.12575 MMBtu/gal.) (2.07 lb./MMBtu)
= 50.0 lb./yr.; MACTEC truncated to three significant figures

Then the emissions were converted to tons/yr.:
CO emissions = 49.97808 lb./yr. / 2,000 lb./ton
= 0.02499 tons/yr.

Table 3-16. Aerospace Ground Equipment Emissions for Lackland AFB, 2002[22]

| Equipment Description | Emissions (tons/yr.) | | |
|---|---|---|---|
| | VOC | $NO_X$ | CO |
| **149th Flying Training Wing** | | | |
| Air Compressor, MC-11 | 0.02500 | 0.03930 | 0.02500 |
| Air Compressor, MC-1A | 0.05000 | 0.07850 | 0.05000 |
| Air Compressor, MC-2A | 0.02175 | 0.26650 | 0.05750 |
| Air Compressor, MC-7 | 0.00950 | 0.07450 | 0.00324 |
| Bomb Lift, MHU83 | 0.02175 | 0.26650 | 0.05750 |
| Bomb Lift, MJ-1B | 0.02175 | 0.26650 | 0.05750 |
| Cabin Leak Tester, AF/M32T-1 | 0.00435 | 0.05350 | 0.01145 |

[22] *Ibid*. Note: Emissions estimates from Table 3.5-6 (pp. 3-51 – 3-52) were converted by AACOG staff from pounds/year to tons/year.

| | | | |
|---|---|---|---|
| Floodlight Set, FL-1D | 0.00000 | 0.29650 | 0.22800 |
| Floodlight Set, NF-2D | 0.00000 | 0.02965 | 0.02280 |
| Gas Turbine Compressor, A/M32A-60B | 0.02710 | 0.54150 | 2.16650 |
| Gas Turbine Compressor, A/M32A-95 | 0.00038 | 0.00770 | 0.03075 |
| Generator, MEP-112A | 0.00435 | 0.05350 | 0.01145 |
| Generator, A/M32A-86 | 0.00343 | 0.07100 | 0.00535 |
| Generator, MEP-113A | 0.00435 | 0.05350 | 0.01145 |
| Heater, H-1 | 0.02650 | 0.04185 | 0.04795 |
| Hydraulic Test Stand, MJ-2-A1 | 0.02015 | 0.06450 | 0.00570 |
| Pressure Washer | 0.00845 | 0.00454 | 0.17450 |
| Welder, D-44 | 0.00435 | 0.05350 | 0.01145 |
| Subtotal | 0.25316 | 2.26304 | 2.97809 |
| **433rd Flying Training Wing** | | | |
| Air Compressor, MC-2A | 0.00925 | 0.11350 | 0.02440 |
| Air Compressor, MC-2A | 0.01055 | 0.12950 | 0.02790 |
| Air Compressor, MC-7 | 0.01850 | 0.14450 | 0.00630 |
| Air Compressor, MA-3D | 0.00995 | 0.78250 | 0.05950 |
| Floodlight Set, FL-1D | 0.00000 | 0.02165 | 0.01665 |
| Floodlight Set, NF-2D | 0.00000 | 0.24300 | 0.18700 |
| Gas Turbine Compressor, A/M32A-95 | 0.00015 | 0.00300 | 0.01195 |
| Generator, A/M32A-86 | 0.39550 | 8.21750 | 0.61500 |
| Generator, B809A | 0.13500 | 1.65300 | 0.35600 |
| Heater, H-1 | 0.02545 | 0.04020 | 0.04605 |
| Hydraulic Test Stand, AF/M27M-1 | 0.00700 | 0.08550 | 0.01840 |
| Hydraulic Test Stand, MJ-2-A1 | 0.00349 | 0.01120 | 0.00099 |
| Pressure Washer | 0.01685 | 0.00910 | 0.34900 |
| Self-generating Nitrogen Service Cart | 0.00114 | 0.01390 | 0.00299 |
| V.A.M.P. Stand | 0.02470 | 0.01330 | 0.51100 |
| Subtotal | 0.65752 | 11.48135 | 2.23313 |
| **Transient Alert** | | | |
| Air Compressor, MC-1A | 0.00333 | 0.00525 | 0.00333 |
| Air Compressor, MC-2A | 0.00033 | 0.00405 | 0.00087 |
| Air Compressor, MC-7 | 0.00132 | 0.01035 | 0.00045 |
| Air Compressor, MA-3D | 0.00154 | 0.12150 | 0.00925 |
| Bomb Lift, MJ-1A | 0.00151 | 0.01845 | 0.00398 |
| Floodlight Set, FL-1D | 0.00000 | 0.01390 | 0.01070 |
| Floodlight Set, NF-2D | 0.00000 | 0.03475 | 0.02670 |
| Floodlight Set, TF-1 | 0.00000 | 0.03125 | 0.02405 |
| Floodlight Set, TF-2 | 0.00000 | 0.00348 | 0.00267 |
| Gas Turbine Compressor, A/M32A-60A | 0.00056 | 0.01110 | 0.04445 |
| Gas Turbine Compressor, A/M32A-60A | 0.00028 | 0.00555 | 0.02225 |
| Gas Turbine Compressor, A/M32A-95 | 0.00139 | 0.02780 | 0.11100 |

| | | | |
|---|---|---|---|
| Generator, A/M32A-85 | 0.05650 | 1.17400 | 0.08800 |
| Generator, A/M32A-86 | 0.01130 | 0.23500 | 0.01760 |
| Heater, H-1 | 0.00530 | 0.00835 | 0.00960 |
| Hydraulic Test Stand, MJ-1-1 | 0.00034 | 0.01005 | 0.00057 |
| Hydraulic Test Stand, MJ-2-A1 | 0.00605 | 0.01940 | 0.00171 |
| Pressure Washer | 0.00845 | 0.00454 | 0.17450 |
| Water Cart | 0.00281 | 0.00152 | 0.05800 |
| Subtotal | 0.10099 | 1.74028 | 0.60966 |
| TOTAL | 1.01167 | 15.48466 | 5.82087 |

Aircraft Engine Testing Operations

This category includes only aircraft engines that are tested "on-wing." This means the engines are actually mounted on the aircraft and not a test stand, as test stand mounted engine testing is considered a stationary source and not included in the AEI performed by MACTEC. All aircraft engine testing is performed at Kelly Air Field. During 2002, the 149$^{th}$ Fighter Wing and the 433$^{rd}$ Airlift Wing conducted engine testing.

These emissions are calculated much like the aircraft flight operations. After the hours of operations are calculated, emission factors, fuel flow rates, and those hours are figured together to achieve emissions in lb./year. From there, AACOG staff converted emissions to tons/year and tons/day. Table 3-17 contains the emissions from engine testing on Lackland AFB by organization. The following example was used by MACTEC for CO emissions from C-5A engine testing operations:

***Testing Organization:*** 433$^{rd}$ Airlift Wing
***Aircraft type/engine model***: C-5A / TF39-GE-1C

Test Duration:

- Idle 238.4 hr./yr. (TF39-GE-1C engine)
- Approach 91.2 hr./yr. (TF39-GE-1C engine)
- Intermediate 91.2 hr./yr. (TF39-GE-1C engine)
- Military 91.2 hr./yr. (TF39-GE-1C engine)
- Constant 25.3 hr./yr. (GTCP 165-1B/2 APU)

Fuel flow rate:

- Idle 1,448 lb. fuel/hr. (TF39-GE-1C engine)
- Approach 10,477 lb. fuel/hr. (TF39-GE-1C engine)
- Intermediate 12,541 lb. fuel/hr. (TF39-GE-1C engine)
- Military 13,861 lb. fuel/hr. (TF39-GE-1C engine)
- Constant 273 lb. fuel/hr. (GTCP 165-1B/2 APU)

CO Emission Factor:

- Idle 58.21 lb./1,000 lb. fuel (TF39-GE-1C engine)
- Approach 0.77 lb./1,000 lb. fuel (TF39-GE-1C engine)
- Intermediate 1.63 lb./1,000 lb. fuel (TF39-GE-1C engine)
- Military 1.28 lb./1,000 lb. fuel (TF39-GE-1C engine)
- Constant 13.93 lb./1,000 lb. fuel (GTCP 165-1B/2 APU)

CO emissions for C-5A / TF39-GE-1C =

[(238.4 hr./yr.) (1,448 lb. fuel/hr.) (58.21 lb./1,000 lb. fuel)] +
[(91.2 hr./yr.) (10,477 lb. fuel/hr.) (0.77 lb./1,000 lb. fuel)] +
[(91.2 hr./yr.) (12,541 lb. fuel/hr.) (1.63 lb./1,000 lb. fuel)] +
[(91.2 hr./yr.) (13,861 lb. fuel/hr.) (1.28 lb./1,000 lb. fuel)] +
[(25.3 hr./yr.) (273 lb. fuel/hr.) (13.93 lb./1,000 lb. fuel)]
= 24,409 lb./yr

From there the emissions were converted from pounds per year to tons per year.

CO = 24,409 lb./yr. ÷ 2,000 lb./ton
= 12.2045 tons/yr.

Table 3-17. Aircraft Engine Testing Operations Emissions for Lackland AFB, 2002[23]

| Organization | Aircraft | Emissions (tons/yr.) | | |
|---|---|---|---|---|
| | | VOC | $NO_X$ | CO |
| 149th Fighting Wing | F-16 | 0.03385 | 3.25100 | 0.39200 |
| 433rd Airlift Wing | C-A5 | 3.15700 | 49.15250 | 12.20450 |
| TOTAL | | 3.19085 | 52.40350 | 12.59650 |

**Results**

The following table contains the overall mobile source emission results in tons of pollutant per year. The table also shows the total and daily emissions by pollutant for each category. Daily emissions were determined utilizing a 261 days per year conversion factor.

[23] *Ibid*. Note: Emissions estimates from Table 3.4-6 (p. 3-41) were converted by AACOG staff from pounds/year to tons/year.

Table 3-18. Lackland AFB Total Annual and Daily Emissions for All Pollutants, 2002

| Emissions Source | VOC | NOx | CO | VOC | NOx | CO |
|---|---|---|---|---|---|---|
| | tons/yr. | | | tons/day | | |
| GOV On-Road | 14.62 | 35.00 | 100.97 | 0.05602 | 0.13412 | 0.38687 |
| POV On-Road | 97.74 | 55.31 | 767.58 | 0.37449 | 0.21191 | 2.94094 |
| Nonroad | 51.18 | 38.46 | 393.95 | 0.19609 | 0.14737 | 1.50937 |
| Aerospace Ground Equipment | 1.01 | 15.48 | 5.82 | 0.00388 | 0.05933 | 0.02230 |
| Aircraft Flight Operations | 49.91 | 283.50 | 216.57 | 0.19121 | 1.08620 | 0.82978 |
| Aircraft Engine Testing | 3.19 | 52.40 | 12.60 | 0.01223 | 0.20078 | 0.04826 |
| TOTAL | 217.65 | 480.16 | 1,497.49 | 0.83391 | 1.83971 | 5.73752 |

## Randolph Air Force Base

### Introduction

Randolph Air Force Base is located in Bexar County, Texas, east-northeast of the City of San Antonio. The base is home to the 12th Flying Training Wing and is one of the few bases that conducts instructor pilot training. The personnel that work at Randolph consist of 5,019 military personnel and 5,494 civilian personnel, for a total of 10,513 employees.

An air emissions inventory (AEI)[24] was conducted at Randolph Air Force Base (AFB) in San Antonio, Texas, in October 2003, for the calendar year 2002. Their report outlines the resources and methodologies used to determine mobile source emissions for a number of criteria, as well as hazardous, pollutants. For the purposes of this inventory, mobile sources encompass:

- Aircraft Flight Operations
- Engine Testing
- Aerospace Ground Equipment
- On-road
- Nonroad
- Fueling

### Methodology

Aircraft Flight Operations

The aircraft emissions were determined by obtaining the type of aircraft and number of landings for the aircraft from base personnel. The hours of operation were estimated from the number of landings in a given year. The emission factors were obtained from several sources, and the total emissions were calculated.

The methodology employed by MACTEC involved obtaining detailed information from each unit. The calculations required multiplying emission factors by the number of hours of operation. Four emission factors (Idle, Approach, Clime Out, and Takeoff) were assigned for each of the three pollutants (VOC, NOx, and CO) based on aircraft type and size of engine. A sample calculation of CO emissions for a T-1A given in the AEI is as follows:

***Aircraft type/engine model:*** T-1A / JT15D-5B

CO emission factors:

[24] MACTEC Engineering and Consulting, Inc., 2003. Air Emissions Inventories for Multiple AETC Installations (Draft), Contract No.F41624-03-D-8606/003.

- Idle 108.14 lb./1,000 lb. fuel
- Approach 35.30 lb./1,000 lb. fuel
- Climb Out 1.63 lb./1,000 lb. fuel
- Takeoff 0.20 lb./1,000 lb. fuel

Aircraft fuel flow rates:

- Idle 221 lb. fuel/hr
- Approach 496 lb. fuel/hr
- Climb Out 1,359 lb. fuel/hr
- Takeoff 1,630 lb. fuel/hr.

Hours of operation:

- Idle 1,176.13 hr./yr.
- Approach 2,025.43 hr./yr.
- Climb Out 1,001.29 hr./yr.
- Takeoff 675.14 hr./yr.

CO emissions in pounds/year for a T-1A =
[(108.14 lb./1,000 lb. fuel) (221 lb. fuel/hr.) (1,176.13 hr./yr.)] +
[(35.30 lb./1,000 lb. fuel) (496 lb. fuel/hr.) (2,205.43 hr./yr.)] +
[(1.63 lb./1,000 lb. fuel) (1,359 lb. fuel/hr.) (1,001.29 hr./yr.)] +
[(0.20 lb./1,000 lb. fuel) (1,630 lb. fuel/hr.) (675.14 hr./yr.)]
= 66,009 lb./yr.

From there the pounds were converted to tons:
CO = 66,009 lb./yr. / 2,000 lb./ton
= 33.0045 tons/yr.

*Results*

To calculate tons per day, the 261 days/year conversion figure was used. The resulting VOC, NOx, and CO emissions for each aircraft type at Randolph in tons per year and tons per day are listed in table 3-19 by unit. These emissions are summarized in table 3-20 by unit.

Table 3-19. Estimated Annual and Daily Emissions for Aircraft - Randolph AFB 2002[25]

| Aircraft | Emissions (tons/yr.) | | | Emissions (tons/day) | | |
|---|---|---|---|---|---|---|
| | VOC | $NO_X$ | CO | VOC | $NO_X$ | CO |
| **12th Flying Training Wing:** | | | | | | |
| T-1A | 15.11 | 15.64 | 33.00 | 0.05790 | 0.05993 | 0.12645 |
| T-6A | 7.04 | 9.30 | 31.09 | 0.02696 | 0.03563 | 0.11913 |
| T-37B | 7.31 | 20.63 | 284.83 | 0.02799 | 0.07903 | 1.09130 |

[25] *Ibid*. Note: Emissions estimates from Table 7.3-25 (pp. 7-61 – 7-63) were converted by AACOG staff from pounds/year to tons/year.

| | | | | | | |
|---|---|---|---|---|---|---|
| T-38A | 28.03 | 26.23 | 528.18 | 0.10739 | 0.10050 | 2.02367 |
| T-43A | 1.93 | 53.88 | 8.77 | 0.00740 | 0.20642 | 0.03359 |
| T-38B | 3.13 | 4.49 | 61.80 | 0.01197 | 0.01720 | 0.23680 |
| **415th Flight Test Flight:** | | | | | | |
| T-38 | 0.40 | 0.15 | 5.31 | 0.00152 | 0.00059 | 0.02036 |
| **Vertex Aerospace Corporation:** | | | | | | |
| C-21 | 0.53 | 1.01 | 3.32 | 0.00203 | 0.00387 | 0.01271 |
| **Transient Alert:** | | | | | | |
| 737 | 0.00 | 0.02 | 0.01 | 0.00000 | 0.00006 | 0.00003 |
| 757 | 0.00 | 0.01 | 0.01 | 0.00000 | 0.00005 | 0.00003 |
| A-10 | 0.28 | 0.06 | 1.24 | 0.00108 | 0.00023 | 0.00476 |
| AH-1 | 0.00 | 0.02 | 0.04 | 0.00001 | 0.00007 | 0.00015 |
| AV-8 | 0.06 | 0.02 | 0.33 | 0.00022 | 0.00007 | 0.00125 |
| B-1 | 0.00 | 0.03 | 0.03 | 0.00000 | 0.00011 | 0.00012 |
| BE-35 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00000 | 0.00004 |
| C-12 | 0.47 | 0.03 | 0.56 | 0.00180 | 0.00012 | 0.00214 |
| C-130 | 0.07 | 0.41 | 0.16 | 0.00025 | 0.00157 | 0.00061 |
| C-135 | 0.80 | 0.14 | 0.96 | 0.00308 | 0.00055 | 0.00369 |
| C-141 | 0.38 | 0.05 | 0.44 | 0.00145 | 0.00020 | 0.00167 |
| C-160 | 0.00 | 0.02 | 0.01 | 0.00001 | 0.00006 | 0.00005 |
| C-17 | 0.00 | 0.11 | 0.05 | 0.00002 | 0.00043 | 0.00017 |
| C-2 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00001 |
| C-20 | 0.00 | 0.01 | 0.02 | 0.00001 | 0.00004 | 0.00008 |
| C-21 | 0.17 | 0.32 | 1.00 | 0.00064 | 0.00123 | 0.00382 |
| C-23 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| C-26 | 0.03 | 0.00 | 0.02 | 0.00010 | 0.00001 | 0.00007 |
| C-414 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00000 | 0.00004 |
| C-9 | 0.02 | 0.10 | 0.07 | 0.00006 | 0.00038 | 0.00028 |
| C337 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00000 | 0.00004 |
| Cessna 172 | 0.00 | 0.00 | 0.02 | 0.00000 | 0.00000 | 0.00006 |
| Cessna 182 | 0.00 | 0.00 | 0.04 | 0.00000 | 0.00000 | 0.00016 |
| Cessna 206 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00000 | 0.00003 |
| Cessna 560 | 0.00 | 0.00 | 0.01 | 0.00001 | 0.00000 | 0.00002 |
| CH-46 | 0.03 | 0.01 | 0.11 | 0.00010 | 0.00006 | 0.00043 |
| CH-47 | 0.01 | 0.01 | 0.01 | 0.00002 | 0.00005 | 0.00005 |
| CH-53 | 0.01 | 0.03 | 0.03 | 0.00005 | 0.00013 | 0.00012 |
| D-8 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00001 |
| E-6 | 0.00 | 0.05 | 0.04 | 0.00001 | 0.00018 | 0.00017 |
| E-8 | 0.06 | 0.01 | 0.07 | 0.00024 | 0.00004 | 0.00028 |
| EA-6B | 0.02 | 0.01 | 0.05 | 0.00009 | 0.00003 | 0.00018 |
| EXTRA 300 | 0.00 | 0.00 | 0.04 | 0.00000 | 0.00000 | 0.00016 |
| F-14 | 0.00 | 0.02 | 0.02 | 0.00002 | 0.00010 | 0.00008 |
| F-15 | 0.67 | 1.27 | 2.27 | 0.00256 | 0.00487 | 0.00871 |
| F-16 | 0.03 | 0.41 | 0.50 | 0.00010 | 0.00157 | 0.00191 |
| F-18 | 1.01 | 0.29 | 2.29 | 0.00386 | 0.00111 | 0.00879 |
| F-4 | 0.07 | 0.13 | 0.46 | 0.00025 | 0.00048 | 0.00178 |
| F-5 | 0.07 | 0.02 | 0.55 | 0.00025 | 0.00008 | 0.00212 |

| | | | | | | |
|---|---|---|---|---|---|---|
| FALCON 50 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| G-5 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00002 |
| H-60 | 0.06 | 0.04 | 0.07 | 0.00021 | 0.00013 | 0.00026 |
| KC-10 | 0.00 | 0.03 | 0.02 | 0.00001 | 0.00012 | 0.00006 |
| LR60 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00001 |
| M-20F | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00000 | 0.00002 |
| M20P | 0.00 | 0.00 | 0.02 | 0.00000 | 0.00000 | 0.00008 |
| MI-8 HELO | 0.00 | 0.00 | 0.00 | 0.00001 | 0.00000 | 0.00001 |
| P-3 | 0.01 | 0.06 | 0.04 | 0.00002 | 0.00021 | 0.00013 |
| P-40 | 0.01 | 0.00 | 0.03 | 0.00002 | 0.00000 | 0.00012 |
| PA-23 | 0.00 | 0.00 | 0.08 | 0.00001 | 0.00000 | 0.00032 |
| PA-28 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00000 | 0.00003 |
| RV-6 | 0.00 | 0.00 | 0.02 | 0.00000 | 0.00000 | 0.00008 |
| S-3 | 0.02 | 0.01 | 0.09 | 0.00007 | 0.00002 | 0.00036 |
| SNJ-5 | 0.01 | 0.00 | 0.03 | 0.00002 | 0.00000 | 0.00012 |
| T-1A | 0.42 | 0.05 | 0.60 | 0.00160 | 0.00018 | 0.00230 |
| T-2 | 0.01 | 0.02 | 0.07 | 0.00005 | 0.00006 | 0.00027 |
| T-34 | 0.00 | 0.03 | 0.07 | 0.00002 | 0.00011 | 0.00026 |
| T-37 | 0.13 | 0.02 | 1.54 | 0.00051 | 0.00010 | 0.00588 |
| T-38 | 2.19 | 0.52 | 25.42 | 0.00840 | 0.00200 | 0.09739 |
| T-39 | 0.05 | 0.03 | 0.49 | 0.00018 | 0.00010 | 0.00188 |
| T-44 | 0.00 | 0.02 | 0.03 | 0.00001 | 0.00006 | 0.00012 |
| T-45 | 0.00 | 0.01 | 0.01 | 0.00001 | 0.00002 | 0.00003 |
| T-6 | 0.04 | 0.01 | 0.11 | 0.00014 | 0.00004 | 0.00043 |
| TH-57 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00000 | 0.00002 |
| UC-35 | 0.17 | 0.02 | 0.28 | 0.00063 | 0.00006 | 0.00107 |
| UH-1 | 0.00 | 0.00 | 0.01 | 0.00001 | 0.00001 | 0.00003 |
| TOTAL | 70.84 | 135.80 | 996.88 | 0.02824 | 0.01716 | 0.15544 |

Table 3-20. Total VOC, NOx, and CO Emissions by Unit for Aircraft[26]

| Unit | Emissions (tons/yr.) | | | Emissions (tons/day) | | |
|---|---|---|---|---|---|---|
| | VOC | $NO_X$ | CO | VOC | $NO_X$ | CO |
| 12th | 62.54 | 130.16 | 947.68 | 0.23961 | 0.49871 | 3.63095 |
| 415th | 0.40 | 0.15 | 5.31 | 0.00152 | 0.00059 | 0.02036 |
| Vertex | 0.53 | 1.01 | 3.32 | 0.00203 | 0.00387 | 0.01271 |
| TA | 7.37 | 4.48 | 40.57 | 0.02824 | 0.01716 | 0.15544 |
| TOTAL | 70.84 | 135.80 | 996.88 | 0.27140 | 0.52032 | 3.81946 |

Ground Mobile Sources

The ground mobile sources can be divided into two distinct groups: on-road and off-road. On-road sources include motor vehicles licensed for operation on roads and highways. MOBILE6 was used to calculate the emissions of volatile organic compounds (VOCs), nitrogen oxides

[26] *Ibid*. Note: Emissions estimates from Table 7.3-27 (p. 7-68) were converted by AACOG staff from pounds/year to tons/year.

($NO_x$), and carbon monoxide (CO). The methodology outlined in the EPA 1991 study entitled *Non-Road Engine and Vehicle Emission Study* was used to perform calculations for off-road sources. EPA's report contains horsepower estimates, activity factors, load factors, and estimates of hours per year equipment usage to calculate the emissions for off-road sources.

On-road

The on-road mobile sources portion of the Randolph Air Force Base emissions inventory was broken down into the following two categories:

- Military owned and operated vehicles (GOV)
- Non-military vehicles (POV) - dependant vehicles, commuter and visiting vehicles, and commercial vehicles

Military Owned and Operated Vehicles (GOV)

The GOV category consists of all government-owned vehicles operated on base. Emissions were estimated using the total vehicle miles traveled (VMT), which were multiplied by MOBILE6, emission factors. For the GOV estimates, these factors were site-specific and vehicle-specific. Vehicle lists are maintained for GOV by the following:

- The Logistics Transportation Maintenance Unit of the 12th Transportation Squadron – maintains the Vehicle Master List (majority of GOV)
- The Logistics Transportation Maintenance Unit of the 81st Transportation Squadron – maintains the list for leased vehicles from the General Service Administration (GSA)
- Acepex Management Corporation, the Military Family Housing Maintenance Contract
- Miranda's Ground Maintenance, grounds maintenance contractor
- Randolph AFB's refuse contractor

The vehicles on these lists were assigned a management code based on vehicle type, fuel type, and model year. These management codes were then assigned in turn to one of the sixteen MOBILE6 vehicle classifications (Table 3-21).

Table 3-21. MOBILE6 Vehicle Classifications Used for the Registration Distribution File[27]

| Number | MOBILE6 Vehicle Class | Description |
|---|---|---|
| 1 | LDV | Light-Duty Vehicles (Passenger Cars) |
| 2 | LDT1 | Light-Duty Trucks 1 (0-6,000 lb. GVWR, 0-3,750 lbs. LVW) |
| 3 | LDT2 | Light-Duty Trucks 2 (0-6,000 lb. GVWR, 3,751-5,750 lb. LVW) |
| 4 | LDT3 | Light-Duty Trucks 3 (6,001-8,500 lb. GVWR, 0-5,750 lb. ALVW) |
| 5 | LDT4 | Light-Duty Trucks 4 (6,001-8,500 lb. GVWR, 5,751 lb. and greater ALVW) |
| 6 | HDV2B | Class 2b Heavy-Duty Vehicles (8,501-10,000 lb. GVWR) |
| 7 | HDV3 | Class 3 Heavy-Duty Vehicles (10,001-14,000 lb. GVWR) |
| 8 | HDV4 | Class 4 Heavy-Duty Vehicles (14,001-16,000 lb. GVWR) |
| 9 | HDV5 | Class 5 Heavy-Duty Vehicles (16,001-19,500 lb. GVWR) |
| 10 | HDV6 | Class 6 Heavy-Duty Vehicles (19,501-26,000 lb. GVWR) |
| 11 | HDV7 | Class 7 Heavy-Duty Vehicles (26,001-33,000 lb. GVWR) |
| 12 | HDV8A | Class 8a Heavy-Duty Vehicles (33,001-60,000 lb. GVWR) |
| 13 | HDV8B | Class 8b Heavy-Duty Vehicles (>60,000 lb. GVWR) |
| 14 | HDBS | School Buses |
| 15 | HDBT | Transit and Urban Buses |
| 16 | MC | Motorcycles (All) |

The total vehicle count per vehicle class is recorded in table 3-22. A registration distribution factor was calculated for each vehicle classification by dividing the number of vehicles registered in the model year by the total number of GOV vehicles in each MOBILE6 vehicle class listed in table 3-22. Table 3-23 shows these factors by vehicle class for each year.

[27] _Ibid_. Table 7.6-4 (pp. 7-102 – 7-103).

Table 3-22. MOBILE6 Vehicle Classifications Assigned to Gov for the Registration Distribution File[28]

| Number | MOBILE6 Vehicle Class | Vehicle Management Codes Assigned | Vehicle Count |
|---|---|---|---|
| 1 | LDV | 8499, B102, B103, B106, B150 | 75 |
| 2 | LDT1 | B170, B180, B200, B204, B207, B227 | 159 |
| 3 | LDT2 | B198, B199, B211, C260 | 20 |
| 4 | LDT3 | B168, B185 | 13 |
| 5 | LDT4 | B188 | 0 |
| 6 | HDV2B | B162, B163, B176, B190, B191, B192, B261, B265, C158, C250, W205 | 41 |
| 7 | HDV3 | B217, B222, C251, L152 | 19 |
| 8 | HDV4 | C156, C157, C160, C161, C167 | 29 |
| 9 | HDV5 | B239, B263, C211 | 7 |
| 10 | HDV6 | K248 | 0 |
| 11 | HDV7 | B390, C116, C122, C300, C324, D731, D738 | 12 |
| 12 | HDV8A | B353, B361, B363, C337 | 5 |
| 13 | HDV8B | -- | 0 |
| 14 | HDBS | B130 | 14 |
| 15 | HDBT | B139, B141, B184 | 7 |
| 16 | MC | -- | 0 |

[28] *Ibid*. Table 7.6-5 (p. 7-103).

Table 3-23. Registration Distribution Factor by MOBILE6 Vehicle Classification[29]

| Model Year | LDV | LDT1 | LDT2 | LDT3 | LDT4 | HDV2B | HDV3 | HDV4 | HDV5 | HDV6 | HDV7 | HDV8A | HDV8B | HDBS | HDBT | MC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2003 | 0.333 | 0.038 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.071 | 0.000 | 0.000 |
| 2002 | 0.173 | 0.031 | 0.000 | 0.000 | 0.000 | 0.163 | 0.050 | 0.000 | 0.000 | 0.000 | 0.083 | 0.000 | 0.000 | 0.071 | 0.000 | 0.000 |
| 2001 | 0.080 | 0.050 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.143 | 0.000 |
| 2000 | 0.133 | 0.057 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.200 | 0.000 | 0.000 | 0.000 | 0.000 |
| 1999 | 0.213 | 0.075 | 0.000 | 0.000 | 0.000 | 0.023 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 1998 | 0.027 | 0.082 | 0.000 | 0.000 | 0.000 | 0.000 | 0.110 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 1997 | 0.013 | 0.151 | 0.000 | 0.000 | 0.000 | 0.000 | 0.050 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 1996 | 0.000 | 0.031 | 0.000 | 0.000 | 0.000 | 0.023 | 0.050 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.143 | 0.000 |
| 1995 | 0.000 | 0.126 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.071 | 0.000 | 0.000 |
| 1994 | 0.000 | 0.094 | 0.000 | 0.154 | 0.000 | 0.023 | 0.260 | 0.069 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.071 | 0.286 | 0.000 |
| 1993 | 0.000 | 0.031 | 0.000 | 0.000 | 0.000 | 0.140 | 0.050 | 0.414 | 0.000 | 0.000 | 0.250 | 0.000 | 0.000 | 0.000 | 0.143 | 0.000 |
| 1992 | 0.013 | 0.000 | 0.000 | 0.769 | 0.000 | 0.023 | 0.000 | 0.000 | 0.000 | 0.000 | 0.167 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 1991 | 0.013 | 0.069 | 0.000 | 0.077 | 0.000 | 0.093 | 0.160 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 1990 | 0.000 | 0.031 | 0.000 | 0.000 | 0.000 | 0.023 | 0.110 | 0.000 | 0.714 | 0.000 | 0.083 | 0.200 | 0.000 | 0.000 | 0.000 | 0.000 |
| 1989 | 0.000 | 0.025 | 0.000 | 0.000 | 0.000 | 0.163 | 0.000 | 0.207 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.143 | 0.000 | 0.000 |
| 1988 | 0.000 | 0.082 | 0.000 | 0.000 | 0.000 | 0.233 | 0.000 | 0.241 | 0.000 | 0.000 | 0.167 | 0.200 | 0.000 | 0.000 | 0.286 | 0.000 |
| 1987 | 0.000 | 0.019 | 0.000 | 0.000 | 0.000 | 0.070 | 0.110 | 0.034 | 0.143 | 0.000 | 0.000 | 0.000 | 0.000 | 0.357 | 0.000 | 0.000 |
| 1986 | 0.000 | 0.006 | 0.000 | 0.000 | 0.000 | 0.023 | 0.050 | 0.034 | 0.000 | 0.000 | 0.167 | 0.200 | 0.000 | 0.000 | 0.000 | 0.000 |
| 1985 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.143 | 0.000 | 0.000 | 0.000 | 0.000 | 0.071 | 0.000 | 0.000 |
| 1984 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.083 | 0.200 | 0.000 | 0.143 | 0.000 | 0.000 |

[29] *Ibid*. Table 7.6-6 (pp. 7-104 – 7-105).

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1983 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 1982 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 1981 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 1980 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 1979 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| *Total* | *1.000* | *1.000* | *0.000* | *1.000* | *0.000* | *1.000* | *1.00* | *1.000* | *1.000* | *0.000* | *1.000* | *1.000* | *0.000* | *1.000* | *1.000* | *0.000* |

Tables 3-24 through table 3-27 contain MOBILE6 variable values used by month, pollutant emission factors by MOBILE6 vehicle class, VMT by MOBILE6 vehicle class, and the resulting emissions for GOV on-road by vehicle fleet list.

Table 3-24. Values for MOBLIE6 Variables used by Month[30].

| Parameter | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Minimum Temperature (ºF) | 49.1 | 52.0 | 54.2 | 63.7 | 66.7 | 73.7 | 73.7 | 75.7 | 65.4 | 54.6 | 46.5 | 39.5 |
| Maximum Temperature (ºF) | 70.4 | 72.8 | 74.8 | 83.1 | 87.0 | 89.9 | 91.6 | 98.0 | 91.6 | 84.8 | 78.3 | 69.3 |
| Gasoline RVP (psia) | 11.8 | 11.8 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 11.8 |
| Gasoline Sulfur Content (ppm.) | 361 | 361 | 263 | 263 | 263 | 263 | 263 | 263 | 263 | 263 | 263 | 361 |
| Diesel Sulfur Content (ppm.) | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 |
| Gasoline Aromatic Content (%) | 25.8 | 25.8 | 30.1 | 30.1 | 30.1 | 30.1 | 30.1 | 30.1 | 30.1 | 30.1 | 30.1 | 25.8 |
| Gasoline Olefin Content (%) | 8.1 | 8.1 | 9.7 | 9.7 | 9.7 | 9.7 | 9.7 | 9.7 | 9.7 | 9.7 | 9.7 | 8.1 |
| Gasoline Benzene Content (%) | 1.21 | 1.21 | 1.48 | 1.48 | 1.48 | 1.48 | 1.48 | 1.48 | 1.48 | 1.48 | 1.48 | 1.21 |
| E200 (%) | 47.3 | 47.3 | 41.5 | 41.5 | 41.5 | 41.5 | 41.5 | 41.5 | 41.5 | 41.5 | 41.5 | 47.3 |
| E300 (%) | 83.7 | 83.7 | 81.6 | 81.6 | 81.6 | 81.6 | 81.6 | 81.6 | 81.6 | 81.6 | 81.6 | 83.7 |
| MTBE $\%_{vol}$ | 0 | 0 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0 |
| ETBE $\%_{vol}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ETOH $\%_{vol}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TAME $\%_{vol}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

[30] *Ibid*. Table 7.6-7 (p. 7-107).

Table 3-25. VOC, NOx, and CO Emission Factors (g/mile) for GOV by 28 MOBILE6 Classes[31]

| MOBILE6 Vehicle Class | VOC | $NO_x$ | CO |
|---|---|---|---|
| LDGV | 0.602 | 0.559 | 9.750 |
| LDGT1 | 1.580 | 1.110 | 17.00 |
| LDGT2 | 2.370 | 1.440 | 22.00 |
| LDGT3 | 4.110 | 2.120 | 33.00 |
| LDGT4 | 3.710 | 1.970 | 32.20 |
| HDGV2B | 3.650 | 5.220 | 16.60 |
| HDGV3 | 3.180 | 5.480 | 21.20 |
| HDGV4 | 6.490 | 7.000 | 26.80 |
| HDGV5 | 8.340 | 8.340 | 51.70 |
| HDGV6 | 4.980 | 5.560 | 40.70 |
| HDGV7 | 6.830 | 7.680 | 46.20 |
| HDGV8A | 9.980 | 9.380 | 81.30 |
| HDGV8B | -- | -- | -- |
| LDDV | 0.179 | 0.591 | 0.989 |
| LDDT12 | 3.420 | 3.040 | 5.590 |
| HDDV2B | 0.428 | 4.570 | 1.570 |
| HDDV3 | 0.471 | 5.530 | 1.860 |
| HDDV4 | 0.722 | 6.930 | 1.730 |
| HDDV5 | 0.942 | 7.030 | 2.590 |
| HDDV6 | 0.619 | 8.380 | 2.070 |
| HDDV7 | 1.050 | 11.50 | 4.370 |
| HDDV8A | 1.350 | 17.30 | 7.570 |
| HDDV8B | 1.010 | 19.20 | 5.410 |
| MC | 2.940 | 1.130 | 14.90 |
| HDGB | 10.60 | 8.000 | 92.30 |
| HDDBT | 1.250 | 17.80 | 8.900 |
| HDDBS | 1.180 | 12.40 | 4.790 |
| LDDT34 | 0.989 | 1.440 | 1.580 |

[31] *Ibid*. Table 7.6-9 (p7-109).

Table 3-26. VMT by MOBILE6 Vehicle Class by Fleet (mile/yr.)[32]

| MOBILE 6 Vehicle Class | GOV Management Code Assignments | Fuel Type | VML Fleet | GSA Fleet | MFH Contractor | Miranda's Grounds Maintenance | Refuse Contractor |
|---|---|---|---|---|---|---|---|
| LDGV | 8499, B102, B103, B106, B150 | Gasoline | 121,420 | 80,404 | 80,000 | -- | -- |
| LDGT1 | B170, B180, B200, B204, B207, B227 | Gasoline | 530,259 | 30,632 | -- | 250,000 | -- |
| LDGT2 | B198, B199, B211, C260 | Gasoline | -- | 66,752 | -- | -- | -- |
| LDGT3 | B168, B185 | Gasoline | 53,388 | -- | -- | -- | -- |
| LDGT4 | B188 | Gasoline | | -- | -- | -- | -- |
| HDGV2B | B162, B163, B190, B191, B192, B261, B265, C158, C250, W205 | Gasoline | 52,613 | 25,840 | -- | -- | -- |
| HDGV3 | B217, B222, C251, L152 | Gasoline | 55,006 | -- | -- | -- | -- |
| HDGV4 | C156, C157, C160, C161, C167 | Gasoline | 106,818 | -- | -- | -- | -- |
| HDGV5 | B239, B263, C211 | Gasoline | | -- | -- | -- | -- |
| HDGV6 | K248 | Gasoline | | -- | -- | -- | -- |
| HDGV7 | B390, C116, C122, C300, C324, D731, D738 | Gasoline | | -- | -- | -- | -- |
| HDGV8A | B353, B361, B363, C337 | Gasoline | | -- | -- | -- | -- |
| HDGV8B | -- | Gasoline | | -- | -- | -- | -- |
| LDDV | 8499, B102, B103, B106, B150 | Diesel | | -- | 5,000 | -- | -- |
| LDDT12 | B170, B180, B198, B199, B200, B204, B207, B211, B227, C260 | Diesel | 132,123 | -- | -- | -- | -- |

[32] *Ibid*. Table 7.6-11 (pp. 7-111 – 7-112).

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| HDDV2B | B162, B163, B168, B176, B185, B188, B190, B191, B192, B261, B265, C158, C250, W205 | Diesel | 84,787 | -- | -- | -- | -- |
| HDDV3 | B217, B222, C251, L152 | Diesel | 28,895 | -- | -- | -- | -- |
| HDDV4 | C156, C157, C160, C161, C167 | Diesel | 1,531 | -- | -- | -- | -- |
| HDDV5 | B239, B263, C211 | Diesel | 4,869 | -- | -- | -- | 11,040 |
| HDDV6 | K248 | Diesel | | -- | -- | -- | -- |
| HDDV7 | B390, C116, C122, C300, C324, D731, D738 | Diesel | 28,695 | -- | -- | -- | -- |
| HDDV8A | B353, B361, B363, C337 | Diesel | 65,769 | -- | -- | -- | -- |
| HDDV8B | -- | Diesel | -- | -- | -- | -- | -- |
| MC | -- | Gasoline | -- | -- | -- | -- | -- |
| HDGB | B130, B139, B141, B184 | Gasoline | -- | -- | -- | -- | -- |
| HDDBT | B139, B184 | Diesel | 46,621 | -- | -- | -- | -- |
| HDDBS | B130, B141 | Diesel | 73,597 | 284 | -- | -- | -- |
| LDDT34 | -- | Diesel | -- | -- | -- | -- | -- |

*GOV Results*

The resulting emissions from the AEI developed by MACTEC have been converted from pounds per year to tons per year and summed by fleet list as listed in Table 3-27. This table also contains the daily estimated GOV on-road emissions for Randolph AFB. The 261 days per year conversion factor was utilized to calculate tons per day.

Table 3-27. Estimated Annual and Daily GOV On-road Emissions by Fleet List Totals, 2002[33]

| Fleet | VOC | NOx | CO | VOC | NOx | CO |
|---|---|---|---|---|---|---|
| | tons/year | | | tons/day (Mon. - Fri.) | | |
| Vehicle Master List | 3.27 | 6.95 | 21.14 | 0.01251 | 0.02661 | 0.08101 |
| GSA Vehicle List | 0.39 | 0.35 | 3.53 | 0.00148 | 0.00132 | 0.01353 |
| MFH Contractor | 0.05 | 0.05 | 0.86 | 0.00021 | 0.00020 | 0.00331 |
| Miranda's Ground Maintenance | 0.44 | 0.31 | 4.68 | 0.00167 | 0.00117 | 0.01792 |
| Refuse Contractor | 0.01 | 0.09 | 0.03 | 0.00004 | 0.00033 | 0.00012 |
| Total Emissions | 4.15 | 7.74 | 30.25 | 0.01591 | 0.02964 | 0.11590 |

Privately Owned And Operated Vehicles (POV)

Non-military vehicles are privately owned and operated, thus referred to as POV. The on-road mobile source emissions in the AEI, resulting from POV on Randolph AFB, include emissions generated on the to and from commute by civilian and military personnel living off base, as well as those generated while on base. For the purpose of this inventory, only the on-base portion of these emissions is included in this Airport/Military chapter, as the off-base emissions are included in the On Road chapter of the EI. Emissions were calculated using a methodology similar to the one employed for GOV. A standard input file for MOBILE6 was prepared and run to obtain emission factors. These factors were multiplied by RAFB specific VMT to determine total emissions.

The VMT traveled by POV on Randolph were determined by a short-term study in which on-base activity was analyzed. On-base POV account for the following:

- On-base portion of commutes to and from work by personnel living off base
- Commutes to and from work by personnel living on-base
- Military dependents and retirees driving on-base
- Contractors driving on-base

The MACTEC estimated values for miles per year traveled by these groups. Table 3-28 contains the on-base POV figures by group.

Table 3-28. Estimated Miles per Year Traveled by POV On-base for Randolph AFB[34]

| On-base Group Estimated | Miles/Year |
|---|---|
| Employees Commute to Work from On-base Housing | 511,538 |
| Employees Commute to Work from Off-base Housing | 4,765,988 |
| Employees Driving to Lunch | 3,958,145 |
| Dependents from On-base Housing | 1,487,740 |

[33] *Ibid*. Note: Subtotals taken from Table 7.6-12 (pp. 7-113 – 7-115) were converted by AACOG staff from pounds/year to tons/year and totaled.

[34] *Ibid*. Totals are from Table 7.7-1 (p. 7-119).

| | |
|---|---|
| Dependents from Off-base Housing | 416,000 |
| Retirees Driving On Base | 645,736 |
| Air Show and Tattoo Visitors | 150,500 |
| Contractors Driving On Base | 114,205 |

Since records are not kept of POV, MACTEC first established the vehicle mix distribution by fuel type based on a comparison between the national fleet vehicle mix, MOBILE6 vehicle classifications, and typical POV mix. The POV VMT was estimated for on-base and off-base travel for each vehicle type (see table 3-29).

Table 3-29. POV VMT by MOBILE6 Vehicle Classification[35]

| MOBILE6 Vehicle Class | POV VMT (mile/yr.) |
|---|---|
| LDGV | 7,129,483 |
| LDDV | 6,422 |
| HDDBS | 37,389 |
| LDGT1 | 4,155,490 |
| HDGV5 | 45,747 |
| HDDV5 | 39,713 |
| HDGV2B | 324,829 |
| HDDV2B | 81,106 |
| MC | 229,674 |
| Total | 12,049,852 |

A MOBILE6 input file was prepared with the same input variables used for GOV. Default national fleet data regarding age was used to define distribution of vehicle model years within the vehicle classifications. Emission factors were calculated for each vehicle class in 2002, as done for GOV. Table 3-30 contains these factors. The resulting emission estimates for VOC, NOx, and CO are totaled in table 3-31.

[35] *Ibid*. Note: On-base figures from Table 7.7-6 (p. 7-122).

Table 3-30. VOC, NOx, and CO Emission Factors (g/mi) for POV by MOBILE6 Vehicle Class[36]

| MOBILE6 Vehicle Class | VOC | $NO_X$ | CO |
|---|---|---|---|
| LDGV | 2.410 | 1.180 | 17.30 |
| LDDV | 0.788 | 1.440 | 1.780 |
| HDDBS | 0.915 | 11.80 | 2.950 |
| LDGT1 | 2.300 | 1.160 | 21.40 |
| HDGV5 | 4.820 | 5.540 | 37.60 |
| HDDV5 | 0.409 | 5.530 | 1.520 |
| HDGV2B | 2.660 | 4.330 | 19.90 |
| HDDV2B | 0.308 | 3.970 | 1.170 |
| MC | 2.940 | 1.130 | 14.90 |

*POV Results*

The resulting emissions from the AEI developed by MACTEC were converted from pounds per year to tons per year, as listed in table 3-31. The results have also been summed by vehicle category in that table. Table 3-31 contains the POV annual and daily on-road emissions for Randolph AFB.

Table 3-31. On-Base POV Activities Emissions Estimates for Randolph AFB, 2002[37]

| Vehicle Category | MOBILE6 Vehicle Class | VOC | NOX | CO | VOC | NOX | CO |
|---|---|---|---|---|---|---|---|
| Passenger Cars | LDGV | 18.91 | 9.29 | 136.24 | 0.07245 | 0.03559 | 0.52200 |
| | LDDV | 0.01 | 0.01 | 0.01 | 0.00002 | 0.00004 | 0.00005 |
| Buses | HDDBS | 0.04 | 0.49 | 0.12 | 0.00014 | 0.00186 | 0.00047 |
| Light Trucks | LDGT1 | 10.55 | 5.32 | 97.96 | 0.04043 | 0.02039 | 0.37531 |
| Truck Tractors | HDGV5 | 0.24 | 0.28 | 1.90 | 0.00093 | 0.00107 | 0.00727 |
| | HDDV5 | 0.02 | 0.24 | 0.07 | 0.00007 | 0.00093 | 0.00025 |
| Other Single Unit Trucks | HDGV2B | 0.95 | 1.55 | 7.14 | 0.00365 | 0.00594 | 0.02734 |
| | HDDV2B | 0.04 | 0.49 | 0.14 | 0.00014 | 0.00189 | 0.00052 |
| Motorcycles | MC | 0.75 | 0.29 | 3.77 | 0.00285 | 0.00109 | 0.01443 |
| Total | | 31.50 | 17.96 | 247.33 | 0.12069 | 0.06881 | 0.94764 |

<u>Nonroad</u>

This category includes recreational, construction, industrial, agricultural, commercial, logging, and lawn/garden equipment. To calculate non-road emissions, MACTEC used the following parameters:

- ER = engine rating (hp)

[36] *Ibid*. Note: Table 7.7-7 (p. 7-124).
[37] *Ibid*. Note: Emissions estimates from Table 7.7-9 (p. 7-125) were converted by AACOG staff from pounds/year to tons/year.

- LF = load factor (%)
- HO = hours of operation (hrs/yr.)
- EF = emissions factor (g/hp-hr.)

Equation used to calculate emissions:

Emissions (lbs./yr.) = ER x LF x HO x EF

An exception to employing this methodology was the calculation used for non-road motorcycle and all terrain vehicle (ATV) emission estimations. The units for the emissions factor (g/hr.) do not account for engine ratings for these vehicles. Thus, the equation used for motorcycles and ATVs was the same as other non-road categories minus the engine rating parameter:

Emissions (lbs./yr.) = LF x HO x EF

*Nonroad Equipment Accounted for on the Vehicle Master List*

The vehicle records contained information about the vehicle type, number of vehicles, fuel type, model year, and number of hours of operation. This list, however, did not include information about the load factors, horsepower ratings, or emission factors for these vehicles. One way to obtain the horsepower ratings would be to visually inspect almost 100 off-road vehicles contained in the registered list and record the engine type for each vehicle. This task could take a considerable amount of time, considering that these vehicles are operated and stored at locations all across the base. In the interest of time, the default value assumptions from EPA's 1991 report[38] were used. EPA's report contains tables of average horsepower ratings, typical load factors, and typical emission factors for various types of off-road vehicles. Other vehicle parameters were obtained from the Vehicle Master List through the Transportation Squadron's Vehicle Maintenance Shop. This accounted for the larger pieces of Government-owned non-road equipment.

The emissions for the Master List equipment, Table 3-32, were calculated by condensing the vehicle list by type and model year. Using the provided emissions factor numbers, EFs were assigned from the emissions factors list. The hours of operation (OH) were totaled as well; and emissions were calculated using the methodology previously mentioned.

*Sample Calculation*

This sample calculation is for loaders and demonstrates how the list was condensed and emissions were calculated by type and model year. This is how the information on loaders was presented in the AEI:

[38] EPA, 1991. Nonroad Engine and Vehicle Study – Report. Office of Mobile Sources.

| Equipment Type | Qnt. | Model Year | Fuel Type | ER (hp) | OH (hrs/yr.) | LF | EF No. |
|---|---|---|---|---|---|---|---|
| Loader | 1 | 2002 | Diesel | 74 | 1076 | 55 % | 1,879 |
| Loader | 1 | 2002 | Diesel | 74 | 660 | 55 % | 1,879 |
| Loader | 1 | 1986 | Diesel | 74 | 272 | 55 % | 1,877 |
| Loader | 1 | 1993 | Diesel | 74 | 362 | 55 % | 1,879 |
| Loader | 1 | 1986 | Diesel | 74 | 25 | 55 % | 1,877 |

This is the condensed version:

| Equipment Type | Qnt. | Model Year | Fuel Type | ER (hp) | OH (hrs/yr.) | LF | EF No. |
|---|---|---|---|---|---|---|---|
| Loader | 2 | 1986 | Diesel | 74 | 297 | 55 % | 1,877 |
| Loader | 3 | 1993-2002 | Diesel | 74 | 2098 | 55 % | 1,879 |

The EFs for No. 1,877 were listed as "Vary by application, see Table 7.8-8". This table contained EFs for some diesel non-road equipment with model years prior to 1988. The EFs for loaders on this table were listed as:

EF for VOC = 1.43
EF for NOx = 10.10
EF for CO = 6.80

The EFs for No. 1,879 were list as:

EF for VOC = 1.50
EF for NOx = 7.10
EF for CO = 2.30

Thus, the following equations were used to calculate the emissions with this data:

2 Loaders of model year 1986 -

VOC = 74 (hp) x 297 (hrs/yr.) x 55 % x 1.43 (g/hp-hr.) / 453.6 (g/lbs.) / 2,000 (lbs./ton)
= 0.01905 tons/year

NOx = 74 (hp) x 297 (hrs/yr.) x 55 % x 10.10 (g/hp-hr.) / 453.6 (g/lbs.) / 2,000 (lbs./ton)
= 0.13458 tons/year

CO = 74 (hp) x 297 (hrs/yr.) x 55 % x 6.80 (g/hp-hr.) / 453.6 (g/lbs.) / 2,000 (lbs./ton)
= 0.09061 tons/year

3 Loaders of model year 1993-2002 -

VOC = 74 (hp) x 2098 (hrs/yr.) x 55 % x 1.50 (g/hp-hr.) ÷ 453.6 (g/lbs.) / 2,000 (lbs./ton)
= 0.14118 tons/year

NOx = 74 (hp) x 2098 (hrs/yr.) x 55 % x 7.10 (g/hp-hr.) ÷ 453.6 (g/lbs.) / 2,000 (lbs./ton)
= 0.66827 tons/year

CO = 74 (hp) x 2098 (hrs/yr.) x 55 % x 2.30 (g/hp-hr.) ÷ 453.6 (g/lbs.) / 2,000 (lbs./ton)
= 0.21648 tons/year

Table 3-32 contains the emissions (in tons/year) calculated for the larger non-road equipment from the Vehicle Master List. It includes the vehicle type, number of vehicles, model years, load factors, average horsepower rating, and emission factors used in the calculations. Because the 1991 EPA report included these emission factors for each of the pollutants, no computer modeling was required to obtain the emissions estimates.

Table 3-32. Master List Nonroad Equipment Emissions Estimates for 2002[39]

| Equipment Type | Model Years | # in Fleet | ER (hp) | Total HO (hr./yr.) | LF | VOC EF | NOx EF | CO EF | VOC tons/year | NOx tons/year | CO tons/year |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Crane | 1988 | 4 | 194 | 727 | 43% | 0.60 | 8.30 | 3.40 | 0.04011 | 0.55486 | 0.22729 |
| Fire Truck | 1987 | 5 | 400 | 582 | 57% | 0.86 | 9.60 | 2.80 | 0.12579 | 1.40419 | 0.40956 |
| Fire Truck | 1989-1994 | 5 | 400 | 960 | 57% | 1.50 | 8.60 | 6.20 | 0.36190 | 2.07492 | 1.49587 |
| Fork Lift | 1985-1986 | 3 | 83 | 612 | 30% | 1.60 | 14.00 | 6.06 | 0.02688 | 0.23517 | 0.10179 |
| Fork Lift | 1989-1995 | 11 | 83 | 1927 | 30% | 2.20 | 8.50 | 8.10 | 0.11636 | 0.44957 | 0.42841 |
| Fuel Truck | 1989-1991 | 11 | 250 | 5397 | 57% | 1.50 | 8.60 | 6.20 | 1.27161 | 7.29059 | 5.25601 |
| Fuel Truck | 1998 | 2 | 250 | 1201 | 57% | 0.90 | 7.10 | 2.30 | 0.16978 | 1.33941 | 0.43389 |
| Golf Cart | 1992-2001 | 20 | 10 | 5200 | 46% | 36.9 | 2.09 | 348 | 0.97294 | 0.05511 | 9.17566 |
| Loader | 1986 | 2 | 74 | 297 | 55% | 1.43 | 10.10 | 6.80 | 0.01905 | 0.13458 | 0.09061 |
| Loader | 1993-2002 | 3 | 74 | 2098 | 55% | 1.50 | 7.10 | 2.30 | 0.14118 | 0.66827 | 0.21648 |
| Road Grader | 1984 | 1 | 159.5 | 235 | 61% | 1.57 | 9.60 | 3.80 | 0.03957 | 0.24195 | 0.09577 |
| Roller | 1983 | 1 | 7 | 47 | 62% | 36.9 | 1.98 | 429 | 0.00830 | 0.00045 | 0.09646 |
| Roller | 1992 | 1 | 99 | 22 | 56% | 0.90 | 8.20 | 4.40 | 0.00121 | 0.01102 | 0.00592 |
| Sweeper | 1984-1986 | 2 | 97 | 1335 | 68% | 1.60 | 14.00 | 6.06 | 0.15530 | 1.35890 | 0.58821 |
| Sweeper | 1992 | 1 | 97 | 794 | 68% | 0.90 | 8.20 | 1.50 | 0.05196 | 0.47338 | 0.08659 |
| Sweeper | 2002 | 2 | 97 | 1821 | 68% | 0.60 | 6.80 | 0.40 | 0.07944 | 0.90032 | 0.05296 |
| Tractor | 1990-1996 | 12 | 87 | 3122 | 48% | 6.5 | 4.79 | 198 | 0.93412 | 0.68838 | 28.45480 |
| Tractor | 1984 | 1 | 98 | 81 | 55% | 1.43 | 10.10 | 6.80 | 0.00688 | 0.04861 | 0.03273 |
| Tractor | 1990 | 6 | 98 | 3261 | 55% | 1.50 | 7.10 | 2.30 | 0.29062 | 1.37561 | 0.44562 |
| Tractor | 1988-1991 | 2 | 98 | 464 | 55% | 2.20 | 8.50 | 8.10 | 0.06065 | 0.23433 | 0.22330 |
| Tractor | 1996-2001 | 11 | 98 | 2448 | 55% | 2.20 | 8.50 | 8.10 | 0.31998 | 1.23628 | 1.17810 |
| TOTAL | | 106 | | | | | | | 5.19364 | 20.77588 | 49.09603 |

[39] MACTEC Engineering and Consulting, Inc., 2003. Air Emissions Inventories for Multiple AETC Installations (Draft), Contract No.F41624-03-D-8606/003. Note: Combination of Tables 7.8-1 (pp. 7-132 – 7-135), 7.8-4 (pp. 7-145 – 7-151), 7.8.5 (pp. 7-152 – 7-161), 7.8-7 (pp. 7-163 – 7-169), 7.8-8 (pp. 7-169 – 7-171), and 7.8-10 (pp. 7-172 – 7-180).

*Other Non-road Equipment*

Organizations or shops that typically operate the smaller Government-owned equipment and the privately owned equipment include the Civil Engineering shops, contractors, grounds maintenance, golf course, etc. To obtain the data for their equipment, interviews with fleet managers at Randolph AFB were conducted by MACTEC.

These other non-road equipment/vehicles include golf course maintenance equipment, stable grounds equipment, and contracts/landscaping equipment. In each case, the fleet manager estimated the number of each type of unit in the fleet, determined the horsepower rating and the fuel type, and estimated the number of hours per day that each unit operated.

Using these estimates and the load factors and emissions factors from EPA's report for these vehicles, the total annual emissions were calculated. Tables 3-33 through 3-47 provide estimated emissions for each fleet/contractor by equipment type and Table 3-48 summarizes these tables by fleet/contractor. The total emissions for these vehicles are, in some cases, larger than the estimates for the registered off-road vehicles. This is primarily due to discrepancies between the hourly usage data given in the registered vehicle list and the estimates given by the fleet managers. In some cases, the fleet managers may have overestimated the hourly usage of the equipment.

Table 3-33. Estimates for 12 CES (CE) Nonroad Emissions, 2002[40]

| Equipment Type | Model Years | # in Fleet | ER (hp) | Total HO (hr./yr.) | LF | VOC EF | NOx EF | CO EF | VOC tons/year | NOx tons/year | CO tons/year |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cart | -- | 35 | 10 | 9,100 | 46% | 36.9 | 2.09 | 348 | 1.70264 | 0.09644 | 16.05741 |
| TOTAL | | | | | | | | | 1.70264 | 0.09644 | 16.05741 |

Table 3-34. Estimates for 12 CES/CEC (Contracting) Contractors Nonroad Emissions, 2002[41]

| Equipment Type | Model Years | # in Fleet | ER (hp) | Total HO (hr./yr.) | LF | VOC EF | NOx EF | CO EF | VOC tons/year | NOx tons/year | CO tons/year |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Backhoe | 1992 | 1 | 74 | 2,813 | 55% | 2.20 | 8.50 | 8.10 | 0.27764 | 1.07270 | 1.02222 |
| Bobcat | 1993 | 2 | 43 | 5,001 | 55% | 3.90 | 7.10 | 11.6 | 0.50845 | 0.92564 | 1.51232 |
| Cherry Picker | -- | 1 | 36 | 1,250 | 46% | 9.60 | 2.09 | 348 | 0.21905 | 0.04769 | 7.94048 |
| Concrete Truck | 1992 | 1 | 350 | 2,813 | 57% | 1.50 | 8.60 | 6.20 | 0.92790 | 5.31996 | 3.83532 |
| Dump Truck | 1993 | 3 | 350 | 7,188 | 57% | 1.50 | 8.60 | 6.20 | 2.37104 | 13.59397 | 9.80031 |
| Excavator | 1992 | 1 | 163 | 2,813 | 57% | 1.50 | 8.60 | 6.20 | 0.43214 | 2.47758 | 1.78616 |
| Loader | 1992 | 2 | 74 | 4,375 | 55% | 2.20 | 8.50 | 8.10 | 0.43181 | 1.66835 | 1.58984 |
| Manlift | -- | 1 | 36 | 1,250 | 46% | 9.60 | 2.09 | 348 | 0.21905 | 0.04769 | 7.94048 |
| Paver | 1992 | 2 | 84 | 5,001 | 62% | 0.90 | 8.20 | 4.40 | 0.25839 | 2.35417 | 1.26322 |
| Power Washer | -- | 1 | 7 | 1,250 | 85% | 37.0 | 1.98 | 429 | 0.30334 | 0.01623 | 3.51707 |
| Roller | 1992 | 2 | 99 | 4,375 | 56% | 0.90 | 8.20 | 4.40 | 0.24063 | 2.19236 | 1.17639 |
| Sweeper | 1992 | 1 | 97 | 2,813 | 68% | 0.90 | 8.20 | 1.50 | 0.18407 | 1.67711 | 0.30679 |
| TOTAL | | | | | | | | | 6.37349 | 31.39346 | 41.69059 |

[40] *Ibid*. Note: Combination of Tables 7.8-2 (pp. 7-136 – 7-141), 7.8-4 (pp. 7-145 – 7-151), 7.8.5 (pp. 7-152 – 7-161), 7.8-7 (pp. 7-163 – 7-169), 7.8-8 (pp. 7-169 – 7-171), and 7.8-10 (pp. 7-172 – 7-180).
[41] *Ibid*.

Table 3-35. Estimates for 12 CES/CECS (SABER) Contractors Nonroad Emissions, 2002[42]

| Equipment Type | Model Years | # in Fleet | ER (hp) | Total HO (hr./yr.) | LF | VOC EF | NOx EF | CO EF | VOC tons/year | NOx tons/year | CO tons/year |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Backhoe | 1992 | 1 | 74 | 240 | 55% | 2.20 | 8.50 | 8.10 | 0.02369 | 0.09152 | 0.08721 |
| Concrete Saw | -- | 1 | 13 | 240 | 78% | 9.60 | 2.09 | 348 | 0.02575 | 0.00561 | 0.93352 |
| Power Washer | -- | 1 | 7 | 240 | 85% | 37.0 | 1.98 | 429 | 0.05824 | 0.00312 | 0.67528 |
| Tamper | -- | 1 | 4 | 240 | 55% | 36.90 | 1.98 | 429 | 0.02148 | 0.00115 | 0.24968 |
| Trencher | 1992 | 1 | 209 | 240 | 75% | 1.50 | 8.60 | 6.20 | 0.06220 | 0.35663 | 0.25710 |
| TOTAL | | | | | | | | | 0.19136 | 0.45802 | 2.20280 |

Table 3-36. Estimates for 12 CES/CEOBE (Entomology) Nonroad Emissions, 2002[43]

| Equipment Type | Model Years | # in Fleet | ER (hp) | Total HO (hr./yr.) | LF | VOC EF | NOx EF | CO EF | VOC tons/year | NOx tons/year | CO tons/year |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Backpack Sprayer | -- | 1 | 1 | 5 | 65% | 261 | 0.94 | 719 | 0.00094 | 0.00000 | 0.00258 |
| Handheld Sprayer | -- | 1 | 1 | 12 | 65% | 261 | 0.94 | 719 | 0.00224 | 0.00001 | 0.00618 |
| Mosquito Fogger | -- | 1 | 18 | 144 | 65% | 9.60 | 2.09 | 348 | 0.01783 | 0.00388 | 0.64629 |
| Pesticide Sprayer | -- | 1 | 5.5 | 5 | 65% | 37.0 | 1.98 | 429 | 0.00073 | 0.00004 | 0.00845 |
| Pesticide Sprayer | -- | 1 | 8 | 30 | 65% | 37.0 | 1.98 | 429 | 0.00636 | 0.00034 | 0.07377 |
| TOTAL | | | | | | | | | 0.02810 | 0.00427 | 0.73727 |

Table 3-37. Estimates for 12 CES/CEOBP (Pavement/Heavy Equipment) Nonroad Emissions, 2002[44]

| Equipment Type | Model Years | # in Fleet | ER (hp) | Total HO (hr./yr.) | LF | VOC EF | NOx EF | CO EF | VOC tons/year | NOx tons/year | CO tons/year |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Asphalt Paver | 1998 | 1 | 84 | 60 | 62% | 0.70 | 6.80 | 1.30 | 0.00241 | 0.02342 | 0.00448 |
| Backpack Blower | -- | 1 | 2 | 120 | 75% | 261 | 0.94 | 719 | 0.05179 | 0.00019 | 0.14266 |
| Cement Mixer | -- | 1 | 7 | 520 | 59% | 36.9 | 1.98 | 429 | 0.08735 | 0.00469 | 1.01556 |

[42] *Ibid*.
[43] *Ibid*.
[44] *Ibid*.

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Chain Saw | -- | 4 | 2.6 | 480 | 92% | 261 | 0.94 | 719 | 0.33032 | 0.00119 | 0.90997 |
| Concrete Router | -- | 2 | 5 | 240 | 78% | 36.9 | 1.98 | 429 | 0.03807 | 0.00204 | 0.44262 |
| Concrete Saw | -- | 4 | 13 | 4,992 | 78% | 9.60 | 2.09 | 348 | 0.53565 | 0.11662 | 19.41730 |
| Leaf Blower (hand) | -- | 1 | 2 | 120 | 75% | 261 | 0.94 | 719 | 0.05179 | 0.00019 | 0.14266 |
| Plate Tamper | -- | 1 | 4 | 624 | 55% | 36.90 | 1.98 | 429 | 0.05584 | 0.00300 | 0.64917 |
| Power Screed | -- | 1 | 1.5 | 96 | 59% | 36.9 | 1.98 | 429 | 0.00346 | 0.00019 | 0.04018 |
| Skid Loader | 1993 | 2 | 43 | 2,600 | 48% | 3.90 | 7.10 | 11.6 | 0.23070 | 0.41999 | 0.68618 |
| Steam Cleaner | 1999 | 1 | 2 | 288 | 30% | 1.50 | 10.0 | 5.00 | 0.00029 | 0.00190 | 0.00095 |
| Trencher | 1997 | 1 | 43.5 | 416 | 75% | 3.90 | 7.10 | 11.6 | 0.05835 | 0.10622 | 0.17354 |
| TOTAL | | | | | | | | | 1.44600 | 0.67962 | 23.62527 |

Table 3-38. Estimates for 12 CES/CEOIEP (Power Production) Nonroad Emissions, 2002[45]

| Equipment Type | Model Years | # in Fleet | ER (hp) | Total HO (hr./yr.) | LF | VOC EF | NOx EF | CO EF | VOC tons/year | NOx tons/year | CO tons/year |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Generator | 2000 | 1 | 5 | 16 | 74% | 1.60 | 5.9 | 5.60 | 0.00010 | 0.00039 | 0.00037 |
| Generator | 1998 | 2 | 7 | 32 | 74% | 1.50 | 10.00 | 5.00 | 0.00027 | 0.00183 | 0.00091 |
| Generator | 2002 | 2 | 8 | 32 | 74% | 1.60 | 5.90 | 5.60 | 0.00033 | 0.00123 | 0.00117 |
| Generator | 1985 | 1 | 13 | 14 | 74% | 1.50 | 10.0 | 5.00 | 0.00022 | 0.00148 | 0.00074 |
| Generator | 1988 | 1 | 13 | 25 | 74% | 1.50 | 10.0 | 5.00 | 0.00040 | 0.00265 | 0.00133 |
| Generator | 1978 | 1 | 20 | 15 | 74% | 1.80 | 6.90 | 5.00 | 0.00044 | 0.00169 | 0.00122 |
| Generator | 1978-1986 | 2 | 40 | 38 | 74% | 1.80 | 6.90 | 5.00 | 0.00223 | 0.00856 | 0.00620 |
| Generator | 1994 | 1 | 80 | 15 | 74% | 0.99 | 8.30 | 3.49 | 0.00097 | 0.00812 | 0.00342 |
| Generator | 1986 | 1 | 134 | 15 | 74% | 1.22 | 8.00 | 5.00 | 0.00200 | 0.01312 | 0.00820 |
| Generator | 1987 | 1 | 268 | 12 | 74% | 1.22 | 8.00 | 5.00 | 0.00320 | 0.02099 | 0.01312 |
| Generator | 1988 | 3 | 268 | 51 | 74% | 0.68 | 8.38 | 2.70 | 0.00758 | 0.09343 | 0.03010 |
| TOTAL | | | | | | | | | 0.01776 | 0.15348 | 0.06677 |

[45] *Ibid*.

Table 3-39. Estimates for 12 CES/CEOZA (Zone A Maintenance) Nonroad Emissions, 2002[46]

| Equipment Type | Model Years | # in Fleet | ER (hp) | Total HO (hr./yr.) | LF | VOC EF | NOx EF | CO EF | VOC tons/year | NOx tons/year | CO tons/year |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Arc Welder | 1977 | 1 | 4 | 500 | 45% | 1.50 | 10.0 | 5.00 | 0.00149 | 0.00992 | 0.00496 |
| Generator | -- | 1 | 5 | 104 | 68% | 37.0 | 1.98 | 429 | 0.01442 | 0.00077 | 0.16721 |
| Generator | -- | 1 | 8 | 104 | 68% | 37.0 | 1.98 | 429 | 0.02307 | 0.00123 | 0.26754 |
| Pressure Washer | -- | 1 | 5 | 48 | 85% | 37.0 | 1.98 | 429 | 0.00832 | 0.00045 | 0.09647 |
| Pump | -- | 1 | 4 | 2 | 69% | 37.0 | 1.98 | 429 | 0.00023 | 0.00001 | 0.00261 |
| Saw (concrete) | -- | 1 | 13 | 2 | 78% | 9.60 | 2.09 | 348 | 0.00021 | 0.00005 | 0.00778 |
| Welder | -- | 1 | 19 | 500 | 51% | 9.60 | 2.09 | 348 | 0.05127 | 0.01116 | 1.85853 |
| TOTAL | | | | | | | | | 0.09901 | 0.02359 | 2.40510 |

Table 3-40. Estimates for 12 CES/CEOZB (Zone B Maintenance) Nonroad Emissions, 2002[47]

| Equipment Type | Model Years | # in Fleet | ER (hp) | Total HO (hr./yr.) | LF | VOC EF | NOx EF | CO EF | VOC tons/year | NOx tons/year | CO tons/year |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Generator | -- | 1 | 5 | 24 | 68% | 37.0 | 1.98 | 429.0 | 0.00333 | 0.00018 | 0.03859 |
| Pressure Washer | -- | 2 | 11 | 120 | 85% | 9.60 | 2.09 | 348.0 | 0.01187 | 0.00258 | 0.43040 |
| Pump | -- | 2 | 5.5 | 24 | 69% | 37.0 | 1.98 | 429.0 | 0.00371 | 0.00020 | 0.04307 |
| Pump | -- | 1 | 4 | 24 | 69% | 37.0 | 1.98 | 429.0 | 0.00270 | 0.00014 | 0.03132 |
| Pump | -- | 1 | 9 | 24 | 69% | 37.0 | 1.98 | 429.0 | 0.00608 | 0.00033 | 0.07048 |
| Welder | 1995 | 1 | 38 | 48 | 45% | 1.80 | 6.90 | 5.00 | 0.00163 | 0.00624 | 0.00452 |
| TOTAL | | | | | | | | | 0.02932 | 0.00967 | 0.61838 |

[46] *Ibid*.
[47] *Ibid*.

Table 3-41. Estimates for 12 CES/COE (Contracting) Contractors Nonroad Emissions, 2002[48]

| Equipment Type | Model Years | # in Fleet | ER (hp) | Total HO (hr./yr.) | LF | VOC EF | NOx EF | CO EF | VOC tons/year | NOx tons/year | CO tons/year |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Backhoe | 1992 | 1 | 74 | 563 | 55% | 2.20 | 8.50 | 8.10 | 0.05557 | 0.21469 | 0.20459 |
| Concrete Saw | -- | 1 | 13 | 563 | 78% | 9.60 | 2.09 | 348 | 0.06041 | 0.01315 | 2.18989 |
| Dump Truck | 1992 | 1 | 350 | 563 | 57% | 1.50 | 8.60 | 6.20 | 0.18571 | 1.06475 | 0.76761 |
| Power Washer | -- | 1 | 7 | 563 | 85% | 37.0 | 1.98 | 429 | 0.13662 | 0.00731 | 1.58409 |
| Tamper | -- | 1 | 4 | 563 | 55% | 9.60 | 2.09 | 348 | 0.01311 | 0.00285 | 0.47512 |
| Trencher | 1992 | 1 | 209 | 563 | 75% | 1.50 | 8.60 | 6.20 | 0.14592 | 0.83659 | 0.60312 |
| TOTAL | | | | | | | | | 0.59734 | 2.13935 | 5.82442 |

Table 3-42. Estimates for 12 SUPS/LGSCO (Supply Squadron) Nonroad Emissions, 2002[49]

| Equipment Type | Model Years | # in Fleet | ER (hp) | Total HO (hr./yr.) | LF | VOC EF | NOx EF | CO EF | VOC tons/year | NOx tons/year | CO tons/year |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cart | -- | 4 | 10 | 2,080 | 46% | 36.9 | 2.09 | 348 | 0.38917 | 0.02204 | 3.67026 |
| Fork Lift | 1986 | 1 | 83 | 1,300 | 30% | 1.70 | 8.00 | 10.00 | 0.06066 | 0.28545 | 0.35681 |
| Fork Lift | 1993-1994 | 2 | 83 | 2,600 | 30% | 2.20 | 8.50 | 8.10 | 0.15700 | 0.60658 | 0.57804 |
| Golf Cart | -- | 1 | 11 | 260 | 46% | 36.9 | 2.09 | 348 | 0.05351 | 0.00303 | 0.50466 |
| Mule (ATV) | -- | 1 | 18 | 1,300 | 72% | 100 | 9.00 | 975 | 0.10317 | 0.00929 | 1.00595 |
| TOTAL | | | | | | | | | 0.76352 | 0.92639 | 6.11573 |

Table 3-43. Estimates for 12 SVS/SBBG (Golf Course) Nonroad Emissions, 2002[50]

| Equipment Type | Model Years | # in Fleet | ER (hp) | Total HO (hr./yr.) | LF | VOC EF | NOx EF | CO EF | VOC tons/year | NOx tons/year | CO tons/year |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Aerator | -- | 2 | 16 | 32 | 58% | 9.60 | 2.09 | 348 | 0.00314 | 0.00068 | 0.11391 |
| Aerator | -- | 1 | 11 | 5 | 58% | 9.60 | 2.09 | 348 | 0.00034 | 0.00007 | 0.01224 |

[48] *Ibid*.
[49] *Ibid*.
[50] *Ibid*.

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Arc Welder | 1977 | 1 | 4 | 520 | 45% | 1.50 | 10.0 | 5.00 | 0.00155 | 0.01032 | 0.00516 |
| Backhoe/Front Loader | 1990 | 1 | 28 | 80 | 55% | 3.90 | 7.10 | 11.6 | 0.00530 | 0.00964 | 0.01575 |
| Backpack Blower | -- | 6 | 1 | 1,050 | 75% | 261 | 0.94 | 719 | 0.22656 | 0.00082 | 0.62413 |
| Ball Picker | -- | 1 | 13 | 300 | 60% | 9.60 | 2.09 | 348 | 0.02476 | 0.00539 | 0.89762 |
| Beer Cart | -- | 1 | 13 | 100 | 58% | 9.60 | 2.09 | 348 | 0.00798 | 0.00174 | 0.28923 |
| Chain Saw | -- | 1 | 2.5 | 15 | 92% | 261 | 0.94 | 719 | 0.00993 | 0.00004 | 0.02734 |
| Chain Saw | -- | 1 | 1.5 | 10 | 92% | 261 | 0.94 | 719 | 0.00397 | 0.00001 | 0.01094 |
| Edger | -- | 5 | 3 | 100 | 68% | 37.0 | 1.98 | 429 | 0.00832 | 0.00045 | 0.09647 |
| Fairway Mower | 1997 | 1 | 18 | 450 | 65% | 9.60 | 2.09 | 348 | 0.05571 | 0.01213 | 2.01964 |
| Fairway Mower | 1997-1998 | 2 | 38 | 800 | 56% | 1.80 | 6.90 | 5.00 | 0.03378 | 0.12948 | 0.09383 |
| Gator (ATV) | -- | 4 | 18 | 5,200 | 72% | 100 | 9.00 | 975 | 0.41270 | 0.03714 | 4.02381 |
| Generator | -- | 1 | 5 | 104 | 68% | 37.0 | 1.98 | 429 | 0.01442 | 0.00077 | 0.16721 |
| Generator | -- | 1 | 8 | 104 | 68% | 37.0 | 1.98 | 429 | 0.02307 | 0.00123 | 0.26754 |
| Greens Mower | -- | 3 | 16 | 1,248 | 65% | 9.60 | 2.09 | 348 | 0.13735 | 0.02990 | 4.97879 |
| Greens Mower | -- | 2 | 18 | 800 | 65% | 9.60 | 2.09 | 348 | 0.09905 | 0.02156 | 3.59048 |
| Groundsmaster | -- | 1 | 24 | 35 | 65% | 9.60 | 2.09 | 348 | 0.00578 | 0.00126 | 0.20944 |
| Hedge Trimmers | -- | 2 | 1 | 10 | 68% | 261 | 0.94 | 719 | 0.00196 | 0.00001 | 0.00539 |
| Lawn Mower | -- | 1 | 5.5 | 5 | 70% | 37.0 | 1.98 | 429 | 0.00079 | 0.00004 | 0.00910 |
| Mower | 1997 | 1 | 19 | 450 | 56% | 1.80 | 6.90 | 5.00 | 0.00950 | 0.03642 | 0.02639 |
| Pole Saw | -- | 2 | 1 | 100 | 92% | 261 | 0.94 | 719 | 0.02647 | 0.00010 | 0.07291 |
| Pressure Washer | -- | 1 | 5 | 56 | 85% | 37.0 | 1.98 | 429 | 0.00971 | 0.00052 | 0.11255 |
| Pump | -- | 1 | 4 | 2 | 69% | 37.0 | 1.98 | 429 | 0.00023 | 0.00001 | 0.00261 |
| SandPro | -- | 2 | 16 | 600 | 60% | 9.60 | 2.09 | 348 | 0.06095 | 0.01327 | 2.20952 |
| Saw | -- | 1 | 13 | 2 | 92% | 37.0 | 1.98 | 429 | 0.00098 | 0.00005 | 0.01131 |
| Sod Cutter | -- | 1 | 5 | 20 | 60% | 37.0 | 1.98 | 429 | 0.00245 | 0.00013 | 0.02837 |
| Sprayer | -- | 1 | 18 | 60 | 65% | 37.0 | 1.98 | 429 | 0.02863 | 0.00153 | 0.33196 |
| Steam Cleaner | 1992 | 1 | 2 | 10 | 30% | 1.50 | 10.0 | 5.00 | 0.00001 | 0.00007 | 0.00003 |
| Sweeper | -- | 1 | 9 | 20 | 71% | 36.9 | 1.98 | 429 | 0.00520 | 0.00028 | 0.06043 |
| Top Dresser | -- | 1 | 9 | 58 | 60% | 37.0 | 1.98 | 429 | 0.01277 | 0.00068 | 0.14811 |
| Tractor | 1992 | 1 | 45 | 200 | 55% | 3.90 | 7.10 | 11.60 | 0.02128 | 0.03874 | 0.06329 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Tractor | 1989 | 1 | 30 | 10 | 55% | 3.90 | 7.10 | 11.60 | 0.00071 | 0.00129 | 0.00211 |
| Tractor | 1990 | 1 | 35 | 230 | 55% | 3.90 | 7.10 | 11.60 | 0.01903 | 0.03465 | 0.05661 |
| Tractor | 2001 | 1 | 39 | 500 | 55% | 1.80 | 5.70 | 5.80 | 0.02128 | 0.06739 | 0.06857 |
| Trash Pump | -- | 1 | 3 | 20 | 69% | 37.0 | 1.98 | 429 | 0.00169 | 0.00009 | 0.01958 |
| TriPlex Mower | 2000 | 1 | 38 | 400 | 56% | 0.80 | 5.50 | 2.50 | 0.00751 | 0.05160 | 0.02346 |
| Truckster | -- | 1 | 20 | 200 | 46% | 9.6 | 2.09 | 348 | 0.01947 | 0.00424 | 0.70582 |
| Weed Eaters | -- | 6 | 1 | 1,500 | 68% | 214 | 1.30 | 696 | 0.24061 | 0.00146 | 0.78254 |
| Welder | -- | 1 | 19 | 520 | 51% | 9.60 | 2.09 | 348 | 0.05332 | 0.01161 | 1.93287 |
| TOTAL | | | | | | | | | 1.61823 | 0.52682 | 24.11709 |

Table 3-44. Estimates for Basewide Nonroad Emissions, 2002[51]

| Equipment Type | Model Years | # in Fleet | ER (hp) | Total HO (hr./yr.) | LF | VOC EF | NOx EF | CO EF | VOC tons/year | NOx tons/year | CO tons/year |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cart | -- | 41 | 10 | 10,660 | 46% | 36.9 | 2.09 | 348 | 1.99452 | 0.11297 | 18.81011 |
| TOTAL | | | | | | | | | 1.99452 | 0.11297 | 18.81011 |

Table 3-45. Estimates for Family Housing Nonroad Emissions, 2002[52]

| Equipment Type | Model Years | # in Fleet | ER (hp) | Total HO (hr./yr.) | LF | VOC EF | NOx EF | CO EF | VOC tons/year | NOx tons/year | CO tons/year |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Push Mower | -- | 1,019 | 4 | 12,228 | 70% | 37.0 | 1.98 | 429 | 1.39641 | 0.07473 | 16.19078 |
| TOTAL | | | | | | | | | 1.39641 | 0.07473 | 16.19078 |

Table 3-46. Estimates for Grounds Maintenance Contractor Nonroad Emissions, 2002[53]

| Equipment Type | Model Years | # in Fleet | ER (hp) | Total HO (hr./yr.) | LF | VOC EF | NOx EF | CO EF | VOC tons/year | NOx tons/year | CO tons/year |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Backpack Blower | 2001 | 5 | 3.9 | 6,500 | 75% | 261 | 0.94 | 719 | 5.46987 | 0.01970 | 15.06833 |

[51] *Ibid*.
[52] *Ibid*.
[53] *Ibid*.

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Blower | 2001 | 2 | 1.2 | 2,600 | 75% | 261 | 0.94 | 719 | 0.67321 | 0.00242 | 1.85456 |
| Chain Saw | 2001 | 4 | 1.7 | 5,200 | 92% | 261 | 0.94 | 719 | 2.33979 | 0.00843 | 6.44564 |
| Chain Saw | 2001 | 2 | 3.5 | 2,496 | 92% | 261 | 0.94 | 719 | 2.31227 | 0.00833 | 6.36981 |
| Chain Saw | 2001 | 1 | 7 | 104 | 92% | 214 | 1.30 | 696 | 0.15799 | 0.00096 | 0.51384 |
| Chipper | 2001 | 1 | 82 | 1,300 | 73% | 0.70 | 6.90 | 1.00 | 0.06004 | 0.59187 | 0.08578 |
| Gator | 2001 | 2 | 12 | 2,600 | 72% | 1.50 | 5.40 | 4.60 | 0.03714 | 0.13371 | 0.11390 |
| Hedge Trimmers | 2002 | 3 | 1.1 | 3,900 | 68% | 261 | 0.94 | 719 | 0.83927 | 0.00302 | 2.31202 |
| Lawn Mower | 2001 | 4 | 26 | 5,200 | 70% | 9.60 | 2.09 | 348 | 1.00148 | 0.21803 | 36.30370 |
| Pole Chain Saw | 2001 | 1 | 1.27 | 416 | 92% | 261 | 0.94 | 719 | 0.13984 | 0.00050 | 0.38522 |
| Power Trimmer | 2001 | 2 | 5.6 | 192 | 68% | 37.0 | 1.98 | 429 | 0.02982 | 0.00160 | 0.34574 |
| Power Washer | 2001 | 1 | 5 | 104 | 85% | 37.0 | 1.98 | 429 | 0.01803 | 0.00096 | 0.20901 |
| Push Mower | 2001 | 1 | 5 | 1,248 | 70% | 37.0 | 1.98 | 429 | 0.17815 | 0.00953 | 2.06556 |
| Stump Grinder | 2001 | 1 | 35 | 832 | 78% | 9.60 | 2.09 | 348 | 0.24036 | 0.05233 | 8.71289 |
| Tractor 6410 | 2001 | 2 | 85 | 2,600 | 48% | 6.5 | 4.79 | 198 | 0.76005 | 0.56010 | 23.15238 |
| Tractor 5400 | 2001 | 1 | 81 | 1,300 | 55% | 1.50 | 7.10 | 2.30 | 0.09576 | 0.45326 | 0.14683 |
| Tractor 5510 | 2001 | 1 | 89 | 1,300 | 55% | 1.50 | 7.10 | 2.30 | 0.10522 | 0.49803 | 0.16133 |
| Water Trailer | 2001 | 1 | 5 | 832 | 57% | 36.9 | 1.98 | 429 | 0.09645 | 0.00518 | 1.12130 |
| Weed Eaters | 2001 | 18 | 1.5 | 23,400 | 68% | 214 | 1.30 | 696 | 5.63024 | 0.03420 | 18.31143 |
| TOTAL | | | | | | | | | 20.18497 | 2.60216 | 123.67928 |

Table 3-47. Vertex Aerospace Corporation Nonroad Emissions, 2002[54]

| Equipment Type | Model Years | # in Fleet | ER (hp) | Total HO (hr./yr.) | LF | VOC EF | NOx EF | CO EF | VOC tons/year | NOx tons/year | CO tons/year |
|---|---|---|---|---|---|---|---|---|---|---|---|
| B1 Tug | 1992 | 2 | 87 | 1,040 | 78% | 6.48 | 5.16 | 199 | 0.50410 | 0.40142 | 15.48094 |
| Tug | 1992 | 1 | 87 | 520 | 78% | 6.48 | 5.16 | 199 | 0.25205 | 0.20071 | 7.74047 |
| TOTAL | | | | | | | | | 0.75615 | 0.60212 | 23.22140 |

[54] *Ibid*.

Table 3-48. Total Emissions from Other Nonroad Equipment and Vehicles for Randolph AFB[55]

| Fleet/Contractor | VOC | NOx | CO | VOC | NOx | CO |
|---|---|---|---|---|---|---|
| | tons/year | | | tons/day | | |
| 12 CES (CE) | 1.70 | 0.10 | 16.06 | 0.00652 | 0.00037 | 0.06152 |
| 12 CES/CEC (Contracting) Contractors | 6.37 | 31.39 | 41.69 | 0.02442 | 0.12028 | 0.15973 |
| 12 CES/CECS (SABER) Contractors | 0.19 | 0.46 | 2.20 | 0.00073 | 0.00175 | 0.00844 |
| 12 CES/CEOBE (Entomology) | 0.03 | 0.00 | 0.74 | 0.00011 | 0.00002 | 0.00282 |
| 12 CES/CEOBP (Pavement/Heavy Equipment) | 1.45 | 0.68 | 23.63 | 0.00554 | 0.00260 | 0.09052 |
| 12 CES/CEOIEP (Power Production) | 0.02 | 0.15 | 0.07 | 0.00007 | 0.00059 | 0.00026 |
| 12 CES/CEOZA (Zone A Maintenance) | 0.10 | 0.02 | 2.41 | 0.00038 | 0.00009 | 0.00921 |
| 12 CES/CEOZB (Zone B Maintenance) | 0.03 | 0.01 | 0.62 | 0.00011 | 0.00004 | 0.00237 |
| 12 CES/COE (Contracting) Contractors | 0.60 | 2.14 | 5.82 | 0.00229 | 0.00820 | 0.02232 |
| 12 SUPS/LGSCO (Supply Squadron) | 0.76 | 0.93 | 6.12 | 0.00293 | 0.00355 | 0.02343 |
| 12 SVS/SBBG (Golf Course) | 1.62 | 0.53 | 24.12 | 0.00620 | 0.00202 | 0.09240 |
| Basewide | 1.99 | 0.11 | 18.81 | 0.00764 | 0.00043 | 0.07207 |
| Family Housing | 1.40 | 0.07 | 16.19 | 0.00535 | 0.00029 | 0.06203 |
| Grounds Maintenance Contractor | 20.18 | 2.60 | 123.68 | 0.07734 | 0.00997 | 0.47387 |
| Vertex Aerospace Corporation | 0.76 | 0.60 | 23.22 | 0.00290 | 0.00231 | 0.08897 |
| TOTAL | 37.20 | 39.80 | 305.36 | 0.14252 | 0.15250 | 1.16997 |

Aerospace Ground Equipment Operations

This category as described in the AEI by MACTEC includes emissions produced by aerospace grounds equipment (AGE) such as, air compressors, floodlights, bomb lifts, turbines, generators, heaters, etc.

Methodology

Emissions from AGE were calculated by multiplying the amount of fuel used by the emissions factor. The example in the AEI is as follows:

| | |
|---|---|
| Equipment description: | Air Compressor, MC-1A |
| Fuel type: | Diesel |
| Quantity of fuel consumed: | 2,816 gal./yr. |
| Diesel fuel heating value: | 137,000 Btu/gal. [$1.37 \times 10^{-1}$ MMBtu/gal] |
| Emission factor ID: | 2 |
| CO emission factor: | 2.07 lb./MMBtu |

CO emissions = (2,816 gal./yr.) ($1.37 \times 10^{-1}$ MMBtu/gal.) (2.07 lb./MMBtu)
= 798 lb./yr; MACTEC truncated to three significant figures

The emissions were converted to tons/yr.:
CO emissions = 798.5894 lb./yr. / 2,000 lb./ton
= 0.39929 tons/yr.

[55] MACTEC Engineering and Consulting, Inc., 2003. Air Emissions Inventories for Multiple AETC Installations (Draft), Contract No.F41624-03-D-8606/003; Table 7.8-11 (pp. 7-180 – 7-181).

The emissions for AGE are presented in table 3-49.

Table 3-49. Aerospace Ground Equipment Emissions for Randolph AFB, 2002[56]

| Equipment Description | VOC | $NO_X$ | CO | VOC | $NO_X$ | CO |
|---|---|---|---|---|---|---|
| | Emissions (lb./yr.) | | | Emissions (lb./day) | | |
| **12th Flying Training Wing** | | | | | | |
| Air Compressor, MC-1A | 0.40 | 0.63 | 0.40 | 0.00153 | 0.00240 | 0.00153 |
| Air Compressor, MC-2A | 0.04 | 0.49 | 0.10 | 0.00015 | 0.00186 | 0.00040 |
| Air Compressor, MC-7 | 0.09 | 0.14 | 0.09 | 0.00033 | 0.00052 | 0.00033 |
| Air Conditioner, MA-3D | 0.03 | 0.23 | 0.01 | 0.00011 | 0.00087 | 0.00004 |
| Floodlight Set, FL-1D | 0.05 | 4.21 | 0.32 | 0.00020 | 0.01613 | 0.00123 |
| Gas Turbine Compressor, A/M32A-95 | 0.09 | 1.83 | 7.34 | 0.00035 | 0.00703 | 0.02811 |
| Generator, A/M32A-86 | 0.07 | 1.40 | 5.58 | 0.00027 | 0.00534 | 0.02138 |
| Generator, Essex 30 kW | 0.35 | 4.28 | 0.92 | 0.00134 | 0.01639 | 0.00353 |
| Heater, H-1 | 0.01 | 0.24 | 0.02 | 0.00004 | 0.00091 | 0.00007 |
| Self-Generating Nitrogen Service Cart | 0.10 | 1.20 | 0.26 | 0.00038 | 0.00461 | 0.00099 |
| Subtotal | 1.23 | 14.63 | 15.03 | 0.00470 | 0.05606 | 0.05760 |
| **Lear Siegler Corporation** | | | | | | |
| Air Compressor, MC-2A | 0.00 | 0.05 | 0.01 | 0.00002 | 0.00019 | 0.00004 |
| Air Compressor, MC-7 | 0.52 | 0.82 | 0.52 | 0.00199 | 0.00314 | 0.00199 |
| Cabin Leak Tester, AF/M32T-1 | 0.00 | 0.04 | 0.01 | 0.00001 | 0.00016 | 0.00003 |
| Floodlight Set, FL-1D | 0.00 | 0.13 | 0.01 | 0.00001 | 0.00048 | 0.00004 |
| Gas Turbine Compressor, A/M32A-95 | 0.01 | 0.13 | 0.53 | 0.00003 | 0.00051 | 0.00204 |
| Generator, A/M32A-86 | 0.01 | 0.15 | 0.61 | 0.00003 | 0.00058 | 0.00233 |
| Generator, MD-3 | 1.23 | 0.66 | 25.54 | 0.00473 | 0.00254 | 0.09784 |
| Heater, H-1 | 0.01 | 0.24 | 0.02 | 0.00004 | 0.00091 | 0.00007 |
| Hydraulic Test Stand, MJ-2-A1 | 0.05 | 0.16 | 0.01 | 0.00019 | 0.00059 | 0.00005 |
| Subtotal | 1.84 | 2.38 | 27.26 | 0.00704 | 0.00910 | 0.10444 |
| **Vertex Aerospace Corporation** | | | | | | |
| Jet EX 3 APU | 0.13 | 0.07 | 2.74 | 0.00051 | 0.00027 | 0.01049 |
| Jet EX 4 APU | 0.17 | 0.09 | 3.42 | 0.00063 | 0.00034 | 0.01312 |
| Subtotal | 0.30 | 0.16 | 6.16 | 0.00114 | 0.00061 | 0.02361 |
| TOTAL | 0.60 | 0.32 | 12.32 | 0.01288 | 0.06577 | 0.18565 |

Aircraft Engine Testing Operations

This category includes only aircraft engines that are tested “on-wing”. This means the engines are actually mounted on the aircraft and not a test stand, as test stand mounted engine testing is considered a stationary source and not included in the AEI performed by MACTEC.

[56] *Ibid*. Note: Emission estimates from Table 7.5-6 (p. 7-90) were converted from pounds/year to tons/year by AACOG staff.

These emissions are calculated much like the Aircraft flight operations. After the hours of operation are calculated, emission factors, fuel flow rates, and those hours are figured together to achieve emissions in lb./year. The following example was used by MACTEC for the CO emissions of a T-1A engine testing:

***Aircraft type/engine model***: T-1A / JT15D-5B

<u>CO emission factor:</u>

- Idle 108.14 lb./1,000 lb. fuel
- Takeoff 0.20 lb./1,000 lb. fuel

<u>Fuel flow rate:</u>

- Idle 221 lb. fuel/hr.
- Takeoff 1,630 lb. fuel/hr.

<u>Hours of Operation</u>:

- Idle 784 hr./yr.
- Takeoff 157 hr./yr.

CO emissions for a T-1A =

[(108.14 lb./1,000 lb. fuel) (221 lb. fuel/hr.) (784 hr./yr.)] +
[(0.20 lb./1,000 lb. fuel) (1,630 lb. fuel/hr.) (157 hr./yr.)]
= 18,792 lb./yr

From there the emissions are converted from pounds to tons

CO = 18,792 lb./yr. ÷ 2,000 lb./ton
= 9.39600 tons/yr.

Table 3-50 contains the emissions from engine testing on Randolph AFB by organization.

Table 3-50. Estimated Emissions from Engine Testing on Randolph AFB, 2002

| Organization | Aircraft | VOC | $NO_X$ | CO | VOC | $NO_X$ | CO |
|---|---|---|---|---|---|---|---|
| | | Emissions (tons/yr.) | | | Emissions (tons/day) | | |
| 12th | T-1A | 6.91 | 1.63 | 9.40 | 0.02648 | 0.00625 | 0.03600 |
| | T-6A | 0.71 | 0.14 | 2.10 | 0.00273 | 0.00052 | 0.00806 |
| | T-37B | 0.44 | 0.27 | 6.95 | 0.00167 | 0.00102 | 0.02661 |
| | T-38A | 8.07 | 6.98 | 113.03 | 0.03092 | 0.02674 | 0.43307 |
| | T-43A | 0.12 | 2.63 | 0.52 | 0.00047 | 0.01006 | 0.00201 |
| Lear Siegler | T-38 | 1.02 | 1.12 | 12.15 | 0.00392 | 0.00428 | 0.04656 |
| Vertex | C-21 | 0.07 | 0.12 | 0.42 | 0.00028 | 0.00047 | 0.00162 |
| TOTAL | | 17.35 | 12.88 | 144.58 | 0.06647 | 0.04935 | 0.55393 |

*Results For Randolph AFB*

The table below shows the overall mobile source emission results in tons of pollutant per year. The table also shows the total emissions by pollutant for the six categories of mobile sources.

Table 3-51. Summary of Emissions in Tons/year for Randolph AFB, 2002

| Emission Source | VOC | NOx | CO | VOC | NOx | CO |
|---|---|---|---|---|---|---|
| | ton/year | | | ton/day | | |
| GOV On-Road | 4.15 | 7.73 | 30.25 | 0.01591 | 0.02964 | 0.11590 |
| POV On-Road | 31.50 | 17.96 | 247.33 | 0.12069 | 0.06881 | 0.94764 |
| Nonroad | 42.39 | 60.58 | 354.46 | 0.16242 | 0.23210 | 1.35808 |
| Aerospace Ground Equipment | 0.60 | 0.32 | 12.32 | 0.00228 | 0.00123 | 0.04722 |
| Aircraft Flight Operations | 70.84 | 135.80 | 996.88 | 0.27140 | 0.52032 | 3.81946 |
| Aircraft Engine Testing | 17.35 | 12.88 | 144.58 | 0.06647 | 0.04935 | 0.55393 |
| Total | 166.82 | 235.27 | 1,785.82 | 0.63917 | 0.90144 | 6.84222 |

**San Antonio International Airport**

**Introduction**

The City of San Antonio Aviation Department operates two municipal airports, San Antonio International and Stinson Field. San Antonio International Airport (SAIA) is located approximately seven miles north of the San Antonio central business district. This area consists primarily of older, fully developed residential areas with commercial strip development along or near the major arterials. Emissions occur from the daily operations at the SAIA and include such diverse sources as aircraft engines, ground support equipment, boilers, and generators. This emissions inventory assesses emission estimates for the sources within the SAIA facility.
At SAIA, the following emission sources were identified:

- Aircraft
- Ground Support Equipment (GSE)
- Generator
- Boilers (heating plants)
- Motor Vehicles (parking lots and roadways)
- Fuel Storage
- Fueling Operations
- Non Road Equipment

**Methodology**

The following sections describe the methodologies employed for developing the emission estimates. Emissions from the SAIA were calculated using the Emission & Dispersion Modeling System version 4.2 (EDMS).[57] All emission factors and estimation techniques used in EDMS are based on EPA approved methodologies. Data on aircraft flight activities was collected from both the "FAA/FPA Terminal Area Forecast" (TAF) software and "Airport IQ Data Center" internet site, which is a web-based flight activity tracking and reporting software for all U.S. airports. The information on local and itinerant aircraft activities gathered from these sources was then entered into the EDMS model to estimate the amount of pollutants attributed to aircraft activities.

Based on the information indicated in the TAF software database, the Airport's activity levels reached a total of 236,189 operations for "local" and "itinerant" categories in the year 2002 indicating a 5% decline in the aircraft operations as compared to the year 1999 Emission Inventory levels.

[57] The Federal Aviation Administration, Sept. 30, 2004. "Emissions & Dispersion Modeling System", Available online: http://www.aee.faa.gov/emissions/edms/EDMShome.htm

Commercial Aircraft

Aircraft operations counts were provided by the approved FAA database Airport IQ[58]. The data provided included commercial and civilian aircraft by total landings and aircraft type. Data was only available for 2003 and 2004. The 2002 total commercial operations data, which came from TAF database, was compared to the 2003/2004 total commercial operations to calculate a growth ratio and apply to the commercial aircraft specific 2003/2004 data. This way, the growth was universally spread among various commercial aircraft types for the year 2002.

When entering this aircraft data into the EDMS model, a comparison of aircraft types had to be made with those of the EDMS 4.2 default aircraft types to match the most compatible engine types. The following table (3.52) indicates the type and activity level of commercial "air carrier" and "commuter" aircrafts that were used in the SAIA commercial aircraft emission analysis for the year 2002. When the exact aircraft type was not available in EDMS, the equivalent aircraft is listed. In two cases, the author had to create a user-define aircraft because the equivalent aircraft was not available in the EDMS database.

Table 3-52. Commercial Aircraft Type and Departure Activity at San Antonio International Airport, 2002.

| Type Designator | Number of Arrivals 2002 | Aircraft Name | Engine Type | Engine/Notes | Equivalent aircraft |
|---|---|---|---|---|---|
| A306 | 499 | AIRBUS - A-300B4 - 600 | 2J/H | | |
| A30B | 1 | AIRBUS - A-300B4 - 600b | 2J/H | | A306 |
| A310 | 97 | AIRBUS - A-310 (CC-150 Polaris) | 2J/H | | |
| A319 | 2,396 | AIRBUS - A-319, ACJ | 2J/L | | |
| A320 | 79 | AIRBUS - A-320 | 2J/L | | |
| A321 | 9 | AIRBUS - A-321 | 2J/L | | |
| A331 | 1 | AIRBUS - A-331 | 2J/L | | A-330 |
| AC11 | 1 | Rockwell - Commander | 1P/S | | |
| AC90 | 1 | Gulfstream Aerospace - 690 Jetprop Commander 840/900 | 2T/S | TPE 331 | Swearingen Merlin |
| AC9L | 1 | Gulfstream Aerospace | 2T/S | TPE 331 | Swearingen Merlin |
| AT43 | 6 | Aerospatiale - ATR-42-200/300/320 | 2T/L | | ATR42 |
| B190 | 251 | Beech - 1900 (C-12J) | 2T/S+ | PT6A-65B | BH-1900 |
| B350 | 13 | Beech - B300 Super King Air 350 | 2T/S+ | | |
| B712 | 627 | Boeing - 717-200 | 2J/L | | |
| B721 | 8 | Boeing - 727-100 (C-22) | 3J/L | | |
| B722 | 198 | Boeing - 727-200 | 3J/L | | |
| B727 | 5 | Boeing – 727 | 3J/L | | B721 |
| B72Q | 516 | Boeing - 727 Stage 3 (-100 or -200) | 3J/L | | B721 |
| B732 | 1,435 | Boeing - 737-200 (Surveiller, CT-43, VC-96) | 2J/L | | |
| B733 | 10,067 | Boeing - 737-300 | 2J/L | | |
| B734 | 11 | Boeing - 737-400 | 2J/L | | |

[58] Gregrory C. Rigamer & Associates, Oct. 2002 "Airport IQ: Airport Intelligence Software", Available online: http://www.airportiq.com/

| | | | | | |
|---|---|---|---|---|---|
| B735 | 3,200 | Boeing - 737-500 | 2J/L | | |
| B737 | 2,696 | Boeing - 737-700 | 2J/L | | |
| B738 | 882 | Boeing - 737-800, BBJ2 | 2J/L | | |
| B739 | 85 | Boeing - 737-900 | 2J/L | | |
| B73Q | 5,257 | Boeing - B737 Stage 3 | 2J/L | | B737 |
| B741 | 4 | Boeing - 747-100 | 4J/H | | |
| B742 | 10 | Boeing - 747-200 (E-4, VC-25) | 4J/H | | |
| B744 | 3 | Boeing - 747-400 (International, winglets) | 4J/H | | |
| B752 | 1,421 | Boeing - 757-200 (C-32) | 2J/L | | |
| B753 | 150 | Boeing - 757-300 | 2J/H | | |
| B757 | 1 | Boeing – 757 | 2J/H | | B752 |
| B762 | 156 | Boeing - 767-200 | 2J/H | | |
| B763 | 9 | Boeing - 767-300 | 2J/H | | |
| B764 | 5 | Boeing - 767-400 | 2J/H | | |
| B772 | 2 | Boeing - 777-200 | 2J/H | | |
| BE10 | 1 | Beech - 100 King Air | 2T/S | | |
| BE18 | 93 | Beech - Twin Beech 18/Super H18 | 1P/S | O-200 | Cessna 150 |
| BE19 | 1 | Beech - 19 Musketeer Sport, Sport | 1P/S | IO-360-B | Cessna 172 Skyhawk |
| BE20 | 57 | Beech - 200 Super King Air | 2T/S+ | | |
| BE30 | 2 | Beech - Super King Air300 | 2T/S+ | | |
| BE33 | 2 | Beech - 33 Debonair | 1P/S | IO-360-B | Cessna 172 Skyhawk |
| BE35 | 9 | Beech - 35 Bonanza | 1P/S | O-200 | Cessna 150 |
| BE36 | 18 | Beech - 36 Bonanza | 1P/S | IO-360-B | Cessna 172 Skyhawk |
| BE3B | 1 | Beech - B300 Super King Air 350 | 2T/S+ | | |
| BE40 | 258 | Beech - 400 Beechjet | 2J/S+ | | |
| BE55 | 4 | Beech - 55 Baron | 2P/S | IO-360-B | Cessna T337 |
| BE58 | 12 | Beech - 58 Baron | 2P/S | IO-360-B | Cessna T337 |
| BE60 | 1 | Beech - 60 Duke | 2P/S | IO-360-B | Cessna T337 |
| BE90 | 1 | Beech - King Air C-90 | 2P/S | IO-360-B | Cessna T337 |
| BE9L | 10 | Beech - 90, A90 to E90 King Air (T-44 V-C6) | 2T/S | | |
| C172 | 8 | Cessna - 172 | 1P/S | | |
| C177 | 1 | Cessna - 177, Cardinal | 1P/S | O-200 | Cessna 150 |
| C182 | 5 | Cessna - 182 | 1P/S | O-200 | Cessna 150 |
| C206 | 13 | Cessna - 206, Super Skywagon, Super Skyland, Skywagon 206, Stationair, Turbo Stationair 6 | 1P/S | O-200 | Cessna 150 |
| C208 | 1,336 | Cessna - 208 Caravan 1, (Super) Cargomaster, Grand Caravan | 1T/S | | |
| C210 | 18 | Cessna - 210, T210, Centurion | 1P/S | O-200 | Cessna 150 |
| C310 | 5 | Cessna - 310, T310 (U-3, L-27) | 1P/S | IO-360-B | Cessna 172 Skyhawk |
| C340 | 1 | Cessna – 340 | 2P/S | IO-360-B | Cessna T337 |
| C401 | 115 | Cessna – 401 | 2P/S | IO-360-B | Cessna T337 |
| C402 | 295 | Cessna - 401, 402, Utililiner, Businessliner | 2P/S | IO-360-B | Cessna T337 |
| C404 | 3 | Cessna - 404 Titan | 2P/S | IO-360-B | Cessna T337 |
| C414 | 2 | Cessna - 414 | 2P/S | IO-360-B | Cessna T337 |
| C421 | 2 | Cessna - 421, Golden Eagle, Executive Commuter | 2P/S | IO-360-B | Cessna T337 |
| C425 | 1 | Cessna - 425, Corsair, Conquest 1 | 2T/S | PT6A-112 | User Defined Aircraft |

| | | | | | |
|---|---|---|---|---|---|
| C500 | 2 | Cessna - 5000 Citation, Citation 1 | 2J/S | | |
| C501 | 1 | Cessna - 501 Citation 1SP | 2J/S | | C500 |
| C525 | 56 | Cessna - Citationjet 525 | 2J/S | FJ44-1A | C500 |
| C550 | 115 | Cessna – Citation 2 | 2J/S+ | | |
| C56 | 2 | Lockheed - C-56 Loadstar | 2T/S+ | ARMY - Historical | Beech - B300 Super King Air 350 |
| C560 | 322 | Cessna - 560 Citation 5 | 2J/S+ | | |
| C56X | 254 | Cessna - 560 Citation 5 | 2J/S+ | | C560 |
| C650 | 179 | Cessna – Citation 3 | 2J/S+ | CF34-3A | CL601-3A |
| C72R | 1 | Cessna - 172RG, Cutlass RG | 1P/S | | C172 |
| C750 | 342 | Cessna - 750 Citation 10 | 2J/S+ | | |
| CJR9 | 1 | Unknown | 0 | | Cessna 172 Skyhawk |
| CL30 | 1 | Bombardier – BD-100 Challenger 300 | 2J/S+ | AS-907 | Beech - 400 Beechjet |
| CL60 | 101 | Canadair - CL-600 Challenger/600 Bombardier | 2J/L | CF34-3A | CL601-3A |
| CL64 | 1 | Canadair - CL-600 Challenger/600 Bombardier | 2J/L | CF34-3A | CL601-3A |
| CR2 | 1 | Crossair | 2J/S+ | | Beech - 400 Beechjet |
| CRJ | 1 | Canadair - 850 Bombardier | 2J/L | | CL601-3A |
| CRJ1 | 271 | Canadair - CL-600 Regional Jet CRJ-100 | 2J/L | | |
| CRJ2 | 5,092 | Canadair - Regional Jet 100/200 | 2J/L | | CRJ1 |
| CRJ7 | 530 | Canadair - CL-600 Regional Jet CRJ-700 | 2J/L | | |
| CRJ9 | 862 | Canadair - CL-600 Regional Jet CRJ-900 | 2J/L | | |
| CVLT | 8 | Convair - CV-580 | 2T/S+ | NAVY - Historical | Beech - B300 Super King Air 350 |
| D328 | 4 | Dornier – 328 | 2T/S+ | | |
| DC10 | 245 | McDonnell-Douglas - DC-10 (KC-10 Extender, KDC-10, MD-10) | 3J/H | | |
| DC3 | 1 | McDonnell-Douglas - Skytrain | 2P/S+ | PT6A-65B | BH-1900 |
| DC8 | 3 | McDonnell-Douglas - DC-8 | 4J/H | | |
| DC87 | 1 | McDonnell-Douglas - DC-8-70 | 4J/H | | |
| DC8Q | 203 | McDonnell-Douglas - DC-8 Stage 3 | 4J/H | | DC8 |
| DC9 | 11 | McDonnell-Douglas - DC-9 | 2J/L | | DC91 |
| DC91 | 14 | McDonnell-Douglas - DC-9-10 | 2J/L | | |
| DC93 | 151 | McDonnell-Douglas - DC-9-30 (C-9, VC-9, Nightingale, Skytrain 2) | 2J/L | | |
| DC94 | 11 | McDonnell-Douglas - DC-9-40 | 2J/L | | |
| DC95 | 11 | McDonnell-Douglas - DC-9-50 | 2J/L | | |
| DC9Q | 325 | McDonnell-Douglas - DC-9 Stage 3 | 2J/L | | DC91 |
| DR20 | 1 | Unknown | 0 | | Cessna 172 Skyhawk |
| E110 | 456 | Embraer - 110/111 Bandeirante (C-95, EC-95, P-95, R-95, SC-95) | 2T/S+ | | |
| E120 | 3 | Embraer - EMB-120 Brasilia (VC-97) | 2T/S+ | | |
| E135 | 30 | Embraer - EMB-135 | 2J/L | | |
| E140 | 1 | Embraer - EMB-140 | 2J/L | | |
| E145 | 1,695 | Embraer - EMB-145, ERJ-145 | 2J/L | | |
| E45X | 667 | Embraer - EMB-145XR | 2J/L | | E145 |
| F100 | 569 | Fokker - 100 | 2J/L | | |
| F2TH | 79 | Dassault - Breguet - Falcon 2000 | 2J/S+ | | |

| | | | | | |
|---|---|---|---|---|---|
| F900 | 2 | Dassault – Falcon 900 | 3J/L | TFE731 | Falcon 20 - 3 |
| FA10 | 2 | Dassault – Falcon (Mystere) 10 | 2J/S+ | | FA20 |
| FA20 | 74 | Dassault – Falcon (Mystere) 20 | 2J/S+ | | |
| FA50 | 34 | Dassault – Falcon 50 | 3J/S+ | | |
| FJ2 | 1 | Hawker Sea Fury | 1T/S+ | ARMY - Historical | Porter PC6/B2 |
| GALX | 37 | Israel IAI-1126 Galaxy - 1126 Gulfstream 200 | 2J/S+ | | |
| GL25 | 1 | F 104 Starfighter | 1J/S+ | ARMY - Historical | A-7E Corsair |
| GLEX | 1 | Bombardier - BD-700-1A10 | 2J/S+ | | |
| GLF2 | 2 | Gulfstream Aerospace - C-20J,/VC-111 | 2J/L | | |
| GLF3 | 2 | Gulfstream Aerospace | 2J/L | | |
| GLF4 | 23 | Gulfstream Aerospace | 2J/L | | |
| GLF5 | 1 | Gulfstream Aerospace G-V Gulfstream V | 2J/L | | |
| GLS4 | 1 | Unknown | 0 | | Cessna 172 Skyhawk |
| H125 | 1 | British Aerospace - Hawker Siddeley 125 | 2J/S+ | | |
| H25 | 2 | British Aerospace | 2J/S+ | | |
| H25A | 8 | British Aerospace - BAe HS 125 Series 1/2/3/400/600 | 2J/S+ | | |
| H25B | 216 | British Aerospace - BAe-125-700/800 (C-29, U-125) | 2J/S+ | | |
| H25C | 70 | British Aerospace - Hawker Siddeley HS 125 | 2J/S+ | | |
| HS25 | 1 | British Aerospace - Hawker Siddeley HS 125 | 2J/S+ | | |
| J328 | 3 | Fairchild Dornier - 328JET, Envoy 3 | 2J/S+ | | |
| LJ23 | 1 | Bombardier - Learjet 23 | 2J/S | TFE731-2-2B | Learjet 35/36 |
| LJ24 | 26 | Bombardier - Learjet 24 | 2J/S+ | | |
| LJ25 | 68 | Bombardier - Learjet 25 | 2J/S+ | | |
| LJ31 | 26 | Bombardier - Learjet 31 | 2J/S+ | | |
| LJ35 | 452 | Bombardier - Learjet 35 | 2J/S+ | | |
| LJ36 | 1 | Bombardier - Learjet 36 | 2J/S+ | | Learjet 35/36 |
| LJ45 | 72 | Bombardier - Learjet 45 | 2J/S+ | TFE731-2-2B | Learjet 35/36 |
| LJ55 | 36 | Bombardier - Learjet 55 | 2J/S+ | TFE731-2-2B | Learjet 35/36 |
| LJ60 | 100 | Bombardier - Learjet 60 | 2J/S+ | TFE731-2-2B | Learjet 35/36 |
| LR24 | 1 | Bombardier - Learjet 24 | 2J/S | | |
| LR25 | 1 | Bombardier - Learjet 25 | 2J/S+ | | |
| LR31 | 2 | Bombardier - Learjet 31 | 2J/S+ | | |
| LR35 | 5 | Bombardier - Learjet 35 | 2J/S+ | | Learjet 35/36 |
| LR36 | 1 | Bombardier - Learjet 36 | 2J/S+ | | Learjet 35/36 |
| LR45 | 1 | Bombardier - Learjet 45 | 2J/S+ | TFE731-2-2B | Learjet 35/36 |
| LR60 | 2 | Bombardier - Learjet 60 | 2J/S+ | TFE731-2-2B | Learjet 35/36 |
| M20 | 1 | Mooney Aircraft - Mark 20 | 1P/S | IO-360-B | Cessna 172 Skyhawk |
| M20J | 1 | Mooney Aircraft - Mark 20 | 1P/S | IO-360-B | Cessna 172 Skyhawk |
| M20K | 1 | Mooney Aircraft - Mark 20 | 1P/S | IO-360-B | Cessna 172 Skyhawk |
| M20P | 5 | Mooney Aircraft - Mark 20 | 1P/S | IO-360-B | Cessna 172 Skyhawk |
| MD10 | 128 | McDonnell-Douglas - MD-10 | 3J/H | | DC10 |
| MD11 | 26 | McDonnell-Douglas - MD-11 | 3J/H | | |

| | | | | | |
|---|---|---|---|---|---|
| MD80 | 1,600 | McDonnell-Douglas - MD-80 | 2J/L | | |
| MD81 | 42 | McDonnell-Douglas - MD-81 | 2J/L | | |
| MD82 | 5,889 | McDonnell-Douglas - MD-82 | 2J/L | | |
| MD83 | 1,260 | McDonnell-Douglas - MD-83 | 2J/L | | |
| MD87 | 12 | McDonnell-Douglas - MD-87 | 2J/L | | |
| MD88 | 8 | McDonnell-Douglas - MD-88 | 2J/L | | |
| MD90 | 1 | McDonnell-Douglas - MD-90 | 2J/L | | |
| MO20 | 1 | Mooney Aircraft - Mark 20 | 1P/S | IO-360-B | Cessna 172 Skyhawk |
| MU2 | 457 | Mitsubishi Aircraft - MU-2, Marquise, Solitaire | 2T/S | PT6A-65B | BH-1900 |
| MU2B | 1 | Mitsubishi Aircraft - MU-2, Marquise, Solitaire | 2T/S | PT6A-65B | BH-1900 |
| MU30 | 1 | Mitsubishi Aircraft - MU-300 Diamond | 2J/S+ | | |
| MX7 | 1 | Mitsubishi Aircraft - Super Rocket, Star Rocket, Comet, Star Craft, Orion, Sportplane | 1P/S | 0-360-C1F | Cessna 172 Skyhawk |
| P180 | 1 | Piaggio - P-180 Avanti | 2T/S | PT6A-66 | BH-1900 |
| P28A | 8 | Piper - Archer, Cadet, Cherokee, Cherokee Archer/Challenger/Chief/Cruiser/ Flite Liner/Warrior | 1P/S | | |
| P28R | 2 | Piper - Archer, Cadet, Cherokee, Cherokee Archer/Challenger/Chief/Cruiser/ Flite Liner/Warrior | 1P/S | | |
| P32T | 1 | Piper - Lance 2 | 1P/S | IO-360-B | Cessna 172 Skyhawk |
| P46T | 11 | Piper - PA-46-500TP Malibu Meridian | 1P/S | IO-360-B | Cessna 172 Skyhawk |
| PA24 | 1 | Piper - Comanche | 1P/S | IO-360-B | Cessna 172 Skyhawk |
| PA27 | 4 | Piper - PA-23-235/250 Aztec | 2P/S | | |
| PA28 | 3 | Piper - Archer, Cadet, Cherokee, Cherokee Archer/Challenger/Chief/Cruiser/ Flite Liner/Warrior | 1P/S | | |
| PA30 | 8 | Piper - PA-30/39 Twin Comanche | 2P/S | IO-360-B | Cessna T337 |
| PA31 | 10 | Piper - Navajo, Navajo Chieftain, Chieftain, Pressurized Navajo, Mohave, T-1020 | 2P/S | | |
| PA32 | 36 | Piper - PA-32 Cherokee Six, Six, Saratoga, Turbo Saratoga, 6, 6XT | 1P/S | IO-360-B | Cessna 172 Skyhawk |
| PA44 | 1 | Piper - Seminole, Turbo Seminole | 2P/S | IO-360-B | Cessna T337 |
| PA46 | 9 | Piper - Malibu, Malibu Mirage | 1P/S | IO-360-B | Cessna 172 Skyhawk |
| PA60 | 1 | Piper - Aerostar | 2P/S | IO-360-B | Cessna T337 |
| PAY2 | 1 | Piper - PA-31T-620.T2-620 | 2T/S | PT6A-45 | ATR42-400 |
| PC12 | 37 | Pilatus Flugzaugwerke (Fairchild) PC-12, Eagle | 1T/S | PT6A-67B | User Defined Aircraft |
| PRM1 | 16 | Beech - Premier 1, 390 | 2J/S+ | FJ442A | Beech - 400 Beechjet |
| R722 | 2 | Boeing - 727-200RE Super 27 | 3J/L | | |
| SBR1 | 5 | Rockwell - NA-265 Sabre 40/60/65 | 2J/S+ | JT8D-7 | Beech - 400 Beechjet |
| SF34 | 388 | Saab - SF-340 | 2T/S+ | | |
| SH36 | 5 | Short Brothers - 360, SD3-60 | 2T/S+ | | |
| SR20 | 1 | Cirrus - SR20 | 1P/S | IO-360-B | Cessna 172 Skyhawk |
| SW2 | 3 | Fairchild - Merlin 2 | 2T/S | TPE 331 | Swearingen Merlin |
| SW3 | 84 | Fairchild - Merlin 3, Fairchild 300 | 2T/S+ | TPE 331-3 | Swearingen Metro 2 |

| | | | | | |
|---|---|---|---|---|---|
| SW4 | 312 | Fairchild - SA-226AC, SA-227AC/AT Metro, Merlin 4, Expediter | 2T/S+ | TPE 331-3 | Swearingen Metro 2 |
| T38 | 2 | Northrop - T-38, AT-38 Talon | 2J/S+ | TFE731-2-2B | Learjet 35/36 |
| TB7 | 1 | Grumman – Avenger | 1T/S+ | ARMY - Historical | Porter PC6/B2 |
| WW24 | 2 | Isreal Aircraft Industries (IAI)/Gulfstream - 1124 Westwind | 2J/S+ | | |
| Total | 56,672 | | | | |

General Aviation Aircraft

The Airport facility is also used for general aviation purposes. There was a total of 110,346 general aviation aircraft operations in 2002, which were allocated to three general aviation aircrafts type: Jet[59], Turbo-Prop[60], and Piston[61]. Similar to the commercial aircraft, general aviation aircraft operations counts were provided by the approved FAA database Airport IQ[62]. The data was used to calculate a breakdown by the three types of aircraft (Figure 3-53). Each arrival consists of two operations (one landing and one take-off).

Table 3-53. General Aviation Breakdown at the San Antonio International Airport, 2002.

| General Aviation Aircraft type | Percentage breakdown by aircraft types, 2003 | Total Operations by aircraft type, 2002 | Number of Arrivals, 2002 |
|---|---|---|---|
| Jet | 47.8% | 52,738 | 26,369 |
| Turbo-Prop | 15.4% | 17,022 | 8,511 |
| Piston | 36.8% | 40,586 | 20,293 |
| Total 2002 Operations | 100.0% | 110,346 | 55,173 |

Similar to the commercial aircraft operations, the 2002 total general aviation operations data, which came from TAF database, was compared to the 2003 total operations to calculate a growth ratio and apply to the aircraft specific 2003 data. This way, the growth was universally spread among various aircraft types for the year 2002.

Recorded operations by aircraft manufacture and name was provided for only some of the general aviation aircraft records in the FAA database Airport IQ. The percentage breakdown

[59] "The principle of all jet engines is essentially the same. The engine draws air in at the front and compresses it. The air then combines with fuel and the engine burns the resulting mixture. The combustion greatly increases the pressure of the gases which are then exhausted out of the rear of the engine.", KnowledgeRush. Available online: http://www.knowledgerush.com/kr/encyclopedia/Jet_engine

[60] "A Turboprop or turboshaft engine is a type of Jet engine. A turboprop …(uses) the power of the jet engine to drive a propeller", Free-Definition. Available online: http://www.free-definition.com/Turboprop.html

[61] A piston-engine with propeller as propulsion

[62] Gregrory C. Rigamer & Associates, Oct. 2002 "Airport IQ: Airport Intelligence Software", Available online: http://www.airportiq.com/

between aircraft manufacture/name was applied to all general aviation aircraft in each of the three categories.

The following tables (3.54, 3.55, and 3.56) indicates the type and activity level of general aviation jet, piston, turbo-prop aircrafts that were used in the SAIA commercial aircraft emission analysis for the year 2002. When the exact aircraft type was not available in EDMS, the equivalent aircraft is listed. In four cases, the author had to create a user-define aircraft because the equivalent aircraft was not available in the EDMS database.

Table 3-54. Jet General Aviation at San Antonio International Airport, 2002.

| Aircraft Name | Engine/Notes | Equivalent aircraft | Recorded Operations | Percentage of Jet | Estimated Number of Arrivals 2002 |
|---|---|---|---|---|---|
| Bell – 206 | Helicopter | | 8 | 0.7% | 174 |
| Beech - 400 Beechjet | | | 41 | 3.4% | 893 |
| Beech - Premier 1, 390 | FJ442A | Beech - 400 Beechjet | 3 | 0.2% | 65 |
| Boeing - 737-200 | | | 1 | 0.1% | 22 |
| Boeing - 737-700 | | | 2 | 0.2% | 44 |
| Boeing - 757-200 (C-32) | | | 2 | 0.2% | 44 |
| Bombardier - BD-700-1A10 | | | 17 | 1.4% | 370 |
| Bombardier - Learjet 24 | | | 10 | 0.8% | 218 |
| Bombardier - Learjet 25 | | | 40 | 3.3% | 872 |
| Bombardier - Learjet 31 | | | 43 | 3.6% | 937 |
| Bombardier - Learjet 35 | | | 46 | 3.8% | 1,002 |
| Bombardier - Learjet 36 | | Learjet 35/36 | 6 | 0.5% | 131 |
| Bombardier - Learjet 45 | TFE731-2-2B | Learjet 35/36 | 53 | 4.4% | 1,155 |
| Bombardier - Learjet 55 | TFE731-2-2B | Learjet 35/36 | 16 | 1.3% | 349 |
| Bombardier - Learjet 60 | TFE731-2-2B | Learjet 35/36 | 18 | 1.5% | 392 |
| British Aerospace - BAe-125-700/800 | | | 43 | 3.6% | 937 |
| British Aerospace - Hawker Siddeley HS 125 | | | 57 | 4.7% | 1,242 |
| Canadair - CL-600 Challenger/600 Bombardier | CF34-3A | CL601-3A | 24 | 2.0% | 523 |
| Cessna - 500 | | | 25 | 2.1% | 545 |
| Cessna - 501 Citation 1SP | | C500 | 30 | 2.5% | 654 |
| Cessna - 550 | | | 85 | 7.0% | 1,852 |
| Cessna - 560 Citation 5 | | | 153 | 12.6% | 3,334 |
| Cessna - 650 Citation 3 | CF34-3A | CL601-3A | 36 | 3.0% | 785 |
| Cessna - 750 Citation 10 | | | 22 | 1.8% | 479 |
| Cessna - Citationjet 525 | FJ44-1A | C500 | 100 | 8.3% | 2,179 |
| Dassault - Breguet - Falcon 2000 | | | 8 | 0.7% | 174 |
| Dassault - Falcon (Mystere) 10 | | Falcon 20 | 23 | 1.9% | 501 |
| Dassault - Falcon (Mystere) 20 | | | 4 | 0.3% | 87 |
| Dassault - Falcon 50 | | | 23 | 1.9% | 501 |
| Dassault - Falcon 900 | TFE731 | Falcon 20 | 30 | 2.5% | 654 |

| | | | | | |
|---|---|---|---|---|---|
| Gulfstream Aerospace G-V Gulfstream V | | | 12 | 1.0% | 262 |
| Gulfstream C-IV | | | 52 | 4.3% | 1,133 |
| Israel IAI-1126 Galaxy - 1126 Gulfstream 200 | | | 70 | 5.8% | 1,525 |
| Isreal Aircraft Industries (IAI) - 1125 Gulfstream 100 | TFE731-2-2B | Learjet 35/36 | 18 | 1.5% | 392 |
| Isreal Aircraft Industries (IAI) - 1124 Westwind | | | 57 | 4.7% | 1,242 |
| Lockheed - 1329-5 Jetstar 2/731 | TF33-P-3 | C-141 | 9 | 0.7% | 196 |
| Mitsubishi Aircraft - MU-300 Diamond | | | 11 | 0.9% | 240 |
| Rockwell - NA-265 Sabre 40/60/65 | JT8D-7 | Beech - 400 Beechjet | 12 | 1.0% | 262 |
| Total | | | 1210 | 100.0% | 26,369 |

Table 3-55. Turbo-Prop General Aviation at San Antonio International Airport, 2002.

| Aircraft Name | Engine/Notes | Equivalent aircraft | Recorded Operations | Percentage of Turbo-Prop | Estimated Number of Arrivals 2002 |
|---|---|---|---|---|---|
| Aerospatiale - TBM TB-700 | PT6A-64 | User Defined Aircraft | 29 | 7.2% | 615 |
| Beech - 100 King Air | | | 24 | 6.0% | 509 |
| Beech - 200 Super King Air | | | 69 | 17.2% | 1,464 |
| Beech - 90 King Air | | | 141 | 35.2% | 2,993 |
| Beech – B300 Super King Air 350 | | | 41 | 10.2% | 870 |
| Cessna - 425, Corsair, Conquest 1 | PT6A-112 | User Defined Aircraft | 11 | 2.7% | 233 |
| Cessna - 441 Conquest, Conquest 2 | | | 29 | 7.2% | 615 |
| Fairchild – Merlin 3, Fairchild 300 | TPE 331-3 | Swearingen Metro 2 | 21 | 5.2% | 446 |
| Gulfstream Aerospace - 690 Jetprop Commander 840/900 | TPE 331 | Swearingen Merlin | 17 | 4.2% | 361 |
| Gulfstream Aerospace - 695 Jetprop Commander 840/900 | TPE 331 | Swearingen Merlin | 2 | 0.5% | 42 |
| Mitsubishi Aircraft - MU-2, Marquise, Solitaire | PT6A-65B | BH-1900 | 14 | 3.5% | 297 |
| Piaggio - P-180 Avanti | PT6A-66 | BH-1900 | 2 | 0.5% | 42 |
| Piper – 42 Cheyenne 3 | PT6A-45 | ATR42-400 | 1 | 0.2% | 21 |
| Total | | | 401 | 100.0% | 8,511 |

Table 3-56. Piston General Aviation at San Antonio International Airport, 2002.

| Aircraft Name | Engine/Notes | Equivalent aircraft | Recorded Operations | Percentage of Piston | Estimated Number of Arrivals 2002 |
|---|---|---|---|---|---|
| Aerospatiale - Trinidad TB-20/21 | IO-540-C4 | Cherokee six | 7 | 0.6% | 115 |
| Beech - 23 Musketeer | O-320-D2B | Rockwell Commander | 5 | 0.4% | 82 |
| Beech - 33 Debonair | IO-360-B | Cessna 172 Skyhawk | 13 | 1.1% | 214 |
| Beech - 35 Bonanza | O-200 | Cessna 150 | 41 | 3.3% | 676 |
| Beech - 36 Bonanza | IO-360-B | Cessna 172 Skyhawk | 89 | 7.2% | 1,467 |
| Beech - 50 Twin Bonanza | IO-435-C2 | Aztec | 2 | 0.2% | 33 |
| Beech - 55 Baron | IO-360-B | Cessna T337 | 8 | 0.6% | 132 |
| Beech - 58 Baron | IO-360-B | Cessna T337 | 54 | 4.4% | 890 |
| Beech - 60 Duke | IO-360-B | Cessna T337 | 6 | 0.5% | 99 |
| Beech - 76 Duchess | IO-360-B | Cessna T337 | 4 | 0.3% | 66 |
| Beech - 95 | IO-360-A | Cessna T337 | 20 | 1.6% | 330 |
| Beech - Twin Beech 18 | O-200 | User Defined Aircraft | 6 | 0.5% | 99 |
| Bellanca - 17 Viking | IO-520-D | Cherokee six | 9 | 0.7% | 148 |
| Cessna - 150 | | | 2 | 0.2% | 33 |
| Cessna - 152 | O-200 | Cessna 150 | 3 | 0.2% | 49 |
| Cessna - 172 | | | 98 | 8.0% | 1,616 |
| Cessna - 177, Cardinal | O-200 | Cessna 150 | 5 | 0.4% | 82 |
| Cessna - 180 | O-470-A | Cherokee six | 3 | 0.2% | 49 |
| Cessna - 182 | O-200 | Cessna 150 | 46 | 3.7% | 758 |
| Cessna - 185 | IO-470-F | Cherokee six | 2 | 0.2% | 33 |
| Cessna - 206, Super Skywagon, Super Skyland, Skywagon 206 | O-200 | Cessna 150 | 21 | 1.7% | 346 |
| Cessna - 208 | | | 7 | 0.6% | 115 |
| Cessna - 210, T210, Centurion | O-200 | Cessna 150 | 64 | 5.2% | 1,055 |
| Cessna - 310, T310 (U-3, L-27) | IO-360-B | Cessna 172 Skyhawk | 26 | 2.1% | 429 |
| Cessna - 337 | IO-360-C | Cessna T337 | 2 | 0.2% | 33 |
| Cessna - 340 | IO-360-B | Cessna T337 | 69 | 5.6% | 1,137 |
| Cessna - 401 | IO-360-B | Cessna T337 | 13 | 1.1% | 214 |
| Cessna - 404 Titan | IO-360-B | Cessna T337 | 5 | 0.4% | 82 |
| Cessna - 414 | IO-360-B | Cessna T337 | 34 | 2.8% | 560 |
| Cessna - 421, Golden Eagle, Executive Commuter | IO-360-B | Cessna T337 | 98 | 8.0% | 1,616 |
| Cirrus - SR20 | IO-360-B | Cessna 172 Skyhawk | 7 | 0.6% | 115 |
| Cirrus - SR22 | IO-550-N | Cherokee six | 12 | 1.0% | 198 |
| Grumman - AA-5, Traveller, Cheetah | IO-360-B | Cessna 172 Skyhawk | 8 | 0.6% | 132 |
| Lancair - LC-40-550FG | IO-550-N | Cherokee six | 3 | 0.2% | 49 |
| Maule - M-5, Strata Rocket, Lunar Rocket, Patroller | IO-360 | Cessna 172 Skyhawk | 2 | 0.2% | 33 |
| Maule - MT-7-235 | O-540-J1A5D | Cherokee six | 4 | 0.3% | 66 |
| Mooney Aircraft - Mark 20 | IO-360-B | Cessna 172 Skyhawk | 92 | 7.5% | 1,517 |
| Partenavia - P68,Victor, Observer | IO-360-B | Cessna 172 Skyhawk | 4 | 0.3% | 66 |
| Pilatus Flugzaugwerke (Fairchild) PC-12, Eagle | PT6A-67B | User Defined Aircraft | 16 | 1.3% | 264 |
| Piper - 23 | O-320 | Twin Comanche | 8 | 0.6% | 132 |

| | | | | | |
|---|---|---|---|---|---|
| Piper - 24 - Comanche | IO-360-B | Cessna 172 Skyhawk | 8 | 0.6% | 132 |
| Piper - 28 - Archer, Cadet, Cherokee, Cherokee Archer/Challenger | | | 59 | 4.8% | 973 |
| Piper - 31 - Navajo, Navajo Chieftain, Chieftain, Pressurized Navajo | | | 36 | 2.9% | 593 |
| Piper - 34 Seneca | IO-360-B | Cessna T337 | 30 | 2.4% | 495 |
| Piper - 38 Tomahawk | O-235-L2A | Cessna 150 | 2 | 0.2% | 33 |
| Piper - 44 - Seminole | IO-360-B | Cessna T337 | 29 | 2.4% | 478 |
| Piper - 46 - Malibu, Malibu Mirage | IO-360-B | Cessna 172 Skyhawk | 61 | 5.0% | 1,006 |
| Piper - 60 - Aerostar | IO-360-B | Cessna T337 | 15 | 1.2% | 247 |
| Piper - PA-30/39 Twin Comanche | IO-360-B | Cessna T337 | 1 | 0.1% | 16 |
| Piper - PA-30/39 Twin Comanche | IO-360-B | Cessna T337 | 5 | 0.4% | 82 |
| Piper - PA-32 Cherokee Six, Six, Saratoga, Turbo Saratoga, 6, 6XT | IO-360-B | Cessna 172 Skyhawk | 65 | 5.3% | 1,072 |
| Rockwell - Commander | | | 2 | 0.2% | 33 |
| Total | | | 1231 | 100.0% | 20,293 |

Military Aircraft

The military also uses the Airport's amenities for training purposes and TAF software maintains records on these military activities. The following table indicates flight characteristics for military operations occurring at SAIA, which were used as input to the EDMS model to calculate emissions from military activities in the Airport.

Table 3-57. Military Aircraft Activity at the San Antonio International Airport, 2002

| Aircraft | LTO | TGO | Total |
|---|---|---|---|
| T-43 | 0 | 4,294 | 4,294 |
| T-34/T-37 | 252 | 0 | 252 |
| F-16 | 0 | 1,145 | 1,145 |
| C-130 | 41 | 368 | 409 |
| C-21 | 55 | 95 | 150 |
| Total | 348 | 5,902 | 6,250 |

Ground Support Equipment (GSE)

Ground service equipment is an essential part of daily operations at airports that must be included in the evaluations. Emissions for GSE are estimated by the EDMS based on the number of aircraft inputted. Therefore, no additional input was required for ground support equipment.

Generator

The amount of emission from generators was calculated using the EPA's NONROAD 2004 model and is included in the Table 3-56. The following formula was used to calculate the emissions from the generator in Terminal 1:

*Annual Emissions*

$$\text{Emissions (grams/year)} = LF \times EF \times HRS \times HP$$

Where:

LF = typical load factor

EF = average emissions of pollutant per unit of use

HRS = average annual hours of use for that equipment type

HP = average rated horsepower for that equipment type

<u>Boilers (Heating Plants)</u>

In 1993, 341,329 cubic meters of natural gas were burned. It was projected that this annual value would increase to 504,000 cubic meters per year in 2015. The 2002 annual value, 407,876 cubic meters, was approximated for use in the inventory by straight-line interpolation. Because natural gas was used, no other control measures were evaluated.

<u>Roadways</u>

The 2000 Texas Department of Transportation (TxDOT) saturation maps were used to identify roadways leading into airport facilities. The average daily traffic (ADT) counts on these maps were selected as traffic volumes corresponding to the airport activities. Airport Boulevard, South Terminal Road, and Jones Maltsberger were modeled using their length and assigned speed limits. Table 3-55 details the length, volume, and speed of airport roadways. It was assumed that any vehicle accessing the parking areas idled for a period of 2 minutes. This assumption was based on a site visit to the airport to review curb-front activity.

Table 3-58. Roadways Used in Analysis of San Antonio International Airport

| Roadway | Length (mile) | 2000 Daily Volume | Speed |
|---|---|---|---|
| Airport Blvd. Loop | 1.20 | 29,870 | 35 |
| South Terminal Dr. Entrance | 0.29 | 24,040 | 35 |
| Jones Maltsberger Entrance | 0.38 | 14,240 | 35 |

<u>Parking</u>

Vehicles that use parking lots at airports contribute emissions that affect the area's air quality. For this reason, information regarding usage and lot size was entered into EDMS model, which then calculates the corresponding emissions. These lots included employee parking, long term and economy parking lots, and parking garages. For employee lots, 1996 data was used since it was the most current data available. The City of San Antonio provided 2002 data for the short-term, long-term and economy parking lots. Actual vehicle counts (entry and exits) for the public parking lots and the average length of trips to the lots were assessed. This mileage, along with a 2-minute idle time per movement, was used with emission factors from MOBILE6 to estimate total yearly emissions. A speed of 10 mph was assumed for parking lots and a speed of 35 mph was used for the roadways.

Fuel Storage

Based on the information reported in the Airport Master Plan document, the amount of annual fuel throughput at SAIA was 208,258 kiloliters of Jet A fuel and 55,360 kiloliters of aviation gasoline in 1993. In 2015, these values are expected to reach 315,846 kiloliters per year and 83,959 kiloliters per year for Jet A fuel and aviation gasoline, respectively. The report indicates that the amount of VOC generated from refueling activities was 64 tons in 1993. This amount of VOC was extrapolated for 2002 based on the growth in the aircraft operations since 1993. The 1993 and the 2002 aircraft operations data were obtained from TAF database.

**Results**

Total emissions from each source are located in table 3-56 by category. For tons per day emissions, the tons/year emissions were divided by 365 days/year to achieve average daily emissions

Table 3-59. 2002 Emission Inventory Results for the San Antonio International Airport

| Source | VOC | $NO_x$ | CO | VOC | $NO_x$ | CO |
|---|---|---|---|---|---|---|
| | ton/yr. | | | ton/day | | |
| Commercial Aircraft | 112.74 | 386.94 | 566.59 | 0.3089 | 1.0601 | 1.5523 |
| GSE/AGE/APU* | 69.29 | 105.33 | 1,832.31 | 0.1898 | 0.2886 | 5.0200 |
| Military | 1.33 | 27.45 | 7.74 | 0.0051 | 0.1052 | 0.0297 |
| GSE/AGE/APU* | 0.06 | 0.71 | 0.21 | 0.0002 | 0.0027 | 0.0008 |
| GA - Jet | 136.39 | 38.20 | 308.99 | 0.3737 | 0.1046 | 0.8465 |
| GSE/AGE/APU* | 14.26 | 16.83 | 367.02 | 0.0391 | 0.0461 | 1.0055 |
| GA - Turbo-Prop | 16.54 | 3.62 | 26.09 | 0.0453 | 0.0099 | 0.0715 |
| GSE/AGE/APU* | 3.74 | 4.55 | 103.85 | 0.0102 | 0.0125 | 0.2845 |
| GA - Piston | 3.72 | 1.03 | 165.57 | 0.0102 | 0.0028 | 0.4536 |
| GSE/AGE/APU* | 0.07 | 0.94 | 0.21 | 0.0002 | 0.0026 | 0.0006 |
| Roadways | 26.12 | 42.18 | 284.65 | 0.0716 | 0.1156 | 0.7799 |
| Diesel Generator Set | 0.01 | 0.06 | 0.03 | 0.0001 | 0.0003 | 0.0002 |
| Parking Lots | 5.27 | 2.30 | 32.27 | 0.0144 | 0.0063 | 0.0884 |
| Fueling Ops | 68.93 | 0.00 | 0.00 | 0.1888 | 0.0000 | 0.0000 |
| Stationary Sources | 0.01 | 3.77 | 0.27 | 0.0000 | 0.0103 | 0.0008 |
| Total | 458.47 | 633.89 | 3,695.79 | 1.2576 | 1.7676 | 10.1342 |

*Note: GSE/AGE/APU stands for Ground Support Equipment, Aerospace Ground Equipment and
Auxiliary Power Unit, respectively

Nonroad Equipment

Emissions for this category consist of lawn and garden equipment, construction equipment, commercial equipment and/or light industrial equipment. Emissions estimations are based on local data produced from surveys and on national data used in the EPA's NONROAD 2004 Emissions Inventory Model. The survey requests:

- Equipment type and quantity
- Activity Rates – total annual hours of use
- Temporal Profiles – hrs of use on weekdays and weekends
- Horse-power (hp) or Engine Capacity (cc) if hp was not available

Annual VOC, NOx, and CO emissions were estimated based on survey responses and NONROAD model defaults. The emissions were converted to tons/day for typical summer ozone-season days by using seasonal adjustment factors. This process is described in full in the Small Airports section of this chapter.

Annual Emissions

Emissions (grams/year) = LF × EF × HRS × HP

Where:

LF = typical load factor
EF = average emissions of pollutant per unit of use
HRS = average annual hours of use for that equipment type
HP = average rated horsepower for that equipment type

*Sample Calculation:*

Annual VOC emissions for diesel tractors (SCC 2270002066):

| Factor | | Quantity | Source |
|---|---|---|---|
| LF | = | 0.33 | NONROAD default |
| EF (Yearly VOC) | = | 44.26 | Calculated using NONROAD Model (see full description in Small Airports section) |
| HRS | = | 2088 | (Equip. pop x M-F hrs) x 261 + (Equip. pop x Sa-Su hrs) x 104 |
| HP | = | 12.5 | survey or average hp NONROAD model default if not quantified on survey |

VOC emissions = 0.33 x 44.26 x 2088 x 12.5
= 381,247.62 grams/year

These emissions are then converted to tons/year:

= 381,247.62 g/yr. / 1,000 g/kg × 2.205 lbs./kg / 2,000 lbs./ton
= 0.42033 tons/year

Daily Emissions

Emissions (grams/year) = LF $\times$ EF $\times$ HRS (EP x HD) $\times$ 261 $\times$ HP

Where:

LF = typical load factor
EF = average emissions of pollutant per unit of use
HRS = average *weekday* hours of use for that equipment type
EP = equipment population (count)
HD = average hours/day
261 = days per year for equipment operated Monday – Friday
HP = average rated horsepower for that equipment type

*Sample Calculation:*

Daily VOC emissions for diesel tractors (SCC 2270002066):

| Factor | | Quantity | Source |
|---|---|---|---|
| LF | = | 0.33 | NONROAD default |
| EF (Daily VOC) | = | 43.89 | Calculated using NONROAD Model (see full description in Small Airports section) |
| HRS | = | 8 | survey (EP x HD = 2 x 4) |
| HP | = | 12.5 | survey |

VOC emissions = 0.33 x 43.89 x 8 x 261 x 12.5
= 378,002.61 weekday grams/year

These emissions are then converted to tons/day:

Emissions (tons/day) = weekday g/yr. $\times$ AF $\div$ 152 $\div$ g/kg $\times$ lbs./kg $\div$ lbs./ton

Where:

152 = ozone season days per year for equipment operated Monday – Friday
AF = Seasonal Adjustment Factor

VOC emissions = 378,002.61 $\div$ 152 $\times$ 74.15% $\div$ 1,000 $\times$ 2.205 $\div$ 2,000
= 0.00203 tons/day (typical ozone season day)

San Antonio International Airport provided AACOG with the information on the Nonroad equipment used in 2002, Table 3-60. Defaults were used only when data was not provided on the survey. Conversions, from cubic centimeters (cc) to hp, were performed when hp was unknown. From this information, emissions were estimated using the methodology previously mention. Emissions data is provided in the Military/Airport Summary Tables at the end of this chapter.

Table 3-60. Survey results for San Antonio International Airport Nonroad Equipment, 2002

| Equipment Type | Engine Type: | SCC | HP | Equip. Pop. | Daily Hrs per Unit Operated (M - F) | Daily Hrs per Unit Operated (Sa & Su) |
|---|---|---|---|---|---|---|
| **Lawn & Garden Equipment:** | | | | | | |
| Chainsaws | Gasoline 2-cycle | 2260004021 | 3.0 | 2 | 1 | 0 |
| Trimmers/Edgers/Brush Cut | Gasoline 2-cycle | 2260004026 | 1.3 | 9 | 4 | 0 |
| Trimmers/Edgers/Brush Cut | Gasoline 2-cycle | 2260004026 | 0.9 | 3 | 2 | 0 |
| Leaf Blowers/Vacuums | Gasoline 2-cycle | 2260004031 | 2.5 | 4 | 2 | 0 |
| Lawn Mowers | Gasoline 4-cycle | 2265004011 | 12.5 | 2 | 4 | 0 |
| Rotary Tillers | Gasoline 2-cycle | 2260004016 | 0.9 | 1 | 1.8 | 0 |
| Rear Engine Riding Mowers | Gasoline 4-cycle | 2265004041 | 20.0 | 2 | 6 | 0 |
| Rear Engine Riding Mowers | Diesel | 2270004041 | 23.0 | 1 | 6 | 2 |
| Front Mowers | Diesel | 2270004046 | 18.0 | 1 | 4 | 0 |
| Front Mowers | Diesel | 2270004046 | 40.0 | 1 | 6 | 2 |
| Commercial Turf Equipment | Diesel | 2270004071 | 86.0 | 5 | 5 | 2 |
| Commercial Turf Equipment | Diesel | 2270004071 | 105.0 | 5 | 5 | 2 |
| Lawn and Garden Tractors | Diesel | 2270004056 | 18.0 | 1 | 2 | 0 |
| **Other Equipment:** | | | | | | |
| Air Compressors | Diesel | 2270006015 | 80.0 | 2 | 0.5 | 0 |
| Air Compressors | Diesel | 2270006015 | 24.0 | 2 | 0.5 | 0 |
| Portable Generators | Diesel | 2270006005 | 8.0 | 3 | 0.5 | 0 |
| Generator | Diesel | 2270006005 | 71.2 | 1 | 1.8 | 0 |
| Paint Machines - Other Ind. Equip. | Gasoline 4-cycle | 2265003040 | 5.0 | 1 | 0.5 | 0 |
| Paint Machines - Other Ind. Equip. | Gasoline 4-cycle | 2265003040 | 3.0 | 2 | 2 | 0.5 |

## Stinson Municipal Airport

### Introduction

Stinson Municipal Airport is the second oldest general aviation airport in continuous operation in the United States. As the primary reliever for general aviation traffic in San Antonio, Stinson is extremely appealing to operators of light aircraft, individuals, and private aviation companies.

Stinson Municipal Airport is located south of downtown San Antonio on Mission Road. It is approximately 6 minutes from San Antonio's central business district and easily accessible to Interstate Highway Loop 410, Interstate Highway 37, Interstate Highway 35, and Interstate Highway 10. It is approximately 14 miles due south of San Antonio International Airport.

According to the information obtained from Stinson[63], the airport's activity levels reached a total of 179,212 operations for military and general aviation in the year 2002. Operations consist of mainly military and general aviation; the airport is not certified for air carrier flights.

The military frequently uses the field to fly visual omni range (VOR) approaches, as the VOR at Stinson is the only remaining operational VOR in the area. USAF aircraft (specifically the T-37) only fly touch-&-go approaches. The reported flight activities at the airport for 2002 are summarized in table 3-61.

### Methodology

The following sections describe the methodologies employed for developing the emission estimates. Similar to the San Antonio International Airport, emissions from the Stinson were calculated using the Emission & Dispersion Modeling System version 4.2 (EDMS).[64] Data on aircraft flight activities was collected from both the "FAA/FPA Terminal Area Forecast" (TAF) software and "Airport IQ Data Center" internet site, which is a web-based flight activity tracking and reporting software for all U.S. airports. The information on local and itinerant aircraft activities gathered from these sources was then entered into the EDMS model to estimate the amount of pollutants attributed to aircraft activities.

---

[63] Note: Beatrice Valdez-Heidari (ph 923-4357) was the contact person at Stinson Airport.
[64] The Federal Aviation Administration, Sept. 30, 2004. "Emissions & Dispersion Modeling System", Available online: http://www.aee.faa.gov/emissions/edms/EDMShome.htm

Table 3-61. 2002 Air Traffic at Stinson Municipal Airport

| Month | General Aviation | Military | Totals |
|---|---|---|---|
| Jan | 13,711 | 643 | 14,354 |
| Feb | 14,249 | 645 | 14,894 |
| Mar | 13,123 | 609 | 13,732 |
| Apr | 15,240 | 754 | 15,994 |
| May | 15,562 | 487 | 16,049 |
| Jun | 14,355 | 505 | 14,860 |
| Jul | 15,190 | 431 | 15,621 |
| Aug | 17,699 | 661 | 18,366 |
| Sep | 15,847 | 477 | 16,324 |
| Oct | 12,676 | 754 | 13,430 |
| Nov | 13,262 | 735 | 13,997 |
| Dec | 11,122 | 469 | 11,591 |
| TOTAL | 172,036 | 7,170 | 179,212 |

Commercial Aircraft

Aircraft operations counts were provided by the approved FAA database Airport IQ[65]. The data provided included commercial and civilian aircraft by total landings and aircraft type. Data was only available for 2003 and 2004. The 2002 total commercial operations data, which came from TAF database, was compared to the 2003/2004 total commercial operations to calculate a growth ratio and apply to the commercial aircraft specific 2003/2004 data. This way, the growth was universally spread among various commercial aircraft types for the year 2002.

When entering this aircraft data into the EDMS model, a comparison of aircraft types had to be made with those of the EDMS 4.2 default aircraft types to match the most compatible engine types. The following table (3.62) indicates the type and activity level of commercial “air carrier” and “commuter” aircrafts that were used in the Stinson commercial aircraft emission analysis for the year 2002. When the exact aircraft type was not available in EDMS, the equivalent aircraft is listed.

[65] Gregrory C. Rigamer & Associates, Oct. 2002 “Airport IQ: Airport Intelligence Software”, Available online: http://www.airportiq.com/

Table 3-62. Commercial Aircraft Type and Departure Activity at Stinson Municipal Airport, 2002.

| Type Designator | Number of Arrivals, 2002 | Aircraft Name | Engine Type | Engine/Notes | Equivalent aircraft |
|---|---|---|---|---|---|
| BE20 | 1 | Beech - 200 Super King Air | 2T/S+ | | |
| BE30 | 1 | Beech - Super King Air300 | 2T/S+ | | |
| BE40 | 5 | Beech - 400 Beechjet | 2J/S+ | | |
| C172 | 1 | Cessna - 172 | 1P/S | | |
| C182 | 1 | Cessna - 182 | 1P/S | O-200 | Cessna 150 |
| C525 | 3 | Cessna - Citationjet 525 | 2J/S | FJ44-1A | C500 |
| C560 | 3 | Cessna - 560 Citation 5 | 2J/S+ | | |
| C56X | 2 | Cessna - 560 Citation 5 | 2J/S+ | | C560 |
| C750 | 1 | Cessna - 750 Citation 10 | 2J/S+ | | |
| E135 | 1 | Embraer - EMB-135 | 2J/L | | |
| H25B | 1 | British Aerospace - BAe-125-700/800 (C-29, U-125) | 2J/S+ | | |
| LJ31 | 4 | Bombardier - Learjet 31 | 2J/S+ | | |
| LJ45 | 1 | Bombardier - Learjet 45 | 2J/S+ | TFE731-2-2B | Learjet 35/36 |
| MO20 | 1 | Mooney Aircraft - Mark 20 | 1P/S | IO-360-B | Cessna 172 Skyhawk |
| PA27 | 1 | Piper - PA-23-235/250 Aztec | 2P/S | | |
| PA30 | 3 | Piper - PA-30/39 Twin Comanche | 2P/S | IO-360-B | Cessna T337 |
| Total | 30 | | | | |

General Aviation Aircraft

There were 172,036 general aviation aircraft operations for 2002, which were allocated to three general aviation aircrafts type: Jet, Turbo-Prop, and Piston. Similar to the commercial aircraft, general aviation aircraft operations counts were provided by the approved FAA database Airport IQ[66]. The data was used to calculate a breakdown by the three types of aircraft (Figure 3-63). Each arrival consists of two operations (one landing and one take-off).

Table 3-63. General Aviation Breakdown at the Stinson Municipal Airport, 2002.

| General Aviation Aircraft type | Percentage breakdown by aircraft types, 2003 | Total Operations by aircraft type, 2002 | Number of Arrivals, 2002 |
|---|---|---|---|
| Jet | 4.0% | 6,852 | 3,426 |
| Turbo | 3.9% | 6,747 | 3,373 |
| Piston | 92.1% | 158,438 | 79,219 |
| Total | 100.0% | 172,036 | 86,018 |

[66] Gregrory C. Rigamer & Associates, Oct. 2002 “Airport IQ: Airport Intelligence Software”, Available online: http://www.airportiq.com/

Recorded operations by aircraft manufacture and name was provided for only some of the general aviation aircraft records in the FAA database Airport IQ for small airports in the AACOG region. The percentage breakdown between aircraft manufacture/name from small airports was applied to general aviation aircraft in each of the three categories at Stinson.

The following tables (3.64, 3.65, and 3.66) indicates the type and activity level of general aviation jet, piston, turbo-prop aircrafts that were used in the Stinson general aviation aircraft emission analysis for the year 2002. When the exact aircraft type was not available in EDMS, the equivalent aircraft was used. In four cases, the author had to create a user-define aircraft because the equivalent aircraft was not available in the EDMS database.

Table 3-64. Jet General Aviation at Stinson Municipal Airport, 2002.

| Aircraft Name | Percentage by Type | Estimated Number of Arrivals 2002 |
|---|---|---|
| Beech - 400 Beechjet | 4.2% | 142 |
| Bell - 206 | 3.8% | 129 |
| Bell - Twin Huey, Model 212 | 2.3% | 78 |
| Bombardier - Learjet 24 | 2.6% | 90 |
| Bombardier - Learjet 25 | 2.3% | 78 |
| Bombardier - Learjet 31 | 10.6% | 362 |
| Bombardier - Learjet 35 | 6.0% | 207 |
| Bombardier - Learjet 45 | 17.4% | 595 |
| Bombardier - Learjet 55 | 12.1% | 414 |
| Bombardier - Learjet 60 | 17.4% | 595 |
| British Aerospace - Hawker Siddeley HS 125 | 1.5% | 52 |
| Canadair - CL-600 Challenger/600 Bombardier | 2.3% | 78 |
| Cessna - 500 Citation, Citation 1 | 10.2% | 349 |
| Cessna - 501 Citation 1SP | 2.3% | 78 |
| Cessna - 560 Citation 5 | 1.5% | 52 |
| Cessna - 750 Citation 10 | 3.0% | 103 |
| Cessna - Citation 2 | 0.8% | 26 |
| Total | 100.0% | 3,426 |

Table 3-65. Turbo-Prop General Aviation at Stinson Municipal Airport, 2002.

| Aircraft Name | Percentage by Type | Estimated Number of Arrivals 2002 |
|---|---|---|
| Aerospatiale - ATR-42-200/300/320 | 1.0% | 34 |
| Aerospatiale - TBM TB-700 | 0.5% | 17 |
| Beech - 100 King Air | 2.0% | 68 |
| Beech - 200 Super King Air | 26.8% | 903 |
| Beech – 90 King Air | 33.8% | 1,141 |
| Beech – B300 Super King Air 350 | 6.6% | 221 |
| Cessna - 425, Corsair, Conquest 1 | 1.5% | 51 |
| Cessna - 441, Conquest, Conquest 2 | 1.5% | 51 |
| Embraer - 110/111 Bandeirante (C-95, EC-95, P-95, R-95, SC-95) | 1.0% | 34 |
| Gulfstream - G-159 Gulfstream I | 0.5% | 17 |
| Mitsubishi Aircraft - MU-2, Marquise, Solitaire | 2.0% | 68 |
| Piper – 31/31P T-1020 | 5.1% | 170 |
| Swearingen Merlin | 9.6% | 324 |
| Swearingen Metro 2 | 8.1% | 273 |
| Total | 100.0% | 3,373 |

Table 3-66. Piston General Aviation at Stinson Municipal Airport, 2002.

| Aircraft Name | Percentage by Type | Estimated Number of Arrivals 2002 |
|---|---|---|
| Beech - Twin Beech 18 | 0.2% | 119 |
| Cessna - 150 | 18.3% | 14,485 |
| Cessna - 172 | 42.4% | 33,559 |
| Cessna - 208 | 0.2% | 119 |
| Cessna – T337 | 18.3% | 14,485 |
| Pilatus Flugzaugwerke (Fairchild) PC-12, Eagle | 3.1% | 2,444 |
| Piper – 23 - Aztec (U-11, E-19, UC-26) | 6.8% | 5,365 |
| Piper – 28 - Archer, Cadet, Cherokee, Cherokee Archer/Challenger/Chief/Cruiser/ Flite Liner/Warrior | 9.0% | 7,093 |
| Piper – 30 Twin Comanche | 1.7% | 1,311 |
| Rockwell - 112 Commander | 0.3% | 238 |
| Total | 100.0% | 79,219 |

Military Aircraft

The military also uses the Airport's amenities for training purposes and TAF software maintains records on these military activities. The following table (3-67) indicates flight characteristics for military operations occurring at Stinson, which were used as input to the EDMS model to calculate emissions from military activities in the Airport.

Table 3-67. Military Operations at Stinson Municipal Airport by Aircraft Type

| Aircraft Mix | 1996 Aircraft Activity | | 2002 Aircraft Activity | |
|---|---|---|---|---|
| | LTO | TGO | LTO | TGO |
| T43A | 0 | 20 | 0 | 32 |
| T-1A | 0 | 85 | 0 | 138 |
| T-34/T-37 | 0 | 2,104 | 0 | 3,417 |
| Total Operations | 4,418 | | 7,170 | |

Note: each TGO = 2 operations

The information on the landing and take off (LTO) cycles and touch and go (TGO) by aircraft type were next entered into the EDMS and processed to determine emissions for 2002.

Evaporative Emissions

Evaporative emissions include emissions generated by diurnal losses and refueling losses.

*Diurnal Losses*

The following equation[67] was used for quantifying HC evaporative emissions resulting from general aviation aircraft diurnal losses.

$$ET = 0.15 \text{ lbs./day/based aircraft} \times Ab \times D \times 1.005$$

Where: ET = total HC emissions, in pounds, resulting from diurnal losses;

Ab = number of aircraft based in the region of interest; and

D = number of days in the period of interest.

1.005 = HC $\rightarrow$ VOC conversion factor

[67] U.S. Environmental Protection Agency, April 1997. "Air Quality Procedures for Civilian Airports & Air Force Bases." Available online: http://www.aee.faa.gov/emissions/local/aq-hndbk/aq-hndbk1.htm

*Refueling Loss*

EPA-approved methodology for aircraft includes a refueling and spillage loss of 4.61 grams of HC per gallon of fuel consumed. The 2002 aircraft fuel consumption rate was estimated using a straight-line calculation with TTI's 1999 and 2007 fuel consumption ratios as follows:

Calculating 2002 fuel consumption ratio:

1999 ratio = 6.09 (1,000 gal./aircraft)
2007 ratio = 7.37 (1,000 gal./aircraft)
2002 ratio = ((7,370 gal./aircraft – 6,090 gal./aircraft) x (3 / 8)) + 6,090 gal./aircraft
= 6,570 gal./aircraft

Converting grams HC to lbs. VOC (per gallon):

EF = 4.61 HC g/gal. / 1,000 g/kg x 2.205 lbs./kg x 1.005 VOC/HC
= 0.01022 lbs. VOC /gal.

<u>Non Road Equipment</u>

Emissions for this category consist of lawn and garden equipment, construction equipment, commercial equipment and other equipment. Emissions estimations are based on local data produced from surveys and on national data used in the EPA's NONROAD 2004 Emissions Inventory Model. The survey requests:

- Equipment type and quantity
- Activity Rates – total annual hours of use
- Temporal Profiles – hrs of use on weekdays and weekends

Annual VOC, NOx, and CO emissions were estimated based on survey responses and NONROAD model defaults. The emissions were converted to tons/day for typical summer ozone-season days by using seasonal adjustment factors. This process is described in full in the Small Airports section of this chapter

*Annual Emissions*

Emissions (grams/year) = LF × EF × HRS × HP

Where:

LF = typical load factor
EF = average emissions of pollutant per unit of use
HRS = average annual hours of use for that equipment type
HP = average rated horsepower for that equipment type

Annual VOC emissions for diesel tractors (SCC 2270002066):

| Factor | | Quantity | Source |
|---|---|---|---|
| LF | = | 0.21 | NONROAD default |
| EF (Yearly VOC) | = | 1.15485 | calculated using NONROAD Model (see full description in Small Airports section) |
| HRS | = | 1135 | NONROAD default |
| HP | = | 94.98424 | survey |

VOC emissions = 0.21 x 1.15485 x 1135 x 94.98424
= 26,039.74 grams/year

These emissions are then converted to tons/year:
= 26,145 g/yr. / 1,000 g/kg × 2.205 lbs./kg / 2,000 lbs./ton
= 0.02883 tons/year

*Daily Emissions*

Emissions (grams/year) = LF × EF × HRS × 261 × HP
↳ EP × HD
↳ HY / 261

Where:

LF = typical load factor
EF = average emissions of pollutant per unit of use
HRS = average *weekday* hours of use for that equipment type
261 = days per year for equipment operated Monday – Friday
EP = equipment population (count)
HD = average hours/day
HY = average annual hours of use for that equipment type
HP = average rated horsepower for that equipment type

Annual VOC emissions for diesel tractors (SCC 2270002066):

| Factor | | Quantity | Source |
|---|---|---|---|
| LF | = | 0.21 | NONROAD default |
| EF (Daily VOC) | = | 1.15485 | calculated using NONROAD Model (see full description in Small Airports section) |
| HRS | = | 17.39464 | (EP x HD) |
| EP | = | 4 | survey |
| HD | = | 4.34866 | (HY x 261) |
| HY | = | 1,135 | NONROAD default |
| HP | = | 94.98424 | survey |

VOC emissions = 0.21 x 1.15485 x (4 x (1,135 / 261)) x 261 x 94.98424
= 0.21 x 1.15485 x (4 x 4.34866) x 261 x 94.98424
= 0.21 x 1.15485 x 17.39464 x 261 x 94.98424
= 104,581 weekday grams/year

These emissions are then converted to tons/day.

Emissions (tons/day) = weekday g/yr. × AF / 152 / g/kg × lbs./kg / lbs./ton

Where:

152 = ozone season days per year for equipment operated Monday – Friday
AF = Seasonal Adjustment Factor

VOC emissions = 104,580 / 152 × 68.66% / 1,000 × 2.205 / 2,000
= 0.00052 tons/day (typical ozone season day)

<u>Other Sources</u>

No traffic emissions were included in the inventory since access to most airport areas is from public roads.

## Small Airports

### Introduction

This section describes the process of calculating emissions attributed to the aircraft operations at small airports within the AACOG region. The emissions from lawn and garden equipment used for maintenance of these small airports were also calculated and are described in the following section. Groundside on-road vehicle emissions are assumed insignificant.

### Aircraft Methodology

The data used for this section was obtained through the "FAA/APO Terminal Area Forecast" software or from the "Airport IQ Data Center"[68] website. Airport IQ Data Center uses the FAA 5010 database to report on the local and itinerant operational activities. Emission factors were provided by the Texas Transportation Institute.[69] Data from these two sources as well as the emission factors were used to calculate emissions for small airports in the AACOG region. Data for Kestrel Airpark was obtained from the manager of the airport.

Commercial Aircraft

Aircraft operations counts were provided by the approved FAA database Airport IQ[70]. The data provided included commercial and civilian aircraft by total landings and aircraft type. Five small Airports recorded commercial activity: McKinley Field Airport, Gillespie County Airport, New Braunfels Municipal Airport, Kerrville Municipal Airport/Louis Schreiner Field, and Hondo Municipal Airport.

When entering this aircraft data into the EDMS model, a comparison of aircraft types had to be made with those of the EDMS 4.2 default aircraft types to match the most compatible engine types. The following table (3.68) indicates the type and activity level of commercial "air carrier" and "commuter" aircrafts that were used in the commercial aircraft emission analysis for the year 2002. When the exact aircraft type was not available in EDMS, the equivalent aircraft is listed.

---

[68] Available on line, 9/02/04: http://www.gcr1.com/5010WEB/
[69] J. Borowiec, T. Qu, and C. Bell, 1996, 1999, and 2007 Airport Emission Inventory, March 2000. Texas Transportation Institute, College Station, TX.
[70] Gregrory C. Rigamer & Associates, Oct. 2002 "Airport IQ: Airport Intelligence Software", Available online: http://www.airportiq.com/

Table 3-68. Commercial Aircraft Type and Departure Activity at Small AACOG Airports, 2002.

| Aircraft Name | Engine Type | Engine/Notes | Equivalent aircraft | McKinley Field Airport | Gillespie County Airport | New Braunfels Municipal Airport | Kerrville Municipal Airport/Louis Schreiner Field | Hondo Municipal Airport |
|---|---|---|---|---|---|---|---|---|
| Beech - 100 King Air | 2T/S | | | | 5 | | | |
| Beech - 200 Super King Air | 2T/S+ | | | 2 | 2 | | 10 | |
| Beech - 36 Bonanza | 1P/S | IO-360-B | Cessna 172 Skyhawk | | | | 2 | |
| Beech - 400 Beechjet | 2J/S+ | | | 2 | 23 | 4 | 26 | 3 |
| Beech - 55 Baron | 2P/S | IO-360-B | Cessna T337 | | 2 | | | |
| Bombardier - Learjet 24 | 2J/S | | | | | 26 | | 1 |
| Bombardier - Learjet 25 | 2J/S+ | | | | | 30 | 5 | |
| Bombardier - Learjet 31 | 2J/S+ | | | | 8 | 1 | 7 | |
| Bombardier - Learjet 35 | 2J/S+ | | | | 2 | 1 | 2 | 3 |
| Bombardier - Learjet 45 | 2J/S+ | TFE731-2-2B | Learjet 35/36 | | 4 | | 16 | 2 |
| Bombardier - Learjet 60 | 2J/S+ | TFE731-2-2B | Learjet 35/36 | | | 2 | 18 | |
| British Aerospace - Hawker Siddeley HS 125 | 2J/S+ | | | | 3 | 2 | 12 | 1 |
| Canadair – CL-600 Challenger/600 Bombardier | 2J/L | CF34-3A | CL601-3A | | | 1 | 8 | |
| Cessna – 172 | 1P/S | | | | | | 2 | |
| Cessna – 177, Cardinal | 1P/S | O-200 | Cessna 150 | | | | 2 | |
| Cessna – 182 | 1P/S | O-200 | Cessna 150 | | 1 | | | |
| Cessna - 208 Caravan 1, (Super) Cargomaster, Grand Caravan | 1T/S | | | | | 2 | | |
| Cessna – 401, 402, Utililiner, Businessliner | 2P/S | IO-360-B | Cessna T337 | | | 1 | 2 | |
| Cessna – 414 | 2P/S | IO-360-B | Cessna T337 | | 3 | | | |
| Cessna – 560 Citation 5 | 2J/S+ | | | 1 | 11 | 2 | 29 | 1 |
| Cessna – 750 Citation 10 | 2J/S+ | | | | | 1 | 6 | 1 |
| Cessna - Citation 2 | 2J/S+ | | | | 11 | | 7 | |
| Cessna - Citation 3 | 2J/S+ | CF34-3A | CL601-3A | | 1 | | 2 | |
| Cessna - Citationjet 525 | 2J/S | FJ44-1A | C500 | | 9 | | 2 | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Cirrus - SR22 | 1P/S | IO-550-N | Cherokee six | | | 1 | | |
| Dassault - Breguet - Falcon 2000 | 2J/S+ | | | | | | | 2 |
| Dassault - Falcon (Mystere) 20 | 2J/S+ | | | | | 15 | | |
| Dassault - Falcon 50 | 3J/S+ | | | | 1 | | 9 | |
| Embraer - 110/111 Bandeirante (C-95, EC-95, P-95, R-95, SC-95) | 2T/S+ | | | | | 1 | | |
| Fairchild - Merlin 3, Fairchild 300 | 2T/S+ | TPE 331-3 | Swearingen Metro 2 | | | 1 | | |
| Gulfstream Aerospace | 2J/L | | | | | | 2 | |
| Isreal Aircraft Industries (IAI)/Gulfstream - 1124 Westwind | 2J/S+ | | | | | | 4 | |
| Mitsubishi Aircraft - MU-2, Marquise, Solitaire | 2T/S | PT6A-65B | BH-1900 | | | 5 | | |
| Mitsubishi Aircraft - MU-300 Diamond | 2J/S+ | | | | | 1 | | |
| Mooney Aircraft - Mark 20 | 1P/S | IO-360-B | Cessna 172 Skyhawk | | | | 1 | |
| Piper - Archer, Cadet, Cherokee, Cherokee Archer/Challenger/Chief/Cruiser/ Flite Liner/Warrior | 1P/S | | | | | 1 | 1 | |
| Piper - PA-32 Cherokee Six, Six, Saratoga, Turbo Saratoga, 6, 6XT | 1P/S | IO-360-B | Cessna 172 Skyhawk | | | | 1 | |
| Short Brothers - 360, SD3-60 | 2T/S+ | | | | | 2 | | |
| Total | | | 0.0% | 5 | 86 | 100 | 176 | 14 |

General Aviation Aircraft

General Aviation were allocated to three general aviation aircrafts type: Jet, Turbo-Prop, and Piston. Similar to the commercial aircraft, general aviation aircraft operations counts were provided by the approved FAA database Airport IQ[71]. The data was used to calculate a breakdown by the three types of aircraft (Figure 3-69). Each arrival consists of two operations (one landing and one take-off).

Recorded operations by aircraft manufacture and name was provided for only some of the general aviation aircraft records in the FAA database Airport IQ for small airports in the AACOG region. The percentage breakdown between aircraft manufacture/name for small airports was applied to general aviation aircraft in each of the three categories.

The following tables (3.70, 3.71, and 3.72) indicates the type/name and activity level of general aviation jet, piston, turbo-prop aircrafts that were used in the small airports emission analysis for the year 2002. When the exact aircraft type was not available in EDMS, the equivalent aircraft was used. In four cases, the author had to create a user-define aircraft because the equivalent aircraft was not available in the EDMS database.

Helicopter operations were applied to only airports that recorded Helicopter operations: Kerrville Municipal Airport/Louis Schreiner Field and Hondo Municipal Airport. The Helicopter operations represented 3.8 percent of the total operations at these airports.

[71] Gregrory C. Rigamer & Associates, Oct. 2002 “Airport IQ: Airport Intelligence Software”, Available online: http://www.airportiq.com/

Table 3-69. General Aviation (GA) Breakdown at Small Airports, 2002.

| Airport | County | Aircraft Type | | | | | | Total GA Arrivals |
|---|---|---|---|---|---|---|---|---|
| | | Jet | | Turbo | | Piston | | |
| | | Arrivals | Percentage | Arrivals | Percentage | Arrivals | Percentage | |
| Pleasanton Municipal Airport | Atascosa | 63 | 2.4% | 613 | 23.6% | 1,924 | 74.0% | 2,600 |
| Boerne Stage Field Airport | Bexar | 196 | 1.9% | 245 | 2.4% | 9,910 | 95.7% | 10,350 |
| Horizon Airport | Bexar | 0 | 0.0% | 0 | 0.0% | 1,400 | 100.0% | 1,400 |
| San Geronimo Airpark | Bexar | 0 | 0.0% | 0 | 0.0% | 6,900 | 100.0% | 6,900 |
| Triple R Airport | Bexar | 0 | 0.0% | 0 | 0.0% | 2,100 | 100.0% | 2,100 |
| Twin-Oaks Airport | Bexar | 100 | 3.2% | 0 | 0.0% | 3,050 | 96.8% | 3,150 |
| Bulverde Airpark | Comal | 0 | 0.0% | 0 | 0.0% | 12,300 | 100.0% | 12,300 |
| Kestrel Airpark | Comal | 11 | 10.1% | 0 | 0.0% | 97 | 89.9% | 108 |
| Dilley Airpark | Frio | 25 | 7.4% | 170 | 50.0% | 145 | 42.6% | 340 |
| McKinley Field Airport | Frio | 549 | 27.5% | 238 | 11.9% | 1,213 | 60.7% | 2,000 |
| Gillespie County Airport | Gillespie | 381 | 8.8% | 287 | 6.6% | 3,682 | 84.7% | 4,350 |
| Huber Airpark Civic Club LLC Airport | Guadalupe | 0 | 0.0% | 0 | 0.0% | 0 | 100.0% | 0 |
| New Braunfels Municipal Airport | Guadalupe | 2,684 | 22.4% | 1,658 | 13.8% | 7,658 | 63.8% | 12,000 |
| Karnes County Airport | Karnes | 192 | 3.3% | 992 | 17.2% | 4,578 | 79.4% | 5,762 |
| Kerrville Municipal Airport/Louis Schreiner Field | Kerr | 5,628 | 25.4% | 3,435 | 15.5% | 13,102 | 59.1% | 22,165 |
| Castroville Municipal Airport | Medina | 472 | 5.7% | 216 | 2.6% | 7,563 | 91.7% | 8,250 |
| Devine Municipal Airport | Medina | 0 | 0.0% | 0 | 0.0% | 2,800 | 100.0% | 2,800 |
| Hondo Municipal Airport | Medina | 2,531 | 30.1% | 1,400 | 16.7% | 4,469 | 53.2% | 8,400 |

Table 3-70. Jet General Aviation at Small Airports, 2002.

| Aircraft Name | Percentage by Type | Pleasanton Municipal Airport | Boerne Stage Field Airport | Horizon Airport | San Geronimo Airpark | Triple R Airport | Twin-Oaks Airport | Bulverde Airpark | Kestrel Airpark | Dilley Airpark |
|---|---|---|---|---|---|---|---|---|---|---|
| Beech - 400 Beechjet | 4.3% | 3 | 8 | 0 | 0 | 0 | 4 | 0 | 0 | 1 |
| Bell – 206 | * | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bombardier - Learjet 24 | 2.4% | 1 | 5 | 0 | 0 | 0 | 2 | 0 | 0 | 1 |
| Bombardier - Learjet 25 | 2.7% | 2 | 5 | 0 | 0 | 0 | 3 | 0 | 0 | 1 |
| Bombardier - Learjet 31 | 2.4% | 1 | 5 | 0 | 0 | 0 | 2 | 0 | 0 | 1 |
| Bombardier - Learjet 35 | 11.0% | 7 | 21 | 0 | 0 | 0 | 11 | 0 | 1 | 3 |
| British Aerospace - Hawker Siddeley HS 125 | 6.3% | 4 | 12 | 0 | 0 | 0 | 6 | 0 | 1 | 2 |
| Canadair - CL-600 Challenger/600 Bombardier | 18.0% | 11 | 35 | 0 | 0 | 0 | 18 | 0 | 2 | 5 |
| Cessna - 500 Citation, Citation 1 | 12.5% | 8 | 25 | 0 | 0 | 0 | 13 | 0 | 1 | 3 |
| Cessna - 560 Citation 5 | 18.0% | 11 | 35 | 0 | 0 | 0 | 18 | 0 | 2 | 5 |
| Cessna - 750 Citation 10 | 1.6% | 1 | 3 | 0 | 0 | 0 | 2 | 0 | 0 | 0 |
| Cessna – Citation 2 | 2.4% | 1 | 5 | 0 | 0 | 0 | 2 | 0 | 0 | 1 |
| Falcon 20 | 10.6% | 7 | 21 | 0 | 0 | 0 | 11 | 0 | 1 | 3 |
| Dassault – Falcon 50 | 2.4% | 1 | 5 | 0 | 0 | 0 | 2 | 0 | 0 | 1 |
| Gulfstream Aerospace G-V Gulfstream V | 1.6% | 1 | 3 | 0 | 0 | 0 | 2 | 0 | 0 | 0 |
| Gulfstream Aerospace III | 3.1% | 2 | 6 | 0 | 0 | 0 | 3 | 0 | 0 | 1 |
| Mitsubishi Aircraft - MU-300 Diamond | 0.8% | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Total | 100.0% | 63 | 196 | 0 | 0 | 0 | 100 | 0 | 11 | 25 |

*only applied to Kerrville Municipal Airport/Louis Schreiner Field and Hondo Municipal Airport (3.8% of total Jet General Aviation)

Table 3-70. Jet General Aviation at Small Airports, 2002 (cont.).

| Aircraft Name | Percentage by Type | McKinley Field Airport | Gillespie County Airport | Huber Airpark Civic Club LLC Airport | New Braunfels Municipal Airport | Karnes County Airport | Kerrville Municipal Airport/Louis Schreiner Field | Castroville Municipal Airport | Devine Municipal Airport | Hondo Municipal Airport |
|---|---|---|---|---|---|---|---|---|---|---|
| Beech - 400 Beechjet | 4.3% | 24 | 16 | 0 | 116 | 8 | 234 | 20 | 0 | 105 |
| Bell – 206 | * | 0 | 0 | 0 | 0 | 0 | 212 | 0 | 0 | 96 |
| Bombardier - Learjet 24 | 2.4% | 13 | 9 | 0 | 63 | 5 | 127 | 11 | 0 | 57 |
| Bombardier - Learjet 25 | 2.7% | 15 | 10 | 0 | 74 | 5 | 149 | 13 | 0 | 67 |
| Bombardier - Learjet 31 | 2.4% | 13 | 9 | 0 | 63 | 5 | 127 | 11 | 0 | 57 |
| Bombardier - Learjet 35 | 11.0% | 60 | 42 | 0 | 295 | 21 | 595 | 52 | 0 | 267 |
| British Aerospace - Hawker Siddeley HS 125 | 6.3% | 34 | 24 | 0 | 168 | 12 | 340 | 30 | 0 | 153 |
| Canadair - CL-600 Challenger/600 Bombardier | 18.0% | 99 | 69 | 0 | 484 | 35 | 977 | 85 | 0 | 439 |
| Cessna - 500 Citation, Citation 1 | 12.5% | 69 | 48 | 0 | 337 | 24 | 680 | 59 | 0 | 306 |
| Cessna - 560 Citation 5 | 18.0% | 99 | 69 | 0 | 484 | 35 | 977 | 85 | 0 | 439 |
| Cessna - 750 Citation 10 | 1.6% | 9 | 6 | 0 | 42 | 3 | 85 | 7 | 0 | 38 |
| Cessna – Citation 2 | 2.4% | 13 | 9 | 0 | 63 | 5 | 127 | 11 | 0 | 57 |
| Falcon 20 | 10.6% | 58 | 40 | 0 | 284 | 20 | 573 | 50 | 0 | 258 |
| Dassault – Falcon 50 | 2.4% | 13 | 9 | 0 | 63 | 5 | 127 | 11 | 0 | 57 |
| Gulfstream Aerospace G-V Gulfstream V | 1.6% | 9 | 6 | 0 | 42 | 3 | 85 | 7 | 0 | 38 |
| Gulfstream Aerospace III | 3.1% | 17 | 12 | 0 | 84 | 6 | 170 | 15 | 0 | 76 |
| Mitsubishi Aircraft - MU-300 Diamond | 0.8% | 4 | 3 | 0 | 21 | 2 | 42 | 4 | 0 | 19 |
| Total | 100.0% | 549 | 381 | 0 | 2,684 | 192 | 5,628 | 472 | 0 | 2,531 |

*only applied to Kerrville Municipal Airport/Louis Schreiner Field and Hondo Municipal Airport (3.8% of total Jet General Aviation)

Table 3-71. Turbo-Prop General Aviation at Small Airports, 2002.

| Aircraft Name | Percentage by Type | Pleasanton Municipal Airport | Boerne Stage Field Airport | Horizon Airport | San Geronimo Airpark | Triple R Airport | Twin-Oaks Airport | Bulverde Airpark | Kestrel Airpark | Dilley Airpark |
|---|---|---|---|---|---|---|---|---|---|---|
| Aerospatiale - ATR-42-200/300/320 | 1.0% | 6 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| Aerospatiale - TBM TB-700 | 0.5% | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Beech - 100 King Air | 2.0% | 12 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| Beech - 200 Super King Air | 26.8% | 164 | 65 | 0 | 0 | 0 | 0 | 0 | 0 | 46 |
| Beech - 90 King Air | 33.8% | 207 | 83 | 0 | 0 | 0 | 0 | 0 | 0 | 58 |
| Beech - B300 Super King Air 350 | 6.6% | 40 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 11 |
| Cessna - 425, Corsair, Conquest 1 | 1.5% | 9 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| Cessna - 441, Conquest, Conquest 2 | 1.5% | 9 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| Embraer - 110/111 Bandeirante (C-95, EC-95, P-95, R-95, SC-95) | 1.0% | 6 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| Gulfstream - G-159 Gulfstream I | 0.5% | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Mitsubishi Aircraft - MU-2, Marquise, Solitaire | 2.0% | 12 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| Piper - 31/31P T-1020 | 5.1% | 31 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 9 |
| Swearingen Merlin | 9.6% | 59 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 16 |
| Swearingen Metro 2 | 8.1% | 50 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 14 |
| Total | 100.0% | 613 | 245 | 0 | 0 | 0 | 0 | 0 | 0 | 170 |

Table 3-71. Turbo-Prop General Aviation at Small Airports, 2002 (cont.).

| Aircraft Name | Percentage by Type | McKinley Field Airport | Gillespie County Airport | Huber Airpark Civic Club LLC Airport | New Braunfels Municipal Airport | Karnes County Airport | Kerrville Municipal Airport/Louis Schreiner Field | Castroville Municipal Airport | Devine Municipal Airport | Hondo Municipal Airport |
|---|---|---|---|---|---|---|---|---|---|---|
| Aerospatiale - ATR-42-200/300/320 | 1.0% | 2 | 3 | 0 | 17 | 10 | 35 | 2 | 0 | 14 |
| Aerospatiale - TBM TB-700 | 0.5% | 1 | 1 | 0 | 8 | 5 | 17 | 1 | 0 | 7 |
| Beech - 100 King Air | 2.0% | 5 | 6 | 0 | 33 | 20 | 69 | 4 | 0 | 28 |
| Beech - 200 Super King Air | 26.8% | 64 | 77 | 0 | 444 | 266 | 919 | 58 | 0 | 375 |
| Beech - 90 King Air | 33.8% | 80 | 97 | 0 | 561 | 336 | 1,162 | 73 | 0 | 474 |
| Beech - B300 Super King Air 350 | 6.6% | 16 | 19 | 0 | 109 | 65 | 226 | 14 | 0 | 92 |
| Cessna - 425, Corsair, Conquest 1 | 1.5% | 4 | 4 | 0 | 25 | 15 | 52 | 3 | 0 | 21 |
| Cessna - 441, Conquest, Conquest 2 | 1.5% | 4 | 4 | 0 | 25 | 15 | 52 | 3 | 0 | 21 |
| Embraer - 110/111 Bandeirante (C-95, EC-95, P-95, R-95, SC-95) | 1.0% | 2 | 3 | 0 | 17 | 10 | 35 | 2 | 0 | 14 |
| Gulfstream - G-159 Gulfstream I | 0.5% | 1 | 1 | 0 | 8 | 5 | 17 | 1 | 0 | 7 |
| Mitsubishi Aircraft - MU-2, Marquise, Solitaire | 2.0% | 5 | 6 | 0 | 33 | 20 | 69 | 4 | 0 | 28 |
| Piper – 31/31P T-1020 | 5.1% | 12 | 14 | 0 | 84 | 50 | 173 | 11 | 0 | 71 |
| Swearingen Merlin | 9.6% | 23 | 28 | 0 | 159 | 95 | 330 | 21 | 0 | 134 |
| Swearingen Metro 2 | 8.1% | 19 | 23 | 0 | 134 | 80 | 278 | 17 | 0 | 113 |
| Total | 100.0% | 238 | 287 | 0 | 1,658 | 992 | 3,435 | 216 | 0 | 1,400 |

Table 3-72. Piston General Aviation at Small Airports, 2002.

| Aircraft Name | Percentage by Type | Pleasanton Municipal Airport | Boerne Stage Field Airport | Horizon Airport | San Geronimo Airpark | Triple R Airport | Twin-Oaks Airport | Bulverde Airpark | Kestrel Airpark | Dilley Airpark |
|---|---|---|---|---|---|---|---|---|---|---|
| Beech - Twin Beech 18 | 0.2% | 3 | 15 | 2 | 10 | 3 | 5 | 19 | 0 | 0 |
| Cessna – 150 | 18.3% | 352 | 1,812 | 256 | 1,262 | 384 | 558 | 2,249 | 18 | 27 |
| Cessna – 172 | 42.4% | 815 | 4,198 | 593 | 2,923 | 890 | 1,292 | 5,211 | 41 | 61 |
| Cessna – 208 | 0.2% | 3 | 15 | 2 | 10 | 3 | 5 | 19 | 0 | 0 |
| Cessna - T337 | 18.3% | 352 | 1,812 | 256 | 1,262 | 384 | 558 | 2,249 | 18 | 27 |
| Pilatus Flugzaugwerke (Fairchild) PC-12, Eagle | 3.1% | 59 | 306 | 43 | 213 | 65 | 94 | 379 | 3 | 4 |
| Piper – 23 - Aztec (U-11, E-19, UC-26) | 6.8% | 130 | 671 | 95 | 467 | 142 | 207 | 833 | 7 | 10 |
| Piper – 28 - Archer, Cadet, Cherokee, Cherokee Archer/Challenger/Chief/Cruiser/ Flite Liner/Warrior | 9.0% | 172 | 887 | 125 | 618 | 188 | 273 | 1,101 | 9 | 13 |
| Piper – 30 Twin Comanche | 1.7% | 32 | 164 | 23 | 114 | 35 | 50 | 204 | 2 | 2 |
| Rockwell - 112 Commander | 0.3% | 6 | 30 | 4 | 21 | 6 | 9 | 37 | 0 | 0 |
| Total | 100.0% | 1,924 | 9,910 | 1,400 | 6,900 | 2,100 | 3,050 | 12,300 | 97 | 145 |

Table 3-72. Piston General Aviation at Small Airports, 2002 (cont.).

| Aircraft Name | Percentage by Type | McKinley Field Airport | Gillespie County Airport | Huber Airpark Civic Club LLC Airport | New Braunfels Municipal Airport | Karnes County Airport | Kerrville Municipal Airport/Louis Schreiner Field | Castroville Municipal Airport | Devine Municipal Airport | Hondo Municipal Airport |
|---|---|---|---|---|---|---|---|---|---|---|
| Beech - Twin Beech 18 | 0.2% | 2 | 6 | 0 | 12 | 7 | 20 | 11 | 4 | 7 |
| Cessna – 150 | 18.3% | 222 | 673 | 0 | 1,400 | 837 | 2,396 | 1,383 | 512 | 817 |
| Cessna – 172 | 42.4% | 514 | 1,560 | 0 | 3,244 | 1,939 | 5,550 | 3,204 | 1,186 | 1,893 |
| Cessna – 208 | 0.2% | 2 | 6 | 0 | 12 | 7 | 20 | 11 | 4 | 7 |
| Cessna - T337 | 18.3% | 222 | 673 | 0 | 1,400 | 837 | 2,396 | 1,383 | 512 | 817 |
| Pilatus Flugzaugwerke (Fairchild) PC-12, Eagle | 3.1% | 37 | 114 | 0 | 236 | 141 | 404 | 233 | 86 | 138 |
| Piper – 23 - Aztec (U-11, E-19, UC-26) | 6.8% | 82 | 249 | 0 | 519 | 310 | 887 | 512 | 190 | 303 |
| Piper - 28 - Archer, Cadet, Cherokee, Cherokee Archer/Challenger/Chief/Cruiser/Flite Liner/Warrior | 9.0% | 109 | 330 | 0 | 686 | 410 | 1,173 | 677 | 251 | 400 |
| Piper - 30 Twin Comanche | 1.7% | 20 | 61 | 0 | 127 | 76 | 217 | 125 | 46 | 74 |
| Rockwell - 112 Commander | 0.3% | 4 | 11 | 0 | 23 | 14 | 39 | 23 | 8 | 13 |
| Total | 100.0% | 1,213 | 3,682 | 0 | 7,658 | 4,578 | 13,102 | 7,563 | 2,800 | 4,469 |

Military Aircraft

The military also uses three of the Small Airport's amenities for training purposes: Pleasanton Municipal Airport, Gillespie County Airport, and Hondo Municipal Airport. The TAF software maintains records on these military activities. The following table (3-73) indicates flight characteristics for military operations occurring at these airports, which were used as input to the EDMS model to calculate emissions from military activities in the Airport. The breakdown of aircraft type/name is the same as the military breakdown for Stinson Municipal Airport.

Table 3-73. TGO Military Operations at Small Airports by Aircraft Type

| Aircraft Name | Percentage by Aircraft Type | Pleasanton Municipal Airport | Gillespie County Airport | Hondo Municipal Airport |
|---|---|---|---|---|
| T43A | 0.9% | 5 | 1 | 654 |
| T-1A | 3.8% | 21 | 3 | 2,781 |
| T-34/T-37 | 95.2% | 514 | 83 | 68,849 |
| Total | 100.0% | 540 | 88 | 72,285 |

Evaporative Emissions

Evaporative emissions include emissions generated by diurnal losses and refueling losses.

*Diurnal Losses*

The following equation[72] was used for quantifying HC evaporative emissions resulting from general aviation aircraft diurnal losses.

$$ET = 0.15 \text{ lbs./day/based aircraft} \times Ab \times D \times 1.005$$

Where:
- ET = total HC emissions, in pounds, resulting from diurnal losses;
- Ab = number of aircraft based in the region of interest; and
- D = number of days in the period of interest.
- 1.005 = HC $\rightarrow$ VOC conversion factor

*Sample Calculation*

Small Airport = McKinley Field Airport
EF = 0.15 lbs./day/aircraft
Ab = 11 Based-Aircraft
D = 365 day/year
HC/VOC conversion = 1.005

*Yearly Diurnal Emissions at McKinley Field:*

[72] U.S. Environmental Protection Agency, April 1997. "Air Quality Procedures for Civilian Airports & Air Force Bases." Available online: http://www.aee.faa.gov/emissions/local/aq-hndbk/aq-hndbk1.htm

VOC Emissions = (0.15 lbs./day/based aircraft x 11 aircraft x 365 x 1.005)
= 605 lbs./year / 2000 lbs./ton
= 0.30 tons/year

*Daily Diurnal Emissions at McKinley Field:*

VOC Emissions = 0.30 tons/year / 365 days/year
= 0.00083 tons/day

*Refueling Loss*

EPA-approved methodology for aircraft includes a refueling and spillage loss of 4.61 grams of HC per gallon of fuel consumed.[69] The 2002 aircraft fuel consumption rate was estimated using a straight-line calculation with TTI's 1999 and 2007 fuel consumption ratios as follows:

Calculating 2002 fuel consumption ratio:

1999 ratio = 6.09 (1,000 gal./aircraft)
2007 ratio = 7.37 (1,000 gal./aircraft)
2002 ratio = ((7,370 gal./aircraft – 6,090 gal./aircraft) x (3 / 8)) + 6,090 gal./aircraft
= 6,570 gal./aircraft

Converting grams HC to lbs. VOC (per gallon):

EF = 4.61 HC g/gal. / 1,000 g/kg x 2.205 lbs./kg x 1.005 VOC/HC
= 0.01022 lbs. VOC /gal.

*Sample Calculation*

Small Airport = Pleasanton Municipal Airport
Number of based aircraft = 27
2002 fuel consumption ratio = 6,570 gal./aircraft
EF = 0.01022 lbs. VOC / gal.

*Yearly Emissions*

VOC Emissions (lbs.) = 27 aircraft x 6,570 gal./aircraft per year x 0.01022 lbs. VOC/gal
= 1,813 lbs./year
VOC Emissions (tons)= 1,813 lbs./year / 2,000 lbs./ton
= 0.90646 tons/year

*Daily Emissions*

VOC Emissions (tons)= 0.90646 tons/year / 365 days/year
= 0.00248 tons/day

Lawn and Garden Equipment

The small airport Lawn and Garden equipment EI accomplishes two goals:

1 Provides a foundation that will allow for better assessment of small airport lawn and garden equipment activity emissions at the county level for each county in the AACOG twelve-county area for the year 2002.

2 Provides a mechanism to determine the representative emissions that would occur on any given day in the typical commercial equipment use period.

This inventory takes into account the following types and categories of equipment:

| SCC: | Equipment Type/Category: |
|---|---|
| 2260004026 | 2-stroke commercial trimmers/edgers/brush cutters |
| 2260004031 | 2-stroke commercial leaf blowers/vacuums |
| 2265004011 | 4-stroke commercial lawnmowers |
| 2265004046 | 4-stroke commercial front mowers |
| 2265004056 | 4-Stroke commercial lawn and garden Tractors |
| 2265002066 | 4-Stroke tractors/loaders/backhoes |
| 2270007010 | Diesel shredders > 5 HP |

The methodology used in calculating emissions from the small airports' lawn and garden equipment in the AACOG region relies on data extracted from locally conducted surveys and national level data used in the NONROAD model, in the absence of reliable local data. The methodology involved the following steps:

1. Conduct a survey of small airports' lawn and garden equipment to determine the equipment usage rates and equipment type.

2. Estimate equipment population and activity levels for small airports that did not respond to the survey. This was accomplished by using the available equipment population data for small airports that responded to surveys. Averages were calculated and applied to the small airports with missing data. The small airports were identified for each county in which they existed.

3. Estimate VOC, NOx, and CO annual emissions by using the NONROAD model's equipment populations and converting the tons/year estimate into an estimate for a typical weekday (tons/day), for the summer ozone season.

*Step 1:*

A survey of equipment use at small airports within the AACOG region was conducted. A copy of the survey questionnaire is attached to the end of this section. There are 19 small airports in the AACOG region and 21 percent responded to the survey. Names and addresses of these facilities and their responses remained confidential throughout the survey process via use of proprietary codes.

The following information was extracted from the survey:

- Activity Rates (HRS) – total annual hours of use for specific equipment
- Temporal Profiles – equipment use on weekdays and equipment use on weekend days for all types of equipment
- Engine Characteristics:
    - Engine Type – gasoline 2-stroke, gasoline 4-stroke, diesel
    - Engine Horsepower – rated power of the engine
    - Fuel type- LPG, CNG

*Step 2:*
An airport to equipment ratio was created for small airports by dividing the total pieces of equipment counted for each category by the total number of airports. This ratio was used to calculate estimated equipment populations for the remaining airports in counties within the AACOG region. The number of small airports in each county was multiplied by the equipment ratio.

*Example*

| | |
|---|---|
| Estimates # Trimmers for County ”A” | = (# Small airports in the County) |
| | x (average number of Trimmers per airport) |
| | = (3) x (1.75) |
| | = 5.25 |
| Estimated # Trimmers for County “A” | = 5 |

*Step 3*
Once county level equipment populations were calculated, emissions of volatile organic compounds (VOC), nitrogen oxides (NOx), and carbon monoxide (CO) were determined using the 2004 NONROAD model. In using the NONROAD model, some adjustments were made for local conditions.

*Population File*
The data for population, activity hours, and horsepower values were summed by equipment category. The equipment populations estimated from the surveys were multiplied by the ratio of activity hours extracted from the surveys in lieu of NONROAD’s default activity hours. NONROAD’s default values were lower for most equipment types than local survey responses indicated. For instance, the model’s default activity levels for front-engine mowers were very low at only 120 hours per year. On the other hand, small airports tended to use lawn mowers and shredders less often than NONROAD’s default.

Table 3-74. Small Airport Equipment Population Estimations Based on the AACOG Survey

| Small Airport Lawn and Garden Equipment | SCC | Engine Type | Estimated Equipment Population | Hours/Year per piece of equipment | NONROAD model Default Hours | Adjustment factor | New Equipment population |
|---|---|---|---|---|---|---|---|
| Trimmers/ Edgers/ Brush Cutters | 2260004026 | Gasoline 2-cycle | 29 | 220 | 137 | 1.60 | 46 |
| Leaf Blowers/ Vacuums | 2260004031 | Gasoline 2-cycle | 14 | 324 | 282 | 1.15 | 16 |
| Lawn Mowers | 2265004011 | Gasoline 4-cycle | 17 | 144 | 406 | 0.36 | 6 |
| Front Mowers | 2265004046 | Gasoline 4-cycle | 5 | 268 | 120 | 2.24 | 10 |
| Lawn and Garden Tractors | 2265004056 | Gasoline 4-cycle | 13 | 1,305 | 721 | 1.81 | 9 |
| Shredders | 2270007010 | Diesel | 12 | 605 | 1,068 | 0.57 | 7 |
| Total | | | 88 | | | | 93 |

NONROAD's allocation file was also updated with updated horsepower (HP) estimates from the survey. Table 3-75 compares the default HPs from NONROAD 2004 with average HPs from the survey responses. In almost all cases, the horsepower levels were very similar between the default values and the survey responses. However, small airports tended to use larger lawn and garden tractors and smaller leaf blowers. For the NONROAD model run, equipment populations were allocated to horsepower bins based on survey responses.

Table 3-75. Small Airport Equipment HP Estimations Based on the AACOG Survey

| Small Airports Lawn and Garden Equipment | Engine Type | SCC | NONROAD model Default HP | Estimated Equipment HP |
|---|---|---|---|---|
| Trimmers/ Edgers/ Brush Cutters | Gasoline 2-cycle | 2260004026 | 1.5 | 0.9 |
| Leaf Blowers/ Vacuums | Gasoline 2-cycle | 2260004031 | 2.0 | 1.0 |
| Lawn Mowers | Gasoline 4-cycle | 2265004011 | 4.1 | 4.4 |
| Front Mowers | Gasoline 4-cycle | 2265004046 | 13.5 | 15.0 |
| Lawn and Garden Tractors | Gasoline 4-cycle | 2265004056 | 14.4 | 48.0 |
| Shredders | Diesel | 2270007010 | N/A | 15.0 |

*Allocation File*

An allocation file was created to properly allocate emissions for each county. The file was made by taking the default landscape allocation file for Texas (TX_LSCAP.AOL) and replacing values (employees in landscape and horticulture service) with zeros for all counties except those in the study area. Values for counties in AACOG were allocated based on the number of small airports in each county. The values for all AACOG counties were summed and this total was used to replace the value for the entire State of Texas, as shown in Table 3-76. This allows the NONROAD model to calculate emissions for the AACOG region as a whole and distribute the emissions to each county appropriately.

Table 3-76. Allocation of Small Airport Equipment in AACOG Region, 2002

| FIPS | County | Total # of Small Airports (Indicator value) | Percentage |
|---|---|---|---|
| 48013 | Atascosa | 1 | 5.5% |
| 48019 | Bandera | 0 | 0.0% |
| 48029 | Bexar | 5 | 27.8% |
| 48091 | Comal | 2 | 11.1% |
| 48163 | Frio | 2 | 11.1% |
| 48171 | Gillespie | 1 | 5.5% |
| 48187 | Guadalupe | 2 | 11.1% |
| 48255 | Karnes | 1 | 5.5% |
| 48259 | Kendall | 0 | 0.0% |
| 48265 | Kerr | 1 | 5.5% |
| 48325 | Medina | 3 | 16.7% |
| 48493 | Wilson | 0 | 0.0% |
| 48000 | AACOG | 18 | 100.0% |

*Activity File*

The equipment activity rates (hours/day) used in the lawn and garden emission calculations were based on survey responses, as listed in table 3-77.

Table 3-77. Survey Results for Average Hours Usage for Small Airport Equipment in the AACOG Region

| Commercial Lawn & Garden Equipment | Engine Type | Avg. # Hrs. Ea. Unit is Operated Weekday | Avg. # Hrs. Ea. Unit is Operated Weekend |
|---|---|---|---|
| Trimmers/ Edgers/ Brush Cutters | Gasoline 2-cycle | 0.3 | 1.4 |
| Leaf Blowers/ Vacuums | Gasoline 2-cycle | 0.0 | 3.0 |
| Lawn Mowers | Gasoline 4-cycle | 0.1 | 1.1 |
| Front Mowers | Gasoline 4-cycle | 0.3 | 0.0 |
| Lawn and Garden Tractors | Gasoline 4-cycle | 2.1 | 0.2 |
| Shredders | Diesel | 2.2 | 0.3 |

*Seasonal File*

A weekday versus weekend adjustment factor of 0.1116428 per weekday and 0.2208930 per weekend day was used in the emissions calculations. The results (Table 3-78) were based on the total hours for each time period from the AACOG survey.

Table 3-78. Nonroad Equipment Emissions for Each Airport Calculated in Small Airports

| Nonroad Equipment Description | SCC | VOC | NOx | CO | VOC | NOx | CO |
|---|---|---|---|---|---|---|---|
| | | tons/year | | | tons/day (Mon. - Fri.) | | |
| 2-Str Trimmers/Edgers/Bush Cutters | 2260004026 | 0.08 | 0.00 | 0.15 | 0.00022 | 0.00000 | 0.00045 |
| 2-Str Leaf Blower/Vacuum | 2260004031 | 0.07 | 0.00 | 0.16 | 0.00021 | 0.00000 | 0.00046 |
| 4-Str Tractors/Loaders/Backhoes | 2265002066 | 0.07 | 0.08 | 1.60 | 0.00019 | 0.00020 | 0.00458 |
| 4-Str Lawn Mowers | 2265004011 | 0.01 | 0.00 | 0.14 | 0.00003 | 0.00000 | 0.00040 |
| 4-Str Front Mowers | 2265004046 | 0.01 | 0.00 | 0.32 | 0.00002 | 0.00001 | 0.00096 |
| 4-Str Lawn & Garden Tractors | 2265004056 | 0.01 | 0.00 | 0.35 | 0.00002 | 0.00001 | 0.00104 |
| Dsl – Shredders > 5 HP | 2270007010 | 0.00 | 0.01 | 0.01 | 0.00000 | 0.00002 | 0.00002 |
| TOTAL | | 0.24 | 0.09 | 2.73 | 0.00069 | 0.00024 | 0.00791 |

Alamo Area Council Of Governments

May 15, 2002

[COMPANY NAME]
[STREET ADDRESS]
[CITY] [STATE] [ZIP]

**ATTENTION: OWNER/ MAINTENANCE MANAGER**

Re: <u>2002 San Antonio Emissions Inventory</u>

The Alamo Area Council of Governments (AACOG) requests your assistance in the development of a 2002, air quality emission inventory for San Antonio and the surrounding counties. AACOG is conducting this inventory in order to assess and quantify local air quality within the San Antonio Metropolitan area and contiguous counties. This inventory is especially significant because the San Antonio region currently risks being declared in non-attainment of federal air quality standards.

AACOG will calculate emissions from the commercial lawn and garden equipment using information submitted by local organizations involved in commercial lawn and garden activities in and around the San Antonio region. With this survey, we are requesting information on commercial equipment used during the 2002 calendar year within Atascosa, Bandera, Bexar, Comal, Frio, Gillespie, Guadalupe, Karnes, Kendall, Kerr, Medina, and Wilson counties. The purpose of this survey is to provide better information and services to our region, as well as help minimize additional regulation on the community.

Your input is vital to this process and will serve to affect a true and correct emissions inventory for 2002 that will be delivered to the EPA. Please provide your responses on the attached survey and return it to us in the self-addressed envelope by the date indicated. The information you provide will be considered strictly confidential and unavailable to public information requests. Please submit your response by June 19, 2002.

Thank you for your time and participation. If you have any questions or comments please feel free to contact Chris Langston at (210) 362-5270.

Regionally yours,

Al J. Notzon III
Executive Director

| | Internal Combustion Equipment Type | Engine Type<br>Gasoline 2-cycle<br>Gasoline 4-cycle<br>Diesel<br>Propane<br>Natural Gas<br>Electric | Approx. Horse-Power Rating | Number of Units Typically Operated | Avg. No. of Hours and Time of Day Each Unit Operated (MON-FRI) | Avg. No. of Hours and Time of Day Each Unit Operated (SAT & SUN) |
|---|---|---|---|---|---|---|
| **COMMERCIAL LAWN AND GARDEN EQUIPMENT** | | | | | | |
| 1 | Lawn Mowers | | | | | |
| 2 | Rear Engine Riding Mowers | | | | | |
| 3 | Front Mowers | | | | | |
| 4 | Rotary Tillers | | | | | |
| 5 | Chain Saws | | | | | |
| 6 | Chippers/Stump Grinders/Mulchers | | | | | |
| 7 | Trimmers/Edgers/ Brush Cutters | | | | | |
| 8 | Commercial Turf Equipment/ Sod Cutters | | | | | |
| 9 | Leaf Blowers/ Vacuums | | | | | |
| 10 | Lawn and Garden Tractors | | | | | |
| 11 | Shredders | | | | | |
| 12 | Other Lawn and Garden Equipment: (Please Describe): ________________ | | | | | |

## Airport/Military Emissions - Bexar County, 2002

### *Non-Military*

**San Antonio International Airport**

| Area Emissions: | SCC | VOC | NOx | CO | VOC | NOx | CO |
|---|---|---|---|---|---|---|---|
| | | tons/year | | | tons/day (Mon. - Fri.) | | |
| Fueling Ops | 2275900000 | 68.93 | 0.00 | 0.00 | 0.18885 | 0.00000 | 0.00000 |
| Boilers | 2102006001 | 0.01 | 3.77 | 0.27 | 0.00003 | 0.01034 | 0.00075 |
| **AREA** | **TOTAL** | **68.94** | **3.77** | **0.27** | **0.18888** | **0.01034** | **0.00075** |
| **Non-Road Emissions:** | | | | | | | |
| 4-Str Other General Industrial Equipment | 2265003040 | 0.07 | 0.01 | 1.91 | 0.00026 | 0.00004 | 0.00684 |
| 2-Str Rotary Tiller | 2260004016 | 0.04 | 0.00 | 0.08 | 0.00019 | 0.00000 | 0.00040 |
| 2-Str Chain Saw < 6 HP | 2260004021 | 0.22 | 0.00 | 0.53 | 0.00084 | 0.00001 | 0.00202 |
| 2-Str Trimmers/Edgers/Bush Cutters | 2260004026 | 2.82 | 0.01 | 6.07 | 0.01374 | 0.00006 | 0.02959 |
| 2-Str Leaf Blower/Vacuum | 2260004031 | 0.96 | 0.01 | 2.30 | 0.00471 | 0.00003 | 0.01124 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.42 | 0.03 | 6.43 | 0.02033 | 0.00016 | 0.03137 |
| 4-Str Rear Engine Riding Mowers (Com) | 2265004041 | 0.30 | 0.09 | 17.85 | 0.00147 | 0.00045 | 0.08707 |
| Dsl - Rear Engine Riding Mowers (Com) | 2270004041 | 0.03 | 0.13 | 0.08 | 0.00011 | 0.00057 | 0.00036 |
| Dsl - Front Mowers (Com) | 2270004046 | 0.06 | 0.29 | 0.18 | 0.00025 | 0.00128 | 0.00081 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 0.01 | 0.03 | 0.02 | 0.00003 | 0.00015 | 0.00010 |
| Dsl - Commercial Turf Equipment | 2270004071 | 0.54 | 4.26 | 1.89 | 0.00225 | 0.01794 | 0.00796 |
| Dsl - Generator Sets | 2270006005 | 0.02 | 0.09 | 0.05 | 0.00006 | 0.00036 | 0.00021 |
| Dsl - Air Compressors | 2270006015 | 0.01 | 0.09 | 0.04 | 0.00004 | 0.00034 | 0.00016 |
| Roadways/Parking Lots | 2201001000 | 31.39 | 44.48 | 316.92 | 0.08599 | 0.12186 | 0.86827 |
| Dsl - Generator Set | 2270006005 | 0.01 | 0.06 | 0.03 | 0.00005 | 0.00030 | 0.00018 |
| GSE/AGE/APU | 2270008000 | 87.42 | 128.35 | 2303.59 | 0.23950 | 0.35165 | 6.31120 |
| Aircraft | 2275050000 | 270.72 | 457.23 | 1074.98 | 0.74168 | 1.25268 | 2.94514 |
| **NON-ROAD** | **TOTAL** | **395.01** | **635.17** | **3,732.96** | **1.11151** | **1.74786** | **10.30291** |
| **San Antonio International Airport** | **TOTAL** | **463.96** | **638.94** | **3,733.23** | **1.30039** | **1.75820** | **10.30366** |

**Small Airports - Boerne Stage Field, Horizon, San Geronimo, Triple R, & Twin-Oaks Airports**

| Area Emissions: | SCC | VOC | NOx | CO | VOC | NOx | CO |
|---|---|---|---|---|---|---|---|
| | | tons/year | | | tons/day | | |
| Aviation Gasoline - Stage 2: Total | 2501080100 | 5.47 | 0.00 | 0.00 | 0.01499 | 0.00000 | 0.00000 |
| **AREA** | **TOTAL** | **5.47** | **0.00** | **0.00** | **0.01499** | **0.00000** | **0.00000** |
| **Non-Road Emissions:** | | | | | | | |
| 2-Str Trimmers/Edgers/Bush Cutters | 2260004026 | 0.38 | 0.00 | 0.77 | 0.00110 | 0.00000 | 0.00223 |
| 2-Str Leaf Blower/Vacuum | 2260004031 | 0.36 | 0.00 | 0.79 | 0.00105 | 0.00000 | 0.00229 |
| 4-Str Tractors/Loaders/Backhoes | 2265002066 | 0.34 | 0.39 | 7.98 | 0.00094 | 0.00100 | 0.02289 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 0.05 | 0.00 | 0.68 | 0.00013 | 0.00001 | 0.00199 |
| 4-Str Front Mowers (Com) | 2265004046 | 0.04 | 0.01 | 1.62 | 0.00011 | 0.00003 | 0.00479 |
| 4-Str Lawn & Garden Tractors (Com) | 2265004056 | 0.03 | 0.01 | 1.77 | 0.00009 | 0.00003 | 0.00521 |
| Dsl - Shredders > 5 HP | 2270007010 | 0.01 | 0.04 | 0.05 | 0.00002 | 0.00008 | 0.00010 |
| Aircraft - Boerne Stage Field | 2275050000 | 3.84 | 0.76 | 97.79 | 0.01052 | 0.00209 | 0.26793 |
| GSE/AGE/APU - Boerne Stage Field | 2270008000 | 0.25 | 0.66 | 6.10 | 0.00068 | 0.00180 | 0.01670 |
| Aircraft - Horizon | 2275050000 | 0.30 | 0.06 | 13.22 | 0.00083 | 0.00016 | 0.03622 |
| GSE/AGE/APU - Horizon | 2270008000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Aircraft - San Geronimo | 2275050000 | 1.49 | 0.28 | 65.14 | 0.00409 | 0.00077 | 0.17847 |
| GSE/AGE/APU - San Geronimo | 2270008000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Aircraft - Triple R. | 2275050000 | 0.45 | 0.09 | 19.82 | 0.00124 | 0.00023 | 0.05431 |
| GSE/AGE/APU - Triple R. | 2270008000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Aircraft - Twin-Oaks Airport | 2275050000 | 1.15 | 0.26 | 30.25 | 0.00315 | 0.00070 | 0.08288 |
| GSE/AGE/APU - Twin-Oaks Airport | 2270008000 | 0.06 | 0.19 | 1.39 | 0.00017 | 0.00051 | 0.00379 |
| Aircraft Diurnal Loss | 2275900202 | 4.48 | 0.00 | 0.00 | 0.01229 | 0.00000 | 0.00000 |
| **NON-ROAD** | **TOTAL** | **13.24** | **2.74** | **247.37** | **0.03641** | **0.00741** | **0.67980** |
| **SMALL AIRPORTS** | **TOTAL** | **18.71** | **2.74** | **247.37** | **0.05140** | **0.00741** | **0.67980** |

**Stinson Municipal Airport**

| Area Emissions: | SCC | VOC | NOx | CO | VOC | NOx | CO |
|---|---|---|---|---|---|---|---|
| | | tons/year | | | tons/day | | |
| Aviation Gasoline - Stage 2: Total | 2501080100 | 2.68 | 0.00 | 0.00 | 0.00735 | 0.00000 | 0.00000 |
| **AREA** | **TOTAL** | **2.68** | **0.00** | **0.00** | **0.00735** | **0.00000** | **0.00000** |

**Non-Road Emissions:**

**Construction Equipment:**

## Airport/Military Emissions - Bexar County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4-Str Cement & Mortar Mixers | 2265002042 | 0.01 | 0.00 | 0.29 | 0.00005 | 0.00001 | 0.00132 |
| Dsl - Tractors/Loaders/Backhoes | 2270002066 | 0.03 | 0.12 | 0.12 | 0.00052 | 0.00225 | 0.00210 |
| **Light Commercial Equipment:** | | | | | | | |
| 4-Str Pressure Washers | 2265006030 | 0.02 | 0.00 | 0.54 | 0.00007 | 0.00001 | 0.00206 |
| Dsl - Air Compressor | 2270006015 | 0.02 | 0.14 | 0.07 | 0.00007 | 0.00055 | 0.00026 |
| **Recreational Equipment:** | | | | | | | |
| 4-Str ATV | 2270001030 | 0.01 | 0.01 | 0.02 | 0.00003 | 0.00007 | 0.00010 |
| **Lawn and Garden Equipment:** | | | | | | | |
| 2-Str Chain Saw < 6 HP | 2260004021 | 0.08 | 0.00 | 0.20 | 0.00033 | 0.00000 | 0.00078 |
| 2-Str Trimmers/Edgers/Bush Cutters | 2260004026 | 0.08 | 0.00 | 0.18 | 0.00091 | 0.00000 | 0.00196 |
| 2-Str Leaf Blower/Vacuum | 2260004031 | 0.31 | 0.00 | 0.74 | 0.00150 | 0.00001 | 0.00359 |
| 4-Str Lawn Mowers | 2265004011 | 0.05 | 0.00 | 0.80 | 0.00025 | 0.00002 | 0.00390 |
| 4-Str Rotary Tillers < 5 HP | 2265004016 | 0.05 | 0.00 | 0.67 | 0.00022 | 0.00002 | 0.00328 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.02 | 0.00 | 0.28 | 0.00007 | 0.00001 | 0.00137 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 0.07 | 0.02 | 4.38 | 0.00036 | 0.00011 | 0.02136 |
| **Agricultural Equipment:** | | | | | | | |
| 4-Str Sprayers | 2265005035 | 0.01 | 0.00 | 0.23 | 0.00004 | 0.00001 | 0.00115 |
| **Other:** | | | | | | | |
| GSE/AGE/APU* | 2270008000 | 3.73 | 6.85 | 94.01 | 0.01021 | 0.01877 | 0.25757 |
| Aircraft | 2275050000 | 37.77 | 8.96 | 817.93 | 0.10348 | 0.02454 | 2.24090 |
| Aircraft Diurnal Loss | 2275900202 | 3.27 | 0.00 | 0.00 | 0.00897 | 0.00000 | 0.00000 |
| **NON-ROAD** | **TOTAL** | **45.52** | **16.13** | **920.45** | **0.12708** | **0.04638** | **2.54169** |
| **STINSON** | **TOTAL** | **48.21** | **16.13** | **920.45** | **0.13443** | **0.04638** | **2.54169** |

### *Military*

**Brooks City-Base**

| | SCC | VOC | NOx | CO | VOC | NOx | CO |
|---|---|---|---|---|---|---|---|
| **Area Emissions:** | | tons/year | | | tons/day | | |
| Internal Combustion | 2102006002 | 0.15 | 1.89 | 0.41 | 0.00041 | 0.00518 | 0.00112 |
| External Combustion | 2270006005 | 0.39 | 7.04 | 5.62 | 0.00107 | 0.01929 | 0.01540 |
| Fuel Storage / Dispensing | 2501060100 | 7.47 | 0.00 | 0.00 | 0.02047 | 0.00000 | 0.00000 |
| General Processes | 2275001000 | 2.45 | 0.00 | 0.00 | 0.00671 | 0.00000 | 0.00000 |
| Waste Incineration | 2601020000 | 0.00 | 0.01 | 0.01 | 0.00000 | 0.00003 | 0.00003 |
| Welding | 2840000020 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Misc. VOC | 9275001000 | 1.10 | 0.00 | 0.00 | 0.00301 | 0.00000 | 0.00000 |
| **AREA** | **TOTAL** | **11.56** | **8.94** | **6.04** | **0.03167** | **0.02449** | **0.01655** |
| **Non-Road Mobile Emissions:** | | | | | | | |
| Roadways | 2201001000 | 4.39 | 7.07 | 47.81 | 0.01203 | 0.01937 | 0.13099 |
| **NON-ROAD** | **TOTAL** | **4.39** | **7.07** | **47.81** | **0.01203** | **0.01937** | **0.13099** |
| **BROOKS CITY-BASE** | **TOTAL** | **15.95** | **16.01** | **53.85** | **0.04370** | **0.04386** | **0.14753** |

**Camp Bullis**

| | SCC | VOC | NOx | CO | VOC | NOx | CO |
|---|---|---|---|---|---|---|---|
| **Area Emissions:** | | tons/year | | | tons/day | | |
| Boilers and Furnaces | 2102006000 | 0.04 | 1.07 | 0.15 | 0.00000 | 0.00000 | 0.00000 |
| DegreasING Operations | 2415000000 | 0.06 | 0.00 | 0.00 | 0.00024 | 0.00000 | 0.00000 |
| Fuel Storage / Dispensing | 2275900000 | 0.08 | 0.00 | 0.00 | 0.00021 | 0.00000 | 0.00000 |
| Woodworking & Fabrication | 2307060000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **AREA** | **TOTAL** | **0.18** | **1.07** | **0.15** | **0.00045** | **0.00000** | **0.00000** |
| **Non-Road Emissions:** | | | | | | | |
| Dsl - Generator set | 2270006005 | 0.05 | 0.67 | 0.14 | 0.00450 | 0.00367 | 0.01197 |
| **NON-ROAD** | **TOTAL** | **0.05** | **0.67** | **0.14** | **0.00450** | **0.00367** | **0.01197** |
| **CAMP BULLIS** | **TOTAL** | **0.23** | **1.74** | **0.29** | **0.00495** | **0.00367** | **0.01197** |

**Fort Sam Houston**

| | SCC | VOC | NOx | CO | VOC | NOx | CO |
|---|---|---|---|---|---|---|---|
| **Area Emissions:** | | tons/year | | | tons/day | | |
| Boilers and Furnaces | 2102006000 | 1.21 | 22.09 | 18.55 | 0.00132 | 0.02401 | 0.02017 |
| Degreasing Operations | 2415000000 | 0.82 | 0.00 | 0.00 | 0.00226 | 0.00000 | 0.00000 |
| Fuel Storage / Dispensing | 2275900000 | 0.92 | 0.00 | 0.00 | 0.00247 | 0.00000 | 0.00000 |
| Misc. VOC | 9275001000 | 2.38 | 0.00 | 0.00 | 0.00652 | 0.00000 | 0.00000 |
| Surface Coating | 2401990000 | 0.57 | 0.00 | 0.00 | 0.00157 | 0.00000 | 0.00000 |
| **AREA** | **TOTAL** | **5.91** | **22.09** | **18.55** | **0.01414** | **0.02401** | **0.02017** |
| **Non-Road Emissions:** | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dsl - Generator set | 2270006000 | 0.06 | 7.16 | 1.54 | 0.00157 | 0.01945 | 0.00419 |
| **NON-ROAD** | **TOTAL** | **0.06** | **7.16** | **1.54** | **0.00157** | **0.01945** | **0.00419** |
| **FORT SAM HOUSTON** | **TOTAL** | **5.97** | **29.24** | **20.10** | **0.01571** | **0.04346** | **0.02436** |

**Lackland Air Force Base & Kelly Air Field**

| | SCC | VOC | NOx | CO | VOC | NOx | CO |
|---|---|---|---|---|---|---|---|
| **Area Emissions:** | | | tons/year | | | tons/day | |
| Jet Engine Testing | 2810040000 | 3.19 | 52.40 | 12.60 | 0.01223 | 0.20078 | 0.04826 |
| **AREA** | **TOTAL** | **3.19** | **52.40** | **12.60** | **0.01223** | **0.20078** | **0.04826** |
| **Non-Road Emissions:** | | | | | | | |
| **Construction Equipment** | | | | | | | |
| 2-Str Plate Compactor | 2260002009 | 0.09 | 0.00 | 0.26 | 0.00036 | 0.00000 | 0.00100 |
| 2-Str Concrete/Industrial Saw | 2260002039 | 0.72 | 0.00 | 1.98 | 0.00275 | 0.00001 | 0.00758 |
| 4-Str Tampers/Rammers | 2265002006 | 0.04 | 0.00 | 0.42 | 0.00014 | 0.00001 | 0.00159 |
| 4-Str Paving Equipment | 2265002021 | 2.14 | 0.01 | 6.13 | 0.00821 | 0.00003 | 0.02348 |
| 4-Str Concrete/Industrial Saw | 2265002039 | 0.14 | 0.03 | 5.24 | 0.00055 | 0.00012 | 0.02006 |
| 4-Str Tractors/Loaders/Backhoes | 2265002066 | 0.04 | 0.03 | 1.17 | 0.00015 | 0.00012 | 0.00448 |
| Dsl - Roller | 2270002015 | 0.02 | 0.16 | 0.08 | 0.00006 | 0.00060 | 0.00029 |
| Dsl - Trencher | 2270002030 | 0.04 | 0.08 | 0.13 | 0.00017 | 0.00031 | 0.00051 |
| Dsl - Crane | 2270002045 | 0.04 | 0.29 | 0.12 | 0.00014 | 0.00111 | 0.00045 |
| Dsl - Grader | 2270002048 | 0.12 | 0.82 | 0.33 | 0.00046 | 0.00314 | 0.00125 |
| Dsl - Off-Highway Truck | 2270002051 | 1.77 | 10.92 | 7.21 | 0.00680 | 0.04183 | 0.02762 |
| Dsl - Tractors/Loaders/Backhoes | 2270002066 | 2.86 | 10.45 | 10.30 | 0.01094 | 0.04005 | 0.03948 |
| Dsl - Crawler Tractor/Dozer | 2270002069 | 0.01 | 0.15 | 0.06 | 0.00004 | 0.00057 | 0.00024 |
| **Light Commercial Equipment** | | | | | | | |
| 4-Str Generator Sets | 2265006005 | 0.22 | 0.03 | 5.76 | 0.00086 | 0.00013 | 0.02207 |
| 4-Str Air Compressor | 2265006015 | 1.61 | 1.02 | 42.80 | 0.00616 | 0.00393 | 0.16400 |
| 4-Str Welders | 2265006025 | 0.28 | 0.05 | 8.92 | 0.00106 | 0.00020 | 0.03416 |
| 4-Str Pressure Washers | 2265006030 | 0.28 | 0.01 | 3.20 | 0.00106 | 0.00006 | 0.01225 |
| Dsl - Generator Sets | 2270006005 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00002 | 0.00001 |
| Dsl - Air Compressor | 2270006015 | 0.01 | 0.03 | 0.02 | 0.00003 | 0.00013 | 0.00009 |
| Dsl - Welders | 2270006025 | 0.00 | 0.01 | 0.01 | 0.00001 | 0.00004 | 0.00003 |
| **Industrial Equipment** | | | | | | | |
| 4-Str Aerial Lifts | 2265003010 | 0.22 | 0.05 | 7.94 | 0.00084 | 0.00018 | 0.03042 |
| 4-Str Forklifts | 2265003020 | 0.01 | 0.00 | 0.16 | 0.00002 | 0.00002 | 0.00061 |
| Dsl - Forklift | 2270003020 | 0.99 | 5.61 | 3.66 | 0.00378 | 0.02149 | 0.01401 |
| Dsl - Sweepers/Scrubbers | 2270003030 | 0.16 | 1.44 | 0.28 | 0.00060 | 0.00550 | 0.00106 |
| Dsl - Other General Industrial Equipment | 2270003040 | 0.08 | 0.47 | 0.28 | 0.00031 | 0.00180 | 0.00107 |
| **Recreational Equipment** | | | | | | | |
| 2-Str Specialty Vehicles/Cart | 2260001060 | 0.01 | 0.00 | 0.28 | 0.00003 | 0.00001 | 0.00109 |
| 4-Str ATV | 2265001030 | 0.31 | 0.03 | 3.02 | 0.00119 | 0.00011 | 0.01156 |
| 4-Str Golf Cart | 2265001050 | 2.27 | 0.43 | 71.94 | 0.00871 | 0.00166 | 0.27564 |
| **Lawn and Garden Equipment** | | | | | | | |
| 2-Str Trimmers/Edgers/Bush Cutters | 2260004026 | 15.57 | 0.09 | 50.65 | 0.05967 | 0.00036 | 0.19407 |
| 2-Str Leaf Blower/Vacuum | 2260004031 | 11.89 | 0.04 | 32.76 | 0.04557 | 0.00016 | 0.12553 |
| 2-Str Chain Saw < 6 HP | 2260004021 | 0.30 | 0.00 | 0.81 | 0.00113 | 0.00000 | 0.00312 |
| 4-Str Lawn Mowers | 2265004011 | 3.88 | 0.64 | 90.25 | 0.01486 | 0.00244 | 0.34580 |
| 4-Str Chain Saw < 6 HP | 2265004021 | 0.02 | 0.00 | 0.17 | 0.00006 | 0.00000 | 0.00067 |
| 4-Str Trimmers/Edgers/Bush Cutters | 2265004026 | 0.14 | 0.01 | 1.62 | 0.00054 | 0.00003 | 0.00621 |
| 4-Str Leaf Blower/Vacuum | 2265004031 | 0.71 | 0.00 | 2.22 | 0.00270 | 0.00002 | 0.00852 |
| 4-Str Shredders < 6 HP | 2265004051 | 0.01 | 0.00 | 0.11 | 0.00004 | 0.00000 | 0.00044 |
| 4-Str Chippers/Stump Grinders | 2265004066 | 0.03 | 0.03 | 1.02 | 0.00013 | 0.00010 | 0.00390 |
| 4-Str Commercial Turf Equipment | 2265004071 | 0.06 | 0.01 | 2.30 | 0.00024 | 0.00005 | 0.00880 |
| 4-Str Other Lawn & Garden Equipment | 2265004076 | 0.33 | 0.04 | 7.31 | 0.00125 | 0.00016 | 0.02799 |
| Dsl - Front Mower | 2270004046 | 0.96 | 6.11 | 3.15 | 0.00369 | 0.02342 | 0.01207 |
| Dsl - chipper/Stump Grinder | 2270004066 | 0.01 | 0.10 | 0.04 | 0.00004 | 0.00036 | 0.00015 |
| **Agricultural Equipment** | | | | | | | |
| 4-Str Sprayers | 2265005035 | 0.58 | 0.03 | 6.71 | 0.00222 | 0.00012 | 0.02572 |
| **Other** | | | | | | | |
| Roadways | 2201001000 | 112.36 | 90.31 | 868.56 | 0.30785 | 0.24743 | 2.37961 |
| 4-Str ASE (Tug) | 2265008005 | 0.47 | 0.38 | 14.55 | 0.00182 | 0.00145 | 0.05574 |
| GSE/AGE/APU | 2270008000 | 1.01 | 15.48 | 5.82 | 0.00388 | 0.05933 | 0.02230 |
| Aircraft | 2275001000 | 49.91 | 283.50 | 216.57 | 0.19121 | 1.08620 | 0.82978 |

## Airport/Military Emissions - Bexar County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **NON-ROAD** | **TOTAL** | **212.71** | **428.93** | **1486.33** | **0.69231** | **1.54480** | **4.74654** |
| **LACKLAND AFB & KELLY AIR FIELD** | **TOTAL** | **215.90** | **481.33** | **1498.92** | **0.70453** | **1.74558** | **4.79481** |

**Randolph Air Force Base**

| | SCC | VOC | NOx | CO | VOC | NOx | CO |
|---|---|---|---|---|---|---|---|
| **Area Emissions:** | | | tons/year | | | tons/day | |
| Jet Engine Testing | 2810040000 | 17.35 | 12.88 | 144.58 | 0.06647 | 0.04935 | 0.55393 |
| **AREA** | **TOTAL** | **17.35** | **12.88** | **144.58** | **0.06647** | **0.04935** | **0.55393** |
| **Non-Road Emissions:** | | | | | | | |
| **Construction Equipment** | | | | | | | |
| 4-Str Tampers/Rammers | 2265002006 | 0.09 | 0.01 | 1.37 | 0.00035 | 0.00003 | 0.00526 |
| 4-Str Paving Equipment | 2265002021 | 0.00 | 0.00 | 0.04 | 0.00001 | 0.00000 | 0.00015 |
| 4-Str Concrete/Industrial Saws | 2265002039 | 0.66 | 0.14 | 22.99 | 0.00253 | 0.00053 | 0.08809 |
| 4-Str Cement & Mortar Mixers | 2265002042 | 0.09 | 0.00 | 1.02 | 0.00033 | 0.00002 | 0.00389 |
| Dsl - Pavers | 2270002003 | 0.26 | 2.38 | 1.27 | 0.00100 | 0.00911 | 0.00486 |
| Dsl - Rollers | 2270002015 | 0.24 | 2.19 | 1.18 | 0.00092 | 0.00840 | 0.00451 |
| Dsl - Trenchers | 2270002030 | 0.27 | 1.30 | 1.03 | 0.00102 | 0.00498 | 0.00396 |
| Dsl - Excavators | 2270002036 | 0.43 | 2.48 | 1.79 | 0.00166 | 0.00949 | 0.00684 |
| Dsl - Off-highway Trucks | 2270002051 | 3.58 | 19.98 | 15.52 | 0.01372 | 0.07657 | 0.05948 |
| Dsl - Tractors/Loaders/Backhoes | 2270002066 | 0.79 | 3.06 | 2.92 | 0.00304 | 0.01171 | 0.01119 |
| Dsl - Skid Steer Loaders | 2270002072 | 0.23 | 0.42 | 0.69 | 0.00088 | 0.00161 | 0.00263 |
| Dsl - Other Construction Equipment | 2270002081 | 0.51 | 0.93 | 1.51 | 0.00195 | 0.00355 | 0.00579 |
| **Light Commercial Equipment** | | | | | | | |
| 4-Str Generator Sets | 2265006005 | 0.08 | 0.00 | 0.91 | 0.00030 | 0.00002 | 0.00348 |
| 4-Str Pumps | 2265006010 | 0.01 | 0.00 | 0.17 | 0.00006 | 0.00000 | 0.00065 |
| 4-Str Welders | 2265006025 | 0.10 | 0.02 | 3.79 | 0.00040 | 0.00009 | 0.01453 |
| 4-Str Pressure Washers | 2265006030 | 0.53 | 0.03 | 6.42 | 0.00202 | 0.00012 | 0.02458 |
| Dsl-Generator Sets | 2270006005 | 0.02 | 0.15 | 0.07 | 0.00007 | 0.00059 | 0.00026 |
| Dsl-Welders | 2270006025 | 0.00 | 0.03 | 0.01 | 0.00002 | 0.00010 | 0.00006 |
| Dsl-Pressure Washers | 2270006030 | 0.02 | 0.00 | 0.21 | 0.00007 | 0.00000 | 0.00080 |
| **Industrial Equipment** | | | | | | | |
| 4-Str Aerial Lifts | 2265003010 | 0.44 | 0.10 | 15.88 | 0.00168 | 0.00037 | 0.06085 |
| 4-Str Sweepers/Scrubbers | 2265003030 | 0.01 | 0.00 | 0.06 | 0.00002 | 0.00000 | 0.00023 |
| Dsl - Forklifts | 2270003020 | 0.22 | 0.89 | 0.93 | 0.00083 | 0.00342 | 0.00358 |
| Dsl - Sweepers/Scrubbers | 2270003030 | 0.18 | 1.68 | 0.31 | 0.00071 | 0.00643 | 0.00118 |
| **Recreational Equipment** | | | | | | | |
| 4-Str ATVs | 2265001030 | 0.10 | 0.01 | 1.01 | 0.00040 | 0.00004 | 0.00385 |
| 4-Str Golf Carts | 2265001050 | 4.16 | 0.24 | 39.75 | 0.01594 | 0.00091 | 0.15229 |
| 4-Str Specialty Vehicles / Carts | 2265001060 | 0.01 | 0.00 | 0.29 | 0.00003 | 0.00001 | 0.00111 |
| Dsl- ATVs | 2270001030 | 0.45 | 0.17 | 4.14 | 0.00172 | 0.00065 | 0.01585 |
| **Lawn and Garden Equipment** | | | | | | | |
| 2-Str Chain Saws < 6 HP (Com) | 2260004021 | 0.37 | 0.00 | 1.02 | 0.00142 | 0.00001 | 0.00391 |
| 2-Str Leafblowers/Vacuums (Com) | 2260004031 | 0.28 | 0.00 | 0.77 | 0.00107 | 0.00000 | 0.00294 |
| 4-Str Lawn Mowers (Com) | 2265004011 | 1.40 | 0.07 | 16.20 | 0.00535 | 0.00029 | 0.06207 |
| 4-Str Trimmers/Edgers/Brush Cutters (Com) | 2265004026 | 0.25 | 0.00 | 0.88 | 0.00096 | 0.00001 | 0.00339 |
| 4-Str Leafblowers/Vacuums (Com) | 2265004031 | 0.05 | 0.00 | 0.14 | 0.00020 | 0.00000 | 0.00055 |
| 4-Str Rear Engine Riding Mower (Com) | 2265004041 | 0.24 | 0.05 | 8.78 | 0.00093 | 0.00020 | 0.03363 |
| 4-Str Commercial Turf Equipment (Com) | 2265004071 | 0.10 | 0.02 | 3.26 | 0.00038 | 0.00007 | 0.01247 |
| 4-Str Other Lawn & Garden Equip. (Com) | 2265004076 | 0.01 | 0.00 | 0.15 | 0.00002 | 0.00000 | 0.00059 |
| Dsl - Lawn Mowere | 2270004010 | 0.18 | 0.01 | 2.07 | 0.00068 | 0.00004 | 0.00791 |
| Dsl -Chain Saw < 4 HP | 2270004020 | 4.95 | 0.02 | 13.71 | 0.01897 | 0.00007 | 0.05255 |
| Dsl - Trimmers/Edgers/Brush Cutters (Com) | 2270004026 | 6.50 | 0.04 | 20.97 | 0.02490 | 0.00015 | 0.08034 |
| Dsl - Leafblowers/Vacuums (Com) | 2270004031 | 6.14 | 0.02 | 16.92 | 0.02354 | 0.00008 | 0.06484 |
| Dsl - Rear Engine Riding Mower (Com) | 2270004041 | 0.02 | 0.09 | 0.05 | 0.00007 | 0.00034 | 0.00019 |
| Dsl - Front Mowers (Com) | 2270004046 | 1.09 | 0.36 | 38.42 | 0.00418 | 0.00138 | 0.14719 |
| Dsl - Lawn & Garden Tractors (Com) | 2270004056 | 1.02 | 1.65 | 23.65 | 0.00392 | 0.00634 | 0.09062 |
| Dsl - Chippers/Stump Grinders (Com) | 2270004066 | 0.30 | 0.64 | 8.80 | 0.00115 | 0.00247 | 0.03371 |
| **Agricultural Equipment** | | | | | | | |
| 2-Str Sprayers | 2260005035 | 0.00 | 0.00 | 0.01 | 0.00001 | 0.00000 | 0.00003 |
| 4-Str Sprayers | 2265005035 | 0.04 | 0.00 | 0.41 | 0.00014 | 0.00001 | 0.00159 |
| 4-Str Other Agriculture Equipment | 2265005055 | 0.02 | 0.00 | 0.65 | 0.00007 | 0.00001 | 0.00248 |
| Dsl - Hydro Power Units | 2270005050 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00001 | 0.00000 |
| **Other** | | | | | | | |

## Airport/Military Emissions - Bexar County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Roadways | 2201001000 | 35.65 | 25.69 | 277.58 | 0.09767 | 0.07038 | 0.76049 |
| 4-Str Chain Saw > 4HP | 2265007005 | 0.00 | 0.00 | 0.01 | 0.00000 | 0.00000 | 0.00004 |
| 4-Str ASE (tugs) | 2265008005 | 0.76 | 0.60 | 23.22 | 0.00290 | 0.00231 | 0.08897 |
| GSE | 2270008000 | 0.60 | 0.32 | 12.32 | 0.00228 | 0.00123 | 0.04722 |
| Aircraft | 2275001000 | 70.84 | 135.80 | 996.88 | 0.27140 | 0.52032 | 3.81946 |
| **NON-ROAD** | **TOTAL** | **144.28** | **201.62** | **1592.15** | **0.51388** | **0.74444** | **5.79714** |
| **RANDOLPH AFB** | **TOTAL** | **161.63** | **214.50** | **1736.72** | **0.58035** | **0.79378** | **6.35107** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **BEXAR AREA** | **TOTAL** | **115.28** | **101.16** | **182.19** | **0.33617** | **0.30897** | **0.63966** |
| **BEXAR NON-ROAD** | **TOTAL** | **815.27** | **1299.48** | **8028.75** | **2.49929** | **4.13338** | **24.21524** |
| **BEXAR EMISSIONS** | **TOTAL** | **930.55** | **1400.63** | **8210.93** | **2.83546** | **4.44234** | **24.85490** |

**Airport/Military Emissions - Bexar County, 2002**

Aircarft NOx

895.40

***Bexar County***

**Airport/Military Emissions - Bexar County, 2002**

Used for 2008 proposal to TCEQ

| VOC | NOx | CO |
|---|---|---|
| tons/day | | |
| 0.02697 | 0.01282 | 1.46356 |

**Airport/Military Emissions - Bexar County, 2002**

***Bexar County***

**Airport/Military Emissions - Bexar County, 2002**

***Bexar County***

**Airport/Military Emissions - Bexar County, 2002**

***Bexar County***

## CHAPTER 4 - AREA SOURCE EMISSIONS

## Agricultural Fertilizer

### Data Gathering Methodology

Fertilizers are used to supply essential plant nutrients to improve crop production. The fertilizer predominately used in this South Texas region is ammonium sulfate $(NH_4)_2SO_4$ applied in a solid form. The application time(s) and rate are dependent upon specific soil type, the crop to be grown, weather at the application time, and equipment available to the individual farmer. The data was based on harvested acres for different types of crops in the AC97-A-43, Census of Agriculture for 2002[1] for Bandera, Karnes, Kendall, Kerr, and Gillespie Counties. For the rest of the counties, the data gathered was from the 1996 EI Agricultural Survey for the AACOG region.[2]

The "typical" application rates and times for this region are illustrated in Table 4-1 along with the EPA's latent EFs for the fertilizer applications in the AACOG region.[3]

Table 4-1. Crops, Application Schedule, Emission Factors.

| CROP | When Applied | Total Weight/Acre | Nitrogen /Acre | Emission Factor for Application lbs./pollutant per ton Nitrogen Applied | | |
|---|---|---|---|---|---|---|
| | | | | NO | $NH_3$ | $N_2O$ |
| Corn | March-April | 2,100 lbs. | 60 lbs. | 138 | 0.405 | 12.1 |
| | May | 700 lbs. | 20 lbs. | 138 | 0.405 | 12.1 |
| Cotton | March-April | 2,100 lbs. | 60 lbs. | 138 | 0.405 | 12.1 |
| | May | 700 lbs. | 20 lbs. | 138 | 0.405 | 12.1 |
| Small Grains | March-April | 2,100 lbs. | 60 lbs. | 138 | 0.405 | 12.1 |
| Sorghum | March-April | 2,100 lbs. | 60 lbs. | 138 | 0.405 | 12.1 |
| | May | 700 lbs. | 20 lbs. | 138 | 0.405 | 12.1 |
| Hay (Bermuda) | March-April | 2,100 lbs. | 60 lbs. | 138 | 0.405 | 12.1 |
| Peanuts | June | 1,000 lbs. | 30 lbs. | 138 | 0.405 | 12.1 |

[1] "2002 Census of Agriculture." August 2004. Available online: http://www.nass.usda.gov/census/
[2] Alamo Area Council of Governments, Oct. 1999. 1996 Emission Inventory for the Alamo Area Council of Governments Region, San Antonio, Texas.
[3] U.S. Environmental Protection Agency, 1999. EPA AP-42, Volume I, Fifth Edition (draft), Research Triangle Park, North Carolina.

The emissions were calculated on a countywide basis for this report, but were obtained from each four-kilometer grid square, (3,953.68 acres), for the counties surveyed in the 1996 EI Agricultural Survey for the AACOG region. The following table (4.2) is a snapshot taken from a spreadsheet used for agricultural data entry. For each grid cell in the AACOG domain there is a corresponding data entry cell as shown below. Entries are expressed in fraction of crops contained within each four-kilometer grid square.

Table 4-2. Sample Fertilizer Grid Data Cell.

| Cell Number | 20-36 |
|---|---|
| Range | 0.96 |
| Corn | |
| Hay | |
| Peanuts | 0.02 |
| Sorghum | |
| Vegetables | |
| Cotton | |
| Small Grains | 0.02 |
| Urban | |
| Water | |

Fertilizers are applied at planting or just before planting of crops in this region. Most crops require roughly 2100 lbs. of ammonium sulfate fertilizer be applied to each acre of crop to achieve an effective application of 60 lbs. of nitrogen/acre. A secondary side dressing of 700 lbs. of ammonium nitrate is used to achieve an effective application rate of 20 lbs. of nitrogen per acre (indicated as side dressing). Side dressing activities only occur for corn and sorghum. Bermuda grass used for hay production is fertilized with 2100 lbs. per acre in the early spring while peanuts are fertilized only at planting with approximately 1,000 lbs. of fertilizer per acre.

Daily emissions for the 2002 ozone season were determined by applying a seasonal adjustment factor when estimating the amount of nitrogen applied to the acreage. This was done in order to account for half of the fertilizer application occurring during ozone season. Spring planting occurs during the months of March and April. Ozone season occurs during the months of April through October and since some fertilizing occurs during April, half of spring planting emissions was applied when determining ozone season estimates. Side dressing activities occur during the summer months, which are during ozone season; therefore no adjustment factor was necessary. Daily emissions due to side dressing were assessed by dividing the annual side dressing estimate by 214 days.

The application of fertilizer is very dependent upon the prevailing weather conditions. Dry and anticipated dry conditions make fertilization harmful, as it will tend to burn crops. Sufficient moisture must be present to achieve the full rates shown in the approximations above. Additionally, the farmer will not spend the money to fertilize his crops if he anticipates a substandard yield or market conditions that would make the expenditure of funds on fertilizer counter productive.

**Sample Calculations**

Annual Emissions

Percent of Grid Cell x Total acres of Grid = Acres in Specific Crop Production in the Grid Cell

*Spring Planting*

Annual Emissions = Acres in Specific Crop Production in the Grid Cell x Emission Rate Per Acre

Annual Emissions = 854 Acres of Corn x 60 lbs. (March-April)
= 51,240 lbs. of Emission / 2,000 lbs./ton
= 25.62 Tons of Emission

NO 25.62 tons x (138 lbs. / 2,000 lbs./ton) = 1.77 tons/yr. NO

$NH_3$ 25.62 tons x (0.405 lbs. / 2,000 lbs./ton) = 0.5 tons/yr. $NH_3$

$N_2O$ 25.62 tons x (12.1 lbs. / 2,000 lbs./ton) = 0.16 tons/yr. $N_2O$

*Side Dressing (only for corn and sorghum)*

Annual Emissions = Acres in Specific Crop Production in the Grid Cell x Emission Rate Per Acre

Annual Emissions = 854 Acres of Corn x 20 lbs. (May or June)
= 17,080 lbs. of Emission / 2,000 lbs./ton
= 8.54 tons of Emission

NO 8.54 tons x (138 lbs. / 2,000 lbs./ton) = 0.59 tons/yr. NO

$NH_3$ 8.54 tons x (0.405 lbs. / 2,000 lbs./ton) = 0.17 tons/yr. $NH_3$

$N_2O$ 8.54 tons x (12.1 lbs. / 2,000 lbs./ton) = 0.05 tons/yr. $N_2O$

Daily Emissions

Percent of Grid Cell x Total acres of Grid = Acres in Specific Crop Production in the Grid Cell

*Spring Planting*

Daily Emissions = 854 Acres of Corn x 60 lbs. (March-April) / 2 (Seasonal Adjustment)
= 25,620 lbs. of Emission / 2,000 lbs./ton
= 12.81 tons of Emission

| | | | |
|---|---|---|---|
| NO | 12.81 tons x (138 lbs. / 2,000 lbs./ton) | = 0.88 tons/yr. NO ÷ 214 | = 0.0041 tons/day |
| $NH_3$ | 12.81 tons x (0.405 lbs. / 2,000 lbs./ton) | = 0.25 tons/yr. $NH_3$ ÷ 214 | = 0.0012 tons/day |
| $N_2O$ | 12.81 tons x (12.1 lbs. / 2,000 lbs./ton) | = 0.008 tons/yr. $N_2O$ ÷ 214 | = 0.0004 tons/day |

*Side Dressing (for corn and sorghum)*
Daily Emissions = Annual Emissions (Side Dressing) ÷ 214 days/yr

NO 0.59 tons/yr. / 214 days/yr. = 0.028 tons/day
$NH_3$ 0.17 tons/yr. / 214 days/yr. = 0.0008 tons/day
$N_2O$ 0.05 tons/yr. / 214 days/yr. = 0.0002 tons/day

**Seasonal Adjustment**
Daily emissions for spring planting activities were assessed by dividing by a seasonal adjustment factor of 2 to account for half of the fertilizer applied during ozone season. Side dressing emissions had no seasonal adjustment. Emissions were then converted to tons/day by dividing each category by 214 days.

## Agricultural Pesticide Applications

**Introduction**
Pesticides are defined as any substance used to kill or retard the growth of insects, rodents, fungi, weeds, or microorganisms. Pesticides used in the home and garden are included as part of the consumer/commercial solvent use category. This section calculates emission estimates for agricultural pesticides.

**Methodology**
The Environmental Protection Agency's (EPA) Emission Inventory Improvement Program (EIIP) prescribes a methodology for calculating emissions from agricultural pesticide applications by using the percentage of active ingredient in the pesticide and the application rate of the pesticide to calculate emissions. These factors were multiplied with the number of acres for each crop as well as a default VOC content of 2.45 pounds of VOC per pound of active ingredient. This is because it is estimated that 2.45 times the active ingredient has the potential to be emitted as VOC.[4]

Table 4-3 lists the main types of crops that are grown and harvested in the AACOG region.

[4] U.S. Environmental Protection Agency, June 2001. Emissions Inventory Improvement Program: Chapter 9 – Pesticides – Agricultural and Nonagricultural. Research Triangle Park, North Carolina.

Table 4-3. Harvested Crops in the AACOG Region

| Crop Type |
| --- |
| Corn |
| Peanuts |
| Sorghum |
| Cotton |
| Small Grains |

The types of pesticides commonly used for these crops were obtained from "Crop Briefs" provided by the Agricultural Program of Texas A&M University.[5] The Crop Briefs report provided the types of pesticides, and their active ingredients, that are used for corn, cotton, sorghum, peanuts and small grains.

In an attempt to gather information regarding the application rates and percentage of active ingredients, the Bexar County office of the Texas Cooperative Extension was contacted for assistance.[6] The county extension office recommended the Clemson University Cooperative Extension website.[7] The website contains a "Pest Management Handbook" that lists and describes various pesticides used for a multitude of crops. The information provided by the Texas A&M Crop Briefs was cross-referenced with the Pest Management Handbook for percentages of active ingredient per pesticide and application rates.

Cross-referencing with the handbook determined that application rates vary depending on the requirements of a targeted pest. Application rates were provided in ounces/1,000 row feet, ounces per acre, and pounds per acre. The methodology requires the application rate be in pounds per acre; thus rates not in pounds per acre were converted to these prescribed units. An average estimate of row width was used to determine the pounds per acre required for pest treatment for application rates specified in weight per 1,000 row feet. Table 4-4 lists the row widths used to determine the required amount of pesticide by crop type.

[5] "The Agricultural Program of Texas A&M University." August 2004. Available online: http://aggie-horticulture.tamu.edu/extension/cropbriefs/
[6] "The Texas Cooperative Extension, Bexar County office". August 2004. Available online: http://bexar-tx.tamu.edu
[7] Clemson University Cooperative Extension. August 2004. Available online: http://www.clemson.edu/extension/

Table 4-4. Average Row Width per Crop Type

| Crop | Average Row Width (in) |
|---|---|
| Corn | 31[8] |
| Sorghum | 30[9] |
| Hay | 30[10] |
| Small Grains | 7[11] |
| Peanuts | 18[12] |

Once the rates were converted, an average application rate was obtained per pesticide. This was necessary since various amounts of the same pesticide are recommended to treat different pests and there are multiple pesticides used on the same crop. This average application rate was multiplied by the pesticide's percentage of active ingredient, a default VOC content of 2.45 lbs. of VOC per pound active ingredient, and a default evaporation rate of 0.9.

The products of these calculations were then summed per crop and multiplied by the number of acres per crop per county to estimate county emissions. Crop-acreage was obtained from the County Agricultural Extension Office[13] for Atascosa, Bexar, Comal, Frio, Guadalupe, Medina, and Wilson counties. Acreages for Bandera, Gillespie, Karnes, Kendall, and Kerr were obtained from the United State Department of Agriculture 2002 Census of Agriculture.[14]

**Sample Calculation**

Small Grains

According to the Texas A&M Crop Brief for wheat, Lorsban is a popular pesticide for small grains in Texas. The percentage of active ingredients in Lorsban is 44.9% and its application rate is 16 oz/ac.

Convert oz/acre to lbs./acre: 16 oz/acre / 16 oz/lbs. = 1 lb./acre

---

[8] Indiana Agricultural Statistics, 2002. Row Spacing. Available online: http://www.nass.usda.gov/in/annbul/0102/pg44.pdf

[9] Sorghum Profit: Productive Rotations on Farms in Texas, 2002. Gulf Coast Row Spacing, Plant Population and Insect Management Research. Available online: http://sorghum.tamu.edu/report_database/files/sub50/2002PROFITresults50.pdf

[10] Alam, M. *et. al.*, June 2002. "An Efficient Irrigation Technology for Alfalfa Growers", Journal of Extension. Volume 40, Number 3. Available online: http://www.joe.org/joe/2002june/rb5.html

[11] Diebert, E.J., ''Fertilizer Application with Small Grain Seed at Planting." North Dakota State University. Available online: http://www.mandakzerotill.org/book17/smallgrain.html

[12] University of Wisconsin-Extension, 2000. "Alternative Field Crops Manual: Peanut." Available online: http://www.hort.purdue.edu/newcrop/afcm/peanut.html

[13] Alamo Area Council of Governments, Oct. 1999. 1996 Emission Inventory for the Alamo Area Council of Governments Region, San Antonio, Texas.

[14] U.S. Department of Agriculture, National Agriculture Statistics Service. 2002 Agriculture Census, Volume I: Geographic Area Series. July 2004. Available online: http://www.nass.usda.gov/census/

Clemson provided data for the pesticide Lorsban that was used to calculate the emissions factor for each type of crop.

Emission Factor = 1 lb./acre x 44.9% active ingredient x 2.45 lbs. VOC/lbs. active ingredient x 0.9 evaporation rate
= 0.990

Atascosa County has 29,458.8 acres of small grain cropland.

Total emissions = acres of each crop x Emission Factor
= 29,458.8 x 0.990
= 29,165.54 lbs./yr. / 2,000 lbs./ton
= 14.58 tons/yr.

**Seasonal Adjustment**

EPA's EIIP provided a seasonal adjustment factor and activity rate (days per week). The seasonal adjustment factor is 1.3 and an annual activity rate of 6 days per week to yield tons per day.

## Architectural Surface Coatings

**Introduction**

The 2002 AACOG region architectural coatings EI includes VOC emissions from the application of paint, primer, varnish, and lacquer to the surface of stationary structures and portable buildings. The majority of surface coatings are applied to domestic, industrial, institutional, and governmental structures. The architectural coatings EI also includes emissions from solvents used as thinners or as solutions for cleanup. VOCs are emitted during the application of coatings and solvents as well as during the drying process.

Coatings are used for a variety of applications besides those included in the architectural coatings subcategory of area sources. These include coatings used for such activities as pavement and curb markings, manufacturing, and industrial maintenance. However, the emissions from these other applications were determined using different methodologies than the approach used to estimate VOC emissions from architectural coatings. Therefore, the methodologies used to estimate emissions from industrial, pavement, and other types of coatings are described in separate sections of the 2002 AACOG EI.

**Methodology**

The emissions from architectural coatings were estimated based on a methodology used by

ENVIRON to develop an area and mobile source EI for the State of Texas.[15] ENVIRON's methodology combined steps listed in the EIIP with information from a California study to develop population-based usage and emission factors. AACOG's coating emission calculations also combine elements of the EIIP and California data, but with certain modifications from the ENVIRON methodology, as described below.

The EIIP recommends conducting a coatings-use survey as the preferred method of estimating emissions from the application of paints, lacquers, sealers and other coatings.[16] Due to the cost and amount of time required to conduct and process surveys, this methodology was not used by ENVIRON to determine the coating inventory for Texas, nor was surveying used by AACOG to estimate the 2002 regional coating inventory. Instead, ENVIRON used elements of an alternative EIIP methodology to develop usage factors for coatings. The EIIP alternative methodology relies on data from the US Census Bureau for national coatings sales and population estimations to develop usage factors for two categories of coatings: solvent- and water-based paints.

ENVIRON refined EPA's alternative methodology by using 1999 US Census Bureau data in conjunction with results from a 1998 architectural coatings survey conducted by the California Air Resources Board (CARB).[17] This allowed ENVIRON to develop usage factors for 10 categories of architectural coatings, rather than using less specific factors solely based on the coatings' thinning agent (solvent or water).

Similarly, AACOG developed usage factors for the same 10 categories of coatings; however these factors were based on more recent US Census Bureau data (2002) for coating sales[18] and national population,[19] as well as a 2001CARB coatings survey.[20] This step entailed developing usage ratios for the 10 coating categories from 2001 CARB survey data. The CARB ratios were then used to allocate national coatings sales data (in gallons) obtained from the 2002 US Census to the proper SCC coatings category. To obtain per capita usage factors, the

---

[15] ENVIRON, August 31, 2001. Area and Mobile Source Emissions Inventory Technical Support Project: 1990-2010 Emission Inventory Trends and Projections. Prepared for the Texas Natural Resources Conservation Commission, Austin, Texas. Prepared by ENVIRON International Corporation, E.H. Pechan & Associates, Inc., Pollution Solutions, and Starcrest Consulting. TNRCC Umbrella Contract No. 582-0-34745, Work Order No. 34745-03 and TNRCC Umbrella Contract No. 582—0-34744, Work Order No. 34745-02.

[16] EIIP, November 1995. EIIP Volume III, Chapter 3 Architectural Surface Coating, US Environmental Protection Agency. Emission Inventory Improvement Program, Research Triangle Park, NC. Available online: http://www.epa.gov/ttn/chief/eiip/techreport/volume03/archsfc.pdf

[17] California Air Resources Board, September 1999. 1998 Architectural Coatings Survey Results, Final report. Available online: http://www.arb.ca.gov/coatings/arch/Survey/results/FReport.PDF

[18] US Census Bureau, July 2003, Paint and Allied Products: 2002, MA325F(02)-1, Available online: http://www.census.gov/industry/1/ma325f02.pdf

[19] US Census Bureau, July 2003, Population Estimates, Available online: http://eire.census.gov/popest/data/national/popbriefing.php

national sales data were divided by the 2002 US population. The per capita usage factors developed for AACOG's 2002 coatings EI are provided, by category, in table 4-5.

Table 4-5. Usage Factors Used to Calculate Architectural Coatings Emissions for the 2002 AACOG Emissions Inventory.

| SCC | Coating Category Description | Usage Factor (gal./capita-yr) |
|---|---|---|
| 2401001001 | Flat Paints | 0.93 |
| 2401001005 | Nonflat Paints - Low and Medium Gloss | 0.67 |
| 2401001006 | Nonflat Paints - High Gloss | 0.06 |
| 2401001010 | Primers, Sealers, and Undercoaters | 0.24 |
| 2401001011 | Quick Dry - Primers, Sealers, and Undercoaters | 0.06 |
| 2401001015 | Stains - Semitransparent | 0.08 |
| 2401001020 | Quick Dry - Enamels | 0.03 |
| 2401001025 | Lacquers - Clear | 0.02 |
| 2401001050 | All Other Architectural Categories | 0.39 |
| 2401001060 | Thinning and Clean-Up of Solvent-Based Architectural Coatings* | 0.05 |

*Paint cleanup and thinning solvent usage factors were based on the California methodology of one pint per gallon of oil-based coating.[21]

The EIIP provides default solvent- and water-based VOC emission factors for calculating coating emissions using the alternative methodology described previously. Instead of using the two EIIP default factors, ENVIRON developed emission factors for 10 coating categories based on data from the 1999 California report, but modified to account for the less stringent Texas coatings regulation in affect at that time. In September 1999, the Texas rule was superceded by a federal coatings regulation (61 FR 46410) that limits the amount of VOCs in AIM products.[22] Due to the enactment of the federal regulation, the emission factors used to calculate the 2002 coatings EI for the AACOG region were based on the federal VOC limits rather than California standards modified for Texas.

---

[20] California Air Resources Board, October 2003. 2001 Architectural Coatings Survey Results, Final report. Available online:http://www.arb.ca.gov/coatings/arch/survey/2001/2001finrpt.pdf

[21] California Air Resources Board, Draft 10/23/03. ARB Solvent Evaporation Methodologies - Architectural Coatings & Cleaning/Thinning Solvents, Section 6.3 Architectural Coatings. Page 6.3-2. Available online: http://www.arb.ca.gov/ei/areasrc/fullpdf/FULL6-3.pdf.

[22] US Environmental Protection Agency, August 1998. National Volatile Organic Compound Emission Standards for Architectural Coatings—Background for Promulgated Standards, EPA-453/R-98-006b. Office of Air Quality Planning and Standards, Research Triangle Park, NC. Available online: http://www.epa.gov/ttn/oarpg/t1/reports/aimbid.pdf

**Sample Calculation**

Annual emissions from coatings were calculated using the formula:

$E_{an} = POP_{an} \times EF \times UF \times 1/2{,}000$

Where:

| | |
|---|---|
| $E_{an}$ | = annual emissions for the inventory area in tons/year |
| $POP_{an}$ | = population within the inventory area |
| UF | = usage factor in gallons/capita-year |
| EF | = category-specific emission factor in lbs./gallon |
| 1/2,000 | = conversion factor, ton/lbs. |

Populations for AACOG counties were interpolated from Texas Water Development Board projections' "Most Likely Scenario".[23] As an example of a county-level estimation, the annual emissions of VOCs from lacquers used in Bexar County in 2002 were calculated using the equation:

$E_{an}$ = (1,440,732 people)(0.02 gal./capita-year)(5.7 lbs. VOC/gal.)(ton/2,000 lbs.)

$E_{an}$ = 82.12 tons VOC/year

**Seasonal Adjustment**

For ozone season weekday calculations, seasonal adjustment factors were developed from the quantities of paint, varnish, lacquer and other coatings listed in the quarterly shipment tables of the Census Bureau's *Paint and Allied Products: 2002* report. The seasonal adjustment factor was determined based on quarterly sales of the "architectural coatings" category. The resulting adjustment factor calculated for the 2002 ozone summer season was 1.056.

Architectural surface coatings are applied 7 days a week. Therefore the activity rate is 365 days/year. Ozone season weekday emissions were calculated using the formula:

$E_{osw} = (E_{an} \times SAF)/AR$

Where:

| | |
|---|---|
| $E_{osw}$ | = ozone season weekday emissions |
| $E_{an}$ | = annual emissions in tons/year |
| SAF | = seasonal adjustment factor |

[23] Texas Water Development Board, July 2004, 2006 Regional Water Plan: County Population Projections for 2000 – 2060. Available online: http://www.twdb.state.tx.us/data/popwaterdemand/2003Projections/Population%20Projections/STATE_REGION/County_Pop.htm

AR = activity rate in days/year

To determine 2002 ozone season weekday emissions from the use of lacquers in Bexar County, the VOC estimate was calculated as follows:

$E_{osw}$ = (82.12 tons VOC/year x 1.056) / 365 days/year
$E_{osw}$ = 0.24 tons VOC/day

## Asphalt Paving

### Introduction

Asphalt concrete is grouped into three universal categories: hot-mix, cutback, and emulsified. Hot-mix asphalt is the most commonly used paving asphalt for surfaces 2 to 6 inches thick, while cutback and emulsified asphalt are used in tack and seal operations. Emissions from asphalt paving operations occur when asphalt mixtures are applied and as they cure.

Hot mix was not calculated for this emissions inventory study. Hot mix produces minimal emissions, which are about one order of magnitude lower than the national estimates of cutback asphalt paving (EIIP, VIII, Ch. 17).[24] Hot mix asphalt is prepared at plants where strict controls are placed on emissions from the plant and those emissions are provided in the point source section.

Cutback asphalt is used primarily in tack and seal operations and for priming roadbeds for hot-mix application. Cutback asphalt is prepared by diluting asphalt cement with petroleum distillates. Cutback asphalt has the highest diluent content of the three asphalt categories and emits the highest levels of VOCs per ton used. Other materials such as cold-mix-cold-lay have almost entirely replaced cutback asphalt in the AACOG region. According to the Texas Department of Transportation most businesses no longer use cutback asphalt. Also one of the largest asphalt suppliers in our area has not used cutback asphalt since 1987.

Adding water and an emulsifying agent, such as soap, produces emulsified asphalt, which can have 0% to 12% solvent added. Emulsified asphalt is used in most of the same applications as cutback asphalt but is lower emitting, energy saving, and a safer alternative to the cutback asphalt.

### Methodology

A survey was distributed to the AACOG county governments, city governments, and businesses

[24] U.S. Environmental Protection Agency, January 2001. Emission Inventory Improvement Program (EIIP)/Area Source Committee Volume III: Chapter 17. Research Triangle Park, North Carolina.

that use asphalt for paving operations. The survey inquired about the types of asphalt used, cure types, diluent percentage, density, and specific gravity. With this information, calculations were formulated, as recommended by the EPA AP-42, to estimate emission amounts. Table 4-6 illustrates the numerical value of cure rate for cutback asphalt that was used in the calculations. In the emission calculations for emulsified asphalt, the set rate is similar to the AP-42 cure rates for cutback. It was estimated to be uniform because the diluent would have evaporated totally.

Table 4-6. Cutback Asphalt Cure Rates

| Cure Rate | Value (by wt. of diluent evaporate) |
|---|---|
| Slow | 25% |
| Medium | 75% |
| Rapid | 95% |

Two methodologies were employed in the calculation of emissions from asphalt paving. The surveys were used as information on sources for the calculations. The following methodology was utilized for all responses in which all categories of information were provided.

**Sample Calculation**

The City of Olmos Park used 3.6 tons of slow set (25%) SS-1 emulsified asphalt in 2002. The specific gravity was 1.01, the density was 8.42 lbs./gal., and the diluent volume was 32-36%, averaged to a factor of 0.34. In cases were the diluent percentage was a range, the average was used. The city used this asphalt during the months of August to December.

The amount of asphalt used needed to be converted into gallons. In one ton, there are 238.10 gallons.

Amount of Asphalt (Gallons) = Amount of Asphalt (Tons) x 238.10 Gallons/Ton
= 3.6 Tons x 238.10 Gallons/Ton
= 857.16 Gallons of Asphalt

VOC EF (Tons/Gal.) = (Density x Diluent Volume Percentage x Cure Rate) / 2,000
= (8.42lbs./gal. x 0.34 x 0.25) / 2,000
= 0.0004 tons/gal.

Total VOC Emission Calculation = Amount of Asphalt (Gallons) x VOC EF (tons/gal.)
= 857.16 Gallons x 0.0004 tons/gal.
= 0.3 tons/yr.

The Ozone months are April to October, a total of 214 days.

| | |
|---|---|
| Ozone Emissions | = Total VOC Emissions / number of Ozone Active Days |
| | = 0.3 tons/yr. / 214 ozone days |
| | = 0.004 tons/ozone days |

Some of the survey responses were incomplete. In such instances, a volume based EF was used as illustrated in Table 4-7 from the EIIP, VIII, Ch. 17. The amount of asphalt was converted into barrels and formulated into the calculations.

Table 4-7. Asphalt Volume-based Emission Factors

| Asphalt Type | Volume Based[a] (lbs. VOC / Barrel of Asphalt) |
|---|---|
| Cutback Asphalt | 88 |
| Emulsified Asphalt | 9.2 |

[a] The density of asphalt is similar to that of water, 8.34 lbs./gal, 1 barrel (42lbs.) of asphalt eights 350 lbs.

**Sample Calculation**

The County of Guadalupe used 376 tons of AC-5 asphalt in 2002. An EF of 88 lbs. VOC / barrel of cutback asphalt was used. This asphalt was used from June to August.

| | |
|---|---|
| Amount of Asphalt (Barrels) | = (Amount of Asphalt (tons) x 2,000 lbs.) / 350 lbs./barrel |
| | = (376 tons x 2,000 lbs.) / 350 lbs./barrel |
| | = 2148.6 barrels of asphalt |
| VOC Emissions (tons/yr.) | = Amount of Asphalt in Barrels x EF / 2,000 lbs. |
| | = 2148.6 barrels x 88 lbs. VOC / Barrel / 2,000 lbs. |
| | = 94.5 VOC tons/yr. |
| Ozone Season Daily Emissions | = Total VOC Emissions / # of days in the ozone season |
| | = 94.5 tons/yr / 214 days |
| | = 0.44 tons/day |

**Seasonal Adjustment**

Daily emissions were based on the percentage of asphalt laid during the ozone season divided by 214 days. For example, if 50 percent of the asphalt was laid during the summer months, annual emissions were divided by 214 and multiplied by a factor of 0.50.

**Sample Survey**

October 4, 2004

«Company»

«Address», «State» «Zip»

ATTENTION: OPERATIONS MANAGER

The Alamo Area Council of Governments (AACOG) requests your assistance in completion of the 2002 Air Quality Emissions Inventory Asphalt Paving survey. The survey information will be used to assess and quantify emissions from asphalt paving within the AACOG 12-County region. Survey responses are required to obtain accurate local data. The San Antonio region currently risks being declared in non-attainment of federal air quality standards (NAAQS); thus this inventory is a significant part of the emissions management process.

The purpose of this survey is to provide better information and services to the region, as well as help minimize additional regulations on the community. Your response is vital to this process and will enable a more precise emissions inventory for 2002.

To increase the accuracy of this information we ask that you review the attached survey and input the necessary data. You can return it to us in the addressed envelope or fax to (210) 225-5937 attention Donna Hessong, Natural Resources / Transportation Specialist, Alamo Area Council of Governments. Please submit your response by January 20, 2004.

Thank you for your time and participation. If you have any questions or comments please feel free to contact Steven Smeltzer, Environmental Manager, Alamo Area Council of Governments at (210) 362-5266.

Regionally Yours,

Al J. Notzon III
Executive Director

Enclosures (1)

Asphalt Paving Emissions Inventory Survey

Name of Municipality or DOT: ______________________________________________

Mailing Address: __________________________________________________________

City/ Zip: _________________________ County: ______________________________

Contact Person/Phone Number: ______________________________________________

The purpose of this survey is to collect information about the amounts and types of asphalt used for paving so those estimates of air pollution from paving operations can be made. Please enter the following information on the attached forms.

1. List the asphalt types used in the calendar year 2002. Note that Table 1 is for cutback asphalt; Table 2 is for emulsified asphalt. Information about hot-mix asphalt is not needed.

2. Provide the cure or set rate for each asphalt type.

3. Provide the amount, in tons, of each asphalt type used. If your agency used subcontractors, please photocopy the survey questionnaire and list the information for each subcontractor. This will help us to avoid double counting the amount and location of asphalt used.

4. Provide the specific gravity for each asphalt type.

5. Provide the volume percent of diluents in each asphalt type.

6. List the specific months during the year that each asphalt type is used (For example April to June).

Table 4-8. Cutback Asphalt Cure Rate Information Survey Form

| 1 Identification # or Name | 2 Cure Rate[a] | 3 Amount Used tons | 4 Specific Gravity | 5 Diluent Content Volume% | 6 Months of the Year Used |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

[a]Rapid, medium,slow

Table 4-9. Emulsified Asphalt Cure Rate Information Survey Form

| 1 Identification # or Name | 2 Set Rate[a] | 3 Amount Used tons | 4 Specific Gravity | 5 Diluent Content Volume% | 6 Months of the Year Used |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

## Asphalt Roofing

### Introduction

Asphalt roofing is the nation's most popular choice for the roofing of industrial, commercial, and residential buildings. Asphalt has been credited for providing protection in a number of ways, especially in roofing products. These products can be found in four groups: shingles, residential roll roofing, built-up roofing, and modified bitumen membranes. Emissions are released during manufacturing as well as the application of these materials in roof construction. For this study, the application in roof construction was analyzed in assessing emissions.[25]

### Methodology

Asphalt usage within the Alamo Area Council of Governments (AACOG) region was determined using 2002 building permit statistics per county provided by the US Census Bureau.[26] Figures of asphalt usage for the state of Texas were obtained from the Asphalt Institute. The methodology for calculating asphalt roofing emissions was based on the methodology used by California's South Coast Air Quality Management District (SCAQMD) in 1989 and 1993. The reports also provided emission factors.[27]

The following are statistics obtained from the SCAQMD methodology.

1) About 20% of roofing asphalt goes into on-site application.
2) Of the asphalt used for the roofing of buildings, ninety-three percent (93%) of it is applied hot.
3) The remaining seven percent of asphalt is applied cold (3% volatile compounds by weight).
4) Asphalt usage is proportional to residential construction growth. This growth is similar with the growth of commercial construction and is tracked by the Census Bureau.

The percent increase in the number of buildings in the AACOG region for 2002 was calculated using the number of building permits issued in each county as well as for the entire state of Texas. This allowed the amount of asphalt that was applied hot or applied cold to be assessed.

[25] Arma Online. Asphalt Roofing Manufacturers Association. July. 12, 2004. Roofing Basics. Available online: http://www.asphaltroofing.org/question_list.html

[26] U.S. Census Bureau, July 12, 2002. State & County QuickFacts, Texas. Available online: http://quickfacts.census.gov/qfd/states/48000.html

[27] South Coast Air Quality Management District, October 1990. Area Source Emissions for C/Y 1989 From Asphalt Roofing Operations in the SCAQMD Air Basins. Diamond Bar, California.

Table 4-10. Comparison of Statewide and AACOG Region Building Numbers

| Comparison of Statewide and AACOG Building Numbers | |
|---|---|
| Statewide Building Increase 2002 | 165,027 |
| AACOG Region Building Permits 2002 | 13,346 |
| Percent Increase for AACOG Region 2002 | 8.09% |

Percent Increase for AACOG Region 2002 = ( AACOG Region Building Permits / Statewide Building Increase 2002 ) x 100%
= ( 13,346 / 165,027 ) x 100% = 8.09%

Table 4-11. Building Permit Totals and Percent Increases in the AACOG Region**.**

| County | Number of Building Permits Issued 2002 | % of AACOG Permits 2002 |
|---|---|---|
| Bexar | 10,432 | 78.17% |
| Comal | 1,492 | 11.18% |
| Guadalupe | 809 | 6.06% |
| Kendall | 373 | 2.79% |
| TOTAL | 13,106 | 98.2% |

These four counties within the AACOG region contributed significant amounts of emissions due to asphalt roofing. The remaining eight counties contributed less than one percent each to the total number of building permits.

**Sample Calculation**

Amount of Asphalt Used in Texas (2002) = 702,088 tons[28]

Amount of Asphalt Used in AACOG

= Percent Increase for AACOG in 2002 x Amount of Asphalt Used in Texas
= 8.09% x 702,088 = 56,778.99 tons/year

[28] Sonnenberg, Mike; Asphalt Institute, Email Communication Lexington, Kentucky

Asphalt Used On-Site (Roof Building)

= Percent of Roofing Asphalt Used in On-Site Application x Amt. of Asphalt Used in AACOG
= 20% x 56,778.99 = 11,355.80 tons/year

Amount of Asphalt Applied Hot

= Amount of Asphalt Used in On-Site Application x Percent of Roofing Asphalt Applied Hot
= 11,355.80 x 93% = 10,590.89 tons/year

Amount of asphalt applied cold

= Amount of Asphalt Used in On-Site Application x Percent of Roofing Asphalt Applied Cold
= 11,355.80 x 7% = 794.91 tons/year

**Sample Calculation**

Asphalt can be applied by either hot or cold application. First, calculating the emissions for each method must be done due to the difference in emission factors. The VOC factor for hot applications is 0.0001 tons/ton of asphalt applied.[29] The cold application has an emission ratio of 3 : 97 compared to hot applications. Once both types of emissions were found, the two were added to give a total emission amount. The seasonal adjustment factor for asphalt roofing was based on a 5-day workweek, or 254 days a year.

Hot Applications

The total amount of asphalt used in hot applications was calculated to be 10,560.89 (tons/yr.). The VOC emissions factor is 0.0001 tons/ton.

VOC Emissions = (Amount of Hot Asphalt Used (tons/yr.)) x (VOC Emission Factor (tons/ton))
= (10,560.9 (tons/yr.)) x (0.0001 (tons/ton))
= 1.05 (tons/yr.)

Cold Applications

The total amount of asphalt used in cold applications was calculated to be 794.91 (tons/yr.). This total must be multiplied to the emission factor with a 3 : 97 ratio.

VOC Emissions = (Amount of Cold Asphalt Used (tons/yr.)) x Emission Factor Ratio of 3 : 97
= (794.91 (tons/yr.)) x (3 / 97)

[29] South Coast Air Quality Management District. "Area Source Emissions for C/Y 1993 From Asphalt Roofing in the SCAQMD Air Basins". Diamond Bar, California. Within the report the emissions factor used was from the study titled "Asphalt Roofing Kettles", Stationary Source Control Measure, Fresno, 1982.

= 24.58 (tons/yr.)

Total Emission (Hot and Cold)

= Hot Application VOC Emission + Cold Application VOC Emission

= 1.05 (tons/yr.) + 24.58 (tons/yr.)

= 25.63 (tons/yr.)

Total Emission per day

= Total VOC Emission / Seasonal adjustment factor for a 5-day week or 254

= 25.63 / 254

= 0.10 tons/day

Allocation per County

The total emission amount was utilized in allocating the emissions per county based on the percentage of permits per county.

Bexar County

County Emission = Hot & Cold Emission Total (tons/yr.) x Increase % of Building Total

= 25.63 (tons/yr.) x 78.17%

= 20.04 (tons/yr.)

tons per day

= 20.04 / 254

= 0.08 tons/day

## Automobile Body Incineration

### Introduction

According to EPA's AP-42 guidelines, automobile body incineration "is rarely practiced today." Rather than being destroyed in an incinerator, vehicles are much more likely to be shredded or crushed and used for scrap metal.[30] A SIC code search of the 2002 Texas Workforce commission[31] files was conducted to determine if incineration activities occurred in the AACOG region. In addition, an on-line search of the TCEQ-permitted facilities was conducted. Of the few disposal/incinerator sites identified using these search methods, none were listed as automobile incinerators. Consequently, no emissions were calculated for this category.

[30] U.S. Environmental Protection Agency, 1995. AP-42 Compilation of Emission Factors, “2.6 Automobile Body Incineration.”

[31] Texas Workforce Commission, 2002. Employment Data for 3rd quarter 2001. Austin, Texas.

## Auto Body Refinishing

### Introduction

Automobile refinishing shops are business establishments that perform replacement, repair, or refinishing of vehicles, which must be regulated for VOC emissions. These emissions can be most accurately calculated via the material balance method. Since the emissions come from solvents in automotive paint, calculating the emissions from the amount of paint consumed by the shops is logical. The amount of paint used and the amount of solvent in the paint is recorded. With this information, a more precise estimate of emissions released into the air can be generated. Shop emissions based upon average paint sales for auto body shops categorized by annual sales is the objective of this effort to characterize emissions typical from these shops.

### Methodology

Emission calculations from auto body repair shops in the AACOG 12-county region were performed utilizing employment numbers provided by the Texas Workforce Commission[32] and emission factors provided by ENVIRON.

Emissions were assigned by the amount of total revenue allocated for each county. Revenue for each facility was determined by presuming that for every employee of an auto body shop, the shop generated $100,000. For the twelve AACOG counties, revenues for the area's body shops were determined by multiplying employment numbers by $100,000. The emission factors were then allocated per auto body shop based on annual revenue. Table 4-12 lists the emission factors used for estimating auto body repair emissions.

Table 4-12. Emission Factors Used for Estimating Auto Refinishing Coating Emissions

| Facility Size Classes | Very Small | Small | Medium | Large | Very Large | Mega Size |
|---|---|---|---|---|---|---|
| Annual Revenue(s) | <$200k | $200-400k | $400-600k | $600-1,000k | $1.0 to 2.4 MM | $2.5 to 4.9 MM |
| Total Employee | 1 | 2-3 | 4-6 | 7-9 | 10-24 | > 24 |
| Allocated VOC lbs./year | 610 | 1,360 | 2,025 | 3,530 | 7,501 | 16,326 |

### Revenue Determination

An auto body shop in Bexar County employed 15 employees in 2002.

Annual Revenue = 15 x $100,000

= $1,500,000

[32] Texas Workforce Commission, 2002. Employment Data for 3rd quarter 2001. Austin, Texas.

Based on table 4-12, facilities with annual revenue of $1,500,000 are classified as "Very Large." Therefore, the emission factor for this facility is 7,501 lbs. of VOC per year.

Once the auto body shops' facility size and emission factors were determined, the number of shops were grouped according to facility size and multiplied by their respective emission factor. The following equation details how VOC emissions were calculated.

$$E_{ia} = \sum \left[ \left( FAC_{ias} \times EF_s \times 1/2000 \right) - E_{pss} \right] \times \left[ 1 - \left( CE \times RP \times RE \right) \right]$$

Where:

| | |
|---|---|
| $E_{ia}$ | = annual emissions for the inventory area, TPY |
| $FAC_{ias}$ | = number of facilities by size class within the inventory area |
| $Ef_s$ | = facility size-specific emission factor, lbs./facility-yr. |
| 1/2,000 | = conversion factor, ton/lbs. |
| $E_{pss}$ | = annual uncontrolled emissions of point sources in the inventory area for facility size class of interest; TPY |
| CE | = control effectiveness (fraction) of applicable rules, unitless |
| RP | = rule penetration (fractions) of applicable rules, unitless |
| RE | = rule effectiveness (fraction) of applicable rules, unitless |

No control parameters (CE, RP, RE) were used for the 2002 auto body emission calculations. To assure the quality of the emission estimation, minor point sources were cross-referenced with area sources to ensure no double counting of companies used.

**Seasonal Adjustment**

Once the amount of VOC in tons per year was determined, emissions were seasonally adjusted to reflect emissions on a typical ozone season day. The seasonal adjustment factor is 1.072 and the activity rate is 250 days. The number of days was suggested by TCEQ in order to account for a 5-day week for 50 weeks of the year. Emissions were determined using the following equation:

$$E_{osd} = \left( E_{ia} \times SAF \right) / AR$$

Where:

| | |
|---|---|
| $E_{osd}$ | = ozone season day emissions, tons/day |
| $E_{ia}$ | = annual area source emissions, TPY |
| SAF | = seasonal adjustment factor, unitless |
| AR | = activity rate, days/yr. |

**Sample Calculation**
Atascosa County has 1 “very large” autobody shop, 1 “large” autobody shop, 2 “medium” autobody shops, and 1 “very small” autobody shop.

County Level Annual Emissions
$E_{ia} = \sum \left[\left(FAC_{ias} \times EF_s \times 1/2000\right) - E_{pss}\right] \times \left[1 - \left(CE \times RP \times RE\right)\right]$

$E_{ia}$ = ({[(1 x 610) / 2,000] - 0} x [1 - (0 x 0 x 0)])+ ({[(2 x 2,025) / 2,000] – 0} x [1 – (0 x 0 x 0)])+ ({[(1 x 3,530) / 2,000] – 0} x [1 – (0 x 0 x 0)]) + ({[(1 x 7,501) / 2,000] – 0} x [1 – (0 x 0 x 0)])

$E_{ia}$= 7.8455 tons of VOC per year

Ozone Season Day Emissions
$E_{osd} = \left(E_{ia} \times SAF\right) / AR$

$E_{osd}$ = (7.8455 TPY x 1.072) / (250 days/yr.)

$E_{osd}$ = 0.03364 tons/day

## Bakeries

### Introduction
The primary VOC emitted from bakeries is ethanol, which is formed from yeast leavening of baked goods at commercial and retail bakeries. Commercial bakeries are included in SIC code 2051. Retail bakeries are covered by SIC code 5461. Bakery emissions from grocery stores have SIC code 5411.

Bakery products that are yeast leavened include bread, bread-type rolls, pretzels, and sweet yeast goods such as doughnuts. There are two basic types of yeast dough mixing processes used in bakeries: sponge-dough and straight dough. During straight-dough leavening (used less by commercial bakers) ingredients are mixed, the yeast is allowed to ferment, and then the bread is baked. The sponge-dough process uses a larger amount of yeast to start the bread, but a smaller portion of other ingredients until baking. The emissions (99%) from sponge-dough leavening take place during baking. The straight-dough process produces a lower 77% amount of emissions during baking, 23% during other steps, and it retains a much higher concentration of ethanol in the baked bread.[33]

To calculate area source emissions for bakeries, the per employee EF method was employed. The businesses using yeast products were identified for each county using SIC codes 2051 (commercial) and 5461 (retail). Grocery stores with bakeries located inside was also included in the area source emissions using SIC code 5411.[34]

**Methodology for Calculating Commercial Bakery Emissions**

For SIC codes 2051 and 5461, the total number of employees for each bakery were added and used to estimate the emissions for each county. Bakeries were cross-referenced with minor point sources to ensure no double counting. The bakeries that are in the minor point source database were removed from the area source calculations. The number of employees in each county is multiplied by per employee emission factor of 0.11 tons of VOC. To calculate tons per day, divide the tons per year by 365.

**Sample Calculation**

Tons VOC/yr. = (bakery employees/county) x (per employee EF)

Gillespie County

Tons VOC/yr. = 25 employees x 0.11 tons VOC
= 2.75 tons of VOC/yr.

Tons VOC/day = 2.75 tons VOC/yr. / 365
= 0.00735 tons/day

**Methodology for Grocery Store Bakery Emissions**

For grocery store bakeries (SIC 5411), the regional offices of the major grocery store chains were contacted and a request was made for the number of employees working in the store bakeries for the AACOG counties. The number of employees provided was compared to the total amount of employees in each store using the Texas Workforce Commission database.[35] An average percentage was calculated and used as a factor to determine the number of bakery department employees for the remaining grocery stores. Based on this method, it was determined that 5.4% of the grocery store employees are in the bakery section. The number of employees provided was then multiplied by 5.4% and an emission factor of 0.11 tons of VOC/person/year to calculate bakery emissions.

[33] Adams, Lucy. April 1992. VOC Emissions from Bakeries. Radian Corporation, Memorandum to USEPA. Research Triangle Park, N.C.
[34] Texas Workforce Commission, 2002. Employment Data for 3rd quarter 2001. Austin, Texas.
[35] Texas Workforce Commission, 2002. Employment Data for 3rd quarter 2001. Austin, Texas.

**Sample Calculation for Grocery Store Bakery Emissions**
Gillespie County has 249 grocery store employees
Total grocery store bakery employment = 249 (total) x 0.054
= 13.45 bakery employees

Tons VOC/yr. = 13.45 employees x 0.11 tons VOC/person/yr.
= 1.47 tons VOC/yr.

Tons VOC/day = 1.47 tons VOC/yr. / 365
= 0.004 tons VOC/day

The emissions for the commercial and grocery store bakeries were added together to provide a total emission quantity. To assure the quality of the emission estimation, minor point sources were cross-referenced with area sources to ensure no double counting of companies used.

**Seasonal Adjustment**
The seasonal adjustment factor is 1. Bakeries have a weekly adjustment factor of 365 days per year (open 7 days a week).

## Breweries

**Introduction**
Breweries are emitters of VOC's (including ethanol, acetate, myrcene, etc.) due to the various steps utilized in the manufacturing of beer.

Due to the poor survey response in 2002, 1999's number was used to calculate the emissions produced by the various breweries. The only exception is Pearl Brewing Company, which did return the survey in 2002. Additionally, at least three breweries (Frio Brewing Co., Pearl Brewing Company, and Yellow Rose Brewing Co) were closed in 2002.

**Methodology**
Emission factors are based on brewery size (i.e. "large" >60,000 barrels per year, "small and micro" <60,000 barrels per year). This factor was multiplied by the production level of the breweries (in barrels) to obtain the pounds of VOC emitted per year. This figure was converted to tons per year and tons per day. The number of days the facility was in production was determined for each facility from the survey data. Then, the emissions were summed for each county.

When production figures were not accessible, best estimates were used. This was the case for a few of the microbreweries or brewpubs within the region. In such instances, production was estimated to be equal to that of establishments of similar size. Large breweries emit the same types of pollutants as the smaller breweries and emissions are based on the amount beer brewed.[36]

**Sample Calculation**

The production level of a microbrewery is 360 barrels per year with an emission factor of 56.8 lbs./1,000 barrels (0.0568 lbs. Per barrel). Activity was two days per week, or 104 days per year.

Tons VOC/yr. = 360 barrels/year x 0.0568 lbs./barrel
= 20.448 lbs. VOC/year. x 1ton/2,000lbs.
= 0.010224 tons VOC/year.

Tons VOC/day = 0.010224 tons VOC/year x 1year/104 activity days
= 0.0000983 tons of VOC/day

[36] Radian Corporation, February 1992. VOC Emissions from breweries. Research Triangle Park, North Carolina.

**Sample Survey**

December 17, 2003

Company

Address

ATTENTION: OPERATIONS MANAGER

The Alamo Area Council of Governments (AACOG) requests your assistance in completion of the 2002 Air Quality Emissions Inventory Breweries survey. The survey information will be used to assess and quantify emissions from brewing within the AACOG 12-County region. Survey responses are required to obtain accurate local data. The San Antonio region currently risks being declared in non-attainment of federal air quality standards (NAAQS); thus this inventory is a significant part of the emissions management process.

The purpose of this survey is to provide better information and services to the region, as well as help minimize additional regulations on the community. Your response is vital to this process and will enable a more precise emissions inventory for 2002.

To increase the accuracy of this information we ask that you review the attached survey and input the necessary data. You can return it to us in the self-addressed envelope or fax to (210) 225-5937 attention Donna Hessong, Natural Resources / Transportation Specialist, Alamo Area Council of Governments. Please submit your response by January 27, 2004.

Thank you for your time and participation. If you have any questions or comments please feel free to contact Steven Smeltzer, Environmental Manager, Alamo Area Council of Governments at (210) 362-5266.

Regionally Yours,

Al J. Notzon III
Executive Director

Enclosures (1)

**2002 Emissions Inventory Survey for Breweries**

Brewery Name: ______________________________________________

Contact Name/ Title: __________________________________________

Phone number: _______________________________________________

Production:

**Please list the Total number of barrels produced in each month in 2002:**

Jan ______ Feb ______ Mar ______ Apr ______ May ______ Jun ______

Jul ______ Aug ______ Sep ______ Oct ______ Nov ______ Dec ______

If production is not known by month please list the total number of barrels for the year.

Manufacturing Rate:

**Please list the number of days that manufacturing activities took place** (i.e.: 5 days per month, 4 months out of the year)

____________________________________________________________

____________________________________________________________

____________________________________________________________

**Please return by January 27, 2004**

## Catastrophic Spills and Accidental Releases

### Introduction

Accidental spills and releases of petroleum products or other chemicals can come from sources such as tanker trucks, refueling stations or ruptured pipelines. Factors affecting emissions include the type of fuel or petroleum product and the time taken to clean up the spill (if cleaned).

Information on spills in the region was acquired through the National Response Center.[37] Information that was provided categorized spills by several different factors, such as date, material, amount, and county were the spill took place. The spill source was useful in that it provide information about the spills nation wide, however from several spills within the 12 county area, all that was recorded was a spill had occurred. The materials were sometimes labeled as unknown or the amount as zero, making it difficult to estimate the amount of substances actually spilled in the 12 county area. There were also spills of substances that would be environmentally important, but are not included within this emissions inventory because they did no emit VOC, $NO_x$ and CO. For example, a spill of approximately 226.1 pounds of sulfur dioxide that was spilled in Comal County during 2002.

### Methodology

With the spill events acquired from NRC for each spill reported within the Alamo Area, a simple and direct method was used to determine the amount of emissions from each county. Estimates are that 10% of crude lost will evaporate, 20% of gas well liquid (condensate) and diesel will evaporate, and 100% of gasoline[38]. These emission factors are based on the density of the material spilled and the amount that will evaporate into the atmosphere. For the emissions calculation, the amount of the substance spilled was multiplied by its density and then by the percentage that would evaporate into the atmosphere. The calculation was then converted from pounds to tons. Since spills can occur at any time and any day, the seasonal adjustment factor is 1.

### Sample Calculation

Bexar County
June 9, 2002
Diesel Fuel Spilled = 150 gallons

The following formula was used:
Tons VOC = gallons x % evaporated x emission factor (tons/gal.) **/** 2,000 lbs.

---

[37] National Response Center, September 28, 2004. Download NRC Data. Available online: http://www.nrc.uscg.mil/foia.html
[38] Pollution Solutions, December 1998. Tyler/Longview/Marshall Flexible Attainment Region Emissions Inventory Ozone Precursors, VOC, NOx and CO 1996 Emissions. Cedar Park, Texas.

| | |
|---|---|
| Tons spilled | = 150 gal. x 20% x 6 lbs./gal. (density factor for diesel) **/** 2,000 lbs. |
| | = 0.09 tons |
| VOC Emissions (from diesel) in Bexar County on June 9, 2002 | = 0.09 tons (diesel) x 1.0/365 days = 0.00025 tons/day |

## Consumer and Commercial Solvents

### Introduction

This section involves all non-industrial solvents that are used in commercial or consumer applications. The solvent-containing products in this category include personal care products, household products, automotive aftermarket products, adhesives and sealants, household pesticides, coatings, and other miscellaneous commercial or consumer products that may emit VOCs. The primary solvents used in the formulation of these products are generally ethanol and isopropanol.

Personal care products include hair products, deodorants and antiperspirants, perfumes, colognes, and nail care products. Household products primarily consist of cleaning products for hard surfaces, clothing, carpet, dishes, waxes, polishes, air fresheners, and charcoal fluids. As a side note, this subdivision of commercial and consumer products may also contain propane, butane, and isobutane. Automotive consumer products are divided into two categories: (1) detailing products, and (2) maintenance and repair products. Detailing products include those used for cleaning, polishing, and waxing. Maintenance and repair products include engine and parts cleaners, carburetor/fuel injection cleaners, lubricants, antifreeze, radiator cleaners, and brake fluids. Adhesives include cements, glues, and pastes. Pesticides include substances or mixtures that are used to prevent, destroy, repel, or mitigate pests and, finally, the coatings portion of this product group includes aerosol spray paints and related products such as paint removers.

Solvents contained in these types of products are primarily released during product use. However, residual amounts of solvent may also remain in discarded product packaging, enter the municipal solid waste streams, and be disposed of in landfills. The VOC EFs presented in this inventory section have been adjusted to account for biodegradation of VOCs that enter the wastewater stream, but not those that enter landfills. Landfill emissions are covered in the landfill emissions section of the EI.

**Methodology**

The methodology employed to calculate emissions from consumer and commercial products uses per capita EFs for the product categories of interest. Multiply per capita EFs[39] by population data for the base year of interest to obtain total VOC emissions for that year.[40] The following example demonstrates this method. Table 4-13 illustrates the per capita consumer and commercial solvent VOC EFs.

Table 4-13. Per Capita Consumer and Commercial Solvent VOC EFs[41]

| Product Category | Per Capita EF (lbs. VOC/person)[42] |
|---|---|
| Personal Care Products | 1.66 |
| Household Products | 1.10 |
| Automotive Aftermarket Products | 0.71 |
| Adhesives and Sealants | 1.87 |
| FIFRA-Regulated Products | 0.28 |
| Coatings and Related Products | 0.51 |
| Miscellaneous Products | 0.60 |
| Total for All Consumer and Commercial Products | 6.73 |

**Sample Calculation**

The equation to estimate VOC emissions from personal care products is:[43]

Population x Per Capita EF = Emissions

If the population of the Bexar County is 1,535,972 persons, the VOC emissions from all commercial and consumer products are:

Tons VOC/year = 1,535,972 persons x 1.66 lbs. VOCs/person/yr. / 2,000
= 1,274.9 tons VOCs/yr.

[39] Texas Commission on Environmental Quality (TCEQ), 1999. Derivation of 1999 Consumer and Commercial Product Per Capita Emission Factors for the State of Texas. Austin, Texas.
[40] Texas Water Development Board, July 2004, 2006 Regional Water Plan: County Population Projections for 2000 – 2060. Available online: http://www.twdb.state.tx.us/data/popwaterdemand/2003Projections/Population%20Projections/STATE_REGION/County_Pop.htm
[41] Provided by the Texas Commission on Environmental Quality.
[42] California Air Resources Board Survey Results and Emission Inventory Improvement Program.
[43] U.S. Environmental Protection Agency (EPA), August 1996. Emissions Inventory Improvement Program/Area Sources Committee Volume III: Chapter 5. Research Triangle Park, North Carolina.

Once the calculation was completed, a rate of progress control factor was applied to account for additional emission reductions due to use of improved techniques and/or implementation of new regulations.[44]

Rate of progress control factor for consumer and commercial solvents: 0.8

1274.9 tons VOC/yr. x 0.8 = 1019.9 tons VOC/yr.

Consumer and commercial product use is not influenced by seasons. The use of consumer and commercial products occurs 7 days a week throughout the year. Thus, to calculate daily emission estimates, the annual emissions estimate is divided by 365.

## Degreasing

### Introduction

Solvent degreasing (or solvent cleaning) is the physical process of using organic solvents or solvent vapor to remove grease, fats, oils, wax or soil from items made of metal, glass or plastic. The types of equipment used for degreasing are categorized as batch and in-line cleaning machines. Furthermore, batch cleaners are categorized as either batch cold cleaning machines or batch vapor cleaning machines. Non-aqueous solvents used in the process include distillates, chlorinated hydrocarbons, ketones, and alcohols.

The metalworking industries are the major users of solvent degreasing. These include automotive, electronics, plumbing, aircraft, refrigeration, and business machine industries. The printing, chemical, plastics, rubber, textiles, glass, paper, and electric power industries also use solvent degreasing operations.

### Methodology

The VOC emissions from degreasing operations were calculated using EPA-approved emission factors. These factors were developed for degreasing based on equipment type and SIC code as illustrated in Table 4-14. By multiplying the EF by the number of people employed within each applicable SIC code, the total emissions for each degreasing category were determined. Employment was verified through the Texas Workforce Commission.[45] Emission Inventory Improvement Program guidance suggests uniform activity throughout the year (no seasonal adjustment) and a six-day workweek when facility-specific information is unavailable. The

[44] ENVIRON International Corporation, 2001. Future-Year Ozone Modeling of the Austin, Texas Region: Draft Final Report. Novato, Ca.
[45] Texas Workforce Commission, 2002. Employment Data for 3rd quarter 2001. Austin, Texas.

calculations performed here are based on this default.[46]

Table 4-14. Degreasing Equipment SIC Codes and EFs

| Subcategory | SIC | Per Employee Factor (lbs. VOC/yr./employee) |
|---|---|---|
| Solvent Cleaning | 25, 33-39, 417, 423, 551, 552, 554-556,753 | 87 |
| **Cold Cleaning** | | |
| Automobile Repair | 417, 423, 551, 552, 554-556, 753 | 270 |
| Manufacturing | 25, 33-39 | 24 |
| **Vapor and In-Line Cleaning** | | |
| Electronics and Electrical | 36 | 29 |
| Other | 25, 33-39, 417, 423, 551, 552, 554-556, 753 | 9.8 |

Calculating degreasing emissions needed to take into account Chapter 106 of the Texas Administration Code.[47] Chapter 106 requires all Texas counties to implement equipment controls, as stipulated by Chapter 115[48], on degreasing units that will reduce emissions from the degreasing process. Chapter 115 requires an overall emission reduction in degreasing emissions by 85%.

A Texas-based company that provides various environmental services supplies approximately 50% of degreasing units in the San Antonio area and their units are Chapter 106 compliant. This factor was utilized to provide a more accurate estimate of emission reductions.

**Sample Calculation**

The emissions from vapor and inline cleaning from the electronics and electrical industries (SIC code 34) in Bexar County were calculated as follows:

Number of people employed in a single manufacturing plant in Bexar County = 1,926

Tons VOC/year = 1,926 x 24 (EF) / 2,000

= 23.11 tons VOC/yr.

[46] U.S. Environmental Protection Agency, September 1997. Emission Inventory Improvement Program Volume III: Chapter 6 Solvent Cleaning. Research Triangle Park, North Carolina.

[47] TCEQ, 2001. Permit By Rule, 30 T.A.C. §106.454 . Available online: http://www.tnrcc.state.tx.us/oprd/rules/pdflib/106_ind.pdf

[48] TCEQ, 1999. Control of Air Pollution from Volatile Organic Compounds, 30 T.A.C. §115.412-415. Available online: http://www.tnrcc.state.tx.us/oprd/rules/pdflib/115_ind.pdf

Based on a six-day workweek, the daily emission rate from the manufacturing plant in Bexar County is:

Tons VOC/day = 23.11 / 312 days/year
= 0.074 tons/day

Once all the emissions for the degreasing subcategories were calculated, Chapter 106 emission reductions were determined. This was accomplished by taking into account that approximately half of the degreasing equipment population in each AACOG county is Chapter 106 compliant. Therefore, the 85% emission reduction resulting from the controls was applied to half of the equipment population.

<u>Degreasing Chapter 106 Emission Reduction for Bexar County</u>

Emission Reduction = Emissions w/out Ch. 106 x 50% (half of the equipment is Ch. 106 compliant) x 85% (emission reducing capacity of equipment controls)
= 7.664 tons/day x 50% x 85%
= 3.258 tons/day

<u>New Emission Total</u>

Tons VOC/day = 7.664 tons/ day – 3.258 tons/day
= 4.407 tons/day

## Dry Cleaners

### Introduction

The VOCs emitted from dry cleaners are from the solvents used in the dry cleaning process. Dry cleaning operations typically use either synthetic halogenated or petroleum distillate organic solvents for cleaning purposes. The VOCs may be emitted in the dry cleaning process or during solvent reclamation processes. Petroleum solvents most commonly used in the dry cleaning process are Stoddard solvent (mineral spirits) and 140-F. Synthetic solvents used in the dry cleaning process include PERC (Perchloroethane), TCA (Trichloroethane), and CFC-113 (Chlorofluorocarbons).

There are three types of dry cleaning operations. The two major types are coin-operated (SIC code 7215) and commercial (SIC code 7216). Industrial launderers (SIC 7218) usually use soap and detergent when cleaning, but may also use large-capacity dry cleaning units that should be monitored for emissions. Coin-operated dry cleaning units are self-service machines that are usually found in laundromats. Commercial dry cleaners are small businesses that offer cleaning services to the public. Some sites may not be emission sources because some of the stores are for drop-off and pick-up only. Industrial launderers that use dry cleaning solvents are usually part of a business operation that generates soiled fabrics. Industrial cleaners may also be large businesses that provide uniform and rental services to its clients.

**Methodology**

The preferred method to estimate emissions for coin-operated dry cleaners is the development of local per facility or per dry cleaning unit EF. For commercial dry cleaners and industrial launderers, a per facility EF method is the preferred approach. Unfortunately, this data was not available and an alternative method had to be used.

The Radian Corporation, in its EIIP (May 1996), states alternative methods for estimating emissions using the national per employee EF and the national per facility EF.[49] The national per employee factor requires the employee count of each dry cleaning business. This employee population was acquired using employment by SIC codes from the Texas Workforce Commission.[50]

Emissions were calculated by multiplying the per employee emission factor of 1,800 pounds per year per employee by the number of employees in area sources of SIC 7215, 7216, and 7218 to obtain an estimate of emissions at dry cleaning area sources.

**Sample Calculation**

Bexar County has 237 employees in SIC 7215 and the Employee EF = 1,800 lbs./employee/yr.

Tons/Year = 237 employees x 1,800 EF / 2,000
= 213.3 tons/yr.

**Seasonal Adjustment**

The weekly adjustment factor is 312 days per year (6-day workweek). The seasonal adjustment factor is 1.[51]

Tons/Day = 213.3 / 312 (weekly adjustment factor)
= 0.68 lbs./day for coin-op dry cleaners

[49] Radian Corporation. 1996. Dry Cleaning: Final Report. Area Sources Committee Emission Inventory Improvement Program, Vol. III: Chapter 4.
[50] Texas Workforce Commission, 2002. Employment Data for 3rd quarter 2001. Austin, Texas.
[51] Radian Corporation. 1996. Dry Cleaning: Final Report. Area Sources Committee Emission Inventory Improvement Program, Vol. III: Chapter 4.

## Explosives Detonation

### Introduction

Explosives are chemical compounds/mixtures that experience rapid burning/decomposition and generate large amounts of gas and heat with a subsequent production of sudden pressure effects.[52] While CO is the primary pollutant produced by the detonation of explosives, NOx is also formed, but only very limited data is available on these emissions. These emissions deal mainly with the detonation of industrial explosives and firing of small arms. There are no major sources of mining operations in the 12 county region. It is estimated that these emissions are insignificant, as well as a lack of information regarding the firing of small arms by private citizens, resulted in no emissions being calculated for this category.

## Fires

### Introduction

Fires are a source of pollutants that have the potential to produce large amounts of emissions over a short period of time. The category of fires is broken into the following four sub-categories: structure (including residential and commercial), vehicle, outside/open and other. Data for Bexar and surrounding counties in the AACOG Region was from the State Fire Marshall, Texas Dept. of Insurance[53].

Structural Fires

Structures are traditionally classified as either residential or non-residential, both categories will be covered in this section. Fuel loading estimates are necessary to convert the number of fires into a value compatible with emission factors, which are based upon the total weight of material burned. A lack of satisfactory data pertaining to square footage for both structures in general and structures involved in fires led to the need for alternative methods of calculating emissions. A fuel-loading factor of 1.15 tons per structure fire was used will a methodology developed by the California Air Resources Board (CARB).[54]

### Sample Calculation

VOC tons/yr. for Bexar County = (1,233 fires *11 lbs./ton x 1.15 tons/fire) / 2,000 tons
= 7.799 tons/yr.

---

[52] Encarta Encyclopedia, Explosives, Available online: http//encarta.msn.com/find/Concise.asp?z=1&pg=2 &ti=7615778751, July 2001.

[53] State Fire Marshall, Texas Department of Insurance, December 2003. Fires in Texas; Texas Fire Incident Reporting System. Austin, Texas.

VOC tons/day for Bexar County = 7.799 tons/yr. / 365 days
= 0.021 tons/day

Where 1,233 equals the number of fires, 11lbs./tons is the emission factor for VOC, 1.15 is the fuel loading factor (CARB) and 365 is the number of activity days per year.

Vehicle Fires

Data concerning vehicle fires in the AACOG area was obtained from the Texas State Fire Marshall's Office. To determine fuel loading, an estimate must be made on how much material burns in a vehicle fire. The estimate used for this parameter is that each vehicle contains approximately 500 pounds (0.25 tons) of material that can burn in a fire, based on the average weight of a vehicle being about 3,700 pounds (CARB, 1995).

**Sample Calculation**

Bexar County:

The emission factor for $NO_X$ is 4lbs./ton burned (EPA,1996) Converting to tons, 4/2,000 = 0.002 tons.

Tons $NO_x$/year = (Activity x fuel loading x Emission Factor)
= (1,390 fires x 0.25tons/fire x 0.002 tons $NO_X$)
= 0.695 tons/yr.

Tons $NO_x$/day = 0.695 tons/yr. / 365 days
= 0.0019 tons $NO_X$/day resulting from vehicle fires

Open Burning

Data concerning the open burning of residential and commercial solid waste is in very short supply. This led to the use of alternative methods in order to estimate emissions from open burning in the AACOG Region for the target year of 2002. According to current regulations, counties with a population less than 30,000 are not responsible for providing waste collection services. In these counties, residents must handle disposal of their waste by: transporting waste to regional landfills, contracting haulers individually, landfilling waste on their property, or burning household waste on their property.

The practice in the AACOG Region[55] however, holds that approximately 28 percent of the population in counties with a total population under 30,000 do not landfill their solid waste.

[54] This method is listed in EIIP Volume III and is derived from the CARB Emission Inventory Procedure Manual, Vol. III: Methods for Assessing Area Source Emissions, developed by the California Environmental Protection Agency: Air Resources Board.

[55] AACOG, 1993. Solid Waste Management in the AACOG Region, 1990 – 2010. 1993 Update, financed by the Texas Natural Resource Conservation Commission. San Antonio, Texas.

Waste generated was calculated based on 1.19 tons per person, per year.[56] On a per day basis, this is 0.00326 tons burned per person. The percentage of households in rural AACOG Region not landfilling waste in AACOG was 28.5714%.[57] Also, only 50 percent of waste subject to burning is combustible.[58] Emission estimates were also calculated for Atascosa and Medina counties, which have population slightly over 30,000. The total for these counties were used to determine the amount of household solid waste burned in the AACOG Region.

EPA methodology was used to estimations emissions from commercial waste[59]. Similar to the methodology used for residential solid waste, commercial open burning was estimated to take place in rural areas only.

**Sample Calculation**

CO emissions in Frio County resulting from open burning of solid waste.

*Residential*

Tons of waste created per year per person = 1.19 tons/person/yr. x 16,634 persons
= 19,794.46 tons/yr.

Tons of waste not in a landfill/yr = 19,794.46 tons/yr. x 0.285714
= 5,655.55 tons of waste not in a landfill/yr

Tons waste burned/yr = 5,5655.55 tons of waste not in a landfill/yr x 0.50 burned
= 2,827.78 tons waste burned/yr

CO Emissions per year = 2,827.78 (tons waste burned/yr.) x (0.0425[60] tons CO/ ton waste burned)
= 120.18 tons CO/yr.

CO Emissions per day = 120.18 tons CO/yr. / 365 day/yr.
= 0.329 tons CO/day

56 AACOG, 1998. Solid Waste Report. 1998 Update. San Antonio, Texas.
57 AACOG, 1993.
58 Volume III, Chapter 16, Emissions Inventory Improvement Program, 1997. Evaluation of Emissions from the Open Burning of Household Waste in Barrels. Triangle Research Park, North Carolina.
59 U.S. Environmental Protection Agency. Procedures for the Preparation of Emission Inventories for Carbon Monoxide and the Precursors of Ozone: Volume I: General Guidance for Stationary Sources. Triangle Research Park, North Carolina.
60 U.S. Environmental Protection Agency. Emission factor from EIIP Volume III. Triangle Research Park, North Carolina.

*Commercial*

Approximately, 0.033[61] tons commercial waste burned per capita per year in rural areas. 2002 population of Frio County was 16,634.

Tons commercial waste/yr. burned in Frio = 0.033 x 16,634
= 548.92 tons/yr.

CO Emissions per day = (548.92 tons/yr.) x (0.0425[62] tons CO/ ton waste burned) / (365 days)
= 0.0639 tons CO/day

Total CO emissions per day = (0.329 tons residential CO/day) + (0.0639 tons commercial CO/day)
= 0.393 tons CO/ day

Slash and Prescribed Burning

Slash and prescribed burning are primarily of use as forest management tools. These entail the deliberate burning of waste logs and underbrush in order to prepare land for the planting of new trees. Emissions for slash and prescribed burning were not calculated because of the lack of valid information from any state or federal agency and the emissions are estimated to be insignificant.

Orchard Heaters

Orchard heaters are used to prevent frost damage to fruit and fruit trees. The heaters are used to keep ambient temperatures within the accepted range of temperatures in which fruit production can be optimized.

After attempting to contact the agricultural agents in the outlying counties of the AACOG Region and getting no response, it is impossible to estimate the use (if any) of the orchard heaters. Therefore, these emissions are estimated to be insignificant and no emissions were calculated for this area.

---

[61] EPA Region VI Default value of 33 tons per person per year of Commercial waste burned.
[62] U.S. Environmental Protection Agency. Emission factor from EIIP Volume III. Triangle Research Park, North Carolina.

## Gas Cans

### Introduction

Portable fuel containers, more commonly known as gas cans, may not generally be thought of as a source for emissions, but as fillable, spillable and permeable containers they can release VOC into the atmosphere. There are five ways in which vapors are released from gas cans[63].

- Permeation
- Diurnal
- Transport Spillage
- Spillage
- Vapor Displacement

With the additional consideration that that for each household there are 1.34 gas cans and for each lawn and garden company there are 10.5 gas cans, the emissions can be significant.[64]

### Residential Gas Can Methodology

The number of residential gas cans was calculated by multiplying the number of households by a percentage of households that have gas cans (70%) by the average number of gas cans per household (1.34).[65] To calculate the number of households in 2002, a ratio of 2000 population to 2000 households was used (Table 4-15).

2002 households = 2000 households / 2002 population × 2000 population.

---

[63] California Environmental Protection Agency, Air Resources Board, September 1999, Gas Can Fact Sheet 1999. California.

[64] Eastern Research Group, August 2002, Emissions from Portable Gasoline Containers in Texas, Final Report.

[65] *Ibid*.

Table 4-15. AACOG Household and Population Data.

| County | 2000 Households | 2000 Population | 2002 Households | 2002 Population |
|---|---|---|---|---|
| Atascosa | 12,816 | 3,8628 | 13,272 | 40,003 |
| Bandera | 7,010 | 17,645 | 7,703 | 19,391 |
| Bexar | 488,942 | 1,392,931 | 505,721 | 1,440,732 |
| Comal | 29,066 | 78,021 | 31,316 | 84,061 |
| Frio | 4,743 | 16,252 | 4,854 | 16,634 |
| Gillespie | 8,521 | 20,814 | 8,789 | 21,469 |
| Guadalupe | 30,900 | 89,023 | 32,695 | 94,194 |
| Karnes | 4,454 | 15,446 | 4,544 | 15,757 |
| Kendall | 8,613 | 23,743 | 9,482 | 26,138 |
| Kerr | 17,813 | 43,653 | 18,270 | 44,772 |
| Medina | 12,880 | 39,304 | 13,363 | 40,778 |
| Wilson | 11,038 | 32,408 | 11,833 | 34,742 |

Number of Residential Gas Cans

$$Pop = N \times A \times COUNT$$

Where:

Pop = population of gas cans
N = number of household units
A = percentage of households with gas cans (70%)
COUNT = average number of gas cans per household

**Sample Calculation**
Bexar County Residential Gas Cans

Bexar Gas Can Population = 505,721 × 70% × 1.34
= 491,560.81 residential gas cans

<u>Permeation</u>
Permeation occurs when the gasoline stored within the gas can has saturated the container and fittings. The emissions factors depend on whether the can is plastic (1.57 grams/gallon per day) or metal (0.06 grams/gallon per day). Within the category of residential gas cans, 81% are made of plastic and 19% are metal. 70% of all gas can in Texas are stored with 29% of their fuel capacity filled with fuel.

$$PER = POP \times S \times EF \times SIZE \times LEVEL$$

Where:

| | |
|---|---|
| Per | = Permeation VOC |
| Pop | = Population of gas cans, plastic (81%) and metal (19%) |
| S | = Percentage of gas cans stored with fuel (70%) |
| EF | = Emission factor (1.57 g/gal. per day for plastic and 0.06g/gal. per day for Metal) |
| SIZE | = Average capacity of the residential gas can (2.34 gallons) |
| LEVEL | = Average amount of fuel within the gas cans (29%) |

**Sample Calculation**

Bexar County for Residential Plastic Gas Cans

Bexar Permeation Emissions (plastic) $= 398{,}164.26 \times 0.70 \times 1.57$ g/gal./day $\times$ 2.34 gal. $\times 0.29 \times$ 0.002205 g / 2,000 lbs.
= 0.3274 tons/day

Diurnal

Diurnal emissions are the result from fuel expansion vapor production during rising temperatures during the day. The amount of emissions depends on whether the gas can is closed (vents and spouts sealed) or open (spout of vent allows any vapors or liquids to escape). 66% of all gas cans (plastic, metal, residential and commercial) are stored open[66]. Within non-road lawn and garden equipment there is a category for diurnal emissions; however, this category pertains to the fuel expansion within the gas tank of the lawn and garden equipment and not within the gas cans themselves.

$$DIU = Pop \times S \times EF \times SIZE \times LEVEL$$

Where:

| | |
|---|---|
| DUI | = Diurnal Emissions |
| Pop | = Population of gas cans, plastic (81%) and metal (19%), open (66%) and closed (34%) |
| S | = Percentage of gas cans stored with fuel (70%) |
| EF | = Emission factor (1.38 g/gal./day closed plastic, 0.44 g/gal./day closed metal, 21.8 g/gal./day open plastic and metal) |
| SIZE | = Average capacity of the residential gas can (2.34 gallons) |

[66] *Ibid*.

LEVEL = Average amount within the gas cans (29%)

**Sample Calculation**
Bexar County Residential Plastic Closed Gas Cans

Bexar Diurnal Emissions (plastic closed) = 1,353,753.85 × 0.70 × 1.38 g/gal./day × 2.34 gal. × 0.29 × 0.002205g / 2,000 lbs.
= 0.098 tons/day

Transport Spillage
Transport spillage occurs when the gas can is refueled at the pump. Only whether the gas can is open or closed is the only variable that impacts emissions. The gas can material does not impact the equation.

$$\text{Trans} = \text{Pop} \times \text{S} \times \text{EF} \times \text{Refill}$$

Where:

DUI = Diurnal Emissions
Pop = Population of gas cans, open (66%) and closed (34%)
S = Percentage of gas cans stored with fuel (70%)
EF = Emission factor (23 g/gal./day closed, 32.5 g/gal./day open)
Refill = frequency of daily refilling (0.0174)

**Sample Calculation**
Bexar County Residential Plastic Closed Gas Cans

Bexar Transport Spillage Emissions (plastic open) = 324,430.14 x 0.70 × 32.5 g/gal./day × 0.0174 × 0.002205 g / 2,000 lbs.
= 0.142 tons/day

Refueling Spillage and Vapor Displacement
Refueling spillage occurs when the gas tank of various non-road equipment are filled using a gas can. This filling causes vapor displacement, displacing the gasoline vapor within the tank as the liquid gasoline is poured in from the gasoline.

These two categories require the NONROAD model be run to estimate the amount of emissions. Emissions have already been included in the non-road lawn and garden category. To avoid double counting, these emissions were not calculated within the methodology.

**Commercial Gas Can Methodology**

Commercial gas cans different from residential in two significant ways: the average size is different, because commercial gas cans hold on average 5 gallons, and the percentage of metal cans to plastic is higher. To determine how many commercial gas cans are used, the number of lawn and garden companies in the twelve county area were counted[67] and multiplied by the average number of gas cans (10.5) per company.[68]

**Sample Calculation**

Bexar County Commercial Gas Cans

Bexar Commercial Gas Cans = 113 lawn and garden companies × 10.5 gas cans per company
= 1,186.5 commercial gas cans

<u>Permeation</u>

$$PER = POP \times S \times EF \times SIZE \times LEVEL$$

Where:

| | |
|---|---|
| Per | = Permeation VOC |
| Pop | = Population of gas cans, plastic (77.6%) and metal (22.4%) |
| S | = Percentage of gas cans stored with fuel (70%) |
| EF | = Emission factor (1.57 g/gal. per day for plastic and 0.06g/gal. per day for Metal) |
| SIZE | = Average capacity of the residential gas can (3.52 gallons) |
| LEVEL | = Average amount within the gas cans (29%) |

**Sample Calculation**

Bexar County for Commercial Plastic Gas Cans

Bexar Permeation Emissions (plastic) = 920.72 × 0.70 ×1.57 g/gal./day × 3.52 gal. × 0.29 × 0.002205 g / 2,000 lbs.
= 0.00114 tons/day

<u>Diurnal</u>

Within Non-Road lawn and garden equipment there is a category for diurnal emissions; however, this category pertains to the fuel expansion within the gas tank of the lawn and garden equipment and not within the gas cans themselves.

$$DIU = Pop \times S \times EF \times SIZE \times LEVEL$$

[67] Texas Workforce Commission, 2002. <u>Employment Data for 3rd quarter 2001</u>. Austin, Texas.
[68] Eastern Research Group, August 2002, <u>Emissions from Portable Gasoline Containers in Texas, Final Report</u>.

Where:

DUI = Diurnal Emissions
Pop = Population of gas cans, plastic (77.6%) and metal (22.4%), open (66%) and closed (34%)
S = Percentage of gas cans stored with fuel (70%)
EF = Emission factor (1.38 g/gal./day closed plastic, 0.44 g/gal./day closed metal, 21.8 g/gal./day open plastic and metal)
SIZE = Average capacity of the residential gas can (3.52 gallons)
LEVEL = Average amount within the gas cans (29%)

**Sample Calculation**

Bexar County Commercial Plastic Closed Gas Cans

Bexar Diurnal Emissions (plastic closed) $= 313.05 \times 0.70 \times 1.38$ g/gal./day $\times 3.52$ gal. $\times 0.29 \times 0.002205$ g / 2,000 lbs.
= 0.00034 tons/day

Transport Spillage

Transport spillage occurs when the gas can is refueled at the pump. Only whether the gas can is open or closed is or any relevance, not the material the gas can is made of.

$$\text{Trans} = \text{Pop} \times \text{S} \times \text{EF} \times \text{Refill}$$

Where:

DUI = Diurnal Emissions
Pop = Population of gas cans, open (66%) and closed (34%)
S = Percentage of gas cans stored with fuel (70%)
EF = Emission factor (23 g/gal./day closed, 32.5 g/gal./day open)
Refill = frequency of daily refilling (0.9636)

**Sample Calculation**

Bexar County Commercial Plastic Closed Gas Cans

Bexar Transport Spillage Emissions (plastic open) $= 783.09 \times 0.70 \times 23$ g/gal./day $\times 0.9636 \times 0.002205$ g / 2,000 lbs.
= 0.013 tons/day

Refueling Spillage and Vapor Displacement

Refueling spillage occurs when the gas tank of various non-road equipment are filled using a gas can. This filling causes vapor displacement, displacing the gasoline vapor within the tank as the liquid gasoline is poured in from the gasoline.

These two categories require the NONROAD model be run to estimate the amount of emissions. Emissions have already been included in the non-road lawn and garden category. To avoid double counting, these emissions were not calculated within the methodology.

## Gasoline Distribution

### Introduction

The gasoline distribution network for automobile gasoline in the United States is a complex system of retail and wholesale outlets. Gasoline distribution can include many sources of emissions. In this category, gasoline distribution emissions from vehicle refueling, tank truck unloading, tank breathing losses, tank trucks in transit, and other emissions are calculated. The emissions calculated in this section do not include marine vessel loading, gasoline bulk tanks, loading and unloading of railway tank cars, and pipeline emissions. In the AACOG region, there is no marine vessel loading. Gasoline bulk tanks emissions are included in the point source database.

In order to calculate VOC emissions from gasoline distribution, this section is divided into four sub-categories, as described in EPA's "Procedures for the Preparation of Emission Inventories for Carbon Monoxide and Precursors of Ozone."

1. Trucks in Transit. These emissions are created by pressure in the truck tank, thermal effects, and leaking delivery trucks. This includes emissions from both loaded and empty trucks in the region.
2. Tank Breathing Losses. Emissions are emitted by the storage of fuel in underground storage tanks at gas stations.
3. Tank Truck Unloading. The transfer of fuel from the tank truck to the service station creates emissions in this category.
4. Vehicle Refueling. The displacement of vapors from the vehicle fuel tank produces emissions.

In this inventory, spillages are calculated with the Catastrophic / Accidental Release section and the emissions from diesel fuels distribution was not considered because it has a higher boiling point than gas and the emissions are insignificant.

**Methodology**

Emissions from refueling, service station tank truck unloading, tank breathing losses, tank trucks in transit, and other emissions were calculated based on gasoline sales for each county. Gasoline sales tax for each county was obtained from the Texas Comptroller of Public Accounts for the State of Texas.[69] Gasoline sales tax data is only available at the state level. To calculate the amount of gallons sold in Bexar County, the following formula was used; the state gasoline-sales tax is 20 cents/gal. Total sales tax revenue is multiplied by five gallons per dollar of tax revenue to arrive at total gallons of gasoline sold. In Texas, approximately 1% of on-road vehicles are exempt from paying gasoline sales tax. Thus, gasoline sales were increased by 1% to account for these exempt vehicles.[70]

**Sample Calculation**

Total Gallons of Gasoline Sold in Bexar County 2002

Gallons Sold = Population for Bexar County 2002 / State Population 2002 × Texas State Gasoline Sales Revenue for 2002 × 5 gal./$1 × 1.01 Exempt Vehicles

= 1,440,732 / 21,663,246 × $2,256,049,541 × 5 gal./$1 × 1.01

= 757,704,177 gal.

**Stage 1 Vapor Recovery Systems**

As a tank of volatile fuel such as gasoline is gradually emptied, the empty space will be occupied by vapors of the fuel, or by a mixture of air and vapors, if an inlet air vent is provided. When a tanker truck delivers fuel to a gas station, the new fuel entering the underground tank would force accumulated gasoline vapors out of the tank into the air. With the Stage I vapor recovery system, vapors are forced out of the underground storage tank into the tanker truck through a vapor recovery line. The recovered vapors in the tanker truck can then be recycled.

Currently, Stage I systems are required in the SA MSA for facilities that dispense 125,000 or more gallons/month of gasoline.[71] The effectiveness of the Stage I vapor recovery system strategy was measured by calculating the current release of hydrocarbon emissions due to tank unloading for the San Antonio MSA. Tanks that are Stage I equipped recapture 98-100% of emissions that would have traditionally been released into the atmosphere during tank filling.

Table 4-16 lists the population and amount of gasoline sold in each AACOG County.

---

[69] Email communication with the Office of the Comptroller of Texas, July. 2004. Austin, Texas.

[70] U.S. Environmental Protection Agency, 1991. Procedures for the Preparation of Emission Inventories for Carbon Monoxide and Precursors of Ozone. Volume 1. Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina; "Gasoline Marketing (Stage I and Stage II)", Emission Inventory Improvement Program, (Volume III, Chapter 11). TRC Environmental Corporation.

[71] Texas Administrative Code, Title 30, Part 1, Chapter 115, Subchapter C, Division 2, Rule 115.229.

Table 4-16. Gasoline Sales per County in the AACOG region, 2002

| County | Population* | Gallons Sold |
|---|---|---|
| Atascosa | 40,003 | 20,947,847 |
| Bandera | 19,391 | 10,117,263 |
| Bexar | 1,440,732 | 751,702,559 |
| Comal | 84,061 | 43,858,864 |
| Frio | 15,226 | 8,678,797 |
| Gillespie | 21,259 | 11,201,460 |
| Guadalupe | 94,194 | 49,145,761 |
| Karnes | 15,757 | 8,221,222 |
| Kendall | 26,138 | 13,637,513 |
| Kerr | 44,772 | 23,359,811 |
| Medina | 40,778 | 21,275,940 |
| Wilson | 34,742 | 18,126,654 |

*Note: Population figures are from the Texas Water Development Board[72]

Table 4-17 shows the emissions factors for the four subcategories within gasoline distribution. The factors for tank trucks in transit, tank truck unloading, and tank-breathing loss were provided by the EIIP[73]. For vehicle refueling, EPA MOBILE6.2 was used to calculate emission factors. The model is designed to support the evaluation of air pollution from gasoline- and diesel-fueled vehicles. MOBILE6.2 has improved predictive equations to calculate refueling emission factors, including sensitivity to temperature and Reid vapor pressure (RVP). Temperature and RVP are not incorporated into published *AP-42* factors for refueling. Additionally, MOBILE6.2 can account for Stage II emissions controls. The RVP, Reid Vapor Pressure, used was 7.8, which is required by the State for counties east of the IH-35 corridor. The maximum temperature used within MOBLIE6.2 was 87.8° F and the minimum was 69.4° F.

[72] Texas Water Development Board, July 2004, 2006 Regional Water Plan: County Population Projections for 2000 – 2060. Available online: http://www.twdb.state.tx.us/data/popwaterdemand/2003Projections/Population%20Projections/STATE_REGION/County_Pop.htm

[73] U.S. Environmental Protection Agency, January 2001. Emission Inventory Improvement Program (EIIP)/Area Source Committee Volume III: Chapter 11. Research Triangle Park, North Carolina.

Table 4-17. VOC Emission Factors for Gasoline Distribution in AACOG

<table>
<tr><th>Category</th><th colspan="2">EF</th></tr>
<tr><td>Vehicle Refueling</td><td colspan="2">1.73 lbs. of VOC/1,000 gal.</td></tr>
<tr><td rowspan="2">Tank Trucks in Transit</td><td>Vapor Filled Truck</td><td>0.055 Lbs./ 1,000 Gal.</td></tr>
<tr><td>Gas Filled Truck</td><td>0.005 Lbs./ 1,000 Gal</td></tr>
<tr><td rowspan="3">Tank Truck Unloading</td><td>Submerged Filling</td><td>7.3 Lbs./ 1,000 Gal.</td></tr>
<tr><td>Splash Filling</td><td>11.5 Lbs./ 1,000 Gal.</td></tr>
<tr><td>Balanced Submerged Filling</td><td>0.3 Lbs./ 1,000 Gal.</td></tr>
<tr><td>Tank Breathing loss</td><td colspan="2">1.0 lb. of VOC/1,000 gal.</td></tr>
</table>

To calculate emissions per day for each county, the number of days per year that each activity would have taken place was required. Table 4-18 shows the days per week and the days per year that the four types of activities took place.

Table 4-18. Daily Allocation of Gasoline Distribution

| Subcategory | Days per Week | Days per Year |
|---|---|---|
| Vehicle Refueling | 7 | 365 |
| Storage Tank Breathing | 7 | 365 |
| Trucks in Transit | 6 | 312 |
| Fuel Delivery to Outlets | 6 | 312 |

By using the amount gasoline sold within the 12 county region, the days in which the activities took place, and the emission factors for vehicle refueling, storage tank breathing, truck in transit and fuel delivery to outlets, the emissions for each activity was calculated.

<u>Trucks in Transit</u>

There are breathing losses when the tank trucks are in transit distribute gasoline. To calculate the breathing loss the amount of gasoline in gallons transported within the area was needed. The gasoline transportation adjustment factor used was the national default of 1.25.

**Sample Calculations**

Trucks In Transit Emissions for Bexar County

$$TTE = ((TGD \times LEF \times GTA) + (TGD \times UEF \times GTA)) / 2{,}000$$

Where: TTE = Total gasoline emissions from tank trucks in transit (tons)
LEF = Loaded tank truck in-transit emission factor from table 4-17 (lbs. / 1,000 gal.)
UEF = unloaded tank truck in-transit emission factor from table 4-17 (lbs. / 1,000 gal.)
TGD = Total gasoline dispensed in the inventory region (1,000 gal.)
GTA = Gasoline transportation adjustment factor.

TTE = ((757,704,177 gal. × 0.055 lbs/1,000 gal. × 1.25) + (751,702,559 gal. × 0.005 lbs./1,000 gal × 1.25)) / 2,000 lbs. / 312 days
= 0.091 tons/day

Storage Tank Breathing Loss

No storage tank is 100% sealed; there are spaces within the tank where the gasoline vapor can escape from the tank and into the atmosphere.

**Sample Calculation**

Storage Tank Breathing Emissions for Bexar County

Breathing Loss/year = EF lbs./gal. × Gasoline gal. / 2,000 lbs.
= 1.0 lbs./1,000 gal. × 757,704,177 gals / 2,000 lbs.
= 378.85 VOC tons/yr.

Breathing Loss/day = 378.85 tons/yr. / 365 days
= 1.04 VOC tons/day

Tank Truck Unloading Emissions for Bexar County

The emissions factors for this category depend on the filling technology used. If Stage I vapor recapture is involved the emissions released are reduced. The three types of technology used are submerged filling (7.3 lbs./1,000 gal.), splash filling (11.5 lbs./1,000 gal.) and balanced submerged filling (0.3 lbs./1,000 gal.). Balanced submerged filling is stage I tank filling. The percentage of tanks equipped with stage I in Bexar, Comal, Guadalupe and Wilson Counties was supplied by Roger Vaughn, an engineer at TCEQ (65%). The other eight counties percentages were supplied by Martha C. Glasgow, a PST Registration & Self Certification Specialist for TCEQ. Because of a lack of information, it was estimated that remaining tanks that did not use stage I were using submerged filling (35%).

**Sample Calculation**

| | |
|---|---|
| Total gallons of gasoline filled | = % filling technology (Balanced submerged filling) × total gallons of Gasoline |
| | = 65% × 757,704,177 gals |
| | = 492,507,714.84 gals |
| VOC tons/yr. | = Emissions Factor × total gallons of gasoline filled / 2,000 lbs. |
| | = 0.3 lbs./1,000 gal. × 492,507,714.84 gal. / 2,000 lbs. |
| | = 73.88 VOC tons/year |
| VOC tons/day | = VOC tons/yr. / 312 days |
| | = 73.88 VOC tons/year / 312 days |
| | = 0.24 tons |
| Total gallons of gasoline filled | = % filling technology other (Submerged filling) × total gallons of Gasoline |
| | = 35% × 757,704,177 gals |
| | = 265,194,461.84 gals |
| VOC tons/yr. | = Emissions Factor × total gallons of gasoline filled / 2,000 lbs. |
| | = 7.3 lbs./1,000 gal. × 263,095,895.8 gal. / 2,000 lbs. |
| | = 967.96 VOC tons/year |
| VOC tons/day | = VOC tons/yr. / 312 days |
| | = 967.96 VOC tons/year / 312 days |
| | = 3.10 tons |

Vehicle Refueling Emissions for Bexar County

The EPA recommends that the MOBILE6.2 model be used to generate refueling (Stage II) emission factors for highway vehicle emission inventories. The VOC emissions factor calculated is 5.88 lbs. per 1,000 gals. Refueling emissions have two mechanisms of introducing emissions to the environment: (1) vapor displacement from the vehicle fuel tank during refilling; and (2) gasoline spillage during refueling.[74] As refueling occurs year around, the seasonal adjustment factor is 1.

| | |
|---|---|
| Refueling Emissions for Bexar County | = EF lbs./ 1,000 gal. × Gasoline gal. / 2,000 lbs. |
| | = 5.88 lbs./ 1,000 gal. × 757,704,117 gal. / 2,000 lbs. |

[74]U.S. Environmental Protection Agency, January 2001. Emission Inventory Improvement Program (EIIP)/Area Source Committee Volume III: Chapter 11. Research Triangle Park, North Carolina.

= 222.87 tons/ yr.

VOC tons/day = VOC tons/yr. / 365 days
= 2,228.87 tons/yr. / 365 days
= 6.11 tons/ days

## Graphic Arts

### Introduction

The graphic art industry was divided by technology used, type of substrate used, and type of product or end use. The predominant emissions from graphic arts printing are VOCs contained in the printing inks, fountain solutions, and cleaning solutions. Many of these VOCs are also likely to be hazardous air pollutants (HAPs).

Graphic art printing inks vary widely in composition, but all consist of three major components: pigments composed of finely divided organic and inorganic materials; binders composed of organic resins and polymers; and solvents composed mostly of organic compounds. Furthermore, emissions can originate from proofing presses, cleaning operations, ink storage tanks, and ink mixing operations. Though they are relatively minor compared to the printing process emissions, they do contribute overall.

### Methodology

To estimate the emissions from the use of print ink, a per capita methodology is used. An emission factor of 1.3 pounds of VOC per person[75] is multiplied by the population[76] of the counties within the Alamo Area to estimate the VOC tons per year. The seasonal adjustment is 1 and printing occurs 5 days a week. It is also estimated that printing occurs in all counties.

### Sample Calculation

Bexar County

VOC ton/year = county population × 1.3 lbs./person / 2,000 lbs.
= 1,440,732 × 1.3 / 2,000
= 936.48 tons/yr.

[75] U.S. Environmental Protection Agency, November 1996. Volume III Chapter 7, Graphic Arts. Research Triangle Park, North Carolina.
[76] Texas Water Development Board, July 2004, 2006 Regional Water Plan: County Population Projections for 2000 – 2060. Available online: http://www.twdb.state.tx.us/data/popwaterdemand/2003Projections/Population%20Projections/STATE_REGION/County_Pop.htm

VOC tons/day = VOC tons/yr. / 261 days
= 936.48 tons/yr. / 261
= 3.59 tons/day

One point source was found in the Alamo Area; Bexar County - Vertis Incorporated. To correct for any doubt counting, the emissions from Vertis Incorporated is subtracted from the Bexar County total.

**Sample Calculation**
Bexar County Point Source Correction

Total VOC tons/yr. = Bexar County Emissions – Point Source Emission
= 936.48 tons/yr .– 29.72 tons/yr.
= 906.76 tons/yr.

## Heavy Duty Diesel Truck Idling

### Introduction

It is not unusual for heavy-duty trucks to idle for extended periods of time, both overnight and during deliveries. This section of the emissions inventory only estimates idiling emissions during deliveries. These emissions are not included in the on-road or non-road Section of the Emissions Inventory.

### Methodology

To estimate the emissions for diesel truck idling, the MOBILE6 model was run to calculate the emissions factor for VOC, $NO_x$, CO. The model was run for the month of July in 2002. Inputs for monthly high and low temperatures used were yearly averages, 87.8° F and 69.4° F. The RVP input was also a yearly average, 7.8 psi. These numbers where put into the MOBILE6 model and using the Bexar County VMT mix for 2002 the emissions factors where calculated for the eight vehicle classes[77]. Only the Heavy-duty Diesel Vehicles (HDDV) are calculated because gasoline vehicles have insignificant total idling emissions. Table 4-19 lists the emission factors by the three pollutants.

[77] Texas Transportation Institute, August 2003. Technical Note: Transportation Air Quality Technical Support Interagency Contract with the Texas Commission on Environmental Quality – San Antonio EAC. College Station, Texas.

Table 4-19. Emission Factors calculated by MOBILE6

| Emission Type | Emission Factor (g/mi) |
|---|---|
| VOC | 1.680 |
| $NO_x$ | 12.498 |
| CO | 20.098 |

To estimate the fleet operating time for heavy-duty diesel vehicles (HDDV), including 20% idle running time, the vehicle hours traveled (VHT) was obtained from the Texas Transportation Institute (TTI)[78]. This number was then multiplied by a factor of 1.2 to calculate total hour with idling.[79] Twenty percent (0.20) of the total calculated hours were used to determine total hours idling.

**Sample Calculation**

*Bexar County Operating Time*

Operating Time (idle + running time) $= \text{HDDV VHT} \times 1.2$

$= 102{,}810.79 \times 1.2$

$= 123{,}375.95$ hrs/day

*Bexar County Idle Time*

Idle Time = Operating Time $\times$ 0.2

$= 123.375.95 \times 0.2$

$= 24{,}674.59$ hrs/day

After total idling time was calculated, the MOBILE6 output was used to estimate emission factors. To convert the emissions factors from g/mi to g/hr, it was multiplied by 2.5 MPH. The lowest speed MOBILE6 will accept is 2.5 MPH.

**Sample Calculation**

*VOC Emission Factor*

VOC Emission factor g/day $= \text{VOC g/mi} \times \text{MPH}$

$= 1.680 \text{ g/mi} \times 2.5 \text{ mi/hour}$

$= 4.20$ g/hr

The total idling time is then multiplied by the emission factor. To convert from grams per day to tons per day, the total was multiplied by the conversion factor, 1 ton per 907,184.74 grams.

---

[78] *Ibid*.

[79] Houston/Galveston Area, December 2000. Houston/Galveston Attainment Demonstration and Post-1999 Rate of progress Sip, Appendix J; Vehicle Idling Restriction Documentation. Houston, Texas

HDDV idling occurs 5 days a week, so the tons per day emissions are then multiplied by 261 to get tons per year[80].

**Sample Calculation**

*Bexar County VOC Emission*

VOC Emissions = Idle time hr/day × 4.20 g/hr / 907,184.74 g
= 24,674.59 hr/day × 4.20 / 907,184.74
= 0.114 tons/day

**Season Adjustment**

Season Allocation = 0.114 tons/day × 261 day/yr.
= 29.82 tons/yr.

## Livestock and Poultry Feed Operations

### Introduction

Methane is among the chemical compounds included within total organic gases (TOG). Ruminants, such as cattle, buffalo, sheep and goats produce higher methane emissions than other animals because of their unique digestive system. The "fore-stomach" or rumen produces significant amount of methane through fermentation. Additionally, livestock manure also is a source $CH_4$ and $N_20$. This category does not include fertilizer that would be applied to crops. Manure management is the storage and breakdown of manure, the process that releases significant amount of VOC and $NO_X$. Wild animals have been excluded because such emissions are not a result of human activity.

Some hydrocarbons are less ozone-forming than other hydrocarbons, so EPA has officially excluded them from the definition of regulated hydrocarbons called volatile organic compounds (VOC). This definition excludes methane, ethane, and compounds not commonly found in large quantities in engine exhaust like chlorohydrocarbons from consideration as VOC. For this work the definition of VOC is the result of subtracting methane and ethane from the TOG emission estimates.[81] Because this methodology only estimates methane, these totals will not be included in the emissions inventory totals for area sources, but will be listed separately.

### Methodology

Cattle

Methane emissions from cattle vary with geographical location, as factors such as feed and

[80] *Ibid*.

breed vary from area to area and have an effect on methane emissions. The state of Texas is grouped with Oklahoma, Arkansas, Louisiana, Tennessee, Kentucky, Georgia and Alabama in the South Central geographic region for the purpose of estimating cattle methane emissions.[82]

The Unites States Agricultural Department[83] conducts an annual agricultural census, usually taking in January and July. The population of cattle can vary widely within those 6 months, depending on calving and slaughter rates, however complete population numbers were not available for Texas in July 2002. Also, county level population[84] for cattle separated into the EIIP categories was not available. A ratio was established between the eight subcategories of cattle in Texas and the state total. This ratio between the eight subcategories was then applied to the county level total.

**Sample Calculation**

Bexar County Cows that have calved – beef

County Pop of Type A = State Pop of Type A / Total State Pop × Total County Pop

Where:

| | |
|---|---|
| County Pop of Type A | = County Level Subcategory Population |
| State Pop of Type A | = State Level Subcategory Population |
| Total State Pop | = State Level Population for Cattle |
| Total County Pop | = County Level Population for Cattle |

Bexar County that have Calved Beef = 5,435,000 head / 13,600,000 head × 57,000 head
= 22,779 head

The population was then multiplied by the appropriate emission factor for TOG. Table 4-20 shows the relationship between the EIIP categories, the USDA subcategories and the South Central emission factors.

---

[81] U.S. Environmental Protection Agency, March 2002. RVP and Temperature Corrections for Nonroad Engine Modeling. Research Triangle Park, North Carolina.
[82] U.S. Environmental Protection Agency, October 1999. Emission Inventory Improvement Program (EIIP)/Area Source Committee Volume VIII: Chapter 6. Research Triangle Park, North Carolina.
[83] USDA-NASS August 19, 2004. Published Estimates Data Base: Available online: http://www.nass.usda.gov:81/ipedb/
[84] *Ibid*.

Table 4-20. Relations between USDA Cattle Categories and Emissions Factor Categories

| EIIP Emissions Category – Animal Type | USDA Category | EPA Factors for South Central US Emissions Factor (lbs. $CH_4$/head/yr.) |
|---|---|---|
| **Dairy Cattle** | | |
| Replacements 0-12 Months | Heifers for Milk Cows Replacements | 44.7 |
| Replacements 12-24 Months | Heifers for Milk Cows Replacements | 135.7 |
| Mature Cows | Milk Cows that have calved | 265.7 |
| **Beef Cattle** | | |
| Replacements 0-12 Months | Heifers for Beef Cows Replacements | 51.9 |
| Replacements 12-24 Months | Heifers for Beef Cows Replacements | 148.9 |
| Mature Cows | Beef Cows that have calved | 155.9 |
| Weanlings Systems Steers/Heifers | 20% Livestock Slaughter | 52.8 |
| Yearlings System Steers/Heifers | 80% Livestock Slaughter | 104.7 |
| Bulls | Bulls 500 lbs. + | 220 |

This category has a seasonal adjustment factor of 1 and so the VOC tons per year is divided by 365 to get VOC tons per day.

**Sample Calculations**

Bexar County Cows that have calved – beef

$CH_4$ tons/yr. = County Cow head Population × Emission Factor / 2,000 lbs.
= 22,779 head × 155.9 tons/head/yr. / 2,000
= 1,775.63 tons/yr.

$CH_4$ tons/day = VOC tons/yr. / 365 days
= 1,775.63 tons/yr. / 365
= 4.86 tons/day

**Methodology**

<u>Animals Other Than Cattle</u>

For animals other than cattle there is a once yearly average number of head[85]. The animal type is then multiplied by the emissions factor and divided by 2,000 lbs. to get the VOC tons per year. There is a seasonal adjustment of 1, and so the yearly emissions is divided by 365 to get the VOC tons per day. Below table 4-18 shows the emissions factors of animals other than cattle.

Table 4-21. Animals Types Other Than Cattle Emission Factors

| Animal Type | Emissions Factors (lbs./head/yr.) |
|---|---|
| Sheep | 17.6 |
| Goats | 11.0 |
| Swine | 3.3 |
| Horses | 39.6 |
| Mules/Asses | 48.5 |

**Sample Calculation**

Bexar County – Sheep

$CH_4$ tons/yr. = Sheep Head Population × Emissions Factor / 2,000 lbs.
= 2,778 head × 17.6 lbs./head/yr. / 2,000
= 24.45 tons/yr.

$CH_4$ tons/day = VOC tons/yr. / 365 days
= 24.45 tons/yr. / 365
= 0.07 tons/day

**Manure Management**

When manure decomposes anaerobically, it releases $CH_4$ and $N_2O$ into the atmosphere. Because of livestock manure high organic content, it is highly conducive to methane production. Wild animals have been excluded because such emissions are not a result of human activity.

**Methodology**

To be consistent with the livestock emissions, the same USDA agricultural census data was used for animal type and population. To estimate $CH_4$ emissions, the volatile solids (VS) need

[85] USDA-NASS, August 19, 2004, <u>2002 Census of Agriculture – Volume 1 Texas State Level</u>. Available online: http://www.nass.usda.gov/census/census02/volume1/tx/index1.htm

to be estimated.  Total $VS_i$ is the population of an animal type multiplied by the average weight of an animal type (typical animal mass - TAM) and the typical volatile solids of one animal, $VS_i$.[86]  The seasonal adjustment factor is 1 and this activity occurs 7 days a week.

**Sample Calculation**

Bexar County Goats – Pasture/Range

Total $VS_i$ (lbs./yr.) = Animal Population (head) × $TAM_i$ (lbs./head) × $VS_i$ (lbs. VS/lbs. animal mass/yr.)

Total $VS_i$ = 310 head × 141 lbs./head × 3.48 lbs. VS/lbs. animal mass/yr.

= 152,111 lbs./yr.

There are nine animal categories that are broken down further into manure management systems.  To determine the emission amount for each system, the EIIP Volume VIII Chapter 7 provides percentages for each manure managing system.

**Sample Calculation**

Sample Calculation

Bexar County Goats - Pasture/Range

Total $VS_i$ (lbs./yr.) = Animal Population (head) × $TAM_i$ (lbs./head) × $VS_i$ (lbs. VS/lbs. animal mass/yr.)

Total $VS_i$ = 310 head × 141 lbs./head × 3.48 lbs. VS/lbs. animal mass/yr.

= 152,111 lbs./yr.

There are nine animal categories that are broken down further into manure management systems.  To determine the emission amount for each system, the EIIP Volume VIII Chapter 7 provides percentages for each manure managing system.

Sample Calculation

Bexar County Goats - Pasture/Range

VOC Emissions tons/year = $VS_i$ (lbs./yr.) × $Bo_i$ ($ft^3$/lbs.-Vs) × $MCF_j$ % × $WS_{ij}$%

Where:

$Bo_i$ = maximum CH4 producing capacity per pound of VS for animal $_i$

$MCF_j$ %= methane conversion factor for manure system j (%)

[86] U.S. Environmental Protection Agency, October 1999.  Emission Inventory Improvement Program (EIIP)/Area Source Committee Volume VIII: Chapter 7.  Research Triangle Park, North Carolina.

$WS_{ij}\%$ = percentage of animal $_i$'s manure managed in manure system $_j$

VOC Emissions tons/year = 152,111 lbs./yr. × 2.72 $ft^3$/lbs.-VS × 41,374.38 $ft^3$ × 1.4% × 80%/ 2,000 lbs.
= 0.10 tons/yr.

VOC tons/day = VOC tons/yr. / 365 days
= 0.10 tons/yr. / 365
= 0.00026 tons/day

## Municipal Solid Waste Landfills

### Introduction

Emissions from landfills in the AACOG region were estimated based on a 2002 landfill report obtained from TCEQ. Only Type 1 municipal solid waste (MSW) facilities listed in the database were included in the emission estimates. According to the TCEQ list, a total of five Type 1 MSW landfills in the AACOG region were receiving waste in 2002: two in Bexar County, one in Comal County, one in Guadalupe County, and one in Kerr County. However, the two active landfills in Bexar County are included in TCEQ's 2002 point source emissions database. To avoid double counting, data for the active Bexar County landfills were removed from AACOG's area source inventory prior to calculating emissions.

In addition to the five active landfills, there are numerous closed Type 1 facilities in the AACOG region. Emissions from closed landfills were also included in the area source calculations. Since many of the closed landfills are small and/or have been closed for a number of years, the closed landfill database was culled based on size and age prior to estimating emissions, as described in the section below.

### Methodology

Landfill emissions were calculated for the AACOG region using EPA's LandGEM model. The model allows users to select default values for estimating emissions depending on the purpose for which the estimates are used. To estimate 2002 landfill emissions for the AACOG region, the AP-42 default was selected. AP-42 values are based on emission factors from EPA's *Compilation of Air Pollutant Emission Factors, AP-42*[87] and are the rates EPA suggests using to develop estimates for state inventories.

---

[87] U.S. Environmental Protection Agency, 1997. Compilation of Air Pollutant Emission Factors, AP-42, 5th ed., Supplement C. Office of Air Quality Planning and Standards. Research Triangle Park, NC. U.S.

One of the parameters required by the LandGEM model is the amount of waste in place at a landfill. The 2002 active landfill data provided by TCEQ listed in situ waste and compaction values for each site. A landfill's in situ waste value (in cubic yards) was multiplied by the compaction rate (pounds/cubic yard) for that facility to develop a waste-in-place estimate. The waste-in-place estimates were converted to megagrams (Mg) using LandGEM's conversion utility to obtain the correct waste units for use in the model.

In addition to active landfills, EPA guidance recommends calculating emissions from closed landfills. These inactive facilities continue to generate emissions after closure, although the generation rate decreases with time. According to EIIP documentation, it is important to set a cutoff level for landfill size and age in order to avoid excessive investment of resources in landfill calculations.[88] Therefore, only inactive landfills that were closed after 1986 and were at least 10 acres in size were included in the estimations.

Closed landfill emissions were also calculated using the LandGEM model. Data used in the model to estimate closed landfill emissions were obtained from a permitting database provided by the TCEQ. Table 4-22 lists all landfills, active and closed, included in the 2002 calculations.

Table 4-22. Landfills included in Emission Calculations

| Name | County | Status |
|---|---|---|
| Waste Management of Texas | Comal | Active |
| City of Fredericksburg | Gillespie | Active |
| City of Kerrville | Kerr | Active |
| Atascosa Landfill Board | Atascosa | Closed |
| Joint Cities Landfill Board | Bexar | Closed |
| City of San Antonio | Bexar | Closed |
| City of San Antonio | Bexar | Closed |
| City of Seguin | Guadalupe | Closed |

**Sample Calculation**

The LandGEM model provides several emission estimation options including the calculation of emission rates for $CH_4$, $CO_2$, total NMOC, and individual NMOC species. Total NMOC includes both VOCs and hazardous air pollutants (HAPs). To determine emissions of VOCs alone, the individual VOC species estimates were summed for each of the landfill runs. A sample of this type of calculation is provided in table 4-23 below.

[88] Eastern Research Group, Inc. January 2001. Volume III: Chapter 15 Landfills, Prepared for the Area Sources Committee: Emission Inventory Improvement Program.

Table 4-23. Annual VOC Emission Rates Calculated using EPA's LandGEM Model for an Active Landfill located in the AACOG Region

| VOC Compound | Emissions in Mg/Year | VOC Compound | Emissions in Mg/Year |
|---|---|---|---|
| 1,1,2,2-Tetrachloroethane | 0.1129 | Dichlorodifluoromethane | 1.15 |
| 1,1,2-Trichloroethane | 0.008083 | Dichlorofluoromethane | 0.1634 |
| 1,1-Dichloroethane | 0.01409 | Dimethyl sulfide | 0.2944 |
| 1,1-Dichloroethene | 0.001175 | Ethanol | 0.7594 |
| 1,2-Dichloroethane | 0.002458 | Ethylbenzene | 0.2965 |
| 1,2-Dichloropropane | 0.01232 | Ethylene dibromide | 0.0001138 |
| 2-Propanol | 1.825 | Ethyl mercaptan | 0.04705 |
| Acrylonitrile | 0.02035 | Fluorotrichloromethane | 0.06325 |
| Benzene | 0.0904 | Hexane | 0.343 |
| Bromodichloromethane | 0.03107 | Methyl ethyl ketone | 0.03098 |
| Butane | 0.1771 | Methyl isobutyl ketone | 0.1135 |
| Carbon disulfide | 0.02676 | Methyl mercaptan | 0.07258 |
| Carbon tetrachloride | 0.0003728 | Pentane | 0.1438 |
| Carbonyl sulfide | 0.01783 | Perchloroethylene | 0.3748 |
| Chlorobenzene | 0.01705 | Propane | 0.2966 |
| Chlorodifluoromethane | 0.06811 | Toluene | 2.194 |
| Chloroethane | 0.04886 | Trichloroethene | 0.2245 |
| Chloroform | 0.001736 | Vinyl chloride | 0.2779 |
| Chloromethane | 0.03701 | Xylene | 0.7783 |
| Dichlorobenzene | 0.0187 | | |
| Total Mg/year | | | 10.33 |

Using LandGEM's conversion utility, 10.33 Mg/year equals 11.39 tons/year.

11.39 tons per year / 365 days = 0.03 tons per day of VOCs

Of the five active landfills in the AACOG region, only one site has a gas collection system. This site is one of the two facilities in Bexar County that was included in TCEQ’s 2002 point source database and, consequently, not included in AACOG’s area source inventory. Therefore, no adjustments were made to the emission rates to account for controls of this type.

## Seasonal Adjustment

Landfill gas emission activity occurs 365 days a year. No seasonal adjustment factor was applied to the daily emissions rate to calculate ozone season emissions.

## Oil and Gas Wells Production

### Introduction

Field production of crude oil and natural gas emit various criteria pollutants by a variety of methods. When potential sources are located, wells are drilled to confirm the presence of oil or gas and determined whether the reserves will support production. Once produced, storage tanks are used to store crude oil and natural gas.

Emissions attributed to oil and gas production can from a variety of additional sources, such as heaters. Due to fuel combustion in order to operate the heaters, pollutants such as carbon monoxide (CO), nitrogen oxides (NOx), and volatile organic compounds (VOC) are emitted.

Emission losses from storage tanks in the oil and gas fields include working losses and breathing losses. Working losses are the combined losses attributed to the filling and emptying of the storage tanks. Breathing losses are the release of vapor from a tank due to vapor expansion caused by changes in the daily temperature and pressure.[89]

Using these methods developed by ENVIRON, emissions produced due to oil and gas production was calculated.[90] The Texas Railroad Commission (RRC) provides individual well data that can be sorted in a multitude of ways, such as by county or identification number. [91] Working and breathing losses from storage tanks was assessed through use of the Environmental Protection Agency's storage tank emissions calculation software, TANKS 4.0. The TANKS model allows users to enter specific information detailing the storage tank dimensions, the liquid contents, and location of the tank to generate an estimation of emissions.[92] Emissions are also generated from other processes that occur at the well sites, such as heaters at oil wells, compressors at gas wells, and dehydrators at gas wells. These additional sources were assessed as well.

---

[89] U.S. Environmental Protection Agency, September 1999. Emissions Inventory Improvement Program, Volume II: Chapter 10 – Preferred and Alternative Methods of Estimating Air Emissions from Oil and Gas Field Production and Processing Operations. Research Triangle Park, North Carolina.
[90] ENVIRON International Corporation. August 2001. 1999-2010 Emission Inventory Trends and Projections. Navato, CA.
[91] Texas Railroad Commission, September 29, 2004. Production Query Data System. Available online: http://webapps.rrc.state.tx.us/PDQ/home.do
[92] U.S. Environmental Protection Agency, September 1999. User's Guide to TANKS. Research Triangle Park, North Carolina.

**Methodology**

Gas and oil well counts for 2002 were obtained from the RRC. The data obtained from the RRC included barrels of oil produced, barrels of condensate produced, and amount of natural gas produced in each individual county.

The EPA's TANKS 4.0 model was used to estimate the amount of emissions emitted by the county wells. When preparing to run the TANKS model, various specifications were inputted for proper model function. These specifications included tank height, tank diameter, roof type, liquid height, average liquid height, volume, turnovers, shell color, shell condition, roof color, roof condition, roof height, roof radius, and the tank's component. The following specifications were inputted for the all the counties:

- Vertical fixed roof
- Shell height of 15 ft
- Tank diameter of 10 ft
- Liquid height of 15 ft
- Average liquid height of 8 ft
- Volume of 12,600 $ft^3$
- Turnovers varied by county. The turnover factor was determined by dividing barrels of production in the county by tank capacity.
- Shell color/shade of gray/light
- Good shell condition
- Roof color/shade of gray/light
- Good roof condition
- Roof height of 1 ft
- Roof radius of 11 ft

Once the specifications were inputted, the TANKS model outputted emission estimates in pounds per year for one individual tank. The emissions were converted to tons per year and then multiplied by the number of well sites of the specific component. These methods were utilized when determining emissions from oil wells and condensate wells.

Heater emissions are produced at oil well sites and are based on the size of the combustion source. ENVIRON surveyed heater types at oil wells in Texas and it was determined that the average size of oil well heaters is 0.5 mm BTU/hr. Of the wells surveyed, data reflected that approximately 75% of the oil wells are equipped with in-line heaters and 24% of wells are equipped with glycol heaters. Therefore, oil well heaters emissions were calculated for 99% of the oil wells. Heater emissions were estimated by multiplying the size of the heaters with the annual hours and emission factors of the criteria pollutant. The VOC, NOx, and CO emission factors are presented in table 4-24. The emissions were then multiplied by the number of well in each county to determine the tons per year.[2]

Table 4-24. Average emission factors for heater emission calculations

| Precursor | Emission Factor |
|---|---|
| VOC | 5.5 lbs./mmcf |
| NOx | 100 lbs./mmcf |
| CO | 84 lbs./mmcf |

Casinghead and GW gas estimates were provided by the RRC and used to estimate natural gas emissions. The amount of casinghead and GW gas were added together and divided by 365 days to determine a daily output. This daily output was then used to determine compressor emissions. The output was multiplied by 205 hp/mmcf to provide a daily operating horsepower estimate. The daily horsepower estimate was then multiplied by 8,760 hours, which are the number of hours in one year, and multiplied with the appropriate pollutant emission factor. The emission factors are provided in table 4-25. The product was divided by 454 gm/lbs.to convert the grams of emissions to pounds and then was divided by 2,000 to convert pounds to tons.

Table 4-25. Emission factors for compressor emission estimation

| Precursor | Emission Factor |
|---|---|
| VOC | 0.43 gm/hp-hr |
| NOx | 5 gm/hp-hr |
| CO | 3 gm/hp-hr |

Dehydrator emissions were also calculated using total natural gas production. Dehydrator emissions were determined by multiplying the amount of gas produced the amount of VOC lost in dehydration (1.2163 lbs./mmscf) and dividing the total by 2,000 for tons per year.

**Sample Calculation**

<u>Wilson County Oil Well Emissions</u>

*Well Site Emissions*

| | |
|---|---|
| Emissions in tons/year per well site | = TANKS emission estimate in lbs / 2,000 lbs. |
| | = 1,717.72 lbs./yr. / 2,000 |
| | = 0.859 tons/yr. per well site |
| Total county VOC emissions | = Tons/year x # of oil wells in county |
| | = 0.859 tons/yr. x 515 |
| | = 442.31 tons/yr. |

*Heater Emissions*

| | |
|---|---|
| Heater VOC Emissions | = (Heater size x hours of operation/year x EF x # of well sites x 99%) / lbs. per ton / 1,000 BTU/mcf<br>= (0.5 mm BTU/hr x 8,760 hrs/yr. x 5.5 lbs./mcf x 515 x 99%) / 2,000 lbs./yr. / 1,000 BTU/mcf<br>= 6.10 tons/year of VOC |
| Total Oil Well VOC Emissions | = 442.31 tons/year + 6.10 tons/year<br>= 448.42 tons/year |

<u>Wilson County Gas Well Emissions</u>

*Well Site Emissions*

| | |
|---|---|
| Well Site VOC Emissions | = TANKS emission estimate in lbs. / 2,000 lbs/ton<br>= 1335.96 lbs./yr. / 2,000 lbs.<br>= 0.667 tons/year |
| Total VOC well emissions | = Tons/yr. per well site x # of wells in the county<br>= 0.667 tons/yr. x 4<br>= 2.672 tons/year |

*Compressor Emissions*

| | |
|---|---|
| Daily Operating HP | = (Condensate + GW Gas) / 365 days x 205 hp/mmscf<br>= 57.74 / 365 days x 205 hp/mmscf<br>= 32.43 hp |
| Compressor VOC Emissions | =(Daily Operating HP x hrs/yr. x Emission Factor)/ 454 gm/lbs. / 2,000 lbs./ton<br>= (32.43 x 8760 x 0.43) / 454 / 2,000<br>= 0.135 tons/year |

*Dehydrator Emissions*

| | |
|---|---|
| Dehydrator VOC Emissions | = (Condensate + GW Gas) x 1.2163 lbs./mmscf / 2,000 lbs./ton<br>= 57.75 x 1.2163 / 2,000<br>= 0.035 tons/year |
| Total Gas Well VOC Emissions | = 2.672 tons/yr. + 0.135 tons/yr. + 0.035 tons/yr.<br>= 2.842 tons/year |

### Seasonal Adjustment

The seasonal adjustment factor for oil and gas well emissions is 1, with activity 7 days a week for 52 weeks.

## Small Stationary Source Fossil Fuel Use

### Coal Consumption

Residential Coal Consumption

No reported usage of coal for home heating in Texas.[93] No emissions are calculated for area sources.

Commercial Coal Consumption

No reported commercial usage of coal in Texas.[94] No emissions are calculated for area sources.

Industrial Coal Consumption

This was reported as point source emissions only. No emissions were calculated for area sources.

### Fuel Oil Consumption

This subcategory consists, in turn, of five subheadings that further define the groups consuming fuel oil products. These are Residential Distillate Consumption, Commercial/Institutional Distillate Consumption, Commercial/Institutional Residual Consumption, Industrial Distillate Consumption, and Industrial Distillate Consumption.

Residential Distillate Consumption

In the state of Texas, the quantity of distillate oil is consumed in residences is low. It is low for at least two reasons: Texas is a major natural gas producer and natural gas is the fuel most often used for residential heating. Second, winters are not severe in Texas compared to other states. The 2000 residential consumption of distillate fuel in Texas was report at 0 gallons.[95] In

[93] Energy Information Administration (EIA), September 28, 2004. Texas Energy: Oil, Petroleum Products, Natural Gas, Coal, Electricity, Nuclear, Prices, Table 8. Available online: http://www.eia.doe.gov/emeu/states/sep_use/res/use_res_tx.html

[94] Energy Information Administration (EIA), September 28, 2004. Texas Energy: Oil, Petroleum Products, Natural Gas, Coal, Electricity, Nuclear, Prices, Table 9. Available online : http://www.eia.doe.gov/emeu/states/sep_use/com/use_com_tx.html

[95] Energy Information Administration (EIA), September 28, 2004. Texas Energy: Oil, Petroleum Products, Natural Gas, Coal, Electricity, Nuclear, Prices, Table 8. Available online : http://www.eia.doe.gov/emeu/states/sep_use/res/use_res_tx.html

addition, previous work done by the Texas Air Control Board (TACB) indicates that the pollutant emissions of VOC, CO and $NO_x$ in this category are insignificant.[96] Therefore, emissions were not calculated.

Commercial Distillate Consumption

The total amount of distillate fuel oil consumed by commercial operations in Texas in 2000 is estimated to be 6,090,000 barrels.[97]

**Methodology**

It is estimated that the commercial consumption of distillate fuel oil in each county is proportionate to the statewide consumption in the same manner as total county employment in the consuming industry to the industry's statewide employment. The NAICS code of the commercial industry consuming distillate fuel oils is 42-81. Therefore, statewide commercial consumption of distillate fuel oil is divided by the statewide employment in the SIC codes industry and multiplied by the industry's employment in county to come up with the county's commercial consumption of distillate fuel oil. Numbers of employees by NAICS code per county are available from the Texas Workforce Commission.[98] The distillate fuel oil consumption is then multiplied by the emission factors of individual pollutant (VOC = 0.34 lbs./1,000 gal.; $NO_x$ = 20 lbs./1,000 gal., CO = 5 lbs./1,000 gal.).[99] The number of pounds is converted to tons/yr. by dividing by 2,000. The tons/yr. are then seasonally adjusted to tons/day by multiplying a seasonal adjustment factor and dividing by the annual activity day. The seasonal adjustment factor for VOC is 0.6 and its annual activity day is 312 (the number of weekly activity days is 6, the annual activity days is 6 days x 52 weeks = 312 days per year). The seasonal adjustment factor for $NO_x$ is uniform (1) and its annual activity day is 365. The seasonal adjustment factor for CO is 1.4 and its annual activity day is 312[100].

**Sample Calculation**

Bexar County had 305,014 employees in the commercial NAICS categories. The statewide employment was 59,787,000.[101] The distillate fuel oil consumed for commercial use in Texas in 2,000 was 255,780,000 gallons.[102]

---

[96] Texas Air Control Board, 1992. 1990 Base Year Ozone Emission Inventory of Volatile Organic Compound (VOC), Nitrogen Oxides (NOx), and Carbon Monoxide (CO) Emissions for Dallas/Fort Worth, Texas Nonattainment Area. Austin, Texas.

[97] Energy Information Administration (EIA), Oct 1. 1999. State Energy Profiles. Available online: http://www.eia.doe.gov/emeu/sep/map.html.

[98] Texas Workforce Commission, 2002. Employment Data for 3rd quarter 2001. Austin, Texas.

[99] U.S. Environmental Protection Agency (EPA), Oct 1. 1999. Compilation of Air Pollutant Emission Factors AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources. Available online: http://www.epa.gov/ttn/chief/ap42.html.

[100] Texas Air Control Board, 1992. 1990 Base Year Ozone Emission Inventory of Volatile Organic Compound (VOC), Nitrogen Oxides (NOx), and Carbon Monoxide (CO) Emissions for Dallas/Fort Worth, Texas Nonattainment Area. Austin, Texas.

[101] U.S. Census Bureau, August 10, 2004. County Business Patterns. Available online: http://www.census.gov/epcd/cbp/view/cbpview.html.

Bexar County Consumption = statewide consumption x county commercial employment / Texas commercial employment
= 255,780,000 gal. x 305,014 / 59,787,000
= 1,304,907.10 gallons of fuel oil consumed

VOC tons/yr. = gallons of fuel oil consumed x Emission Factor / 2,000 lbs./ton
= 1,304,907.10 gal. x 0.34 VOC lbs./1,000 gal. / 2,000
= 0.22 tons/yr.

VOC tons/day = VOC tons/yr. x Seasonal Adjustment factor / 312 days
= 0.22 tons/yr. x 0.6 / 312
= 0.00043 tons/average ozone season day

$NO_x$ tons/yr. = gallons of fuel oil consumed x Emission Factor / 2,000 lbs./ton
= 1,304,907.10 gal. x 20 lbs. / 1,000 gal. / 2,000lbs
= 13.05 tons/yr.

NOx tons/day = NOx tons/yr. x Seasonal Adjustment factor / 365 days
= 13.05 ton/yr. x 1.0 / 365 days
= 0.036 tons/day

CO tons/yr. = gallons of fuel oil consumed x Emission Factor / 2,000 lbs./ton
= 1,304,907.10 gal. x 5 CO lbs. / 1,000 gal. / 2,000 lbs .
= 3.26 tons/yr.

CO tons/day = CO tons/yr. x Seasonal Adjustment factor / 312 days
= 3.26 tons/yr. x 1.4 / 312
= 0.015 tons/day

Commercial Residual Consumption

Use of residual quality fuel by commercial operations in Texas is even smaller in numbers of barrels than is use of distillate. The Energy Information Administration (EIA) estimates[103] indicate that no commercial residual fuel oil was used statewide in 2000. Therefore, emissions were not calculated because of insignificant fuel usage.

[102] Energy Information Administration (EIA), August 10 2004. Texas Energy: Oil, Petroleum Products, Natural Gas, Coal, Electricity, Nuclear, Prices, Table 9. Available online: http://www.eia.doe.gov/emeu/states/sep_use/com/use_com_tx.html
[103] *Ibid*.

Industrial Distillate Consumption

This was reported as point source emissions only. No emissions were calculated for area sources.

Industrial Residual Consumption

This was reported as point source emissions only. No emissions were calculated for area sources.

**Liquid Petroleum Gas Consumption**

Residential LPG Consumption

The statewide consumption of LPG by residential uses in 2000 was estimated by the EIA at 10,755,000 barrels.[104]

**Methodology**

The statewide LPG usage in 2002 was multiplied by an household ratio to yield the amount of LPG usage for each county. The number housing units using LPG in Texas is available from the 2000 census.

**Sample Calculation**

Bexar County

Households using LPG = Bexar County Household × % of Households using LPG in Texas
= 505,721 × 6.4%
= 32,366.14

The state LPG usage is then multiplied by the county households using LPG and then divided by the state total of households using LPG for heating to calculate the barrels of LPG used within a county. Then this number of barrels was multiple by 42 gallons per barrel.

**Sample Calculation**

Bexar County

Gallons of LPG = State Consumption of LPG × County Households using LPG /Statewide Households using LPG x 42 gallons/barrel
= 10,755,000 × 32,366.14 / 455,451.26 x 42 gallons/barrels
= 32,100,275.18 gallons

The gallons of LPG used for each county is multiplied by an EF (VOC = 0.4 lbs./1,000 gal.; $NO_x$ = 15 lbs./1,000 gal., CO = 2.1 lbs./1,000 gal.).[105] Then the emission amount by pounds was converted to tons per year by dividing by 2,000. Finally, the seasonal adjustment factor was applied to yield the emission amount of tons per day. The seasonal adjustment factor for VOC is 0.3 and its annual activity day is 365. The seasonal adjustment factor for $NO_x$ is uniform (1) and its annual activity day is 365. The seasonal adjustment factor for CO is 1.7 and its annual activity day is 365.[106]

**Sample Calculation**

Bexar County

| | |
|---|---|
| VOC tons/yr. | = gallons of LPG consumed x Emission Factor / 2,000 lbs./ton |
| | = 32,100,725.18 gal. x 0.4 lbs./ 1,000 gal. / 2,000 |
| | = 6.42 tons/yr. |
| VOC tons/day | = VOC tons/yr. x Seasonal Adjustment factor / 312 days |
| | = 6.42 x 0.3 / 365 |
| | = 0.005 tons/day |

<u>Commercial LPG Consumption</u>

**Methodology**

Emissions for the AACOG region were determined by allocating Houston area employment numbers and emission estimates for commercial LPG consumption to AACOG counties. Commercial employment numbers were obtained using NAICS codes 42, 44, 45, 52, 53, 71, 72, and 81.[107] Percentage difference was established by comparing employment numbers of each AACOG county to the total employment in the Houston Metropolitan Statistical Area (MSA). This percentage was then applied to the each precursor's total emission estimate for the 8-

---

[104] Energy Information Administration (EIA), September 29, 2004. <u>Texas Energy: Oil, Petroleum Products, Natural Gas, Coal, Electricity, Nuclear, Prices, Table 8</u>. Available: http://www.eia.doe.gov/emeu/states/sep_use/res/use_res_tx.html

[105] The higher factors for butane were used since no information is available as to whether the LPG is butane, propane, or a mixture of both.

[105] Energy Information Administration (EIA), September 29, 2004. <u>Texas Energy: Oil, Petroleum Products, Natural Gas, Coal, Electricity, Nuclear, Prices, Table 8</u>. Available online: http://www.eia.doe.gov/emeu/states/sep_use/res/use_res_tx.html

[105] The higher factors for butane were used since no information is available as to whether the LPG is butane, propane, or a mixture of both.

[106] Texas Air Control Board, 1992. <u>1990 Base Year Ozone Emission Inventory of Volatile Organic Compound (VOC), Nitrogen Oxides (NOx), and Carbon Monoxide (CO) Emissions for Dallas/Fort Worth, Texas Nonattainment Area</u>. Austin, Texas.

[107] Employment numbers obtained from the U.S. Census Bureau, August 10, 2004. <u>County Business Patterns</u>. Available online: http://www.census.gov/epcd/cbp/view/cbpview.html.

county Houston area, thus allocating VOC, NOx, and CO emissions to each individual county. Houston MSA county emissions were obtained from the Texas Commission on Environmental Quality (TCEQ).[108] Emissions were originally determined in tons per year, therefore a seasonal adjustment factor (SAF) and an annual activity rate were applied to yield the emission amount of tons per day. The seasonal adjustment factor for VOC is 0.6, for CO is 1.4, and for $NO_x$ is 1.0. Both VOC and CO have an annual activity rate of 312 days while NOx has an annual activity rate of 365 days.[109]

**Sample Calculation**

Atascosa County has 2,957 employees listed in the commercial business NAICS codes. The Houston MSA has a total of 850,201 employees within the commercial sector and a total emission estimate of 2.92 tons/year of VOC, 55.55 tons/year of NOx, and 11.21 tons/year of CO.

Employment % Difference = Atascosa County Employment / Houston MSA Employment
= 2,957 employees / 850,201employees
= 0.0035

VOC tons/yr. = Atascosa % Difference x Houston MSA VOC Emissions
= 0.035 x 2.92 tons/year of VOC
= 0.0102 tons/year

VOC tons/day = Atascosa County VOC Emissions x Seasonal Adjustment Factor / Annual Activity
= 0.0102 t/y x 0.6 / 312
= 0.000020 tons/day

Industrial LPG Consumption

**Methodology**

Industrial LPG emissions were determined in a similar manner as commercial LPG emissions. Houston MSA industrial sector employment was compared to the industrial sector employment for each AACOG county. The comparison yielded a difference between the two employment numbers, which was then applied to the total emission estimate for industrial LPG consumption in the Houston area. This yielded tons/year estimates for each of the twelve AACOG counties.

[108] Texas Commission on Environmental Quality (TCEQ), Houston/Galveston Ozone Nonattainment Area: Non-Point Source Emission Data. Available online: http://www.tnrcc.state.tx.us/air/aqp/ei/hgmap.htm
[109] Texas Air Control Board, 1992. 1990 Base Year Ozone Emission Inventory of Volatile Organic Compound (VOC), Nitrogen Oxides (NOx), and Carbon Monoxide (CO) Emissions for Dallas/Fort Worth, Texas Nonattainment Area. Austin, Texas.

In order to estimate the daily emissions for each county, seasonal adjustment factors and annual activity rates were applied. The seasonal adjustment factor for VOC is 1 and its annual activity day is 312. The seasonal adjustment factor for CO is 1 and its annual activity day is 312. The seasonal adjustment factor for $NO_x$ is 1 and its annual activity day is 365.[110]

**Sample Calculation**

Bexar County has 146,216 employees in industries of NAICS codes 21-23, 31, 51, 54, and 56. The Houston MSA industries employed approximately 1,004,564 employees. Houston MSA emissions for industrial LPG consumption are 2.13 tons/year of VOC, 107.89 tons/year of NOx, and 26.97 tons/year of CO.

Employment % Difference = Bexar County Employment / Houston MSA Employment
= 146,216 employees / 1,004,564 employees
= 0.1456

VOC tons/yr. = Employment % Difference x Houston MSA NOx Emissions
= 0.1456 x 107.89 tons/year of NOx
= 15.7 tons/year

VOC tons/day = Bexar County VOC Emissions x Seasonal Adjustment Factor / Annual Activity
= 15.7 t/y x 1.0 / 365 days
= 0.0430 tons/day

[110] Ibid.

### Natural Gas Consumption

Residential Natural Gas Consumption

There were 209,896 million cubic feet of natural gas consumed in Texas during 2000 by residential users.[111] Within Texas, 43.2% of households use natural gas.

### Methodology

To estimate the amount of natural gas used in cubic feet, a ratio between the number of county households that use natural gas by the number of households within Texas that use natural gas. This ratio was then multiplied by the statewide consumption of natural gas.

### Sample Calculation

Bexar County Natural Gas Consumption

Bexar County Natural Gas Households = 505,721 households $\times$ 43.2% using natural gas
= 218,471.5 households using natural gas

Bexar County Natural Gas Consumption = County households/State households $\times$ State Consumption
= 218471.5 / 3,074,296.032 $\times$ 209,896,000,000 $ft^3$
= 14,916,028,778.49 $ft^3$

The amount of the natural gas usage for each county was multiplied by an EF[112] (VOC = 5.5 lbs./million cubic feet; $NO_x$ = 94 lbs./million cubic feet , CO = 40 lbs./million cubic feet). Afterwards, the emission was converted to tons/yr. by dividing by 2000. The seasonal adjustment factor was calculated for VOC as follows:[113]

VOC Seasonal Adjustment Factor = June2002 / 2002 + July2002 / 2002 + August2002 / 2002

Where:

| | |
|---|---|
| 2002 | = the residential gas consumption in the state for 2002 |
| June2002 | = the residential gas consumption in the state for June 2002 |
| July2002 | = the residential gas consumption in the state for July 2002 |
| August2002 | = the residential gas consumption in the state for Aug. 2002 |

[111] Energy Information Administration (EIA), September 29, 2004. Texas Energy: Oil, Petroleum Products, Natural Gas, Coal, Electricity, Nuclear, Prices, Table 8. Available online: http://www.eia.doe.gov/emeu/states/sep_use/res/use_res_tx.html

[112] U.S. Environmental Protection Agency (EPA), January, 2001. Compilation of Air Pollutant Emission Factors AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources. Available online: http://www.epa.gov/ttn/chief/ap42.html.

[113] ENVIRON, August 31, 2001. Area and Mobile Source Emissions Inventory, Technical Support Project. Novato, Ca.

VOC Seasonal Adjustment Factor = 5,998 $mft^3$ / 209,896 $mft^3$ + 5,918 $mft^3$ / 209,896 $mft^3$ + 5,646 $mft^3$ / 209,896c $mft^3$
= 0.08

The $NO_x$ seasonal factor adjustment is 1. The CO seasonal factor adjustment is calculated as follows:

CO Seasonal Adjustment Factor = December2002 / 2002 + January2002 / 2002 + February2002 / 2002

Where:

| | |
|---|---|
| 2002 | = the residential gas consumption in the state for 2002 |
| December2002 | = the residential gas consumption in the state for Dec. 2002 |
| January2002 | = the residential gas consumption in the state for Jan. 2002 |
| February2002 | = the residential gas consumption in the state for Feb. 2002 |

CO Seasonal Adjustment Factor = 32,561 $mft^3$ / 209,896 $mft^3$ + 39,497 $mft^3$ / 209,896 $mft^3$ + 37,735 $mft^3$ / 209,896 $mft^3$
= 0.52

**Sample Calculation**

In the county of Bexar 14,916,028,778.49 $ft^3$ of natural gas were consumed for the year of 2002. This amount is multiplied by the emissions factor for VOC, $NO_x$ and CO.

VOC tons/yr. = Natural gas consumed x Emission Factor / 2,000 lbs./ton
= 14,916,028,778.49 $ft^3$ x 5.5 lbs. / $10^6$ $ft^3$ / 2,000
= 41.02 tons/yr.

VOC tons/day = Bexar County VOC Emissions x Seasonal Adjustment Factor / Annual Activity
= 41.02 tons/yr. x 0.08 / 365
= 0.009 tons/day

Commercial/Industrial Natural Gas Consumption

Countywide consumption of natural gas by commercial and industrial establishments in Texas in 2000 was estimated at 186,430,000,000 $ft^3$

**Methodology**

To estimate the commercial/industrial natural gas consumption a ratio between the county workforce in NAICS codes (42-81) and the statewide workforce. This ratio was then multiplied by the statewide commercial/industrial consumption.

**Sample Calculation**

Bexar County Natural Gas Consumption

Bexar County Natural Gas Consumption = County Workforce / Statewide Workforce x Statewide Consumption
= 305,014 / 59,787,000 x 186,430,000,000 $ft^3$
= 951,105,759 $ft^3$

The county natural gas consumption was multiplied by an emissions factor (VOC = 5.5 lbs./million cubic feet; $NO_x$ = 100 lbs./million cubic feet, CO = 84 lbs./million cubic feet).[114] The emission amount by pounds was converted to tons per year by dividing by 2,000. Finally, the seasonal adjustment factor was applied to yield the emission amount in tons per day.

The seasonal adjustment factor was calculated for VOC as follows:[115]
VOC Seasonal Adjustment Factor = June2002 / 2002 + July2002 / 2002 + August2002 / 2002

Where:

| | |
|---|---|
| 2002 | = the commercial/industrial gas consumption in the state for 2002 |
| June2002 | = the commercial/industrial gas consumption in the state for June 2002 |
| July2002 | = the commercial/industrial gas consumption in the state for July 2002 |
| August2002 | = the commercial/industrial gas consumption in the state for Aug. 2002 |

VOC Seasonal Adjustment Factor = 10,576 $mft^3$ / 186,429 $mft^3$ + 10,563 $mft^3$ / 186,429 $mft^3$ + 11,007 $mft^3$ / 186,429 $mft^3$
= 0.17

The $NO_x$ seasonal factor adjustment is 1. The CO seasonal factor adjustment is calculated as follows:

---

114 U.S. Environmental Protection Agency (EPA), January, 2001. Compilation of Air Pollutant Emission Factors AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources. Available online: http://www.epa.gov/ttn/chief/ap42.html.
115 ENVIRON, August 31, 2001. Area and Mobile Source Emissions Inventory, Technical Support Project. Novato, Ca.

CO Seasonal Adjustment Factor = December2002 / 2002 + January2002 / 2002 + February2002 / 2002

Where:

2002 = the commercial/industrial gas consumption in the state for 2002
December2002 = the commercial/industrial gas consumption in the state for Dec. 2002
January2002 = the commercial/industrial gas consumption in the state for Jan. 2002
February2002 = the commercial/industrial gas consumption in the state for Feb. 2002

CO Seasonal Adjustment Factor = 22,104 $mft^3$ / 186,429 $mft^3$ + 26,329 $mft^3$ / 186,429 $mft^3$ + 21,055 $mft^3$ / 186,429 $mft^3$
= 0.37

**Sample Calculation**
Bexar County consumed 951,105,759 $mft^3$ in the year 2000.

VOC tons/yr. = Natural gas consumed x Emission Factor / 2,000 lbs./ton
= 951,105,759 $mft^3$ x 5.5 lbs. / $10^6$ $ft^3$ / 2,000 lbs.
= 2.62 tons/yr.

VOC tons/day = Bexar County VOC Emissions x Seasonal Adjustment Factor / Annual Activity
= 2.62 x 0.17 / 52.143 weeks/yr. x 6 day/week
= 0.0014 (tons/day)

**Wood Consumption**

Residential Wood Consumption

**Methodology**
The seasonal adjustment factor was calculated as follows:

**Sample Calculation**
Seasonal Adjustment Factor[116] = April-October Heating Degree Days / 2002 Annual Heating Degree Days[117]
= 95 Heating Degree Days / 2028 Heating Degree Day

[116] U.S. Environmental Protection Agency (EPA), January, 2001. Emission Inventory Improvement Program (EIIP)/Area Source Committee Volume III: Chapter 2. Research Triangle Park, North Carolina.
[117] U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), August, 11, 2004. Historical Climatology Series 5-1, Available online : http://www.ncdc.noaa.gov/oa/documentlibrary/hcs/hdd.200107-200306.pdf

= 0.047

Residential wood use takes place 7 days a week. Approximately, 0.4 percent of households use residential wood for heating

The residential consumption of wood is calculated according to the following equation:

Residential Wood Use = Statewide wood use × county household using wood/statewide household using wood

**Sample Calculation**

Atascosa Residential Wood Usage.

Residential Wood Use = 550,000 cords × 55.09 / 28,465.7
= 1,064.38 cords

To covert cords of wood to a weight measurement, the following equation is used:

Wood Weight = Cords × 0.79 $ft^3$ × 0.639 specific gravity × 62.4 lbs.

Atascosa Residential Wood Weight

Wood Weight = 1,064.38 cords × 0.79 x 0.639 specific gravity × 62.4 lbs. / 2,000
= 16.764 tons

Residential wood use was multiplied by an emissions factor (VOC = 53 lbs./ton; $NO_x$ = 2.8 lbs./ton; CO = 230 lbs./ton).[118] The number of pounds was converted to tons per day by dividing by 2,000. Then seasonal adjustment was applied.

**Sample Calculation**

Atascosa Wood Consumption Emissions

VOC tons/yr. = Wood consumed x Emission Factor / 2,000 lbs./ton
= 16.764 tons x 53 lbs./tons / 2,000 tons/lbs. =
= 0.444 tons/yr.

VOC tons/day = Bexar County VOC Emissions x Seasonal Adjustment Factor / Annual Activity
= 0.444 tons/yr. x 0.047 / 365
= 0.00006 tons/day

[118] The factors used are for conventional stoves since no information is available on specific types of stoves used.

## Surface Coatings

### Introduction

The surface coating industry contains many different types of coatings, which include paints, varnishes, polishes, sealers, etc. Typically, coatings provide protection or decoration to a substrate or surface. In a typical coating sequence, three coatings are used: a primer, an intermediate coat, and a topcoat.

The majority of emissions that are produced during surface coatings are due to evaporation of the solvents contained in the coatings. The most commonly used solvents include organic compounds such as ketones, esters, aromatics, and alcohols. Other constituents of surface coatings, such as metals and particulates, may also be emitted during coating operations.

### Methodology

Per employee Emission factors were used in calculating the emissions for the categories listed below. ENVIRON's Report Area and Mobile Source Emissions Inventory, Technical Support Project.[119] was used to acquire the Emission factors and the activity days per week, which is five days, for each category. The Texas Workforce Commission provided data on the number of employees by SIC codes for each of the following categories.[120] The point source emissions were subtracted from the area source categories to prevent any overlapping.

[119] ENIVIRON. August 2001. Area and Mobile Source Emissions Inventory, Technical Support Project. Ch. 2.8 and 5.10. Navato, CA.
[120] Texas Workforce Commission, 2002. Employment Data for 3rd quarter 2001. Austin, Texas.

Table 4-26. SIC Codes and Emission factors for Surface Coating Operations

| Coating Subcategories | SIC Codes | Emission Factors lbs. / employees yr. |
|---|---|---|
| Factory Finished Wood: Coating | 246, 2429, 243, 244, 245, 2493, 2499 | 30.33 |
| Wood Furniture: Coating | 2511, 2512, 2517, 2521, 2541 | 1349 |
| Metal Furniture: Coating | 2514, 2515, 2519, 2522, 253, 2542, 2599 | 577.2 |
| Paper, Foil, And Film: Coating | 2671, 2672, 2673, 3081, 3082 | 152.1 |
| Metal Cans: Coating | 341 | 5017 |
| Sheet, Strip, and Coil: Coating | 3479 | 3101 |
| Machinery and Equipment: Coating | 35 | 55.83 |
| Appliances: Coating | 363 | 323.1 |
| Electronic and Other Electrical: Coating | 3357, 3612 | 49.88 |
| Motor Vehicles: Coating | 371 | 737.6 |
| Aircraft: Coating | 3721 | 183.2 |
| Marine: Coating | 373 | 289.6 |
| Railroad: Coating | 374 | 1190 |
| Miscellaneous Manufacturing: Coating | All of 20-39 except those listed above | 18.39 |

**Sample Calculation**

Paper, Foil and Film: Coating Emissions for Bexar County

Paper, Foil and Film: Coating Emission tons/yr. = # of Employees per SIC $\times$ Emission Factor lbs./employee yr. / 2,000 lbs.

= 147 employees $\times$ 152.1 lbs/employee yr. / 2,000 lbs.

= 11.18 tons/yr.

**Seasonal Adjustment**

Business within these subcategories operate 5 days a week, having a 260 work day year. The seasonal adjustment factor was uniform and activity days were 5 days a week.

VOC tons/day = VOC tons/yr. / 260 days

= 11.18 tons/yr . / 260 days
= 0.043 tons/day

## Traffic Markings

### Introduction

Traffic markings consist of centerlines, edge stripes and directional markings found on highways as well as markings on paved and unpaved surfaces, such as parking lots. Various materials are used to make traffic markings, including solvent-based paints, water-based paints, thermoplastics, preformed tapes, field-reacted materials, and permanent markers. Three of these materials emit VOCs in appreciable amounts: water- and solvent-based non-aerosol paint, water- and solvent-based aerosol paint, and preformed tapes applied with adhesive primer.

### Methodology

Emissions were determined by calculating the average paint consumption by the Texas Department of Transportation (TxDOT), allocating the amount of paint to each county, and then allocating paint usage on state, county, city, and private roadways.[121]

Paint Consumption

Paint consumption data was provided by TxDOT for 2001, 2002, and 2003.[122] Along with the paint consumption information, TxDOT provided the VOC content of the paint used which was 95 grams per liter. The VOC content was converted to pounds per gallon in order to calculate emissions to pounds of VOC, which was 0.79 pounds per gallon.

Table 4-27. Paint Consumption for Traffic Marking per Year by the State of Texas

| Paint | 2001 | 2002 | 2003 | Average |
|---|---|---|---|---|
| 0.79 lbs./gal. | 7,532 | 8,779 | 8,206 | **8,172.3** |

The paint consumption for 2001-2003 was averaged to reflect an average consumption of 8,172.3 gallons by the state.

The averaged paint consumption was then allocated to each individual county based on the total state-highway lane miles in each county. State-highway lane miles for the state and the

[121] ENVIRON International Corporation, et. al. August 31, 2001. Area and Mobile Source Emissions Inventory Technical Support Project. Navato, CA.
[122] Texas Department of Transportation – Austin District. April 2004. Paint purchased and paint specifications. Austin, Texas.

twelve AACOG counties were obtained from TxDOT.[123] The proportion of total county-highway lane miles to state-highway lane miles was determined and multiplied by the 2002 averaged paint consumption and the pounds per gallon VOC content. This provided the emissions from traffic marking paints used on state highways.

**Sample Calculation**

Atascosa County

State-highway miles total = 187,151.6 County-highway miles total = 1,007.13

Proportion of state lane miles in Atascosa County = County-highway miles total / State-highway miles total

= 1,007.13 / 187,151.6

= 0.00538

VOC Emissions from state highways traffic markings in Atascosa County = Percentage of County-highway miles X gallons consumed by the State X Emission Factor / 2,000 lbs.

= 0.00538 x 8,172.3 x 0.79) / 2,000

= 0.01737 tons per year

ENVIRON states that of the traffic paint purchased by the state, 65% is used on state highways and 25% is used on city and county roads. By attributing the state highway markings as 65% of the total traffic marking emissions, the traffic marking emissions total was calculated. This was accomplished by dividing the state traffic marking emissions by 65%. The traffic marking emissions total was then multiplied by 25% to determine the city and county traffic marking emissions. The traffic marking emissions total is also multiplied by 10% to determine emissions from private roads.

VOC Emissions from county and city traffic markings = VOC Emissions from state highways traffic markings / Percentage of state highway markings X Percentage city and county traffic markings

= (0.01737 / 0.65) x 0.25

= 0.00668 tons per year

VOC Emissions from private emissions = VOC Emissions from state highways traffic markings / Percentage of state highway markings X Percentage private traffic markings

= (0.01737 / 0.65) x 0.10

= 0.00267 tons per year

[123] Texas Department of Transportation - San Antonio District. April 2004. County Centerline Miles and Lane Miles. Austin, Texas.

Total traffic marking emissions = VOC Emissions from state highways traffic markings + VOC Emissions from county and city traffic markings + VOC Emissions from private emissions

= 0.01737 + 0.00668 + 0.00267

= 0.0267 tons per year

VOC tons/day = VOC tons/yr. / 365 days

= 0.0267 / 365

= 0.00007 tons per day

A rate of progress factors of 0.8 was applied to the traffic marking emissions to account for the amount of emission reductions due to use of improved techniques and/or implementation of new regulations.[124]

Controlled VOC tons/year = VOC tons/year x 0.8 rate of progress factor

= 0.0267 tons/year x 0.8

= 0.02138 tons/year

Controlled VOC tons/day = VOC tons/day x 0.8 rate of progress factor

= 0.00007 tons/day x 0.8

= 0.00006 tons/day

### Seasonal Adjustment

Calculations are based on 365 days a year. The seasonal allocation adjustment factor is 1.

## Underground Storage Tanks Remediation

### Introduction

This is a category for the 2002 Emissions Inventory dealing with the remediation of underground storage tanks (UST). This category measures the amount of emissions that occur when a leaking underground storage tank has been unearthed for removal. The initial emittence of emissions occurs in the first 3-4 days to two weeks of activity during a remediation event and can last as long as 30 days.[125]

### Methodology

The number of underground storage tank removals for each county in the AACOG region was obtained from the Texas Commission on Environmental Quality (TCEQ) and listed in table 4-

[124] Environ International Corporation, 2001. Future-Year Ozone Modeling of the Austin, Texas Region: Draft Final Report. Novato, Ca.

[125] U.S. Environmental Protection Agency, 2001. Remediation of Leaking Underground Storage Tanks (UST). Emission Inventory Improvement Program, Volume III. Research Triangle Park, North Carolina.

28.[126] These figures were used to calculate VOC emissions from the soil after tank removal.

Table 4-28. Remediated Tanks in 2002

| County | Tanks |
|---|---|
| Atascosa | 0 |
| Bandera | 0 |
| Bexar | 118 |
| Comal | 3 |
| Frio | 0 |
| Gillespie | 3 |
| Guadalupe | 2 |
| Karnes | 0 |
| Kendall | 7 |
| Kerr | 4 |
| Medina | 0 |
| Wilson | 6 |

Guidance provided by the Environmental Protection Agency's (EPA) Emission Inventory Improvement Program (EIIP) estimated a default emission factor of 28 pounds of VOC compounds per tank remediation. The emission factor was developed to represent typical levels of unleaded gasoline contamination, quantities of soil removed, as well as typical ozone season temperatures reflecting the midpoint of the ozone season. Applying the emission factor to all remediated storage tanks may overestimation of emissions in the event that some of the leaking storage tank contained contents of a lower volatility. However, the factor would provide an appropriate representation of emissions for such tanks in the event the soil was exposed to the air for a long enough period and cause emittance of all the contaminant.

EIIP guidance recommends the estimation of emissions for remediated storage tanks by multiplying the number of storage tanks by the 28 lbs. of VOC/day emission factor. The duration of the emissions was 30 days, or approximately 1 month. The number of tanks in the calculation represents the number of remediated tanks for the year 2002. To properly allocate the emissions, the total was divided by 12 taking into account the number of months in 2002.

**Sample Calculation**

Comal County

[126] Texas Commission on Environmental Quality, November 2001. TRACS PST Dump Utility Programs. Austin, Texas. Databases provided on CD.

VOC Emissions Tons/Day = (number of tanks removed x emission factor) / 2,000 lbs / 12 months
= 3 tanks x 28 lbs. VOC/day / 2,000 / 12
= 0.0035 tons/day

VOC tons/year = VOC tons/day x 365 days
= 0.0035 x 365
= 1.2775 tons/year

**Seasonal Adjustment**

As mentioned previously, the duration of the emissions from remediated storage tanks is estimated to be 30 days, not 365 days. Dividing the tank emission estimate by 365 days would improperly allocate the emissions on a daily basis. Therefore, the emissions were divided by 12, representing the number of months in a year, prior to dividing the estimate by 365.

## Underground and Above Ground Storage Tanks

**Introduction**

Working and breathing losses from petroleum storage tanks result in the emission of volatile organic compounds (VOCs). These emissions were added and referred to as total losses. Emissions from above and under ground storage tanks were estimated using the TANKS 4.0 model, which is available through the Technology Transfer Network (TTN) Bulletin Board System maintained by the United States Environmental Protection Agency (EPA).[127] The TANKS model was designed to estimate emissions for specific liquids being stored. Once specific tank and fluid properties are entered, the model uses AP-42 methodology and emission factors to calculate total losses in lbs. per year. The Texas Commission on Environmental Quality (TCEQ) provided the database of tanks within the AACOG region.[128]

**Methodology**

To effectively estimate losses from the petroleum storage tanks with the AACOG region without entering all active tanks into the model, model runs were performed for distinct volumes for each RVP value and chemical stored. The database of storage tanks was culled to remove tanks at diesel tanks, empty tanks, tanks abandoned in place and tanks removed from the ground (for USTs). All valid tanks remaining in the database were then sorted by volume and substance stored. Tanks located at gas stations were removed because the emissions are calculated in

[127] U.S. Environmental Protection Agency, 2004. "TANKS Emission Estimation Software." Available online: http://www.epa.gov/ttn/chief/software/tanks/index.html
[128] Texas Commission on Environmental Quality, November 2001. "TRACS PST Dump Utility Programs." Austin, TX.

the Gasoline Distribution section.  Also, aboveground storage tanks in the point source database were removed to prevent double counting of emissions.

Once the tanks were sorted by volume and component, model runs using the TANKS model was performed.  It was noted that tanks was grouped by their component and volume in each county, therefore a model run for one tank of each group occurred and the emissions resulting from the run was applied for the remaining tanks.  For example, the specifications for a tank holding gasoline with a capacity of 500 gallons were inputted into TANKS and the losses from the tank was used to estimate emissions for all tanks with a volume of 500 gallons within that county.

Specific tank properties are required to be able to effectively run the TANK model.  The database made available by the TCEQ did not detail all properties required for the model.  The TANKS model contains defaults for color, condition and pressure settings.  TCEQ provided a formula that helped to define tank dimensions.  To estimate throughput, total gas sales for the region was divided by total volume of above and under ground storage tanks used for gasoline storage.  This yielded a turnover rate of fifty-six times per year.  To arrive at a throughput value, the volume for each respective volume category multiplied the turnover rate by the TANKS model.  The throughput value for other fuels was estimated to be equal to that of gasoline.  Because little or no information existed on the sale of crude oils for the region, turnover was once per weather season of the year.  All vertical tanks were estimated to be fixed roof tanks with dome shaped roofs.  The following specifications were inputted for the all the counties:

- Horizontal Tank
- Shell height of 15 ft
- Tank diameter of 10 ft
- Liquid height of 15 ft
- Average liquid height of 8 ft
- Volume varied by size.
- Turnovers varied by county.  The turnover factor was determined by dividing barrels of production in the county by tank capacity.
- Shell color/shade of gray/light
- Good shell condition
- Roof color/shade of gray/light
- Good roof condition
- Roof height of 1 ft
- Roof radius of 11 ft

One of the inputs required of the TANKS model to estimate emissions for gasoline emissions is the Reid Vapor Pressure (RVP) of the gasoline used in the county.  To account for different RVP values within the region, losses for tanks within Atascosa, Bexar, Comal, Guadalupe, Karnes, and Wilson counties were calculated using an RVP value of 8. The remaining counties in the AACOG region – Bandera, Frio, Gillespie, Kendall, Kerr, and Medina were calculated using an RVP value of 9. Then TANKS model does not use fractions of RVP, for instance 7.8 or 8.7, therefore the closest whole value was used.

**Sample Calculation**

To yield turnover and throughput rates, total gas sales for the region were divided by total gas tank volume for the region.

Throughput values were calculated by multiplying the turnover value by the volume of each tank.

To calculate tank dimensions, TCEQ provided the following formula[129]:

R = cube root (Volume/15$\pi$)

Where diameter = 2r and length = 4r.

Examples : Horizontal tank with a volume of 2,000 gallons

R = cube root (2,000/15$\pi$) = 2.8 ft

Diameter = 5.6 ft, length = 11.2 ft

## Wastewater Treatment

**Introduction**

The state of Texas assumed the authority to administer the National Pollutant Discharge Elimination System (NPDES) program in Texas on Sept. 14, 1998. The NPDES is a federal regulatory program to control discharges of pollutants to surface waters of the United States. The TCEQ's Texas Pollutant Discharge Elimination System (TPDES) program now has federal regulatory authority over discharges of pollutants to Texas surface water, with the exception of discharges associated with oil, gas, and geothermal exploration and development activities, which are regulated by the Railroad Commission of Texas. [130]

Accordingly, the TCEQ permitting records provide a record of all in the state who create wastewater discharge according to the following guidelines:[131]

[129] Texas Commission on Environmental Quality, 1999. E-mail communication. Austin, TX

[130] Texas Commission on Environmental Quality, September 28, 2004. Texas Pollutant Discharge Elimination System (TPDES). Available online: http://www.tnrcc.state.tx.us/permitting/waterperm/wwperm/tpdes.html, February 20, 2001.

[131] Texas Commission on Environmental Quality, September 29, 2004. TPDES Program Summary. Available online: http://www.tnrcc.state.tx.us/permitting/waterperm/wwperm/summary.pdf,

1. Discharges of waste from industry and municipal treatment works, including publicly owned treatment works (POTWs)
2. Discharges and land application of waste from concentrated animal feeding operations (CAFOs)
3. Discharges of storm water associated with industrial activities, including construction sites
4. Discharges of storm water associated with city storm sewers, known formally in the regulations as municipal separate storm sewer systems (MS4s)
5. Oversight of municipal pretreatment programs operated by publicly owned treatment works
6. Disposal and use of sewage sludge

The AACOG requested permitting information from the TCEQ for all municipalities, school districts, trailer parks, municipal utility districts (MUDs), etc., which have been charged with handling wastewater discharge from industries, wastewater collection systems, and other miscellaneous sources. There are two broad categories of wastewater treatment plants defined by the EPA: publicly owned waste treatment (POWT) facilities and package plants. POWTs are government owned entities charged with the handling of wastewater discharge from industries, wastewater collection systems, and other miscellaneous sources. Package plants refer to small, automated (usually) domestic waste treatment plants that do not require full-time supervision. In general, these facilities treat less than one million gallons per day (MGD).[132]

**Methodology**

For both categories, the industrial wastewater VOCs represent the single most important source of the volatile organic constituents in the entire wastewater stream, while only representing a percentage of the flow total. With this estimation, emission factors was derived by applying EFs suitable to the total industrial flow. The EPA guidance allows a default value of $1.1 \times 10^{-4}$ pounds of VOC per gallon of industrial wastewater discharged.[133] Since discharge units are typically in MGD, it follows that:

Emission Factor = ($1.1 \times 10^{-4}$ pounds of VOC per gallon of wastewater) x ($1 \times 10^{6}$ gallons per million gallons)
= 110 pounds of VOC emitter per million gallons of industrial wastewater

The results of this calculation provide an EF 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 package plants where measured emissions data are not available. The EPA-recommended default value is that total wastewater flow is

[132] U.S. Environmental Protection Agency, May 1991. Procedures for the Preparation of Emission Inventories for Carbon Monoxide and Precursors of Ozone, Volume I: General Guidance for Stationary Sources. Publication No. EPA-450/491-016, p. 3-13 and 3-14. Research Triangle Park, North Carolina.
[133] Ibid.

composed of 16 percent industrial wastewater.[134] 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.

TCEQ provided the daily average discharge data for wastewater sites in AACOG's 12-county region. The data included industrial, municipal, and federal facilities. The data included the daily flow averages in MGD, per site, for the months the sites were in operation. These site-specific data sets were then used to calculate annual emissions and emissions per ozone season day. The data sets listed the months and the average daily flow of wastewater per month. Quantifying the total amount of wastewater for the entire year and the amount of wastewater discharged during the months of ozone season is a crucial element when calculating emissions from wastewater. Determining annual and ozone season discharge required two separate calculations, one accounting for all the discharge all the months in 2002 and the other accounting for wastewater discharged during the months of ozone season. These determinations were performed on each individual site.

Annual wastewater flow was figured by calculating the average of the total daily flow averages for all the reported months at each site. The daily flow averages for each reported month were multiplied by 30.4169, which is the average number of days in a month. This product represented the total amount of discharge for each month. The monthly averages were summed and then divided by 12 to provide an average monthly discharge amount. This average was then divided by 30.4169 to obtain a collective daily average that would represent an average daily flow for every day of the year.

Average daily flow per ozone season day was calculated by determining the average discharge amount by the same method employed in determining the annual wastewater flow, except rather than utilizing all averages for all months provided, the average monthly flow was calculated for the months only within the ozone season. Once the monthly flows were obtained and added together, the total was then divided by seven, since there are seven months in the ozone season (April – October). The result represented the average monthly total and was then divided by 30.4169 and provided the average daily flow for the ozone season.

Emissions from wastewater treatment facilities that are operated by the San Antonio Water System (SAWS) were provided by SAWS (personal communication, November 26, 2003). These emission estimates were added to emissions that were calculated using the above methodology.

[134] Ibid.

**Sample Calculation**

| *Month of Operation* | *Site* | *MGD* | *Days/Mo* | *Monthly Total* |
|---|---|---|---|---|
| 043002 | 001A | 0.05 | 30.4169 | 1.5208 |
| 073102 | 001A | 0.05 | 30.4169 | 1.5208 |
| 093002 | 001A | 0.05 | 30.4169 | 1.5208 |
| 103102 | 001A | 0.05 | 30.4169 | 1.5208 |
| 123102 | 001A | 0.05 | 30.4169 | 1.5208 |

| | |
|---|---|
| *Annual Flow* | 7.604 |
| *Monthly Flow* | 7.604 / 12 = 0.6336 |
| *Annual Daily Flow* | 0.6336 / 30.4169 = 0.0208 MGD |
| | |
| *Ozone Season Flow* | 6.0832 |
| *Monthly Flow* | 6.0832 / 7 = 0.8690 |
| *Ozone Daily Flow* | 0.8690 / 30.4169 = 0.0285 MGD |

Annual emissions were calculated by adding the annual daily flow totals from each individual site and multiplying this total by 0.16 in order to account for 16% of all wastewater discharge being industrial wastewater. This result was then multiplied by 110 to convert the figure to pounds of VOC per county in 2002. Dividing the total pounds by 2,000 provided the emissions in tons per year.

Total wastewater flow per year = 1,405.154 million gallons

Industrial wastewater component = Total wastewater flow per year x Percentage of Industrial wastewater
= 1,405.154 x 0.16
= 224.824

VOC tons/year = Industrial wastewater component x Emission Factor / 2,000 lbs.
= 224.824 x 110 / 2,000
= 12.37 tons

Daily emissions for a typical ozone season day were calculated using the average daily flow rate for the ozone season and adding the averaged totals from each site. This total was then multiplied by the 16% industrial wastewater factor and 110 to convert the units to pounds of VOC. This total was then divided by 2,000 to reflect tons of VOC per day.

Total wastewater flow per day = 5.137 million gallons

Industrial wastewater component = Total wastewater flow per year x Percentage of Industrial wastewater
= 5.137 x 0.16
= 0.822

VOC tons/day = Industrial wastewater component x Emission Factor / 2,000 lbs.
= 90.42 x 110 / 2,000
= 0.0452 per day

**Seasonal Adjustment**

The seasonal adjustment factor was based on month-specific records provided. Wastewater treatment was considered a seven-day-per-week operation for the sewerage SIC codes and no daily adjustment factors were considered.

## Wineries

**Introduction**

Emissions from wineries are a consequence of the biological process of fermentation of grapes, the filtration process of grape solids from grape juice, and the fugitive emissions from the wine bottling process. The primary emission resulting from these processes is ethanol. The wineries within the AACOG Region are located in rural areas and, since they are not large establishments, are not reported as point sources.

A survey was sent to local wineries to determine production levels and types of wines. Additionally, due to poor survey response the emission calculations were preformed using 1999's production numbers. Texas 2002 Wine production dropped by 50% due to weather conditions[135]. However, most of the production was lost at a vineyard that is not included within the Alamo Area. Within the AACOG Region, only Gillespie, and Kendall Counties have emissions from wineries.

**Methodology**

Emissions factors for red and white wines are different. The production of white wine has an emission factor of 1.76 lbs./1,000 gallons produced, whereas red wine has an emission factor of 5.52 lbs./1,000 gallons produced. To determine emissions, the number of gallons produced was multiplied by the emission factor for each wine type and converted to tons. Wine production occurs during peak ozone season, so there is no seasonal adjustment.

[135] Texas Wine Research Marketing Institute, Texas Wine & Wine Grape Industry Fact Sheet. Texas Tech University, Lubbock, Texas.

**Sample Calculation**

Estimate the number of gallons of red and white wine produced.[136]

White wine

VOC tons/yr. = gallons of white wine x Emission Factor / 2,000 lbs./ton
= 4,400 gallons/yr. x 1.76 lbs./1,000 gallons / 2,000
= 0.00387 tons VOC /yr.

VOC tons/day = VOC tons/yr. / 365 days
= 0.00387 / 365
= 0.00001 tons/day for white wine production

Red wine

VOC tons/yr. = gallons of red wine x Emission Factor / 2,000 lbs./ton
= 3,000 gallons/yr. x 5.52 lbs./1,000 gallons / 2,000
= 0.00828 tons VOC /yr.

VOC tons/day = VOC tons/yr. / 365 days
= 0.00828 / 365
= 0.00002 tons/day for red wine production

[136] U.S. Environmental Protection Agency, May 1991. Stationary Point and Area Sources", Compilation of Air Pollutant Emission Factors AP-42, Fifth Edition, Volume I. Research Triangle Park, North Carolina.

**Sample Survey**

December 17, 2003

Company

Address

ATTENTION: OPERATIONS MANAGER

The Alamo Area Council of Governments (AACOG) requests your assistance in completion of the 2002 Air Quality Emissions Inventory Wineries survey. The survey information will be used to assess and quantify emissions from wine making within the AACOG 12-County region. Survey responses are required to obtain accurate local data. The San Antonio region currently risks being declared in non-attainment of federal air quality standards (NAAQS); thus this inventory is a significant part of the emissions management process.

The purpose of this survey is to provide better information and services to the region, as well as help minimize additional regulations on the community. Your response is vital to this process and will enable a more precise emissions inventory for 2002.

To increase the accuracy of this information we ask that you review the attached survey and input the necessary data. You can return it to us in the self-addressed envelope or fax to (210) 225-5937 attention Donna Hessong, Natural Resources / Transportation Specialist, Alamo Area Council of Governments. Please submit your response by January 20, 2004.

Thank you for your time and participation. If you have any questions or comments please feel free to contact Steven Smeltzer, Environmental Manager, Alamo Area Council of Governments at (210) 362-5266.

Regionally Yours,

Al J. Notzon III
Executive Director

Enclosures (1)

**2002 Emissions Inventory Survey for Wineries**

Winery Name: ____________________________________________

Mailing Address: __________________________________________

City /ZIP: ________________________________County: __________

Contact Name/ Title: _______________________________________

Phone number: ____________________________________________

Production:

**Please list the Total number of gallons produced in each month in 2002:**

**RED** Wine**:**

Jan ______ Feb ______ Mar ______ Apr ______ May______ Jun ______

Jul ______ Aug______ Sep ______ Oct ______ Nov______ Dec______

**WHITE** Wine**:**

Jan ______ Feb ______ Mar ______ Apr ______ May______ Jun ______

Jul ______ Aug______ Sep ______ Oct ______ Nov______ Dec______

Manufacturing Rate:

Please list the number of days that manufacturing activities took place (i.e.: 5 days per month, 4 months out of the year)

______________________________________________________

______________________________________________________

______________________________________________________

**Please return by January 27, 2004**

## Area Source Emissions - Atascosa County, 2002

| ATASCOSA COUNTY<br>AREA SOURCES | SCC Code | VOC ton/year | NOx ton/year | CO ton/year | VOC ton/day M-F | NOx ton/day M-F | CO ton/day M-F |
|---|---|---|---|---|---|---|---|
| **Combustion (Heating & Cooking)** | | | | | | | |
| Fuel Oil-Industrial/Distillate | 2102004000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Industrial/Residual | 2102005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG-Industrial | 2102007000 | 0.00 | 0.20 | 0.05 | 0.00001 | 0.00054 | 0.00016 |
| Fuel Oil-Commercial/Distillate | 2103004000 | 0.00 | 0.26 | 0.06 | 0.00001 | 0.00071 | 0.00029 |
| Fuel Oil-Commercial/Residual | 2103005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Natural Gas-Commercial / Industrial | 2103006000 | 0.05 | 0.94 | 0.79 | 0.00003 | 0.00257 | 0.00094 |
| LPG-Commercial | 2103007000 | 0.01 | 0.19 | 0.04 | 0.00002 | 0.00053 | 0.00017 |
| Coal, Anthracite- Residential | 2104001000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Coal, Bituminous-Residential | 2104002000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Residential/Distillate | 2104004000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Residential/Residential | 2104005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Natural Gas-Residential | 2104006000 | 1.12 | 19.09 | 8.12 | 0.00026 | 0.05231 | 0.01164 |
| LPG-Residential | 2104007000 | 0.17 | 6.56 | 0.92 | 0.00014 | 0.01796 | 0.00428 |
| Wood/Residental Fireplace | 2104008001 | 0.44 | 0.02 | 1.93 | 0.00006 | 0.00000 | 0.00025 |
| **Agricultural** | | | | | | | |
| Fertilizer: NO entered as NOx | 2325050000 | 0.00 | 173.82 | 0.00 | 0.00000 | 0.78423 | 0.00000 |
| Pesticide Application | 2461800000 | 273.17 | 0.00 | 0.00 | 1.13820 | 0.00000 | 0.00000 |
| Bakeries | 2302050000 | 2.57 | 0.00 | 0.00 | 0.00703 | 0.00000 | 0.00000 |
| Wineries | 2302070005 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Breweries | 2302070001 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Oil Production | 2310000000 | 1,242.01 | 282.55 | 237.34 | 3.40276 | 0.77411 | 0.65026 |
| Gas Production | 2310020000 | 84.01 | 216.36 | 129.82 | 0.23017 | 0.59277 | 0.35566 |
| HDDV Truck Idling | 2230070000 | 0.78 | 5.79 | 9.30 | 0.00298 | 0.02217 | 0.03565 |
| **Gas Cans** | | | | | | | |
| Residential Gas Cans - Permeation | 8908951100 | 3.16 | 0.00 | 0.00 | 0.00867 | 0.00000 | 0.00000 |
| Residential Gas Cans - Diurnal | 8908951100 | 36.49 | 0.00 | 0.00 | 0.09997 | 0.00000 | 0.00000 |
| Residential Gas Cans - Transport Spillage | 8908951100 | 1.85 | 0.00 | 0.00 | 0.00507 | 0.00000 | 0.00000 |
| Commericial Gas Cans - Permeation | 8908951100 | 0.01 | 0.00 | 0.00 | 0.00003 | 0.00000 | 0.00000 |
| Commercial Gas Cans - Diurnal | 8908951100 | 0.00 | 0.00 | 0.00 | 0.13666 | 0.00000 | 0.00000 |
| Commercial Gas Cans - Transport Spillage | 8908951100 | 0.25 | 0.00 | 0.00 | 0.00069 | 0.00000 | 0.00000 |
| **Aboveground Storage Tanks** | | | | | | | |
| Gasoline | 2501000120 | 77.31 | 0.00 | 0.00 | 0.21180 | 0.00000 | 0.00000 |
| Jet Naptha | 2501000150 | 0.01 | 0.00 | 0.00 | 0.00002 | 0.00000 | 0.00000 |
| Jet Kerosene | 2501000180 | 1.26 | 0.00 | 0.00 | 0.00344 | 0.00000 | 0.00000 |
| Distillate Fuel Oil | 2501000090 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **Underground Storage Tanks** | | | | | | | |
| Gasoline | 2501010120 | 6.41 | 0.00 | 0.00 | 0.01758 | 0.00000 | 0.00000 |
| Jet Kerosene | 2501010180 | 0.01 | 0.00 | 0.00 | 0.00003 | 0.00000 | 0.00000 |
| Used Oil | 2501010060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| New Oil | 2501010030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Jet Naptha | 2501010150 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Distillate Fuel Oil | 2501000090 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Leaking Underground Tanks | 2660000000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **Coating (Painting) Operations** | | | | | | | |
| Flat Paints | 2401001001 | 13.80 | 0.00 | 0.00 | 0.03993 | 0.00000 | 0.00000 |
| Nonflat Paints - Low and Medium Gloss | 2401001005 | 11.12 | 0.00 | 0.00 | 0.03216 | 0.00000 | 0.00000 |
| Nonflat Paints - High Gloss | 2401001006 | 2.11 | 0.00 | 0.00 | 0.00610 | 0.00000 | 0.00000 |
| Primers, Sealers, and Undercoaters | 2401001010 | 13.78 | 0.00 | 0.00 | 0.03986 | 0.00000 | 0.00000 |
| Quick Dry - Primers, Sealers, and Undercoaters | 2401001011 | 4.78 | 0.00 | 0.00 | 0.01383 | 0.00000 | 0.00000 |
| Stains - Semitransparent | 2401001015 | 7.63 | 0.00 | 0.00 | 0.02207 | 0.00000 | 0.00000 |
| Quick Dry - Enamels | 2401001020 | 1.91 | 0.00 | 0.00 | 0.00553 | 0.00000 | 0.00000 |
| Lacquers - Clear | 2401001025 | 2.30 | 0.00 | 0.00 | 0.00665 | 0.00000 | 0.00000 |
| All Other Architectural Categories | 2401001050 | 24.83 | 0.00 | 0.00 | 0.07183 | 0.00000 | 0.00000 |

# Area Source Emissions - Atascosa County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Thinning & Clean-up of Solvent-Based Arch. Co | 2401001060 | 6.66 | 0.00 | 0.00 | 0.01928 | 0.00000 | 0.00000 |
| Auto Refinishing | 2401005000 | 7.85 | 0.00 | 0.00 | 0.03364 | 0.00000 | 0.00000 |
| Traffic Markings | 2401008000 | 0.02 | 0.00 | 0.00 | 0.00006 | 0.00000 | 0.00000 |
| Factory Finished Wood | 2401015000 | 6.37 | 0.00 | 0.00 | 0.02450 | 0.00000 | 0.00000 |
| Wood Furniture | 2401020000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Metal Furniture | 2401025000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Paper, Foil, And Film | 2401030000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Metal Cans | 2401040000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Sheet, Strip, and Coil | 2401045000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Machinery and Equipment | 2401055000 | 10.89 | 0.00 | 0.00 | 0.04187 | 0.00000 | 0.00000 |
| Appliances | 2401060000 | 12.92 | 0.00 | 0.00 | 0.04971 | 0.00000 | 0.00000 |
| Electronic and Other Electrical | 2401065000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Motor Vehicles | 2401070000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Aircraft | 2401075000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Marine | 2401080000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Railroad | 2401085000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Miscellaneous Manufacturing | 2401090000 | 27.13 | 0.00 | 0.00 | 0.10433 | 0.00000 | 0.00000 |
| Surface Cleaning Cold Cleaning - General | 2415300000 | 18.83 | 0.00 | 0.00 | 0.06035 | 0.00000 | 0.00000 |
| Dry Cleaning - General | 2420000000 | 16.20 | 0.00 | 0.00 | 0.05192 | 0.00000 | 0.00000 |
| Graphic Arts | 2425000000 | 26.00 | 0.00 | 0.00 | 0.09973 | 0.00000 | 0.00000 |
| Cutback Asphalt | 2461021000 | 55.99 | 0.00 | 0.00 | 0.15340 | 0.00000 | 0.00000 |
| Emulsified Asphalt | 2461022000 | 24.05 | 0.00 | 0.00 | 0.11239 | 0.00000 | 0.00000 |
| Asphalt Roofing | 2461023000 | 0.14 | 0.00 | 0.00 | 0.00055 | 0.00000 | 0.00000 |
| **Consumer/Commercial Solvent Use** | | | | | | | |
| Personal Care Solvents | 2465100000 | 26.55 | 0.00 | 0.00 | 0.07274 | 0.00000 | 0.00000 |
| Household Solvents | 2465200000 | 17.59 | 0.00 | 0.00 | 0.04820 | 0.00000 | 0.00000 |
| Automotive Solvents | 2465400000 | 11.36 | 0.00 | 0.00 | 0.03111 | 0.00000 | 0.00000 |
| Adhesives Application: Industrial | 2440020000 | 4.48 | 0.00 | 0.00 | 0.01227 | 0.00000 | 0.00000 |
| FIFRA Solvents | 2460890000 | 8.16 | 0.00 | 0.00 | 0.02235 | 0.00000 | 0.00000 |
| Coating Solvents | 2460520000 | 29.91 | 0.00 | 0.00 | 0.08195 | 0.00000 | 0.00000 |
| Misc.Solvents | 2460900000 | 9.60 | 0.00 | 0.00 | 0.02629 | 0.00000 | 0.00000 |
| **Service Stations** | | | | | | | |
| Service Stations - Tank Truck Unloading | 2501060053 | 61.38 | 0.00 | 0.00 | 0.19672 | 0.00000 | 0.00000 |
| Service Stations - Vehicle Refueling | 2501060100 | 60.70 | 0.00 | 0.00 | 0.16630 | 0.00000 | 0.00000 |
| Service Stations - Tank Breathing Loss | 2501060201 | 10.52 | 0.00 | 0.00 | 0.02882 | 0.00000 | 0.00000 |
| Service Stations - Tank Trucks in Transit | 2505030120 | 0.79 | 0.00 | 0.00 | 0.00253 | 0.00000 | 0.00000 |
| **Waste Disposal** | | | | | | | |
| Municipal Waste Landfills | 2620000000 | 1.33 | 0.00 | 0.00 | 0.00365 | 0.00000 | 0.00000 |
| Municipal Wastewater Treatment | 2630000000 | 12.37 | 0.00 | 0.00 | 0.04521 | 0.00000 | 0.00000 |
| **Fires** | | | | | | | |
| Structure Fires | 2810030000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Open Burning | 2810001500 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Vehicle | 2810050000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Catastrophic/Accidental Releases | 2830000000 | 0.01 | 0.00 | 0.00 | 0.00003 | 0.00000 | 0.00000 |
| Explosive Detonation | 2311000030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Autobody Incineration | 2601000000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL AREA SOURCES** | | **2,281.15** | **705.78** | **388.38** | **6.9935** | **2.2479** | **1.0593** |

| ATASCOSA COUNTY AREA SOURCES | SCC Code | HAP ton/year | NOx ton/year | CO ton/year | HAP ton/day M-F | NOx ton/day M-F | CO ton/day M-F |
|---|---|---|---|---|---|---|---|
| **Livestock and Poultry** | | | | | | | |
| Cattle and Calves Waste Emissions - Milk Cow | 2805020001 | 293.23 | 0.00 | 0.00 | 0.80337 | 0.00000 | 0.00000 |
| Dairy Cattle Production - Manure Handling and | 2805022200 | 247.92 | 0.00 | 0.00 | 0.67922 | 0.00000 | 0.00000 |
| Cattle and Calves Waste Emissions - Beef Cow | 2805020002 | 2,909.36 | 0.00 | 0.00 | 7.97085 | 0.00000 | 0.00000 |
| Beef Cattle Production - Manure Handling and | 2805001200 | 80.55 | 0.00 | 0.00 | 0.22068 | 0.00000 | 0.00000 |

## Area Source Emissions - Atascosa County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cattle and Calves Waste Emissions - Steers, S | 2805020004 | 266.26 | 0.00 | 0.00 | 0.72948 | 0.00000 | 0.00000 |
| Cattle and Calves Production - Steers, Steer Ca | 2805020004 | 119.04 | 0.00 | 0.00 | 0.32614 | 0.00000 | 0.00000 |
| Sheep and Lambs Waste Emissions | 2805040000 | 7.44 | 0.00 | 0.00 | 0.02040 | 0.00000 | 0.00000 |
| Sheep and Lambs Production - Manure Handlir | 2805040000 | 2.46 | 0.00 | 0.00 | 0.00675 | 0.00000 | 0.00000 |
| Goats Waste Emissions - Goats | 2805045003 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Goats Production - Goats - Manure Handling ar | 2805045003 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Horses and Ponies Waste Emissions | 2805035000 | 36.02 | 0.00 | 0.00 | 0.09867 | 0.00000 | 0.00000 |
| Horses and Ponies Production - Manure Handli | 2805035000 | 6.04 | 0.00 | 0.00 | 0.01656 | 0.00000 | 0.00000 |
| Swine Waste Emissions | 2805039200 | 1.04 | 0.00 | 0.00 | 0.00284 | 0.00000 | 0.00000 |
| Swine Production - Manure Handling and Stora | 2805039200 | 20.24 | 0.00 | 0.00 | 0.05544 | 0.00000 | 0.00000 |
| Poultry Production - Layers - Manure Handling | 2805008200 | 0.26 | 0.00 | 0.00 | 0.00071 | 0.00000 | 0.00000 |
| Poultry Production - Broilers - Manure Handling | 2805009200 | 0.10 | 0.00 | 0.00 | 0.00026 | 0.00000 | 0.00000 |
| **TOTAL** | | **3,989.95** | **0.00** | **0.00** | **10.93** | **0.00** | **0.00** |

## Area Sources Emissions - Bandera County, 2002

| BANDERA COUNTY AREA SOURCES | SCC Code | VOC ton/year | NOx ton/year | CO ton/year | VOC ton/day M-F | NOx ton/day M-F | CO ton/day M-F |
|---|---|---|---|---|---|---|---|
| **Combustion (Heating & Cooking)** | | | | | | | |
| Fuel Oil-Industrial/Distillate | 2102004000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Industrial/Residual | 2102005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG-Industrial | 2102007000 | 0.00 | 0.06 | 0.01 | 0.00000 | 0.00016 | 0.00005 |
| Fuel Oil-Commercial/Distillate | 2103004000 | 0.00 | 0.07 | 0.02 | 0.00000 | 0.00020 | 0.00008 |
| Fuel Oil-Commercial/Residual | 2103005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Natural Gas-Commercial / Industrial | 2103006000 | 0.01 | 0.27 | 0.22 | 0.00001 | 0.00073 | 0.00027 |
| LPG-Commercial | 2103007000 | 0.00 | 0.06 | 0.01 | 0.00001 | 0.00017 | 0.00005 |
| Coal, Anthracite- Residential | 2104001000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Coal, Bituminous-Residential | 2104002000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Residential/Distillate | 2104004000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Residential/Residential | 2104005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Natural Gas-Residential | 2104006000 | 0.62 | 10.68 | 4.54 | 0.00014 | 0.02926 | 0.00651 |
| LPG-Residential | 2104007000 | 0.10 | 3.67 | 0.51 | 0.00008 | 0.01005 | 0.00239 |
| Wood/Residental Fireplace | 2104008001 | 0.25 | 0.01 | 1.08 | 0.00003 | 0.00000 | 0.00014 |
| **Agricultural** | | | | | | | |
| Fertilizer: NO entered as NOx | 2325050000 | 0.00 | 12.40 | 0.00 | 0.00000 | 0.05792 | 0.00000 |
| Pesticide Application | 2461800000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Bakeries | 2302050000 | 0.48 | 0.00 | 0.00 | 0.00132 | 0.00000 | 0.00000 |
| Wineries | 2302070005 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Breweries | 2302070001 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Oil Production | 2310000000 | 0.31 | 0.22 | 0.18 | 0.00085 | 0.00059 | 0.00050 |
| Gas Production | 2310020000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| HDDV Truck Idling | 2230070000 | 0.23 | 1.71 | 2.75 | 0.00088 | 0.00655 | 0.01053 |
| **Gas Cans** | | | | | | | |
| Residential Gas Cans - Permeation | 8908951100 | 1.84 | 0.00 | 0.00 | 0.00503 | 0.00000 | 0.00000 |
| Residential Gas Cans - Diurnal | 8908951100 | 21.18 | 0.00 | 0.00 | 0.05802 | 0.00000 | 0.00000 |
| Residential Gas Cans - Transport Spillage | 8908951100 | 1.07 | 0.00 | 0.00 | 0.00294 | 0.00000 | 0.00000 |
| Commericial Gas Cans - Permeation | 8908951100 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Commercial Gas Cans - Diurnal | 8908951100 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Commercial Gas Cans - Transport Spillage | 8908951100 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **Aboveground Storage Tanks** | | | | | | | |
| Gasoline | 2501000120 | 10.10 | 0.00 | 0.00 | 0.02768 | 0.00000 | 0.00000 |
| Jet Kerosene | 2501000180 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Jet Naptha | 2501000150 | 0.34 | 0.00 | 0.00 | 0.00093 | 0.00000 | 0.00000 |
| Distillate Fuel Oil | 2501000090 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **Underground Storage Tanks** | | | | | | | |
| Gasoline | 2501010120 | 4.20 | 0.00 | 0.00 | 0.01151 | 0.00000 | 0.00000 |
| Jet Kerosene | 2501010180 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Used Oil | 2501010060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| New Oil | 2501010030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Jet Naptha | 2501010150 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Distillate Fuel Oil | 2501010090 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Leaking Underground Tanks | 2660000000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **Coating (Painting) Operations** | | | | | | | |
| Flat Paints | 2401001001 | 6.69 | 0.00 | 0.00 | 0.01936 | 0.00000 | 0.00000 |
| Nonflat Paints - Low and Medium Gloss | 2401001005 | 5.39 | 0.00 | 0.00 | 0.01559 | 0.00000 | 0.00000 |
| Nonflat Paints - High Gloss | 2401001006 | 1.02 | 0.00 | 0.00 | 0.00296 | 0.00000 | 0.00000 |
| Primers, Sealers, and Undercoaters | 2401001010 | 6.68 | 0.00 | 0.00 | 0.01932 | 0.00000 | 0.00000 |
| Quick Dry - Primers, Sealers, and Undercoater | 2401001011 | 2.32 | 0.00 | 0.00 | 0.00671 | 0.00000 | 0.00000 |
| Stains - Semitransparent | 2401001015 | 3.70 | 0.00 | 0.00 | 0.01070 | 0.00000 | 0.00000 |
| Quick Dry - Enamels | 2401001020 | 0.93 | 0.00 | 0.00 | 0.00268 | 0.00000 | 0.00000 |
| Lacquers - Clear | 2401001025 | 1.11 | 0.00 | 0.00 | 0.00322 | 0.00000 | 0.00000 |

**Area Sources Emissions - Bandera County, 2002**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| All Other Architectural Categories | 2401001050 | 12.04 | 0.00 | 0.00 | 0.03482 | 0.00000 | 0.00000 |
| Thinning & Clean-up of Solvent-Based Arch Co | 2401001060 | 3.23 | 0.00 | 0.00 | 0.00934 | 0.00000 | 0.00000 |
| Auto Refinishing | 2401005000 | 0.31 | 0.00 | 0.00 | 0.00131 | 0.00000 | 0.00000 |
| Traffic Markings | 2401008000 | 0.01 | 0.00 | 0.00 | 0.00002 | 0.00000 | 0.00000 |
| Factory Finished Wood | 2401015000 | 0.18 | 0.00 | 0.00 | 0.00070 | 0.00000 | 0.00000 |
| Wood Furniture | 2401020000 | 0.67 | 0.00 | 0.00 | 0.00259 | 0.00000 | 0.00000 |
| Metal Furniture | 2401025000 | 1.15 | 0.00 | 0.00 | 0.00444 | 0.00000 | 0.00000 |
| Paper, Foil, And Film | 2401030000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Metal Cans | 2401040000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Sheet, Strip, and Coil | 2401045000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Machinery and Equipment | 2401055000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Appliances | 2401060000 | 0.48 | 0.00 | 0.00 | 0.00186 | 0.00000 | 0.00000 |
| Electronic and Other Electrical | 2401065000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Motor Vehicles | 2401070000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Aircraft | 2401075000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Marine | 2401080000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Railroad | 2401085000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Miscellaneous Manufacturing | 2401090000 | 0.47 | 0.00 | 0.00 | 0.00180 | 0.00000 | 0.00000 |
| | | | | | | | |
| Surface Cleaning Cold Cleaning - General | 2415300000 | 8.62 | 0.00 | 0.00 | 0.02764 | 0.00000 | 0.00000 |
| | | | | | | | |
| Dry Cleaning - General | 2420000000 | 2.70 | 0.00 | 0.00 | 0.00865 | 0.00000 | 0.00000 |
| | | | | | | | |
| Graphic Arts | 2425000000 | 12.60 | 0.00 | 0.00 | 0.04834 | 0.00000 | 0.00000 |
| | | | | | | | |
| Cutback Asphalt | 2461021000 | 37.71 | 0.00 | 0.00 | 0.10333 | 0.00000 | 0.00000 |
| Emulsified Asphalt | 2461022000 | 7.04 | 0.00 | 0.00 | 0.03292 | 0.00000 | 0.00000 |
| Asphalt Roofing | 2461023000 | 0.00 | 0.00 | 0.00 | 0.00002 | 0.00000 | 0.00000 |
| | | | | | | | |
| **Consumer/Commercial Solvent Use** | | | | | | | |
| Personal Care Solvents | 2465100000 | 14.53 | 0.00 | 0.00 | 0.03980 | 0.00000 | 0.00000 |
| Household Solvents | 2465200000 | 9.63 | 0.00 | 0.00 | 0.02638 | 0.00000 | 0.00000 |
| Automotive Solvents | 2465400000 | 6.21 | 0.00 | 0.00 | 0.01702 | 0.00000 | 0.00000 |
| Adhesives Application: Industrial | 2440020000 | 2.45 | 0.00 | 0.00 | 0.00671 | 0.00000 | 0.00000 |
| FIFRA Solvents | 2460890000 | 4.46 | 0.00 | 0.00 | 0.01223 | 0.00000 | 0.00000 |
| Coating Solvents | 2460520000 | 16.37 | 0.00 | 0.00 | 0.04484 | 0.00000 | 0.00000 |
| Misc.Solvents | 2460900000 | 5.25 | 0.00 | 0.00 | 0.01439 | 0.00000 | 0.00000 |
| | | | | | | | |
| **Service Stations** | | | | | | | |
| Service Stations - Tank Truck Unloading | 2501060053 | 27.14 | 0.00 | 0.00 | 0.08697 | 0.00000 | 0.00000 |
| Service Stations - Vehicle Refueling | 2501060100 | 29.42 | 0.00 | 0.00 | 0.08061 | 0.00000 | 0.00000 |
| Service Stations - Tank Breathing Loss | 2501060201 | 5.10 | 0.00 | 0.00 | 0.01397 | 0.00000 | 0.00000 |
| Service Stations - Tank Trucks in Transit | 2505030120 | 0.38 | 0.00 | 0.00 | 0.00123 | 0.00000 | 0.00000 |
| | | | | | | | |
| **Waste Disposal** | | | | | | | |
| Municipal Waste Landfills | 2620000000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Municipal Wastewater Treatment | 2630000000 | 0.35 | 0.00 | 0.00 | 0.00071 | 0.00000 | 0.00000 |
| | | | | | | | |
| **Fires** | | | | | | | |
| Structure Fires | 2810030000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Open Burning | 2810015000 | 142.94 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Vehicle | 2810050000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| | | | | | | | |
| Catastrophic/Accidental Releases | 2830000000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Explosive Detonation | 2311000030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Autobody Incineration | 2601000000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL AREA SOURCES** | | **420.04** | **29.14** | **9.33** | **0.81263** | **0.10562** | **0.02052** |

| BANDERA COUNTY AREA SOURCES | SCC Code | HAP ton/year | NOx ton/year | CO ton/year | HAP ton/day M-F | NOx ton/day M-F | CO ton/day M-F |
|---|---|---|---|---|---|---|---|
| **Livestock and Poultry** | | | | | | | |
| Cattle and Calves Waste Emissions - Milk Cow | 2805020001 | 41.89 | 0.00 | 0.00 | 0.11477 | 0.00000 | 0.00000 |
| Dairy Cattle Production - Manure Handling and | 2805022200 | 35.42 | 0.00 | 0.00 | 0.09703 | 0.00000 | 0.00000 |
| Cattle and Calves Waste Emissions - Beef Cov | 2805020002 | 415.62 | 0.00 | 0.00 | 1.13869 | 0.00000 | 0.00000 |

## Area Sources Emissions - Bandera County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Beef Cattle Production - Manure Handling and | 2805001200 | 11.51 | 0.00 | 0.00 | 0.03153 | 0.00000 | 0.00000 |
| Cattle and Calves Waste Emissions - Steers, S | 2805020004 | 38.04 | 0.00 | 0.00 | 0.10421 | 0.00000 | 0.00000 |
| Cattle and Calves Production - Steers, Steer C | 2805020004 | 17.01 | 0.00 | 0.00 | 0.04659 | 0.00000 | 0.00000 |
| Sheep and Lambs Waste Emissions | 2805040000 | 65.34 | 0.00 | 0.00 | 0.17901 | 0.00000 | 0.00000 |
| Sheep and Lambs Production - Manure Handli | 2805040000 | 21.61 | 0.00 | 0.00 | 0.05921 | 0.00000 | 0.00000 |
| Goats Waste Emissions - Goats | 2805045003 | 9.80 | 0.00 | 0.00 | 0.02685 | 0.00000 | 0.00000 |
| Goats Production - Goats - Manure Handling a | 2805045003 | 0.55 | 0.00 | 0.00 | 0.00151 | 0.00000 | 0.00000 |
| Horses and Ponies Waste Emissions | 2805035000 | 30.61 | 0.00 | 0.00 | 0.08387 | 0.00000 | 0.00000 |
| Horses and Ponies Production - Manure Hand | 2805035000 | 5.14 | 0.00 | 0.00 | 0.01407 | 0.00000 | 0.00000 |
| Swine Waste Emissions | 2805039200 | 0.26 | 0.00 | 0.00 | 0.00072 | 0.00000 | 0.00000 |
| Swine Production - Manure Handling and Stora | 2805039200 | 8.57 | 0.00 | 0.00 | 0.02347 | 0.00000 | 0.00000 |
| Poultry Production - Layers - Manure Handling | 2805008200 | 0.15 | 0.00 | 0.00 | 0.00040 | 0.00000 | 0.00000 |
| Poultry Production - Broilers - Manure Handling | 2805009200 | 0.01 | 0.00 | 0.00 | 0.00004 | 0.00000 | 0.00000 |
| **TOTAL** | | **701.52** | **0.00** | **0.00** | **1.92** | **0.00** | **0.00** |

## Area Source Emissions - Bexar County, 2002

| BEXAR COUNTY AREA SOURCES | SCC Code | VOC ton/year | NOx ton/year | CO ton/year | VOC ton/day M-F | NOx ton/day M-F | CO ton/day M-F |
|---|---|---|---|---|---|---|---|
| **Combustion (Heating & Cooking)** | | | | | | | |
| Fuel Oil-Industrial/Distillate | 2102004000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Industrial/Residual | 2102005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG-Industrial | 2102007000 | 0.31 | 15.70 | 3.93 | 0.00047 | 0.04302 | 0.01258 |
| Fuel Oil-Commercial/Distillate | 2103004000 | 0.22 | 13.05 | 3.26 | 0.00043 | 0.03575 | 0.01464 |
| Fuel Oil-Commercial/Residual | 2103005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Natural Gas-Commercial / Industrial | 2103006000 | 2.62 | 47.56 | 39.95 | 0.00144 | 0.13029 | 0.04759 |
| LPG-Commercial | 2103007000 | 0.84 | 16.05 | 3.24 | 0.00162 | 0.04398 | 0.01454 |
| Coal, Anthracite- Residential | 2104001000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Coal, Bituminous-Residential | 2104002000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Residential/Distillate | 2104004000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Residential/Residential | 2104005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Natural Gas-Residential | 2104006000 | 41.02 | 701.05 | 28.97 | 0.00940 | 1.92069 | 0.42752 |
| LPG-Residential | 2104007000 | 6.42 | 240.75 | 33.71 | 0.00528 | 0.65959 | 0.15698 |
| Wood/Residental Fireplace | 2104008001 | 16.31 | 0.86 | 70.79 | 0.00210 | 0.00011 | 0.00912 |
| **Agricultural** | | | | | | | |
| Fertilizer: NO entered as NOx | 2325050000 | 0.00 | 91.15 | 0.00 | 0.00000 | 0.38050 | 0.00000 |
| Pesticide Application | 2461800000 | 838.14 | 0.00 | 0.00 | 3.49226 | 0.00000 | 0.00000 |
| Bakeries | 2302050000 | 253.03 | 0.00 | 0.00 | 0.69322 | 0.00000 | 0.00000 |
| Wineries | 2302070005 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Breweries | 2302070001 | 0.02 | 0.00 | 0.00 | 0.00023 | 0.00000 | 0.00000 |
| Oil Production | 2310000000 | 1,790.53 | 723.08 | 607.39 | 4.90555 | 1.98105 | 1.66408 |
| Gas Production | 2310020000 | 0.01 | 723.18 | 0.06 | 0.00003 | 1.98133 | 0.00017 |
| HDDV Truck Idling | 2230070000 | 29.82 | 221.81 | 356.69 | 0.11424 | 0.84984 | 1.36662 |
| **Gas Cans** | | | | | | | |
| Residential Gas Cans - Permeation | 8908951100 | 120.56 | 0.00 | 0.00 | 0.33031 | 0.00000 | 0.00000 |
| Residential Gas Cans - Diurnal | 8908951100 | 1,390.33 | 0.00 | 0.00 | 3.80913 | 0.00000 | 0.00000 |
| Residential Gas Cans - Transport Spillage | 8908951100 | 70.52 | 0.00 | 0.00 | 0.19321 | 0.00000 | 0.00000 |
| Commericial Gas Cans - Permeation | 8908951100 | 0.46 | 0.00 | 0.00 | 0.00126 | 0.00000 | 0.00000 |
| Commercial Gas Cans - Diurnal | 8908951100 | 5.15 | 0.00 | 0.00 | 0.01410 | 0.00000 | 0.00000 |
| Commercial Gas Cans - Transport Spillage | 8908951100 | 9.43 | 0.00 | 0.00 | 0.02583 | 0.00000 | 0.00000 |
| **Aboveground Storage Tanks** | | | | | | | |
| Gasoline | 2501000120 | 428.58 | 0.00 | 0.00 | 1.17420 | 0.00000 | 0.00000 |
| Jet Kerosene | 2501000180 | 0.02 | 0.00 | 0.00 | 0.00005 | 0.00000 | 0.00000 |
| Jet Naptha | 2501000150 | 70.36 | 0.00 | 0.00 | 0.19278 | 0.00000 | 0.00000 |
| Distillate Fuel Oil | 2501000090 | 0.02 | 0.00 | 0.00 | 0.00006 | 0.00000 | 0.00000 |
| **Underground Storage Tanks** | | | | | | | |
| Gasoline | 2501010120 | 547.16 | 0.00 | 0.00 | 1.49906 | 0.00000 | 0.00000 |
| Jet Kerosene | 2501010180 | 0.53 | 0.00 | 0.00 | 0.00144 | 0.00000 | 0.00000 |
| Used Oil | 2501010060 | 25.63 | 0.00 | 0.00 | 0.07021 | 0.00000 | 0.00000 |
| New Oil | 2501010030 | 3.16 | 0.00 | 0.00 | 0.00865 | 0.00000 | 0.00000 |
| Jet Naptha | 2501010150 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Distillate Fuel Oil | 2501010090 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Leaking Underground Tanks | 2660000000 | 50.25 | 0.00 | 0.00 | 0.13767 | 0.00000 | 0.00000 |
| **Coating (Painting) Operations** | | | | | | | |
| Flat Paints | 2401001001 | 497.11 | 0.00 | 0.00 | 1.43821 | 0.00000 | 0.00000 |
| Nonflat Paints - Low and Medium Gloss | 2401001005 | 400.36 | 0.00 | 0.00 | 1.15831 | 0.00000 | 0.00000 |
| Nonflat Paints - High Gloss | 2401001006 | 75.97 | 0.00 | 0.00 | 0.21979 | 0.00000 | 0.00000 |
| Primers, Sealers, and Undercoaters | 2401001010 | 496.23 | 0.00 | 0.00 | 1.43567 | 0.00000 | 0.00000 |
| Quick Dry - Primers, Sealers, and Undercoaters | 2401001011 | 172.21 | 0.00 | 0.00 | 0.49824 | 0.00000 | 0.00000 |
| Stains - Semitransparent | 2401001015 | 274.77 | 0.00 | 0.00 | 0.79496 | 0.00000 | 0.00000 |
| Quick Dry - Enamels | 2401001020 | 68.89 | 0.00 | 0.00 | 0.19931 | 0.00000 | 0.00000 |
| Lacquers - Clear | 2401001025 | 82.81 | 0.00 | 0.00 | 0.23959 | 0.00000 | 0.00000 |
| All Other Architectural Categories | 2401001050 | 894.21 | 0.00 | 0.00 | 2.58710 | 0.00000 | 0.00000 |

## Area Source Emissions - Bexar County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Thinning & Clean-up of Solvent-Based Arch Co | 2401001060 | 239.97 | 0.00 | 0.00 | 0.69427 | 0.00000 | 0.00000 |
| Auto Refinishing | 2401005000 | 175.18 | 0.00 | 0.00 | 0.75116 | 0.00000 | 0.00000 |
| Traffic Markings | 2401008000 | 0.06 | 0.00 | 0.00 | 0.00018 | 0.00000 | 0.00000 |
| Factory Finished Wood | 2401015000 | 39.29 | 0.00 | 0.00 | 0.15113 | 0.00000 | 0.00000 |
| Wood Furniture | 2401020000 | 82.29 | 0.00 | 0.00 | 0.31650 | 0.00000 | 0.00000 |
| Metal Furniture | 2401025000 | 214.72 | 0.00 | 0.00 | 0.82584 | 0.00000 | 0.00000 |
| Paper, Foil, And Film | 2401030000 | 11.18 | 0.00 | 0.00 | 0.04300 | 0.00000 | 0.00000 |
| Metal Cans | 2401040000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Sheet, Strip, and Coil | 2401045000 | 82.18 | 0.00 | 0.00 | 0.31606 | 0.00000 | 0.00000 |
| Machinery and Equipment | 2401055000 | 79.39 | 0.00 | 0.00 | 0.30535 | 0.00000 | 0.00000 |
| Appliances | 2401060000 | 0.48 | 0.00 | 0.00 | 0.00186 | 0.00000 | 0.00000 |
| Electronic and Other Electrical | 2401065000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Motor Vehicles | 2401070000 | 10.70 | 0.00 | 0.00 | 0.04114 | 0.00000 | 0.00000 |
| Aircraft | 2401075000 | 29.40 | 0.00 | 0.00 | 0.11309 | 0.00000 | 0.00000 |
| Marine | 2401080000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Railroad | 2401085000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Miscellaneous Manufacturing | 2401090000 | 223.22 | 0.00 | 0.00 | 0.85853 | 0.00000 | 0.00000 |
| | | | | | | | |
| Surface Cleaning Cold Cleaning - General | 2415300000 | 1,327.90 | 0.00 | 0.00 | 4.25609 | 0.00000 | 0.00000 |
| | | | | | | | |
| Dry Cleaning - General | 2420000000 | 2,423.70 | 0.00 | 0.00 | 7.76827 | 0.00000 | 0.00000 |
| | | | | | | | |
| Graphic Arts | 2425000000 | 936.48 | 0.00 | 0.00 | 3.59195 | 0.00000 | 0.00000 |
| | | | | | | | |
| Cutback Asphalt | 2461021000 | 109.30 | 0.00 | 0.00 | 0.34207 | 0.00000 | 0.00000 |
| Emulsified Asphalt | 2461022000 | 429.19 | 0.00 | 0.00 | 2.00262 | 0.00000 | 0.00000 |
| Asphalt Roofing | 2461023000 | 20.04 | 0.00 | 0.00 | 0.07891 | 0.00000 | 0.00000 |
| | | | | | | | |
| **Consumer/Commercial Solvent Use** | | | | | | | |
| Personal Care Solvents | 2465100000 | 1,019.89 | 0.00 | 0.00 | 2.79421 | 0.00000 | 0.00000 |
| Household Solvents | 2465200000 | 675.83 | 0.00 | 0.00 | 1.85158 | 0.00000 | 0.00000 |
| Automotive Solvents | 2465400000 | 436.22 | 0.00 | 0.00 | 1.19511 | 0.00000 | 0.00000 |
| Adhesives Application: Industrial | 2440020000 | 172.03 | 0.00 | 0.00 | 0.47131 | 0.00000 | 0.00000 |
| FIFRA Solvents | 2460890000 | 313.34 | 0.00 | 0.00 | 0.85846 | 0.00000 | 0.00000 |
| Coating Solvents | 2460520000 | 1,148.91 | 0.00 | 0.00 | 3.14769 | 0.00000 | 0.00000 |
| Misc.Solvents | 2460900000 | 368.63 | 0.00 | 0.00 | 1.00995 | 0.00000 | 0.00000 |
| | | | | | | | |
| **Service Stations** | | | | | | | |
| Service Stations - Tank Truck Unloading | 2501060053 | 1,041.84 | 0.00 | 0.00 | 3.33924 | 0.00000 | 0.00000 |
| Service Stations - Vehicle Refueling | 2501060100 | 2,186.11 | 0.00 | 0.00 | 5.98935 | 0.00000 | 0.00000 |
| Service Stations - Tank Breathing Loss | 2501060201 | 378.85 | 0.00 | 0.00 | 1.03795 | 0.00000 | 0.00000 |
| Service Stations - Tank Trucks in Transit | 2505030120 | 28.41 | 0.00 | 0.00 | 0.09107 | 0.00000 | 0.00000 |
| | | | | | | | |
| **Waste Disposal** | | | | | | | |
| Municipal Waste Landfills | 2620000000 | 15.83 | 0.00 | 0.00 | 0.04337 | 0.00000 | 0.00000 |
| Municipal Wastewater Treatment | 2630000000 | 50.39 | 0.00 | 0.00 | 0.13720 | 0.00000 | 0.00000 |
| | | | | | | | |
| **Fires** | | | | | | | |
| Structure Fires | 2810030000 | 7.80 | 0.99 | 42.54 | 0.02137 | 0.00272 | 0.11654 |
| Open Burning | 2810015000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Vehicle | 2810050000 | 1.74 | 0.70 | 21.72 | 0.00476 | 0.00190 | 0.05950 |
| | | | | | | | |
| Catastrophic/Accidental Releases | 2830000000 | 3.00 | 0.01 | 0.00 | 0.00822 | 0.00002 | 0.00000 |
| Explosive Detonation | 2311000030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Autobody Incineration | 2601000000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL AREA SOURCES** | | **22,947.51** | **2,795.94** | **1,212.23** | **69.7143** | **8.0308** | **3.8899** |

| BEXAR COUNTY AREA SOURCES | SCC Code | HAP ton/year | NOx ton/year | CO ton/year | HAP ton/day M-F | NOx ton/day M-F | CO ton/day M-F |
|---|---|---|---|---|---|---|---|
| **Livestock and Poultry** | | | | | | | |
| Cattle and Calves Waste Emissions - Milk Cow | 2805020001 | 198.98 | 0.00 | 0.00 | 0.54514 | 0.00000 | 0.00000 |
| Dairy Cattle Production - Manure Handling and | 2805022200 | 168.23 | 0.00 | 0.00 | 0.46090 | 0.00000 | 0.00000 |
| Cattle and Calves Waste Emissions - Beef Cow | 2805020002 | 1,974.21 | 0.00 | 0.00 | 5.40879 | 0.00000 | 0.00000 |
| Beef Cattle Production - Manure Handling and | 2805001200 | 54.66 | 0.00 | 0.00 | 0.14975 | 0.00000 | 0.00000 |

## Area Source Emissions - Bexar County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cattle and Calves Waste Emissions - Steers, S | 2805020004 | 180.68 | 0.00 | 0.00 | 0.49500 | 0.00000 | 0.00000 |
| Cattle and Calves Production - Steers, Steer Ca | 2805020004 | 80.78 | 0.00 | 0.00 | 0.22131 | 0.00000 | 0.00000 |
| Sheep and Lambs Waste Emissions | 2805040000 | 24.45 | 0.00 | 0.00 | 0.06698 | 0.00000 | 0.00000 |
| Sheep and Lambs Production - Manure Handlir | 2805040000 | 8.09 | 0.00 | 0.00 | 0.02215 | 0.00000 | 0.00000 |
| Goats Waste Emissions - Goats | 2805045003 | 1.71 | 0.00 | 0.00 | 0.00467 | 0.00000 | 0.00000 |
| Goats Production - Goats - Manure Handling ar | 2805045003 | 0.10 | 0.00 | 0.00 | 0.00026 | 0.00000 | 0.00000 |
| Horses and Ponies Waste Emissions | 2805035000 | 56.39 | 0.00 | 0.00 | 0.15449 | 0.00000 | 0.00000 |
| Horses and Ponies Production - Manure Handli | 2805035000 | 9.46 | 0.00 | 0.00 | 0.02592 | 0.00000 | 0.00000 |
| Swine Waste Emissions | 2805039200 | 5.63 | 0.00 | 0.00 | 0.01542 | 0.00000 | 0.00000 |
| Swine Production - Manure Handling and Stora | 2805039200 | 112.73 | 0.00 | 0.00 | 0.30886 | 0.00000 | 0.00000 |
| Poultry Production - Layers - Manure Handling | 2805008200 | 0.84 | 0.00 | 0.00 | 0.00229 | 0.00000 | 0.00000 |
| Poultry Production - Broilers - Manure Handling | 2805009200 | 0.11 | 0.00 | 0.00 | 0.00030 | 0.00000 | 0.00000 |
| **TOTAL** | | **2,877.02** | **0.00** | **0.00** | **7.88** | **0.00** | **0.00** |

## Area Source Emissions - Comal County, 2002

| COMAL COUNTY AREA SOURCES | SCC Code | VOC ton/year | NOx ton/year | CO ton/year | VOC ton/day M-F | NOx ton/day M-F | CO ton/day M-F |
|---|---|---|---|---|---|---|---|
| **Combustion (Heating & Cooking)** | | | | | | | |
| Fuel Oil-Industrial/Distillate | 2102004000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Industrial/Residual | 2102005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG-Industrial | 2102007000 | 0.02 | 1.04 | 0.26 | 0.00003 | 0.00284 | 0.00083 |
| Fuel Oil-Commercial/Distillate | 2103004000 | 0.22 | 13.05 | 3.26 | 0.00043 | 0.03575 | 0.01464 |
| Fuel Oil-Commercial/Residual | 2103005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Natural Gas-Commercial / Industrial | 2103006000 | 0.18 | 3.26 | 2.74 | 0.00010 | 0.00893 | 0.00326 |
| LPG-Commercial | 2103007000 | 0.04 | 0.76 | 0.15 | 0.00008 | 0.00208 | 0.00069 |
| Coal, Anthracite- Residential | 2104001000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Coal, Bituminous-Residential | 2104002000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Residential/Distillate | 2104004000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Residential/Residential | 2104005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Natural Gas-Residential | 2104006000 | 2.54 | 43.41 | 18.47 | 0.00058 | 0.11894 | 0.02647 |
| LPG-Residential | 2104007000 | 0.40 | 14.91 | 2.09 | 0.00033 | 0.04084 | 0.00972 |
| Wood/Residental Fireplace | 2104008001 | 1.01 | 0.05 | 4.38 | 0.00013 | 0.00001 | 0.00056 |
| **Agricultural** | | | | | | | |
| Fertilizer: NO entered as NOx | 2325050000 | 0.00 | 55.74 | 0.00 | 0.00000 | 0.24862 | 0.00000 |
| Pesticide Application | 2461800000 | 66.71 | 0.00 | 0.00 | 0.27798 | 0.00000 | 0.00000 |
| Bakeries | 2302050000 | 11.60 | 0.00 | 0.00 | 0.03179 | 0.00000 | 0.00000 |
| Wineries | 2302070005 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Breweries | 2302070001 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Oil Production | 2310000000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Gas Production | 2310020000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| HDDV Truck Idling | 2230070000 | 1.73 | 12.84 | 20.65 | 0.00661 | 0.04921 | 0.07914 |
| **Gas Cans** | | | | | | | |
| Residential Gas Cans - Permeation | 8908951100 | 7.47 | 0.00 | 0.00 | 0.02045 | 0.00000 | 0.00000 |
| Residential Gas Cans - Diurnal | 8908951100 | 86.09 | 0.00 | 0.00 | 0.23587 | 0.00000 | 0.00000 |
| Residential Gas Cans - Transport Spillage | 8908951100 | 4.37 | 0.00 | 0.00 | 0.01196 | 0.00000 | 0.00000 |
| Commericial Gas Cans - Permeation | 8908951100 | 0.10 | 0.00 | 0.00 | 0.00027 | 0.00000 | 0.00000 |
| Commercial Gas Cans - Diurnal | 8908951100 | 1.09 | 0.00 | 0.00 | 0.00300 | 0.00000 | 0.00000 |
| Commercial Gas Cans - Transport Spillage | 8908951100 | 2.00 | 0.00 | 0.00 | 0.00549 | 0.00000 | 0.00000 |
| **Aboveground Storage Tanks** | | | | | | | |
| Gasoline | 2501000120 | 38.16 | 0.00 | 0.00 | 0.10455 | 0.00000 | 0.00000 |
| Jet Kerosene | 2501000180 | 0.01 | 0.00 | 0.00 | 0.00002 | 0.00000 | 0.00000 |
| Jet Naptha | 2501000150 | 2.75 | 0.00 | 0.00 | 0.00753 | 0.00000 | 0.00000 |
| Distillate Fuel Oil | 2501000090 | 0.02 | 0.00 | 0.00 | 0.00005 | 0.00000 | 0.00000 |
| **Underground Storage Tanks** | | | | | | | |
| Gasoline | 2501010120 | 28.01 | 0.00 | 0.00 | 0.07673 | 0.00000 | 0.00000 |
| Jet Kerosene | 2501010180 | 0.03 | 0.00 | 0.00 | 0.00008 | 0.00000 | 0.00000 |
| Used Oil | 2501010060 | 2.74 | 0.00 | 0.00 | 0.00750 | 0.00000 | 0.00000 |
| New Oil | 2501010030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Jet Naptha | 2501010150 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Distillate Fuel Oil | 2501010090 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Leaking Underground Tanks | 2660000000 | 1.28 | 0.00 | 0.00 | 0.00350 | 0.00000 | 0.00000 |
| **Coating (Painting) Operations** | | | | | | | |
| Flat Paints | 2401001001 | 29.00 | 0.00 | 0.00 | 0.08391 | 0.00000 | 0.00000 |
| Nonflat Paints - Low and Medium Gloss | 2401001005 | 23.36 | 0.00 | 0.00 | 0.06758 | 0.00000 | 0.00000 |
| Nonflat Paints - High Gloss | 2401001006 | 4.43 | 0.00 | 0.00 | 0.01282 | 0.00000 | 0.00000 |
| Primers, Sealers, and Undercoaters | 2401001010 | 28.95 | 0.00 | 0.00 | 0.08377 | 0.00000 | 0.00000 |
| Quick Dry - Primers, Sealers, and Undercoaters | 2401001011 | 10.05 | 0.00 | 0.00 | 0.02907 | 0.00000 | 0.00000 |
| Stains - Semitransparent | 2401001015 | 16.03 | 0.00 | 0.00 | 0.04638 | 0.00000 | 0.00000 |
| Quick Dry - Enamels | 2401001020 | 4.02 | 0.00 | 0.00 | 0.01163 | 0.00000 | 0.00000 |
| Lacquers - Clear | 2401001025 | 4.83 | 0.00 | 0.00 | 0.01398 | 0.00000 | 0.00000 |
| All Other Architectural Categories | 2401001050 | 52.17 | 0.00 | 0.00 | 0.15095 | 0.00000 | 0.00000 |

## Area Source Emissions - Comal County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Thinning & Clean-up of Solvent-Based Arch Co | 2401001060 | 14.00 | 0.00 | 0.00 | 0.04051 | 0.00000 | 0.00000 |
| Auto Refinishing | 2401005000 | 14.00 | 0.00 | 0.00 | 0.06004 | 0.00000 | 0.00000 |
| Traffic Markings | 2401008000 | 0.01 | 0.00 | 0.00 | 0.00004 | 0.00000 | 0.00000 |
| Factory Finished Wood | 2401015000 | 1.47 | 0.00 | 0.00 | 0.00566 | 0.00000 | 0.00000 |
| Wood Furniture | 2401020000 | 66.78 | 0.00 | 0.00 | 0.25683 | 0.00000 | 0.00000 |
| Metal Furniture | 2401025000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Paper, Foil, And Film | 2401030000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Metal Cans | 2401040000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Sheet, Strip, and Coil | 2401045000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Machinery and Equipment | 2401055000 | 5.02 | 0.00 | 0.00 | 0.01933 | 0.00000 | 0.00000 |
| Appliances | 2401060000 | 31.66 | 0.00 | 0.00 | 0.12178 | 0.00000 | 0.00000 |
| Electronic and Other Electrical | 2401065000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Motor Vehicles | 2401070000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Aircraft | 2401075000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Marine | 2401080000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Railroad | 2401085000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Miscellaneous Manufacturing | 2401090000 | 31.38 | 0.00 | 0.00 | 0.12070 | 0.00000 | 0.00000 |
| | | | | | | | |
| Surface Cleaning Cold Cleaning - General | 2415300000 | 177.49 | 0.00 | 0.00 | 0.56889 | 0.00000 | 0.00000 |
| | | | | | | | |
| Dry Cleaning - General | 2420000000 | 88.20 | 0.00 | 0.00 | 0.28269 | 0.00000 | 0.00000 |
| | | | | | | | |
| Graphic Arts | 2425000000 | 54.64 | 0.00 | 0.00 | 0.20958 | 0.00000 | 0.00000 |
| | | | | | | | |
| Cutback Asphalt | 2461021000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Emulsified Asphalt | 2461022000 | 4.98 | 0.00 | 0.00 | 0.02327 | 0.00000 | 0.00000 |
| Asphalt Roofing | 2461023000 | 2.87 | 0.00 | 0.00 | 0.01129 | 0.00000 | 0.00000 |
| | | | | | | | |
| **Consumer/Commercial Solvent Use** | | | | | | | |
| Personal Care Solvents | 2465100000 | 56.30 | 0.00 | 0.00 | 0.15424 | 0.00000 | 0.00000 |
| Household Solvents | 2465200000 | 37.31 | 0.00 | 0.00 | 0.10221 | 0.00000 | 0.00000 |
| Automotive Solvents | 2465400000 | 24.08 | 0.00 | 0.00 | 0.06597 | 0.00000 | 0.00000 |
| Adhesives Application: Industrial | 2440020000 | 9.50 | 0.00 | 0.00 | 0.02602 | 0.00000 | 0.00000 |
| FIFRA Solvents | 2460890000 | 17.30 | 0.00 | 0.00 | 0.04739 | 0.00000 | 0.00000 |
| Coating Solvents | 2460520000 | 63.42 | 0.00 | 0.00 | 0.17376 | 0.00000 | 0.00000 |
| Misc.Solvents | 2460900000 | 20.35 | 0.00 | 0.00 | 0.05575 | 0.00000 | 0.00000 |
| | | | | | | | |
| **Service Stations** | | | | | | | |
| Service Stations - Tank Truck Unloading | 2501060053 | 62.31 | 0.00 | 0.00 | 0.19972 | 0.00000 | 0.00000 |
| Service Stations - Vehicle Refueling | 2501060100 | 127.55 | 0.00 | 0.00 | 0.34945 | 0.00000 | 0.00000 |
| Service Stations - Tank Breathing Loss | 2501060201 | 22.10 | 0.00 | 0.00 | 0.06056 | 0.00000 | 0.00000 |
| Service Stations - Tank Trucks in Transit | 2505030120 | 1.66 | 0.00 | 0.00 | 0.00531 | 0.00000 | 0.00000 |
| | | | | | | | |
| **Waste Disposal** | | | | | | | |
| Municipal Waste Landfills | 2620000000 | 11.39 | 0.00 | 0.00 | 0.03120 | 0.00000 | 0.00000 |
| Municipal Wastewater Treatment | 2630000000 | 14.73 | 0.00 | 0.00 | 0.03981 | 0.00000 | 0.00000 |
| | | | | | | | |
| **Fires** | | | | | | | |
| Structure Fires | 2810030000 | 0.51 | 0.07 | 2.79 | 0.00140 | 0.00018 | 0.00766 |
| Open Burning | 2810015000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Vehicle | 2810050000 | 0.06 | 0.02 | 0.75 | 0.00016 | 0.00000 | 0.00205 |
| | | | | | | | |
| Catastrophic/Accidental Releases | 2830000000 | 0.11 | 0.00 | 0.00 | 0.00031 | 0.00000 | 0.00000 |
| Explosive Detonation | 2311000030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Autobody Incineration | 2601000000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL AREA SOURCES** | | **1,392.61** | **145.16** | **55.56** | **4.3290** | **0.5074** | **0.1450** |

| COMAL COUNTY<br>**AREA SOURCES** | SCC Code | HAP ton/year | NOx ton/year | CO ton/year | HAP ton/day M-F | NOx ton/day M-F | CO ton/day M-F |
|---|---|---|---|---|---|---|---|
| **Livestock and Poultry** | | | | | | | |
| Cattle and Calves Waste Emissions - Milk Cow | 2805020001 | 48.87 | 0.00 | 0.00 | 0.13389 | 0.00000 | 0.00000 |
| Dairy Cattle Production - Manure Handling and | 2805022200 | 41.32 | 0.00 | 0.00 | 0.11320 | 0.00000 | 0.00000 |
| Cattle and Calves Waste Emissions - Beef Cow | 2805020002 | 484.89 | 0.00 | 0.00 | 1.32848 | 0.00000 | 0.00000 |
| Beef Cattle Production - Manure Handling and | 2805001200 | 13.42 | 0.00 | 0.00 | 0.03678 | 0.00000 | 0.00000 |

## Area Source Emissions - Comal County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cattle and Calves Waste Emissions - Steers, S | 2805020004 | 44.38 | 0.00 | 0.00 | 0.12158 | 0.00000 | 0.00000 |
| Cattle and Calves Production - Steers, Steer Ca | 2805020004 | 19.84 | 0.00 | 0.00 | 0.05436 | 0.00000 | 0.00000 |
| Sheep and Lambs Waste Emissions | 2805040000 | 29.74 | 0.00 | 0.00 | 0.08147 | 0.00000 | 0.00000 |
| Sheep and Lambs Production - Manure Handlir | 2805040000 | 9.84 | 0.00 | 0.00 | 0.02695 | 0.00000 | 0.00000 |
| Goats Waste Emissions - Goats | 2805045003 | 5.51 | 0.00 | 0.00 | 0.01508 | 0.00000 | 0.00000 |
| Goats Production - Goats - Manure Handling ar | 2805045003 | 0.31 | 0.00 | 0.00 | 0.00085 | 0.00000 | 0.00000 |
| Horses and Ponies Waste Emissions | 2805035000 | 19.92 | 0.00 | 0.00 | 0.05457 | 0.00000 | 0.00000 |
| Horses and Ponies Production - Manure Handli | 2805035000 | 3.34 | 0.00 | 0.00 | 0.00916 | 0.00000 | 0.00000 |
| Swine Waste Emissions | 2805039200 | 0.83 | 0.00 | 0.00 | 0.00228 | 0.00000 | 0.00000 |
| Swine Production - Manure Handling and Stora | 2805039200 | 24.24 | 0.00 | 0.00 | 0.06640 | 0.00000 | 0.00000 |
| Poultry Production - Layers - Manure Handling | 2805008200 | 0.16 | 0.00 | 0.00 | 0.00044 | 0.00000 | 0.00000 |
| Poultry Production - Broilers - Manure Handling | 2805009200 | 0.01 | 0.00 | 0.00 | 0.00004 | 0.00000 | 0.00000 |
| **TOTAL** | | **746.62** | **0.00** | **0.00** | **2.05** | **0.00** | **0.00** |

## Area Source Emissions - Frio County, 2002

| FRIO COUNTY AREA SOURCES | SCC Code | VOC ton/year | NOx ton/year | CO ton/year | VOC ton/day M-F | NOx ton/day M-F | CO ton/day M-F |
|---|---|---|---|---|---|---|---|
| **Combustion (Heating & Cooking)** | | | | | | | |
| Fuel Oil-Industrial/Distillate | 2102004000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Industrial/Residual | 2102005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG-Industrial | 2102007000 | 0.00 | 0.04 | 0.01 | 0.00000 | 0.00010 | 0.00003 |
| Fuel Oil-Commercial/Distillate | 2103004000 | 0.00 | 0.11 | 0.03 | 0.00000 | 0.00030 | 0.00012 |
| Fuel Oil-Commercial/Residual | 2103005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Natural Gas-Commercial / Industrial | 2103006000 | 0.02 | 0.39 | 0.33 | 0.00001 | 0.00108 | 0.00040 |
| LPG-Commercial | 2103007000 | 0.00 | 0.07 | 0.01 | 0.00001 | 0.00020 | 0.00007 |
| Coal, Anthracite- Residential | 2104001000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Coal, Bituminous-Residential | 2104002000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Residential/Distillate | 2104004000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Residential/Residential | 2104005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Natural Gas-Residential | 2104006000 | 0.39 | 6.73 | 2.86 | 0.00009 | 0.01844 | 0.00410 |
| LPG-Residential | 2104007000 | 0.06 | 2.31 | 0.32 | 0.00005 | 0.00633 | 0.00151 |
| Wood/Residental Fireplace | 2104008001 | 0.16 | 0.01 | 0.68 | 0.00002 | 0.00000 | 0.00009 |
| **Agricultural** | | | | | | | |
| Fertilizer: NO entered as NOx | 2325050000 | 0.00 | 78.95 | 0.00 | 0.00000 | 0.34027 | 0.00000 |
| Pesticide Application | 2461800000 | 489.12 | 0.00 | 0.00 | 2.03801 | 0.00000 | 0.00000 |
| Bakeries | 2302050000 | 1.06 | 0.00 | 0.00 | 0.00291 | 0.00000 | 0.00000 |
| Wineries | 2302070005 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Breweries | 2302070001 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Oil Production | 2310000000 | 521.46 | 115.89 | 97.35 | 1.42865 | 0.31752 | 0.26672 |
| Gas Production | 2310020000 | 68.97 | 35.50 | 21.30 | 0.18895 | 0.09726 | 0.05836 |
| HDDV Truck Idling | 2230070000 | 0.45 | 3.33 | 5.36 | 0.00172 | 0.01277 | 0.02054 |
| **Gas Cans** | | | | | | | |
| Residential Gas Cans - Permeation | 8908951100 | 1.16 | 0.00 | 0.00 | 0.00317 | 0.00000 | 0.00000 |
| Residential Gas Cans - Diurnal | 8908951100 | 13.34 | 0.00 | 0.00 | 0.03656 | 0.00000 | 0.00000 |
| Residential Gas Cans - Transport Spillage | 8908951100 | 0.68 | 0.00 | 0.00 | 0.00185 | 0.00000 | 0.00000 |
| Commericial Gas Cans - Permeation | 8908951100 | 0.00 | 0.00 | 0.00 | 0.00001 | 0.00000 | 0.00000 |
| Commercial Gas Cans - Diurnal | 8908951100 | 0.05 | 0.00 | 0.00 | 0.00012 | 0.00000 | 0.00000 |
| Commercial Gas Cans - Transport Spillage | 8908951100 | 0.08 | 0.00 | 0.00 | 0.00023 | 0.00000 | 0.00000 |
| **Aboveground Storage Tanks** | | | | | | | |
| Gasoline | 2501000120 | 55.69 | 0.00 | 0.00 | 0.15258 | 0.00000 | 0.00000 |
| Jet Kerosene | 2501000180 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Jet Naptha | 2501000150 | 1.14 | 0.00 | 0.00 | 0.00312 | 0.00000 | 0.00000 |
| Distillate Fuel Oil | 2501000090 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **Underground Storage Tanks** | | | | | | | |
| Gasoline | 2501010120 | 7.27 | 0.00 | 0.00 | 0.01992 | 0.00000 | 0.00000 |
| Jet Kerosene | 2501010180 | 0.01 | 0.00 | 0.00 | 0.00003 | 0.00000 | 0.00000 |
| Used Oil | 2501010060 | 0.11 | 0.00 | 0.00 | 0.00031 | 0.00000 | 0.00000 |
| New Oil | 2501010030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Jet Naptha | 2501010150 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Distillate Fuel Oil | 2501010090 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| | | | | | | | |
| Leaking Underground Tanks | 2660000000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **Coating (Painting) Operations** | | | | | | | |
| Flat Paints | 2401001001 | 5.74 | 0.00 | 0.00 | 0.01660 | 0.00000 | 0.00000 |
| Nonflat Paints - Low and Medium Gloss | 2401001005 | 4.62 | 0.00 | 0.00 | 0.01337 | 0.00000 | 0.00000 |
| Nonflat Paints - High Gloss | 2401001006 | 0.88 | 0.00 | 0.00 | 0.00254 | 0.00000 | 0.00000 |
| Primers, Sealers, and Undercoaters | 2401001010 | 5.73 | 0.00 | 0.00 | 0.01658 | 0.00000 | 0.00000 |
| Quick Dry - Primers, Sealers, and Undercoaters | 2401001011 | 1.99 | 0.00 | 0.00 | 0.00575 | 0.00000 | 0.00000 |
| Stains - Semitransparent | 2401001015 | 3.17 | 0.00 | 0.00 | 0.00918 | 0.00000 | 0.00000 |
| Quick Dry - Enamels | 2401001020 | 0.80 | 0.00 | 0.00 | 0.00230 | 0.00000 | 0.00000 |
| Lacquers - Clear | 2401001025 | 0.96 | 0.00 | 0.00 | 0.00277 | 0.00000 | 0.00000 |
| All Other Architectural Categories | 2401001050 | 10.32 | 0.00 | 0.00 | 0.02987 | 0.00000 | 0.00000 |

## Area Source Emissions - Frio County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Thinning & Clean-up of Solvent-Based Arch Co | 2401001060 | 2.77 | 0.00 | 0.00 | 0.00802 | 0.00000 | 0.00000 |
| Auto Refinishing | 2401005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Traffic Markings | 2401008000 | 0.02 | 0.00 | 0.00 | 0.00004 | 0.00000 | 0.00000 |
| Factory Finished Wood | 2401015000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Wood Furniture | 2401020000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Metal Furniture | 2401025000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Paper, Foil, And Film | 2401030000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Metal Cans | 2401040000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Sheet, Strip, and Coil | 2401045000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Machinery and Equipment | 2401055000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Appliances | 2401060000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Electronic and Other Electrical | 2401065000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Motor Vehicles | 2401070000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Aircraft | 2401075000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Marine | 2401080000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Railroad | 2401085000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Miscellaneous Manufacturing | 2401090000 | 0.65 | 0.00 | 0.00 | 0.00251 | 0.00000 | 0.00000 |
| Surface Cleaning Cold Cleaning - General | 2415300000 | 7.38 | 0.00 | 0.00 | 0.02366 | 0.00000 | 0.00000 |
| Dry Cleaning - General | 2420000000 | 4.50 | 0.00 | 0.00 | 0.01442 | 0.00000 | 0.00000 |
| Graphic Arts | 2425000000 | 10.81 | 0.00 | 0.00 | 0.04147 | 0.00000 | 0.00000 |
| Cutback Asphalt | 2461021000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Emulsified Asphalt | 2461022000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Asphalt Roofing | 2461023000 | 0.02 | 0.00 | 0.00 | 0.00006 | 0.00000 | 0.00000 |
| **Consumer/Commercial Solvent Use** | | | | | | | |
| Personal Care Solvents | 2465100000 | 10.50 | 0.00 | 0.00 | 0.02876 | 0.00000 | 0.00000 |
| Household Solvents | 2465200000 | 6.96 | 0.00 | 0.00 | 0.01906 | 0.00000 | 0.00000 |
| Automotive Solvents | 2465400000 | 4.49 | 0.00 | 0.00 | 0.01230 | 0.00000 | 0.00000 |
| Adhesives Application: Industrial | 2440020000 | 1.77 | 0.00 | 0.00 | 0.00485 | 0.00000 | 0.00000 |
| FIFRA Solvents | 2460890000 | 3.22 | 0.00 | 0.00 | 0.00883 | 0.00000 | 0.00000 |
| Coating Solvents | 2460520000 | 11.82 | 0.00 | 0.00 | 0.03239 | 0.00000 | 0.00000 |
| Misc.Solvents | 2460900000 | 3.79 | 0.00 | 0.00 | 0.01039 | 0.00000 | 0.00000 |
| **Service Stations** | | | | | | | |
| Service Stations - Tank Truck Unloading | 2501060053 | 25.81 | 0.00 | 0.00 | 0.08271 | 0.00000 | 0.00000 |
| Service Stations - Vehicle Refueling | 2501060100 | 25.24 | 0.00 | 0.00 | 0.06915 | 0.00000 | 0.00000 |
| Service Stations - Tank Breathing Loss | 2501060201 | 4.37 | 0.00 | 0.00 | 0.01198 | 0.00000 | 0.00000 |
| Service Stations - Tank Trucks in Transit | 2505030120 | 0.33 | 0.00 | 0.00 | 0.00105 | 0.00000 | 0.00000 |
| **Waste Disposal** | | | | | | | |
| Municipal Waste Landfills | 2620000000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Municipal Wastewater Treatment | 2630000000 | 4.27 | 0.00 | 0.00 | 0.01153 | 0.00000 | 0.00000 |
| **Fires** | | | | | | | |
| Structure Fires | 2810030000 | 0.14 | 0.02 | 0.76 | 0.00038 | 0.00005 | 0.00208 |
| Open Burning | 2810015000 | 122.62 | 10.13 | 143.51 | 0.39577 | 0.02775 | 0.39318 |
| Vehicle | 2810050000 | 0.03 | 0.01 | 0.39 | 0.00009 | 0.00000 | 0.00107 |
| Catastrophic/Accidental Releases | 2830000000 | 0.11 | 0.00 | 0.00 | 0.00029 | 0.00000 | 0.00000 |
| Explosive Detonation | 2311000030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Autobody Incineration | 2601000000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL AREA SOURCES** | | **1,447.05** | **253.50** | **272.92** | **4.7570** | **0.8221** | **0.7483** |

| **FRIO COUNTY** **AREA SOURCES** | SCC Code | HAP ton/year | NOx ton/year | CO ton/year | HAP ton/day M-F | NOx ton/day M-F | CO ton/day M-F |
|---|---|---|---|---|---|---|---|
| **Livestock and Poultry** | | | | | | | |
| Cattle and Calves Waste Emissions - Milk Cow | 2805020001 | 251.34 | 0.00 | 0.00 | 0.68860 | 0.00000 | 0.00000 |
| Dairy Cattle Production - Manure Handling and | 2805022200 | 212.50 | 0.00 | 0.00 | 0.58219 | 0.00000 | 0.00000 |
| Cattle and Calves Waste Emissions - Beef Cow | 2805020002 | 2,493.74 | 0.00 | 0.00 | 6.83216 | 0.00000 | 0.00000 |
| Beef Cattle Production - Manure Handling and | 2805001200 | 69.04 | 0.00 | 0.00 | 0.18916 | 0.00000 | 0.00000 |

## Area Source Emissions - Frio County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cattle and Calves Waste Emissions - Steers, S | 2805020004 | 228.22 | 0.00 | 0.00 | 0.62526 | 0.00000 | 0.00000 |
| Cattle and Calves Production - Steers, Steer Ca | 2805020004 | 102.04 | 0.00 | 0.00 | 0.27955 | 0.00000 | 0.00000 |
| Sheep and Lambs Waste Emissions | 2805040000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Sheep and Lambs Production - Manure Handlir | 2805040000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Goats Waste Emissions - Goats | 2805045003 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Goats Production - Goats - Manure Handling ar | 2805045003 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Horses and Ponies Waste Emissions | 2805035000 | 12.36 | 0.00 | 0.00 | 0.03385 | 0.00000 | 0.00000 |
| Horses and Ponies Production - Manure Handli | 2805035000 | 2.47 | 0.00 | 0.00 | 0.00675 | 0.00000 | 0.00000 |
| Swine Waste Emissions | 2805039200 | 0.21 | 0.00 | 0.00 | 0.00057 | 0.00000 | 0.00000 |
| Swine Production - Manure Handling and Stora | 2805039200 | 4.68 | 0.00 | 0.00 | 0.01283 | 0.00000 | 0.00000 |
| Poultry Production - Layers - Manure Handling | 2805008200 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Poultry Production - Broilers - Manure Handling | 2805009200 | 0.01 | 0.00 | 0.00 | 0.00003 | 0.00000 | 0.00000 |
| **TOTAL** | | **3,376.60** | **0.00** | **0.00** | **9.25** | **0.00** | **0.00** |

## Area Source Emissions - Gillespie County, 2002

| GILLESPIE COUNTY AREA SOURCES | SCC Code | VOC ton/year | NOx ton/year | CO ton/year | VOC ton/day M-F | NOx ton/day M-F | CO ton/day M-F |
|---|---|---|---|---|---|---|---|
| **Combustion (Heating & Cooking)** | | | | | | | |
| Fuel Oil-Industrial/Distillate | 2102004000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Industrial/Residual | 2102005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG-Industrial | 2102007000 | 0.00 | 0.14 | 0.03 | 0.00000 | 0.00038 | 0.00011 |
| Fuel Oil-Commercial/Distillate | 2103004000 | 0.00 | 0.22 | 0.06 | 0.00001 | 0.00061 | 0.00025 |
| Fuel Oil-Commercial/Residual | 2103005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Natural Gas-Commercial / Industrial | 2103006000 | 0.04 | 0.81 | 0.68 | 0.00002 | 0.00223 | 0.00081 |
| LPG-Commercial | 2103007000 | 0.01 | 0.21 | 0.04 | 0.00002 | 0.00058 | 0.00019 |
| Coal, Anthracite- Residential | 2104001000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Coal, Bituminous-Residential | 2104002000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Residential/Distillate | 2104004000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Residential/Residential | 2104005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Natural Gas-Residential | 2104006000 | 0.71 | 12.18 | 5.18 | 0.00016 | 0.03338 | 0.00743 |
| LPG-Residential | 2104007000 | 0.11 | 4.18 | 0.59 | 0.00009 | 0.01146 | 0.00273 |
| Wood/Residental Fireplace | 2104008001 | 0.28 | 0.01 | 1.23 | 0.00004 | 0.00000 | 0.00016 |
| **Agricultural** | | | | | | | |
| Fertilizer: NO entered as NOx | 2325050000 | 0.00 | 57.72 | 0.00 | 0.00000 | 0.13852 | 0.00000 |
| Pesticide Application | 2461800000 | 26.17 | 0.00 | 0.00 | 0.10904 | 0.00000 | 0.00000 |
| Bakeries | 2302050000 | 4.23 | 0.00 | 0.00 | 0.01159 | 0.00000 | 0.00000 |
| Wineries | 2302070005 | 0.05 | 0.00 | 0.00 | 0.00013 | 0.00000 | 0.00000 |
| Breweries | 2302070001 | 0.02 | 0.00 | 0.00 | 0.00044 | 0.00000 | 0.00000 |
| Oil Production | 2310000000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Gas Production | 2310020000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| HDDV Truck Idling | 2230070000 | 0.46 | 3.39 | 5.45 | 0.00174 | 0.01298 | 0.02087 |
| **Gas Cans** | | | | | | | |
| Residential Gas Cans - Permeation | 2501000120 | 2.10 | 0.00 | 0.00 | 0.00574 | 0.00000 | 0.00000 |
| Residential Gas Cans - Diurnal | 2501000120 | 24.16 | 0.00 | 0.00 | 0.06620 | 0.00000 | 0.00000 |
| Residential Gas Cans - Transport Spillage | 2501000120 | 1.23 | 0.00 | 0.00 | 0.00336 | 0.00000 | 0.00000 |
| Commericial Gas Cans - Permeation | 2501000120 | 0.03 | 0.00 | 0.00 | 0.00009 | 0.00000 | 0.00000 |
| Commercial Gas Cans - Diurnal | 2501000120 | 0.36 | 0.00 | 0.00 | 0.00100 | 0.00000 | 0.00000 |
| Commercial Gas Cans - Transport Spillage | 2501000120 | 0.67 | 0.00 | 0.00 | 0.00183 | 0.00000 | 0.00000 |
| **Aboveground Storage Tanks** | | | | | | | |
| Gasoline | 2501000120 | 110.39 | 0.00 | 0.00 | 0.30245 | 0.00000 | 0.00000 |
| Jet Kerosene | 2501000180 | 0.00 | 0.00 | 0.00 | 0.00001 | 0.00000 | 0.00000 |
| Jet Naptha | 2501000150 | 0.87 | 0.00 | 0.00 | 0.00238 | 0.00000 | 0.00000 |
| Distillate Fuel Oil | 2501000090 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **Underground Storage Tanks** | | | | | | | |
| Gasoline | 8908951100 | 1.94 | 0.00 | 0.00 | 0.00531 | 0.00000 | 0.00000 |
| Jet Kerosene | 8908951100 | 0.02 | 0.00 | 0.00 | 0.00005 | 0.00000 | 0.00000 |
| Used Oil | 8908951100 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| New Oil | 8908951100 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Jet Naptha | 8908951100 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Distillate Fuel Oil | 8908951100 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Leaking Underground Tanks | 2660000000 | 1.28 | 0.00 | 0.00 | 0.00350 | 0.00000 | 0.00000 |
| **Coating (Painting) Operations** | | | | | | | |
| Flat Paints | 2401001001 | 7.41 | 0.00 | 0.00 | 0.02143 | 0.00000 | 0.00000 |
| Nonflat Paints - Low and Medium Gloss | 2401001005 | 5.97 | 0.00 | 0.00 | 0.01726 | 0.00000 | 0.00000 |
| Nonflat Paints - High Gloss | 2401001006 | 1.13 | 0.00 | 0.00 | 0.00328 | 0.00000 | 0.00000 |
| Primers, Sealers, and Undercoaters | 2401001010 | 7.39 | 0.00 | 0.00 | 0.02139 | 0.00000 | 0.00000 |
| Quick Dry - Primers, Sealers, and Undercoaters | 2401001011 | 2.57 | 0.00 | 0.00 | 0.00742 | 0.00000 | 0.00000 |
| Stains - Semitransparent | 2401001015 | 4.09 | 0.00 | 0.00 | 0.01185 | 0.00000 | 0.00000 |
| Quick Dry - Enamels | 2401001020 | 1.03 | 0.00 | 0.00 | 0.00297 | 0.00000 | 0.00000 |
| Lacquers - Clear | 2401001025 | 1.23 | 0.00 | 0.00 | 0.00357 | 0.00000 | 0.00000 |
| All Other Architectural Categories | 2401001050 | 13.33 | 0.00 | 0.00 | 0.03855 | 0.00000 | 0.00000 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Thinning & Clean-up of Solvent-Based Arch Co | 2401001060 | 3.58 | 0.00 | 0.00 | 0.01035 | 0.00000 | 0.00000 |
| Auto Refinishing | 2401005000 | 5.44 | 0.00 | 0.00 | 0.02334 | 0.00000 | 0.00000 |
| Traffic Markings | 2401008000 | 0.01 | 0.00 | 0.00 | 0.00004 | 0.00000 | 0.00000 |
| Factory Finished Wood | 2401015000 | 0.17 | 0.00 | 0.00 | 0.00064 | 0.00000 | 0.00000 |
| Wood Furniture | 2401020000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Metal Furniture | 2401025000 | 2.02 | 0.00 | 0.00 | 0.00777 | 0.00000 | 0.00000 |
| Paper, Foil, And Film | 2401030000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Metal Cans | 2401040000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Sheet, Strip, and Coil | 2401045000 | 13.95 | 0.00 | 0.00 | 0.05367 | 0.00000 | 0.00000 |
| Machinery and Equipment | 2401055000 | 2.48 | 0.00 | 0.00 | 0.00956 | 0.00000 | 0.00000 |
| Appliances | 2401060000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Electronic and Other Electrical | 2401065000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Motor Vehicles | 2401070000 | 0.37 | 0.00 | 0.00 | 0.00142 | 0.00000 | 0.00000 |
| Aircraft | 2401075000 | 0.27 | 0.00 | 0.00 | 0.00106 | 0.00000 | 0.00000 |
| Marine | 2401080000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Railroad | 2401085000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Miscellaneous Manufacturing | 2401090000 | 4.97 | 0.00 | 0.00 | 0.01910 | 0.00000 | 0.00000 |
| | | | | | | | |
| Surface Cleaning Cold Cleaning - General | 2415300000 | 25.36 | 0.00 | 0.00 | 0.08129 | 0.00000 | 0.00000 |
| | | | | | | | |
| Dry Cleaning - General | 2420000000 | 3.60 | 0.00 | 0.00 | 0.01154 | 0.00000 | 0.00000 |
| | | | | | | | |
| Graphic Arts | 2425000000 | 13.95 | 0.00 | 0.00 | 0.05353 | 0.00000 | 0.00000 |
| | | | | | | | |
| Cutback Asphalt | 2461021000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Emulsified Asphalt | 2461022000 | 7.68 | 0.00 | 0.00 | 0.03583 | 0.00000 | 0.00000 |
| Asphalt Roofing | 2461023000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| | | | | | | | |
| **Consumer/Commercial Solvent Use** | | | | | | | |
| Personal Care Solvents | 2465100000 | 14.58 | 0.00 | 0.00 | 0.03994 | 0.00000 | 0.00000 |
| Household Solvents | 2465200000 | 9.66 | 0.00 | 0.00 | 0.02647 | 0.00000 | 0.00000 |
| Automotive Solvents | 2465400000 | 6.24 | 0.00 | 0.00 | 0.01708 | 0.00000 | 0.00000 |
| Adhesives Application: Industrial | 2440020000 | 2.46 | 0.00 | 0.00 | 0.00674 | 0.00000 | 0.00000 |
| FIFRA Solvents | 2460890000 | 4.48 | 0.00 | 0.00 | 0.01227 | 0.00000 | 0.00000 |
| Coating Solvents | 2460520000 | 16.42 | 0.00 | 0.00 | 0.04500 | 0.00000 | 0.00000 |
| Misc.Solvents | 2460900000 | 5.27 | 0.00 | 0.00 | 0.01444 | 0.00000 | 0.00000 |
| | | | | | | | |
| **Service Stations** | | | | | | | |
| Service Stations - Tank Truck Unloading | 2501060053 | 32.65 | 0.00 | 0.00 | 0.10465 | 0.00000 | 0.00000 |
| Service Stations - Vehicle Refueling | 2501060100 | 32.58 | 0.00 | 0.00 | 0.08925 | 0.00000 | 0.00000 |
| Service Stations - Tank Breathing Loss | 2501060201 | 5.65 | 0.00 | 0.00 | 0.01547 | 0.00000 | 0.00000 |
| Service Stations - Tank Trucks in Transit | 2505030120 | 0.42 | 0.00 | 0.00 | 0.00136 | 0.00000 | 0.00000 |
| | | | | | | | |
| **Waste Disposal** | | | | | | | |
| Municipal Waste Landfills | 2620000000 | 0.94 | 0.00 | 0.00 | 0.00257 | 0.00000 | 0.00000 |
| Municipal Wastewater Treatment | 2630000000 | 2.33 | 0.00 | 0.00 | 0.00629 | 0.00000 | 0.00000 |
| | | | | | | | |
| **Fires** | | | | | | | |
| Structure Fires | 2810030000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Open Burning | 2810015000 | 158.26 | 13.07 | 185.22 | 0.51081 | 0.03582 | 0.50746 |
| Vehicle | 2810050000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| | | | | | | | |
| Catastrophic/Accidental Releases | 2830000000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Explosive Detonation | 2311000030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Autobody Incineration | 2601000000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL AREA SOURCES** | | **595.09** | **91.96** | **198.49** | **1.8444** | **0.2360** | **0.5400** |

| GILLESPIE COUNTY AREA SOURCES | SCC Code | HAP ton/year | NOx ton/year | CO ton/year | HAP ton/day M-F | NOx ton/day M-F | CO ton/day M-F |
|---|---|---|---|---|---|---|---|
| **Livestock and Poultry** | | | | | | | |
| Cattle and Calves Waste Emissions - Milk Cow | 2805020001 | 160.58 | 0.00 | 0.00 | 0.43994 | 0.00000 | 0.00000 |
| Dairy Cattle Production - Manure Handling and | 2805022200 | 135.76 | 0.00 | 0.00 | 0.3719559 | 0.00000 | 0.00000 |
| Cattle and Calves Waste Emissions - Beef Cow | 2805020002 | 1,593.22 | 0.00 | 0.00 | 4.3649913 | 0.00000 | 0.00000 |
| Beef Cattle Production - Manure Handling and | 2805001200 | 44.11 | 0.00 | 0.00 | 0.1208501 | 0.00000 | 0.00000 |

**Area Source Emissions - Gillespie County, 2002**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cattle and Calves Waste Emissions - Steers, S | 2805020004 | 145.81 | 0.00 | 0.00 | 0.3994746 | 0.00000 | 0.00000 |
| Cattle and Calves Production - Steers, Steer Ca | 2805020004 | 65.19 | 0.00 | 0.00 | 0.1786032 | 0.00000 | 0.00000 |
| Sheep and Lambs Waste Emissions | 2805040000 | 387.09 | 0.00 | 0.00 | 1.0605326 | 0.00000 | 0.00000 |
| Sheep and Lambs Production - Manure Handlin | 2805040000 | 128.03 | 0.00 | 0.00 | 0.3507757 | 0.00000 | 0.00000 |
| Goats Waste Emissions - Goats | 2805045003 | 47.99 | 0.00 | 0.00 | 0.1314877 | 0.00000 | 0.00000 |
| Goats Production - Goats - Manure Handling ar | 2805045003 | 2.69 | 0.00 | 0.00 | 0.0073795 | 0.00000 | 0.00000 |
| Horses and Ponies Waste Emissions | 2805035000 | 27.03 | 0.00 | 0.00 | 0.0740466 | 0.00000 | 0.00000 |
| Horses and Ponies Production - Manure Handli | 2805035000 | 4.54 | 0.00 | 0.00 | 0.0124251 | 0.00000 | 0.00000 |
| Swine Waste Emissions | 2805039200 | 8.08 | 0.00 | 0.00 | 0.0221416 | 0.00000 | 0.00000 |
| Swine Production - Manure Handling and Stora | 2805039200 | 134.89 | 0.00 | 0.00 | 0.369572 | 0.00000 | 0.00000 |
| Poultry Production - Layers - Manure Handling | 2805008200 | 0.18 | 0.00 | 0.00 | 0.0004796 | 0.00000 | 0.00000 |
| Poultry Production - Broilers - Manure Handling | 2805009200 | 0.25 | 0.00 | 0.00 | 0.0006891 | 0.00000 | 0.00000 |
| **TOTAL AREA SOURCES** | | **2,885.45** | **0.00** | **0.00** | **7.91** | **0.00** | **0.00** |

## Area Source Emissions - Guadalupe County, 2002

| GUADALUPE COUNTY AREA SOURCES | SCC Code | VOC ton/year | NOx ton/year | CO ton/year | VOC ton/day M-F | NOx ton/day M-F | CO ton/day M-F |
|---|---|---|---|---|---|---|---|
| **Combustion (Heating & Cooking)** | | | | | | | |
| Fuel Oil-Industrial/Distillate | 2102004000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Industrial/Residual | 2102005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG-Industrial | 2102007000 | 0.02 | 0.96 | 0.24 | 0.00003 | 0.00264 | 0.00077 |
| Fuel Oil-Commercial/Distillate | 2103004000 | 0.01 | 0.55 | 0.14 | 0.00002 | 0.00151 | 0.00062 |
| Fuel Oil-Commercial/Residual | 2103005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Natural Gas-Commercial / Industrial | 2103006000 | 0.11 | 2.01 | 1.69 | 0.00006 | 0.00550 | 0.00201 |
| LPG-Commercial | 2103007000 | 0.03 | 0.51 | 0.10 | 0.00005 | 0.00138 | 0.00046 |
| Coal, Anthracite- Residential | 2104001000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Coal, Bituminous-Residential | 2104002000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Residential/Distillate | 2104004000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Residential/Residential | 2104005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Natural Gas-Residential | 2104006000 | 2.65 | 45.32 | 19.29 | 0.00061 | 0.01726 | 0.02764 |
| LPG-Residential | 2104007000 | 0.42 | 15.56 | 2.18 | 0.00034 | 0.04264 | 0.01015 |
| Wood/Residental Fireplace | 2104008001 | 1.05 | 0.06 | 4.58 | 0.00014 | 0.00001 | 0.00059 |
| **Agricultural** | | | | | | | |
| Fertilizer: NO entered as NOx | 2325050000 | 0.00 | 260.69 | 0.00 | 0.00000 | 0.69511 | 0.00000 |
| Pesticide Application | 2461800000 | 669.28 | 0.00 | 0.00 | 2.78865 | 0.00000 | 0.00000 |
| Bakeries | 2302050000 | 5.77 | 0.00 | 0.00 | 0.01581 | 0.00000 | 0.00000 |
| Wineries | 2302070005 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Breweries | 2302070001 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Oil Production | 2310000000 | 2,016.96 | 419.62 | 352.48 | 5.52593 | 1.14966 | 0.96571 |
| Gas Production | 2310020000 | 1.02 | 3.27 | 1.96 | 0.00280 | 0.00895 | 0.00537 |
| HDDV Truck Idling | 2230070000 | 1.55 | 11.55 | 18.58 | 0.00595 | 0.04426 | 0.07117 |
| **Gas Cans** | | | | | | | |
| Residential Gas Cans - Permeation | 8908951100 | 7.79 | 0.00 | 0.00 | 0.02135 | 0.00000 | 0.00000 |
| Residential Gas Cans - Diurnal | 8908951100 | 89.89 | 0.00 | 0.00 | 0.24626 | 0.00000 | 0.00000 |
| Residential Gas Cans - Transport Spillage | 8908951100 | 4.56 | 0.00 | 0.00 | 0.01249 | 0.00000 | 0.00000 |
| Commericial Gas Cans - Permeation | 8908951100 | 0.04 | 0.00 | 0.00 | 0.00012 | 0.00000 | 0.00000 |
| Commercial Gas Cans - Diurnal | 8908951100 | 0.50 | 0.00 | 0.00 | 0.00137 | 0.00000 | 0.00000 |
| Commercial Gas Cans - Transport Spillage | 8908951100 | 0.92 | 0.00 | 0.00 | 0.00251 | 0.00000 | 0.00000 |
| **Aboveground Storage Tanks** | | | | | | | |
| Gasoline | 2501000120 | 25.25 | 0.00 | 0.00 | 0.06919 | 0.00000 | 0.00000 |
| Jet Kerosene | 2501000180 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Jet Naptha | 2501000150 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Distillate Fuel Oil | 2501000090 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **Underground Storage Tanks** | | | | | | | |
| Gasoline | 2501010120 | 8.22 | 0.00 | 0.00 | 0.02251 | 0.00000 | 0.00000 |
| Jet Kerosene | 2501010180 | 0.05 | 0.00 | 0.00 | 0.00014 | 0.00000 | 0.00000 |
| Used Oil | 2501010060 | 1.13 | 0.00 | 0.00 | 0.00309 | 0.00000 | 0.00000 |
| New Oil | 2501010030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Jet Naptha | 2501010150 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Distillate Fuel Oil | 2501010090 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| | | | | | | | |
| Leaking Underground Tanks | 2660000000 | 0.85 | 0.00 | 0.00 | 0.00233 | 0.00000 | 0.00000 |
| **Coating (Painting) Operations** | | | | | | | |
| Flat Paints | 2401001001 | 32.50 | 0.00 | 0.00 | 0.09403 | 0.00000 | 0.00000 |
| Nonflat Paints - Low and Medium Gloss | 2401001005 | 26.18 | 0.00 | 0.00 | 0.07573 | 0.00000 | 0.00000 |
| Nonflat Paints - High Gloss | 2401001006 | 4.97 | 0.00 | 0.00 | 0.01437 | 0.00000 | 0.00000 |
| Primers, Sealers, and Undercoaters | 2401001010 | 32.44 | 0.00 | 0.00 | 0.09386 | 0.00000 | 0.00000 |
| Quick Dry - Primers, Sealers, and Undercoaters | 2401001011 | 11.26 | 0.00 | 0.00 | 0.03257 | 0.00000 | 0.00000 |
| Stains - Semitransparent | 2401001015 | 17.96 | 0.00 | 0.00 | 0.05197 | 0.00000 | 0.00000 |
| Quick Dry - Enamels | 2401001020 | 4.50 | 0.00 | 0.00 | 0.01303 | 0.00000 | 0.00000 |
| Lacquers - Clear | 2401001025 | 5.41 | 0.00 | 0.00 | 0.01566 | 0.00000 | 0.00000 |
| All Other Architectural Categories | 2401001050 | 58.46 | 0.00 | 0.00 | 0.16914 | 0.00000 | 0.00000 |

## Area Source Emissions - Guadalupe County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Thinning & Clean-up of Solvent-Based Arch Co | 2401001060 | 15.69 | 0.00 | 0.00 | 0.04539 | 0.00000 | 0.00000 |
| Auto Refinishing | 2401005000 | 20.79 | 0.00 | 0.00 | 0.08913 | 0.00000 | 0.00000 |
| Traffic Markings | 2401008000 | 0.02 | 0.00 | 0.00 | 0.00005 | 0.00000 | 0.00000 |
| Factory Finished Wood | 2401015000 | 2.81 | 0.00 | 0.00 | 0.01079 | 0.00000 | 0.00000 |
| Wood Furniture | 2401020000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Metal Furniture | 2401025000 | 10.39 | 0.00 | 0.00 | 0.03996 | 0.00000 | 0.00000 |
| Paper, Foil, And Film | 2401030000 | 0.61 | 0.00 | 0.00 | 0.00234 | 0.00000 | 0.00000 |
| Metal Cans | 2401040000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Sheet, Strip, and Coil | 2401045000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Machinery and Equipment | 2401055000 | 17.95 | 0.00 | 0.00 | 0.06904 | 0.00000 | 0.00000 |
| Appliances | 2401060000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Electronic and Other Electrical | 2401065000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Motor Vehicles | 2401070000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Aircraft | 2401075000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Marine | 2401080000 | 0.87 | 0.00 | 0.00 | 0.00334 | 0.00000 | 0.00000 |
| Railroad | 2401085000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Miscellaneous Manufacturing | 2401090000 | 40.04 | 0.00 | 0.00 | 0.15398 | 0.00000 | 0.00000 |
| Surface Cleaning Cold Cleaning - General | 2415300000 | 158.65 | 0.00 | 0.00 | 0.50848 | 0.00000 | 0.00000 |
| Dry Cleaning - General | 2420000000 | 42.30 | 0.00 | 0.00 | 0.13558 | 0.00000 | 0.00000 |
| Graphic Arts | 2425000000 | 61.23 | 0.00 | 0.00 | 0.23484 | 0.00000 | 0.00000 |
| Cutback Asphalt | 2461021000 | 117.17 | 0.00 | 0.00 | 0.50376 | 0.00000 | 0.00000 |
| Emulsified Asphalt | 2461022000 | 12.66 | 0.00 | 0.00 | 0.05914 | 0.00000 | 0.00000 |
| Asphalt Roofing | 2461023000 | 1.55 | 0.00 | 0.00 | 0.00612 | 0.00000 | 0.00000 |
| **Consumer/Commercial Solvent Use** | | | | | | | |
| Personal Care Solvents | 2465100000 | 60.98 | 0.00 | 0.00 | 0.16707 | 0.00000 | 0.00000 |
| Household Solvents | 2465200000 | 40.41 | 0.00 | 0.00 | 0.11071 | 0.00000 | 0.00000 |
| Automotive Solvents | 2465400000 | 26.08 | 0.00 | 0.00 | 0.07146 | 0.00000 | 0.00000 |
| Adhesives Application: Industrial | 2440020000 | 10.29 | 0.00 | 0.00 | 0.02818 | 0.00000 | 0.00000 |
| FIFRA Solvents | 2460890000 | 18.73 | 0.00 | 0.00 | 0.05133 | 0.00000 | 0.00000 |
| Coating Solvents | 2460520000 | 68.69 | 0.00 | 0.00 | 0.18820 | 0.00000 | 0.00000 |
| Misc.Solvents | 2460900000 | 22.04 | 0.00 | 0.00 | 0.06039 | 0.00000 | 0.00000 |
| **Service Stations** | | | | | | | |
| Service Stations - Tank Truck Unloading | 2501060053 | 67.67 | 0.00 | 0.00 | 0.21689 | 0.00000 | 0.00000 |
| Service Stations - Vehicle Refueling | 2501060100 | 142.93 | 0.00 | 0.00 | 0.39158 | 0.00000 | 0.00000 |
| Service Stations - Tank Breathing Loss | 2501060201 | 24.77 | 0.00 | 0.00 | 0.06786 | 0.00000 | 0.00000 |
| Service Stations - Tank Trucks in Transit | 2505030120 | 1.86 | 0.00 | 0.00 | 0.00595 | 0.00000 | 0.00000 |
| **Waste Disposal** | | | | | | | |
| Municipal Waste Landfills | 2620000000 | 2.20 | 0.00 | 0.00 | 0.00604 | 0.00000 | 0.00000 |
| Municipal Wastewater Treatment | 2630000000 | 12.64 | 0.00 | 0.00 | 0.03471 | 0.00000 | 0.00000 |
| **Fires** | | | | | | | |
| Structure Fires | 2810030000 | 0.43 | 0.02 | 2.35 | 0.00118 | 0.00015 | 0.00643 |
| Open Burning | 2810015000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Vehicle | 2810050000 | 0.06 | 0.02 | 0.75 | 0.00016 | 0.00000 | 0.00205 |
| Catastrophic/Accidental Releases | 2830000000 | 0.01 | 0.00 | 0.00 | 0.00003 | 0.00000 | 0.00000 |
| Explosive Detonation | 2311000030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Autobody Incineration | 2601000000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL AREA SOURCES** | | **4,034.27** | **760.15** | **404.33** | **12.5458** | **1.9691** | **1.0930** |

| GUADALUPE COUNTY<br>**AREA SOURCES** | SCC Code | HAP ton/year | NOx ton/year | CO ton/year | HAP ton/day M-F | NOx ton/day M-F | CO ton/day M-F |
|---|---|---|---|---|---|---|---|
| **Livestock and Poultry** | | | | | | | |
| Cattle and Calves Waste Emissions - Milk Cow | 2805020001 | 17.45 | 0.00 | 0.00 | 0.04782 | 0.00000 | 0.00000 |
| Dairy Cattle Production - Manure Handling and | 2805022200 | 14.76 | 0.00 | 0.00 | 0.04043 | 0.00000 | 0.00000 |
| Cattle and Calves Waste Emissions - Beef Cow | 2805020002 | 173.18 | 0.00 | 0.00 | 0.47446 | 0.00000 | 0.00000 |
| Beef Cattle Production - Manure Handling and | 2805001200 | 4.79 | 0.00 | 0.00 | 0.01314 | 0.00000 | 0.00000 |

## Area Source Emissions - Guadalupe County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cattle and Calves Waste Emissions - Steers, S | 2805020004 | 15.85 | 0.00 | 0.00 | 0.04342 | 0.00000 | 0.00000 |
| Cattle and Calves Production - Steers, Steer Ca | 2805020004 | 7.09 | 0.00 | 0.00 | 0.01941 | 0.00000 | 0.00000 |
| Sheep and Lambs Waste Emissions | 2805040000 | 32.32 | 0.00 | 0.00 | 0.08855 | 0.00000 | 0.00000 |
| Sheep and Lambs Production - Manure Handlin | 2805040000 | 10.69 | 0.00 | 0.00 | 0.02929 | 0.00000 | 0.00000 |
| Goats Waste Emissions - Goats | 2805045003 | 1.88 | 0.00 | 0.00 | 0.00515 | 0.00000 | 0.00000 |
| Goats Production - Goats - Manure Handling an | 2805045003 | 0.11 | 0.00 | 0.00 | 0.00029 | 0.00000 | 0.00000 |
| Horses and Ponies Waste Emissions | 2805035000 | 67.68 | 0.00 | 0.00 | 0.18541 | 0.00000 | 0.00000 |
| Horses and Ponies Production - Manure Handli | 2805035000 | 11.36 | 0.00 | 0.00 | 0.03111 | 0.00000 | 0.00000 |
| Swine Waste Emissions | 2805039200 | 2.47 | 0.00 | 0.00 | 0.00677 | 0.00000 | 0.00000 |
| Swine Production - Manure Handling and Stora | 2805039200 | 60.44 | 0.00 | 0.00 | 0.16559 | 0.00000 | 0.00000 |
| Poultry Production - Layers - Manure Handling | 2805008200 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Poultry Production - Broilers - Manure Handling | 2805009200 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL AREA SOURCES** | | **420.06** | **0.00** | **0.00** | **1.15** | **0.00** | **0.00** |

## Area Source Emissions - Karnes County, 2002

| KARNES COUNTY AREA SOURCES | SCC Code | VOC ton/year | NOx ton/year | CO ton/year | VOC ton/day M-F | NOx ton/day M-F | CO ton/day M-F |
|---|---|---|---|---|---|---|---|
| **Combustion (Heating & Cooking)** | | | | | | | |
| Fuel Oil-Industrial/Distillate | 2102004000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Industrial/Residual | 2102005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG-Industrial | 2102007000 | 0.00 | 0.06 | 0.02 | 0.00000 | 0.00017 | 0.00005 |
| Fuel Oil-Commercial/Distillate | 2103004000 | 0.00 | 0.10 | 0.03 | 0.00000 | 0.00028 | 0.00012 |
| Fuel Oil-Commercial/Residual | 2103005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Natural Gas-Commercial / Industrial | 2103006000 | 0.02 | 0.37 | 0.31 | 0.00001 | 0.00103 | 0.00037 |
| LPG-Commercial | 2103007000 | 0.00 | 0.06 | 0.01 | 0.00001 | 0.00017 | 0.00006 |
| Coal, Anthracite- Residential | 2104001000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Coal, Bituminous-Residential | 2104002000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Residential/Distillate | 2104004000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Residential/Residential | 2104005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Natural Gas-Residential | 2104006000 | 0.37 | 6.30 | 2.68 | 0.00008 | 0.01726 | 0.00384 |
| LPG-Residential | 2104007000 | 0.06 | 2.16 | 0.30 | 0.00005 | 0.00593 | 0.00141 |
| Wood/Residental Fireplace | 2104008001 | 0.15 | 0.01 | 0.64 | 0.00002 | 0.00000 | 0.00008 |
| **Agricultural** | | | | | | | |
| Fertilizer: NO entered as NOx | 2325050000 | 0.00 | 93.40 | 0.00 | 0.00000 | 0.24296 | 0.00000 |
| Pesticide Application | 2461800000 | 242.04 | 0.00 | 0.00 | 1.00850 | 0.00000 | 0.00000 |
| Bakeries | 2302050000 | 0.57 | 0.00 | 0.00 | 0.00156 | 0.00000 | 0.00000 |
| Wineries | 2302070005 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Breweries | 2302070001 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Oil Production | 2310000000 | 78.43 | 24.79 | 20.82 | 0.21488 | 0.06790 | 0.05704 |
| Gas Production | 2310020000 | 143.77 | 232.67 | 139.60 | 0.39390 | 0.63744 | 0.38247 |
| HDDV Truck Idling | 2230070000 | 0.44 | 3.30 | 5.30 | 0.00170 | 0.01263 | 0.02032 |
| **Gas Cans** | | | | | | | |
| Residential Gas Cans - Permeation | 2501000120 | 1.08 | 0.00 | 0.00 | 0.00297 | 0.00000 | 0.00000 |
| Residential Gas Cans - Diurnal | 2501000120 | 12.49 | 0.00 | 0.00 | 0.03423 | 0.00000 | 0.00000 |
| Residential Gas Cans - Transport Spillage | 2501000120 | 0.63 | 0.00 | 0.00 | 0.00174 | 0.00000 | 0.00000 |
| Commericial Gas Cans - Permeation | 2501000120 | 0.00 | 0.00 | 0.00 | 0.00001 | 0.00000 | 0.00000 |
| Commercial Gas Cans - Diurnal | 2501000120 | 0.05 | 0.00 | 0.00 | 0.00012 | 0.00000 | 0.00000 |
| Commercial Gas Cans - Transport Spillage | 2501000120 | 0.08 | 0.00 | 0.00 | 0.00023 | 0.00000 | 0.00000 |
| **Aboveground Storage Tanks** | | | | | | | |
| Gasoline | 2501000120 | 74.11 | 0.00 | 0.00 | 0.20305 | 0.00000 | 0.00000 |
| Jet Kerosene | 2501000180 | 0.01 | 0.00 | 0.00 | 0.00002 | 0.00000 | 0.00000 |
| Jet Naptha | 2501000150 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Distillate Fuel Oil | 2501000090 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **Underground Storage Tanks** | | | | | | | |
| Gasoline | 8908951100 | 5.05 | 0.00 | 0.00 | 0.01382 | 0.00000 | 0.00000 |
| Jet Kerosene | 8908951100 | 0.01 | 0.00 | 0.00 | 0.00002 | 0.00000 | 0.00000 |
| Used Oil | 8908951100 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| New Oil | 8908951100 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Jet Naptha | 8908951100 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Distillate Fuel Oil | 8908951100 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Leaking Underground Tanks | 2660000000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **Coating (Painting) Operations** | | | | | | | |
| Flat Paints | 2401001001 | 5.44 | 0.00 | 0.00 | 0.01573 | 0.00000 | 0.00000 |
| Nonflat Paints - Low and Medium Gloss | 2401001005 | 4.38 | 0.00 | 0.00 | 0.01267 | 0.00000 | 0.00000 |
| Nonflat Paints - High Gloss | 2401001006 | 0.83 | 0.00 | 0.00 | 0.00240 | 0.00000 | 0.00000 |
| Primers, Sealers, and Undercoaters | 2401001010 | 5.43 | 0.00 | 0.00 | 0.01570 | 0.00000 | 0.00000 |
| Quick Dry - Primers, Sealers, and Undercoaters | 2401001011 | 1.88 | 0.00 | 0.00 | 0.00545 | 0.00000 | 0.00000 |
| Stains - Semitransparent | 2401001015 | 3.01 | 0.00 | 0.00 | 0.00869 | 0.00000 | 0.00000 |
| Quick Dry - Enamels | 2401001020 | 0.75 | 0.00 | 0.00 | 0.00218 | 0.00000 | 0.00000 |
| Lacquers - Clear | 2401001025 | 0.91 | 0.00 | 0.00 | 0.00262 | 0.00000 | 0.00000 |
| All Other Architectural Categories | 2401001050 | 9.78 | 0.00 | 0.00 | 0.02829 | 0.00000 | 0.00000 |

## Area Source Emissions - Karnes County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Thinning & Clean-up of Solvent-Based Arch Co | 2401001060 | 2.62 | 0.00 | 0.00 | 0.00759 | 0.00000 | 0.00000 |
| Auto Refinishing | 2401005000 | 0.99 | 0.00 | 0.00 | 0.00422 | 0.00000 | 0.00000 |
| Traffic Markings | 2401008000 | 0.01 | 0.00 | 0.00 | 0.00004 | 0.00000 | 0.00000 |
| Factory Finished Wood | 2401015000 | 0.02 | 0.00 | 0.00 | 0.00006 | 0.00000 | 0.00000 |
| Wood Furniture | 2401020000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Metal Furniture | 2401025000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Paper, Foil, And Film | 2401030000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Metal Cans | 2401040000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Sheet, Strip, and Coil | 2401045000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Machinery and Equipment | 2401055000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Appliances | 2401060000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Electronic and Other Electrical | 2401065000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Motor Vehicles | 2401070000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Aircraft | 2401075000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Marine | 2401080000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Railroad | 2401085000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Miscellaneous Manufacturing | 2401090000 | 1.77 | 0.00 | 0.00 | 0.00679 | 0.00000 | 0.00000 |
| | | | | | | | |
| Surface Cleaning Cold Cleaning - General | 2415300000 | 7.28 | 0.00 | 0.00 | 0.02334 | 0.00000 | 0.00000 |
| | | | | | | | |
| Dry Cleaning - General | 2420000000 | 6.30 | 0.00 | 0.00 | 0.02019 | 0.00000 | 0.00000 |
| | | | | | | | |
| Graphic Arts | 2425000000 | 10.24 | 0.00 | 0.00 | 0.03928 | 0.00000 | 0.00000 |
| | | | | | | | |
| Cutback Asphalt | 2461021000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Emulsified Asphalt | 2461022000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Asphalt Roofing | 2461023000 | 0.02 | 0.00 | 0.00 | 0.00006 | 0.00000 | 0.00000 |
| | | | | | | | |
| **Consumer/Commercial Solvent Use** | | | | | | | |
| Personal Care Solvents | 2465100000 | 9.62 | 0.00 | 0.00 | 0.02637 | 0.00000 | 0.00000 |
| Household Solvents | 2465200000 | 6.38 | 0.00 | 0.00 | 0.01747 | 0.00000 | 0.00000 |
| Automotive Solvents | 2465400000 | 4.12 | 0.00 | 0.00 | 0.01128 | 0.00000 | 0.00000 |
| Adhesives Application: Industrial | 2440020000 | 1.62 | 0.00 | 0.00 | 0.00445 | 0.00000 | 0.00000 |
| FIFRA Solvents | 2460890000 | 2.96 | 0.00 | 0.00 | 0.00810 | 0.00000 | 0.00000 |
| Coating Solvents | 2460520000 | 10.84 | 0.00 | 0.00 | 0.02970 | 0.00000 | 0.00000 |
| Misc.Solvents | 2460900000 | 3.48 | 0.00 | 0.00 | 0.00953 | 0.00000 | 0.00000 |
| | | | | | | | |
| **Service Stations** | | | | | | | |
| Service Stations - Tank Truck Unloading | 2501060053 | 22.71 | 0.00 | 0.00 | 0.07280 | 0.00000 | 0.00000 |
| Service Stations - Vehicle Refueling | 2501060100 | 23.91 | 0.00 | 0.00 | 0.06550 | 0.00000 | 0.00000 |
| Service Stations - Tank Breathing Loss | 2501060201 | 4.14 | 0.00 | 0.00 | 0.01135 | 0.00000 | 0.00000 |
| Service Stations - Tank Trucks in Transit | 2505030120 | 0.31 | 0.00 | 0.00 | 0.00100 | 0.00000 | 0.00000 |
| | | | | | | | |
| **Waste Disposal** | | | | | | | |
| Municipal Waste Landfills | 2620000000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Municipal Wastewater Treatment | 2630000000 | 5.95 | 0.00 | 0.00 | 0.01504 | 0.00000 | 0.00000 |
| | | | | | | | |
| **Fires** | | | | | | | |
| Structure Fires | 2810030000 | 0.08 | 0.01 | 0.45 | 0.00023 | 0.00003 | 0.00123 |
| Open Burning | 2810015000 | 116.15 | 9.60 | 135.94 | 0.37490 | 0.02629 | 0.37245 |
| Vehicle | 2810050000 | 0.01 | 0.01 | 0.17 | 0.00004 | 0.00000 | 0.00047 |
| | | | | | | | |
| Catastrophic/Accidental Releases | 2830000000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Explosive Detonation | 2311000030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Autobody Incineration | 2601000000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL AREA SOURCES** | | **833.31** | **372.83** | **306.27** | **2.71999** | **1.01209** | **0.83990** |

| KARNES COUNTY AREA SOURCES | SCC Code | HAP ton/year | NOx ton/year | CO ton/year | HAP ton/day M-F | NOx ton/day M-F | CO ton/day M-F |
|---|---|---|---|---|---|---|---|
| **Livestock and Poultry** | | | | | | | |
| Cattle and Calves Waste Emissions - Milk Cow | 2805020001 | 223.41 | 0.00 | 0.00 | 0.61209 | 0.00000 | 0.00000 |
| Dairy Cattle Production - Manure Handling and | 2805022200 | 188.89 | 0.00 | 0.00 | 0.51750 | 0.00000 | 0.00000 |
| Cattle and Calves Waste Emissions - Beef Cow | 2805020002 | 2,216.66 | 0.00 | 0.00 | 6.07303 | 0.00000 | 0.00000 |
| Beef Cattle Production - Manure Handling and | 2805001200 | 61.37 | 0.00 | 0.00 | 0.16814 | 0.00000 | 0.00000 |

## Area Source Emissions - Karnes County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cattle and Calves Waste Emissions - Steers, S | 2805020004 | 202.86 | 0.00 | 0.00 | 0.55579 | 0.00000 | 0.00000 |
| Cattle and Calves Production - Steers, Steer Ca | 2805020004 | 90.70 | 0.00 | 0.00 | 0.24849 | 0.00000 | 0.00000 |
| Sheep and Lambs Waste Emissions | 2805040000 | 3.27 | 0.00 | 0.00 | 0.00897 | 0.00000 | 0.00000 |
| Sheep and Lambs Production - Manure Handlin | 2805040000 | 1.08 | 0.00 | 0.00 | 0.00297 | 0.00000 | 0.00000 |
| Goats Waste Emissions - Goats | 2805045003 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Goats Production - Goats - Manure Handling an | 2805045003 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Horses and Ponies Waste Emissions | 2805035000 | 19.27 | 0.00 | 0.00 | 0.05278 | 0.00000 | 0.00000 |
| Horses and Ponies Production - Manure Handli | 2805035000 | 3.23 | 0.00 | 0.00 | 0.00886 | 0.00000 | 0.00000 |
| Swine Waste Emissions | 2805039200 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Swine Production - Manure Handling and Stora | 2805039200 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Poultry Production - Layers - Manure Handling | 2805008200 | 0.17 | 0.00 | 0.00 | 0.00048 | 0.00000 | 0.00000 |
| Poultry Production - Broilers - Manure Handling | 2805009200 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL AREA SOURCES** | | **3,010.92** | **0.00** | **0.00** | **8.25** | **0.00** | **0.00** |

## Area Source Emissions - Kendall County, 2002

| KENDALL COUNTY AREA SOURCES | SCC Code | VOC ton/year | NOx ton/year | CO ton/year | VOC ton/day M-F | NOx ton/day M-F | CO ton/day M-F |
|---|---|---|---|---|---|---|---|
| **Combustion (Heating & Cooking)** | | | | | | | |
| Fuel Oil-Industrial/Distillate | 2102004000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Industrial/Residual | 2102005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG-Industrial | 2102007000 | 0.00 | 0.24 | 0.06 | 0.00001 | 0.00065 | 0.00019 |
| Fuel Oil-Commercial/Distillate | 2103004000 | 0.00 | 0.24 | 0.06 | 0.00001 | 0.00065 | 0.00026 |
| Fuel Oil-Commercial/Residual | 2103005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Natural Gas-Commercial / Industrial | 2103006000 | 0.05 | 0.86 | 0.00 | 0.00003 | 0.00235 | 0.00086 |
| LPG-Commercial | 2103007000 | 0.01 | 0.25 | 0.05 | 0.00003 | 0.00069 | 0.00023 |
| Coal, Anthracite- Residential | 2104001000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Coal, Bituminous-Residential | 2104002000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Residential/Distillate | 2104004000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Residential/Residential | 2104005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Natural Gas-Residential | 2104006000 | 0.77 | 13.14 | 5.59 | 0.00018 | 0.03601 | 0.00802 |
| LPG-Residential | 2104007000 | 0.12 | 4.51 | 0.63 | 0.00010 | 0.01237 | 0.00294 |
| Wood/Residental Fireplace | 2104008001 | 0.31 | 0.02 | 1.33 | 0.00004 | 0.00000 | 0.00017 |
| **Agricultural** | | | | | | | |
| Fertilizer: NO entered as NOx | 2325050000 | 0.00 | 20.86 | 0.00 | 0.00000 | 0.04924 | 0.00000 |
| Pesticide Application | 2461800000 | 0.10 | 0.00 | 0.00 | 0.00043 | 0.00000 | 0.00000 |
| Bakeries | 2302050000 | 5.15 | 0.00 | 0.00 | 0.01410 | 0.00000 | 0.00000 |
| Wineries | 2302070005 | 0.01 | 0.00 | 0.00 | 0.00003 | 0.00000 | 0.00000 |
| Breweries | 2302070001 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Oil Production | 2310000000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Gas Production | 2310020000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| HDDV Truck Idling | 2230070000 | 0.52 | 3.90 | 6.28 | 0.00201 | 0.01495 | 0.02404 |
| **Gas Cans** | | | | | | | |
| Residential Gas Cans - Permeation | 8908951100 | 2.26 | 0.00 | 0.00 | 0.00619 | 0.00000 | 0.00000 |
| Residential Gas Cans - Diurnal | 8908951100 | 26.07 | 0.00 | 0.00 | 0.07142 | 0.00000 | 0.00000 |
| Residential Gas Cans - Transport Spillage | 8908951100 | 1.32 | 0.00 | 0.00 | 0.00362 | 0.00000 | 0.00000 |
| Commericial Gas Cans - Permeation | 8908951100 | 0.04 | 0.00 | 0.00 | 0.00012 | 0.00000 | 0.00000 |
| Commercial Gas Cans - Diurnal | 8908951100 | 0.50 | 0.00 | 0.00 | 0.00137 | 0.00000 | 0.00000 |
| Commercial Gas Cans - Transport Spillage | 8908951100 | 0.92 | 0.00 | 0.00 | 0.00251 | 0.00000 | 0.00000 |
| **Aboveground Storage Tanks** | | | | | | | |
| Gasoline | 2501000120 | 37.96 | 0.00 | 0.00 | 0.10399 | 0.00000 | 0.00000 |
| Jet Kerosene | 2501000180 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Jet Naptha | 2501000150 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Distillate Fuel Oil | 2501000090 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **Underground Storage Tanks** | | | | | | | |
| Gasoline | 2501010120 | 0.16 | 0.00 | 0.00 | 0.00044 | 0.00000 | 0.00000 |
| Jet Kerosene | 2501010180 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Used Oil | 2501010060 | 1.69 | 0.00 | 0.00 | 0.00464 | 0.00000 | 0.00000 |
| New Oil | 2501010030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Jet Naptha | 2501010150 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Distillate Fuel Oil | 2501010090 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Leaking Underground Tanks | 2660000000 | 2.98 | 0.00 | 0.00 | 0.00817 | 0.00000 | 0.00000 |
| **Coating (Painting) Operations** | | | | | | | |
| Flat Paints | 2401001001 | 9.02 | 0.00 | 0.00 | 0.02609 | 0.00000 | 0.00000 |
| Nonflat Paints - Low and Medium Gloss | 2401001005 | 7.26 | 0.00 | 0.00 | 0.02101 | 0.00000 | 0.00000 |
| Nonflat Paints - High Gloss | 2401001006 | 1.38 | 0.00 | 0.00 | 0.00399 | 0.00000 | 0.00000 |
| Primers, Sealers, and Undercoaters | 2401001010 | 9.00 | 0.00 | 0.00 | 0.02605 | 0.00000 | 0.00000 |
| Quick Dry - Primers, Sealers, and Undercoaters | 2401001011 | 3.12 | 0.00 | 0.00 | 0.00904 | 0.00000 | 0.00000 |
| Stains - Semitransparent | 2401001015 | 4.98 | 0.00 | 0.00 | 0.01442 | 0.00000 | 0.00000 |
| Quick Dry - Enamels | 2401001020 | 1.25 | 0.00 | 0.00 | 0.00362 | 0.00000 | 0.00000 |
| Lacquers - Clear | 2401001025 | 1.50 | 0.00 | 0.00 | 0.00435 | 0.00000 | 0.00000 |
| All Other Architectural Categories | 2401001050 | 16.22 | 0.00 | 0.00 | 0.04694 | 0.00000 | 0.00000 |

## Area Source Emissions - Kendall County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Thinning & Clean-up of Solvent-Based Arch Co | 2401001060 | 4.35 | 0.00 | 0.00 | 0.01260 | 0.00000 | 0.00000 |
| Auto Refinishing | 2401005000 | 17.01 | 0.00 | 0.00 | 0.07292 | 0.00000 | 0.00000 |
| Traffic Markings | 2401008000 | 0.01 | 0.00 | 0.00 | 0.00003 | 0.00000 | 0.00000 |
| Factory Finished Wood | 2401015000 | 0.76 | 0.00 | 0.00 | 0.00292 | 0.00000 | 0.00000 |
| Wood Furniture | 2401020000 | 3.37 | 0.00 | 0.00 | 0.01297 | 0.00000 | 0.00000 |
| Metal Furniture | 2401025000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Paper, Foil, And Film | 2401030000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Metal Cans | 2401040000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Sheet, Strip, and Coil | 2401045000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Machinery and Equipment | 2401055000 | 2.04 | 0.00 | 0.00 | 0.00784 | 0.00000 | 0.00000 |
| Appliances | 2401060000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Electronic and Other Electrical | 2401065000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Motor Vehicles | 2401070000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Aircraft | 2401075000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Marine | 2401080000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Railroad | 2401085000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Miscellaneous Manufacturing | 2401090000 | 6.53 | 0.00 | 0.00 | 0.02511 | 0.00000 | 0.00000 |
| | | | | | | | |
| Surface Cleaning Cold Cleaning - General | 2415300000 | 67.24 | 0.00 | 0.00 | 0.21551 | 0.00000 | 0.00000 |
| | | | | | | | |
| Dry Cleaning - General | 2420000000 | 36.00 | 0.00 | 0.00 | 0.11538 | 0.00000 | 0.00000 |
| | | | | | | | |
| Graphic Arts | 2425000000 | 16.99 | 0.00 | 0.00 | 0.06517 | 0.00000 | 0.00000 |
| | | | | | | | |
| Cutback Asphalt | 2461021000 | 268.00 | 0.00 | 0.00 | 1.25235 | 0.00000 | 0.00000 |
| Emulsified Asphalt | 2461022000 | 832.18 | 0.00 | 0.00 | 4.49261 | 0.00000 | 0.00000 |
| Asphalt Roofing | 2461023000 | 0.72 | 0.00 | 0.00 | 0.00282 | 0.00000 | 0.00000 |
| | | | | | | | |
| **Consumer/Commercial Solvent Use** | | | | | | | |
| Personal Care Solvents | 2465100000 | 17.25 | 0.00 | 0.00 | 0.04725 | 0.00000 | 0.00000 |
| Household Solvents | 2465200000 | 11.43 | 0.00 | 0.00 | 0.03131 | 0.00000 | 0.00000 |
| Automotive Solvents | 2465400000 | 7.38 | 0.00 | 0.00 | 0.02021 | 0.00000 | 0.00000 |
| Adhesives Application: Industrial | 2440020000 | 2.91 | 0.00 | 0.00 | 0.00797 | 0.00000 | 0.00000 |
| FIFRA Solvents | 2460890000 | 5.30 | 0.00 | 0.00 | 0.01452 | 0.00000 | 0.00000 |
| Coating Solvents | 2460520000 | 19.43 | 0.00 | 0.00 | 0.05323 | 0.00000 | 0.00000 |
| Misc.Solvents | 2460900000 | 6.23 | 0.00 | 0.00 | 0.01708 | 0.00000 | 0.00000 |
| | | | | | | | |
| **Service Stations** | | | | | | | |
| Service Stations - Tank Truck Unloading | 2501060053 | 41.85 | 0.00 | 0.00 | 0.13413 | 0.00000 | 0.00000 |
| Service Stations - Vehicle Refueling | 2501060100 | 39.66 | 0.00 | 0.00 | 0.10866 | 0.00000 | 0.00000 |
| Service Stations - Tank Breathing Loss | 2501060201 | 6.87 | 0.00 | 0.00 | 0.01883 | 0.00000 | 0.00000 |
| Service Stations - Tank Trucks in Transit | 2505030120 | 0.52 | 0.00 | 0.00 | 0.00165 | 0.00000 | 0.00000 |
| | | | | | | | |
| **Waste Disposal** | | | | | | | |
| Municipal Waste Landfills | 2620000000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Municipal Wastewater Treatment | 2630000000 | 3.75 | 0.00 | 0.00 | 0.01082 | 0.00000 | 0.00000 |
| | | | | | | | |
| **Fires** | | | | | | | |
| Structure Fires | 2810030000 | 0.16 | 0.02 | 0.90 | 0.00045 | 0.00006 | 0.00246 |
| Open Burning | 2810015000 | 192.68 | 15.92 | 225.51 | 0.62189 | 0.04361 | 0.61782 |
| Vehicle | 2810050000 | 0.03 | 0.01 | 0.33 | 0.00007 | 0.00000 | 0.00090 |
| | | | | | | | |
| Catastrophic/Accidental Releases | 2830000000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Explosive Detonation | 2311000030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Autobody Incineration | 2601000000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL AREA SOURCES** | | **1,745.34** | **59.97** | **240.73** | **7.74122** | **0.16059** | **0.65790** |

| **KENDALL COUNTY** **AREA SOURCES** | SCC Code | HAP ton/year | NOx ton/year | CO ton/year | HAP ton/day M-F | NOx ton/day M-F | CO ton/day M-F |
|---|---|---|---|---|---|---|---|
| **Livestock and Poultry** | | | | | | | |
| Cattle and Calves Waste Emissions - Milk Cow | 2805020001 | 62.83 | 0.00 | 0.00 | 0.17215 | 0.00000 | 0.00000 |
| Dairy Cattle Production - Manure Handling and | 2805022200 | 53.13 | 0.00 | 0.00 | 0.14555 | 0.00000 | 0.00000 |
| Cattle and Calves Waste Emissions - Beef Cow | 2805020002 | 623.43 | 0.00 | 0.00 | 1.70804 | 0.00000 | 0.00000 |
| Beef Cattle Production - Manure Handling and | 2805001200 | 17.26 | 0.00 | 0.00 | 0.04729 | 0.00000 | 0.00000 |

## Area Source Emissions - Kendall County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cattle and Calves Waste Emissions - Steers, S | 2805020004 | 57.06 | 0.00 | 0.00 | 0.15632 | 0.00000 | 0.00000 |
| Cattle and Calves Production - Steers, Steer Ca | 2805020004 | 25.51 | 0.00 | 0.00 | 0.06989 | 0.00000 | 0.00000 |
| Sheep and Lambs Waste Emissions | 2805040000 | 118.65 | 0.00 | 0.00 | 0.32507 | 0.00000 | 0.00000 |
| Sheep and Lambs Production - Manure Handlin | 2805040000 | 39.24 | 0.00 | 0.00 | 0.10752 | 0.00000 | 0.00000 |
| Goats Waste Emissions - Goats | 2805045003 | 33.37 | 0.00 | 0.00 | 0.09142 | 0.00000 | 0.00000 |
| Goats Production - Goats - Manure Handling ar | 2805045003 | 1.87 | 0.00 | 0.00 | 0.00513 | 0.00000 | 0.00000 |
| Horses and Ponies Waste Emissions | 2805035000 | 31.24 | 0.00 | 0.00 | 0.08560 | 0.00000 | 0.00000 |
| Horses and Ponies Production - Manure Handli | 2805035000 | 5.24 | 0.00 | 0.00 | 0.01436 | 0.00000 | 0.00000 |
| Swine Waste Emissions | 2805039200 | 1.26 | 0.00 | 0.00 | 0.00345 | 0.00000 | 0.00000 |
| Swine Production - Manure Handling and Stora | 2805039200 | 30.49 | 0.00 | 0.00 | 0.08354 | 0.00000 | 0.00000 |
| Poultry Production - Layers - Manure Handling | 2805008200 | 0.26 | 0.00 | 0.00 | 0.00072 | 0.00000 | 0.00000 |
| Poultry Production - Broilers - Manure Handling | 2805009200 | 0.03 | 0.00 | 0.00 | 0.00007 | 0.00000 | 0.00000 |
| **TOTAL AREA SOURCES** | | **1,100.88** | **0.00** | **0.00** | **3.02** | **0.00** | **0.00** |

## Area Source Emissions - Kerr County, 2002

| KERR COUNTY AREA SOURCES | SCC Code | VOC ton/year | NOx ton/year | CO ton/year | VOC ton/day M-F | NOx ton/day M-F | CO ton/day M-F |
|---|---|---|---|---|---|---|---|
| **Combustion (Heating & Cooking)** | | | | | | | |
| Fuel Oil-Industrial/Distillate | 2102004000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Industrial/Residual | 2102005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG-Industrial | 2102007000 | 0.01 | 0.38 | 0.10 | 0.00001 | 0.00105 | 0.00031 |
| Fuel Oil-Commercial/Distillate | 2103004000 | 0.01 | 0.51 | 0.13 | 0.00002 | 0.00140 | 0.00057 |
| Fuel Oil-Commercial/Residual | 2103005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Natural Gas-Commercial / Industrial | 2103006000 | 0.10 | 1.86 | 1.56 | 0.00006 | 0.00510 | 0.00186 |
| LPG-Commercial | 2103007000 | 0.02 | 0.40 | 0.08 | 0.00004 | 0.00108 | 0.00036 |
| Coal, Anthracite- Residential | 2104001000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Coal, Bituminous-Residential | 2104002000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Residential/Distillate | 2104004000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Residential/Residential | 2104005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Natural Gas-Residential | 2104006000 | 1.48 | 25.33 | 10.78 | 0.00034 | 0.06939 | 0.01545 |
| LPG-Residential | 2104007000 | 0.23 | 8.70 | 1.22 | 0.00019 | 0.02383 | 0.00567 |
| Wood/Residental Fireplace | 2104008001 | 0.59 | 0.03 | 2.56 | 0.00008 | 0.00000 | 0.00033 |
| **Agricultural** | | | | | | | |
| Fertilizer: NO entered as NOx | 2325050000 | 0.00 | 19.94 | 0.00 | 0.00000 | 0.04660 | 0.00000 |
| Pesticide Application | 2461800000 | 0.15 | 0.00 | 0.00 | 0.00061 | 0.00000 | 0.00000 |
| Bakeries | 2302050000 | 3.01 | 0.00 | 0.00 | 0.00825 | 0.00000 | 0.00000 |
| Wineries | 2302070005 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Breweries | 2302070001 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Oil Production | 2310000000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Gas Production | 2310020000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| HDDV Truck Idling | 2230070000 | 0.68 | 5.06 | 8.14 | 0.00261 | 0.01939 | 0.03119 |
| **Gas Cans** | | | | | | | |
| Residential Gas Cans - Permeation | 8908951100 | 4.36 | 0.00 | 0.00 | 0.01193 | 0.00000 | 0.00000 |
| Residential Gas Cans - Diurnal | 8908951100 | 50.23 | 0.00 | 0.00 | 0.13761 | 0.00000 | 0.00000 |
| Residential Gas Cans - Transport Spillage | 8908951100 | 2.55 | 0.00 | 0.00 | 0.00698 | 0.00000 | 0.00000 |
| Commericial Gas Cans - Permeation | 8908951100 | 0.07 | 0.00 | 0.00 | 0.00020 | 0.00000 | 0.00000 |
| Commercial Gas Cans - Diurnal | 8908951100 | 0.82 | 0.00 | 0.00 | 0.00225 | 0.00000 | 0.00000 |
| Commercial Gas Cans - Transport Spillage | 8908951100 | 1.50 | 0.00 | 0.00 | 0.00411 | 0.00000 | 0.00000 |
| **Aboveground Storage Tanks** | | | | | | | |
| Gasoline | 2501000120 | 56.53 | 0.00 | 0.00 | 0.15488 | 0.00000 | 0.00000 |
| Jet Kerosene | 2501000180 | 0.01 | 0.00 | 0.00 | 0.00003 | 0.00000 | 0.00000 |
| Jet Naptha | 2501000150 | 1.26 | 0.00 | 0.00 | 0.00344 | 0.00000 | 0.00000 |
| Distillate Fuel Oil | 2501000090 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **Underground Storage Tanks** | | | | | | | |
| Gasoline | 2501010120 | 9.53 | 0.00 | 0.00 | 0.02611 | 0.00000 | 0.00000 |
| Jet Kerosene | 2501010180 | 0.01 | 0.00 | 0.00 | 0.00002 | 0.00000 | 0.00000 |
| Used Oil | 2501010060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| New Oil | 2501010030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Jet Naptha | 2501010150 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Distillate Fuel Oil | 2501010090 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Leaking Underground Tanks | 2660000000 | 1.70 | 0.00 | 0.00 | 0.00467 | 0.00000 | 0.00000 |
| **Coating (Painting) Operations** | | | | | | | |
| Flat Paints | 2401001001 | 15.45 | 0.00 | 0.00 | 0.04469 | 0.00000 | 0.00000 |
| Nonflat Paints - Low and Medium Gloss | 2401001005 | 12.44 | 0.00 | 0.00 | 0.03600 | 0.00000 | 0.00000 |
| Nonflat Paints - High Gloss | 2401001006 | 2.36 | 0.00 | 0.00 | 0.00683 | 0.00000 | 0.00000 |
| Primers, Sealers, and Undercoaters | 2401001010 | 15.42 | 0.00 | 0.00 | 0.04461 | 0.00000 | 0.00000 |
| Quick Dry - Primers, Sealers, and Undercoaters | 2401001011 | 5.35 | 0.00 | 0.00 | 0.01548 | 0.00000 | 0.00000 |
| Stains - Semitransparent | 2401001015 | 8.54 | 0.00 | 0.00 | 0.02470 | 0.00000 | 0.00000 |
| Quick Dry - Enamels | 2401001020 | 2.14 | 0.00 | 0.00 | 0.00619 | 0.00000 | 0.00000 |
| Lacquers - Clear | 2401001025 | 2.57 | 0.00 | 0.00 | 0.00745 | 0.00000 | 0.00000 |
| All Other Architectural Categories | 2401001050 | 27.79 | 0.00 | 0.00 | 0.08040 | 0.00000 | 0.00000 |

## Area Source Emissions - Kerr County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Thinning & Clean-up of Solvent-Based Arch Co | 2401001060 | 7.46 | 0.00 | 0.00 | 0.02158 | 0.00000 | 0.00000 |
| Auto Refinishing | 2401005000 | 9.88 | 0.00 | 0.00 | 0.04235 | 0.00000 | 0.00000 |
| Traffic Markings | 2401008000 | 0.01 | 0.00 | 0.00 | 0.00004 | 0.00000 | 0.00000 |
| Factory Finished Wood | 2401015000 | 1.76 | 0.00 | 0.00 | 0.00677 | 0.00000 | 0.00000 |
| Wood Furniture | 2401020000 | 4.05 | 0.00 | 0.00 | 0.01557 | 0.00000 | 0.00000 |
| Metal Furniture | 2401025000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Paper, Foil, And Film | 2401030000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Metal Cans | 2401040000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Sheet, Strip, and Coil | 2401045000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Machinery and Equipment | 2401055000 | 0.06 | 0.00 | 0.00 | 0.00021 | 0.00000 | 0.00000 |
| Appliances | 2401060000 | 0.16 | 0.00 | 0.00 | 0.00062 | 0.00000 | 0.00000 |
| Electronic and Other Electrical | 2401065000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Motor Vehicles | 2401070000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Aircraft | 2401075000 | 7.51 | 0.00 | 0.00 | 0.02889 | 0.00000 | 0.00000 |
| Marine | 2401080000 | 0.29 | 0.00 | 0.00 | 0.00111 | 0.00000 | 0.00000 |
| Railroad | 2401085000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Miscellaneous Manufacturing | 2401090000 | 6.41 | 0.00 | 0.00 | 0.02465 | 0.00000 | 0.00000 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Surface Cleaning Cold Cleaning - General | 2415300000 | 52.85 | 0.00 | 0.00 | 0.16940 | 0.00000 | 0.00000 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dry Cleaning - General | 2420000000 | 86.40 | 0.00 | 0.00 | 0.27692 | 0.00000 | 0.00000 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Graphic Arts | 2425000000 | 29.10 | 0.00 | 0.00 | 0.11162 | 0.00000 | 0.00000 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cutback Asphalt | 2461021000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Emulsified Asphalt | 2461022000 | 22.29 | 0.00 | 0.00 | 0.10418 | 0.00000 | 0.00000 |
| Asphalt Roofing | 2461023000 | 0.17 | 0.00 | 0.00 | 0.00067 | 0.00000 | 0.00000 |

**Consumer/Commercial Solvent Use**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Personal Care Solvents | 2465100000 | 30.24 | 0.00 | 0.00 | 0.08284 | 0.00000 | 0.00000 |
| Household Solvents | 2465200000 | 20.04 | 0.00 | 0.00 | 0.05490 | 0.00000 | 0.00000 |
| Automotive Solvents | 2465400000 | 12.93 | 0.00 | 0.00 | 0.03543 | 0.00000 | 0.00000 |
| Adhesives Application: Industrial | 2440020000 | 5.10 | 0.00 | 0.00 | 0.01397 | 0.00000 | 0.00000 |
| FIFRA Solvents | 2460890000 | 9.29 | 0.00 | 0.00 | 0.02545 | 0.00000 | 0.00000 |
| Coating Solvents | 2460520000 | 34.06 | 0.00 | 0.00 | 0.09332 | 0.00000 | 0.00000 |
| Misc.Solvents | 2460900000 | 10.93 | 0.00 | 0.00 | 0.02994 | 0.00000 | 0.00000 |

**Service Stations**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Service Stations - Tank Truck Unloading | 2501060053 | 65.55 | 0.00 | 0.00 | 0.21011 | 0.00000 | 0.00000 |
| Service Stations - Vehicle Refueling | 2501060100 | 67.94 | 0.00 | 0.00 | 0.18612 | 0.00000 | 0.00000 |
| Service Stations - Tank Breathing Loss | 2501060201 | 11.77 | 0.00 | 0.00 | 0.03226 | 0.00000 | 0.00000 |
| Service Stations - Tank Trucks in Transit | 2505030120 | 0.88 | 0.00 | 0.00 | 0.00283 | 0.00000 | 0.00000 |

**Waste Disposal**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Municipal Waste Landfills | 2620000000 | 2.77 | 0.00 | 0.00 | 0.00758 | 0.00000 | 0.00000 |
| Municipal Wastewater Treatment | 2630000000 | 6.10 | 0.00 | 0.00 | 0.01692 | 0.00000 | 0.00000 |

**Fires**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Structure Fires | 2810030000 | 0.22 | 0.03 | 1.17 | 0.00059 | 0.00007 | 0.00321 |
| Open Burning | 2810001000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Vehicle | 2810050000 | 0.03 | 0.01 | 0.39 | 0.00009 | 0.00000 | 0.00107 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Catastrophic/Accidental Releases | 2830000000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Explosive Detonation | 2311000030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Autobody Incineration | 2601000000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL AREA SOURCES** | | **733.17** | **62.25** | **26.12** | **2.2277** | **0.1679** | **0.0600** |

| KERR COUNTY AREA SOURCES | SCC Code | HAP ton/year | NOx ton/year | CO ton/year | VOC ton/day M-F | NOx ton/day M-F | CO ton/day M-F |
|---|---|---|---|---|---|---|---|
| **Livestock and Poultry** | | | | | | | |
| Cattle and Calves Waste Emissions - Milk Cow | 2805020001 | 66.33 | 0.00 | 0.00 | 0.18171 | 0.00000 | 0.00000 |
| Dairy Cattle Production - Manure Handling and | 2805022200 | 56.08 | 0.00 | 0.00 | 0.15363 | 0.00000 | 0.00000 |
| Cattle and Calves Waste Emissions - Beef Cow | 2805020002 | 658.07 | 0.00 | 0.00 | 1.80293 | 0.00000 | 0.00000 |
| Beef Cattle Production - Manure Handling and | 2805001200 | 18.22 | 0.00 | 0.00 | 0.04992 | 0.00000 | 0.00000 |

## Area Source Emissions - Kerr County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cattle and Calves Waste Emissions - Steers, S | 2805020004 | 60.23 | 0.00 | 0.00 | 0.16500 | 0.00000 | 0.00000 |
| Cattle and Calves Production - Steers, Steer Ca | 2805020004 | 26.93 | 0.00 | 0.00 | 0.07377 | 0.00000 | 0.00000 |
| Sheep and Lambs Waste Emissions | 2805040000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Sheep and Lambs Production - Manure Handlir | 2805040000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Goats Waste Emissions - Goats | 2805045003 | 12.06 | 0.00 | 0.00 | 0.03303 | 0.00000 | 0.00000 |
| Goats Production - Goats - Manure Handling ar | 2805045003 | 0.68 | 0.00 | 0.00 | 0.00185 | 0.00000 | 0.00000 |
| Horses and Ponies Waste Emissions | 2805035000 | 33.13 | 0.00 | 0.00 | 0.09075 | 0.00000 | 0.00000 |
| Horses and Ponies Production - Manure Handli | 2805035000 | 6.61 | 0.00 | 0.00 | 0.01811 | 0.00000 | 0.00000 |
| Swine Waste Emissions | 2805039200 | 1.07 | 0.00 | 0.00 | 0.00292 | 0.00000 | 0.00000 |
| Swine Production - Manure Handling and Stora | 2805039200 | 24.84 | 0.00 | 0.00 | 0.06805 | 0.00000 | 0.00000 |
| Poultry Production - Layers - Manure Handling | 2805008200 | 0.33 | 0.00 | 0.00 | 0.00090 | 0.00000 | 0.00000 |
| Poultry Production - Broilers - Manure Handling | 2805009200 | 0.00 | 0.00 | 0.00 | 0.00001 | 0.00000 | 0.00000 |
| **TOTAL AREA SOURCES** | | **964.55** | **0.00** | **0.00** | **2.64** | **0.00** | **0.00** |

## Area Source Emissions - Medina County

| MEDINA COUNTY AREA SOURCES | SCC Code | VOC ton/year | NOx ton/year | CO ton/year | VOC ton/day M-F | NOx ton/day M-F | CO ton/day M-F |
|---|---|---|---|---|---|---|---|
| **Combustion (Heating & Cooking)** | | | | | | | |
| Fuel Oil-Industrial/Distillate | 2102004000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Industrial/Residual | 2102005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG-Industrial | 2102007000 | 0.00 | 0.16 | 0.04 | 0.00000 | 0.00044 | 0.00013 |
| Fuel Oil-Commercial/Distillate | 2103004000 | 0.00 | 0.22 | 0.05 | 0.00001 | 0.00060 | 0.00025 |
| Fuel Oil-Commercial/Residual | 2103005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Natural Gas-Commercial / Industrial | 2103006000 | 0.04 | 0.80 | 0.67 | 0.00002 | 0.00218 | 0.00080 |
| LPG-Commercial | 2103007000 | 0.01 | 0.16 | 0.03 | 0.00002 | 0.00044 | 0.00015 |
| Coal, Anthracite- Residential | 2104001000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Coal, Bituminous-Residential | 2104002000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Residential/Distillate | 2104004000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Residential/Residential | 2104005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Natural Gas-Residential | 2104006000 | 1.08 | 18.52 | 7.88 | 0.00025 | 0.05075 | 0.01130 |
| LPG-Residential | 2104007000 | 0.17 | 6.36 | 0.89 | 0.00014 | 0.01743 | 0.00415 |
| Wood/Residental Fireplace | 2104008001 | 0.43 | 0.02 | 1.87 | 0.00006 | 0.00000 | 0.00024 |
| **Agricultural** | | | | | | | |
| Fertilizer: NO entered as NOx | 2325050000 | 0.00 | 42.20 | 0.00 | 0.00000 | 0.16921 | 0.00000 |
| Pesticide Application | 2461800000 | 482.81 | 0.00 | 0.00 | 2.01172 | 0.00000 | 0.00000 |
| Bakeries | 2302050000 | 2.00 | 0.00 | 0.00 | 0.00549 | 0.00000 | 0.00000 |
| Wineries | 2302070005 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Breweries | 2302070001 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Oil Production | 2310000000 | 711.91 | 342.25 | 287.49 | 1.95045 | 0.93768 | 0.78765 |
| Gas Production | 2310020000 | 0.00 | 0.02 | 0.01 | 0.00001 | 0.00006 | 0.00004 |
| HDDV Truck Idling | 2230070000 | 0.67 | 4.97 | 7.99 | 0.00256 | 0.01903 | 0.03061 |
| **Gas Cans** | | | | | | | |
| Residential Gas Cans - Permeation | 8908951100 | 3.19 | 0.00 | 0.00 | 0.00873 | 0.00000 | 0.00000 |
| Residential Gas Cans - Diurnal | 8908951100 | 36.74 | 0.00 | 0.00 | 0.10065 | 0.00000 | 0.00000 |
| Residential Gas Cans - Transport Spillage | 8908951100 | 2.55 | 0.00 | 0.00 | 0.00511 | 0.00000 | 0.00000 |
| Commericial Gas Cans - Permeation | 8908951100 | 0.02 | 0.00 | 0.00 | 0.00004 | 0.00000 | 0.00000 |
| Commercial Gas Cans - Diurnal | 8908951100 | 0.18 | 0.00 | 0.00 | 0.00050 | 0.00000 | 0.00000 |
| Commercial Gas Cans - Transport Spillage | 8908951100 | 0.33 | 0.00 | 0.00 | 0.00091 | 0.00000 | 0.00000 |
| **Aboveground Storage Tanks** | | | | | | | |
| Gasoline | 2501000120 | 112.95 | 0.00 | 0.00 | 0.30944 | 0.00000 | 0.00000 |
| Jet Kerosene | 2501000180 | 0.07 | 0.00 | 0.00 | 0.00019 | 0.00000 | 0.00000 |
| Jet Naptha | 2501000150 | 2.52 | 0.00 | 0.00 | 0.00691 | 0.00000 | 0.00000 |
| Distillate Fuel Oil | 2501000090 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **Underground Storage Tanks** | | | | | | | |
| Gasoline | 2501010120 | 5.98 | 0.00 | 0.00 | 0.01638 | 0.00000 | 0.00000 |
| Jet Kerosene | 2501010180 | 0.02 | 0.00 | 0.00 | 0.00005 | 0.00000 | 0.00000 |
| Used Oil | 2501010060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| New Oil | 2501010030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Jet Naptha | 2501010150 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Distillate Fuel Oil | 2501010090 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Leaking Underground Tanks | 2660000000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **Coating (Painting) Operations** | | | | | | | |
| Flat Paints | 2401001001 | 14.07 | 0.00 | 0.00 | 0.04071 | 0.00000 | 0.00000 |
| Nonflat Paints - Low and Medium Gloss | 2401001005 | 11.33 | 0.00 | 0.00 | 0.03278 | 0.00000 | 0.00000 |
| Nonflat Paints - High Gloss | 2401001006 | 2.15 | 0.00 | 0.00 | 0.00622 | 0.00000 | 0.00000 |
| Primers, Sealers, and Undercoaters | 2401001010 | 14.05 | 0.00 | 0.00 | 0.04063 | 0.00000 | 0.00000 |
| Quick Dry - Primers, Sealers, and Undercoaters | 2401001011 | 4.87 | 0.00 | 0.00 | 0.01410 | 0.00000 | 0.00000 |
| Stains - Semitransparent | 2401001015 | 7.78 | 0.00 | 0.00 | 0.02250 | 0.00000 | 0.00000 |
| Quick Dry - Enamels | 2401001020 | 1.95 | 0.00 | 0.00 | 0.00564 | 0.00000 | 0.00000 |
| Lacquers - Clear | 2401001025 | 2.34 | 0.00 | 0.00 | 0.00678 | 0.00000 | 0.00000 |
| All Other Architectural Categories | 2401001050 | 25.31 | 0.00 | 0.00 | 0.07322 | 0.00000 | 0.00000 |

## Area Source Emissions - Medina County

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Thinning & Clean-up of Solvent-Based Arch Co | 2401001060 | 6.79 | 0.00 | 0.00 | 0.01965 | 0.00000 | 0.00000 |
| Auto Refinishing | 2401005000 | 3.75 | 0.00 | 0.00 | 0.01608 | 0.00000 | 0.00000 |
| Traffic Markings | 2401008000 | 0.02 | 0.00 | 0.00 | 0.00004 | 0.00000 | 0.00000 |
| Factory Finished Wood | 2401015000 | 0.33 | 0.00 | 0.00 | 0.00128 | 0.00000 | 0.00000 |
| Wood Furniture | 2401020000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Metal Furniture | 2401025000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Paper, Foil, And Film | 2401030000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Metal Cans | 2401040000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Sheet, Strip, and Coil | 2401045000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Machinery and Equipment | 2401055000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Appliances | 2401060000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Electronic and Other Electrical | 2401065000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Motor Vehicles | 2401070000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Aircraft | 2401075000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Marine | 2401080000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Railroad | 2401085000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Miscellaneous Manufacturing | 2401090000 | 4.60 | 0.00 | 0.00 | 0.01768 | 0.00000 | 0.00000 |
| | | | | | | | |
| Surface Cleaning Cold Cleaning - General | 2415300000 | 45.58 | 0.00 | 0.00 | 0.14608 | 0.00000 | 0.00000 |
| | | | | | | | |
| Dry Cleaning - General | 2420000000 | 18.00 | 0.00 | 0.00 | 0.05769 | 0.00000 | 0.00000 |
| | | | | | | | |
| Graphic Arts | 2425000000 | 26.51 | 0.00 | 0.00 | 0.10167 | 0.00000 | 0.00000 |
| | | | | | | | |
| Cutback Asphalt | 2461021000 | 595.06 | 0.00 | 0.00 | 1.77264 | 0.00000 | 0.00000 |
| Emulsified Asphalt | 2461022000 | 1.37 | 0.00 | 0.00 | 0.00639 | 0.00000 | 0.00000 |
| Asphalt Roofing | 2461023000 | 0.04 | 0.00 | 0.00 | 0.00016 | 0.00000 | 0.00000 |
| | | | | | | | |
| **Consumer/Commercial Solvent Use** | | | | | | | |
| Personal Care Solvents | 2465100000 | 22.71 | 0.00 | 0.00 | 0.06221 | 0.00000 | 0.00000 |
| Household Solvents | 2465200000 | 14.91 | 0.00 | 0.00 | 0.04122 | 0.00000 | 0.00000 |
| Automotive Solvents | 2465400000 | 9.62 | 0.00 | 0.00 | 0.02661 | 0.00000 | 0.00000 |
| Adhesives Application: Industrial | 2440020000 | 3.79 | 0.00 | 0.00 | 0.01049 | 0.00000 | 0.00000 |
| FIFRA Solvents | 2460890000 | 6.91 | 0.00 | 0.00 | 0.01911 | 0.00000 | 0.00000 |
| Coating Solvents | 2460520000 | 25.34 | 0.00 | 0.00 | 0.07008 | 0.00000 | 0.00000 |
| Misc.Solvents | 2460900000 | 8.13 | 0.00 | 0.00 | 0.02249 | 0.00000 | 0.00000 |
| | | | | | | | |
| **Service Stations** | | | | | | | |
| Service Stations - Tank Truck Unloading | 2501060053 | 58.12 | 0.00 | 0.00 | 0.18629 | 0.00000 | 0.00000 |
| Service Stations - Vehicle Refueling | 2501060100 | 61.88 | 0.00 | 0.00 | 0.16952 | 0.00000 | 0.00000 |
| Service Stations - Tank Breathing Loss | 2501060201 | 10.72 | 0.00 | 0.00 | 0.02938 | 0.00000 | 0.00000 |
| Service Stations - Tank Trucks in Transit | 2505030120 | 0.80 | 0.00 | 0.00 | 0.00258 | 0.00000 | 0.00000 |
| | | | | | | | |
| **Waste Disposal** | | | | | | | |
| Municipal Waste Landfills | 2620000000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Municipal Wastewater Treatment | 2630000000 | 14.74 | 0.00 | 0.00 | 0.04143 | 0.00000 | 0.00000 |
| | | | | | | | |
| **Fires** | | | | | | | |
| Structure Fires | 2810030000 | 0.28 | 0.04 | 1.52 | 0.00076 | 0.00010 | 0.00416 |
| Open Burning | 2810015000 | 300.60 | 24.83 | 351.81 | 0.97022 | 0.06804 | 0.96387 |
| Vehicle | 2810050000 | 0.05 | 0.02 | 0.61 | 0.00013 | 0.00000 | 0.00167 |
| | | | | | | | |
| Catastrophic/Accidental Releases | 2830000000 | 0.02 | 0.00 | 0.00 | 0.00006 | 0.00000 | 0.00000 |
| Explosive Detonation | 2311000030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Autobody Incineration | 2601000000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL AREA SOURCES** | | **2,688.20** | **440.57** | **660.87** | **8.4542** | **1.2660** | **1.8050** |
| | | | | | | | |
| **Livestock and Poultry** | | | | | | | |
| Cattle and Calves Waste Emissions - Milk Cow | 2805020001 | 205.96 | 0.00 | 0.00 | 0.56427 | 0.00000 | 0.00000 |
| Dairy Cattle Production - Manure Handling and | 2805022200 | 174.13 | 0.00 | 0.00 | 0.47707 | 0.00000 | 0.00000 |
| Cattle and Calves Waste Emissions - Beef Cow | 2805020002 | 2,043.48 | 0.00 | 0.00 | 5.59858 | 0.00000 | 0.00000 |
| Beef Cattle Production - Manure Handling and | 2805001200 | 56.58 | 0.00 | 0.00 | 0.15500 | 0.00000 | 0.00000 |
| Cattle and Calves Waste Emissions - Steers, S | 2805020004 | 187.01 | 0.00 | 0.00 | 0.51237 | 0.00000 | 0.00000 |
| Cattle and Calves Production - Steers, Steer Ca | 2805020004 | 83.61 | 0.00 | 0.00 | 0.22908 | 0.00000 | 0.00000 |
| Sheep and Lambs Waste Emissions | 2805040000 | 17.98 | 0.00 | 0.00 | 0.04926 | 0.00000 | 0.00000 |

## Area Source Emissions - Medina County

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Sheep and Lambs Production - Manure Handlir | 2805040000 | 5.95 | 0.00 | 0.00 | 0.01629 | 0.00000 | 0.00000 |
| Goats Waste Emissions - Goats | 2805045003 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Goats Production - Goats - Manure Handling ar | 2805045003 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Horses and Ponies Waste Emissions | 2805035000 | 34.37 | 0.00 | 0.00 | 0.09417 | 0.00000 | 0.00000 |
| Horses and Ponies Production - Manure Handli | 2805035000 | 5.77 | 0.00 | 0.00 | 0.01580 | 0.00000 | 0.00000 |
| Swine Waste Emissions | 2805039200 | 0.75 | 0.00 | 0.00 | 0.00205 | 0.00000 | 0.00000 |
| Swine Production - Manure Handling and Stora | 2805039200 | 15.57 | 0.00 | 0.00 | 0.04265 | 0.00000 | 0.00000 |
| Poultry Production - Layers - Manure Handling | 2805008200 | 0.93 | 0.00 | 0.00 | 0.00254 | 0.00000 | 0.00000 |
| Poultry Production - Broilers - Manure Handling | 2805009200 | 0.08 | 0.00 | 0.00 | 0.00021 | 0.00000 | 0.00000 |
| **TOTAL AREA SOURCES** | | **2,832.16** | **0.00** | **0.00** | **7.76** | **0.00** | **0.00** |

## Area Source Emissions - Wilson County, 2002

| WILSON COUNTY AREA SOURCES | SCC Code | VOC ton/year | NOx ton/year | CO ton/year | VOC ton/day M-F | NOx ton/day M-F | CO ton/day M-F |
|---|---|---|---|---|---|---|---|
| **Combustion (Heating & Cooking)** | | | | | | | |
| Fuel Oil-Industrial/Distillate | 2102004000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Industrial/Residual | 2102005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| LPG-Industrial | 2102007000 | 0.00 | 0.08 | 0.02 | 0.00000 | 0.00023 | 0.00007 |
| Fuel Oil-Commercial/Distillate | 2103004000 | 0.00 | 0.17 | 0.04 | 0.00001 | 0.00047 | 0.00019 |
| Fuel Oil-Commercial/Residual | 2103005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Natural Gas-Commercial / Industrial | 2103006000 | 0.03 | 0.62 | 0.52 | 0.00002 | 0.00171 | 0.00062 |
| LPG-Commercial | 2103007000 | 0.00 | 0.09 | 0.02 | 0.00001 | 0.00024 | 0.00008 |
| Coal, Anthracite- Residential | 2104001000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Coal, Bituminous-Residential | 2104002000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Residential/Distillate | 2104004000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Fuel Oil-Residential/Residential | 2104005000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Natural Gas-Residential | 2104006000 | 0.96 | 16.40 | 6.98 | 0.00022 | 0.04494 | 0.01000 |
| LPG-Residential | 2104007000 | 0.15 | 5.63 | 0.79 | 0.00012 | 0.01543 | 0.00367 |
| Wood/Residental Fireplace | 2104008001 | 0.38 | 0.02 | 1.66 | 0.00005 | 0.00000 | 0.00021 |
| **Agricultural** | | | | | | | |
| Fertilizer: NO entered as NOx | 2325050000 | 0.00 | 283.24 | 0.00 | 0.00000 | 1.05176 | 0.00000 |
| Pesticide Application | 2461800000 | 596.93 | 0.00 | 0.00 | 2.48719 | 0.00000 | 0.00000 |
| Bakeries | 2302050000 | 1.97 | 0.00 | 0.00 | 0.00540 | 0.00000 | 0.00000 |
| Wineries | 2302070005 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Breweries | 2302070001 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Oil Production | 2310000000 | 448.42 | 110.99 | 93.24 | 1.22854 | 0.30410 | 0.25544 |
| Gas Production | 2310020000 | 2.84 | 1.56 | 0.94 | 0.00779 | 0.00429 | 0.00257 |
| HDDV Truck Idling | 2230070000 | 0.67 | 4.97 | 7.99 | 0.00256 | 0.01903 | 0.03061 |
| **Gas Cans** | | | | | | | |
| Residential Gas Cans - Permeation | 8908951100 | 2.82 | 0.00 | 0.00 | 0.00773 | 0.00000 | 0.00000 |
| Residential Gas Cans - Diurnal | 8908951100 | 32.53 | 0.00 | 0.00 | 0.08913 | 0.00000 | 0.00000 |
| Residential Gas Cans - Transport Spillage | 8908951100 | 1.65 | 0.00 | 0.00 | 0.00452 | 0.00000 | 0.00000 |
| Commericial Gas Cans - Permeation | 8908951100 | 0.02 | 0.00 | 0.00 | 0.00004 | 0.00000 | 0.00000 |
| Commercial Gas Cans - Diurnal | 8908951100 | 0.18 | 0.00 | 0.00 | 0.00050 | 0.00000 | 0.00000 |
| Commercial Gas Cans - Transport Spillage | 8908951100 | 0.33 | 0.00 | 0.00 | 0.00091 | 0.00000 | 0.00000 |
| **Aboveground Storage Tanks** | | | | | | | |
| Gasoline | 2501000120 | 61.12 | 0.00 | 0.00 | 0.16746 | 0.00000 | 0.00000 |
| Jet Kerosene | 2501000180 | 0.00 | 0.00 | 0.00 | 0.00001 | 0.00000 | 0.00000 |
| Jet Naptha | 2501000150 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Distillate Fuel Oil | 2501000090 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **Underground Storage Tanks** | | | | | | | |
| Gasoline | 2501010120 | 7.21 | 0.00 | 0.00 | 0.01975 | 0.00000 | 0.00000 |
| Jet Kerosene | 2501010180 | 0.02 | 0.00 | 0.00 | 0.00005 | 0.00000 | 0.00000 |
| Used Oil | 2501010060 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| New Oil | 2501010030 | 1.13 | 0.00 | 0.00 | 0.00309 | 0.00000 | 0.00000 |
| Jet Naptha | 2501010150 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Distillate Fuel Oil | 2501010090 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Leaking Underground Tanks | 2660000000 | 2.56 | 0.00 | 0.00 | 0.00700 | 0.00000 | 0.00000 |
| **Coating (Painting) Operations** | | | | | | | |
| Flat Paints | 2401001001 | 11.99 | 0.00 | 0.00 | 0.03468 | 0.00000 | 0.00000 |
| Nonflat Paints - Low and Medium Gloss | 2401001005 | 9.65 | 0.00 | 0.00 | 0.02793 | 0.00000 | 0.00000 |
| Nonflat Paints - High Gloss | 2401001006 | 1.83 | 0.00 | 0.00 | 0.00530 | 0.00000 | 0.00000 |
| Primers, Sealers, and Undercoaters | 2401001010 | 11.97 | 0.00 | 0.00 | 0.03462 | 0.00000 | 0.00000 |
| Quick Dry - Primers, Sealers, and Undercoaters | 2401001011 | 4.15 | 0.00 | 0.00 | 0.01201 | 0.00000 | 0.00000 |
| Stains - Semitransparent | 2401001015 | 6.63 | 0.00 | 0.00 | 0.01917 | 0.00000 | 0.00000 |
| Quick Dry - Enamels | 2401001020 | 1.66 | 0.00 | 0.00 | 0.00481 | 0.00000 | 0.00000 |
| Lacquers - Clear | 2401001025 | 2.00 | 0.00 | 0.00 | 0.00578 | 0.00000 | 0.00000 |
| All Other Architectural Categories | 2401001050 | 21.56 | 0.00 | 0.00 | 0.06239 | 0.00000 | 0.00000 |

## Area Source Emissions - Wilson County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Thinning & Clean-up of Solvent-Based Arch Co | 2401001060 | 5.79 | 0.00 | 0.00 | 0.01674 | 0.00000 | 0.00000 |
| Auto Refinishing | 2401005000 | 4.44 | 0.00 | 0.00 | 0.01905 | 0.00000 | 0.00000 |
| Traffic Markings | 2401008000 | 0.02 | 0.00 | 0.00 | 0.00004 | 0.00000 | 0.00000 |
| Factory Finished Wood | 2401015000 | 0.29 | 0.00 | 0.00 | 0.00111 | 0.00000 | 0.00000 |
| Wood Furniture | 2401020000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Metal Furniture | 2401025000 | 0.58 | 0.00 | 0.00 | 0.00222 | 0.00000 | 0.00000 |
| Paper, Foil, And Film | 2401030000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Metal Cans | 2401040000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Sheet, Strip, and Coil | 2401045000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Machinery and Equipment | 2401055000 | 0.75 | 0.00 | 0.00 | 0.00290 | 0.00000 | 0.00000 |
| Appliances | 2401060000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Electronic and Other Electrical | 2401065000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Motor Vehicles | 2401070000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Aircraft | 2401075000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Marine | 2401080000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Railroad | 2401085000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Miscellaneous Manufacturing | 2401090000 | 2.34 | 0.00 | 0.00 | 0.00898 | 0.00000 | 0.00000 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Surface Cleaning Cold Cleaning - General | 2415300000 | 20.45 | 0.00 | 0.00 | 0.06553 | 0.00000 | 0.00000 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dry Cleaning - General | 2420000000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Graphic Arts | 2425000000 | 22.58 | 0.00 | 0.00 | 0.08662 | 0.00000 | 0.00000 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cutback Asphalt | 2461021000 | 12.62 | 0.00 | 0.00 | 0.05898 | 0.00000 | 0.00000 |
| Emulsified Asphalt | 2461022000 | 22.77 | 0.00 | 0.00 | 0.06253 | 0.00000 | 0.00000 |
| Asphalt Roofing | 2461023000 | 0.07 | 0.00 | 0.00 | 0.00029 | 0.00000 | 0.00000 |

**Consumer/Commercial Solvent Use**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Personal Care Solvents | 2465100000 | 22.50 | 0.00 | 0.00 | 0.06164 | 0.00000 | 0.00000 |
| Household Solvents | 2465200000 | 14.91 | 0.00 | 0.00 | 0.04084 | 0.00000 | 0.00000 |
| Automotive Solvents | 2465400000 | 9.62 | 0.00 | 0.00 | 0.02636 | 0.00000 | 0.00000 |
| Adhesives Application: Industrial | 2440020000 | 3.79 | 0.00 | 0.00 | 0.01040 | 0.00000 | 0.00000 |
| FIFRA Solvents | 2460890000 | 6.91 | 0.00 | 0.00 | 0.01894 | 0.00000 | 0.00000 |
| Coating Solvents | 2460520000 | 25.34 | 0.00 | 0.00 | 0.06943 | 0.00000 | 0.00000 |
| Misc.Solvents | 2460900000 | 8.13 | 0.00 | 0.00 | 0.02228 | 0.00000 | 0.00000 |

**Service Stations**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Service Stations - Tank Truck Unloading | 2501060053 | 24.03 | 0.00 | 0.00 | 0.07701 | 0.00000 | 0.00000 |
| Service Stations - Vehicle Refueling | 2501060100 | 52.72 | 0.00 | 0.00 | 0.14443 | 0.00000 | 0.00000 |
| Service Stations - Tank Breathing Loss | 2501060201 | 9.14 | 0.00 | 0.00 | 0.02503 | 0.00000 | 0.00000 |
| Service Stations - Tank Trucks in Transit | 2505030120 | 0.69 | 0.00 | 0.00 | 0.00220 | 0.00000 | 0.00000 |

**Waste Disposal**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Municipal Waste Landfills | 2620000000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Municipal Wastewater Treatment | 2630000000 | 1.07 | 0.00 | 0.00 | 0.00377 | 0.00000 | 0.00000 |

**Fires**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Structure Fires | 2810030000 | 0.04 | 0.01 | 0.24 | 0.00012 | 0.00002 | 0.00066 |
| Open Burning | 2810015000 | 256.10 | 21.16 | 299.74 | 0.82661 | 0.05797 | 0.82120 |
| Vehicle | 2810050000 | 0.01 | 0.00 | 0.11 | 0.00002 | 0.00000 | 0.00030 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Catastrophic/Accidental Releases | 2830000000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Explosive Detonation | 2311000030 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Autobody Incineration | 2601000000 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| **TOTAL AREA SOURCES** | | **1,761.07** | **444.96** | **412.28** | **5.8929** | **1.5002** | **1.1256** |

**Livestock and Poultry**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cattle and Calves Waste Emissions - Milk Cow | 2805020001 | 289.74 | 0.00 | 0.00 | 0.79380 | 0.00000 | 0.00000 |
| Dairy Cattle Production - Manure Handling and | 2805022200 | 244.97 | 0.00 | 0.00 | 0.67114 | 0.00000 | 0.00000 |
| Cattle and Calves Waste Emissions - Beef Cow | 2805020002 | 2,874.73 | 0.00 | 0.00 | 7.87596 | 0.00000 | 0.00000 |
| Beef Cattle Production - Manure Handling and | 2805001200 | 79.59 | 0.00 | 0.00 | 0.21806 | 0.00000 | 0.00000 |
| Cattle and Calves Waste Emissions - Steers, S | 2805020004 | 263.09 | 0.00 | 0.00 | 0.72079 | 0.00000 | 0.00000 |
| Cattle and Calves Production - Steers, Steer Ca | 2805020004 | 117.63 | 0.00 | 0.00 | 0.32226 | 0.00000 | 0.00000 |
| Sheep and Lambs Waste Emissions | 2805040000 | 6.54 | 0.00 | 0.00 | 0.01791 | 0.00000 | 0.00000 |

## Area Source Emissions - Wilson County, 2002

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Sheep and Lambs Production - Manure Handlir | 2805040000 | 2.16 | 0.00 | 0.00 | 0.00592 | 0.00000 | 0.00000 |
| Goats Waste Emissions - Goats | 2805045003 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Goats Production - Goats - Manure Handling ar | 2805045003 | 0.00 | 0.00 | 0.00 | 0.00000 | 0.00000 | 0.00000 |
| Horses and Ponies Waste Emissions | 2805035000 | 41.07 | 0.00 | 0.00 | 0.11251 | 0.00000 | 0.00000 |
| Horses and Ponies Production - Manure Handli | 2805035000 | 6.89 | 0.00 | 0.00 | 0.01888 | 0.00000 | 0.00000 |
| Swine Waste Emissions | 2805039200 | 2.22 | 0.00 | 0.00 | 0.00608 | 0.00000 | 0.00000 |
| Swine Production - Manure Handling and Stora | 2805039200 | 45.56 | 0.00 | 0.00 | 0.12482 | 0.00000 | 0.00000 |
| Poultry Production - Layers - Manure Handling | 2805008200 | 0.31 | 0.00 | 0.00 | 0.00085 | 0.00000 | 0.00000 |
| Poultry Production - Broilers - Manure Handling | 2805009200 | 0.09 | 0.00 | 0.00 | 0.00025 | 0.00000 | 0.00000 |
| **TOTAL AREA SOURCES** | | **3,974.57** | **0.00** | **0.00** | **10.89** | **0.00** | **0.00** |

## CHAPTER 5 – BIOGENIC EMISSIONS

### Introduction

Emissions from natural sources such as vegetation and microbial activity are categorized as biogenic sources. This pollution source is the only source that is entirely a non-anthropogenic related source. Some examples include trees and grasses, as well as emissions from activities of microbes in soil.

The 2002 AACOG region's biogenic emissions were estimated using the BEIS3.12 model. Also used in generating of the biogenic estimates, were the 2001 annual meteorology, the recently revised BEIS3.12 emission factors, and the BELD3 land use data that was aggregated to a 36-km grid system. The 2002 meteorological data was not available at the time that the biogenic emissions were developed. The MM5 model and the MCIP preprocessor to the CMAQ model were applied to compute the meteorology data. The BEIS3.12 model uses the following data from the MCIP's outputs: air temperature at 10 meters, surface pressure, solar radiation reaching the surface, convective precipitation, soil temperature in the top centimeter, volumetric soil moisture in the top centimeter, and soil texture type by USDA.[1] This method provided annual biogenic emissions.

The data provided by the TCEQ included annual, monthly and daily ozone season biogenic emissions. This data was presented in an Excel spreadsheet format[2]. From the annual emissions, monthly emissions were calculated which were then used to estimate average ozone season daily emissions. Daily emissions were determined by adding the monthly totals for June, July, and August and then dividing the total for three months by 92. This number represents the number of days in the three months. Table 5-1 details the annual and daily biogenic emissions for the AACOG region.

[1] Texas Commission on Environmental Quality. June 2004. "County and month specific biogenic emissions defaults for CERR submittal", Austin, Texas.
[2] Rubick, C., Texas Commission on Environmental Quality. Email: "Re: Request for Biogenic Emission Data." Received June 2, 2004.

Table 5-1. 2002 Annual and Daily Tonnage of Biogenic Emissions in AACOG Region

| County | Tons/Year | | | Tons/Day | | |
|---|---|---|---|---|---|---|
| | VOC | NOx | CO | VOC | NOx | CO |
| Atascosa | 14740.5 | 1572.8 | 4213.0 | 72.57 | 5.40 | 19.54 |
| Bandera | 14491.2 | 758.1 | 2734.8 | 80.97 | 2.71 | 13.70 |
| Bexar | 12356.0 | 1063.4 | 3229.3 | 63.60 | 3.74 | 15.43 |
| Comal | 7936.1 | 441.4 | 1979.6 | 42.04 | 1.59 | 9.75 |
| Frio | 17114.3 | 1616.2 | 4509.7 | 85.37 | 5.60 | 21.06 |
| Gillespie | 9014.7 | 951.0 | 2631.3 | 49.32 | 3.44 | 13.61 |
| Guadalupe | 7716.2 | 831.8 | 2255.2 | 38.83 | 2.98 | 10.65 |
| Karnes | 10449.9 | 1074.6 | 2753.8 | 51.52 | 3.72 | 12.56 |
| Kendall | 9137.7 | 616.0 | 2287.4 | 49.42 | 2.23 | 11.50 |
| Kerr | 11261.1 | 1033.5 | 3051.5 | 61.10 | 3.76 | 15.56 |
| Medina | 18302.1 | 1460.0 | 4452.9 | 95.32 | 5.13 | 21.41 |
| Wilson | 9744.8 | 1112.0 | 2766.7 | 48.36 | 3.89 | 12.86 |

## Chapter 6 - POINT SOURCE EMISSIONS

### Introduction

The point source inventory is comprised of stationary sources engaging in industrial or commercial activities. An industrial or commercial facility is considered a point source if it generates at least 100 tons per year of VOC, 100 tons per year of NOx or 100 tons per year of CO.

### Methodology

The point source inventory for the AACOG region was estimated with the assistance of the Texas Commission on Environmental Quality (TCEQ) and City Public Service (CPS) gas and electric utility company, which is owned by the City of San Antonio. TCEQ provided a list of point source emitters in each of the twelve counties within the AACOG region. This list is a section of the Point Sources Database (PSDB) maintained for the entire state of Texas. The list contains annual and daily emission estimates of VOC, NOx, and CO by county.

CPS provided emission estimates for its power plants within Bexar County.[1] These estimates were used to replace the data originally provided by the TCEQ. The figures were then aggregated for each pollutant to arrive at annual and daily tonnage of emissions.

Table 6-1. 2002 Annual and Daily Tonnage of Point Source Emissions in AACOG Region

| County | Tons/Year | | | Tons/Day | | |
|---|---|---|---|---|---|---|
| | VOC | NOx | CO | VOC | NOx | CO |
| Atascosa | 87.55 | 6961.48 | 1271.13 | 0.025 | 0.722 | 0.514 |
| Bandera | 13.86 | 1050.43 | 784.64 | 0.007 | 2.771 | 2.139 |
| Bexar | 1487.28 | 20216.35 | 4843.78 | 1.553 | 55.685 | 14.613 |
| Comal | 125.59 | 4169.39 | 2508.00 | 0.063 | 11.436 | 6.898 |
| Frio | 17.44 | 143.66 | 110.52 | 0.009 | 0.528 | 0.373 |
| Gillespie | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| Guadalupe | 243.25 | 1028.07 | 898.75 | 0.122 | 4.010 | 2.847 |
| Karnes | 98.89 | 314.97 | 140.10 | 0.157 | 0.070 | 0.423 |
| Kendall | 1.56 | 0.05 | 0.02 | 0.001 | 0.000 | 0.000 |
| Kerr | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| Medina | 0.00 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 |
| Wilson | 2.90 | 0.00 | 0.00 | 0.001 | 0.000 | 0.000 |
| Total | 2078.32 | 33884.40 | 10556.95 | 1.93769 | 75.22088 | 27.80762 |

[1] Levesque, Cynthia A. August 30, 2004. Email Communication, “2002 Ozone season - Average NOx tons per day from April 1 through Sept. 20, 2002”, City Public Service: San Antonio, Texas.

Point Sources within the AACOG Region

| ATASCOSA COUNTY | VOC | NOx | CO | VOC | NOx | CO |
|---|---|---|---|---|---|---|
| | ton/yr. | ton/yr. | ton/yr. | ton/day | ton/day | ton/day |
| EOG RESOURCES INC | 1.244 | 7.088 | 11.092 | 0.00062 | 0.02878 | 0.04447 |
| PUEBLO MIDSTREAM GAS CORP | 49.289 | 252.388 | 171.0364 | 0.02464 | 0.69339 | 0.46988 |
| SAN MIGUEL ELCTRC COOPERATIVE INC | 37.019 | 6702.000 | 1089.000 | 0.01851 | 20.62154 | 3.35077 |
| **TOTAL** | **87.552** | **6961.476** | **1271.129** | **0.02527** | **0.72217** | **0.51435** |

| BANDERA COUNTY | | | | | | |
|---|---|---|---|---|---|---|
| EPGT TEXAS PIPELINE CO, L.P. | 13.857 | 1050.432 | 784.643 | 0.00693 | 2.77050 | 2.13882 |
| **TOTAL** | **13.857** | **1050.432** | **784.643** | **0.00693** | **2.77050** | **2.13882** |

| BEXAR COUNTY | | | | | | |
|---|---|---|---|---|---|---|
| AGE REFINING INC | 50.8746 | 13.7703 | 2.6016 | 0.0254 | 0.0376 | 0.0064 |
| ALAMO CEMENT CO LTD | 33.1096 | 2,514.6450 | 1,112.8000 | 0.0166 | 6.8894 | 3.0488 |
| ALCOA INC | 49.0879 | 101.7982 | 60.8376 | 0.0245 | 0.2789 | 0.1667 |
| BESSER-APPCO FABRICATION | 23.8800 | 0.0000 | 0.0000 | 0.0119 | 0.0000 | 0.0000 |
| BFI WASTE SYSTEMS OF NORTH AMERICA | 13.5860 | 9.9730 | 33.2440 | 0.0068 | 0.0273 | 0.0911 |
| BIO ENERGY (AUSTIN) LLC | 2.9220 | 10.5360 | 35.1720 | 0.0015 | 0.0000 | 0.0000 |
| CAPITOL AGGREGATES LTD | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| CAPITOL CEMENT DIV CAPITOL AGGREGATE | 135.5989 | 2,153.5397 | 648.0374 | 0.0678 | 5.9001 | 1.7754 |
| CARDELL CABINETS INC | 142.2100 | 2.4200 | 2.4200 | 0.0711 | 0.0066 | 0.0066 |
| CITGO PETROLEUM CORP | 59.3788 | 0.0000 | 0.0000 | 0.0297 | 0.0000 | 0.0000 |
| CITY PUBLIC SERVICE - SOMMERS DEELY SPR | 159.0301 | 13,585.4022 | 2,020.4900 | 0.4381 | 37.2203 | 6.4204 |
| CITY PUBLIC SERVICE - V H BRAUNIG | 16.3291 | 830.6980 | 121.1000 | 0.4381 | 2.2759 | 0.5490 |
| CITY PUBLIC SERVICE - W B TUTTLE | 1.0408 | 0.0000 | 26.0100 | 0.0450 | 0.0000 | 0.2315 |
| CITY PUBLIC SERVICE BOARD - LEON CREEK | 0.0000 | 0.0000 | 0.0000 | 0.0029 | 0.0000 | 0.0000 |
| CITY PUBLIC SERVICE BOARD - MISSION | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| COLONIAL CAKE CO | 53.6945 | 3.2673 | 2.7948 | 0.0000 | 0.0128 | 0.0108 |
| COLUMBIA INDUSTRIES INC | 6.4097 | 0.6570 | 0.0134 | 0.0032 | 0.0018 | 0.0004 |
| DEE HOWARD AIRCRAFT MAINTENANCE LP | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| EARTH GRAINS BAKING CO | 31.2537 | 1.3279 | 1.1153 | 0.0156 | 0.0045 | 0.0038 |
| EL PASO HYDROCARBONS | 17.8062 | 155.4649 | 17.7431 | 0.0089 | 0.4312 | 0.0525 |
| EXXONMOBIL CORPORATION 6 | 28.7461 | 0.1679 | 0.4197 | 0.0144 | 0.0005 | 0.0011 |
| KO STEEL FOUNDRY AND MACHINE CO | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| MARTIN MARIETTA MATERIALS | 46.6919 | 18.8200 | 66.3900 | 0.0233 | 0.0607 | 0.2229 |
| MOTIVA ENTERPRISES, L.L.C. | 40.4595 | 4.5427 | 10.3347 | 0.0202 | 0.0119 | 0.0271 |
| PERKINELMER AUTOMOTIVE RESEARCH INC | 22.2666 | 24.2571 | 131.0361 | 0.0111 | 0.0665 | 0.3590 |
| RANDOLPH AIR FORCE BASE | 52.8448 | 11.4410 | 24.6336 | 0.0264 | 0.0314 | 0.0675 |
| SAN ANTONIO WATER SYSTEM | 0.4400 | 7.4800 | 6.5500 | 0.0002 | 0.0144 | 0.0121 |
| SAS SHOEMAKERS, INC. | 10.5502 | 0.0000 | 0.0000 | 0.0053 | 0.0000 | 0.0000 |
| SONY SEMICONDUCTOR CO OF AMERICA | 10.6796 | 6.6743 | 7.8535 | 0.0053 | 0.0055 | 0.0043 |
| SOUTHWEST RESEARCH INSTITUTE | 58.5900 | 255.8800 | 172.1910 | 0.0293 | 0.7010 | 0.4718 |
| THE BOEING COMPANY | 38.3950 | 1.7687 | 1.3400 | 0.0192 | 0.0074 | 0.0043 |
| US AIR FORCE | 46.2037 | 356.0581 | 172.3990 | 0.0231 | 1.2747 | 0.6251 |
| US ARMY FORT SAM HOUSTON | 6.4637 | 29.3451 | 20.3249 | 0.0032 | 0.0432 | 0.0243 |
| USAA | 3.5144 | 63.2716 | 52.2587 | 0.0018 | 0.1733 | 0.1432 |
| USNR DBA FRIEDRICH AIR CONDITIONING | 18.2988 | 0.0294 | 0.0269 | 0.0091 | 0.0001 | 0.0001 |
| VALERO LOGISTICS OPERATION LP | 73.1861 | 1.1124 | 6.0530 | 0.0366 | 0.0023 | 0.0123 |
| VALERO MARKETING & SUPPLY CO | 40.1633 | 3.7242 | 5.6958 | 0.0201 | 0.0102 | 0.0156 |
| VERTIS INCORPORATED | 29.7200 | 5.4920 | 3.8080 | 0.0149 | 0.0115 | 0.0104 |
| WASTE MANAGEMENT OF TEXAS, INC. | 43.0890 | 9.0100 | 63.1900 | 0.0215 | 0.0250 | 0.1782 |
| WIN-SAM INC | 5.0374 | 33.1357 | 14.3573 | 0.0025 | 0.1589 | 0.0709 |
| ZEE MANUFACTURING CO | 8.1338 | 0.6140 | 0.5157 | 0.0041 | 0.0000 | 0.0000 |
| ZEE MANUFACTURING LTD | 107.5971 | 0.0285 | 0.0219 | 0.0538 | 0.0000 | 0.0000 |
| **TOTAL** | **1487.28290** | **20216.35223** | **4843.77900** | **1.55264** | **55.68495** | **14.61326** |

Point Sources within the AACOG Region

**COMAL COUNTY**

| | | | | | | |
|---|---|---|---|---|---|---|
| SUNBELT ASPHALT AND MATERIALS, INC. | 0.0192 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| TXI OPERATIONS, L.P. | 59.4169 | 1,319.8381 | 709.9924 | 0.0297 | 3.6160 | 1.9452 |
| CHEMICAL LIME | 2.2610 | 581.1000 | 248.9400 | 0.0011 | 1.6047 | 0.7090 |
| CEMEX CEMENT OF TEXAS, LP | 43.4300 | 2,268.4500 | 1,549.0700 | 0.0217 | 6.2150 | 4.2440 |
| NEW BRAUNFELS GENERAL STORE INTL | 20.4615 | 0.0000 | 0.0000 | 0.0102 | 0.0000 | 0.0000 |
| FLEXTRONICS ENCLOSURES, INC. | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| **TOTAL** | **125.589** | **4169.388** | **2508.002** | **0.063** | **11.436** | **6.898** |

**FRIO COUNTY**

| | | | | | | |
|---|---|---|---|---|---|---|
| J L DAVIS | 15.687 | 54.347 | 83.724 | 0.00784 | 0.16177 | 0.24911 |
| MEDINA ELECTRIC COOPERATIVE INC | 1.754 | 89.317 | 26.795 | 0.00088 | 0.36589 | 0.12426 |
| **TOTAL** | **17.441** | **143.664** | **110.519** | **0.00872** | **0.52766** | **0.37337** |

**GILLESPIE COUNTY**

| | | | | | | |
|---|---|---|---|---|---|---|
| | n/a | n/a | n/a | n/a | n/a | n/a |
| **TOTAL** | **0.000** | **0.000** | **0.000** | **0.000** | **0.000** | **0.000** |

**GUADALUPE COUNTY**

| | | | | | | |
|---|---|---|---|---|---|---|
| ACME BRICK COMPANY | 5.600 | 16.660 | 75.160 | 0.00280 | 0.04564 | 0.20592 |
| DUKE ENERGY FIELD SERVICES, L.P. | 15.630 | 40.940 | 14.040 | 0.00782 | 0.11216 | 0.03846 |
| GUADALUPE POWER PARTNERS LP | 4.103 | 570.500 | 33.884 | 0.00205 | 1.92231 | 0.11417 |
| MOTOROLA, INCORPORATED | 0.000 | 0.000 | 0.000 | 0.00000 | 0.00000 | 0.00000 |
| RIO NOGALES POWER PROJECT L P | 1.510 | 133.010 | 9.330 | 0.00076 | 1.18513 | 0.31403 |
| STANDARD GYPSUM LLC | 44.820 | 61.200 | 49.550 | 0.02241 | 0.16636 | 0.13464 |
| STRUCTURAL METALS INC | 119.188 | 205.759 | 716.790 | 0.05959 | 0.57837 | 2.03937 |
| XERXES CORPORATION | 52.400 | 0.000 | 0.000 | 0.02620 | 0.00000 | 0.00000 |
| **TOTAL** | **243.251** | **1028.069** | **898.754** | **0.122** | **4.010** | **2.847** |

**KARNES COUNTY**

| | | | | | | |
|---|---|---|---|---|---|---|
| DUKE ENERGY FIELD SERVICES | 29.1450 | 71.9080 | 13.5805 | 0.0360 | 0.0068 | 0.0000 |
| EPGT TEXAS PIPELINE LP | 22.9680 | 210.9800 | 120.8300 | 0.1055 | 0.0604 | 0.4075 |
| GULF ENERGY GATHERING AND PROCESSING | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| INDUSTRIAL PIPE & PLASTICS | 1.7043 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| INDUSTRIAL PIPE AND PLASTICS | 5.3700 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| PERSON-PANNA MARIA LLC | 10.0111 | 32.0800 | 5.6900 | 0.0160 | 0.0028 | 0.0156 |
| RED EWALD INC | 29.6900 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| **TOTAL** | **98.888** | **314.968** | **140.101** | **0.15748** | **0.07005** | **0.42310** |

**KENDALL COUNTY**

| | | | | | | |
|---|---|---|---|---|---|---|
| OASIS PIPELINE COMPANY TEXAS LP | 1.560 | 0.050 | 0.020 | 0.00078 | 0.00000 | 0.00000 |
| **TOTAL** | **1.560** | **0.050** | **0.020** | **0.00078** | **0.00000** | **0.00000** |

**KERR COUNTY**

| | | | | | | |
|---|---|---|---|---|---|---|
| | n/a | n/a | n/a | n/a | n/a | n/a |
| **TOTAL** | **0.000** | **0.000** | **0.000** | **0.000** | **0.000** | **0.000** |

**MEDINA COUNTY**

| | | | | | | |
|---|---|---|---|---|---|---|
| | n/a | n/a | n/a | n/a | n/a | n/a |

| | | | | | | |
|---|---|---|---|---|---|---|
| **TOTAL** | **0.000** | **0.000** | **0.000** | **0.000** | **0.000** | **0.000** |

**WILSON COUNTY**

| | | | | | | |
|---|---|---|---|---|---|---|
| PULLIN LEASE SERVICE INC | 2.900 | 0.000 | 0.000 | 0.00145 | 0.00000 | 0.00000 |
| **TOTAL** | **2.900** | **0.000** | **0.000** | **0.00145** | **0.00000** | **0.00000** |
| POINT SOURCES TOTAL | 1952.732 | 29715.011 | 8048.944 | 1.875 | 63.785 | 20.909 |

# CHAPTER 7 – ON-ROAD EMISSIONS

## Introduction

The vehicles, cars, trucks, buses, and motorcycles, traveling the regional roads and highways, generate on-road emissions. In the AACOG region, on-road sources contribute VOC, NOx, and CO anthropogenic emissions.

## Methodology

To estimate on-road emissions for the Alamo Area, the Texas Transportation Institute (TTI) used MOBILE6.2 to calculate emissions for the San Antonio Early Action Compact (EAC) area containing Bexar, Comal, Guadalupe, and Wilson counties. The other eight counties, Atascosa, Bandera, Frio, Gillespie, Karnes, Kendall, Kerr, and Medina, are included in the rural county report.

The following technical notes document the methods used in developing and estimating the on-road mobile source emissions, including ozone season weekday and annual estimates.

7.1 Technical Note: Transportation Air Quality Technical Support Interagency Contract with the Texas Commission on Environmental Quality – San Antonio EAC

7.2 Technical Note: Transportation Air Quality Technical Support Interagency Contract with the Texas Commission on Environmental Quality – Rural Counties

# 7.1 Technical Note: Transportation Air Quality Technical Support Interagency Contract with the Texas Commission on Environmental Quality – San Antonio EAC

# 7.2 Technical Note: Transportation Air Quality Technical Support Interagency Contract with the Texas Commission on Environmental Quality – Rural Counties

Texas Transportation Institute

# 2002 Three-Year Cycle Emissions Inventory Methodology for the San Antonio Early Action Compact Counties

TEXAS TRANSPORTATION INSTITUTE
THE TEXAS A&M UNIVERSITY SYSTEM
COLLEGE STATION, TEXAS

Sponsored by the
Texas Commission
On Environmental Quality
August 2003

# TECHNICAL NOTE

## Transportation Air Quality Technical Support Interagency Contract with Texas Commission on Environmental Quality

TO: Anusuya Iyer, Project Manager
Texas Commission on Environmental Quality

DATE: 22 August 2003

FROM: Dennis G. Perkinson, Ph.D.,
Martin E. Boardman, and
L. D. White
Texas Transportation Institute

TTI STUDY NO.: 402131-14

SUBJECT: 2002 Three-Year Cycle Emissions Inventory Methodology for the San Antonio Early Action Compact Counties
(Umbrella Contract 03-60200-07: Task 1) - **Final**

**INTRODUCTION**

This Technical Note is one of seven reports documenting the methodologies used to develop the Texas 2002 actual on-road mobile source emissions inventories (EIs) as required in the Consolidated Emissions Reporting Rule (CERR) task. According to the CERR, starting with 2002 and at three year intervals, states are to develop summer (or ozone season) weekday and annual on-road mobile source EIs for all counties, regardless of nonattainment status. Carbon monoxide (CO) season weekday EIs are also required for CO nonattainment counties.

The overall CERR task required development of county-level summer weekday and annual emissions estimates for 242 Texas counties (excludes the 12 Dallas/Fort Worth consolidated metropolitan statistical area counties). Separate analyses were performed and documented for: each of six air quality planning (AQP) areas (26 counties), and all of the remaining non-AQP area counties (216). The AQP areas are: Beaumont/Port Arthur (BPA), Houston/Galveston (HGA) and El Paso (ELP) ozone nonattainment areas; and Austin (AUS), San Antonio (SAN) and Northeast Texas (TLM) Early Action Compact (EAC) areas. Estimates for AQP areas include 18 travel demand model (TDM) link-based counties and eight Highway Performance Monitoring System (HPMS)-based counties.

This Technical Note documents the methods used to develop the SAN EAC area (Bexar, Comal, Guadalupe, and Wilson counties) on-road mobile source Three-Year Cycle (3YC) EI. Ozone season weekday and annual estimates are included for volatile organic compounds

(VOC), CO, oxides of nitrogen (NOx), ammonia ($NH_3$), sulfur dioxide ($SO_2$), particulate matter (PM) of 10 microns or less in diameter (PM-10) and PM-2.5. Summary results are included in EPA's National Emissions Inventory (NEI) version 3.0 (NIFv3.0) reporting format for use in the EPA's 2002 NEI.

Documented within are methods relating to calculating inventory elements including vehicle miles traveled (VMT) estimates, seasonal weekday adjustments and HPMS consistency adjustments to travel demand model (TDM) VMT, speeds, VMT mix, MOBILE6 emissions factors, emissions annualization ratios and weekday and annual emissions estimates.

**ACKNOWLEDGMENTS**
Peter Ogbeide, with the Texas Commission on Environmental Quality (TCEQ), and Martin Boardman and L. D. White, both of the Texas Transportation Institute (TTI) contributed to the development of the MOBILE6.2 emissions rate set-ups used. White performed the emissions rates and emissions analyses. Dennis Perkinson, Ph.D., of TTI, developed seasonal adjustments for VMT, VMT time-of-day allocation factors and VMT mix. The Texas Department of Transportation (TxDOT) provided the TDM datasets and the 2002 HPMS data report (Road Inventory Functional Classification Record report). White modeled VMT, speeds and emissions for the TDM-based counties, and Boardman performed the modeling for the counties without TDM networks. All TTI staff involved contributed to the quality assurance of the emissions inventory data. Dr. Perkinson was the principle investigator for this project. This work was performed by TTI under contract to TCEQ. Anusuya Iyer was the TCEQ project technical manager.

**Deliverables**
Interim deliverables are an informal Technical Note (a narrative in memorandum format that explains the task, the approaches used, and the findings) provided to the Project Manager in WordPerfect 6/7/8 format, and supported by electronic document files. All pertinent data are being submitted in specified electronic format. (There is no FORTRAN source code or executable files developed under this task.) CD-ROM is used to record the final data and supporting documentation. TTI is providing five copies of the final report. One of the copies is an unbound original suitable for copying. Electronic copies of all materials related to the task report to document results and conclusions (e.g., data, work files, text files, etc.), or developed as work products under this contract are provided as requested by the TCEQ staff.

The electronic data submittal (described in Appendix A) was previously delivered to TCEQ. The electronic data submittal includes the detailed emissions data summaries, emissions factors input and output files, annualization factors, climate and fuel parameter inputs and worksheets, and NIFv3.0 emissions files and descriptions.

## SUMMARY OF VMT AND EMISSIONS

For the SAN EAC counties, VOC, CO, NOx, $SO_2$, $NH_3$, PM-10 and PM-2.5 emissions estimates at the vehicle type and road type level (TDM functional classification level for Bexar County; HPMS system functional classification level for Comal, Guadalupe, and Wilson counties) were estimated for a typical ozone season weekday and for the year. The 2002 county-level summaries of VMT, average speeds, and emissions estimates for these periods are shown in Tables 1 and 2, respectively.

**Table 1**
**2002 Ozone Season Weekday San Antonio EAC Area On-Road Mobile Source 24-Hour VMT, Average Speed (MPH), and Emissions (pounds)**

| | County | | | |
|---|---|---|---|---|
| **Summary** | **Bexar** | **Comal** | **Guadalupe** | **Wilson** |
| **VMT** | 37,266,471 | 3,566,246 | 3,143,806 | 908,526 |
| **Speed** | 28.5 | 46.2 | 44.8 | 41.9 |
| **VOC** | 103,635.56 | 8,685.66 | 8,119.58 | 2,362.48 |
| **CO** | 1,298,111.64 | 131,539.10 | 119,628.82 | 32,366.27 |
| **NOx** | 205,907.19 | 21,983.98 | 19,531.09 | 3,878.03 |
| **$SO_2$** | 5,518.17 | 532.01 | 468.06 | 125.23 |
| **$NH_3$** | 7,609.19 | 726.80 | 640.03 | 187.29 |
| **PM-10** | 5,051.31 | 484.89 | 427.39 | 110.98 |
| **PM-2.5** | 3,612.48 | 346.75 | 305.63 | 77.37 |

**TABLE 2**
**2002 Ozone Season Weekday San Antonio EAC Area On-Road Mobile Source Annual VMT, Average Speed (mph), and Emissions (tons)**

| Summary | County | | | |
|---|---|---|---|---|
| | Bexar | Comal | Guadalupe | Wilson |
| **VMT** | 12,426,242,206 | 1,189,139,613 | 1,048,279,943 | 302,941,547 |
| **Speed** | 28.5 | 46.2 | 44.8 | 41.9 |
| **VOC** | 19,261.49 | 1,616.52 | 1,511.48 | 440.07 |
| **CO** | 262,903.33 | 26,708.84 | 24,293.19 | 6,580.43 |
| **NOx** | 36,951.55 | 3,910.07 | 3,480.44 | 710.44 |
| **SO2** | 973.82 | 93.86 | 82.59 | 22.22 |
| **NH3** | 1,268.62 | 121.17 | 106.71 | 31.23 |
| **PM-10** | 845.18 | 81.09 | 71.48 | 18.57 |
| **PM-2.5** | 605.29 | 58.06 | 51.18 | 12.97 |

## OVERVIEW OF METHODOLOGY

Developing the on-road mobile source emissions inventories for the SAN EAC area counties required two basic methods — one for the seasonal weekday emissions estimates, and an annual emissions estimation methodology.

To develop the ozone season weekday 2002 emissions estimates, a directional link-based, time-of-day methodology was applied. Emissions estimates were calculated at the roadway network link level (TDM network-based for Bexar County, and HPMS "virtual link"-based for Comal, Guadalupe, and Wilson counties) for each hour of the average peak ozone season (July through September) weekday (Monday through Friday).

The annual emissions estimates were developed based on the ozone season weekday emissions. For the SAN EAC region, a set of annualization ratios was developed and applied by county to ozone season weekday emissions. This annualization procedure consists of two components — VMT annualization and emissions rate annualization. In general, multiplying ozone season weekday emissions for each county by the appropriate annualization factor yielded the annual emissions results.

The MOBILE6 model (EPA, October 2002) was used to develop hourly (and daily) emissions factors by MOBILE6 road type (or drive cycle) and 28 vehicle types. The speed sensitive freeway and arterial drive cycle emissions factors were applied — freeway emissions factors to freeway functional classifications, and arterial emissions factors to non-freeway functional classifications (except for network links coded as ramp). The non-speed sensitive ramp emissions factors were applied to the TDM network ramp functional classification links.

Since a 2002 TDM does not exist for this area, the activity basis for the TDM counties was the TxDOT TDM network equilibrium traffic assignments and trip information for the 1999 network. The 2002 Average Annual Daily Traffic (AADT) HPMS VMT were used with this network to estimate the VMT and speeds for the 2002 analysis year. For the HPMS-based counties, the activity basis were the county 2002 historical HPMS VMT.

TxDOT Automatic Traffic Recorder (ATR)- data were used to create an summer weekday VMT factor and applied to the county base VMT estimates to produce the seasonally adjusted VMT estimates. ATR-based hourly travel fractions were also developed and used to allocate the VMT for each county by hour-of-day. Directional split factors were applied to allocate the hourly VMT by peak and off-peak direction. Based on the estimated hourly directional traffic volumes (and capacities and freeflow speeds), fleet-level, hourly, directional, average operational (congested) speeds were estimated. The link congested speed is estimated as the link freeflow speed reduced by the "delay" estimate, which is a function of the link's volume-to-capacity (v/c) ratio.

Vehicle classification count data were used with vehicle registration data and MOBILE6 default gasoline/diesel fractions to estimate 24-hour regional VMT mixes for apportioning fleetwide functional classification-specific VMT for three functional classification groups to the 28 U.S. Environmental Protection Agency (EPA) vehicle types. VMT and emissions factor annualization ratios were developed and applied to the 24-hour ozone season weekday emissions totals to produce the annual emissions estimates.

TTI previously developed a series of computer programs to calculate and summarize detailed on-road mobile source EIs. These computer programs were used to produce and/or apply the EI elements discussed above to calculate the emissions estimates for this analysis. Appendix B describes these applications. The applications summarize activity and emissions estimates for each county by facility type and vehicle type, at the hourly and 24-hour levels, convert summer weekday estimates to annual emissions estimates, and summarize the results for each period. The results are also produced to EPA's NIFv3.0 specifications.

**ESTIMATION OF VMT**

For each county, the main products of the VMT estimation process are estimates of seasonally adjusted, HPMS-consistent VMT by hour and direction for each link (i.e. of the TDM networks for Bexar County and the HPMS "virtual network" for Comal, Guadalupe, and Wilson counties).

Ozone season weekday adjustment factors and hourly travel factors were also developed and used to characterize the seasonal and day type travel on an hourly basis. The directional split factors were applied for estimating directional VMT (or traffic volumes) for modeling directional congested link speeds (discussed later). Annual VMT is also discussed in a later section.

**Data Sources**
There are four traffic data sources used for developing the required adjustment factors and VMT estimates. These are the TDM data sets, ATR counts, HPMS VMT estimates, and vehicle classification counts (used to estimate VMT mix). The TDMs are developed by TxDOT, and the other three data sets are collected by TxDOT on a formal and on-going basis as part of the larger HPMS data collection program. U.S. Census and Texas State Data Center (TSDC) county population statistics and projections were used in the HPMS VMT forecasts.

The latest San Antonio 1999 TDM network and trip matrix (a 2002 TDM was not available) were used for this analysis. The networks and trip matrix were initially in TRANPLAN format. Using a series of steps, these networks and trip matrices were converted to TRANSCAD and a user-equilibrium traffic assignment, with 24 iterations and 0.0001 convergence, was performed on each network. The zonal radii (assumed intrazonal trip length) was also calculated for each network from the TRANSCAD format. Because the estimated intrazonal trips are not assigned to the network, the intrazonal trips and zonal radii were needed to estimate the intrazonal VMT. The TDM VMT are modeled as annual non-summer weekday traffic (ANSWT, or average Monday through Thursday traffic excluding the months of June through August). The San Antonio TDM network links are categorized by up to 15 functional classifications, five area types, and three counties (Bexar, Comal, and Guadalupe). However, only one county (Bexar) is located entirely within the TDM area (i.e, Comal and Guadalupe counties do not play a role in the TDM VMT and speed estimation process).

HPMS VMT annual average daily traffic (AADT, or average Monday through Sunday, January through December traffic) estimates are based on traffic count data collected according to a statistical sampling procedure specified by the Federal Highway Administration (FHWA) designed to estimate VMT (as well as lane miles and centerline miles). A wide range of traffic data is collected under the HPMS program. HPMS VMT, centerline miles, and lane miles are applied in this analysis. The HPMS VMT is categorized by seven functional classifications and three area types.

ATR vehicle counts are collected by TxDOT at selected locations on a continuous basis throughout Texas. These counts are available by season, month, and weekday, as well as on an AADT basis. Since they are continuous, they are especially well-suited for making seasonal, day-of-week, and time-of-day comparisons (i.e., adjustment factors), even though there may be relatively few ATR data collection locations in any given area. The ATR counts may also may be aggregated within time periods (e.g., hours of day) and in the form of allocation factors, to distribute 24-hour VMT estimates, for example, to each hour of the day.

Vehicle classification counts are collected at representative locations throughout Texas on a regular but periodic basis. Roadway functional classification is included as part of the data collected. Vehicle classification counts were used to estimate the relative proportion of VMT to be assigned to each type of vehicle (VMT mix is described later in this report).

HPMS VMT estimates are available for all counties. ATR and vehicle classification (VMT mix) data are available for most but not all counties. Consequently, these last two data sources were aggregated for the SA/MSA to provide adequate data for this analysis.

**County-Level VMT Totals**

This section discusses the ozone season weekday adjustment factors, development of the VMT control total for the TDM-based county, and development of the VMT totals for the HPMS-based counties.

*Ozone Season Weekday Adjustment Factors*

Emissions estimates are required for a typical ozone season weekday. Since the evaluation year base-VMT estimates are in AADT form (HPMS-based), an ozone season weekday adjustment factor is needed to convert this VMT. To develop the ozone season weekday adjustment factor for this analysis, three years (1999 through 2001) of SA/MSA ATR data are aggregated. The ozone season weekday (average June through August, Monday through Friday) adjustment factor is 1.09464.

*Estimation of TDM-Based County VMT Total*

To develop the 2002 HPMS consistent TDM-based county VMT, the 1999 TDM, the estimated intrazonal VMT, and 2002 VMT control total is used.

Since TDMs do not assign intrazonal VMT to the network links, intrazonal VMT is estimated and assigned a link (i.e. A-node = B-node = zone centroid). The 24-hour TDM network data sets were processed to produce link estimates for total ANSWT VMT to include both the network and intrazonal VMT (which is assumed to be a part of the "local" road type VMT estimate). The intrazonal VMT is estimated as the product of the number of intrazonal trips, the average intrazonal travel time, and the average of the zone's coded centroid connector link speeds.

For the 2002 evaluation year the official historical 2002 HPMS AADT VMT estimate is available. To estimate the 2002 link VMT, county-level seasonal day type-adjusted HPMS VMT control totals were used. These control totals were disaggregated to the 1999 TDM network assignment links proportionally to the unadjusted model (and added intrazonal) VMT on each link. The Bexar county 2002 seasonal day-type control totals are calculated by multiplying the Bexar county HPMS AADT VMT total (Table 3) by the ozone season weekday adjustment factor. Since Comal and Guadalupe counties are only partially within the TDM area, this process is not applied to the TDM link VMT for those counties. The fully adjusted county-level evaluation year ozone season weekday VMT totals are summarized in Table 1.

*<u>HPMS Counties</u>*

The base link VMT for the HPMS-based counties is AADT. The 2002 evaluation year base-VMT estimate is the historical HPMS VMT total for each county. Table 3 shows the county level AADT VMT estimates for 2002.

**Table 3**
**County-Level 2002 HPMS AADT VMT**

| Bexar | Comal | Guadalupe | Wilson |
|---|---|---|---|
| 34,044,498 | 3,257,918 | 2,871,998 | 829,977 |

These AADT estimates were adjusted to the ozone season weekday control total values (as shown in Table 1) using the ozone season weekday factors for conversion of VMT from the AADT form. To allocate county control total VMT by the HPMS functional classifications, 2002 historical official HPMS functional class and area type (virtual link) AADT VMT proportions were used. By county, the VMT control totals were disaggregated to the HPMS virtual links proportionally to the 2002 HPMS AADT VMT on each link.

**Hourly Travel and Directional Factors**

Emissions estimates are required by hour during a typical ozone season weekday. Since the VMT forecasts are 24-hour estimates, hourly travel factors are required to apportion the VMT to each hour of the day.

TxDOT continuous ATR, June through August weekday volume data (for 1999 and 2001) were aggregated for SAN EAC counties for developing EAC area level hourly travel factors. These factors are the ratio of hourly volumes to 24-hour volume. Table 4 shows the hourly travel factors for the SAN EAC counties.

**Table 4**
**Hourly Travel Factors for the San Antonio EAC Area**

| Hour | Weekday |
|---|---|
| 12:00 a.m. | 0.01063 |
| 1:00 a.m. | 0.00658 |
| 2:00 a.m. | 0.00582 |
| 3:00 a.m. | 0.00451 |
| 4:00 a.m. | 0.00635 |
| 5:00 a.m. | 0.01582 |
| 6:00 a.m. | 0.04778 |
| 7:00 a.m. | 0.07407 |
| 8:00 a.m. | 0.06045 |
| 9:00 a.m. | 0.04861 |
| 10:00 a.m. | 0.04859 |
| 11:00 a.m. | 0.05322 |
| 12:00 p.m. | 0.05562 |
| 1:00 p.m. | 0.05679 |
| 2:00 p.m. | 0.05922 |
| 3:00 p.m. | 0.06543 |
| 4:00 p.m. | 0.07365 |
| 5:00 p.m. | 0.07806 |
| 6:00 p.m. | 0.06220 |
| 7:00 p.m. | 0.04640 |
| 8:00 p.m. | 0.03828 |
| 9:00 p.m. | 0.03480 |
| 10:00 p.m. | 0.02738 |
| 11:00 p.m. | 0.01977 |

Finally, the VMT were apportioned by direction to allow for differences in congestion levels based on the direction of traffic flow. Directional volumes are required for modeling directional operational speeds, discussed in the next section. The directional split ratio applied for the HPMS-based counties is 60/40 based on aggregate observed values for areas where data are available. The directional splits used for the TDM-based counties vary by network functional classification and area type and by peak and off-peak travel periods. Appendix C lists the directional splits and their corresponding travel periods for the TDM-based analysis.

Tables 5 and 6, respectively, show the San Antonio TDM network functional classes and area types. Table 7 shows the HPMS functional classes and area types.

**Table 5**
**San Antonio TDM Network Functional Classifications**

| Functional Class Code | Functional Class Name |
|---|---|
| 0 | Local Roads |
| 1 | Radial Freeway |
| 2 | Radial Parkway |
| 3 | Expressway |
| 4 | Primary Arterial Divided |
| 5 | Primary Arterial Undivided |
| 6 | Minor Arterial Divided |
| 7 | Minor Arterial Undivided |
| 8 | Collectors Divided |
| 9 | Collectors Undivided |
| 10 | Frontage Road |
| 11 | Ramp |
| 12 | Circumferential Freeway |
| 13 | Circumferential Parkway |
| 14 | Circumferential Arterial |
| 40 | Intrazonal |

**Table 6**
**San Antonio TDM Network Area Types**

| Area Type Code | Area Type Name |
|---|---|
| 1 | Central Business District (CBD) |
| 2 | Urban |
| 3 | Urban Residential |
| 4 | Suburban |
| 5 | Rural |
| 6 | Military |

**Table 7**
**HPMS Functional Classes and Area Types**

| HPMS Area Type* | HPMS Roadway Functional Classification | | | | | | |
|---|---|---|---|---|---|---|---|
| Rural | Interstate | Freeway | Other Principal Arterial | Minor Arterial | Major Collector | Minor Collector | Local |
| Small Urban | | | | | | | |
| Urban | | | | | | | |

* For this analysis, the Urban area type is for population of 50,000 +.

Hourly and 24-hour VMT summaries (by day type, road type, and vehicle type) are included with the EI data provided on CD-ROM. Appendix A describes these data files.

**ESTIMATION OF SPEEDS**

Speed is a critical parameter for estimating emissions. Similarly, capacity and freeflow speed (and traffic volume, as discussed in the previous section) are critical parameters for determining speed. Capacity is the maximum flow past a given point on a roadway. It varies by the type of roadway (i.e., by functional classification). Freeflow speed is the maximum speed that traffic will move along a given roadway if there are no impediments (e.g., congestion, bad weather).

To estimate a link's (or "virtual" link, in the case of HPMS-based analyses) directional, time-of-day congested speed, a speed model involving both the estimated freeflow speed and estimated directional delay as a function of volume and capacity for the link and time-period is applied. The model is applied to each link (except for TDM centroid connectors and the special intrazonal links) for each time period and direction. Development of the link capacities and freeflow speeds input to the speed model is first discussed, followed by the model delay and congested speed equations.

**Capacities and Freeflow Speeds for HPMS-based Analysis**

The capacities and freeflow speeds used for the HPMS-based county analyses all come from the Highway Capacity Manual (HCM). For HPMS functional classifications 1 and 2 (interstate and freeway), both capacities and freeflow speeds are taken directly from the HCM (3-3). The capacity (2,200 passenger cars per hour per lane [pcphpl]) and freeflow speed (70 mph) for four-lane freeways was used for all interstates, regardless of area type. Similarly, a freeflow speed of 65 mph and capacity of 2,100 pcphpl was used for all freeways (HCM figure 3-2a).

HPMS functional classifications 3, 4, 5, 6, and 7 (principal arterial, minor arterial, major collector, minor collector, and local) have traffic control devices (i.e., signals or stop signs) that determine their capacities. The capacities of these signalized roadways were calculated based on signalized intersection capacity defined as shown (HCM 1994: 9-5, equation 9-3):

$$Ci = Si \times (gi/C)$$

Where:

| | | |
|---|---|---|
| Ci | = | capacity of lane group i, vehicles per hour (vph); |
| Si | = | saturation flow rate of lane group i, vehicles per hour of effective green time (vphg); and |
| gi/c | = | effective green ratio for lane group i. |

The saturation flow rate (Si) is the flow in vph that could be accommodated by the lane group assuming that the green phase was always available to the lane group (i.e., green ratio = 1.0). Computation of the adjusted saturation flow rate begins with the ideal saturation flow rate of 1,900, which is adjusted to reflect variance from ideal conditions. The saturation flow rate was adjusted for area type using the following assumptions (HCM 1994: 9-14, equation 9-12):

$$S = N \times fw \times fhv \times fg \times fp \times fbb \times fa \times frt \times flt$$

Where:

| | | |
|---|---|---|
| S | = | saturation flow rate factor (rounded to two decimal places); |
| N | = | number of lanes in the lane group; |
| fw | = | lane width adjustment factor (12-foot lane for all area types assumed); |
| fhv | = | heavy vehicle adjustment factor (5 percent heavy vehicles for all area types to adjust for passenger car equivalents, not to be confused with VMT mix); |

fg = approach grade factor (level terrain assumed for all area types);
fp = parking lane adjustment (none for rural areas, one maneuver per hour for urban areas);
fbb = bus blocking factor (none for rural areas, 10 per hour for urban areas, mid-point for small urban areas);
fa = area type adjustment (0.9 for urban area, 1.0 for all other areas);
frt = right turn adjustment factor (shared lane for right turns for all area types, high pedestrian crossing for urban areas, moderate for small urban areas, and low for rural); and
flt = left turn adjustment factor (exclusive left turn lanes and protected phasing for rural areas, shared left turn lanes and protected plus permitted phasing for urban areas, mid-point for small urban areas).

Table 8 shows the saturation flow rate adjustment factors used for the three different area types.

**Table 8**
**Saturation Flow Rate Adjust Factors by Area Type**

| Area Type | fw | fhv | fg | fp | fbb | fa | frt | flt |
|---|---|---|---|---|---|---|---|---|
| Rural | 1 | 0.95 | 1 | 1 | 1 | 1 | 0.98 | 0.95 |
| Small Urban | 1 | 0.95 | 1 | 0.98 | 0.98 | 1 | 0.94 | 0.90 |
| Urban | 1 | 0.95 | 1 | 0.95 | 0.96 | 0.90 | 0.90 | 0.85 |

Table 9 shows the effective green ratios used for different functional classes. The same ratios were used for all area types. (Interstates and freeways are unsignalized and do not require green ratios.)

**Table 9**
**Effective Green Ratios (gi/C) by HPMS Roadway Functional Classification**

| Principal Arterial | Minor Arterial | Major Collector | Minor Collector | Local |
|---|---|---|---|---|
| 0.60 | 0.55 | 0.50 | 0.40 | 0.30 |

Table 10 shows the adjusted saturation flow rate (expressed in pcphpl) for all signalized streets (i.e., not interstate or freeway) for the three area types.

**Table 10**
**Adjusted Saturation Flow Rate (pcphpl) by Area Type**

| HPMS Area Type | Ideal Flow | Adjustment Factor | Adjusted Saturation Flow |
|---|---|---|---|
| Rural | 1,900 | 0.88 | 1,672 |
| Small Urban | | 0.77 | 1,463 |
| Urban | | 0.59 | 1,121 |

The freeflow speed for rural and urban arterials (FC-3 and FC-4) were taken directly from HCM (HMC 1994: 7-10 and 11-6, respectively). The freeflow speed for other functional classes decreases from arterial freeflow speed by 5 mph increments. No freeflow speed is below 30 mph. Table 11 shows the hourly lane capacities for all functional classes and area types.

**Table 11**
**Hourly Lane Capacities (vehicles per hour per lane [vphpl])**

| HPMS Area Type | HPMS Roadway Functional Classification | | | | | | |
|---|---|---|---|---|---|---|---|
| | Interstate | Freeway | Other Principal Arterial | Minor Arterial | Major Collector | Minor Collector | Local |
| Rural | 2,200 | 2,100 | 1,003 | 920 | 836 | 669 | 502 |
| Small Urban | 2,200 | 2,100 | 878 | 805 | 732 | 585 | 439 |
| Urban | 2,200 | 2,100 | 673 | 617 | 561 | 448 | 336 |

Similarly, freeflow speeds are provided for each of the three area types and seven roadway functional classifications (or 21-HPMS virtual links). Table 12 shows the freeflow speeds.

**Table 12**
**Freeflow Speeds (mph)**

| HPMS Area Type | HPMS Roadway Functional Classification | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Interstate** | **Freeway** | **Other Principal Arterial** | **Minor Arterial** | **Major Collector** | **Minor Collector** | **Local** |
| Rural | 70 | 65 | 55 | 50 | 40 | 35 | 30 |
| Small Urban | 70 | 65 | 45 | 40 | 35 | 30 | 30 |
| Urban | 70 | 65 | 40 | 35 | 30 | 30 | 30 |

V/C ratios were generated for each combination of time period, roadway functional classification, area type, and direction using these capacities and VMT. The following describes the calculation for this procedure:

- Volume: VMT was multiplied by each 24 hourly time period factors yielding VMT for each time period. VMT per time period was divided by centerline miles, yielding volume for each time period. This procedure was performed for each combination of time period, roadway functional classification, area type, and direction.

- Capacity: Lane miles were divided by centerline miles to produce lanes. Lanes were multiplied by the lane capacities (i.e., adjusted saturation flows) generated by the process described above, producing hourly lane capacities. Hourly lane capacities were multiplied by the number of hours in the time period to produce time period capacities. This procedure was performed for each combination of time period, roadway functional classification, and area type. (Capacity is the same for each direction.)

- V/C ratios: The speed model was applied to the resulting volumes and capacities for each functional classification and area type combination. This yields volumes adjusted for the impact of congestion-related delay for each combination of time period, functional classification, area type, and direction.

**Capacities and Freeflow Speeds for the TDM-based Analysis**
The San Antonio TDM network 24-hour equilibrium assignments were performed using nondirectional 24-hour capacities. Time-of-day (i.e., hourly) capacity factors were applied to nondirectional capacity (or service volume) for the 24-hour assignment time period. In computing the directional v/c ratio for estimating the directional speeds, the directional split for capacity is assumed at 50/50. The network was processed to compute the average capacity per

lane by functional classification and area type. Appendix D summarizes the capacity factors, which are computed as follows:

$$Capacity\ Factor = \frac{(Hourly\ Capacity\ per\ Lane)(Length\ of\ the\ Time\ Period)}{24\text{-}hour\ Capacity\ per\ Lane}$$

Freeflow speed factors are used to convert TDM level-of-service (LOS) C speeds to LOS A (i.e., freeflow) speeds. Appendix D shows the freeflow speed factors for the San Antonio TDMs by area type and functional classification.

With the freeflow speeds and hourly, directional volumes and capacities on each link, the congested speeds may be computed.

**Estimation of Congested Speeds**

The congested speed model first calculates delay on the link which it then applies to the link freeflow speed to compute the link operational congested speed estimate. The volume/delay equation is:

$$Delay = Min\ [A\ e^{B\left(\frac{V}{C}\right)},\ M]$$

Where:

Delay = congestion delay (in minutes/mile);
A & B = volume/delay equation coefficients;
M = maximum minutes of delay per mile; and
V/C = time-of-day directional v/c ratio.

The delay model parameters (A, B, and M) were developed for the Dallas/Fort Worth area and verified by application in other Texas urban areas. There is a set of parameters for high-capacity facilities and a set for low-capacity facilities (see Table 13). The San Antonio network high-capacity facility types are Radial Freeway, Radial Parkway, Circular Freeway and Circular Parkway. The remaining facility types (except for centroid connector and intrazonal, which do not use capacity data) are low-capacity facilities. The HPMS high-capacity facilities are Interstate and Freeway classifications.

**Table 13**
**Volume/Delay Equation Parameters**

| Facility Category | A | B | M* |
|---|---|---|---|
| High Capacity Facilities (> 3,400 vph one way, e.g., Interstates and Freeways) | 0.015 | 3.5 | 5.0 |
| Low Capacity Facilities ($\leq$ 3,400 vph, e.g., Arterials, Collectors and Locals) | 0.050 | 3.0 | 10.0 |

* For HPMS, M values are 3.0 for high capacity and 5.0 for low capacity facilities.

Given the estimated directional delay (in minutes/mile) and the estimated freeflow speed, the directional congested speed is computed as follows:

$$Congested\ speed = \frac{60}{\frac{60}{Freeflow\ speed} + Delay}$$

This model is applied to each link, based on functional class and area type, for each time period and each direction.

**TDM Centroid Connector and Intrazonal Speeds**
For the centroid connector links and intrazonal links (intrazonal links are developed specifically for air emissions analyses), capacity data are not used. The centroid connector traffic assignment input speeds were used as the centroid connector operational speeds estimates. Operational speeds for the intrazonal trips category were estimated by zone as the average of the zone's centroid connector speeds.

The hourly and 24-hour VMT weighted speed summaries by county and road type are included in the set of data files provided to TCEQ on CD-ROM (see Appendix A for electronic data descriptions).

**VMT MIX**
The VMT mix for 2002 was estimated using TxDOT 1997 - 2001 vehicle classification data. As was the case with the seasonal adjustment factor for the VMT estimation procedure, the four-county SAN EAC area data were aggregated.

TxDOT classification counts classify vehicles into the standard FHWA vehicle classifications (based on vehicle length/number of axles) using best practice vehicle classification count methods:

| | |
|---|---|
| C | Passenger vehicles; |
| P | Two-axle, four-tire single-unit trucks; |
| B | Buses; |
| SU2 | Six-tire, two-axle single-unit vehicles; |
| SU3 | Three-axle single-unit vehicles; |
| SU4 | Four or more axle single-unit vehicles; |
| SE4 | Three or four axle single-trailer vehicles; |
| SE5 | Five-axle single-trailer vehicles; |
| SE6 | Six or more axle single-trailer vehicles; |
| SD5 | Five or less axle multi-trailer vehicles; |
| SD6 | Six-axle multi-trailer vehicles; and |
| SD7 | Seven or more axle multi-trailer vehicles. |

EPA and MOBILE use a different vehicle classification scheme than the FHWA categories. The 28 EPA vehicle categories are defined as a function of gross vehicle weight rating (GVWR) and fuel type (see Table 14). The FHWA axle/vehicle length based classification categories must be converted into 28 MOBILE GVWR/fuel type based categories.

**Table 17**
**EPA Vehicle Types - 28 Categories**

| Category | Description | GVWR |
|---|---|---|
| LDGV | Light-duty gasoline vehicle | $\leq$ 6,000 |
| LDGT1 | Light-duty gasoline truck | $\leq$ 6,000 |
| LDGT2 | Light-duty gasoline truck | $\leq$ 6,000 |
| LDGT3 | Light-duty gasoline truck | 6,001 - 8,500 |
| LDGT4 | Light-duty gasoline truck | 6,001 - 8,500 |
| HDGV2b | Heavy-duty gasoline vehicle | 8,501 - 10,000 |
| HDGV3 | Heavy-duty gasoline vehicle | 10,001 - 14,000 |
| HDGV4 | Heavy-duty gasoline vehicle | 14,001 - 16,000 |
| HDGV5 | Heavy-duty gasoline vehicle | 16,001 - 19,500 |
| HDGV6 | Heavy-duty gasoline vehicle | 19,501 - 26,000 |
| HDGV7 | Heavy-duty gasoline vehicle | 26,001 - 33,000 |
| HDGV8a | Heavy-duty gasoline vehicle | 33,001 - 60,000 |
| HDGV8b | Heavy-duty gasoline vehicle | > 60,000 |
| HDGB | Heavy-duty gasoline bus | all |
| LDDV | Light-duty diesel vehicle | $\leq$ 6,000 |
| LDDT12 | Light-duty diesel truck | $\leq$ 6,000 |
| LDDT34 | Light-duty diesel truck | 6,001 - 8,500 |
| HDDV2b | Heavy-duty diesel vehicle | 8,501 - 10,000 |
| HDDV3 | Heavy-duty diesel vehicle | 10,001 - 14,000 |
| HDDV4 | Heavy-duty diesel vehicle | 14,001 - 16,000 |
| HDDV5 | Heavy-duty diesel vehicle | 16,001 - 19,500 |
| HDDV6 | Heavy-duty diesel vehicle | 19,501 - 26,000 |
| HDDV7 | Heavy-duty diesel vehicle | 26,001 - 33,000 |
| HDDV8a | Heavy-duty diesel vehicle | 33,001 - 60,000 |
| HDDV8b | Heavy-duty diesel vehicle | > 60,000 |
| HDDBS | Heavy-duty diesel school bus | all |
| HDDBT | Heavy-duty diesel transit bus | all |
| MC | Motorcycle | all |

The FHWA category counts (based on number of axles or vehicle length) are first converted into categories (based on GVWR). Vehicle classification counts are first aggregated into three intermediate groups:

| | |
|---|---|
| Passenger Vehicles (PV) | C + P; |
| Heavy-Duty Vehicles (HDV) | SU2 + SU3 + SU4 + SE4; and |
| HDDV8b (HDX) | SE5 + SE6 + SD5 + SD6 + SD7. |

This is followed by a second intermediate allocation that separates light-duty vehicles (LDV) into passenger cars and light-duty trucks (LDT) based on TxDOT registration data:

| | |
|---|---|
| LDV | 0.708 × PV (by county, 2002 Bexar registration data shown*); and |
| LDT | 0.292 × PV (by county, 2002 Bexar registration data shown). |

A third intermediate allocation further separates LDTs into LDT1 and HLDT (note that LDT1 is itself intermediate and is further divided into LDGT1 and LDDT):

| | |
|---|---|
| LDT1 | 0.842 × LDT (by county, 2002 Bexar registration data shown); and |
| HLDT | 0.158 × LDT (by county, 2002 Bexar registration data shown). |

Next, the remaining FHWA categories are disaggregated into EPA vehicle groups, as shown. Note that TxDOT vehicle classification count procedures do not distinguish between gasoline and diesel LDTs. Consequently, MOBILE defaults for the year of interest are used. As before, actual TxDOT vehicle registration data are used to separate gasoline from HDDTs. Note also that motorcycles are not counted separately and are included as a default (subtracted from LDGV):

| | |
|---|---|
| LDGV | 0.9972136 × LDV (MOBILE6 default for 1999 shown); |
| LDDV | 0.0027864 × LDV (MOBILE6 default for 1999 shown); |
| LLDT | 0.9936534 × LDT1 (MOBILE6 default for 1999 shown); |
| LDDT | 0.0063466 × LDT1 (MOBILE6 default for 1999 shown); |
| HDGV | 0.333 × HDV (by county, 2002 Bexar registration data shown); |
| HDDV | 0.667 × HDV (by county, 2002 Bexar registration data shown); and |
| MC | 0.001 of total (subtracted from LDGV). |

* The analysis year for this inventory is 2002. For illustration purposes only, 2002 registration data for Bexar County and 1999 MOBILE6 default data are shown.

This converts the FHWA axle count-based categories into GVWR categories. This part of the conversion procedure is summarized schematically in Table 15. Starting with the TxDOT vehicle classification data, these data themselves provide sufficient information to complete the first step in the conversion process, the allocation of vehicles into PVs, HDVs, HDDV8bs, and buses (B). Steps 2 and 3 further allocate these categories using TxDOT registration data. Finally, Step 4 allocates LDVs by fuel type using EPA MOBILE diesel fractions and motorcycles are separated from LDGVs using a nominal constant.

**Table 15**
**Initial Vehicle Classification Conversion Procedure**

<table>
<tr><th>Start</th><th>Step 1</th><th>Step 2</th><th>Step 3</th><th>Step 4</th></tr>
<tr><td rowspan="10">Total Vehicles</td><td rowspan="6">PV</td><td rowspan="3">LDV</td><td rowspan="2">LDGV</td><td>MC</td></tr>
<tr><td>LDGV</td></tr>
<tr><td colspan="2">LDDV</td></tr>
<tr><td rowspan="3">LDT</td><td rowspan="2">LDT1</td><td>LLDT</td></tr>
<tr><td>LDDT</td></tr>
<tr><td colspan="2">HLDT</td></tr>
<tr><td rowspan="2">HDV</td><td colspan="3">HDGV</td></tr>
<tr><td colspan="3">HDDV</td></tr>
<tr><td colspan="4">HDDV8b</td></tr>
<tr><td colspan="4">B</td></tr>
</table>

The MOBILE6 28-category typology is a subset of this typology. A combination of EPA MOBILE6 defaults and Texas vehicle registration data are used to expand these intermediate categories.

For the 28-category EPA scheme, HDVs are separated into eight and seven categories respectively. HDDV8b vehicles are counted directly. The 15 HDV categories are separated from total HDV, which have been separated by fuel type (HDGV and HDDV) using TxDOT registration data. Each HDV category (HDGV and HDDV) is then divided into sub-categories based on detailed area wide TxDOT county vehicle registration data. Buses are treated separately.

The 28-category EPA scheme also further divides the two LDT categories based in part on assumed loading. The previous LDGT1 and LDGT2 categories (previously defined as GVWR $\leq$ 6,000 and GVWR > 6,000 to 8,500, respectively) are separated into subcategories in terms of adjusted loaded vehicle weight (ALVW). ALVW is the average of vehicle curb weight and GVWR. Thus, two new intermediate categories are introduced. These are light light-duty trucks (LLDT) and heavy light-duty trucks (HLDT), which are defined as:

- LLDT - any light-duty truck rated through 6,000 pounds GVWR; and
- HLDT - any light-duty truck rated greater than 6,000 pounds GVWR.

These two new intermediate categories are then used to define the four LDT categories using EPA MOBILE6 defaults for the year of interest. The four LDT categories are:

- LDGT1 - light light-duty trucks through 3,750 pounds loaded vehicle weight (LVW);
- LDGT2 - light light-duty trucks greater than 3,750 pounds LVW;
- LDGT3 - heavy light-duty trucks to 5,750 pounds ALVW; and
- LDGT4 - heavy light-duty trucks greater than 5,750 pounds ALVW.

Similarly, the LDDT category is sub-divided into two categories based on GVWR (less than or equal to 6,000 GVWR and 6,000 to 8,500 GVWR). This is accomplished using EPA MOBILE6 default values for the year of interest.

Finally the three bus categories are separated from the TxDOT classification counts bus category using EPA MOBILE6 default values. (Under MOBILE6 the HDV category does not include buses.)

The MOBILE6 default values used in the VMT mix estimate are consistent with the evaluation year. Table 16 shows the VMT mix estimation procedure summary followed by explanatory notes. For this analysis, VMT mix estimates were developed for three functional classification groups (identified later in the "Emissions Estimation" section of this report). Table 17 shows the VMT mix.

**Table 16**
**VMT Mix Estimation Procedure Summary**

| EPA-8 | EPA-28 | Conversion |
|---|---|---|
| LDGV | LDGV | .9972 × LDV |
| LDGT1 | LDGT1 | .2310 × LLDT |
| | LDGT2 | .7690 × LLDT |
| LDGT2 | LDGT3 | .6850 × HDLT |
| | LDGT4 | .3150 × HDLT |
| HDGV | HDGV2b | .430 × HDGV |
| | HDGV3 | .203 × HDGV |
| | HDGV4 | .081 × HDGV |
| | HDGV5 | .048 × HDGV |
| | HDGV6 | .153 × HDGV |
| | HDGV7 | .049 × HDGV |
| | HDGV8a | .029 × HDGV |
| | HDGV8b | .007 × HDGV |
| | HDGB | .2045 × B |
| LDDV | LDDV | .0028 × LDV |
| LDDT | LDDT12 | .1623 × LDDT |
| | LDDT34 | .8377 × LDDT |
| HDDV | HDDV2b | .273 × HDDV |
| | HDDV3 | .122 × HDDV |
| | HDDV4 | .063 × HDDV |
| | HDDV5 | .046 × HDDV |
| | HDDV6 | .199 × HDDV |
| | HDDV7 | .119 × HDDV |
| | HDDV8a | .178 × HDDV |
| | HDDV8b | HDX |
| | HDDBT | .3253 × B |
| | HDDBS | .4702 × B |
| MC | MC | MC |

**Notes to VMT Mix Estimation Procedure Summary**

Intermediate category factors and sources:

| | |
|---|---|
| LDV | .708 × PV (by county, 2002 Bexar registration data shown) |
| LDT | .292 × PV (by county, 2002 Bexar registration data shown) |
| LDT1 | .842 × LDT (by county, 2002 Bexar registration data shown) |
| HLDT | .158 × LDT (by county, 2002 Bexar registration data shown) |
| LLDT | .9937 × LDT1 (EPA MOBILE6 default) |
| LDDT | .0063 × LDT1 (EPA MOBILE6 default) |
| HDV | SU2+SU3+SU4+SE3+SE4 |
| HDX | SE5+SE6+SD5+SD6+SD7 |
| HDGV | .333 × HDV (by county, 2002 Bexar registration data shown) |
| HDDV | .667 × HDV (by county, 2002 Bexar registration data shown) |

Category conversion factors and sources:

| | |
|---|---|
| LDGV | .9972 × LDV (EPA MOBILE6 default, 1999 shown) |
| LDGT1 | .2310 × LLDT (EPA MOBILE6 default, 1999 shown) |
| LDGT2 | .7690 × LLDT (EPA MOBILE6 default, 1999 shown) |
| LDGT3 | .6850 × HLDT (EPA MOBILE6 default, 1999 shown) |
| LDGT4 | .3150 × HLDT (EPA MOBILE6 default, 1999 shown) |
| HDGV2a | .430 × HDGV (San Antonio area registration data) |
| HDGV3 | .203 × HDGV (San Antonio area registration data) |
| HDGV4 | .081 × HDGV (San Antonio area registration data) |
| HDGV5 | .048 × HDGV (San Antonio area registration data) |
| HDGV6 | .153 × HDGV (San Antonio area registration data) |
| HDGV7 | .049 × HDGV (San Antonio area registration data) |
| HDGV8a | .029 × HDGV (San Antonio area registration data) |
| HDGV8b | .007 × HDGV (San Antonio area registration data) |
| HDGB | .2243 × B (EPA MOBILE6 default, 1999 shown) |
| LDDV | .0028 × LDV (EPA MOBILE6 default, 1999 shown) |
| LDDT12 | .2723 × LDDT (EPA MOBILE6 default, 1999 shown) |
| LDDT34 | .7277 × LDDT (EPA MOBILE6 default, 1999 shown) |
| HDDV2b | .273 × HDDV (San Antonio area registration data) |
| HDDV3 | .122 × HDDV (San Antonio area registration data) |
| HDDV4 | .063 × HDDV (San Antonio area registration data) |
| HDDV5 | .046 × HDDV (San Antonio area registration data) |
| HDDV6 | .199 × HDDV (San Antonio area registration data) |
| HDDV7 | .119 × HDDV (San Antonio area registration data) |
| HDDV8a | .178 × HDDV (San Antonio area registration data) |
| HDDV8b | HDX (TxDOT classification counts) |
| HDDBT | .3240 × B (EPA MOBILE6 default, 1999 shown) |
| HDDBS | .4517 × B (EPA MOBILE6 default, 1999 shown) |
| MC | MC (default subtracted from LDGV, no conversion) |

**Table 17**
**San Antonio EAC Area 24-Hour VMT Mix by Roadway Functional Classification Group**

| Obs | FC | P_LDGV | P_LDGT1 | P_LDGT2 | P_LDGT3 | P_LDGT4 | P_HDGV2b | P_HDGV_3 | P_HDGV_4 | P_HDGV_5 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Art | 0.6068804 | 0.0569605 | 0.1896277 | 0.0387252 | 0.0178087 | 0.0072051 | 0.0034015 | 0.0013572 | 0.0008043 |
| 2 | Col | 0.5871330 | 0.0591447 | 0.1968988 | 0.0415232 | 0.0190954 | 0.0085071 | 0.0040161 | 0.0016025 | 0.0009496 |
| 3 | Fway | 0.6023595 | 0.0515813 | 0.1717195 | 0.0326162 | 0.0149993 | 0.0068825 | 0.0032492 | 0.0012965 | 0.0007683 |

| Obs | P_HDGV_6 | P_HDGV_7 | P_HDGV8a | P_HDGV8b | P_LDDV | P_LDDT12 | P_HDDV2b | P_HDDV_3 | P_HDDV_4 | P_HDDV_5 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.0025637 | 0.0008210 | 0.0004859 | 0.0001173 | 0.0009998 | 0.0001650 | 0.0099603 | 0.0044511 | 0.0022985 | 0.0016783 |
| 2 | 0.0030269 | 0.0009694 | 0.0005737 | 0.0001385 | 0.0009674 | 0.0001714 | 0.0112687 | 0.0050358 | 0.0026005 | 0.0018987 |
| 3 | 0.0024489 | 0.0007843 | 0.0004642 | 0.0001120 | 0.0009924 | 0.0001495 | 0.0094061 | 0.0042035 | 0.0021706 | 0.0015849 |

| Obs | P_HDDV_6 | P_HDDV_7 | P_HDDV8a | P_HDDV8b | P_MC | P_HDGB | P_HDDBT | P_HDDBS | P_LDDT34 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.0072604 | 0.0043417 | 0.0064943 | 0.0281741 | 0.0010000 | 0.0008835 | 0.0016979 | 0.0026506 | 0.0011859 |
| 2 | 0.0082141 | 0.0049120 | 0.0073473 | 0.0254421 | 0.0010000 | 0.0010692 | 0.0020548 | 0.0032077 | 0.0012314 |
| 3 | 0.0068565 | 0.0041001 | 0.0061329 | 0.0700486 | 0.0010000 | 0.0005065 | 0.0009734 | 0.0015195 | 0.0010739 |

## ESTIMATION OF OZONE SEASON WEEKDAY EMISSIONS FACTORS

This section discusses development of the ozone season weekday county-level emissions factors. An additional set of SAN EAC area summer season weekday and winter season weekday emissions factors developed for the annual emissions estimates procedure are discussed later in the “Estimation of Annualization Ratios” section.

The MOBILE6 model (October 2002) was applied to calculate county-level ozone season weekday emissions factors (in grams per mile [g/mi]) of VOC, CO, NOx, $SO_2$, $NH_3$, and the filterable PM pollutants available in MOBILE6: $SO_4$, OCARBON, ECARBON, GASPM, LEAD, BRAKE, TIRE, in both PM-10 and PM-2.5 particle size categories. Because MOBILE6 will only calculate one PM size cutoff at a time, two runs were required for each scenario. Emissions factors are estimated by speed, emissions type (i.e., emissions factor sub-component), hour, MOBILE6 road type (or drive cycle), and vehicle type. The average emissions factors for each vehicle class fleet (28), or vehicle type, are developed by combining the MOBILE6 by-model-year emissions factors output weighted by their corresponding model year travel fractions. Emissions factors are organized in “look-up” tables.

The MOBILE6 model is equipped with national (or EPA) default modeling values for a wide range of conditions that affect emissions factors. The only actual data parameters requiring user-input values to run the model are fuel Reid Vapor Pressure (RVP), temperature, and calendar year. Many MOBILE6 default modeling parameters may be overridden through the use of MOBILE6 commands and their associated inputs and options. Particular MOBILE6 defaults were replaced by local input values that were developed to yield emissions factors characteristic of the SAN EAC area ozone season climatic conditions, and 2002 evaluation year-specific vehicle fleets, activity, and emissions control programs.

The following emissions factors documentation discusses the MOBILE6 input/output files, summarizes the control programs modeled, details the aggregation-level of the applied MOBILE6 emissions factors, and briefly describes all of the MOBILE6 commands that may affect emissions factor calculations. It also identifies the commands used and describes the development of locality-specific inputs and the emissions factor post-processing procedure.

### MOBILE6 Input and Output Files

The MOBILE6 commands and particular model input data are entered in the MOBILE6 command file. Other input parameters (and in some cases, commands) are applied to MOBILE6 from external data files.

The POLFAC62 program (described in Appendix B) was applied to run MOBILE6 with the user-input command and external data files to produce emissions factor output tables. No post-processing of MOBILE6 emissions factors was required. The final product of the emissions factor modeling is eight hourly emissions factor files (i.e., a PM-10 run and a PM2.5 run hourly emissions factors table for each county). (A corresponding set of average 24-hour emissions factors was also produced.) All of the MOBILE6 input files and output files (MOBILE6 emissions factor tables developed with POLFAC62) were provided on CD-ROM as described in Appendix A.

**Control Programs Modeled**
All of the federal motor vehicle control programs (FMVCP) were modeled (this is the MOBILE6 default). Also modeled by default were the programs to offset heavy-duty diesel (HDDV) defeat device effects: the low emissions rebuild program, and the HDDV 2004 standard pull-ahead program. The Texas Regional Low Reid Vapor Pressure (RVP) Gasoline Program is essentially modeled using summer the 2002 RVP estimate based on City of San Antonio summer 2002 gasoline sample survey data.

**Aggregation Level of MOBILE6 Emissions Factors**
The by-model-year emissions factors from the MOBILE6 database output format are condensed into average fleet emissions factors by vehicle class. This is performed by multiplying each by-model-year emissions factor by its corresponding travel fraction and summing the resulting products. Each emissions factor table provides the MOBILE6 emissions factors by:

- 28 vehicle types;
- 4 road types;
- 14 speeds (except for two MOBILE6 road types, each with one average speed);
- the number of pollutant-specific emissions types defined by analyst; and
- 24 hourly time periods.

MOBILE6 vehicle type, emissions type, pollutant categories, and roadway type classifications are described in Tables 18 through 21. Tables 22 and 23 show the speeds and the sequence for hourly time periods, respectively.

The 28 MOBILE6 vehicle types as defined by fuel-type (gasoline or diesel) and GVWR category, are shown in sequence by EPA vehicle type number in Table 18.

**Table 18**
**Complete MOBILE6 Vehicle Classifications**

| Number | Abbreviation | Description |
|---|---|---|
| 1 | LDGV | Light-Duty Gasoline Vehicles (Passenger Cars) |
| 2 | LDGT1 | Light-Duty Gasoline Trucks 1 (0-6,000 lbs. GVWR, 0-3,750 lbs. LVW) |
| 3 | LDGT2 | Light-Duty Gasoline Trucks 2 (0-6,000 lbs. GVWR, 3,751-5,750 lbs. LVW) |
| 4 | LDGT3 | Light-Duty Gasoline Trucks 3 (6,001-8,500 lbs. GVWR, 0-5,750 lbs. ALVW*) |
| 5 | LDGT4 | Light-Duty Gasoline Trucks 4 (6,001-8,500 lbs. GVWR, 5,751 lbs. and greater ALVW) |
| 6 | HDGV2b | Class 2b Heavy-Duty Gasoline Vehicles (8,501-10,000 lbs. GVWR) |
| 7 | HDGV3 | Class 3 Heavy-Duty Gasoline Vehicles (10,001-14,000 lbs. GVWR) |
| 8 | HDGV4 | Class 4 Heavy-Duty Gasoline Vehicles (14,001-16,000 lbs. GVWR) |
| 9 | HDGV5 | Class 5 Heavy-Duty Gasoline Vehicles (16,001-19,500 lbs. GVWR) |
| 10 | HDGV6 | Class 6 Heavy-Duty Gasoline Vehicles (19,501-26,000 lbs. GVWR) |
| 11 | HDGV7 | Class 7 Heavy-Duty Gasoline Vehicles (26,001-33,000 lbs. GVWR) |
| 12 | HDGV8a | Class 8a Heavy-Duty Gasoline Vehicles (33,001-60,000 lbs. GVWR) |
| 13 | HDGV8b | Class 8b Heavy-Duty Gasoline Vehicles (>60,000 lbs. GVWR) |
| 14 | LDDV | Light-Duty Diesel Vehicles (Passenger Cars) |
| 15 | LDDT12 | Light-Duty Diesel Trucks 1 and 2 (0-6,000 lbs. GVWR) |
| 16 | HDDV2b | Class 2b Heavy-Duty Diesel Vehicles (8,501-10,000 lbs. GVWR) |
| 17 | HDDV3 | Class 3 Heavy-Duty Diesel Vehicles (10,001-14,000 lbs. GVWR) |
| 18 | HDDV4 | Class 4 Heavy-Duty Diesel Vehicles (14,001-16,000 lbs. GVWR) |
| 19 | HDDV5 | Class 5 Heavy-Duty Diesel Vehicles (16,001-19,500 lbs. GVWR) |
| 20 | HDDV6 | Class 6 Heavy-Duty Diesel Vehicles (19,501-26,000 lbs. GVWR) |
| 21 | HDDV7 | Class 7 Heavy-Duty Diesel Vehicles (26,001-33,000 lbs. GVWR) |
| 22 | HDDV8a | Class 8a Heavy-Duty Diesel Vehicles (33,001-60,000 lbs. GVWR) |
| 23 | HDDV8b | Class 8b Heavy-Duty Diesel Vehicles (>60,000 lbs. GVWR) |
| 24 | MC | Motorcycles (Gasoline) |
| 25 | HDGB | Gasoline Buses (School, Transit, and Urban) |
| 26 | HDDBT | Diesel Transit and Urban Buses |
| 27 | HDDBS | Diesel School Buses |
| 28 | LDDT34 | Light-Duty Diesel Trucks 3 and 4 (6,001-8,500 lbs. GVWR) |

* ALVW is the numerical average of the vehicle curb weight and the GVWR.
Source: MOBILE6 User's Guide (EPA, January 2002).

The 10 MOBILE6 emissions type classifications and availability by pollutant category are shown in Table 15. In addition to these emissions types by pollutant (see Table 20, MOBILE6 Pollutant Category), POLFAC62 emissions factor tables contain composite emissions factors (i.e., the total emissions factor for each pollutant with multiple emissions types). POLFAC62 tables also contain the total PM emissions factor which is the sum of the filterable PM emissions factor components. The refueling emissions factor component is generally considered an area source category emissions factor and is not included in the on-road mobile source emissions analysis.

**Table 19**
**MOBILE6 Emission Type Classifications**

| Number | Abbreviation | Description | Pollutants | Vehicle Classes |
|---|---|---|---|---|
| 1 | Running | Exhaust Running Emissions | All except tire and brake wear | All |
| 2 | Start | Exhaust Engine Start Emissions (trip start) | HC, CO, NOx, Air Toxics* | LD plus MC |
| 3 | Hot Soak | Evaporative Hot Soak Emissions (trip end) | HC, BENZ, MTBE | Gas, including MC |
| 4 | Diurnal | Evaporative Diurnal Emissions (heat rise) | HC, BENZ, MTBE | Gas, including MC |
| 5 | Resting | Evaporative Resting Loss Emissions (leaks and seepage) | HC, BENZ, MTBE | Gas, including MC |
| 6 | Run Loss | Evaporative Running Loss Emissions | HC, BENZ, MTBE | Gas, less MC |
| 7 | Crankcase | Evaporative Crankcase Emissions (blow-by) | HC | Gas, including MC |
| 8 | Refueling | Evaporative Refueling Emissions (fuel displacement and spillage) | HC, BENZ, MTBE | Gas, less MC |
| 9 | Brake Wear | PM from brake component wear | Brake wear particulate | All |
| 10 | Tire Wear | PM from tire wear | Tire wear particulate | All |

* Air Toxics (see Table 20) are BENZ, MTBE, BUTA, FORM, ACET, ACRO.

**Table 20**
**MOBILE6 Pollutant Categories***

| Abbreviation | Description |
|---|---|
| HC | Hydrocarbons (gaseous) |
| CO | Carbon Monoxide (gaseous) |
| NOx | Oxides of Nitrogen (gaseous) |
| $CO_2$ | Carbon Dioxide (gaseous) |
| $SO_4$ | Sulfate Portion of Exhaust Particulate |
| OCARBON | Organic Carbon Portion of Diesel Exhaust Particulate |
| ECARBON | Elemental Carbon Portion of Diesel Exhaust Particulate |
| GASPM | Total Carbon Portion of Gasoline Exhaust Particulate |
| Lead | Lead Portion of Exhaust Particulate |
| $SO_2$ | Sulfur Dioxide (gaseous) |
| $NH_3$ | Ammonia (gaseous) |
| Brake | Brake Wear Particulate |
| Tire | Tire Wear Particulate |
| BENZ | Benzene |
| MTBE | Methyl Tertiary Butyl Ether |
| BUTA | 1,3-Butadiene |
| FORM | Formaldehyde |
| ACET | Acetaldehyde |
| ACRO | Acrolein |

* The particulate matter pollutants, SO4, OCARBON, ECARBON, GASPM, LEAD, BRAKE, and TIRE may be modeled at particulate size cutoffs from 1.0 to 10.0 micrometers.

MOBILE6 calculates particular emissions factors reflective of driving cycles observed on four roadway types, as well as emissions factors for those emissions types that are not directly applicable to the driving cycles. The driving cycle (or roadway type) descriptions are provided in Table 21. The fifth roadway type, according to MOBILE6 is “None.” None, or roadway type number 5, is the index for the emissions types that do not apply to the driving cycles, and thus are not sensitive to, or do not vary by, roadway type or speed.

The POLFAC62 emissions factor table, however, categorizes all of the pollutant-specific emissions types by MOBILE6 roadway types one through four — Freeway, Arterial, Local, and Ramp. That is, in POLFAC62 tables, the MOBILE6 g/mi emissions factors corresponding to the "None" roadway type are tabulated as emissions factors under each of the four actual roadway types. This allocation of the MOBILE6 "None" road type emissions factors to the Freeway, Arterial, Local, and Ramp MOBILE6 road types is done in POLFAC62 so that all emissions, regardless of "type," may be spatially allocated to the functional class (or roadway type)-coded network links.

**Table 21**
**MOBILE6 Roadway Classifications**

| Number | Abbreviation | Description |
|---|---|---|
| 1 | Freeway | High-speed, limited-access roadways |
| 2 | Arterial | Arterial and collector roadways |
| 3 | Local | Urban local roadways |
| 4 | Fwy Ramp | Freeway on and off ramps |
| 5 | None | Not applicable (for start and some evaporative emissions) |

Source: MOBILE6 User's Guide (EPA, January 2002).

The 14 speeds for which the MOBILE6 freeway and arterial emissions factors are calculated and tabulated are presented in Table 22. Later in the emissions estimation process, emissions factors for average operational speeds that are not represented in the 14 speeds as tabulated, are calculated by interpolation (except for those speeds higher than the MOBILE6 maximum speed, and those lower than the MOBILE6 minimum speed, in which case the emissions factors corresponding to these bounding speeds are used, respectively). The MOBILE6 Local and Ramp road type emissions factors are not speed sensitive and are each characterized by one average speed.

**Table 22**
**Speeds for POLFAC62 Tabulated MOBILE6 Freeway and Arterial Emissions Factors***

| Number | Speed |
|---|---|
| 1 | 2.5 mph |
| 2 | 5 mph |
| 3 | 10 mph |
| 4 | 15 mph |
| 5 | 20 mph |
| 6 | 25 mph |
| 7 | 30 mph |
| 8 | 35 mph |
| 9 | 40 mph |
| 10 | 45 mph |
| 11 | 50 mph |
| 12 | 55 mph |
| 13 | 60 mph |
| 14 | 65 mph |

* MOBILE6 Local and Ramp drive cycle emissions factor's fixed speeds are 12.9 and 34.6 mph, respectively.

MOBILE6 uses several hourly input parameters (e.g., hourly temperatures, hourly VMT fractions, etc.) to model hourly emissions factors. MOBILE6 requires that hourly input parameters be sequenced starting from the 6 a.m. hour. In some cases, however, particular overnight hours are grouped together as a single time period. Table 23 shows the MOBILE6 sequence for hourly inputs.

**Table 23**
**General Sequence for Calendar Day Hourly* Inputs to MOBILE6**

| Input Sequence Number | Abbreviation | Description |
|---|---|---|
| 1 | 6 a.m. | 6 a.m. through 6:59 a.m. |
| 2 | 7 a.m. | 7 a.m. through 7:59 a.m. |
| 3 | 8 a.m | 8 a.m. through 8:59 a.m. |
| 4 | 9 a.m. | 9 a.m. through 9:59 a.m. |
| 5 | 10 a.m. | 10 a.m. through 10:59 a.m. |
| 6 | 11 a.m. | 11 a.m. through 11:59 a.m. |
| 7 | 12 Noon | 12 p.m. through 12:59 p.m. |
| 8 | 1 p.m. | 1 p.m. through 1:59 p.m. |
| 9 | 2 p.m. | 2 p.m. through 2:59 p.m. |
| 10 | 3 p.m. | 3 p.m. through 3:59 p.m. |
| 11 | 4 p.m. | 4 p.m. through 4:59 p.m. |
| 12 | 5 p.m. | 5 p.m. through 5:59 p.m. |
| 13 | 6 p.m. | 6 p.m. through 6:59 p.m. |
| 14 | 7 p.m. | 7 p.m. through 7:59 p.m. |
| 15 | 8 p.m. | 8 p.m. through 8:59 p.m. |
| 16 | 9 p.m. | 9 p.m. through 9:59 p.m. |
| 17 | 10 p.m. | 10 p.m. through 10:59 p.m. |
| 18 | 11 p.m. | 11 p.m. through 11:59 p.m. |
| 19 | 12 Midnight | 12 a.m. through 12:59 a.m. |
| 20 | 1 a.m. | 1 a.m. through 1:59 a.m. |
| 21 | 2 a.m. | 2 a.m. through 2:59 a.m. |
| 22 | 3 a.m. | 3 a.m. through 3:59 a.m. |
| 23 | 4 a.m. | 4 a.m. through 4:59 a.m. |
| 24 | 5 a.m. | 5 a.m. through 5:59 a.m. |

* For some MOBILE6 hourly input parameters, overnight hours are grouped. Hourly inputs are representative of the same day or day type, but are reordered for input to MOBILE6 to start at 6 a.m.

**Application of MOBILE6 Commands and Associated Input Parameters**
All of the MOBILE6 commands that may affect calculating emissions factors (excluding some commands such as those that affect only the output format or content) are listed and described in the Tables 24 through 30. Respectively, these seven tables are: MOBILE6 Pollutants and Emission Rates, MOBILE6 External Conditions, MOBILE6 Vehicle Fleet Characteristics, MOBILE6 Activity, MOBILE6 State Programs, MOBILE6 Fuels, and MOBILE6 Alternative Emissions Regulations and Control Measures. These tables identify the combinations of MOBILE6 commands and parameters used for this 2002 actual emissions inventory analysis.

Because the task requires particulate matter emissions estimates for two particle size cutoffs, a second set of MOBILE6 command input files and emissions factor runs was required. (See PARTICLE SIZE command in Table 24.) Unless otherwise stated in the tables, input parameter values are applied in both Run 1 (PM-10) and Run 2 (PM-2.5).

Parameters associated with each MOBILE6 command are in general labeled as either EPA default, locality-specific or NOT APPLIED. The tabulated commands where the associated input parameters are labeled only as "EPA default" are generally not input for this analysis. MOBILE6 technical report references (electronic file names available on the EPA MOBILE Internet site [http://www.epa.gov/otaq/models/mobile6/m6tech.htm]) are provided for particular parameters.

The procedures used to develop the locality-specific inputs to MOBILE6 are detailed following the seven MOBILE6 input category tables.

**Table 24**
**MOBILE6 Pollutants and Emission Rates**

| Command | Function/Description | Input Parameter Source/Value |
|---|---|---|
| POLLUTANTS | Defines the basic set of pollutants to report. | Run 1) HC, CO, NOx<br><br>Run 2) (None) |
| PARTICULATES | Enables computation of particulate matter (PM) an related emissions factors. | Run 1) $SO_2$, $NH_3$, $SO_4$, OCARBON, ECARBON, GASPM, LEAD, BRAKE, TIRE<br><br>Run 2) $SO_4$, OCARBON, ECARBON, GASPM, LEAD, BRAKE, TIRE |
| PARTICULATE EF | Specifies location of files that contain the particulate emissions factors when PARTICULATES command is used. | EPA default emissions factors applied. |
| PARTICLE SIZE | Specifies the maximum particulate size cutoff value in micrometers used by MOBILE. | Run 1) 10.0<br><br>Run 2) 2.5. |
| EXPRESS HC AS VOC | One of five possible commands which allow the user to specify the particular HC species (non-methane HC, non-methane organic gases, total HC, total organic gases, and VOC) to report in the exhaust emissions output. | "VOC" command is applied. Only the command is required. |
| NO REFUELING | Directs MOBILE6 not to calculate refueling emissions factors. | APPLIED.<br>Only the command is required. |
| AIR TOXICS | Enables the computation of air toxic emissions factors (six explicit pollutants) and specifies which to calculate. | NOT APPLIED. |
| ADDITIONAL HAPS | Allows entry of emissions factors or air toxic ratios for calculation of additional user-defined air toxic pollutant emissions factors. | NOT APPLIED. |
| MPG ESTIMATES | Allows entry of alternate fuel economy performance data by vehicle class and model year. | NOT APPLIED. (MOBILE6 default values are assumed.) |

## Table 25
## MOBILE6 External Conditions

| Command | Function/Description | Input Parameter Source/Value |
|---|---|---|
| CALENDAR YEAR | Calendar year for which emissions factors are to be calculated. (Needed to run model). | 2002 |
| EVALUATION MONTH | Provides option of calculating January 1 or July 1 emissions factors for calendar year. | 7 (July), for summer season. |
| MIN/MAX TEMPERATURE | Sets minimum and maximum daily temperatures. (Required to run model if the HOURLY TEMPERATURES command is not used.) | NOT APPLIED. (See HOURLY TEMPERATURES.) |
| HOURLY TEMPERATURES | Allows temperatures input for each hour of day. (Required to run model if MIN/ MAX TEMPERATURE command is not used.) | TTI used San Antonio weather station data to develop hourly averages from 10 max 8-hr ozone exceedence days from June through August, 2000 through 2002. See Table 31. |
| ALTITUDE | Specifies high- or low-altitude for modeling area. | NOT APPLIED. (EPA default, low altitude, is assumed). |
| ABSOLUTE HUMIDITY | Used to specify daily average humidity (directly affects NOx emissions). MOBILE6 also converts absolute humidity to heat index which affects HC and CO emissions for the portion of the fleet that MOBILE6 determines is using air conditioning. | NOT APPLIED. (See RELATIVE HUMIDITY.) |
| <u>Environmental Effects on Air Conditioning</u>: | Commands used by MOBILE6 to model the extent of vehicle air-conditioning usage. | |
| CLOUD COVER | Specifies average percent cloud cover for given day. | NOT APPLIED. (EPA default assumed.) |
| PEAK SUN | Specifies Mid-day hours with peak sun intensity. | NOT APPLIED. (EPA default assumed.) |
| SUNRISE/ SUNSET | Allows user to specify time of sunrise and sunset. | NOT APPLIED. (EPA default assumed.) |
| RELATIVE HUMIDITY | Specifies use of 24 hourly relative humidity values entered by user. MOBILE6 will perform hour-specific calculations with hourly values rather than use single daily default absolute humidity value. | TTI used San Antonio weather station data to develop hourly averages from 10 max 8-hr ozone exceedence days from June through August, 2000 through 2002. See Table 31. |
| BAROMETRIC PRES | Specifies use of user input daily average barometric pressure for use with hourly relative humidity to calculate hourly absolute humidity values. | TTI used San Antonio weather station data to develop daily average from 10 max 8-hr ozone exceedence days from June through August, 2000 through 2002. See Table 31. |

**Table 26**
**MOBILE6 Vehicle Fleet Characteristics**

| Command | Function/Description | Input Parameter Source/Value |
|---|---|---|
| REG DIST | Allows the user to supply registration distributions by age for any of the 16 composite (combined gasoline and diesel) vehicle types. | Locality-Specific/EPA default. Developed by TTI.<br><br>Mid-year 2002 TxDOT county-level registrations data are applied for LDV, LDT and MC; SAN EAC regional data is applied for HDV; MOBILE6 default is used for buses. See Appendix E. |
| DIESEL FRACTIONS | Permits user to supply locality-specific diesel fractions for 14 of the 16 composite vehicle categories by age. | Locality-Specific/EPA default. Developed by TTI.<br><br>Mid-year 2002 TxDOT SAN EAC regional gasoline/diesel registrations data is used for HDV; LDV, LDT, Bus fractions are MOBILE6 defaults. See Appendix E. |
| MILE ACCUM RATE | Allows the user to supply the annual mileage accumulation rates by vehicle type and age. | NOT APPLIED. (EPA defaults are assumed — see technical report M6FLT.007.) |
| NGV FRACTION | Lets user specify percent of natural gas vehicles (NGV) in the fleet by type and age certified to operate on either compressed or liquefied natural gas. | NOT APPLIED. (The EPA default percentage of NGV vehicles in the fleet, zero, is assumed.) |
| NGV EF | Permits the user to enter alternate NGV emissions factors for each of the 28 vehicle types, for running and start emissions. | NOT APPLIED. (The EPA default, none, is assumed.) |

## Table 27
## MOBILE6 Activity

| Command | Function/Description | Input Parameter Source/Value |
|---|---|---|
| VMT FRACTIONS | Used in MOBILE6 to weight the emissions of various vehicle types into average rates for groupings of vehicle classes. | NOT APPLIED. (EPA default assumed, used for aggregate results which do not apply to this analysis.) |
| VMT BY FACILITY | VMT fractions by MOBILE6 road type combine the four road type emissions factors into the "all road types" emissions factors. | NOT APPLIED. (EPA default assumed, used for aggregate results with no impact on this analysis.) |
| VMT BY HOUR | Allows VMT fractions allocation by hour-of-day; applied in conversion of grams per hour (g/hr) to g/mi, as well as in weighting of hourly g/mi rates to obtain daily emissions factors. | SAN EAC region-specific. The hourly VMT fractions were produced using aggregated regional ATR data (same fractions used to distribute link VMT estimates by hour. See Table 4. |
| SPEED VMT | Allows user to allocate VMT by average speed (14 pre-selected: 2.5 and 5 through 65 at 5 mph increments) for arterials and freeways for each hour of the day. | Generic input. Same for all counties. Inputs are set up to calculate emissions factors by 14 MOBILE6 speed bin speed scenarios for MOBILE6 freeway and arterial road types. |
| AVERAGE SPEED | Allows a single average speed for combined freeways and arterials for the entire day. | NOT APPLIED. |
| STARTS PER DAY | Lets user specify the average number of engine starts per vehicle per day by vehicle types for weekend days and weekdays. | NOT APPLIED. (Used EPA weekday and weekend day-specific defaults — see technical report M6FLT.003.) |
| START DIST | Allows user to allocate engine starts by hour of the day for weekend days and weekdays. | NOT APPLIED. (Used EPA weekday and weekend day-specific defaults — see technical report M6FLT.003.) |
| SOAK DISTRIBUTION | Allows use of alternate vehicle soak duration distributions for weekend days and weekdays. | NOT APPLIED. (Used EPA weekday and weekend day-specific defaults — see technical reports M6FLT.003 and 004.) |
| HOT SOAK ACTIVITY | Allows users to specify a hot soak duration distribution for each of 14 daily time periods for weekend days and for weekdays. | NOT APPLIED. (Used EPA weekday and weekend day-specific defaults — see technical reports M6FLT.003 and 004.) |
| DIURN SOAK ACTIVITY | Allows user set diurnal soak time distributions for each of 18 daily time periods. | NOT APPLIED. (The EPA defaults are assumed. — see technical report M6FLT.006.) |
| WE DA TRI LEN DI | Specifies alternate fractions of VMT that occur during trips of various durations at each hour of the average weekday. | NOT APPLIED. (EPA defaults are assumed.) |
| WE EN TRI LEN DI | Specifies hourly alternate fractions of VMT for trips of various lengths for weekend days. | NOT APPLIED. |
| WE VEH US | Directs MOBILE6 to use weekend activity data for calculating emissions factors. | NOT APPLIED. |

**Table 28**
**MOBILE6 State Programs**

| Command | Function/Description | Input Parameter Source/Value |
|---|---|---|
| STAGE II REFUELING | Allows modeling of at-the-pump refueling emissions. | NOT APPLIED. Accounted for as an area source category. |
| ANTI-TAMP PROG | Allows user to model impacts of an anti-tampering program (ATP). | NOT APPLIED. (Although Texas administers a statewide ATP, ATP credit is only taken in those counties which also administer an enforced inspection/maintenance [I/M] program.) |
| I/M Commands:<br>I/M PROGRAM<br>I/M MODEL YEARS<br>I/M VEHICLES<br>I/M STRINGENCY<br>I/M COMPLIANCE<br>I/M WAIVER RATES<br>I/M CUTPOINTS<br><br>I/M EXEMPTION AGE<br>I/M GRACE PERIOD<br>NO I/M TTC CREDITS<br>I/M EFFECTIVENESS<br>I/M DESC FILE | <br>Required for exhaust/evaporative I/M programs.<br>Required for exhaust/evaporative I/M programs.<br>Required for exhaust/evaporative I/M programs.<br>Required for exhaust. Do not use for evaporative.<br>Required for exhaust. Optional for evaporative.<br>Required for exhaust. Optional for evaporative.<br>Optional for exhaust (but required for IM240). Do not use with evaporative.<br>Optional for both exhaust and evaporative.<br>Optional for both exhaust and evaporative.<br>Optional for exhaust. Do not use with evaporative.<br>Optional for exhaust. Do not use with evaporative.<br>Optional for both. | NOT APPLIED. No I/M program administered in SAN EAC counties. |

## Table 29
## MOBILE6 Fuels

| Command | Function/Description | Input Parameter Source/Value |
|---|---|---|
| FUEL PROGRAM | Allows specification of one of four options:<br>1) Conventional Gasoline East Tier2 sulfur phase-in schedule (includes Texas);<br>2) Reformulated Gasoline (RFG);<br>3) Conventional Gasoline West Tier2 sulfur geographical phase-in area schedule; or<br>4) Conventional Gasoline East with user input sulfur content for after 1999. | Option 4: Applied for all counties. TTI used City of San Antonio summer 2002 Northrop Grumman Mission Systems (or NGM, formerly TRW) sample survey data provided by TCEQ to estimate summer 2002 gasoline sulfur content (166 ppm). |
| SULFUR CONTENT | (or GASOLINE SULFUR) Allows use of alternate sulfur content for conventional gasoline through calendar year 1999. | NOT APPLIED. |
| DIESEL SULFUR | Allows use of ave. diesel fuel sulfur level for all calendar years. Required if PARTICULATES command is used. No affect on HC, CO, NOx, air toxics (except if calculated as ratio to PM). | Value of 364 ppm used for all Texas counties from NGM 2002 survey data provided by TCEQ |
| OXYGENATED FUELS | Allows modeling of oxygenated gasoline effects on exhaust for all gasoline-fueled vehicle types. Not for use with AIR TOXICS command. | NOT APPLIED. |
| FUEL RVP | Allows user to specify fuel RVP for area being modeled (required to run model). | TTI used San Antonio summer 2002 value, 7.5 psi, estimated by TCEQ based on the City of San Antonio summer 2002 NGB data. |
| SEASON | Identifies effective season for RFG calculation regardless of month modeled. | NOT APPLIED. |
| GAS AROMATIC% | Only when AIR TOXICS command is used. | NOT APPLIED. |
| GAS OLEFIN% | Only when AIR TOXICS command is used. | NOT APPLIED. |
| GAS BENZENE% | Only when AIR TOXICS command is used. | NOT APPLIED. |
| E200 | Only when AIR TOXICS command is used. | NOT APPLIED. |
| E300 | Only when AIR TOXICS command is used. | NOT APPLIED. |
| OXYGENATE | Only when AIR TOXICS command is used. | NOT APPLIED. |
| RVP OXY WAIVER | Only when AIR TOXICS command is used. | NOT APPLIED. |

## Table 30
## MOBILE6 Alternative Emissions Regulations and Control Measures

| **Command** | **Function/Description** | **Input Parameter Source/Value** |
|---|---|---|
| NO CLEAN AIR ACT | Models vehicle emissions as if the Federal Clean Air Act Amendments of 1990 had not been implemented. | NOT APPLIED. |
| HDDV NOx Off-Cycle Emissions Effects: | | |
| NO DEFEAT DEVICE | Turns off the effects of the HDD vehicle NOx off-cycle emissions effects (defeat device emissions). | NOT APPLIED. |
| NO NOX PULL AHEAD | Turns off HDD NOx emissions reduction effects of Pull- Ahead program. | NOT APPLIED. |
| NO REBUILD | Turns off HDD NOx emissions reduction effects of Rebuild program. | NOT APPLIED. |
| REBUILD EFFECTS | Allows user change Rebuild program effectiveness rate. | User-input, latest actual estimate provided by TCEQ, 0.01. |
| Tier 2 Emission Standards and Fuel Requirements: | Allow the overriding of the default Tier 2 emissions standards and fuel requirements settings. | NOT APPLIED. |
| NO TIER2 | Disables Tier 2 requirements. | |
| T2 EXH PHASE-IN | Allows alternate Tier 2 exhaust standard phase-in schedules. | |
| T2 EVAP PHASE-IN | Allows alternate Tier 2 evaporative standard phase-in schedules. | |
| T2 CERT | Allows user to specify alternate Tier 2 50,000-mile certification standards. | |
| 94+ LDG IMPLEMENTATON | Allows use of alternate 1994 and later fleet penetration fractions for LDGVs under the Tier 1, NLEV (or California LEV 1), and Tier 2 emissions standard programs. | NOT APPLIED. |
| NO 2007 HDDV RULE | Disables 2007 HDV emissions standards. | NOT APPLIED. |

**External Conditions**
MOBILE6 inputs were based on 10 maximum eight-hour standard ozone exceedence days for the June through August summer periods during 2000 through 2002. With EPA guidance (Procedures for Emissions Inventory Preparation, Vol. IV, Mobile Source, 1992) and the 2000 through 2002 San Antonio area ozone exceedance data provided by TCEQ, TTI defined the three-month period (June through August) to select the 10 maximum exceedence days to use for developing the MOBILE6 weather inputs. TTI used San Antonio weather station (San Antonio International Airport) data from these 10 days to calculate average hourly temperatures, average hourly relative humidity values, and average daily barometric pressure inputs reflective of the ozone season conditions. Table 31 shows the values used.

The weather station raw data files, eight-hour ozone exceedance data spreadsheet and input value calculations spreadsheet were provided on CD-ROM (see description in Appendix A).

**Table 31**
**Hourly Temperature, Hourly Humidity and Daily Barometric Pressure Input Values***

| Hour (CDT) | Temperature (F) | Relative Humidity (%) | Barometric Pressure (inches Hg) |
|---|---|---|---|
| 12 a.m. to 1 a.m. | 75.1 | 78.4 | 29.1 |
| 1 a.m. to 2 a.m. | 74.2 | 80.5 | 29.1 |
| 2 a.m. to 3 a.m. | 73.4 | 82.5 | 29.1 |
| 3 a.m. to 4 a.m. | 72.5 | 84.4 | 29.1 |
| 4 a.m. to 5 a.m. | 72.4 | 85.0 | 29.1 |
| 5 a.m. to 6 a.m. | 74.8 | 82.3 | 29.2 |
| 6 a.m. to7 a.m. | 78.8 | 73.9 | 29.2 |
| 7 a.m. to 8 a.m. | 82.0 | 62.9 | 29.2 |
| 8 a.m. to 9 a.m. | 84.9 | 55.1 | 29.2 |
| 9 a.m. to 10 a.m. | 87.3 | 49.1 | 29.2 |
| 10 a.m. to 11 a.m. | 89.2 | 44.9 | 29.2 |
| 11 a.m. to 12 p.m. | 90.6 | 41.6 | 29.1 |
| 12 p.m. to 1 p.m. | 92.5 | 38.3 | 29.1 |
| 1 p.m. to 2 p.m. | 92.6 | 36.8 | 29.1 |
| 2 p.m. to 3 p.m. | 92.6 | 36.6 | 29.1 |
| 3 p.m. to 4 p.m. | 92.6 | 36.2 | 29.1 |
| 4 p.m. to 5 p.m. | 91.3 | 37.0 | 29.1 |
| 5 p.m. to 6 p.m. | 88.1 | 42.6 | 29.1 |
| 6 p.m. to 7 p.m. | 84.9 | 47.3 | 29.1 |
| 7 p.m. to 8 p.m. | 82.5 | 53.4 | 29.1 |
| 8 p.m. to 9 p.m. | 81.7 | 57.1 | 29.1 |
| 9 p.m. to 10 p.m. | 79.6 | 64.3 | 29.1 |
| 10 p.m. to 11 p.m. | 77.7 | 70.2 | 29.1 |
| 11 p.m. to 12 a.m. | 76.9 | 73.5 | 29.1 |
| 24-hr average | | | 29.1 |

* Developed by averaging data from the 10 unique days with the highest 8-hour average ozone concentrations from the months June through August and years 2000 through 2002. These 10 days are: from 2000 — None; from 2001 — 6/18; and from 2002 — 6/17, 6/18, 6/23, 6/24, 6/25, 8/05, 8/06, 8/30, and 8/31. See Sat20002002_jun-augTop10.xls on CD-ROM provided (description in Appendix A).

*Temperatures (HOURLY TEMPERATURES Command)*
The HOURLY TEMPERATURES command was applied to specify local hourly temperature values for the SAN EAC counties.

TTI developed one set of ambient hourly temperatures (degrees Fahrenheit) MOBILE6 input for all four SAN EAC area counties based 8-hour maximum exceedance data as described above (see Table 31). Hourly temperatures from the 10 maximum exceedence days were averaged within each hour.

The temperatures were sequenced as required for input to MOBILE6 starting with the 6 a.m. hour. The same hourly temperatures were used for all counties. The temperatures are a MOBILE6 command file input. MOBILE6 input files were provided on CD-ROM as described in Appendix A.

*Relative Humidity (RELATIVE HUMIDITY Command)*
The RELATIVE HUMIDITY command was applied to specify local hourly percent relative humidity values for the area.

The hourly relative humidity inputs were developed following the same procedure as described above for the hourly temperature input development (see Table 31). The humidity parameter is input in the MOBILE6 command file. MOBILE6 input files were provided on CD-ROM as described in Appendix A.

*Barometric Pressure (BAROMETRIC PRES Command)*
The BAROMETRIC PRES command was used to specify the 24-hour average barometric pressure value (in units of inches of Mercury) for input to MOBILE6.

The hourly relative humidity inputs were developed in the same manner and using the same monitoring station data sets as described above for the hourly temperature and hourly relative humidity input, except hourly values were averaged to get the required daily input value (Table 31). The barometric pressure is input in the MOBILE6 command file.

**Vehicle Fleet Characteristics**
Vehicle registration (age) distributions and diesel fractions inputs to MOBILE6 were developed from TxDOT mid-year 2002 county vehicle registration data for those vehicle types where TxDOT registrations data were available. EPA defaults were used where necessary. Due to sparse registration data for some vehicle classes resulting from the increased disaggregation level of the vehicle classifications in MOBILE6 (28 vehicle types versus the previous eight vehicle class scheme), the HDV registrations data are grouped for the four-county EAC area for developing the age distributions and diesel fractions input.

*Vehicle Registration Distributions (REG DIST Command)*
The user-supplied vehicle registration distributions input to MOBILE6 are by vehicle age for any of the 16 composite (combined gas and diesel) vehicle types as shown in Table 32. EPA default distributions are internally applied by MOBILE6 for vehicle classes for which the user does not

provide alternate values. The input values for each vehicle class are 25 age fractions representing the fraction of vehicles by age for that particular vehicle class as of July of the evaluation year. These age fractions start with the evaluation year as the 1st age fraction and work back in annual increments to end with the 25th fraction, which represents the fraction of vehicles of age 25 years and older. The fractions are calculated as the model year-specific registrations in a class divided by the total vehicles registered in that class.

**Table 32**
**Composite Vehicle Classes for Vehicle Registration Data**
**(REG DIST Command)**

| Number | Abbreviation | Description |
|---|---|---|
| 1 | LDV | Light-Duty Vehicles (Passenger Cars) |
| 2 | LDT1 | Light-Duty Trucks 1 (0-6,000 lbs. GVWR, 0-3,750 lbs. LVW) |
| 3 | LDT2 | Light-Duty Trucks 2 (0-6,000 lbs. GVWR, 3,751-5,750 lbs. LVW) |
| 4 | LDT3 | Light-Duty Trucks 3 (6,001-8,500 lbs. GVWR, 0-5,750 lbs. ALVW*) |
| 5 | LDT4 | Light-Duty Trucks 4 (6,001-8,500 lbs. GVWR, 5,751 lbs. and greater ALVW) |
| 6 | HDV2B | Class 2b Heavy-Duty Vehicles (8,501-10,000 lbs. GVWR) |
| 7 | HDV3 | Class 3 Heavy-Duty Vehicles (10,001-14,000 lbs. GVWR) |
| 8 | HDV4 | Class 4 Heavy-Duty Vehicles (14,001-16,000 lbs. GVWR) |
| 9 | HDV5 | Class 5 Heavy-Duty Vehicles (16,001-19,500 lbs. GVWR) |
| 10 | HDV6 | Class 6 Heavy-Duty Vehicles (19,501-26,000 lbs. GVWR) |
| 11 | HDV7 | Class 7 Heavy-Duty Vehicles (26,001-33,000 lbs. GVWR) |
| 12 | HDV8A | Class 8a Heavy-Duty Vehicles (33,001-60,000 lbs. GVWR) |
| 13 | HDV8B | Class 8b Heavy-Duty Vehicles (>60,000 lbs. GVWR) |
| 14 | HDBS | School Buses |
| 15 | HDBT | Transit and Urban Buses |
| 16 | MC | Motorcycles (All) |

* ALVW is the numerical average of the vehicle curb weight and the GVWR.
Source: MOBILE6 User's Guide (EPA, January 2002).

TTI developed MOBILE6 age distributions fractions input from TxDOT data for all vehicle types except for the two bus categories. EPA defaults were used for the two bus categories. To develop these distributions, TTI used two county-level data sets provided by TxDOT. The TxDOT registrations data provided are summarized as:

- July 2002 registrations for:
  gasoline and diesel: LDV, LDT12, LDT34, MC, HDGT, HDDT; and
- July 2002 registrations for:
  gasoline: HDV2B, HDV3, HDV4, HDV5, HDV6, HDV7, HDV8A, HDV8B; and
  diesel: HDV2B, HDV3, HDV4, HDV5, HDV6, HDV7, HDV8A, HDV8B.

The LDT12 and LDT34 classes of the combined gasoline and diesel registrations data set correspond to the MOBILE6 classes LDT1 and LDT2, and LDT3 and LDT4, respectively. The aggregate HDGTs and HDDTs were not used.

First the registrations data for each of the HDV classes (numbers 6 through 13 in Table 32) for the four counties were aggregated to the regional level. Then there are three steps to developing the MOBILE6 registration distributions input for the 14 non-bus vehicle classes. The first step in the process develops the July 2002 registrations by the 25 age groups for 12 of the 16 composite (by fuel) vehicle classes (the eight HDV classes, LDV, LDT12, LDT34, MC). The second step converts the registrations from numbers of vehicles registered, to fractions registered by age for each of these 12 classes. The registrations are then expanded from 12 to 14 vehicle classes.

The 16 HDV class registrations were combined into the MOBILE6 eight composite (gasoline and diesel) classes by summing the individual fuel type registrations by age within each weight category. The 1978 and older registrations were summed to yield the “age 25 and older” registrations for each of the 12 composite vehicle classes (i.e. the eight HDV classes plus LDV, LDT12, LDT34, and MC.

The conversion of the registrations from numbers of vehicles to fractions of vehicles by age was made for each vehicle class by dividing the registrations for each age by the total registrations. MOBILE6 requires that the age distribution fractions for each vehicle class sum to one. In this step the age distribution fractions for each class were summed. For sums not equal to one (due to rounding error), the largest registration fraction was adjusted to make the fractions sum to one.

The resulting July 2002 estimated vehicle age distribution fractions for the 12 composite classes were then expanded to 14 classes by using the LDT12 age fractions for the LDT1 and LDT2 classes, and using the LDT34 age fractions for the LDT3 and LDT4 classes. The MOBILE6 vehicle registration distributions are input from external data files. The external data files were provided on CD-ROM (see description in Appendix A). The registrations distributions for each county are shown in Appendix E.

*Diesel Fractions (DIESEL FRACTIONS Command)*
The DIESEL FRACTIONS command allows the user to specify diesel fractions for 14 of the 16 composite (gasoline and diesel) vehicle categories by vehicle age. MOBILE6 assumes that urban/transit buses are 100 percent diesel, and that motorcycles are all gasoline fueled, so these two categories do not require diesel fractions. The diesel fraction represents the portion of diesels in a composite (gasoline and diesel) vehicle class for any vehicle age. When the user enters diesel fractions, all 14 sets of fractions are required. Each set of fractions contains the diesel fractions for 25 vehicle ages from the evaluation year back through the $25^{th}$ fraction, which represents vehicle ages of 25 years and older.

The MOBILE6 default fractions vary by age for model years 1972 through 1996. For 1971 and earlier model years, the default diesel fractions are assumed the same as the 1972 model year fractions. For the 1997 and later model years, the default diesel fractions are assumed the same as the 1996 model year fractions.

TTI developed one 2002 SAN EAC regional-level diesel fractions input data set, using a combination of estimated TxDOT diesel fractions and EPA default diesel fractions. Table 33 shows the MOBILE6 diesel fractions input sequence and categories with corresponding data sources. The diesel fraction estimates were calculated based on TxDOT individual diesel and gasoline vehicle registrations for the eight HDV (HDV2b through HDV8b) weight classes. To produce the HDV diesel fractions by model year, the diesel registrations were divided by the sum of the gasoline and diesel registrations, by HDV composite vehicle class, and model year. The 2002 regional diesel fractions estimate input are shown in Appendix E following the registrations distributions inputs for each county.

**Table 33**
**Source of Diesel Fractions for Composite Vehicle Types**
**(DIESEL FRACTIONS Command)**

| Number | Label | Description | Source of Fractions |
|---|---|---|---|
| 1 | LDV | Light-Duty Vehicles | MOBILE6 evaluation year default |
| 2 | LDT1 | Light-Duty Trucks 1 | MOBILE6 evaluation year default |
| 3 | LDT2 | Light-Duty Trucks 2 | MOBILE6 evaluation year default |
| 4 | LDT3 | Light-Duty Trucks 3 | MOBILE6 evaluation year default |
| 5 | LDT4 | Light-Duty Trucks 4 | MOBILE6 evaluation year default |
| 6 | HDV2B | Class 2b Heavy-Duty Vehicles | TxDOT July, 2002 SAN EAC region registrations |
| 7 | HDV3 | Class 3 Heavy-Duty Vehicles | TxDOT July, 2002 SAN EAC region registrations |
| 8 | HDV4 | Class 4 Heavy-Duty Vehicles | TxDOT July, 2002 SAN EAC region registrations |
| 9 | HDV5 | Class 5 Heavy-Duty Vehicles | TxDOT July, 2002 SAN EAC region registrations |
| 10 | HDV6 | Class 6 Heavy-Duty Vehicles | TxDOT July, 2002 SAN EAC region registrations |
| 11 | HDV7 | Class 7 Heavy-Duty Vehicles | TxDOT July, 2002 SAN EAC region registrations |
| 12 | HDV8A | Class 8a Heavy-Duty Vehicles | TxDOT July, 2002 SAN EAC region registrations |
| 13 | HDV8B | Class 8b Heavy-Duty Vehicles | TxDOT July, 2002 SAN EAC region registrations |
| 14 | HDBS | School Buses | MOBILE6 Evaluation Year Default |

**Activity**
The locality-specific activity parameters used to develop the hourly emissions factors are fleet hourly VMT fractions (through the VMT BY HOUR command). Additional non-default (however, generic) activity inputs to the model were hourly fractions of VMT by the 14 speeds for Arterials and Freeways (see SPEED VMT command below).

*VMT Fractions (Also Known as VMT Mix)*
These sets of fractions (VMT fractions attributable to individual vehicle classes) are an input to MOBILE6, however, the method for this study requires the application of the VMT mix (or mixes) later in the emissions calculation process. VMT mix development was discussed previously in this documentation.

*Total VMT by Hour (VMT BY HOUR Command)*
Hourly fleet total VMT distributions are input to MOBILE6 by using the VMT BY HOUR command. These fractions are used by MOBILE6 to convert the units of the non travel-related hourly emissions factors (e.g., hot soak, diurnal, start, etc.) to units of g/mi. (The VMT by hour fractions are also used to produce the daily emissions factors as composites of the hourly emissions factors.)

Development of the hourly travel fractions for the SAN EAC area were previously discussed in the "Hourly Travel and Directional Factors" section. These same hourly fractions, used to distribute VMT by hour of day, are applied as input to MOBILE6. The only differences are in sequence (MOBILE6 hourly input starts with the 6 a.m. fraction) and format. These fractions are input to MOBILE6 as an external data file. Table 4 shows the hourly travel factors. The MOBILE6 external data files are included on CD-ROM, as described in Appendix A.

*VMT Distribution by Average Speed on Freeways and Arterials (SPEED VMT Command)*
The VMT distributions by average speed inputs are called by the SPEED VMT command, but are accommodated internally by the POLFAC62 program (that is, no user speed input commands or data parameter values are required when producing MOBILE6 emissions factors tables with POLFAC62). POLFAC62 uses the SPEED VMT inputs to produce the individual Freeway and Arterial emissions factors indexed by the 14 MOBILE6 speed bin speeds.

There are 14 scenarios, each with 100 percent of Freeway and Arterial VMT set to one of the 14 MOBILE speed bin speeds. Each scenario produces a set of Arterial and Freeway emissions factors corresponding to one of the 14 speeds.

**State Programs**
There are no MOBILE6 State Programs descriptive inputs (i.e., I/M, ATP, and Stage II refueling programs) modeled.

**Fuels – Locality-Specific Inputs to MOBILE6**
User inputs for fuel effects modeling for SAN EAC area counties includes the FUELS PROGRAM, DIESEL SULFUR, and FUEL RVP commands and associated input parameters.

The fuel property input parameters applied (see Table 34) are gasoline and diesel sulfur content in parts-per-million (ppm) and gasoline RVP. Diesel and gasoline sample survey data used to estimate the input values (also for winter season, used for annual emissions estimates) are from the reports "Motor Gasolines, Summer 2002," "Motor Gasolines, Winter 2001-2002," and "Diesel Fuel Oils, 2002," by Northrop Grumman Mission Systems (or NGM, formerly TRW). Gasoline sample analysis results were reported in the NGM surveys for six Texas cities, including San Antonio. Thus the San Antonio survey data were used to estimate fuel property inputs for this analysis.

TCEQ estimated weighting factors by fuel grade for calculating average gasoline fuel property inputs from the grade-specific survey sample averages. TCEQ developed these weighting factors using Texas 2001 gasoline sales volume by grade data. The gasoline sales volume values used are the Texas average monthly “to end users through retail outlets”values from Table 43 of the Department of Energy, Energy Information Administration “Petroleum Marketing Annual 2001” (see http://www.eia.doe.gov/oil_gas/petroleum/data_publications/petroleum_marketing_annual/pma_historical.html). (Mid-grade volumes, about 15 percent of total, were excluded from the sales volume weight calculation because no mid-grade gasoline sample data were available.) The weighting is 86 percent premium and 14 percent regular.

TCEQ provided the gasoline sample data and spreadsheets with summer and winter average RVP calculations to TTI. Using these gasoline survey data and fuel grade weights, TTI estimated summer and winter 2002 average gasoline sulfur content. The spreadsheet calculations were provided in the electronic data submittal, described in Appendix A.

**Table 34**
**San Antonio Fuel Property Inputs* to MOBILE6**

| Fuel | Summer | | | Winter | | |
|---|---|---|---|---|---|---|
| | RVP (psi) | Sulfur (ppm) | Samples | RVP (psi) | Sulfur (ppm) | Samples |
| Gasoline* | 7.5 | 166 | 10 | 12.3 | 199 | 20 |
| Diesel** | NA | 364 | 19 | NA | NA | 0 |

* Based on NGM 2002 San Antonio gasoline sample survey data.
** Diesel sulfur content value is a straight average of 2002 on-highway diesel fuel sample values reported by refiners marketing to Texas, as reported in “Diesel Fuel Oils, 2002” (NGM).

*Fuel Program (FUEL PROGRAM Command)*
The MOBILE6 FUEL PROGRAM command provides the user four options for modeling fuels effects. Option four was used which models Conventional Gasoline East and requires user-input post-1999 gasoline sulfur values. The required inputs are average gasoline sulfur content (ppm) values for 2000 through 2015 and a corresponding set of maximum sulfur levels to which those model year vehicles are exposed. All of the input values used were MOBILE6 defaults except for the estimated summer 2002 average sulfur content value shown in Table 34. The FUEL PROGRAM option and input parameter values are entered in the MOBILE6 command file. MOBILE6 command files were submitted on CD-ROM (see the electronic data submittal description in Appendix A).

*Gasoline RVP (FUEL RVP Command)*
The fuel RVP command was used to input the summer 2002 San Antonio estimated RVP value; the MOBILE6 command file input value used is 7.5 psi.

*Diesel Sulfur (Diesel Sulfur Command)*
Diesel Sulfur command was used to input the estimated Texas 2002 diesel sulfur content input value; the MOBILE6 command file input value used is 364 ppm.

**MOBILE6 Alternative Emissions Regulations and Control Measures Commands**

The only user-input value applied (which was not required because the EPA default was input) within this section of MOBILE6 commands, is related to the HDDV NOx off-cycle emissions effects.

In the late 1980s and most of the 1990s, HDDV engines were built with "defeat devices" allowing in-use engine emissions to be higher than emissions as specified under Federal Test Procedure conditions. MOBILE6 includes estimates of these excess HDDV emissions as well as the emissions offsetting effects of two programs — early pull-ahead of 2004 HDDV emissions standards, and low emissions rebuilds of existing engines.

TCEQ estimated a 1.0 percent effectiveness rate for the low-NOx emissions rebuilds program for heavy-duty diesels. This is the latest available estimate. The basis of TCEQ's estimates was based on information provided by EPA showing that the number of low-NOx-rebuild kits supplied (as of January, 2002) to the affected population was 0.97 percent.

The MOBILE6 effectiveness rate input for the low NOx emissions rebuild program was set at 1.0 percent through the REBUILD EFFECTS command.

Using the above-described MOBILE6 input parameters and options, MOBILE6 input files were set up and run with the POLFAC62 program. The resulting tabulated hourly emissions factors indexed by speed, MOBILE6 drive cycle, vehicle type, and pollutant-specific emissions type were input to the emissions calculation program, IMPSUM62. The modeled emissions factors were provided on CD-ROM. (See description in Appendix A.)

**ESTIMATION OF ANNUALIZATION RATIOS**

TTI developed a methodology for producing annual emissions estimates from seasonal weekday emissions estimates. There are two elements in the annualization methodology. The first is the VMT adjustment that converts the seasonal weekday VMT component of seasonal weekday emissions to annual VMT. The second is the emissions rate adjustment that is required to accommodate changes in emissions rates between a particular season and the rest of the year (due to seasonal variation in temperatures and RVP of gasoline). The general expression below shows how the VMT annualization factor ($VMT_{ANNFAC}$) and the emissions rate annualization factors ($ER_{ANNFAC}$) are applied to, in the case for this analysis, ozone season weekday emissions ($EM_{OWKD}$) for each county to produce the annual emissions estimate ($EM_{ANNUAL}$). For each county, a single $VMT_{ANNFAC}$ was applied to all pollutants and vehicle types, whereas a separate $ER_{ANNFAC}$ was developed and applied per pollutant and vehicle type.

$$EM_{ANNUAL} = EM_{OWKD} \times VMT_{ANNFAC} \times ER_{ANNFAC}$$

**Annualization Ratios for Summer Weekday VMT**

To produce link-level summer weekday VMT for the ozone season weekday emissions analyses, the HPMS consistent, ozone season weekday VMT control total were used (Table 1). The control totals consist of the 2002 HPMS AADT VMT for each county (Table 3) and an ozone season weekday adjustment factor. Thus to annualize the summer weekday VMT, a factor was developed to produce AADT VMT, and to expand from the daily to the annual period. This VMT annualization factor is the inverse of the summer weekday adjustment factor multiplied by 365.

The SAN EAC counties ozone season weekday VMT adjustment factor is 1.09464. The VMT annualization factor for each county is thus (1/1.09464) × 365, or 333.4429584. Conceptually, this value represents the number of days of ozone season weekday VMT equivalent to calendar year 2002 VMT total. Table 2 shows the annual VMT by county.

**Annualization Ratios for Average Summer Weekday Emissions Rates**

In addition to the VMT annualization component, ratios of emissions factors ($ER_{ANNFAC}$) were needed to convert ozone season weekday emissions to annual emissions. For the SAN EAC region one set of emissions rate ratios were developed by pollutant and vehicle type.

To develop the emissions rate annualization ratios, seasonal emissions factors were modeled to accommodate changes in emissions rates from the seasonal variation in meteorology and gasoline properties. Taking the month-weighted average of the seasonal EFs ($EF_{SUMMER}$, $EF_{WINTER}$), the annual average daily emission factor ($EF_{AAD}$) was produced. Finally, the $EF_{AAD}$ was divided by the $EF_{SUMMER}$ for each pollutant and vehicle type, yielding the desired annualization ratios.

The year was divided into two seasons with equal weighting, summer and winter, reflecting the mild climate in the San Antonio region. The National Climatological Data Center Meteorological Data (hourly summaries) for 2002 from San Antonio International Airport were used to develop summer and winter average hourly temperature and relative humidity inputs, and daily average barometric pressure inputs. Data for the three-month period January, February, and December and for the period June through August were used for the winter and summer seasons, respectively. The climate inputs for both winter and summer used to calculate the seasonal emissions factors for the annualization procedure are listed in Appendix F. The weather station hourly data files and spreadsheets used to calculate the average seasonal climate inputs were provided on CD-ROM as described in Appendix A.

The general expression for an emissions rate annualization factor as applied in this analysis is:

$$
\begin{aligned}
ER_{ANNFAC} &= (0.5 \times EF_{SUMMER} + 0.5 \times EF_{WINTER})/EF_{SUMMER} \\
&= EF_{AAD}/EF_{SUMMER}
\end{aligned}
$$

For example, the $EF_{SUMMER}$ and $EF_{WINTER}$ for Bexar County LDGV VOC are 1.20646 grams/mile (g/mi) and 1.51350 g/mi respectively, thus the Bexar County LDGV VOC emissions rate annualization factor (for application to LDGV VOC emissions at the individual county level) is:

$$ER_{ANNFAC}\text{ (LDGV VOC)} = [0.5(1.20646\text{ g/mi}) + 0.5(1.51350\text{ g/mi})] / 1.17209\text{ g/mi}$$
$$= 1.35998\text{ g/mi}/1.20646\text{ g/mi}$$
$$= 1.12725$$

The emissions factor annualization ratios were developed using daily MOBILE6 emissions factors (see POLFAC62 *.rtd output files provided on CD-ROM) at a nominal speed of 40 mph. The values used in the example above were taken from data files provided on CD-ROM as described in Appendix A. In addition to the San Antonio-specific seasonal meteorological and fuel property inputs, regional (four-county) level calendar year 2002 registration distributions and diesel fractions were used. The MOBILE6 inputs used that differ from those in the ozone season weekday emission factor set-ups are listed, along with the SAN EAC area emission rate annualization ratios in Appendix F.

## EMISSIONS CALCULATIONS

Hourly emissions were calculated at the network link level using the IMPSUM6 program (Appendix B). Generally, for each hour the average ozone season weekday, link-VMT estimates were multiplied by the ozone season hourly emissions factors (g/mi) to produce hourly emissions estimates for each of the 28 vehicle types and each pollutant on each network link (i.e. TDM network links and HPMS virtual links, depending on county). The MOBILE6 Freeway, Arterial, or Ramp emissions factors were used depending on the link facility type code. The SUMALL6 program was applied to produce the daily summaries and convert daily emissions estimates to annual estimates and to summarize the results. There were three types of files output from the emissions calculations — an emissions summary file of county-level and area total hourly and 24-hour emissions estimates cross classified by vehicle type and road type (including VMT, vehicle hours traveled, VMT weighted speeds, and VMT mix); a tab-delimited version of the emissions summary file; and a log file containing the emissions calculation program execution records. An additional set of NIFv3.0 formatted EI results were also produced. These files are provided on CD-ROM (see Appendix A).

### Hourly Link Emissions

For each county, the emissions were calculated by hour for each link using the following basic inputs:

- MOBILE6 hourly Freeway, Arterial, and Ramp emissions factors indexed by speed for 28 vehicle types, developed with POLFAC62;

- records associating the MOBILE6 Freeway emissions factors to the freeway links, and the MOBILE6 Arterial emissions factors to the non-freeway links (excluding Ramps), and MOBILE6 Ramp emissions factors to the TDM network links coded as Ramp;

- link-specific operational VMT and speed estimates as developed (for each hour) for TDM network and added intrazonal links (or HPMS virtual links) using the PREPIN program to include: A-node (HPMS area type code), B-node (HPMS functional class code), county number, functional classification code (HPMS area type and functional class cross combination code), link length (HPMS center lane miles), congested speed, and VMT; and

- VMT mix (to allocate link VMT by each of the 28 vehicle types) by time period and roadway type.

For each hour, the emissions estimates were computed by vehicle type for each link. The emissions factors for each county were tabulated in look-up tables by hour, road type (drive cycle), vehicle type, and 14 speeds (2.5 mph and 5 mph to 65 mph at 5 mph intervals). County-group-level, 24-hour VMT mix correlated to functional classification, were multiplied by the fleet total link VMT to produce hourly link VMT estimates by the 28 vehicle types. Emissions factors were then matched with link-level VMT based on county, speed, road type, hour, and vehicle class. Emissions factors for link speeds that are not represented in the set of 14 MOBILE6 speed bin speeds were calculated by interpolation (see example calculation, Appendix B). For link speeds greater than or less than the MOBILE6 bounding speeds of 65 mph and 2.5 mph, the emissions factors corresponding to those bounding speeds were used, respectively. The link VMT were then multiplied by the emissions factors to produce the link-level emissions estimates.

Tables 35 and 36 show the correlation of the functional classes to the MOBILE6 drive cycles and to the VMT mix functional classification groups, as used in the emissions calculations for the TDM network counties and the HPMS-based counties, respectively.

**Table 35**
**San Antonio TDM Network Functional Class Groupings for**
**Allocation of VMT Mix and MOBILE6 Drive Cycle Emissions Factors**

| MOBILE6 Drive Cycle | Functional Class Name | VMT Mix Functional Group |
|---|---|---|
| Freeway | Radial Freeway | Freeway |
| | Expressway | |
| | Circular Freeway | |
| Ramp | Ramp | Arterial |
| Arterial | Radial Parkway | |
| | Primary Arterial Divided | |
| | Primary Arterial Undivided | |
| | Minor Arterial Divided | |
| | Minor Arterial Undivided | |
| | Circular Parkway | |
| | Circular Arterial Undivided | |
| | Collectors Divided | Collector/Local |
| | Collectors Undivided | |
| | Centroid Connector | |
| | Intrazonal | |

**Table 36**
**HPMS Functional Class Groupings for**
**Allocation of VMT Mix and MOBILE6 Drive Cycle Emissions Factors**

| MOBILE6 Drive Cycle | HPMS Functional Class | VMT mix Functional Group |
|---|---|---|
| Freeway | Interstate | Freeway |
| | Freeway | |
| Arterial | Other Principal Arterial | Arterial |
| | Minor Arterial | |
| | Major Collector | Collector |
| | Minor Collector | |
| | Local | |

**Ozone Season Weekday (24-hour) Emissions**
For each county, the link-emissions estimates were summed for each hour, and the hourly emissions were summed for each day. The resulting composite VOC, CO, NOX, SO2, NH3, PM-10 and PM-2.5 emissions estimates are summarized in pounds by road type, vehicle type, and road type and vehicle type cross classification. VMT, VHT, VMT-weighted speeds, and other inventory data are included with the emissions summaries. The estimated annual VMT and emissions (discussed below) are also included in the summaries. These files (*.LST and a tab delimited version, *.TAB) are included with the set of data files provided on CD-ROM (see Appendix A).

**Annual Emissions**
The methodology for producing annual estimates was an annualization of the ozone season weekday emissions estimates. One county-level VMT annualization factor was multiplied to ozone season weekday emissions (for all pollutants) at the vehicle- and roadway-type level. The emissions rate annualization ratios were also multiplied by the ozone season weekday emissions, but on a pollutant- and vehicle-type specific basis (i.e., 28 ratios per pollutant).

The following example shows the calculation for the annualization of the ozone season weekday Bexar County collector LDGV CO emissions:

Annual LDGV collector CO emissions = ozone season weekday collector LDGV CO emissions × VMT annualization factor ×LDGV CO emissions factor annualization ratio

Where:

Ozone season weekday LDGV collector
CO emissions = 403.7060 tons/day;
VMT annualization factor = 333.4429584 days/year; and
LDGV CO emissions factor annualization ratio = 1.22134

Annual collector LDGV CO emissions = 403.7060 tons/day × 336.5389048 days/year × 1.23121
= 164408.2 tons/year.

The input values for this example may be found in the EI input files and output files provided, as described in Appendix A. The emissions factor annualization ratios are also summarized in Appendix F. Additionally, the ozone weekday emissions were converted from units of pounds to tons for this example (using 2,000 lbs./ton conversion factor).

# APPENDIX A
# ELECTRONIC SUBMITTAL DATA SET NAMES AND DESCRIPTIONS

**2002 CERR EI Electronic Data Submittal Description**

TTI provided the data described below on CD-ROM (1) to TCEQ to support the Texas 242 counties 2002 CERR NEI task. Files were “WinZipped”with paths so that once uncompressed, Job Control Files (JCFs) (provided in Part 5) can be used to locate emissions factor input/output files in the file directories as used in the emissions factor and emissions modeling runs. The parts to this data submittal are:

- Part 1, Detailed Emissions Data Summaries;
- Part 2, Emissions Factors;
- Part 3, Annualization Ratios;
- Part 4, Climate and Fuel Parameters; and
- Part 5, NIFv3.0 Emissions Files and Job Control Files.

County-level EI methods and data aggregation levels for input parameter development varied depending on: 1) whether the county was in one of the six AQP areas (see table below), and 2) AQP-county TDM availability. AQP counties with TDMs used the TDM-link-based methodology; other counties used the HPMS-based virtual link method. All AQP counties used county level vehicle registration distributions and AQP region-level — ATR factors, climate data, diesel fractions. The remaining counties (216) use climate zone data (eight zones/data sets), ATR factors and registration distributions developed at the TxDOT District level (25), and state level diesel fractions. Sample-survey-based fuel parameter input estimates were developed for five Texas cities and allocated to the 242 counties based on county/city survey proximity and fuel regulation boundaries.

| Area | Counties | Activity Basis |
|---|---|---|
| Houston/Galveston (HGA) nonattainment area (NAA) | Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller | TDM |
| Beaumont/Port Arthur (BPA) NAA | Jefferson, Hardin, Orange | TDM |
| El Paso (ELP) NAA | El Paso | TDM |
| Austin (AUS) Early Action Compact (EAC) area | Hays, Travis, Williamson<br>Bastrop, Caldwell | TDM<br>HPMS |
| San Antonio (SAN) EAC area | Bexar<br>Comal, Guadalupe, Wilson | TDM<br>HPMS |
| Tyler/Longview (TLM) EAC area | Gregg, Smith<br>Harrison, Rusk, Upshur | TDM<br>HPMS |
| Dallas/Fort Worth CMSA | Collin, Dallas, Denton, Ellis, Henderson, Hood, Hunt, Johnson, Kaufman, Parker, Rockwall, Tarrant | Excluded from analysis |
| Rest of Texas | 216 counties | HPMS |
| Totals | 18<br>224 | TDM<br>HPMS |

**Part 1:** Detailed Emissions Data Summaries, consists of:

- A_02cerr_ems.zip (contains multiple emissions run output files); and
- 242_all_sum.xls (contains seasonal weekday and annual county-level VMT, speed, and emissions totals summaries).

The zip file contains the emissions calculation programs output files, i.e., combined IMPSUM62 hourly and SUMALL62 24-hour results in the form of *.LOG, *.LST, and *.TAB files. (An additional set of SUMALL62 (24-hour emissions program) output files, EPA NIF version 3.0 report format EI data, is included as Part 5.) There were two emissions run jobs required for each county (or TDM network) to produce both the PM-10 (output with "pm1" in filename) and PM-2.5 (output with "pm2" in filename) emissions estimates. HPMS-method-based counties were run individually, however TDM-method counties within the same TDM network are calculated in the same run (see network counties in table above noting that Gregg [Longview] and Smith [Tyler] counties have separate TDM networks). This run/output file scheme yielded 1,396 output files (includes the fact that, due to size, the Houston/Galveston hourly and 24-hour estimates were output in separate files doubling the number of HGA files, and there is an additional set of output files for the El Paso CO season estimates).

The *.LOG files contain emissions run execution records, and the *.LST (and *.TAB, which is a reduced tab-delimited version of *.LST) is a tabulation of the hourly and 24-hour emissions data at the vehicle type and road type level. Data included are summaries of inputs as well as summer weekday (and winter weekday for El Paso CO season) and annual estimates of VMT, speeds, VHT, and emissions for the following pollutants: VOC, CO, NOX, $SO_2$, $NH_3$, total PM-10, total PM-2.5, and the following PM subcomponents (in MOBILE6 vernacular) $SO_4$, OCARBON, ECARBON, GASPM, LEAD, BRAKE, and TIRE.

The Microsoft Excel spreadsheet provides a summary (extract from the LST output) of county level summer weekday and annual estimates of VMT, Speed, VOC, CO, NOX, $SO_2$, $NH_3$, PM-10, and PM-2.5.

**Part 2:** Emissions Factors, consists of:

- P2a_02cerr_M6in.zip (command input and external data input files);
- P2b_02cerr_M6out.zip (hourly [*.rat] and daily [*.rtd] emissions factors, *.LOG files [run execution records], and *.LST files [MOBILE6 descriptive output for error checking]); and
- 216x47groupCodes.xls (lists the non-AQP-HPMS-based counties by county-group-code composed of three parts: TxDOT District, Climate Zone, and Fuel Group Code).

MOBILE6 input and output files are organized in folders named by AQP area label (e.g., HGA, BPA, AUS, ...) and an "HPMS" folder for the 216 remaining counties. AQP county emissions factors were developed at the county-level, whereas the remaining 216 counties emissions factors were developed based on input data aggregations forming 47 county-groupings (see 216x47groupCodes.xls). For each set of emissions factors, two runs were required because PM-10 and PM-2.5 emissions factors cannot both be produced in the same run. Associated command input filenames and emissions factor output filenames generally use the convention *_$1.* and * _$2.* (where "$" may be a "c," "z," "s," or "w," representing CO season, ozone season, summer season, and winter season respectively, and the particular county is represented by first four letters of the county name for AQP counties, or by county group code for non-AQP counties).

Both hourly and daily emissions factors were used in the analysis. Hourly emissions factors were input to the IMPSUM62 program to estimate summer (or ozone season, for AQP counties) weekday hourly emissions which were summed by SUMALL62 program to produce 24-hour results. Daily summer season and winter season emissions factors at a nominal speed of 40 mph were used to produce emissions annualization ratios (used in conjunction with VMT annualization ratios, see Part 3 and Appendix E) to convert summer weekday 24-hour emissions estimates to annual emissions estimates.

**Part 3:** Annualization Ratios, contains P3_02cerr_annfac.zip
VMT and emissions factor annualization ratios used to convert summer/ozone season weekday emissions estimates to annual emissions estimates are included in this part of the data set. The emissions factor annualization ratio calculation spreadsheets are included as well. The "*EFannfac.*" files correspond to the PM-10 runs, and the "*EFp25annfac.*" files correspond to the PM-2.5 files.

**Part 4:** Climate and Fuel Parameter Inputs, contains:

- P4a_02cerr_climate.zip; and
- P4b_02cerr_fuel.zip.

This part contains the National Climatological Data Center (NCDC) hourly weather data files and MOBILE6 climate inputs calculation spreadsheets. The pair of spreadsheets containing the summer and winter NGB gasoline sample survey data and average fuel property calculations by Texas city is also included.

**Part 5:** NIFv3.0 Emissions Files, contains:

- NIF_dataval.wpd (data dictionary and description of NIFv3.0 files);
- P5a_02cerr_nif.zip (the NIF files for 242 county CERR EIs);
- modrun_TRkey.CERR.xls, (model run/Transmittal Record (TR) index); and
- P5b_02cerr_jcf.zip (emissions and emissions factor job control files listed in model run/TR record index).

The three files required for EIs per EPA NIFv3.0 specification are in *nif.zip. The "NIF_dataval.wpd" file describes the NIF records/files. The table in"modrun_TRkey.CERR.xls" identifies the emissions factor and emissions modeling runs (by JCF file name). The JCF files used for the analysis are in "P5b_02cerr_jcf.zip."

# APPENDIX B
# EMISSIONS ESTIMATION PROGRAMS

## TTI EMISSIONS ESTIMATION PROGRAMS

The following is a summary of programs developed by TTI that may be used to produce TDM network link-based and HPMS "virtual link"-based, hourly, on-road mobile source emissions estimates for air quality analyses.

For the TDM-based analyses the emissions estimates are made at the TDM network link level (for thousands of links) where geographical coordinates are associated.

For the HPMS-based analyses, emissions estimates are made at the functional classification/area type level which constitutes a 21-cell array defined by seven functional classifications and three area types, or road-type "cells." These road-type cells may be viewed as a roadway network (analogous to the TDM network, but with larger and fewer links) consisting of up to 21 links (or, with directionality included, 42 links).

Hereafter, for the purpose of this discussion, the term "link" may be used to mean either a TDM network link or an HPMS "virtual link."

The main emissions estimation programs are: PREPIN (2BW for TDM network analyses and 254HPMS for HPMS analyses), POLFAC62, RATEADJ62, RATEADJV62, IMPSUM62, and SUMALL62. PREPIN prepares activity input, POLFAC62 prepares emissions factor input, the RATEADJ62 programs make special adjustments to emissions factors when required, IMPSUM62 calculates emissions by time period, and SUMALL62 summarizes emissions at various levels by 24-hour period, performs EI data annualization calculations and summarizes annual EI results, and produces the results in EPA's National Emissions Inventory Input Format (NIFv3.0).

### PREPIN

The PREPIN2BW program post-processes travel model output to produce time-of-day-specific, on-road vehicle fleet, link VMT and speed estimates for emissions inventory applications. The PREPIN2BW program was developed for use in urban areas that do not have all of the time-of-day assignments and operational speeds available as may be required for air quality analyses of particular temporal scales (e.g., hourly).

For example, PREPIN2BW reads a travel demand model traffic assignment data set from a directional four period time-of-day assignment (another common assignment read by PREPIN2BW is the nondirectional or directional 24-hour assignment). PREPIN2BW initially scales the assignment volumes on each link to the appropriate VMT (i.e., seasonal, day-of-week specific). Time-of-day (e.g., hourly) factors (and directional split factors for a nondirectional assignment) are applied to the adjusted assignment results on each link to estimate the directional time-of-day travel on the link. Speed models, originally developed for the Dallas/Fort Worth Region or optionally the Houston/Galveston Region, are used to estimate the operational time-of-day speeds by direction on the links. Special intrazonal links are defined (as intrazonal links are not a feature of travel demand models), and the VMT and speeds for intrazonal trips are estimated. These VMT and speeds by link are subsequently input to the IMPSUM6 program for the application of MOBILE6 emissions factors.

**PREPIN254HPMS**
The PREPIN254HPMS program processes the Statewide HPMS county AADT VMT, centerline miles, and lane miles by functional classification and area type to produce hourly, on-road vehicle fleet, seasonal and day-of-week-specific, actual or forecast VMT and directional speed estimates for EI applications. These estimated VMT and speeds are produced for 21 HPMS functional classification/area type combinations, or "links." The program was developed for use in areas that do not have TDM networks, and for EI applications where network link-based detail is not required. However, the HPMS link speeds are developed analogous to those produced from network travel model-based input data, except with a much smaller set of "links." The main inputs are:

- TxDOT statewide HPMS data set at the county level which includes AADT VMT, centerline miles, and lane miles by HPMS area type and functional class;
- county-level VMT control totals;
- list of Texas county names;
- hourly VMT distributions; and
- Dallas/Fort Worth speed modeling inputs to include volume/delay equation parameters adapted for HPMS, and freeflow speeds and lane capacities by HPMS functional classification and area type.

The program initially allocates the county control total VMT (VMT adjusted for season, etc.) to the link, proportional HPMS AADT VMT on each link. Hourly factors and directional split factors are applied to the adjusted VMT on each link to estimate the hourly directional VMT (and volumes) by HPMS link. Speed models, originally developed for the Dallas/Fort Worth Region, are used to estimate the hourly operational speeds by direction for each link. The operational speeds are based on v/c derived directional delay (minutes/mile) applied to the estimated freeflow speeds for each link. These HPMS link-VMT and speed estimates are subsequently input to the IMPSUM62 program for the application of MOBILE6 emissions factors.

**POLFAC62**
The POLFAC62 program is used to apply the EPA's MOBILE6 program (October 2002 version with additional pollutant capabilities) to calculate the on-road mobile emissions factors. The MOBILE6 emissions factors may be produced for each of the pollutant-specific emissions types (e.g., depending on the pollutant and vehicle type, the total composite, exhaust running, exhaust start, plus the six sub-component evaporative rates), 28 vehicle types, four MOBILE6 functional classifications (or drive cycles, i.e., Freeway, Arterial/Collector, Local, and Ramp), 14 speeds (i.e., 2.5 mph, and 5 mph through 65 mph at 5 mph increments for Freeway and Arterial functional classifications—MOBILE6 Local and Ramp functional classification rates are single speed only, 12.9 mph, and 34.6 mph, respectively), and each of the 24 hours of the day.

The POLFAC62 emissions factors are average vehicle class rates calculated from the MOBILE6 database output by weighting the by-model-year emissions rates within each vehicle class by its corresponding travel fraction. These emissions factors are tabulated individually by geographical area (county or county group) and analysis day for the evaluation year. These emissions factors are output to an ASCII file for subsequent input to the IMPSUM62 program. The IMPSUM62 program is then used to apply the hourly emissions factors to hourly VMT estimates by link. (POLFAC62 also optionally produces a set of daily emissions factors.) POLFAC62 also calculates the additional pollutant emissions factors provided by the MOBILE6 October 2002 version.

**RATEADJ62**
RATEADJ62 is a special utility program that produces a new set of emissions factors by linearly combining the emissions factors from multiple applications of POLFAC62. There is one set of linear factors. Each factor is applied to all emissions rates in a single data set.

A practical application of the RATEADJ program is the combining of two sets of emissions factors, where each set has different control program credits, into one set including the combined credits. For example, this program may be used to combine different ATP credits from two separate POLFAC62 runs into one set of emissions factors that includes the credits for both ATPs.

**RATEADJV62**
RATEADJV62 is a special utility program that produces a new set of emissions factors by linearly combining the emissions factors from multiple applications of POLFAC62 or RATEADJ62. There is a separate set of factors (that may be different for each pollutant-specific emissions type and vehicle type combination) for each of the input emissions factor data sets.

A practical application of RATEADJV62 is the application of emissions factor credits by individual vehicle class and/or individual pollutant. For example, for analyses requiring the effects of the Texas Low-Emissions Diesel Fuel Program in MOBILE6 emissions factors, RATEADJV62 is used to apply reduction factors to only the NOx emissions factors for diesel-fueled vehicle classes only.

**IMPSUM62**
The IMPSUM62 program applies the emissions factors obtained from POLFAC62 (or from one of the RATEADJ programs, when used) and VMT mixes (fractions of fleet VMT attributable to each vehicle classification in the study) to the time-of-day fleet VMT and speed estimates to calculate emissions by the specified time periods. The five primary inputs to IMPSUM62 are:

- MOBILE6 emissions factors developed with POLFAC62 (or a RATEADJ6, if used);
- link-based hourly VMT and speeds developed using a PREPIN program. For each link, the following information is input to IMPSUM: county number, roadway type number, VMT on link, operational link-speed estimate, and link distance;

- VMT mix by time period, county and roadway type;
- X-Y coordinates (optional for gridded emissions); and
- data records associating the MOBILE6 drive cycle (Freeway, Arterial, Local, Ramp) emissions factors (or percentages thereof) to specific travel model functional classifications. These MOBILE6 drive cycle emissions factor percentages (valid from zero to 100) must sum to 100 percent for each travel model functional classification.

Using these input data, the VMT for each link is stratified by MOBILE6 drive cycle and the 28 vehicle types. The MOBILE6 emissions factors are matched to link VMT by drive cycle, speed, and vehicle type and are interpolated (for the speed that falls between the 14 MOBILE6 speeds, see the MOBILE6 interpolation methodology below) and multiplied by the link VMT to estimate the mobile source emissions for that link. Emissions factors for 65 mph are used for links with speeds greater than 65 mph and emissions factors for 2.5 mph are used for links with speeds lower than 2.5 mph. The emissions for the county and emissions type are reported by both roadway type and vehicle type for each of the subject time periods. A data set is produced for subsequent input to the SUMALL62 program. Also, link emissions may be written by county at the pollutant-specific emissions type sub-component level and 28 vehicle types level.

A tab-delimited output is optionally produced. This output includes all 28 vehicle types (or eight vehicle types in the compressed format) across a single output line. Each field in the output is separated by a tab character.

*Example Emissions Factor Interpolation*
To calculate emissions factors for average operational speeds that fall between two of the 14 MOBILE6 speed bin speeds, MOBILE6 interpolates each emissions factor using a factor developed from the inverse link speed and the inverse high and low bounding speed bin speeds (Section 5.3.4, MOBILE6 User's Guide, January 2002).

Using the MOBILE6 emissions factors tabulated by the 14 speeds, the IMPSUM62 program uses the MOBILE6 method to interpolate emissions factors as shown in the following example. This example interpolates an emissions factor corresponding to an average speed of 41.2 mph.

The interpolated emissions factor ($EF_{Interp}$) is expressed as:

$$EF_{Interp} = EF_{LowSpeed} - FAC_{Interp} \times (EF_{LowSpeed} - EF_{HighSpeed})$$

Where:

$EF_{LowSpeed}$ = emission factor (EF) corresponding to tabulated speed below the average link speed,

$EF_{HighSpeed}$ = EF corresponding to tabulated speed above the average link speed, and

$$FAC_{Interp} = \left(\frac{1}{Speed_{link}} - \frac{1}{Speed_{low}}\right) \Big/ \left(\frac{1}{Speed_{high}} - \frac{1}{Speed_{low}}\right)$$

Given that:

$EF_{LowSpeed}$ = 0.7413 g/mi,
$EF_{HighSpeed}$ = 0.7274 g/mi,
$Speed_{lnk}$ = 41.2 mph,
$Speed_{low}$ = 40 mph, and
$Speed_{high}$ = 45 mph.

$$FAC_{Interp} = \left(\frac{1}{41.2mph} - \frac{1}{40mph}\right) \Big/ \left(\frac{1}{45mph} - \frac{1}{40mph}\right) = \frac{-0.00073}{-0.00278} = 0.26214,$$

$$EF_{Interp} = 0.7413 \text{ g/mi} - (0.26214) \times (0.7413 \text{ g/mi} - 0.7274 \text{ g/mi})$$

$$= 0.7377 \text{ g/mi}$$

**SUMALL62**

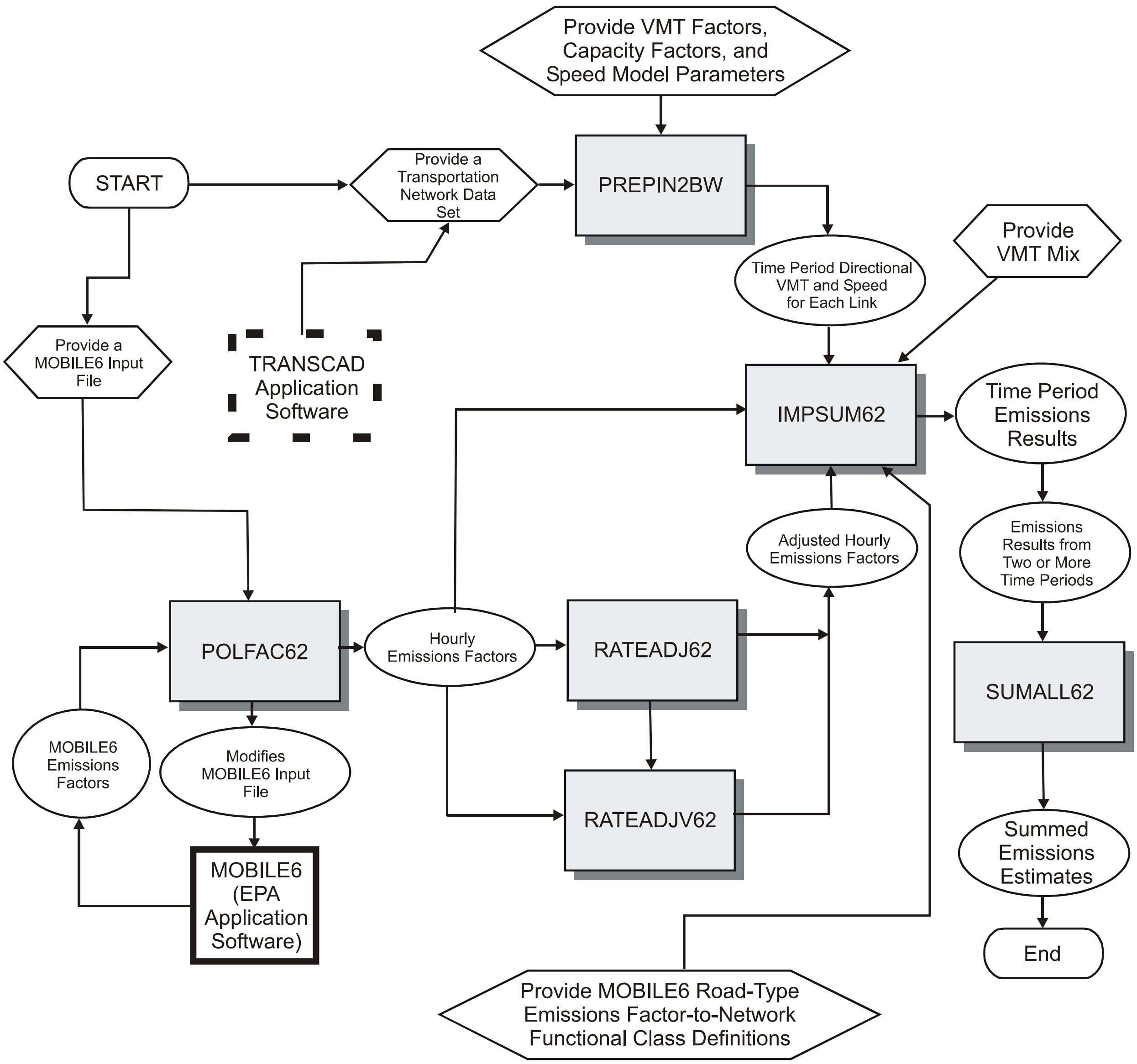
The SUMALL62 program is used to sum the emissions estimates for the time-of-day periods (e.g., 24 periods in the case of hourly analyses) to develop 24-hour emissions estimates, and optionally applies EI annualization factors to the daily results to produce annual EI results . The emissions by pollutant type are reported by roadway type and 28 vehicle types (or optionally condensed to eight vehicle types).

A tab-delimited output is optionally produced. This output includes all 28 vehicle types (or eight vehicle types in the compressed format) across a single output line. Each field in the output is separated by a tab character.

The overall emissions estimate process flow is shown in the diagram below.

# General Process Flow

## Travel Demand Model Network Link-Based Hourly MOBILE6 Emissions Estimates with Texas Mobile Source Emissions Software



# APPENDIX C
# DIRECTIONAL SPLIT ESTIMATES

## San Antonio Network Directional Split Factors - AM Peak Period

| Functional Class | Area Type* | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Local Roads | 50.00000 | 50.00000 | 50.00000 | 50.00000 | 50.00000 | 50.00000 |
| Radial Freeway | 53.37670 | 53.37670 | 74.13610 | 61.25710 | 61.73610 | 74.13610 |
| Radial Parkway | 53.37670 | 53.37670 | 74.13610 | 61.25710 | 61.73610 | 74.13610 |
| Expressway | 53.37670 | 53.37670 | 74.13610 | 61.25710 | 61.73610 | 74.13610 |
| Primary Arterial Divided | 68.72790 | 68.72790 | 68.03360 | 56.38190 | 61.73610 | 68.03360 |
| Primary Arterial Undivided | 68.72790 | 68.72790 | 68.03360 | 56.38190 | 61.73610 | 68.03360 |
| Minor Arterial Divided | 68.72790 | 68.72790 | 68.03360 | 56.38190 | 61.73610 | 68.03360 |
| Minor Arterial Undivided | 68.72790 | 68.72790 | 68.03360 | 56.38190 | 61.73610 | 68.03360 |
| Collectors Divided | 65.87060 | 65.87060 | 65.87060 | 65.87060 | 65.57410 | 65.87060 |
| Collectors Undivided | 65.87060 | 65.87060 | 65.87060 | 65.87060 | 65.57410 | 65.87060 |
| Frontage Road | 68.72790 | 68.72790 | 68.03360 | 56.38190 | 61.73610 | 68.03360 |
| Ramp | 68.72790 | 68.72790 | 68.03360 | 56.38190 | 61.73610 | 68.03360 |
| Circumferential Freeway | 53.37670 | 53.37670 | 74.13610 | 61.25710 | 61.73610 | 74.13610 |
| Circumferential Parkway | 53.37670 | 53.37670 | 74.13610 | 61.25710 | 61.73610 | 74.13610 |
| Circumferential Arterial | 68.72790 | 68.72790 | 68.03360 | 56.38190 | 61.73610 | 68.03360 |

* Area Type codes are listed at the end of this appendix.

## San Antonio Network Directional Split Factors - Mid-Day Period

| Functional Class | Area Type* | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Local Roads | 50.00000 | 50.00000 | 50.00000 | 50.00000 | 50.00000 | 50.00000 |
| Radial Freeway | 51.85418 | 51.85418 | 58.91482 | 58.91482 | 56.18798 | 58.91482 |
| Radial Parkway | 51.85418 | 51.85418 | 58.91482 | 58.91482 | 56.18798 | 58.91482 |
| Expressway | 51.85418 | 51.85418 | 58.91482 | 58.91482 | 56.18798 | 58.91482 |
| Primary Arterial Divided | 59.80851 | 59.80851 | 57.87852 | 57.87852 | 56.18798 | 57.87852 |
| Primary Arterial Undivided | 59.80851 | 59.80851 | 57.87852 | 57.87852 | 56.18798 | 57.87852 |
| Minor Arterial Divided | 59.80851 | 59.80851 | 57.87852 | 57.87852 | 56.18798 | 57.87852 |
| Minor Arterial Undivided | 59.80851 | 59.80851 | 57.87852 | 57.87852 | 56.18798 | 57.87852 |
| Collectors Divided | 59.53949 | 59.53949 | 59.53949 | 59.53949 | 58.27722 | 59.53949 |
| Collectors Undivided | 59.53949 | 59.53949 | 59.53949 | 59.53949 | 58.27722 | 59.53949 |
| Frontage Road | 59.80851 | 59.80851 | 57.87852 | 54.04745 | 56.18798 | 57.87852 |
| Ramp | 59.80851 | 59.80851 | 57.87852 | 57.87852 | 56.18798 | 57.87852 |
| Circumferential Freeway | 51.85418 | 51.85418 | 58.91482 | 58.91482 | 56.18798 | 58.91482 |
| Circumferential Parkway | 51.85418 | 51.85418 | 58.91482 | 58.91482 | 56.18798 | 58.91482 |
| Circumferential Arterial | 59.80851 | 59.80851 | 57.87852 | 57.87852 | 56.18798 | 57.87852 |

* Area Type codes are listed at the end of this appendix.

## San Antonio Network Directional Split Factors - PM Peak Period

| Functional Class | Area Type* | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Local Roads | 50.00000 | 50.00000 | 50.00000 | 50.00000 | 50.00000 | 50.00000 |
| Radial Freeway | 52.62830 | 52.62830 | 69.38360 | 56.48830 | 58.00540 | 69.38360 |
| Radial Parkway | 52.62830 | 52.62830 | 69.38360 | 56.48830 | 58.00540 | 69.38360 |
| Expressway | 52.62830 | 52.62830 | 69.38360 | 56.48830 | 58.00540 | 69.38360 |
| Primary Arterial Divided | 63.81940 | 63.81940 | 60.33020 | 56.78330 | 58.00540 | 60.33020 |
| Primary Arterial Undivided | 63.81940 | 63.81940 | 60.33020 | 56.78330 | 58.00540 | 60.33020 |
| Minor Arterial Divided | 63.81940 | 63.81940 | 60.33020 | 56.78330 | 58.00540 | 60.33020 |
| Minor Arterial Undivided | 63.81940 | 63.81940 | 60.33020 | 56.78330 | 58.00540 | 60.33020 |
| Collectors Divided | 60.07770 | 60.07770 | 60.07770 | 60.07770 | 57.38310 | 60.07770 |
| Collectors Undivided | 60.07770 | 60.07770 | 60.07770 | 60.07770 | 57.38310 | 60.07770 |
| Frontage Road | 63.81940 | 63.81940 | 60.33020 | 56.78330 | 58.00540 | 60.33020 |
| Ramp | 63.81940 | 63.81940 | 60.33020 | 56.78330 | 58.00540 | 60.33020 |
| Circumferential Freeway | 52.62830 | 52.62830 | 69.38360 | 56.48830 | 58.00540 | 69.38360 |
| Circumferential Parkway | 52.62830 | 52.62830 | 69.38360 | 56.48830 | 58.00540 | 69.38360 |
| Circumferential Arterial | 63.81940 | 63.81940 | 60.33020 | 56.78330 | 58.00540 | 60.33020 |

* Area Type codes are listed at the end of this appendix.

## San Antonio Network Directional Split Factors - Overnight Period

| Functional Class | Area Type* | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Local Roads | 50.00000 | 50.00000 | 50.00000 | 50.00000 | 50.00000 | 50.00000 |
| Radial Freeway | 52.89322 | 52.89322 | 57.80462 | 58.35028 | 60.92629 | 57.80462 |
| Radial Parkway | 52.89322 | 52.89322 | 57.80462 | 58.35028 | 60.92629 | 57.80462 |
| Expressway | 52.89322 | 52.89322 | 57.80462 | 58.35028 | 60.92629 | 57.80462 |
| Primary Arterial Divided | 64.07599 | 64.07599 | 60.11187 | 58.87167 | 60.92629 | 60.11187 |
| Primary Arterial Undivided | 64.07599 | 64.07599 | 60.11187 | 58.87167 | 60.92629 | 60.11187 |
| Minor Arterial Divided | 64.07599 | 64.07599 | 60.11187 | 58.87167 | 60.92629 | 60.11187 |
| Minor Arterial Undivided | 64.07599 | 64.07599 | 60.11187 | 58.87167 | 60.92629 | 60.11187 |
| Collectors Divided | 63.07224 | 63.07224 | 63.07224 | 63.07224 | 60.48731 | 63.07224 |
| Collectors Undivided | 63.07224 | 63.07224 | 63.07224 | 63.07224 | 60.48731 | 63.07224 |
| Frontage Road | 64.07599 | 64.07599 | 60.11187 | 58.87167 | 60.92629 | 60.11187 |
| Ramp | 64.07599 | 64.07599 | 60.11187 | 58.87167 | 60.92629 | 60.11187 |
| Circumferential Freeway | 52.89322 | 52.89322 | 57.80462 | 58.35028 | 60.92629 | 57.80462 |
| Circumferential Parkway | 52.89322 | 52.89322 | 57.80462 | 58.35028 | 60.92629 | 57.80462 |
| Circumferential Arterial | 64.07599 | 64.07599 | 60.11187 | 58.87167 | 60.92629 | 60.11187 |

* Area Type codes are listed at the end of this appendix.

## San Antonio Time-of-Day Travel Periods

| Period | Hours |
|---|---|
| AM Peak | 7 a.m. - 8 a.m. |
| Mid-Day | 8 a.m. - 5 p.m. |
| PM Peak | 5 p.m. - 6 p.m. |
| Overnight | 6 p.m. - 7 a.m. |

**San Antonio TDM Network Area Types**

| Area Type Code | Area Type Name |
|---|---|
| 1 | Central Business District (CBD) |
| 2 | Urban |
| 3 | Urban Residential |
| 4 | Suburban |
| 5 | Rural |
| 6 | Military |

# APPENDIX D
# CAPACITY FACTORS AND SPEED FACTORS

## San Antonio Network Capacity Factors

| Roadway Type | Area Type* | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Local Roads | 0.1000 | 0.1000 | 0.1000 | 0.1000 | 0.1000 | 0.1000 |
| Radial Freeway | 0.0750 | 0.0684 | 0.0693 | 0.1054 | 0.1527 | 0.1054 |
| Radial Parkway | 0.1043 | 0.0946 | 0.0959 | 0.1660 | 0.2632 | 0.1660 |
| Expressway | 0.0698 | 0.0777 | 0.0788 | 0.0878 | 0.1333 | 0.0878 |
| Primary Arterial Divided | 0.0659 | 0.0800 | 0.0915 | 0.1160 | 0.1818 | 0.1160 |
| Primary Arterial Undivided | 0.0662 | 0.0809 | 0.0938 | 0.1205 | 0.1859 | 0.1205 |
| Minor Arterial Divided | 0.0759 | 0.0923 | 0.1136 | 0.1728 | 0.2941 | 0.1728 |
| Minor Arterial Undivided | 0.0758 | 0.0924 | 0.1139 | 0.1667 | 0.2813 | 0.1667 |
| Collectors Divided | 0.0726 | 0.0856 | 0.1075 | 0.1642 | 0.3194 | 0.1642 |
| Collectors Undivided | 0.0702 | 0.0833 | 0.1047 | 0.1587 | 0.3088 | 0.1587 |
| Frontage Road | 0.0407 | 0.0444 | 0.0463 | 0.0933 | 0.1364 | 0.0933 |
| Ramp | 0.0638 | 0.0614 | 0.0639 | 0.1191 | 0.1974 | 0.1191 |
| Circumferential Freeway | 0.1000 | 0.0539 | 0.0564 | 0.1054 | 0.1000 | 0.1054 |
| Circumferential Parkway | 0.1000 | 0.1000 | 0.0852 | 0.1013 | 0.1039 | 0.1013 |
| Circumferential Arterial | 0.1000 | 0.1000 | 0.0839 | 0.1115 | 0.1280 | 0.1115 |

* Area Type codes are listed at the end of this appendix.

## San Antonio Network Speed Factors

| Roadway Type | Area Type* | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Local Roads | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| Radial Freeway | 1.70588 | 1.61111 | 1.59459 | 1.42857 | 1.42000 | 1.59459 |
| Radial Parkway | 1.61111 | 1.56757 | 1.68571 | 1.39535 | 1.39216 | 1.68571 |
| Expressway | 1.25000 | 1.25926 | 1.25000 | 1.24324 | 1.27660 | 1.25000 |
| Primary Arterial Divided | 1.25000 | 1.26087 | 1.26667 | 1.24242 | 1.25000 | 1.26667 |
| Primary Arterial Undivided | 1.25000 | 1.27273 | 1.25000 | 1.26471 | 1.22222 | 1.25000 |
| Minor Arterial Divided | 1.27273 | 1.26316 | 1.24000 | 1.26667 | 1.13636 | 1.24000 |
| Minor Arterial Undivided | 1.30000 | 1.26316 | 1.24000 | 1.25000 | 1.25000 | 1.24000 |
| Collectors Divided | 1.22222 | 1.27778 | 1.26087 | 1.24000 | 1.12500 | 1.25926 |
| Collectors Undivided | 1.25000 | 1.25000 | 1.27273 | 1.24000 | 1.18421 | 1.25926 |
| Frontage Road | 1.25000 | 1.23529 | 1.26087 | 1.24000 | 1.41026 | 1.24000 |
| Ramp | 1.26316 | 1.25714 | 1.25714 | 1.26190 | 1.20000 | 1.26190 |
| Circumferential Freeway | 1.00000 | 1.34884 | 1.31111 | 1.25000 | 1.00000 | 1.31111 |
| Circumferential Parkway | 1.00000 | 1.00000 | 1.22917 | 1.20000 | 1.33962 | 1.11321 |
| Circumferential Arterial | 1.00000 | 1.00000 | 1.26190 | 1.24444 | 1.26087 | 1.26190 |

* Area Type codes are listed at the end of this appendix.

**San Antonio TDM Network Area Types**

| Area Type Code | Area Type Name |
|---|---|
| 1 | Central Business District (CBD) |
| 2 | Urban |
| 3 | Urban Residential |
| 4 | Suburban |
| 5 | Rural |
| 6 | Military |

# APPENDIX E
# REGISTRATION DISTRIBUTIONS AND DIESEL FRACTIONS INPUT TO MOBILE6

## Bexar County Registration Distributions

```
*  LDV, LDT1, LDT2, LDT3, LDT4, and MC estimated from county registration data;
*  All HDV estimated from Bexar, Comal, Guadalupe and Wilson Counties;
*  HDBS, HDBT are MOBILE6 defaults;
*  Calculated from Mid-Year (July) 2002 Registration data
*  LDV
    1  0.07344 0.09069 0.08927 0.07681 0.06881 0.06552 0.05972 0.06937 0.05885 0.05419
       0.04438 0.04191 0.03398 0.03085 0.02501 0.02025 0.01847 0.01578 0.01271 0.00785
       0.00544 0.00437 0.00350 0.00454 0.02429
*  LDT1
    2  0.11841 0.14622 0.10790 0.13295 0.04909 0.07441 0.05235 0.05363 0.04042 0.03263
       0.02404 0.01751 0.01649 0.01522 0.01350 0.00816 0.01386 0.01272 0.01192 0.00714
       0.00743 0.00478 0.00622 0.00724 0.02576
*  LDT2
    3  0.11841 0.14622 0.10790 0.13295 0.04909 0.07441 0.05235 0.05363 0.04042 0.03263
       0.02404 0.01751 0.01649 0.01522 0.01350 0.00816 0.01386 0.01272 0.01192 0.00714
       0.00743 0.00478 0.00622 0.00724 0.02576
*  LDT3
    4  0.08276 0.10232 0.08399 0.07636 0.05942 0.06545 0.04965 0.05670 0.05782 0.04468
       0.03597 0.03197 0.02542 0.02608 0.02289 0.01796 0.02340 0.02059 0.01816 0.01158
       0.01202 0.01041 0.00672 0.00912 0.04856
*  LDT4
    5  0.08276 0.10232 0.08399 0.07636 0.05942 0.06545 0.04965 0.05670 0.05782 0.04468
       0.03597 0.03197 0.02542 0.02608 0.02289 0.01796 0.02340 0.02059 0.01816 0.01158
       0.01202 0.01041 0.00672 0.00912 0.04856
*  HDV2B
    6  0.14791 0.15513 0.09707 0.08581 0.04381 0.06170 0.03035 0.04622 0.03658 0.03376
       0.02512 0.02291 0.01527 0.01487 0.01668 0.01085 0.02834 0.02452 0.01608 0.00945
       0.01929 0.00844 0.00904 0.00945 0.03135
*  HDV3
    7  0.04338 0.09347 0.08318 0.10823 0.03667 0.08184 0.04651 0.07335 0.05769 0.05903
       0.03265 0.03399 0.03309 0.02370 0.01834 0.01655 0.01208 0.02057 0.01297 0.00850
       0.01342 0.00671 0.00805 0.00984 0.06619
*  HDV4
    8  0.05387 0.08325 0.11949 0.12731 0.04603 0.09403 0.08913 0.05583 0.04310 0.03820
       0.02351 0.02057 0.02253 0.01469 0.01371 0.01273 0.00392 0.00686 0.01273 0.00588
       0.01175 0.00392 0.00881 0.01273 0.07542
*  HDV5
    9  0.05772 0.05195 0.12410 0.15004 0.05339 0.04185 0.04185 0.04329 0.02309 0.02165
       0.01732 0.01876 0.02020 0.02165 0.02309 0.02597 0.01587 0.03175 0.01443 0.01299
       0.03030 0.02309 0.01732 0.02165 0.09668
*  HDV6
   10  0.04549 0.08437 0.09391 0.08914 0.09832 0.03999 0.04182 0.07667 0.04072 0.04549
       0.02531 0.02788 0.02971 0.02128 0.02201 0.02384 0.02348 0.02531 0.02091 0.01394
       0.02201 0.01614 0.00990 0.01614 0.04622
*  HDV7
   11  0.03975 0.08020 0.10530 0.07113 0.06555 0.05300 0.04951 0.05718 0.03835 0.04881
       0.04045 0.05927 0.04463 0.02999 0.02859 0.02999 0.03138 0.02859 0.02301 0.01813
       0.01325 0.00837 0.00628 0.01116 0.01813
*  HDV8A
   12  0.05428 0.04737 0.05482 0.05801 0.04311 0.02874 0.03938 0.06919 0.05535 0.05907
       0.03459 0.05269 0.04577 0.04843 0.04417 0.04045 0.03938 0.03885 0.02714 0.00958
       0.02501 0.01916 0.01384 0.02182 0.02980
*  HDV8B
   13  0.02781 0.08217 0.12261 0.09482 0.03919 0.07206 0.06068 0.03919 0.08976 0.09229
       0.01391 0.03666 0.01138 0.00759 0.00759 0.00506 0.02655 0.03540 0.04678 0.02528
       0.01391 0.03161 0.00632 0.00759 0.00379
*   HDBS is MOBILE6 default
*   HDBT is MOBILE6 default
*  MC
   16  0.15797 0.14079 0.10595 0.07999 0.05845 0.04461 0.03891 0.03493 0.02950 0.02208
       0.01873 0.01321 0.01294 0.01448 0.01131 0.01149 0.02307 0.02316 0.01529 0.01810
       0.02407 0.01692 0.01529 0.01004 0.05872
```

## Comal County Registration Distributions

```
*  LDV, LDT1, LDT2, LDT3, LDT4, and MC estimated from county registration data;
*  All HDV estimated from Bexar, Comal, Guadalupe and Wilson Counties;
*  HDBS, HDBT are MOBILE6 defaults;
*  Calculated from Mid-Year (July) 2002 Registration data
*  LDV
    1  0.05916 0.08192 0.09383 0.08312 0.07314 0.07082 0.06100 0.07090 0.06020 0.05377
       0.04411 0.03987 0.03373 0.02941 0.02396 0.02015 0.01745 0.01518 0.01220 0.00747
       0.00480 0.00403 0.00376 0.00499 0.03103
*  LDT1
    2  0.10157 0.15107 0.10439 0.13362 0.05172 0.08752 0.05116 0.05941 0.04123 0.03692
       0.02286 0.02080 0.01555 0.01705 0.01518 0.00600 0.01424 0.01218 0.01199 0.00637
       0.00600 0.00356 0.00319 0.00487 0.02155
*  LDT2
    3  0.10157 0.15107 0.10439 0.13362 0.05172 0.08752 0.05116 0.05941 0.04123 0.03692
       0.02286 0.02080 0.01555 0.01705 0.01518 0.00600 0.01424 0.01218 0.01199 0.00637
       0.00600 0.00356 0.00319 0.00487 0.02155
*  LDT3
    4  0.07337 0.10687 0.08336 0.08611 0.06055 0.07535 0.05280 0.05960 0.05771 0.04433
       0.03697 0.03163 0.02741 0.02496 0.02246 0.01588 0.02208 0.01747 0.01640 0.00977
       0.01011 0.00856 0.00525 0.00732 0.04368
*  LDT4
    5  0.07337 0.10687 0.08336 0.08611 0.06055 0.07535 0.05280 0.05960 0.05771 0.04433
       0.03697 0.03163 0.02741 0.02496 0.02246 0.01588 0.02208 0.01747 0.01640 0.00977
       0.01011 0.00856 0.00525 0.00732 0.04368
*  HDV2B
    6  0.14791 0.15513 0.09707 0.08581 0.04381 0.06170 0.03035 0.04622 0.03658 0.03376
       0.02512 0.02291 0.01527 0.01487 0.01668 0.01085 0.02834 0.02452 0.01608 0.00945
       0.01929 0.00844 0.00904 0.00945 0.03135
*  HDV3
    7  0.04338 0.09347 0.08318 0.10823 0.03667 0.08184 0.04651 0.07335 0.05769 0.05903
       0.03265 0.03399 0.03309 0.02370 0.01834 0.01655 0.01208 0.02057 0.01297 0.00850
       0.01342 0.00671 0.00805 0.00984 0.06619
*  HDV4
    8  0.05387 0.08325 0.11949 0.12731 0.04603 0.09403 0.08913 0.05583 0.04310 0.03820
       0.02351 0.02057 0.02253 0.01469 0.01371 0.01273 0.00392 0.00686 0.01273 0.00588
       0.01175 0.00392 0.00881 0.01273 0.07542
*  HDV5
    9  0.05772 0.05195 0.12410 0.15004 0.05339 0.04185 0.04185 0.04329 0.02309 0.02165
       0.01732 0.01876 0.02020 0.02165 0.02309 0.02597 0.01587 0.03175 0.01443 0.01299
       0.03030 0.02309 0.01732 0.02165 0.09668
*  HDV6
   10  0.04549 0.08437 0.09391 0.08914 0.09832 0.03999 0.04182 0.07667 0.04072 0.04549
       0.02531 0.02788 0.02971 0.02128 0.02201 0.02384 0.02348 0.02531 0.02091 0.01394
       0.02201 0.01614 0.00990 0.01614 0.04622
*  HDV7
   11  0.03975 0.08020 0.10530 0.07113 0.06555 0.05300 0.04951 0.05718 0.03835 0.04881
       0.04045 0.05927 0.04463 0.02999 0.02859 0.02999 0.03138 0.02859 0.02301 0.01813
       0.01325 0.00837 0.00628 0.01116 0.01813
*  HDV8A
   12  0.05428 0.04737 0.05482 0.05801 0.04311 0.02874 0.03938 0.06919 0.05535 0.05907
       0.03459 0.05269 0.04577 0.04843 0.04417 0.04045 0.03938 0.03885 0.02714 0.00958
       0.02501 0.01916 0.01384 0.02182 0.02980
*  HDV8B
   13  0.02781 0.08217 0.12261 0.09482 0.03919 0.07206 0.06068 0.03919 0.08976 0.09229
       0.01391 0.03666 0.01138 0.00759 0.00759 0.00506 0.02655 0.03540 0.04678 0.02528
       0.01391 0.03161 0.00632 0.00759 0.00379
*   HDBS is MOBILE6 default
*   HDBT is MOBILE6 default
*  MC
   16  0.10974 0.11991 0.11628 0.08576 0.05669 0.02907 0.04215 0.03779 0.02471 0.03561
       0.02035 0.01090 0.01308 0.01090 0.01235 0.01163 0.02180 0.02689 0.02180 0.02326
       0.03488 0.02180 0.02108 0.01744 0.07413
```

## Guadalupe County Registration Distributions

```
*  LDV, LDT1, LDT2, LDT3, LDT4, and MC estimated from county registration data;
*  All HDV estimated from Bexar, Comal, Guadalupe and Wilson counties;
*  HDBS, HDBT are MOBILE6 defaults;
*  Calculated from Mid-Year (July) 2002 Registration data
*  LDV
    1  0.05256 0.07824 0.09153 0.08189 0.07274 0.06693 0.06148 0.06875 0.05551 0.05587
       0.04693 0.04396 0.03585 0.03275 0.02558 0.02034 0.01830 0.01783 0.01348 0.00793
       0.00686 0.00467 0.00386 0.00516 0.03100
*  LDT1
    2  0.08703 0.12904 0.10793 0.13699 0.05623 0.08315 0.06247 0.06053 0.04244 0.03835
       0.02693 0.01982 0.01810 0.02025 0.01099 0.00689 0.01551 0.01573 0.00991 0.00776
       0.00797 0.00431 0.00259 0.00517 0.02391
*  LDT2
    3  0.08703 0.12904 0.10793 0.13699 0.05623 0.08315 0.06247 0.06053 0.04244 0.03835
       0.02693 0.01982 0.01810 0.02025 0.01099 0.00689 0.01551 0.01573 0.00991 0.00776
       0.00797 0.00431 0.00259 0.00517 0.02391
*  LDT3
    4  0.06235 0.09181 0.08268 0.08053 0.06136 0.06731 0.05490 0.05956 0.05934 0.04586
       0.03807 0.03389 0.02851 0.02993 0.02399 0.01860 0.02420 0.01951 0.01843 0.01059
       0.01167 0.00956 0.00611 0.00870 0.05254
*  LDT4
    5  0.06235 0.09181 0.08268 0.08053 0.06136 0.06731 0.05490 0.05956 0.05934 0.04586
       0.03807 0.03389 0.02851 0.02993 0.02399 0.01860 0.02420 0.01951 0.01843 0.01059
       0.01167 0.00956 0.00611 0.00870 0.05254
*  HDV2B
    6  0.14791 0.15513 0.09707 0.08581 0.04381 0.06170 0.03035 0.04622 0.03658 0.03376
       0.02512 0.02291 0.01527 0.01487 0.01668 0.01085 0.02834 0.02452 0.01608 0.00945
       0.01929 0.00844 0.00904 0.00945 0.03135
*  HDV3
    7  0.04338 0.09347 0.08318 0.10823 0.03667 0.08184 0.04651 0.07335 0.05769 0.05903
       0.03265 0.03399 0.03309 0.02370 0.01834 0.01655 0.01208 0.02057 0.01297 0.00850
       0.01342 0.00671 0.00805 0.00984 0.06619
*  HDV4
    8  0.05387 0.08325 0.11949 0.12731 0.04603 0.09403 0.08913 0.05583 0.04310 0.03820
       0.02351 0.02057 0.02253 0.01469 0.01371 0.01273 0.00392 0.00686 0.01273 0.00588
       0.01175 0.00392 0.00881 0.01273 0.07542
*  HDV5
    9  0.05772 0.05195 0.12410 0.15004 0.05339 0.04185 0.04185 0.04329 0.02309 0.02165
       0.01732 0.01876 0.02020 0.02165 0.02309 0.02597 0.01587 0.03175 0.01443 0.01299
       0.03030 0.02309 0.01732 0.02165 0.09668
*  HDV6
   10  0.04549 0.08437 0.09391 0.08914 0.09832 0.03999 0.04182 0.07667 0.04072 0.04549
       0.02531 0.02788 0.02971 0.02128 0.02201 0.02384 0.02348 0.02531 0.02091 0.01394
       0.02201 0.01614 0.00990 0.01614 0.04622
*  HDV7
   11  0.03975 0.08020 0.10530 0.07113 0.06555 0.05300 0.04951 0.05718 0.03835 0.04881
       0.04045 0.05927 0.04463 0.02999 0.02859 0.02999 0.03138 0.02859 0.02301 0.01813
       0.01325 0.00837 0.00628 0.01116 0.01813
*  HDV8A
   12  0.05428 0.04737 0.05482 0.05801 0.04311 0.02874 0.03938 0.06919 0.05535 0.05907
       0.03459 0.05269 0.04577 0.04843 0.04417 0.04045 0.03938 0.03885 0.02714 0.00958
       0.02501 0.01916 0.01384 0.02182 0.02980
*  HDV8B
   13  0.02781 0.08217 0.12261 0.09482 0.03919 0.07206 0.06068 0.03919 0.08976 0.09229
       0.01391 0.03666 0.01138 0.00759 0.00759 0.00506 0.02655 0.03540 0.04678 0.02528
       0.01391 0.03161 0.00632 0.00759 0.00379
*   HDBS is MOBILE6 default
*   HDBT is MOBILE6 default
*  MC
   16  0.07676 0.12649 0.09946 0.09297 0.04541 0.04973 0.05297 0.04432 0.04108 0.02162
       0.01514 0.01514 0.01297 0.02270 0.01622 0.02054 0.03135 0.02270 0.01297 0.02919
       0.03243 0.02054 0.01081 0.00865 0.07784
```

## Wilson County Registration Distributions

```
*  LDV, LDT1, LDT2, LDT3, LDT4, and MC estimated from county registration data;
*  All HDV estimated from Bexar, Comal, Guadalupe and Wilson counties;
*  HDBS, HDBT are MOBILE6 defaults;
*  Calculated from Mid-Year (July) 2002 Registration data
*  LDV
    1  0.05380 0.07582 0.09410 0.07369 0.07528 0.06703 0.05975 0.06889 0.05620 0.05895
       0.04252 0.04031 0.03409 0.03320 0.02761 0.02148 0.02131 0.01882 0.01438 0.01021
       0.00701 0.00586 0.00382 0.00515 0.03072
*  LDT1
    2  0.10353 0.14447 0.11116 0.13002 0.05377 0.08146 0.05257 0.05417 0.04655 0.04454
       0.02408 0.02087 0.01083 0.01886 0.01043 0.01083 0.01565 0.01525 0.01324 0.00642
       0.00602 0.00120 0.00321 0.00522 0.01565
*  LDT2
    3  0.10353 0.14447 0.11116 0.13002 0.05377 0.08146 0.05257 0.05417 0.04655 0.04454
       0.02408 0.02087 0.01083 0.01886 0.01043 0.01083 0.01565 0.01525 0.01324 0.00642
       0.00602 0.00120 0.00321 0.00522 0.01565
*  LDT3
    4  0.08931 0.10780 0.08052 0.07996 0.05729 0.06599 0.05183 0.05710 0.05794 0.04776
       0.03804 0.03304 0.02693 0.02869 0.02249 0.01749 0.02332 0.01870 0.01481 0.01138
       0.00963 0.00870 0.00509 0.00787 0.03832
*  LDT4
    5  0.08931 0.10780 0.08052 0.07996 0.05729 0.06599 0.05183 0.05710 0.05794 0.04776
       0.03804 0.03304 0.02693 0.02869 0.02249 0.01749 0.02332 0.01870 0.01481 0.01138
       0.00963 0.00870 0.00509 0.00787 0.03832
*  HDV2B
    6  0.14791 0.15513 0.09707 0.08581 0.04381 0.06170 0.03035 0.04622 0.03658 0.03376
       0.02512 0.02291 0.01527 0.01487 0.01668 0.01085 0.02834 0.02452 0.01608 0.00945
       0.01929 0.00844 0.00904 0.00945 0.03135
*  HDV3
    7  0.04338 0.09347 0.08318 0.10823 0.03667 0.08184 0.04651 0.07335 0.05769 0.05903
       0.03265 0.03399 0.03309 0.02370 0.01834 0.01655 0.01208 0.02057 0.01297 0.00850
       0.01342 0.00671 0.00805 0.00984 0.06619
*  HDV4
    8  0.05387 0.08325 0.11949 0.12731 0.04603 0.09403 0.08913 0.05583 0.04310 0.03820
       0.02351 0.02057 0.02253 0.01469 0.01371 0.01273 0.00392 0.00686 0.01273 0.00588
       0.01175 0.00392 0.00881 0.01273 0.07542
*  HDV5
    9  0.05772 0.05195 0.12410 0.15004 0.05339 0.04185 0.04185 0.04329 0.02309 0.02165
       0.01732 0.01876 0.02020 0.02165 0.02309 0.02597 0.01587 0.03175 0.01443 0.01299
       0.03030 0.02309 0.01732 0.02165 0.09668
*  HDV6
   10  0.04549 0.08437 0.09391 0.08914 0.09832 0.03999 0.04182 0.07667 0.04072 0.04549
       0.02531 0.02788 0.02971 0.02128 0.02201 0.02384 0.02348 0.02531 0.02091 0.01394
       0.02201 0.01614 0.00990 0.01614 0.04622
*  HDV7
   11  0.03975 0.08020 0.10530 0.07113 0.06555 0.05300 0.04951 0.05718 0.03835 0.04881
       0.04045 0.05927 0.04463 0.02999 0.02859 0.02999 0.03138 0.02859 0.02301 0.01813
       0.01325 0.00837 0.00628 0.01116 0.01813
*  HDV8A
   12  0.05428 0.04737 0.05482 0.05801 0.04311 0.02874 0.03938 0.06919 0.05535 0.05907
       0.03459 0.05269 0.04577 0.04843 0.04417 0.04045 0.03938 0.03885 0.02714 0.00958
       0.02501 0.01916 0.01384 0.02182 0.02980
*  HDV8B
   13  0.02781 0.08217 0.12261 0.09482 0.03919 0.07206 0.06068 0.03919 0.08976 0.09229
       0.01391 0.03666 0.01138 0.00759 0.00759 0.00506 0.02655 0.03540 0.04678 0.02528
       0.01391 0.03161 0.00632 0.00759 0.00379
*   HDBS is MOBILE6 default
*   HDBT is MOBILE6 default
*  MC
   16  0.08088 0.08456 0.11030 0.09926 0.05882 0.03309 0.04412 0.02941 0.04044 0.05147
       0.04044 0.01838 0.02941 0.01471 0.02574 0.01103 0.04044 0.01103 0.00735 0.01471
       0.04044 0.01471 0.01838 0.00735 0.07353
```

## 2002 San Antonio Diesel Sales Fractions Estimates

```
* HDV fractions are estimated from TxDOT registration data (Mid-year July 2002);
* HDV data aggregated for Bexar, Comal, Guadalupe, and Wilson counties;
* LDV, LDT, and Bus fractions are EPA defaults
DIESEL FRACTIONS   :
 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00060 0.00010 0.00030
 0.00060 0.00130 0.00040 0.00040 0.00010 0.00270 0.00320 0.00970 0.01620 0.02410
 0.05100 0.07060 0.03900 0.02690 0.01140
 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
 0.00000 0.00000 0.00000 0.00000 0.00000 0.00070 0.00330 0.00480 0.01200 0.02230
 0.06560 0.06160 0.04390 0.03160 0.02590
 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
 0.00000 0.00000 0.00000 0.00000 0.00000 0.00070 0.00330 0.00480 0.01200 0.02230
 0.06560 0.06160 0.04390 0.03160 0.02590
 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01150 0.01110 0.01450
 0.01150 0.01290 0.00960 0.00830 0.00720 0.00820 0.01240 0.01350 0.01690 0.02090
 0.02560 0.00130 0.00060 0.00110 0.00010
 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01150 0.01110 0.01450
 0.01150 0.01290 0.00960 0.00830 0.00720 0.00820 0.01240 0.01350 0.01690 0.02090
 0.02560 0.00130 0.00060 0.00110 0.00010
 0.79620 0.78886 0.69979 0.65105 0.60092 0.48208 0.37086 0.27391 0.57143 0.49405
 0.46400 0.44737 0.35526 0.21622 0.24096 0.14815 0.12766 0.14754 0.16250 0.29787
 0.11458 0.02381 0.00000 0.00000 0.01282
 0.77320 0.64115 0.67204 0.60744 0.64634 0.60109 0.47115 0.40244 0.78295 0.59091
 0.57534 0.78947 0.59459 0.64151 0.41463 0.40541 0.40741 0.41304 0.34483 0.15789
 0.26667 0.06667 0.00000 0.04545 0.00676
 0.76364 0.63529 0.76230 0.69231 0.61702 0.55208 0.70330 0.57895 0.77273 0.79487
 0.83333 0.66667 0.60870 0.66667 0.64286 0.46154 0.25000 0.28571 0.30769 0.16667
 0.08333 0.50000 0.00000 0.00000 0.00000
 0.77500 0.94444 0.91860 0.88462 0.81081 0.68966 0.65517 0.70000 0.75000 0.86667
 0.83333 0.76923 0.71429 0.60000 0.62500 0.33333 0.18182 0.40909 0.40000 0.22222
 0.57143 0.43750 0.08333 0.06667 0.05970
 0.93548 0.88696 0.89453 0.90535 0.84701 0.66055 0.81579 0.64593 0.83784 0.76613
 0.59420 0.75000 0.69136 0.70690 0.53333 0.61538 0.54688 0.42029 0.52632 0.39474
 0.41667 0.52273 0.33333 0.13636 0.07143
 0.98246 0.86957 0.97351 0.86275 0.81915 0.65789 0.77465 0.52439 0.89091 0.94286
 0.91379 0.91765 0.87500 0.90698 0.75610 0.90698 0.84444 0.90244 0.84848 0.80769
 0.73684 0.66667 0.44444 0.37500 0.15385
 0.98039 0.97753 0.95146 0.97248 0.92593 0.83333 0.97297 0.80769 0.97115 0.98198
 0.95385 0.93939 0.96512 0.94505 0.98795 0.97368 0.97297 0.95890 0.92157 0.94444
 0.95745 0.91667 0.69231 0.56098 0.51786
 1.00000 1.00000 1.00000 0.98667 0.80645 0.85965 1.00000 0.61290 0.95775 1.00000
 0.90909 1.00000 1.00000 1.00000 1.00000 1.00000 0.95238 1.00000 1.00000 1.00000
 0.90909 1.00000 0.60000 0.50000 0.00000
 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.88570 0.85250 0.87950
 0.99000 0.91050 0.87600 0.77100 0.75020 0.73450 0.67330 0.51550 0.38450 0.32380
 0.32600 0.26390 0.05940 0.04600 0.02910
```

# APPENDIX F
# EMISSIONS RATE ANNUALIZATION RATIOS

Emissions Rate Annualization Ratios

This appendix gives the MOBILE6 input values, different from the ozone season weekday analysis inputs (though summer season fuel property inputs used for ozone season analysis are repeated here for comparison), used to develop the summer season and winter season daily emissions factors which were used to produce the emissions rate annualization ratios, used in conjunction with the VMT annualization factor, to convert ozone season weekday emissions to annual emissions. One set of regional emissions factor annualization ratios were developed (using summer and winter daily emissions factors at a nominal speed of 40 mph) for application with all four SAN EAC counties. All of the MOBILE6 inputs/outputs were provided on CD-ROM (see description in Appendix A).

The regional vehicle age distributions were used for both the summer and winter weekday runs, a winter weekday hourly VMT distribution and the winter fuel property inputs were used for the winter season emissions factors – note that the summer hourly VMT distribution and summer fuel property inputs shown, were used in the ozone season weekday emissions factor analysis but are repeated here for comparison. The summer and winter climate inputs were used for respective seasonal emissions factors (raw data files and spreadsheets for averaging summer and winter values were provided on the CD-ROM described in Appendix A).

The last table in this appendix shows the calculated emissions factor annualization ratios used (in conjunction with the VMT annualization ratio) to convert the ozone season weekday emissions to annual emissions.

# San Antonio EAC Area 2002 Vehicle Age Distributions

```
*  Calculated from Mid-Year (July) 2002 Registration data
*  LDV
    1  0.07135 0.08938 0.08968 0.07735 0.06933 0.06588 0.05988 0.06941 0.05871 0.05433
       0.04447 0.04189 0.03407 0.03091 0.02503 0.02027 0.01845 0.01590 0.01275 0.00787
       0.00550 0.00439 0.00353 0.00460 0.02507
*  LDT1
    2  0.07443 0.09358 0.07900 0.06645 0.06143 0.06423 0.04977 0.05758 0.06127 0.04696
       0.03865 0.03487 0.02773 0.02841 0.02482 0.01980 0.02518 0.02164 0.01915 0.01222
       0.01268 0.01129 0.00673 0.00935 0.05278
*  LDT2
    3  0.07443 0.09358 0.07900 0.06645 0.06143 0.06423 0.04977 0.05758 0.06127 0.04696
       0.03865 0.03487 0.02773 0.02841 0.02482 0.01980 0.02518 0.02164 0.01915 0.01222
       0.01268 0.01129 0.00673 0.00935 0.05278
*  LDT3
    4  0.11333 0.14514 0.10770 0.13323 0.05019 0.07680 0.05311 0.05483 0.04096 0.03410
       0.02417 0.01819 0.01627 0.01601 0.01331 0.00796 0.01413 0.01305 0.01182 0.00708
       0.00727 0.00445 0.00546 0.00673 0.02471
*  LDT4
    5  0.11333 0.14514 0.10770 0.13323 0.05019 0.07680 0.05311 0.05483 0.04096 0.03410
       0.02417 0.01819 0.01627 0.01601 0.01331 0.00796 0.01413 0.01305 0.01182 0.00708
       0.00727 0.00445 0.00546 0.00673 0.02471
*  HDV2
    6  0.14791 0.15513 0.09707 0.08581 0.04381 0.06170 0.03035 0.04622 0.03658 0.03376
       0.02512 0.02291 0.01527 0.01487 0.01668 0.01085 0.02834 0.02452 0.01608 0.00945
       0.01929 0.00844 0.00904 0.00945 0.03135
*  HDV3
    7  0.04338 0.09347 0.08318 0.10823 0.03667 0.08184 0.04651 0.07335 0.05769 0.05903
       0.03265 0.03399 0.03309 0.02370 0.01834 0.01655 0.01208 0.02057 0.01297 0.00850
       0.01342 0.00671 0.00805 0.00984 0.06619
*  HDV4
    8  0.05387 0.08325 0.11949 0.12731 0.04603 0.09403 0.08913 0.05583 0.04310 0.03820
       0.02351 0.02057 0.02253 0.01469 0.01371 0.01273 0.00392 0.00686 0.01273 0.00588
       0.01175 0.00392 0.00881 0.01273 0.07542
*  HDV5
    9  0.05772 0.05195 0.12410 0.15004 0.05339 0.04185 0.04185 0.04329 0.02309 0.02165
       0.01732 0.01876 0.02020 0.02165 0.02309 0.02597 0.01587 0.03175 0.01443 0.01299
       0.03030 0.02309 0.01732 0.02165 0.09668
*  HDV6
   10  0.04549 0.08437 0.09391 0.08914 0.09832 0.03999 0.04182 0.07667 0.04072 0.04549
       0.02531 0.02788 0.02971 0.02128 0.02201 0.02384 0.02348 0.02531 0.02091 0.01394
       0.02201 0.01614 0.00990 0.01614 0.04622
*  HDV7
   11  0.03975 0.08020 0.10530 0.07113 0.06555 0.05300 0.04951 0.05718 0.03835 0.04881
       0.04045 0.05927 0.04463 0.02999 0.02859 0.02999 0.03138 0.02859 0.02301 0.01813
       0.01325 0.00837 0.00628 0.01116 0.01813
*  HDV8A
   12  0.05428 0.04737 0.05482 0.05801 0.04311 0.02874 0.03938 0.06919 0.05535 0.05907
       0.03459 0.05269 0.04577 0.04843 0.04417 0.04045 0.03938 0.03885 0.02714 0.00958
       0.02501 0.01916 0.01384 0.02182 0.02980
*  HDV8B
   13  0.02781 0.08217 0.12261 0.09482 0.03919 0.07206 0.06068 0.03919 0.08976 0.09229
       0.01391 0.03666 0.01138 0.00759 0.00759 0.00506 0.02655 0.03540 0.04678 0.02528
       0.01391 0.03161 0.00632 0.00759 0.00379
*   HDBS is MOBILE6 default
*   HDBT is MOBILE6 default
*  MC
   16  0.14608 0.13659 0.10664 0.08183 0.05739 0.04316 0.04029 0.03574 0.03002 0.02400
       0.01908 0.01321 0.01328 0.01468 0.01204 0.01211 0.02385 0.02327 0.01563 0.01930
       0.02606 0.01761 0.01563 0.01064 0.06187
```

**Summer and Winter Weekday Hourly Travel Factors**

| Hour | Hourly Summer Factor | Hourly Winter Factor |
|---|---|---|
| 6 a.m. | 0.047776 | 0.047147 |
| 7 a.m. | 0.074065 | 0.074204 |
| 8 a.m. | 0.060454 | 0.060900 |
| 9 a.m. | 0.048605 | 0.048424 |
| 10 a.m. | 0.048585 | 0.048476 |
| 11 a.m. | 0.053217 | 0.053361 |
| 12 p.m. | 0.055617 | 0.055974 |
| 1 p.m. | 0.056792 | 0.057604 |
| 2 p.m. | 0.059217 | 0.060867 |
| 3 p.m. | 0.065434 | 0.068295 |
| 4 p.m. | 0.073647 | 0.076529 |
| 5 p.m. | 0.078057 | 0.079753 |
| 6 p.m. | 0.062201 | 0.064660 |
| 7 p.m. | 0.046396 | 0.045922 |
| 8 p.m. | 0.038282 | 0.035260 |
| 9 p.m. | 0.034801 | 0.032141 |
| 10 p.m. | 0.027375 | 0.026010 |
| 11 p.m. | 0.019773 | 0.017546 |
| 12 a.m. | 0.010630 | 0.009512 |
| 1 a.m. | 0.006582 | 0.006147 |
| 2 a.m. | 0.005817 | 0.005523 |
| 3 a.m. | 0.004509 | 0.004316 |
| 4 a.m. | 0.006354 | 0.006115 |
| 5 a.m. | 0.015815 | 0.015316 |

* Summer weekday factors are same as used for ozone season, shown for comparison.

**San Antonio Fuel Property Inputs* to MOBILE6**

| Fuel | Summer | | | Winter | | |
|---|---|---|---|---|---|---|
| | RVP (psi) | Sulfur (ppm) | Samples | RVP (psi) | Sulfur (ppm) | Samples |
| Gasoline* | 7.5 | 166 | 10 | 12.3 | 199 | 20 |
| Diesel** | NA | 364 | 19 | NA | NA | 0 |

* Based on NGM 2002 San Antonio gasoline sample survey data.

** Diesel sulfur content value is a straight average of 2002 on-highway diesel fuel sample values reported by refiners marketing to Texas, as reported in "Diesel Fuel Oils, 2002" (NGM).

### San Antonio Summer Season Climate Inputs* for MOBILE6

| Hour (CDT) | Temperature (F) | Relative Humidity (%) | Barometric Pressure (inches Hg) |
|---|---|---|---|
| 12 a.m. to 1 a.m. | 77.2 | 84.8 | 29.1 |
| 1 a.m. to 2 a.m. | 76.7 | 86.8 | 29.1 |
| 2 a.m. to 3 a.m. | 76.2 | 87.7 | 29.1 |
| 3 a.m. to 4 a.m. | 75.7 | 88.6 | 29.1 |
| 4 a.m. to 5 a.m. | 75.5 | 89.1 | 29.1 |
| 5 a.m. to 6 a.m. | 76.7 | 86.9 | 29.1 |
| 6 a.m. to7 a.m. | 79.1 | 81.3 | 29.2 |
| 7 a.m. to 8 a.m. | 81.5 | 73.5 | 29.2 |
| 8 a.m. to 9 a.m. | 84.1 | 67.0 | 29.2 |
| 9 a.m. to 10 a.m. | 86.3 | 61.8 | 29.2 |
| 10 a.m. to 11 a.m. | 88.1 | 57.1 | 29.1 |
| 11 a.m. to 12 p.m. | 89.5 | 54.1 | 29.1 |
| 12 p.m. to 1 p.m. | 90.5 | 51.5 | 29.1 |
| 1 p.m. to 2 p.m. | 90.7 | 50.4 | 29.1 |
| 2 p.m. to 3 p.m. | 90.3 | 51.7 | 29.1 |
| 3 p.m. to 4 p.m. | 89.8 | 52.1 | 29.1 |
| 4 p.m. to 5 p.m. | 88.5 | 54.1 | 29.1 |
| 5 p.m. to 6 p.m. | 86.2 | 58.3 | 29.1 |
| 6 p.m. to 7 p.m. | 83.6 | 64.0 | 29.1 |
| 7 p.m. to 8 p.m. | 81.9 | 69.3 | 29.1 |
| 8 p.m. to 9 p.m. | 80.7 | 73.0 | 29.1 |
| 9 p.m. to 10 p.m. | 79.5 | 77.0 | 29.1 |
| 10 p.m. to 11 p.m. | 78.5 | 80.6 | 29.1 |
| 11 p.m. to 12 a.m. | 77.7 | 83.6 | 29.1 |
| 24-Hour Average | | | 29.1 |

* Developed by averaging data from the June through August 2002, San Antonio International Airport weather station.

## San Antonio Winter Season Climate Inputs* for MOBILE6

| Hour (CST) | Temperature (F) | Relative Humidity (%) | Barometric Pressure (inches Hg) |
|---|---|---|---|
| 12 a.m. to 1 a.m. | 47.7 | 77.5 | 29.3 |
| 1 a.m. to 2 a.m. | 47.1 | 77.8 | 29.3 |
| 2 a.m. to 3 a.m. | 46.2 | 79.5 | 29.3 |
| 3 a.m. to 4 a.m. | 46.1 | 80.0 | 29.3 |
| 4 a.m. to 5 a.m. | 45.6 | 80.9 | 29.3 |
| 5 a.m. to 6 a.m. | 45.2 | 81.5 | 29.3 |
| 6 a.m. to7 a.m. | 45.3 | 80.7 | 29.3 |
| 7 a.m. to 8 a.m. | 45.7 | 79.4 | 29.3 |
| 8 a.m. to 9 a.m. | 49.6 | 72.6 | 29.3 |
| 9 a.m. to 10 a.m. | 53.5 | 64.4 | 29.3 |
| 10 a.m. to 11 a.m. | 56.4 | 58.5 | 29.3 |
| 11 a.m. to 12 p.m. | 58.8 | 54.4 | 29.3 |
| 12 p.m. to 1 p.m. | 60.9 | 50.4 | 29.3 |
| 1 p.m. to 2 p.m. | 62.1 | 48.1 | 29.2 |
| 2 p.m. to 3 p.m. | 63.1 | 46.1 | 29.2 |
| 3 p.m. to 4 p.m. | 63.1 | 45.6 | 29.2 |
| 4 p.m. to 5 p.m. | 62.0 | 46.9 | 29.2 |
| 5 p.m. to 6 p.m. | 59.3 | 51.8 | 29.2 |
| 6 p.m. to 7 p.m. | 56.3 | 56.6 | 29.2 |
| 7 p.m. to 8 p.m. | 54.1 | 62.2 | 29.2 |
| 8 p.m. to 9 p.m. | 52.2 | 67.1 | 29.3 |
| 9 p.m. to 10 p.m. | 51.1 | 70.4 | 29.3 |
| 10 p.m. to 11 p.m. | 49.7 | 74.1 | 29.3 |
| 11 p.m. to 12 a.m. | 48.8 | 76.3 | 29.3 |
| 24-Hour Average | | | 29.3 |

* Developed by averaging data from January, February and December 2002, San Antonio International Airport weather station.

## Emissions Factor Annualization Ratios*

| | VOC | CO | NOX | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.12725 | 1.22134 | 1.18538 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.11358 | 1.26190 | 1.22134 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.11715 | 1.25859 | 1.21913 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.11999 | 1.22063 | 1.21134 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.12495 | 1.22080 | 1.21425 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 1.03734 | 1.01539 | 0.99711 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 1.01922 | 0.97978 | 1.00465 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.99714 | 0.98231 | 1.00076 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.98872 | 0.96263 | 1.01193 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 1.00752 | 0.97849 | 1.00420 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 1.02010 | 1.00055 | 0.99566 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.98687 | 0.96242 | 1.00834 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 1.01736 | 1.01035 | 0.99097 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.98754 | 0.95178 | 1.32501 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 1.01848 | 0.93283 | 1.04837 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* Used in conjunction with VMT annualization ratios to convert ozone season weekday emissions estimates to annual emissions estimates. The PM component annualization factors apply to both PM-10 and PM-2.5 pollutants.

Texas Transportation Institute

# 2002 Three-Year Cycle Emissions Inventory Methodology for 216 Counties in Texas


TEXAS TRANSPORTATION INSTITUTE
THE TEXAS A&M UNIVERSITY SYSTEM
COLLEGE STATION, TEXAS



Sponsored by the
Texas Commission
On Environmental Quality
May 2004

# TECHNICAL NOTE

## Transportation Air Quality Technical Support Interagency Contract with Texas Commission on Environmental Quality


| | | |
|---|---|---|
| TO: | Anusuya Iyer, Project Manager<br>Texas Commission on Environmental Quality | DATE: 28 May 2004 |
| FROM: | Dennis G. Perkinson, Ph.D., and<br>Martin E. Boardman<br>Texas Transportation Institute | TTI STUDY NO.: 402131-14 |


SUBJECT: 2002 Three-Year Cycle Emissions Inventory Methodology for 216 Counties in Texas
(Umbrella Contract 03-60200-07: Task 1) - **Revised Final**

**INTRODUCTION**

This Technical Note is one of seven reports documenting the methodologies used to develop the 2002 actual on-road mobile source emissions inventories (EIs) as required in the Consolidated Emissions Reporting Rule (CERR) task. According to the CERR, starting with 2002 and at three year intervals, states are to develop summer (or ozone season) weekday and annual on-road mobile source EIs for all counties, regardless of nonattainment status. Carbon monoxide (CO) season weekday EIs are also required for CO nonattainment counties.

This CERR-based task required development of county-level summer weekday and annual emissions estimates for 242 Texas counties (the 12 Dallas/Fort Worth consolidated metropolitan statistical area counties were excluded). Separate EI analyses were performed and documented for six air quality planning (AQP) areas (26 counties) and a seventh EI analysis was performed and documented for the remaining non-AQP area counties (216).

The six AQP areas in the analysis are: the Beaumont/Port Arthur (BPA), Houston/Galveston (HGA) and El Paso (ELP) ozone nonattainment areas; and the Austin (AUS), San Antonio (SAN) and Northeast Texas (TLM) Early Action Compact (EAC) areas. (CO season weekday estimates were also developed for El Paso.) Analysis for these six AQP areas consists of 18 travel demand model (TDM) link-based counties and eight Highway Performance Monitoring System (HPMS)-based counties (see Table 1).

**Table 1**
**Delineation of County-Level Emissions Analyses by Region and Activity Basis**

| Area | Counties | Activity Basis |
|---|---|---|
| Houston-Galveston (HGA) nonattainment area (NAA) | Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller | TDM |
| Beaumont-Port Arthur (BPA) NAA | Jefferson, Hardin, Orange | TDM |
| El Paso (ELP) NAA | El Paso | TDM |
| Austin (AUS) Early Action Compact (EAC) area | Hays, Travis, Williamson<br>Bastrop, Caldwell | TDM<br>HPMS |
| San Antonio (SAN) EAC area | Bexar<br>Comal, Guadalupe, Wilson | TDM<br>HPMS |
| Tyler-Longview (TLM) EAC area | Gregg, Smith<br>Harrison, Rusk, Upshur | TDM<br>HPMS |
| Dallas/Fort Worth CMSA | Collin, Dallas, Denton, Ellis, Henderson, Hood, Hunt, Johnson, Kaufman, Parker, Rockwall, Tarrant | Excluded from analysis |
| Rest of Texas | 216 counties | HPMS |
| Totals | 18<br>224 | TDM<br>HPMS |

This Technical Note documents the methods used to develop the non-AQP county (216) 2002 HPMS-based on-road mobile source Three-Year Cycle (3YC) EIs. This analysis includes both summer weekday and annual emissions estimates for volatile organic compounds (VOC), CO, oxides of nitrogen (NOx), ammonia ($NH_3$), sulfur dioxide ($SO_2$), and particulate matter (PM) of both 10 microns or less and 2.5 microns or less in diameter (PM-10 and PM-2.5). The results are included in EPA's National Emissions Inventory (NEI) version 3.0 (NIFv3.0) reporting format for use in the EPA's 2002 NEI.

Documented in this technical note are the methods relating to calculating inventory elements including vehicle miles traveled (VMT), speeds, VMT mix, MOBILE6 emissions factors, and weekday and annual emissions estimates.

**ACKNOWLEDGMENTS**
Peter Ogbeide, with the Texas Commission on Environmental Quality (TCEQ), and Martin Boardman and L. D. White, both of the Texas Transportation Institute (TTI) contributed to the development of the MOBILE6.2 emissions rate setups used. Boardman developed the emissions rates, VMT and speeds, and performed the emissions analyses. Dennis Perkinson, Ph.D., of TTI, developed seasonal adjustments for VMT, VMT time-of-day allocation factors and VMT mix.

The Texas Department of Transportation (TxDOT) provided the 2002 HPMS data report (RIFCREC, or Road Inventory Functional Classification Record report). All TTI staff involved contributed to the quality assurance of the emissions inventory data. Dr. Perkinson was the principle investigator for this project. This work was performed by TTI under contract to TCEQ. Anusuya Iyer was the TCEQ project technical manager.

**Deliverables**

Interim deliverables are an informal Technical Note (a narrative in memorandum format that explains the task, the approaches used, and the findings) provided to the Project Manager in WordPerfect 6/7/8 format, and supported by electronic document files. All pertinent data are being submitted in specified electronic format. (There is no FORTRAN source code or executable files developed under this task.) CD-ROM is used to record the final data and supporting documentation. TTI is providing five copies of the final report. One of the copies is an unbound original suitable for copying. Electronic copies of all materials related to the task report to document results and conclusions (e.g., data, work files, text files, etc.), or developed as work products under this contract are provided as requested by the TCEQ staff.

The electronic data submittal (described in Appendix A) was previously delivered to TCEQ on CD-ROM. The electronic data submittal includes the detailed emissions data summaries, emissions factors input and output files, annualization factors, climate and fuel parameter inputs and worksheets, and NIFv3.0 emissions files and descriptions.

## SUMMARY OF VMT AND EMISSIONS

For the 216 counties, VOC, CO, NOx, $SO_2$, $NH_3$, PM-10 and PM-2.5 emissions estimates at the vehicle type and road type level were estimated for a typical 2002 summer weekday and for the year. The 2002 county-level summaries of VMT and emissions estimates for these periods are shown in Appendix B (all 242 counties in the CERR task are included the summaries). The detailed EI data summaries, as provided on CD-ROM, are described in Appendix A.

## OVERVIEW OF METHODOLOGY

Developing the on-road mobile source emissions inventories for the 216 non-AQP area HPMS-based counties required two basic methods — one for the seasonal weekday emissions estimates, and an annual emissions estimation methodology.

To develop the summer weekday 2002 emissions estimates, a directional "virtual link"-based, hourly methodology was applied. Emissions estimates were calculated at the HPMS roadway network virtual link level (up to 42 directional links, i.e., 21 roadway/area type combinations by two directions) for each hour of the average summer (June through July) weekday (Monday through Friday).

The annual emissions estimates were developed based on the summer weekday emissions. Sets of annualization ratios were developed and applied by county to summer weekday emissions. This procedure consists of two components — VMT annualization and emissions rate annualization. In general, multiplying summer weekday emissions for each county by the appropriate VMT and emissions rate annualization ratios produced the annual emissions estimates.

The MOBILE6 model (EPA, October 2002) was used to develop hourly (and daily) emissions factors by MOBILE6 road type (or drive cycle) and 28 vehicle types. The speed sensitive freeway and arterial drive cycle emissions factors were applied — freeway emissions factors to freeway functional classifications, and arterial emissions factors to non-freeway functional classifications.

The activity basis were the county 2002 historical HPMS Annual Average Daily Traffic (AADT) VMT provided in TxDOT's 2002 Road Inventory Functional Classification Record Report. With TxDOT Automatic Traffic Recorder (ATR) data, summer weekday VMT factors were developed and applied to the county 2002 AADT VMT estimates to produce 2002 Average Summer Weekday Traffic (ASWT) VMT estimates.

ATR-based summer weekday hourly travel profiles were developed and used to allocate the ASWT VMT for each county by hour-of-day. Directional split factors were applied to allocate the hourly VMT by peak and off-peak direction. Based on the estimated hourly directional traffic volumes (and capacities and freeflow speeds), fleet-level, hourly, directional, average operational (congested) speeds were estimated. The link congested speed is estimated as the link freeflow speed reduced by the "delay" estimate, which is a function of the link's volume-to-capacity (v/c) ratio.

Vehicle classification count data were used with vehicle registration data and MOBILE6 default gasoline/diesel fractions to estimate 24-hour regional VMT mixes for apportioning fleetwide functional classification-specific VMT for three functional classification groups to the 28 U.S. Environmental Protection Agency (EPA) vehicle types.

To calculate emissions, for each hour the link-VMT were stratified by vehicle type and functional classification group. Hourly emissions factors were matched to the stratified input data on each link based on the link's speed, functional classification and vehicle type. The hourly emissions factors are multiplied with VMT producing link-level hourly emissions estimates which are then summarized at various levels. The 24-hour summer weekday emissions estimates were multiplied by the VMT and emissions factor annualization ratios to produce the annual emissions estimates.

TTI used a previously developed series of computer programs to calculate and summarize the detailed on-road mobile source EIs in various formats, including the EPA's NIFv3.0 format. Appendix C describes these applications.

## ESTIMATION OF SUMMER WEEKDAY VMT

The VMT estimation process yields county-level summer weekday VMT estimates by hour and direction for each HPMS functional classification and area type combination. These estimates are developed with: county level AADT VMT, AADT to ASWT adjustment factor and hourly travel and directional factors. Annual VMT is discussed later.

**Data Sources**

There are three traffic data sources used for developing the required adjustment factors and VMT estimates. These are ATR counts, HPMS VMT estimates, and vehicle classification counts (used to estimate VMT mix). All are collected by the TxDOT on a formal and on-going basis as part of the larger HPMS data collection program.

HPMS VMT estimates are available for all counties. ATR and vehicle classification (VMT mix) data are available for most but not all counties. Consequently, these last two data sources were aggregated to TxDOT Districts (Appendix D) to provide adequate data for this analysis.

ATR vehicle counts are collected by TxDOT at selected locations on a continuous basis throughout Texas. These counts are available by season, month, and weekday, as well as on an annual average daily basis. Since they are continuous, they are especially well-suited for making seasonal, day-of-week, and time-of-day comparisons (i.e., adjustment factors), even though there may be relatively few ATR data collection locations in any given area.

HPMS VMT estimates are based on traffic count data collected according to a statistical sampling procedure specified by the Federal Highway Administration (FHWA) designed to estimate VMT (as well as lane miles and centerline miles). A wide range of traffic data is collected under the HPMS program. The focus for this analysis was specifically on the vehicle miles traveled, centerline miles, and lane miles estimates made as part of the HPMS program. For this analysis, the HPMS VMT is categorized by seven functional classifications and three area types.

Vehicle classification counts are collected at representative locations throughout Texas on a regular but periodic basis. Roadway functional classification is included as part of the data collected. Vehicle classification counts were used to estimate the relative proportion of VMT to be assigned to each type of vehicle (VMT mix is described later in this report).

**Summer Weekday Factors**

Emissions estimates are required for the summer weekday. Since the HPMS average annual daily traffic (AADT) VMT data are for Monday through Sunday, January through December, a conversion factor is required to convert AADT to ASWT. The three most recent years of these data are aggregated by TxDOT District for this analysis.

The TxDOT District AADT to ASWT factors are simply the ratio of ASWT volume to AADT volume within each district. The AADT to ASWT adjustment factors are shown in Appendix E.

**Adjusted County VMT Totals**

The historical HPMS county total AADT VMT data for 2002 are used for this purpose, along with the AADT-to-ASWT factors described in the preceding section. The AADT VMT total for each county is multiplied by the appropriate TxDOT District AADT-to-ASWT factor to produce the ASWT VMT estimates. These county VMT control totals are shown in Appendix F.

The county VMT control totals are disaggregated to the HPMS functional classification and area type level (21 combinations, or cells). This is performed for each county by multiplying the ratio, county control total VMT to county total AADT VMT, by the HPMS AADT VMT for each of the 21 cells. This procedure allocates the 2002 control total VMT to each cell proportional to each cell's 2002 HPMS AADT VMT estimate.

**Hourly Travel and Directional Factors**

The VMT up to this point are 24-hour estimates; hourly travel factors are required to apportion the VMT to each hour of the day.

TxDOT District-level continuous ATR data (for 1999 and 2001) are used to develop summer weekday hourly travel factors. Using the summer weekday volumes, these factors are the ratio of hourly volumes to 24-hour volume.

The hourly factors for each District are then applied to each county 24-hour VMT estimate within that District to produce the hourly virtual link summer weekday VMT estimates. The hourly travel factors are shown in Appendix G. (A corresponding set of winter hourly travel factors were also developed for the annual emissions procedure, discussed below.)

The VMT were apportioned by direction to allow for differences in congestion levels based on the direction of traffic flow. Directional volumes are required for modeling directional operational speeds, discussed in the next section. The directional split ratio applied is 60/40 based on aggregate observed values for areas where data are available.

Hourly and 24-hour VMT summaries (by day type, road type, and vehicle type) are included with the EI data provided to TCEQ on CD-ROM. Appendix A describes the electronic data files that were provided to TCEQ.

**ESTIMATION OF SPEEDS**

Speed is a critical parameter for estimating emissions. Similarly, capacity and freeflow speed are critical parameters for determining speed. Capacity is the maximum flow past a given point on a roadway. It varies by the type of roadway (i.e., by functional classification). Freeflow speed is the maximum speed at which traffic will move along a given roadway if there are no impediments (e.g., congestion, bad weather, etc.).

To estimate a link's (or "virtual" link, in the case of HPMS-based analyses) directional, time-of-day congested speed, a speed model involving both the estimated freeflow speed and estimated directional delay as a function of volume and capacity for the link and time-period is applied. The model is applied to each link for each time period and direction. Development of the link capacities and freeflow speeds input to the speed model is first discussed, followed by the model delay and congested speed equations.

**Capacities and Freeflow Speeds**

The capacities and freeflow speeds used for HPMS-based county analyses all come from the Highway Capacity Manual (HCM). For HPMS functional classifications 1 and 2 (interstate and freeway), both capacities and freeflow speeds are taken directly from the HCM (3-3). The capacity (2,200 passenger cars per hour per lane [pcphpl]) and freeflow speed (70 mph) for four-lane freeways was used for all interstates, regardless of area type. Similarly, a freeflow speed of 65 mph and capacity of 2,100 pcphpl was used for all freeways (HCM figure 3-2a).

HPMS functional classifications 3, 4, 5, 6, and 7 (principal arterial, minor arterial, major collector, minor collector, and local) have traffic control devices (i.e., signals or stop signs) that determine their capacities. The capacities of these signalized roadways were calculated based on signalized intersection capacity defined as shown (HCM 1994: 9-5, equation 9-3):

$$Ci = Si \times (gi/C)$$

Where:

| | | |
|---|---|---|
| Ci | = | capacity of lane group i, vehicles per hour (vph); |
| Si | = | saturation flow rate of lane group i, vehicles per hour of effective green time (vphg); and |
| gi/c | = | effective green ratio for lane group i. |

The saturation flow rate (Si) is the flow in vph that could be accommodated by the lane group assuming that the green phase was always available to the lane group (i.e., green ratio = 1.0). Computation of the adjusted saturation flow rate begins with the ideal saturation flow rate of 1,900, which is adjusted to reflect variance from ideal conditions. The saturation flow rate was adjusted for area type using the following assumptions (HCM 1994: 9-14, equation 9-12):

$$S = N \times fw \times fhv \times fg \times fp \times fbb \times fa \times frt \times flt$$

Where:

| | | |
|---|---|---|
| S | = | saturation flow rate factor (rounded to two decimal places); |
| N | = | number of lanes in the lane group; |
| fw | = | lane width adjustment factor (12-foot lane for all area types assumed); |
| fhv | = | heavy vehicle adjustment factor (5 percent heavy vehicles for all area types to adjust for passenger car equivalents, not to be confused with VMT mix); |
| fg | = | approach grade factor (level terrain assumed for all area types); |
| fp | = | parking lane adjustment (none for rural areas, one maneuver per hour for urban areas); |
| fbb | = | bus blocking factor (none for rural areas, 10 per hour for urban areas, mid-point for small urban areas); |
| fa | = | area type adjustment (0.9 for urban area, 1.0 for all other areas); |
| frt | = | right turn adjustment factor (shared lane for right turns for all area types, high pedestrian crossing for urban areas, moderate for small urban areas, and low for rural); and |

flt = left turn adjustment factor (exclusive left turn lanes and protected phasing for rural areas, shared left turn lanes and protected plus permitted phasing for urban areas, mid-point for small urban areas).

Table 2 shows the saturation flow rate adjustment factors used for the three different area types.

**Table 2**
**Saturation Flow Rate Adjust Factors by Area Type**

| Area Type | fw | fhv | fg | fp | fbb | fa | frt | flt |
|---|---|---|---|---|---|---|---|---|
| Rural | 1 | 0.95 | 1 | 1 | 1 | 1 | 0.98 | 0.95 |
| Small Urban | 1 | 0.95 | 1 | 0.98 | 0.98 | 1 | 0.94 | 0.90 |
| Urban | 1 | 0.95 | 1 | 0.95 | 0.96 | 0.90 | 0.90 | 0.85 |

Table 3 shows the effective green ratios used for different functional classes. The same ratios were used for all area types. (Interstates and freeways are unsignalized and do not require green ratios.)

**Table 3**
**Effective Green Ratios (gi/C) by HPMS Roadway Functional Classification**

| Principal Arterial | Minor Arterial | Major Collector | Minor Collector | Local |
|---|---|---|---|---|
| 0.60 | 0.55 | 0.50 | 0.40 | 0.30 |

Table 4 shows the adjusted saturation flow rate (expressed in pcphpl) for all signalized streets (i.e., not interstate or freeway) for the three area types.

**Table 4**
**Adjusted Saturation Flow Rate (pcphpl) by Area Type**

| HPMS Area Type | Ideal Flow | Adjustment Factor | Adjusted Saturation Flow |
|---|---|---|---|
| Rural | 1,900 | 0.88 | 1,672 |
| Small Urban | | 0.77 | 1,463 |
| Urban | | 0.59 | 1,121 |

The freeflow speed for rural and urban arterials (FC-3 and FC-4) were taken directly from HCM (HMC 1994: 7-10 and 11-6, respectively). The freeflow speed for other functional classes decreases from arterial freeflow speed by 5 mph increments. No freeflow speed is below 30 mph. Table 5 shows the hourly lane capacities for all functional classes and area types.

**Table 5**
**Hourly Lane Capacities (vehicles per hour per lane [vphpl])**

| HPMS Area Type | HPMS Roadway Functional Classification | | | | | | |
|---|---|---|---|---|---|---|---|
| | Interstate | Freeway | Other Principal Arterial | Minor Arterial | Major Collector | Minor Collector | Local |
| Rural | 2,200 | 2,100 | 1,003 | 920 | 836 | 669 | 502 |
| Small Urban | 2,200 | 2,100 | 878 | 805 | 732 | 585 | 439 |
| Urban | 2,200 | 2,100 | 673 | 617 | 561 | 448 | 336 |

Similarly, freeflow speeds are provided for each of the three area types and seven roadway functional classifications (or 21-HPMS virtual links). Table 6 shows the freeflow speeds.

**Table 6**
**Freeflow Speeds (mph)**

| HPMS Area Type | HPMS Roadway Functional Classification | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Interstate** | **Freeway** | **Other Principal Arterial** | **Minor Arterial** | **Major Collector** | **Minor Collector** | **Local** |
| Rural | 70 | 65 | 55 | 50 | 40 | 35 | 30 |
| Small Urban | 70 | 65 | 45 | 40 | 35 | 30 | 30 |
| Urban | 70 | 65 | 40 | 35 | 30 | 30 | 30 |

V/C ratios were generated for each combination of time period, roadway functional classification, area type, and direction using these capacities and VMT. The following describes the calculation for this procedure:

- Volume: VMT was multiplied by each 24 hourly time period factors yielding VMT for each time period. VMT per time period was divided by centerline miles, yielding volume for each time period. This procedure was performed for each combination of time period, roadway functional classification, area type, and direction.

- Capacity: Lane miles were divided by centerline miles to produce lanes. Lanes were multiplied by the lane capacities (i.e., adjusted saturation flows) generated by the process described above, producing hourly lane capacities. Hourly lane capacities were multiplied by the number of hours in the time period to produce time period capacities. This procedure was performed for each combination of time period, roadway functional classification, and area type. (Capacity is the same for each direction.)

- V/C ratios: The speed model was applied to the resulting volumes and capacities for each functional classification and area type combination. This yields volumes adjusted for the impact of congestion-related delay for each combination of time period, functional classification, area type, and direction.

With the freeflow speeds and hourly, directional volumes and capacities on each link, the congested speeds may be computed.

**Estimation of Congested Speeds**
The congested speed model first calculates delay on the link which it then applies to the link freeflow speed to compute the link operational congested speed estimate. The volume/delay equation is:

$$Delay = Min\ [A\, e^{B(\frac{V}{C})},\ M]$$

Where:

Delay = congestion delay (in minutes/mile);
A & B = volume/delay equation coefficients;
M = maximum minutes of delay per mile; and
V/C = time-of-day directional v/c ratio.

The delay model parameters (A, B, and M) were developed for the Dallas/Fort Worth area and verified by application in other Texas urban areas. There is a set of parameters for high-capacity facilities and a set for low-capacity facilities (see Table 7). The HPMS high-capacity facilities are Interstate and Freeway classifications.

**Table 7**
**Volume/Delay Equation Parameters**

| Facility Category | A | B | M* |
|---|---|---|---|
| High-Capacity Facilities (> 3,400 vph one way, e.g., Interstates and Freeways) | 0.015 | 3.5 | 3.0 |
| Low-Capacity Facilities (≤ 3,400 vph, e.g., Arterials, Collectors and Locals) | 0.050 | 3.0 | 5.0 |

* M values are adjusted for HPMS model.

Given the estimated directional delay (in minutes/mile) and the estimated freeflow speed, the directional congested speed is computed as follows:

$$Congested\ speed = \frac{60}{\frac{60}{Freeflow\ speed} + Delay}$$

This model is applied to each link, based on functional class and area type, for each time period and each direction. The hourly and 24-hour VMT weighted speed summaries by county and road type are included in the set of data files provided to TCEQ on CD-ROM (see Appendix A for electronic data descriptions).

**TXDOT DISTRICT VMT MIX**

VMT mix is estimated using TxDOT 1997 - 2001 vehicle classification data for each TxDOT District. TxDOT classification counts classify vehicles into the standard FHWA vehicle classifications (based on vehicle length/number of axles) using best practice vehicle classification count methods.

| | |
|---|---|
| C | Passenger vehicles; |
| P | Two-axle, four-tire single-unit trucks; |
| B | Buses; |
| SU2 | Six-tire, two-axle single-unit vehicles; |
| SU3 | Three-axle single-unit vehicles; |
| SU4 | Four or more axle single-unit vehicles; |
| SE4 | Three or four axle single-trailer vehicles; |
| SE5 | Five-axle single-trailer vehicles; |
| SE6 | Six or more axle single-trailer vehicles; |
| SD5 | Five or less axle multi-trailer vehicles; |
| SD6 | Six-axle multi-trailer vehicles; and |
| SD7 | Seven or more axle multi-trailer vehicles. |

EPA and MOBILE use a different vehicle classification scheme than the FHWA categories. The 28 EPA vehicle categories are defined as a function of gross vehicle weight rating (GVWR) and fuel type (see Table 8). The FHWA axle/vehicle length based classification categories must be converted into 28 MOBILE GVWR/fuel type based categories.

The FHWA vehicle classification counts are first aggregated into three intermediate groups:

| | |
|---|---|
| Passenger Vehicles (PV) | C + P; |
| Heavy-Duty Vehicles (HDV) | SU2 + SU3 + SU4 + SE4; and |
| HDDV8b (HDX) | SE5 + SE6 + SD5 + SD6 + SD7 |

This is followed by a second intermediate allocation that separates light-duty vehicles (LDV) into PVs and light-duty trucks (LDT) based on TxDOT registration data:

| | |
|---|---|
| LDV | 0.747 × PV (by district, 2002 El Paso District registration data shown); and |
| LDT | 0.253 × PV (by district, 2002 El Paso District registration data shown). |

A third intermediate allocation further separates LDTs into LDT1 and HLDT (note that LDT1 is itself intermediate and is further divided into LDGT1 and LDDT):

| | |
|---|---|
| LDT1 | 0.893 × LDT (by district, 2002 El Paso District registration data shown); and |
| HLDT | 0.107 × LDT (by district, 2002 El Paso District registration data shown). |

Next, the remaining FHWA categories are disaggregated into EPA vehicle groups, as shown. Note that TxDOT vehicle classification count procedures do not distinguish between gasoline and diesel LDTs. Consequently, MOBILE defaults for the year of interest are used. As before, actual TxDOT vehicle registration data are used to separate gasoline from diesel heavy-duty trucks. Note also that motorcycles are not counted separately and are included as a default (subtracted from LDGV):

| | |
|---|---|
| LDGV | 0.9983579 × LDV (MOBILE6 default for 2002 shown); |
| LDDV | 0.0016421 × LDV (MOBILE6 default for 2002 shown); |
| LLDT | 0.9945513 × LDT1 (MOBILE6 default for 2002 shown); |
| LDDT | 0.0054487 × LDT1 (MOBILE6 default for 2002 shown); |
| HDGV | 0.484 × HDV (by district, 2002 El Paso District registration data shown); |
| HDDV | 0.516 × HDV (by district, 2002 El Paso District registration data shown); and |
| MC | 0.001 of total (subtracted from LDGV). |

This converts the FHWA axle count-based categories into GVWR categories. This part of the conversion procedure is summarized schematically in Table 9. Starting with the TxDOT vehicle classification data, these data themselves provide sufficient information to complete the first step in the conversion process, the allocation of vehicles into PVs, HDVs), HDDV8bs, and buses (B). Steps 2 and 3 further allocate these categories using TxDOT registration data. Finally, Step 4 allocates LDVs by fuel type using EPA MOBILE diesel fractions and motorcycles are separated from LDGVs using a nominal constant.

The MOBILE6 28-category typology is a subset of this typology. A combination of EPA MOBILE6 defaults and area vehicle registration data are used to expand these intermediate categories.

For the 28-category EPA scheme, HDVs — HDGV and HDDV — are separated into eight and seven categories respectively. HDDV8b vehicles are counted directly. The 15 HDV categories are separated from total HDV, which have been separated by fuel type using TxDOT registration data by county. Each HDV category (HDGV and HDDV) is then divided into sub-categories based on TxDOT area vehicle registration data. Buses are treated separately.

The 28-category EPA scheme also further divides the two LDT categories based in part on assumed loading. The previous LDGT1 and LDGT2 categories (previously defined as GVWR ≤ 6,000 and GVWR > 6,000 to 8,500, respectively) are separated into subcategories in terms of adjusted loaded vehicle weight (ALVW). ALVW is the average of vehicle curb weight and GVWR. Thus, two new intermediate categories are introduced. These are light light-duty trucks (LLDT) and heavy light-duty trucks (HLDT), which are defined as:

- LLDT - any light-duty truck rated through 6,000 pounds GVWR; and
- HLDT - any light-duty truck rated greater than 6,000 pounds GVWR.

These two new intermediate categories are then used to define the four LDT categories using EPA MOBILE6 defaults for the year of interest. The four LDT categories are:

- LDGT1 - light light-duty trucks through 3,750 pounds loaded vehicle weight (LVW);

- LDGT2 - light light-duty trucks greater than 3,750 pounds LVW;
- LDGT3 - heavy light-duty trucks to 5,750 pounds ALVW; and
- LDGT4 - heavy light-duty trucks greater than 5,750 pounds ALVW.

Similarly, the LDDT category is sub-divided into two categories based on GVWR (less than or equal to 6,000 GVWR and 6,000 to 8,500 GVWR). This is accomplished using EPA MOBILE6 default values for the year of interest.

Finally the three bus categories are separated from the TxDOT classification counts bus category using EPA MOBILE6 default values. (Under MOBILE6 the HDV category does not include buses.)

For historical VMT mix estimates, the MOBILE6 default values consistent with the historical year are used. No other adjustments are made to alter the count data and conversion procedure to accommodate future years or historical years. Table 10 shows the VMT mix estimation procedure summary followed by explanatory notes. For this analysis, VMT mix estimates were developed for three functional classification groups. VMT mixes are shown in Appendix H.

This procedure is performed as described for weekdays. TxDOT vehicle classification data are only collected for weekdays (Monday through Thursday). No seasonal changes are assumed.

**Table 8**
**EPA Vehicle Types - 28 Categories**

| Category | Description | GVWR |
|---|---|---|
| LDGV | Light-duty gasoline vehicle | $\leq$ 6,000 |
| LDGT1 | Light-duty gasoline truck | $\leq$ 6,000 |
| LDGT2 | Light-duty gasoline truck | $\leq$ 6,000 |
| LDGT3 | Light-duty gasoline truck | 6,001 - 8,500 |
| LDGT4 | Light-duty gasoline truck | 6,001 - 8,500 |
| HDGV2b | Heavy-duty gasoline vehicle | 8,501 - 10,000 |
| HDGV3 | Heavy-duty gasoline vehicle | 10,001 - 14,000 |
| HDGV4 | Heavy-duty gasoline vehicle | 14,001 - 16,000 |
| HDGV5 | Heavy-duty gasoline vehicle | 16,001 - 19,500 |
| HDGV6 | Heavy-duty gasoline vehicle | 19,501 - 26,000 |
| HDGV7 | Heavy-duty gasoline vehicle | 26,001 - 33,000 |
| HDGV8a | Heavy-duty gasoline vehicle | 33,001 - 60,000 |
| HDGV8b | Heavy-duty gasoline vehicle | > 60,000 |
| HDGB | Heavy-duty gasoline bus | all |
| LDDV | Light-duty diesel vehicle | $\leq$ 6,000 |
| LDDT12 | Light-duty diesel truck | $\leq$ 6,000 |
| LDDT34 | Light-duty diesel truck | 6,001 - 8,500 |
| HDDV2b | Heavy-duty diesel vehicle | 8,501 - 10,000 |
| HDDV3 | Heavy-duty diesel vehicle | 10,001 - 14,000 |
| HDDV4 | Heavy-duty diesel vehicle | 14,001 - 16,000 |
| HDDV5 | Heavy-duty diesel vehicle | 16,001 - 19,500 |
| HDDV6 | Heavy-duty diesel vehicle | 19,501 - 26,000 |
| HDDV7 | Heavy-duty diesel vehicle | 26,001 - 33,000 |
| HDDV8a | Heavy-duty diesel vehicle | 33,001 - 60,000 |
| HDDV8b | Heavy-duty diesel vehicle | > 60,000 |
| HDDBS | Heavy-duty diesel school bus | all |
| HDDBT | Heavy-duty diesel transit bus | all |
| MC | Motorcycle | all |

**Table 9**
**Initial Vehicle Classification Conversion Procedure**

<table>
<tr><th>Start</th><th>Step 1</th><th>Step 2</th><th>Step 3</th><th>Step 4</th></tr>
<tr><td rowspan="10">Total Vehicles</td><td rowspan="6">PV</td><td rowspan="3">LDV</td><td rowspan="2">LDGV</td><td>MC</td></tr>
<tr><td>LDGV</td></tr>
<tr><td colspan="2">LDDV</td></tr>
<tr><td rowspan="3">LDT</td><td rowspan="2">LDT1</td><td>LLDT</td></tr>
<tr><td>LDDT</td></tr>
<tr><td colspan="2">HLDT</td></tr>
<tr><td rowspan="2">HDV</td><td colspan="3">HDGV</td></tr>
<tr><td colspan="3">HDDV</td></tr>
<tr><td colspan="4">HDDV8b</td></tr>
<tr><td colspan="4">B</td></tr>
</table>

**Table 10**
**VMT Mix Estimation Procedure Summary**

| EPA-8 | EPA-28 | Conversion |
|---|---|---|
| LDGV | LDGV | .9984 × LDV |
| LDGT1 | LDGT1 | .2310 × LLDT |
| | LDGT2 | .7690 × LLDT |
| LDGT2 | LDGT3 | .6850 × HLDT |
| | LDGT4 | .3150 × HLDT |
| HDGV | HDGV2b | .436 × HDGV |
| | HDGV3 | .200 × HDGV |
| | HDGV4 | .085 × HDGV |
| | HDGV5 | .053 × HDGV |
| | HDGV6 | .137 × HDGV |
| | HDGV7 | .047 × HDGV |
| | HDGV8a | .038 × HDGV |
| | HDGV8b | .004 × HDGV |
| | HDGB | .1689 × B |
| LDDV | LDDV | .0016 × LDV |
| LDDT | LDDT12 | .1222 × LDDT |
| | LDDT34 | .8778 × LDDT |
| HDDV | HDDV2b | .330 × HDDV |
| | HDDV3 | .125 × HDDV |
| | HDDV4 | .071 × HDDV |
| | HDDV5 | .048 × HDDV |
| | HDDV6 | .165 × HDDV |
| | HDDV7 | .099 × HDDV |
| | HDDV8a | .162 × HDDV |
| | HDDV8b | HDX |
| | HDDBT | .3245 × B |
| | HDDBS | .5066 × B |
| MC | MC | MC |

## Notes to VMT Mix Estimation Procedure Summary

Intermediate category factors and sources:

| | |
|---|---|
| LDV | .747 × PV (by district, 2002 El Paso District registration data shown) |
| LDT | .253 × PV (by district, 2002 El Paso District registration data shown) |
| LDT1 | .893 × LDT (by district, 2002 El Paso District registration data shown) |
| HLDT | .107 × LDT (by district, 2002 El Paso District registration data shown) |
| LLDT | .9945 × LDT1 (EPA MOBILE6 default for 2002) |
| LDDT | .0055 × LDT1 (EPA MOBILE6 default for 2002) |
| HDV | SU2+SU3+SU4+SE3+SE4 |
| HDX | SE5+SE6+SD5+SD6+SD7 |
| HDGV | .484 × HDV (by district, 2002 El Paso District registration data shown) |
| HDDV | .516 × HDV (by district, 2002 El Paso District registration data shown) |

Category conversion factors and sources:

| | |
|---|---|
| LDGV | .9984 × LDV (EPA MOBILE6 default for 2002) |
| LDGT1 | .2310 × LLDT (EPA MOBILE6 default for 2002) |
| LDGT2 | .7690 × LLDT (EPA MOBILE6 default for 2002) |
| LDGT3 | .6850 × HLDT (EPA MOBILE6 default for 2002) |
| LDGT4 | .3150 × HLDT (EPA MOBILE6 default for 2002) |
| HDGV2a | .436 × HDGV (State 2002 registration data shown) |
| HDGV3 | .200 × HDGV (State 2002 registration data shown) |
| HDGV4 | .085 × HDGV (State 2002 registration data shown) |
| HDGV5 | .053 × HDGV (State 2002 registration data shown) |
| HDGV6 | .137 × HDGV (State 2002 registration data shown) |
| HDGV7 | .047 × HDGV (State 2002 registration data shown) |
| HDGV8a | .038 × HDGV (State 2002 registration data shown) |
| HDGV8b | .004 × HDGV (State 2002 registration data shown) |
| HDGB | .1689 × B (EPA MOBILE6 default for 2002) |
| LDDV | .0016 × LDV (EPA MOBILE6 default for 2002) |
| LDDT12 | .1222 × LDDT (EPA MOBILE6 default for 2002) |
| LDDT34 | .8778 × LDDT (EPA MOBILE6 default for 2002) |
| HDDV2b | .330 × HDDV (State 2002 registration data shown) |
| HDDV3 | .125 × HDDV (State 2002 registration data shown) |
| HDDV4 | .071 × HDDV (State 2002 registration data shown) |
| HDDV5 | .048 × HDDV (State 2002 registration data shown) |
| HDDV6 | .165 × HDDV (State 2002 registration data shown) |
| HDDV7 | .099 × HDDV (State 2002 registration data shown) |
| HDDV8a | .162 × HDDV (State 2002 registration data shown) |
| HDDV8b | HDX (TxDOT District classification counts) |
| HDDBT | .3245 × B (EPA MOBILE6 default for 2002) |
| HDDBS | .5066 × B (EPA MOBILE6 default for 2002) |
| MC | MC (default subtracted from LDGV, no conversion) |

## ESTIMATION OF SUMMER WEEKDAY EMISSIONS FACTORS

This section discusses development of the summer weekday emissions factors used for estimating summer weekday emissions for each of the 216 non-AQP area counties. These 216 counties were grouped into 47 MOBILE6 input data aggregation categories (see table in Appendix A) for developing the emissions factors. An additional set of winter season weekday emissions factors developed for the annual emissions estimates procedure are discussed later in the "Estimation of Annualization Ratios" section.

The MOBILE6 model (October 2002) was applied to calculate county-group-level summer weekday emissions factors (in grams per mile [g/mi]) of VOC, CO, NOx, $SO_2$, $NH_3$, and the filterable PM pollutants available in MOBILE6: $SO_4$, OCARBON, ECARBON, GASPM, LEAD, BRAKE, and TIRE, in both PM-10 and PM-2.5 particle size categories. Because MOBILE6 will only calculate one PM size cutoff at a time, two runs were required for each scenario. Emissions factors are estimated by speed, emissions type (i.e., emissions factor sub-component), hour, MOBILE6 road type (or drive cycle), and vehicle type. The average emissions factors for each vehicle class fleet (28), or vehicle type, are developed by combining the MOBILE6 by-model-year emissions factors output weighted by their corresponding model year travel fractions. Emissions factors are organized in "look-up" tables.

The MOBILE6 model is equipped with national (or EPA) default modeling values for a wide range of conditions that affect emissions factors. The only actual data parameters requiring user-input values to run the model are fuel Reid Vapor Pressure (RVP), temperature, and calendar year. Many MOBILE6 default modeling parameters may be overridden through the use of MOBILE6 commands and their associated inputs and options. Particular MOBILE6 defaults were replaced by local input values that were developed to yield emissions factors characteristic of the summer 2002 climatic conditions (for eight climate zones), and 2002 evaluation year vehicle fleets and activity estimates (TxDOT district-level), summer 2002 fuels, and emissions control programs.

The following emissions factors documentation discusses the MOBILE6 input/output files, summarizes the control programs modeled, details the aggregation-level of the applied MOBILE6 emissions factors, and briefly describes all of the MOBILE6 commands that may affect emissions factor calculations. It also identifies the commands used and describes the development of locality-specific inputs.

### MOBILE6 Input and Output Files

The MOBILE6 commands and particular model input data are entered in the MOBILE6 command file. Other input parameters (and in some cases, commands) are applied to MOBILE6 from external data files.

The POLFAC62 program (described in Appendix C) was applied to run MOBILE6 with the user-input command and external data files to produce emissions factor output tables. No post-processing of MOBILE6 emissions factors was required. The final product of the emissions factor modeling for the 216 counties is 94 hourly emissions factor files (i.e., a PM-10 run and a PM-2.5 run hourly emissions factors table for each county group). (A corresponding set of average 24-hour emissions factors was also produced.) All of the MOBILE6 input files and output files (MOBILE6 emissions factor tables developed with POLFAC62) were provided on CD-ROM as described in Appendix A.

**Control Programs Modeled**

All of the federal motor vehicle control programs (FMVCP) were modeled (this is the MOBILE6 default). Also modeled by default were the programs to offset heavy-duty diesel (HDDV) defeat device effects: the low emissions rebuild program, and the HDDV 2004 standard pull-ahead program. The Texas Regional Low Reid Vapor Pressure (RVP) Gasoline Program is essentially modeled for subject counties using the summer 2002 RVP estimate based on City of San Antonio summer 2002 gasoline sample survey data (only Texas Regional Low RVP-subject city with survey data available).

**Aggregation Level of MOBILE6 Emissions Factors**

The by-model-year emissions factors from the MOBILE6 database output format are condensed into average fleet emissions factors by vehicle class. This is performed by multiplying each by-model-year emissions factor by its corresponding travel fraction and summing the resulting products. Each emissions factor table provides the MOBILE6 emissions factors by:

- 28 vehicle types;
- 4 road types;
- 14 speeds (except for two MOBILE6 road types, each with one average speed);
- the number of pollutant-specific emissions types defined by analyst; and
- 24 hourly time periods.

MOBILE6 vehicle type, emissions type, pollutant categories, and roadway type classifications are described in Tables 11 through 14. Tables 15 and 16 show the speeds and the sequence for hourly time periods, respectively.

The 28 MOBILE6 vehicle types as defined by fuel-type (gasoline or diesel) and GVWR category, are shown in sequence by EPA vehicle type number in Table 11.

## Table 11
## Complete MOBILE6 Vehicle Classifications

| Number | Abbreviation | Description |
|---|---|---|
| 1 | LDGV | Light-Duty Gasoline Vehicles (Passenger Cars) |
| 2 | LDGT1 | Light-Duty Gasoline Trucks 1 (0-6,000 lbs. GVWR, 0-3,750 lbs. LVW) |
| 3 | LDGT2 | Light-Duty Gasoline Trucks 2 (0-6,000 lbs. GVWR, 3,751-5,750 lbs. LVW) |
| 4 | LDGT3 | Light-Duty Gasoline Trucks 3 (6,001-8,500 lbs. GVWR, 0-5,750 lbs. ALVW*) |
| 5 | LDGT4 | Light-Duty Gasoline Trucks 4 (6,001-8,500 lbs. GVWR, 5,751 lbs. and greater ALVW) |
| 6 | HDGV2b | Class 2b Heavy-Duty Gasoline Vehicles (8,501-10,000 lbs. GVWR) |
| 7 | HDGV3 | Class 3 Heavy-Duty Gasoline Vehicles (10,001-14,000 lbs. GVWR) |
| 8 | HDGV4 | Class 4 Heavy-Duty Gasoline Vehicles (14,001-16,000 lbs. GVWR) |
| 9 | HDGV5 | Class 5 Heavy-Duty Gasoline Vehicles (16,001-19,500 lbs. GVWR) |
| 10 | HDGV6 | Class 6 Heavy-Duty Gasoline Vehicles (19,501-26,000 lbs. GVWR) |
| 11 | HDGV7 | Class 7 Heavy-Duty Gasoline Vehicles (26,001-33,000 lbs. GVWR) |
| 12 | HDGV8a | Class 8a Heavy-Duty Gasoline Vehicles (33,001-60,000 lbs. GVWR) |
| 13 | HDGV8b | Class 8b Heavy-Duty Gasoline Vehicles (>60,000 lbs. GVWR) |
| 14 | LDDV | Light-Duty Diesel Vehicles (Passenger Cars) |
| 15 | LDDT12 | Light-Duty Diesel Trucks 1 and 2 (0-6,000 lbs. GVWR) |
| 16 | HDDV2b | Class 2b Heavy-Duty Diesel Vehicles (8,501-10,000 lbs. GVWR) |
| 17 | HDDV3 | Class 3 Heavy-Duty Diesel Vehicles (10,001-14,000 lbs. GVWR) |
| 18 | HDDV4 | Class 4 Heavy-Duty Diesel Vehicles (14,001-16,000 lbs. GVWR) |
| 19 | HDDV5 | Class 5 Heavy-Duty Diesel Vehicles (16,001-19,500 lbs. GVWR) |
| 20 | HDDV6 | Class 6 Heavy-Duty Diesel Vehicles (19,501-26,000 lbs. GVWR) |
| 21 | HDDV7 | Class 7 Heavy-Duty Diesel Vehicles (26,001-33,000 lbs. GVWR) |
| 22 | HDDV8a | Class 8a Heavy-Duty Diesel Vehicles (33,001-60,000 lbs. GVWR) |
| 23 | HDDV8b | Class 8b Heavy-Duty Diesel Vehicles (>60,000 lbs. GVWR) |
| 24 | MC | Motorcycles (Gasoline) |
| 25 | HDGB | Gasoline Buses (School, Transit, and Urban) |
| 26 | HDDBT | Diesel Transit and Urban Buses |
| 27 | HDDBS | Diesel School Buses |
| 28 | LDDT34 | Light-Duty Diesel Trucks 3 and 4 (6,001-8,500 lbs. GVWR) |

* The ALVW is the numerical average of the vehicle curb weight and the GVWR.
Source: MOBILE6 User's Guide (EPA, January 2002).

The 10 MOBILE6 emissions type classifications and availability by pollutant category are shown in Table 12. In addition to these emissions types by pollutant (see Table 13, MOBILE6 Pollutant Category), POLFAC62 emissions factor tables contain composite emissions factors (i.e., the total emissions factor for each pollutant with multiple emissions types). POLFAC62 tables also contain the total PM emissions factor which is the sum of the filterable PM emissions factor components. The refueling emissions factor component is generally considered an area source category emissions factor and is not included in the on-road mobile source emissions analysis.

**Table 12**
**MOBILE6 Emission Type Classifications**

| Number | Abbreviation | Description | Pollutants | Vehicle Classes |
|---|---|---|---|---|
| 1 | Running | Exhaust Running Emissions | All except tire and brake wear | All |
| 2 | Start | Exhaust Engine Start Emissions (trip start) | Hydrocarbon (HC), CO, NOx, Air Toxics* | All light-duty plus MC |
| 3 | Hot Soak | Evaporative Hot Soak Emissions (trip end) | HC, BENZ, MTBE | Gas, including MC |
| 4 | Diurnal | Evaporative Diurnal Emissions (heat rise) | HC, BENZ, MTBE | Gas, including MC |
| 5 | Resting | Evaporative Resting Loss Emissions (leaks and seepage) | HC, BENZ, MTBE | Gas, including MC |
| 6 | Run Loss | Evaporative Running Loss Emissions | HC, BENZ, MTBE | Gas, less MC |
| 7 | Crankcase | Evaporative Crankcase Emissions (blow-by) | HC | Gas, including MC |
| 8 | Refueling | Evaporative Refueling Emissions (fuel displacement and spillage) | HC, BENZ, MTBE | Gas, less MC |
| 9 | Brake Wear | Particulate matter from brake component wear | Brake wear particulate | All |
| 10 | Tire Wear | Particulate matter from tire wear | Tire wear particulate | All |

* Air Toxics (see Table 13) are BENZ, MTBE, BUTA, FORM, ACET, and ACRO.

**Table 13**
**MOBILE6 Pollutant Categories***

| Abbreviation | Description |
|---|---|
| HC | Hydrocarbons (gaseous) |
| CO | Carbon Monoxide (gaseous) |
| NOx | Oxides of Nitrogen (gaseous) |
| $CO_2$ | Carbon Dioxide (gaseous) |
| $SO_4$ | Sulfate Portion of Exhaust Particulate |
| OCARBON | Organic Carbon Portion of Diesel Exhaust Particulate |
| ECARBON | Elemental Carbon Portion of Diesel Exhaust Particulate |
| GASPM | Total Carbon Portion of Gasoline Exhaust Particulate |
| Lead | Lead Portion of Exhaust Particulate |
| $SO_2$ | Sulfur Dioxide (gaseous) |
| $NH_3$ | Ammonia (gaseous) |
| Brake | Brake Wear Particulate |
| Tire | Tire Wear Particulate |
| BENZ | Benzene |
| MTBE | Methyl Tertiary Butyl Ether |
| BUTA | 1,3-Butadiene |
| FORM | Formaldehyde |
| ACET | Acetaldehyde |
| ACRO | Acrolein |

* The PM pollutants, $SO_4$, OCARBON, ECARBON, GASPM, LEAD, BRAKE, and TIRE may be modeled at particulate size cutoffs from 1.0 to 10.0 micrometers.

MOBILE6 calculates particular emissions factors reflective of driving cycles observed on four roadway types, as well as emissions factors for those emissions types that are not directly applicable to the driving cycles. The driving cycle (or roadway type) descriptions are provided in Table 14. The fifth roadway type, according to MOBILE6 is “None.” None, or roadway type number 5, is the index for the emissions types that do not apply to the driving cycles, and thus are not sensitive to, or do not vary by, roadway type or speed.

The POLFAC62 emissions factor table, however, categorizes all of the pollutant-specific emissions types by MOBILE6 roadway types one through four — Freeway, Arterial, Local, and Ramp. That is, in POLFAC62 tables, the MOBILE6 g/mi emissions factors corresponding to the "None" roadway type are tabulated as emissions factors under each of the four actual roadway types. This allocation of the MOBILE6 "None" road type emissions factors to the Freeway, Arterial, Local, and Ramp MOBILE6 road types is done in POLFAC62 so that all emissions, regardless of "type," may be spatially allocated to the functional class (or roadway type)-coded network links.

**Table 14**
**MOBILE6 Roadway Classifications**

| Number | Abbreviation | Description |
|---|---|---|
| 1 | Freeway | High-speed, limited-access roadways |
| 2 | Arterial | Arterial and collector roadways |
| 3 | Local | Urban local roadways |
| 4 | Fwy Ramp | Freeway on and off ramps |
| 5 | None | Not applicable (for start and some evaporative emissions) |

Source: MOBILE6 User's Guide (EPA, January 2002).

The 14 speeds for which the MOBILE6 freeway and arterial emissions factors are calculated and tabulated are presented in Table 15. Later in the emissions estimation process, emissions factors for average operational speeds that are not represented in the 14 speeds as tabulated, are calculated by interpolation (except for those speeds higher than the MOBILE6 maximum speed, and those lower than the MOBILE6 minimum speed, in which case the emissions factors corresponding to these bounding speeds are used, respectively). The MOBILE6 Local and Ramp road type emissions factors are not speed sensitive and are each characterized by one average speed.

**Table 15**
**Speeds for POLFAC62 Tabulated MOBILE6**
**Freeway and Arterial Emissions Factors***

| Number | Speed |
|---|---|
| 1 | 2.5 mph |
| 2 | 5 mph |
| 3 | 10 mph |
| 4 | 15 mph |
| 5 | 20 mph |
| 6 | 25 mph |
| 7 | 30 mph |
| 8 | 35 mph |
| 9 | 40 mph |
| 10 | 45 mph |
| 11 | 50 mph |
| 12 | 55 mph |
| 13 | 60 mph |
| 14 | 65 mph |

* MOBILE6 Local and Ramp drive cycle emissions factor's fixed speeds are 12.9 and 34.6 mph, respectively.

MOBILE6 uses several hourly input parameters (e.g., hourly temperatures, hourly VMT fractions, etc.) to model hourly emissions factors. MOBILE6 requires that hourly input parameters be sequenced starting from the 6 a.m. hour. In some cases, however, particular overnight hours are grouped together as a single time period. Table 16 shows the MOBILE6 sequence for hourly inputs.

**Table 16**
**General Sequence for Calendar Day Hourly***
**Inputs to MOBILE6**

| Input Sequence Number | Abbreviation | Description |
|---|---|---|
| 1 | 6 a.m. | 6 a.m. through 6:59 a.m. |
| 2 | 7 a.m. | 7 a.m. through 7:59 a.m. |
| 3 | 8 a.m | 8 a.m. through 8:59 a.m. |
| 4 | 9 a.m. | 9 a.m. through 9:59 a.m. |
| 5 | 10 a.m. | 10 a.m. through 10:59 a.m. |
| 6 | 11 a.m. | 11 a.m. through 11:59 a.m. |
| 7 | 12 Noon | 12 p.m. through 12:59 p.m. |
| 8 | 1 p.m. | 1 p.m. through 1:59 p.m. |
| 9 | 2 p.m. | 2 p.m. through 2:59 p.m. |
| 10 | 3 p.m. | 3 p.m. through 3:59 p.m. |
| 11 | 4 p.m. | 4 p.m. through 4:59 p.m. |
| 12 | 5 p.m. | 5 p.m. through 5:59 p.m. |
| 13 | 6 p.m. | 6 p.m. through 6:59 p.m. |
| 14 | 7 p.m. | 7 p.m. through 7:59 p.m. |
| 15 | 8 p.m. | 8 p.m. through 8:59 p.m. |
| 16 | 9 p.m. | 9 p.m. through 9:59 p.m. |
| 17 | 10 p.m. | 10 p.m. through 10:59 p.m. |
| 18 | 11 p.m. | 11 p.m. through 11:59 p.m. |
| 19 | 12 Midnight | 12 a.m. through 12:59 a.m. |
| 20 | 1 a.m. | 1 a.m. through 1:59 a.m. |
| 21 | 2 a.m. | 2 a.m. through 2:59 a.m. |
| 22 | 3 a.m. | 3 a.m. through 3:59 a.m. |
| 23 | 4 a.m. | 4 a.m. through 4:59 a.m. |
| 24 | 5 a.m. | 5 a.m. through 5:59 a.m. |

* For some MOBILE6 hourly input parameters, overnight hours are grouped. Hourly inputs are representative of the same day or day type, but are reordered for input to MOBILE6 to start at 6 a.m.

**Application of MOBILE6 Commands and Associated Input Parameters**
All of the MOBILE6 commands that may affect calculating emissions factors (excluding some commands such as those that affect only the output format or content) are listed and described in the Tables 17 through 23. Respectively, these seven tables are: MOBILE6 Pollutants and Emission Rates, MOBILE6 External Conditions, MOBILE6 Vehicle Fleet Characteristics, MOBILE6 Activity, MOBILE6 State Programs, MOBILE6 Fuels, and MOBILE6 Alternative Emissions Regulations and Control Measures. These tables identify the combinations of MOBILE6 commands and parameters used for this 2002 actual emissions inventory analysis.

Because the task requires PM emissions estimates for two particle size cutoffs, a second set of MOBILE6 command input files and emissions factor runs was required. (See PARTICLE SIZE command in Table 17.) Unless otherwise stated in the tables, input parameter values are applied in both Run 1 (PM-10) and Run 2 (PM-2.5).

Parameters associated with each MOBILE6 command are in general labeled as either EPA default, locality-specific or NOT APPLIED. The tabulated commands where the associated input parameters are labeled only as “EPA default” are generally not input for this analysis. MOBILE6 technical report references (electronic file names available on the EPA MOBILE Internet site [http://www.epa.gov/otaq/models/mobile6/m6tech.htm]) are provided for particular parameters.

The procedures used to develop the locality-specific inputs to MOBILE6 are detailed following the seven MOBILE6 input category tables.

**Table 17**
**MOBILE6 Pollutants and Emission Rates**

| Command | Function/Description | Input Parameter Source/Value |
|---|---|---|
| POLLUTANTS | Defines the basic set of pollutants to report. | Run 1) HC, CO, NOx,<br><br>Run 2) (None) |
| PARTICULATES | Enables computation of particulate matter (PM) an related emissions factors. | Run 1) $SO_2$, $NH_3$, $SO_4$, OCARBON, ECARBON, GASPM, LEAD, BRAKE, TIRE;<br><br>Run 2) $SO_4$, OCARBON, ECARBON, GASPM, LEAD, BRAKE, TIRE |
| PARTICULATE EF | Specifies location of files that contain the particulate emissions factors when PARTICULATES command is used. | EPA default emissions factors applied. |
| PARTICLE SIZE | Specifies the maximum particulate size cutoff value in micrometers used by MOBILE. | Run 1) 10.0,<br><br>Run 2) 2.5. |
| EXPRESS HC AS VOC | One of five possible commands which allow the user to specify the particular HC species (non-methane HC, non-methane organic gases, total HC, total organic gases, and VOC) to report in the exhaust emissions output. | "VOC" command is applied. Only the command is required. |
| NO REFUELING | Directs MOBILE6 not to calculate refueling emissions factors. | APPLIED.<br>Only the command is required. |
| AIR TOXICS | Enables the computation of air toxic emissions factors (six explicit pollutants) and specifies which to calculate. | NOT APPLIED. |
| ADDITIONAL HAPS | Allows entry of emissions factors or air toxic ratios for calculation of additional user-defined air toxic pollutant emissions factors. | NOT APPLIED. |
| MPG ESTIMATES | Allows entry of alternate fuel economy performance data by vehicle class and model year. | NOT APPLIED. (MOBILE6 default values are assumed.) |

**Table 18**
**MOBILE6 External Conditions**

| Command | Function/Description | Input Parameter Source/Value |
|---|---|---|
| CALENDAR YEAR | Calendar year for which emissions factors are to be calculated. (Needed to run model). | 2002 |
| EVALUATION MONTH | Provides option of calculating January 1 or July 1 emissions factors for calendar year. | 7 (July), for summer season. |
| MIN/MAX TEMPERATURE | Sets minimum and maximum daily temperatures. (Required to run model if the HOURLY TEMPERATURES command is not used.) | NOT APPLIED. (See HOURLY TEMPERATURES.) |
| HOURLY TEMPERATURES | Allows temperatures input for each hour of day. (Required to run model if MIN/ MAX TEMPERATURE command is not used.) | TTI developed hourly averages for eight county groups using June through August 2002 National Climatic Data Center hourly data summaries. Texas was divided into eight climate zones; the data used are from major cities centrally located in these eight climate zones. See Appendix I. |
| ALTITUDE | Specifies high- or low-altitude for modeling area. | NOT APPLIED. (EPA default, low altitude, is assumed). |
| ABSOLUTE HUMIDITY | Used to specify daily average humidity (directly affects NOx emissions). MOBILE6 also converts absolute humidity to heat index which affects HC and CO emissions for the portion of the fleet that MOBILE6 determines is using air conditioning. | NOT APPLIED. (See RELATIVE HUMIDITY.) |
| Environmental Effects on Air Conditioning: | Commands used by MOBILE6 to model the extent of vehicle air-conditioning usage. | |
| CLOUD COVER | Specifies average percent cloud cover for given day. | NOT APPLIED. (EPA default assumed.) |
| PEAK SUN | Specifies Mid-day hours with peak sun intensity. | NOT APPLIED. (EPA default assumed.) |
| SUNRISE/ SUNSET | Allows user to specify time of sunrise and sunset. | NOT APPLIED. (EPA default assumed.) |
| RELATIVE HUMIDITY | Specifies use of 24 hourly relative humidity values entered by user. MOBILE6 will perform hour-specific calculations with hourly values rather than use single daily default absolute humidity value. | TTI developed hourly averages for eight county groups using the data as describe above for HOURLY TEMPERATURES. See Appendix I. |
| BAROMETRIC PRES | Specifies use of user input daily average barometric pressure for use with hourly relative humidity to calculate hourly absolute humidity values. | TTI developed daily averages for the counties within the eight climate zones. See Appendix I. |

## Table 19
## MOBILE6 Vehicle Fleet Characteristics

| Command | Function/Description | Input Parameter Source/Value |
|---|---|---|
| REG DIST | Allows the user to supply registration distributions by age for any of the 16 composite (combined gasoline and diesel) vehicle types. | Locality-Specific/EPA default. Developed by TTI.<br><br>Mid-year 2002 TxDOT District-level registrations data are applied for LDV, LDT, HDV and MC; MOBILE6 default is used for buses. See Appendix J. |
| DIESEL FRACTIONS | Permits user to supply locality-specific diesel fractions for 14 of the 16 composite vehicle categories by age. | Locality-Specific/EPA default. Developed by TTI.<br><br>Mid-year 2002 TxDOT statewide gasoline/diesel registrations data are used for HDV, LDV, LDT, Bus fractions are MOBILE6 defaults. See Appendix J. |
| MILE ACCUM RATE | Allows the user to supply the annual mileage accumulation rates by vehicle type and age. | NOT APPLIED. (EPA defaults are assumed — see technical report M6FLT.007.) |
| NGV FRACTION | Lets user specify percent of natural gas vehicles (NGV) in the fleet by type and age certified to operate on either compressed or liquefied natural gas. | NOT APPLIED. (The EPA default percentage of NGV vehicles in the fleet, zero, is assumed.) |
| NGV EF | Permits the user to enter alternate NGV emissions factors for each of the 28 vehicle types, for running and start emissions. | NOT APPLIED. (The EPA default, none, is assumed.) |

**Table 20**
**MOBILE6 Activity**

| Command | Function/Description | Input Parameter Source/Value |
|---|---|---|
| VMT FRACTIONS | Used in MOBILE6 to weight the emissions of various vehicle types into average rates for groupings of vehicle classes. | NOT APPLIED. (EPA default assumed, used for aggregate results which do not apply to this analysis.) |
| VMT BY FACILITY | VMT fractions by MOBILE6 road type combine the four road type emissions factors into the "all road types" emissions factors. | NOT APPLIED. (EPA default assumed, used for aggregate results with no impact on this analysis.) |
| VMT BY HOUR | Allows VMT fractions allocation by hour-of-day; applied in conversion of grams per hour (g/hr) to g/mi, as well as in weighting of hourly g/mi rates to obtain daily emissions factors. | District-specific. The hourly VMT fractions were produced using TxDOT District-level ATR data (same fractions used to distribute link VMT estimates by hour). See Appendix G. |
| SPEED VMT | Allows user to allocate VMT by average speed (14 pre-selected: 2.5 and 5 through 65 at 5 mph increments) for arterials and freeways for each hour of the day. | Generic input. Same for all counties. Inputs are set up to calculate emissions factors by 14 MOBILE6 speed bin speed scenarios for MOBILE6 freeway and arterial road types. |
| AVERAGE SPEED | Allows a single average speed for combined freeways and arterials for the entire day. | NOT APPLIED. |
| STARTS PER DAY | Lets user specify the average number of engine starts per vehicle per day by vehicle types for weekend days and weekdays. | NOT APPLIED. (Used EPA weekday and weekend day-specific defaults — see technical report M6FLT.003.) |
| START DIST | Allows user to allocate engine starts by hour of the day for weekend days and weekdays. | NOT APPLIED. (Used EPA weekday and weekend day-specific defaults — see technical report M6FLT.003.) |
| SOAK DISTRIBUTION | Allows use of alternate vehicle soak duration distributions for weekend days and weekdays. | NOT APPLIED. (Used EPA weekday and weekend day-specific defaults — see technical reports M6FLT.003 and 004.) |
| HOT SOAK ACTIVITY | Allows users to specify a hot soak duration distribution for each of 14 daily time periods for weekend days and for weekdays. | NOT APPLIED. (Used EPA weekday and weekend day-specific defaults — see technical reports M6FLT.003 and 004.) |
| DIURN SOAK ACTIVITY | Allows user set diurnal soak time distributions for each of 18 daily time periods. | NOT APPLIED. (The EPA defaults are assumed. — see technical report M6FLT.006.) |
| WE DA TRI LEN DI | Specifies alternate fractions of VMT that occur during trips of various durations at each hour of the average weekday. | NOT APPLIED. (EPA defaults are assumed.) |
| WE EN TRI LEN DI | Specifies hourly alternate fractions of VMT for trips of various lengths for weekend days. | NOT APPLIED. |
| WE VEH US | Directs MOBILE6 to use weekend activity data for calculating emissions factors. | NOT APPLIED. |

**Table 21**
**MOBILE6 State Programs**

| Command | Function/Description | Input Parameter Source/Value |
|---|---|---|
| STAGE II REFUELING | Allows modeling of at-the-pump refueling emissions. | NOT APPLIED. Accounted for as an area source category. |
| ANTI-TAMP PROG | Allows user to model impacts of an ATP. | NOT APPLIED. (Although Texas administers a statewide ATP, ATP credit is only taken in those counties which also administer an enforced I/M program.) |
| I/M Commands:<br>I/M PROGRAM<br>I/M MODEL YEARS<br>I/M VEHICLES<br>I/M STRINGENCY<br>I/M COMPLIANCE<br>I/M WAIVER RATES<br>I/M CUTPOINTS<br><br>I/M EXEMPTION AGE<br>I/M GRACE PERIOD<br>NO I/M TTC CREDITS<br>I/M EFFECTIVENESS<br>I/M DESC FILE | <br>Required for exhaust/evaporative I/M programs.<br>Required for exhaust/evaporative I/M programs.<br>Required for exhaust/evaporative I/M programs.<br>Required for exhaust. Do not use for evaporative.<br>Required for exhaust. Optional for evaporative.<br>Required for exhaust. Optional for evaporative.<br>Optional for exhaust (but required for IM240). Do not use with evaporative.<br>Optional for both exhaust and evaporative.<br>Optional for both exhaust and evaporative.<br>Optional for exhaust. Do not use with evaporative.<br>Optional for exhaust. Do not use with evaporative.<br>Optional for both. | NOT APPLIED. No I/M program administered in the 216 non-AQP area counties. |

**Table 22**
**MOBILE6 Fuels**

| Command | Function/Description | Input Parameter Source/Value |
|---|---|---|
| FUEL PROGRAM | Allows specification of one of four options: 1) Conventional Gasoline East Tier2 sulfur phase-in schedule (includes Texas); 2) Reformulated Gasoline (RFG); 3) Conventional Gasoline West Tier2 sulfur geographical phase-in area schedule; or 4) Conventional Gasoline East with user input sulfur content for after 1999. | Option 4: Applied for all counties. TTI used summer 2002 Northrop Grumman Mission Systems (or NGM) Texas gasoline sample survey data provided by TCEQ.TTI estimated gasoline sulfur content and applied to the county level based on survey city/county geographic proximity and fuel regulation boundaries. See Appendix K. |
| SULFUR CONTENT | (or GASOLINE SULFUR) Allows use of alternate sulfur content for conventional gasoline through calendar year 1999. | NOT APPLIED. |
| DIESEL SULFUR | Allows use of ave. diesel fuel sulfur level for all calendar years. Required if PARTICULATES command is used. No affect on HC, CO, NOx, air toxics (except if calculated as ratio to PM). | Value of 364 ppm used for all Texas counties, from NGM 2002 survey data provided by TCEQ. |
| OXYGENATED FUELS | Allows modeling of oxygenated gasoline effects on exhaust for all gasoline-fueled vehicle types. Not for use with AIR TOXICS command. | NOT APPLIED. |
| FUEL RVP | Allows user to specify fuel RVP for area being modeled (required to run model). | TTI used RVP estimates provided by TCEQ, based on the NGM survey data. Values for five survey cities were allocated to the county level as described for FUEL PROGRAMS, above. See Appendix K. |
| SEASON | Identifies effective season for RFG calculation regardless of month modeled. | NOT APPLIED. |
| GAS AROMATIC% | Only when AIR TOXICS command is used. | NOT APPLIED. |
| GAS OLEFIN% | Only when AIR TOXICS command is used. | NOT APPLIED. |
| GAS BENZENE% | Only when AIR TOXICS command is used. | NOT APPLIED. |
| E200 | Only when AIR TOXICS command is used. | NOT APPLIED. |
| E300 | Only when AIR TOXICS command is used. | NOT APPLIED. |
| OXYGENATE | Only when AIR TOXICS command is used. | NOT APPLIED. |
| RVP OXY WAIVER | Only when AIR TOXICS command is used. | NOT APPLIED. |

**Table 23**
**MOBILE6 Alternative Emissions Regulations and Control Measures**

| Command | Function/Description | Input Parameter Source/Value |
|---|---|---|
| NO CLEAN AIR ACT | Models vehicle emissions as if the Federal Clean Air Act Amendments of 1990 had not been implemented. | NOT APPLIED. |
| HDDV NOx Off-Cycle Emissions Effects:<br>NO DEFEAT DEVICE<br><br>NO NOX PULL AHEAD<br><br>NO REBUILD<br><br>REBUILD EFFECTS | <br><br>Turns off the effects of the HDD vehicle NOx off-cycle emissions effects (defeat device emissions).<br>Turns off HDD NOx emissions reduction effects of Pull- Ahead program.<br>Turns off HDD NOx emissions reduction effects of Rebuild program.<br>Allows user change Rebuild program effectiveness rate. | <br><br>NOT APPLIED.<br><br>NOT APPLIED.<br><br>NOT APPLIED.<br><br>Alternate-input, latest actual estimate provided by TCEQ, 0.01. |
| Tier 2 Emission Standards and Fuel Requirements:<br><br>NO TIER2<br>T2 EXH PHASE-IN<br><br>T2 EVAP PHASE-IN<br><br>T2 CERT | Allow the overriding of the default Tier 2 emissions standards and fuel requirements settings.<br><br>Disables Tier 2 requirements.<br>Allows alternate Tier 2 exhaust standard phase-in schedules.<br>Allows alternate Tier 2 evaporative standard phase-in schedules.<br>Allows user to specify alternate Tier 2 50,000-mile certification standards. | NOT APPLIED. |
| 94+ LDG IMPLEMENTATON | Allows use of alternate 1994 and later fleet penetration fractions for LDGVs under the Tier 1, NLEV (or California LEV 1), and Tier 2 emissions standard programs. | NOT APPLIED. |
| NO 2007 HDDV RULE | Disables 2007 HDV emissions standards. | NOT APPLIED. |

**External Conditions – Locality-Specific Inputs to MOBILE6**
TTI developed MOBILE6 inputs for hourly temperatures, hourly relative humidity and average daily barometric pressure using NCDC weather station hourly summaries data for the 2002 June through August period. The data were applied based on local time.

Climate data are not available for all Texas counties. Thus, to develop the climatic inputs to MOBILE6 for this analysis, TTI used a division of the 254 Texas counties into eight climate-based zones — Amarillo, Corpus Christi, Dallas, El Paso, Houston, Lubbock, Midland, and San Antonio. These zones were developed for previous statewide analyses in consultation with TCEQ. Weather station data were used from the cities for which the zones are named. Texas counties by climate zone are shown in Appendix I.

The raw weather data (NCDC *.cgi files) and spreadsheets used to average the data as required to produce average summer day inputs for each of the zones were provided on CD-ROM as described in Appendix A. Tabulated summaries of the MOBILE6 climatic inputs for each zone are provided in Appendix I.

*Temperatures (HOURLY TEMPERATURES Command)*
TTI developed one set of ambient hourly temperatures (degrees Fahrenheit) for input to MOBILE6 for each of the eight climate zones.

TTI used hourly temperature data (NCDC hourly summaries provided by TCEQ Monitoring Operations) from monitoring stations throughout Texas. One set of summer season inputs (and a set of winter season inputs used in developing emissions factor annualization ratios, discussed later) were developed for each of the eight climate zones. The recorded temperatures within each hour-of-day were averaged for the 92 days within the June through August period.

The temperatures were sequenced as required for input to MOBILE6 starting with the 6 a.m. hour. The temperatures are a MOBILE6 command file input; the MOBILE6 command files were provided on CD-ROM (see Appendix A).

*Relative Humidity (RELATIVE HUMIDITY Command)*
The RELATIVE HUMIDITY command was applied to specify local hourly percent relative humidity.

The hourly relative humidity inputs were developed following the same procedure as described above for the hourly temperature input development. The humidity parameter is input in the MOBILE6 command file. MOBILE6 input files were provided on CD-ROM as described in Appendix A.

*Barometric Pressure (BAROMETRIC PRES Command)*
The BAROMETRIC PRES command was used to specify the 24-hour average barometric pressure value (in units of inches of Mercury) for input to MOBILE6.

The hourly relative humidity inputs were developed in the same manner and using the same monitoring station data sets as described above for the hourly temperature and hourly relative humidity input, except hourly values were averaged to get the required daily input. The barometric pressure is input in the MOBILE6 command file.

**Vehicle Fleet Characteristics**

Vehicle registration (age) distributions and diesel fractions inputs to MOBILE6 were developed from TxDOT mid-year 2002 county vehicle registration data for those vehicle types where TxDOT registrations data were available. EPA defaults were used where necessary.

For the 216 non-AQP area county analysis, registration data for developing the age distributions for each vehicle class were aggregated at the TxDOT District level. For developing the diesel fractions, the registrations data were aggregated to the state level. These aggregation levels were used to overcome input data problems that may occur especially for rural counties where vehicle registrations for particular vehicle classes are sparse.

*Vehicle Registration Distributions (REG DIST Command)*

The user-supplied vehicle registration distributions input to MOBILE6 are by vehicle age for any of the 16 composite (combined gas and diesel) vehicle types as shown in Table 24. EPA default distributions are internally applied by MOBILE6 for vehicle classes for which the user does not provide alternate values. The input values for each vehicle class are 25 age fractions representing the fraction of vehicles by age for that particular vehicle class as of July of the evaluation year. These age fractions start with the evaluation year as the $1^{st}$ age fraction and work back in annual increments to end with the $25^{th}$ fraction, which represents the fraction of vehicles of age 25 years and older. The fractions are calculated as the model year-specific registrations in a class divided by the total vehicles registered in that class.

**Table 24**
**Composite Vehicle Classes for Vehicle Registration Data**
**(REG DIST Command)**

| Number | Abbreviation | Description |
|---|---|---|
| 1 | LDV | Light-Duty Vehicles (Passenger Cars) |
| 2 | LDT1 | Light-Duty Trucks 1 (0-6,000 lbs. GVWR, 0-3,750 lbs. LVW) |
| 3 | LDT2 | Light-Duty Trucks 2 (0-6,000 lbs. GVWR, 3,751-5,750 lbs. LVW) |
| 4 | LDT3 | Light-Duty Trucks 3 (6,001-8,500 lbs. GVWR, 0-5,750 lbs. ALVW*) |
| 5 | LDT4 | Light-Duty Trucks 4 (6,001-8,500 lbs. GVWR, 5,751 lbs. and greater ALVW) |
| 6 | HDV2B | Class 2b Heavy-Duty Vehicles (8,501-10,000 lbs. GVWR) |
| 7 | HDV3 | Class 3 Heavy-Duty Vehicles (10,001-14,000 lbs. GVWR) |
| 8 | HDV4 | Class 4 Heavy-Duty Vehicles (14,001-16,000 lbs. GVWR) |
| 9 | HDV5 | Class 5 Heavy-Duty Vehicles (16,001-19,500 lbs. GVWR) |
| 10 | HDV6 | Class 6 Heavy-Duty Vehicles (19,501-26,000 lbs. GVWR) |
| 11 | HDV7 | Class 7 Heavy-Duty Vehicles (26,001-33,000 lbs. GVWR) |
| 12 | HDV8A | Class 8a Heavy-Duty Vehicles (33,001-60,000 lbs. GVWR) |
| 13 | HDV8B | Class 8b Heavy-Duty Vehicles (>60,000 lbs. GVWR) |
| 14 | HDBS | School Buses |
| 15 | HDBT | Transit and Urban Buses |
| 16 | MC | Motorcycles (All) |

* The ALVW is the numerical average of the vehicle curb weight and the GVWR.
Source: MOBILE6 User's Guide (EPA, January 2002).

TTI developed MOBILE6 age distributions fractions input from TxDOT data for all vehicle types except for the two bus categories. EPA defaults were used for the two bus categories. To develop these distributions, TTI used two county-level data sets provided by TxDOT. The TxDOT registrations data provided are summarized as:

- July 2002 registrations for:
  gasoline and diesel: LDV, LDT12, LDT34, MC, HDGT, HDDT; and
- July 2002 registrations for:
  gasoline: HDV2B, HDV3, HDV4, HDV5, HDV6, HDV7, HDV8A, HDV8B; and
  diesel: HDV2B, HDV3, HDV4, HDV5, HDV6, HDV7, HDV8A, HDV8B.

The LDT12 and LDT34 classes of the combined gasoline and diesel registrations data set correspond to the MOBILE6 classes LDT1 and LDT2, and LDT3 and LDT4, respectively. The aggregate HDGTs and HDDTs were not used.

First the registrations data for each of the HDV classes (numbers 6 through 13 in Table 24) were aggregated to the TxDOT District level. Then there are three main steps to developing the MOBILE6 registration distributions input for the 14 non-bus vehicle classes. The first step in the process develops the July 2002 registrations by the 25 age groups for 12 of the 16 composite (by fuel) vehicle classes (the eight HDV classes, LDV, LDT12, LDT34, MC). The second step converts the registrations from numbers of vehicles registered, to fractions registered by age for each of these 12 classes. The registrations are then expanded from 12 to 14 vehicle classes.

The 16 HDV class registrations were combined into the MOBILE6 eight composite (gasoline and diesel) classes by summing the individual fuel type registrations by age within each weight category. The 1978 and older registrations were summed to yield the "age 25 and older" registrations for each of the 12 composite vehicle classes (i.e. the 8 HDV classes plus LDV, LDT12, LDT34, and MC.

The conversion of the registrations from numbers of vehicles to fractions of vehicles by age was made for each vehicle class by dividing the registrations for each age by the total registrations. MOBILE6 requires that the age distribution fractions for each vehicle class sum to one. In this step the age distribution fractions for each class were summed. For sums not equal to one (due to rounding error), the largest registration fraction was adjusted to make the fractions sum to one.

The resulting July 2002 estimated vehicle age distribution fractions for the 12 composite classes were then expanded to 14 classes by using the LDT12 age fractions for the LDT1 and LDT2 classes and using the LDT34 age fractions for the LDT3 and LDT4 classes. The MOBILE6 vehicle registration distributions are input from external data files. The external data files were provided on CD-ROM (see description in Appendix A). The registrations distributions for each TxDOT District are shown in Appendix J.

*Diesel Fractions (DIESEL FRACTIONS Command)*
The DIESEL FRACTIONS command allows the user to specify diesel fractions for 14 of the 16 composite (gasoline and diesel) vehicle categories by vehicle age. MOBILE6 assumes that urban/transit buses are 100 percent diesel, and that motorcycles are all gasoline fueled, so these two categories do not require diesel fractions. The diesel fraction represents the portion of diesels in a composite (gasoline and diesel) vehicle class for any vehicle age. When the user enters diesel fractions, all 14 sets of fractions are required. Each set of fractions contains the diesel fractions for 25 vehicle ages from the evaluation year back through the 25$^{th}$ fraction, which represents vehicle ages of 25 years and older.

The MOBILE6 default fractions vary by age for model years 1972 through 1996. For 1971 and earlier model years, the default diesel fractions are assumed the same as the 1972 model year fractions. For the 1997 and later model years, the default diesel fractions are assumed the same as the 1996 model year fractions.

TTI developed one 2002 statewide diesel fractions input data set for the 216-county analysis using a combination of estimated TxDOT diesel fractions and EPA default diesel fractions.

Table 25 shows the MOBILE6 diesel fractions input sequence and categories with corresponding data sources. The diesel fraction estimates were calculated based on TxDOT individual diesel and gasoline vehicle registrations for the eight HDV (HDV2b through HDV8b) weight classes. To produce the HDV diesel fractions by model year, the diesel registrations were divided by the sum of the gasoline and diesel registrations, by HDV composite vehicle class, and model year. The 2002 regional diesel fractions estimate input are shown in Appendix J.

**Table 25**
**Source of Diesel Fractions for Composite Vehicle Types**
**(DIESEL FRACTIONS Command)**

| Number | Label | Description | Source of Fractions |
|---|---|---|---|
| 1 | LDV | Light-Duty Vehicles | MOBILE6 evaluation year default |
| 2 | LDT1 | Light-Duty Trucks 1 | MOBILE6 evaluation year default |
| 3 | LDT2 | Light-Duty Trucks 2 | MOBILE6 evaluation year default |
| 4 | LDT3 | Light-Duty Trucks 3 | MOBILE6 evaluation year default |
| 5 | LDT4 | Light-Duty Trucks 4 | MOBILE6 evaluation year default |
| 6 | HDV2B | Class 2b Heavy-Duty Vehicles | TxDOT July, 2002 BPA region registrations |
| 7 | HDV3 | Class 3 Heavy-Duty Vehicles | TxDOT July, 2002 BPA region registrations |
| 8 | HDV4 | Class 4 Heavy-Duty Vehicles | TxDOT July, 2002 BPA region registrations |
| 9 | HDV5 | Class 5 Heavy-Duty Vehicles | TxDOT July, 2002 BPA region registrations |
| 10 | HDV6 | Class 6 Heavy-Duty Vehicles | TxDOT July, 2002 BPA region registrations |
| 11 | HDV7 | Class 7 Heavy-Duty Vehicles | TxDOT July, 2002 BPA region registrations |
| 12 | HDV8A | Class 8a Heavy-Duty Vehicles | TxDOT July, 2002 BPA region registrations |
| 13 | HDV8B | Class 8b Heavy-Duty Vehicles | TxDOT July, 2002 BPA region registrations |
| 14 | HDBS | School Buses | MOBILE6 Evaluation Year Default |

## Activity

The locality-specific activity parameters used to develop the hourly emissions factors are fleet hourly VMT fractions (through the VMT BY HOUR command). Additional non-default (but generic) activity inputs to the model were hourly fractions of VMT by the 14 speeds for Arterials and Freeways (SPEED VMT command).

*VMT Fractions (Also Known as VMT mix)*

These sets of fractions (VMT fractions attributable to individual vehicle classes) are an input to MOBILE6, however, the method for this study requires the application of the VMT mix (or mixes) later in the emissions calculation process. VMT mix development was discussed previously in this documentation.

*Total VMT by Hour (VMT BY HOUR Command)*
Hourly fleet total VMT distributions are input to MOBILE6 by using the VMT BY HOUR command. These fractions are used by MOBILE6 to convert the units of the non travel-related hourly emissions factors (e.g., hot soak, diurnal, start, etc.) to units of g/mi. (The VMT by hour fractions are also used to produce the daily emissions factors as composites of the hourly emissions factors.)

Development of the hourly travel fractions for by TxDOT District were previously discussed in the "Hourly Travel and Directional Factors" section. These same hourly fractions, used to distribute daily VMT by hour of day, are applied as input to MOBILE6 to develop the summer weekday emissions factors. The only differences are in sequence (MOBILE6 hourly input starts with the 6 a.m. fraction) and format.

To summarize, TxDOT continuous ATR data (for 1999 and 2001) are aggregated within each TxDOT District. Using June through August weekday volumes, the summer weekday hourly travel factors are the ratio of hourly volumes to 24-hour volume. (Winter weekday hourly travel factors used in developing winter season emissions factors were developed also with this procedure, but using December, January, and February weekday volumes.) See Appendix G.

These fractions are input to MOBILE6 as an external data file. The MOBILE6 external data files are included on CD-ROM, as described in Appendix A.

*VMT Distribution by Average Speed on Freeways and Arterials (SPEED VMT Command)*
The VMT distributions by average speed inputs are called by the SPEED VMT command, but are accommodated internally by the POLFAC62 program (that is, no user speed input commands or data parameter values are required when producing MOBILE6 emissions factors tables with POLFAC62). POLFAC62 uses the SPEED VMT inputs to produce the individual Freeway and Arterial emissions factors indexed by the 14 MOBILE6 speed bin speeds.

There are 14 scenarios, each with 100 percent of Freeway and Arterial VMT set to one of the 14 MOBILE speed bin speeds. Each scenario produces a set of Arterial and Freeway emissions factors corresponding to one of the 14 speeds.

**State Programs**
There are no MOBILE6 State Programs descriptive inputs (i.e., I/M, ATP, and stage II refueling programs) modeled.

**Fuels – Locality-Specific Inputs to MOBILE6**
User inputs for fuel effects modeling includes the FUELS PROGRAM, DIESEL SULFUR, and FUEL RVP commands and associated input parameters.

The fuel property input parameters applied are gasoline and diesel sulfur content in parts-per-million (ppm) and gasoline RVP. Diesel and gasoline sample survey data used to estimate the input values (also for winter season, used for annual emissions estimates) are from the reports "Motor Gasolines, Summer 2002," "Motor Gasolines, Winter 2001-2002," and "Diesel Fuel

Oils, 2002," by Northrop Grumman Mission Systems (or NGM, formerly TRW). Gasoline sample analysis results were reported in the NGM surveys for six Texas cities.

TCEQ estimated weighting factors by fuel grade for calculating average gasoline fuel property inputs from the grade-specific survey sample averages. TCEQ developed these weighting factors using Texas 2001 gasoline sales volume by grade data. The gasoline sales volume values used are the Texas average monthly "to end users through retail outlets"values from Table 43 of the Department of Energy, Energy Information Administration "Petroleum Marketing Annual 2001" (see http://www.eia.doe.gov/oil_gas/petroleum/data_publications/petroleum_marketing_annual/pma_historical.html). (Mid-grade volumes, about 15 percent of total, were excluded from the sales volume weight calculation because no mid-grade gasoline sample data were available.) The weighting is 86 percent premium and 14 percent regular.

TCEQ provided the gasoline sample data and spreadsheets with summer and winter average RVP calculations to TTI. Using these gasoline survey data and fuel grade weights, TTI estimated summer and winter 2002 average gasoline sulfur content. The 2002 summer and winter average RVP and average sulfur content estimates used are shown in Table 26. Note that the Dallas values were not developed, and for this 216 county analysis the San Antonio, Amarillo and Midland values were used. These values were applied at the county level as shown in Appendix K. Counties under the Texas Regional Low RVP Gasoline Program used fuel property inputs based on the City of San Antonio survey data; the 47 northern counties in the TxDOT Amarillo, Childress, and Lubbock Districts used the City of Amarillo-based fuels inputs; and the remaining counties used the City of Midland-based-fuels inputs. The spreadsheet calculations were provided in the electronic data submittal, described in Appendix A.

**Table 26**
**Texas City 2002 Estimated Fuel Property Inputs* to MOBILE6**

| City/State | Fuel | Summer | | | | Winter | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | RVP (psi) | Sulfur (ppm) | Ave. Oxygen (wt %) | Samples* | RVP (psi) | Sulfur (ppm) | Ave. Oxygen (wt %) | Samples* |
| Houston | Gasoline* | 6.8 | 119 | 2.1 | 24 | 11.3 | 175 | 2.0 | 10 |
| Dallas | | - | - | - | 10 | - | - | - | 18 |
| El Paso | | 6.8 | 245 | - | 20 | 12.3 | 263 | 2.7 | 8 |
| San Antonio | | 7.5 | 166 | - | 10 | 12.3 | 199 | - | 20 |
| Amarillo | | 8.3 | 203 | - | 12 | 11.5 | 162 | - | 6 |
| Midland | | 8.4 | 425 | - | 10 | 11.5 | 264 | - | 16 |
| Texas | Diesel** | - | 364 | - | 19 | - | 364 | - | NA |

* Based on NGM 2002 San Antonio gasoline sample survey data.
** Diesel sulfur content value is a straight average of 2002 on-highway diesel fuel sample values reported by refiners marketing to Texas, as reported in "Diesel Fuel Oils, 2002" (NGM).

*Fuel Program (FUEL PROGRAM Command)*
The MOBILE6 FUEL PROGRAM command provides the user four options for modeling fuels effects. For all 216 non-AQP area counties, option four was used which models Conventional Gasoline East and requires alternate gasoline sulfur values for post-1999 evaluation years. The required inputs are average gasoline sulfur content (ppm) values for 2000 through 2015 and a corresponding set of maximum sulfur levels to which those model year vehicles are exposed. TTI used all MOBILE6 defaults except for the estimated summer 2002 average sulfur content value shown in Table 26. The FUEL PROGRAM option and input parameter values are entered in the MOBILE6 command file. MOBILE6 command files were submitted on CD-ROM (see the electronic data submittal description in Appendix A). The sulfur content values used by county are shown with the other fuel property inputs by county in Appendix K.

*Gasoline RVP (FUEL RVP Command)*
The fuel RVP command was used to input the summer 2002 estimated RVP value values, which is a MOBILE6 command file input. See input values by county in Appendix K.

*Diesel Sulfur (Diesel Sulfur Command)*
Diesel Sulfur command was used to input the estimated Texas 2002 diesel sulfur content input value; the MOBILE6 command file input value used for all counties is 364 ppm.

**MOBILE6 Alternative Emissions Regulations and Control Measures Commands**
The only user-input value applied (which was not required because the EPA default was input) within this section of MOBILE6 commands, is related to the HDDV NOx off-cycle emissions effects.

In the late 1980s and most of the 1990s, HDDV engines were built with "defeat devices" allowing in-use engine emissions to be higher than emissions as specified under Federal Test Procedure conditions. MOBILE6 includes estimates of these excess HDDV emissions as well as the emissions offsetting effects of two programs — early pull-ahead of 2004 HDDV emissions standards, and low emissions rebuilds of existing engines.

TCEQ estimated a 1.0 percent effectiveness rate for the low-NOx emissions rebuilds program for heavy duty diesels. This is the latest available estimate. The basis of TCEQ's estimate was information from EPA showing that the number of low-NOx-rebuild kits supplied (as of January, 2002) to the affected population was 0.97 percent. The MOBILE6 effectiveness rate input for the low-NOx emissions rebuild program was set at 1.0 percent through the REBUILD EFFECTS command.

Using the above-described MOBILE6 input parameters and options, MOBILE6 input files were set up and run with the POLFAC62 program. The resulting tabulated hourly emissions factors indexed by speed, MOBILE6 drive cycle, vehicle type, and pollutant-specific emissions type were input to the emissions calculation program, IMPSUM62. The modeled emissions factors were provided on CD-ROM (see CD-ROM description including county group codes [47] by county [216] included in Appendix A).

**ESTIMATION OF ANNUALIZATION RATIOS**
TTI developed a methodology for producing annual emissions estimates from seasonal weekday emissions estimates. There are two elements in the annualization methodology. The first is the VMT adjustment that converts the seasonal weekday VMT component of seasonal weekday emissions to annual VMT. The second is the emissions rate adjustment that is required to accommodate changes in emissions rates between a particular season and the rest of the year (due to seasonal variation in temperatures and fuel properties). The general expression below shows how the VMT annualization factor ($VMT_{ANNFAC}$) and the emissions rate annualization factors ($ER_{ANNFAC}$) are applied to, in the case for this analysis, summer weekday emissions ($EM_{OWKD}$) for each county to produce the annual emissions estimate ($EM_{ANNUAL}$). For each county, a single $VMT_{ANNFAC}$ was applied to all pollutants and vehicle types, whereas a separate $ER_{ANNFAC}$ was developed and applied per pollutant and vehicle type.

$$EM_{ANNUAL} = EM_{OWKD} \times VMT_{ANNFAC} \times ER_{ANNFAC}$$

**Annualization Ratios for Summer Weekday VMT**
To produce link-level summer weekday VMT for the summer weekday emissions analyses, the HPMS consistent, summer weekday VMT control totals were used (Appendix F). The control totals consist of the 2002 HPMS AADT VMT for each county and an summer weekday adjustment factor. Thus to annualize the summer weekday VMT, a factor was developed to

produce AADT VMT, and to expand from the daily to the annual period. This VMT annualization factor is the inverse of the summer weekday adjustment factor multiplied by 365.

The summer season weekday VMT adjustment factors for all counties are shown in Appendix E. For example, the AADT to summer weekday adjustment factor for Tyler District counties is 1.07774. The VMT annualization factor for each Tyler District county is thus (1/1.07774) × 365, or 338.6716648. Conceptually, this value represents the number of days of summer weekday VMT equivalent to calendar year 2002 VMT total. Appendix L show the VMT annualization factors.

**Annualization Ratios for Average Summer Weekday Emissions Rates**

In addition to the VMT annualization component, ratios of emissions factors ($ER_{ANNFAC}$) were needed to convert summer weekday emissions to annual emissions. For each district one set of emissions rate ratios were developed by pollutant and vehicle type.

To develop the emissions rate annualization ratios, seasonal emissions factors were modeled to accommodate changes in emissions rates from the seasonal variation in meteorology and gasoline properties. Taking the month-weighted average of the seasonal EFs ($EF_{SUMMER}$, $EF_{WINTER}$), the annual average daily emission factor ($EF_{AAD}$) was produced. Finally, the $EF_{AAD}$ was divided by the $EF_{SUMMER}$ for each pollutant and vehicle type, yielding the desired annualization ratios.

The year was divided into two seasons with equal weighting, summer and winter, reflecting the mild climate in Texas. The National Climatological Data Center Meteorological Data (hourly summaries) representing each of the eight climate zones were used to develop 2002 summer and winter average hourly temperature and relative humidity inputs, and daily average barometric pressure inputs. Data for the three-month period January, February, and December and for the period June through August were used for the winter and summer seasons, respectively. The climate inputs for both winter and summer used to calculate the seasonal emissions factors for the annualization procedure are listed in Appendix I. The weather station hourly data files and spreadsheets used to calculate the average seasonal climate inputs were provided on CD-ROM as described in Appendix A.

The general expression for an emissions rate annualization factor as applied in this analysis is:

$$
\begin{aligned}
ER_{ANNFAC} &= (0.5 \times EF_{SUMMER} + 0.5 \times EF_{WINTER})/EF_{SUMMER} \\
&= EF_{AAD}/EF_{SUMMER}
\end{aligned}
$$

For example, the $EF_{SUMMER}$ and $EF_{WINTER}$ for Anderson County (uses county group code D22C3R2) LDGV VOC are 1.301857 grams/mile (g/mi) and 1.541098 g/mi respectively, thus the county-group (which includes Anderson County) LDGV VOC emissions rate annualization factor (for application to LDGV VOC emissions at the individual county level) is:

$$
\begin{aligned}
ER_{ANNFAC}\ (\text{LDGV VOC}) &= [0.5(1.301857\ \text{g/mi}) + 0.5(1.541098\ \text{g/mi})] / 1.301857\ \text{g/mi} \\
&= 1.42148\ \text{g/mi}/1.301857\ \text{g/mi} \\
&= 1.09188
\end{aligned}
$$

The emissions factor annualization ratios were developed using daily MOBILE6 emissions factors (see POLFAC62 *.rtd output files provided on CD-ROM) at a nominal speed of 40 mph. The values used in the example above were taken from data files provided on CD-ROM as described in Appendix A. The winter season hourly activity, meteorological and fuel property inputs are shown in Appendix G, Appendix I and Appendix K, respectively. The emissions rate annualization ratios are shown in Appendix M.

**EMISSIONS CALCULATIONS**

Hourly emissions were calculated at the HPMS virtual link-level using the IMPSUM62 program (Appendix C). Generally, for each hour the average summer weekday, link-VMT estimates were multiplied by the summer hourly emissions factors (g/mi) to produce hourly emissions estimates for each of the 28 vehicle types and each pollutant on each link. The MOBILE6 freeway and arterial drive cycle emissions factors used; freeway emissions factors were applied to freeway links and arterial emissions factors to non-freeway links. The SUMALL62 program was applied to produce the daily summaries and to convert daily emissions estimates to annual estimates and to summarize those results. There are three types of files output from the emissions calculations: an emissions summary file of county-level hourly and 24-hour emissions estimates cross classified by vehicle type and road type (including VMT, vehicle hours traveled, VMT weighted speeds, and VMT mix); a tab-delimited version of the emissions summary file, and a log file containing the emissions calculation program execution records. An additional set of NIFv3.0 formatted EI results were also produced. These files are provided on CD-ROM (see Appendix A).

**Hourly Link Emissions**

For each county, the emissions were calculated by hour for each link using the following basic inputs:

- MOBILE6 hourly Freeway and Arterial emissions factors indexed by speed for 28 vehicle types, developed with POLFAC62;

- records associating the MOBILE6 Freeway emissions factors to the freeway links, and the MOBILE6 Arterial emissions factors to the non-freeway links;

- link-specific operational VMT and speed estimates as developed (for each hour) for HPMS virtual links using the PREPIN program to include: HPMS area type code, HPMS functional class code, county number, HPMS area type and functional class cross combination code, link length (HPMS center lane miles), congested speed, and VMT; and

- VMT mix (to allocate link VMT by each of the 28 vehicle types) by time period and roadway type.

For each hour, the emissions estimates were computed by vehicle type for each link. The emissions factors for each county were tabulated in look-up tables by hour, road type (drive cycle), vehicle type, and 14 speeds (2.5 mph and 5 mph to 65 mph at 5 mph intervals). County-group-level (TxDOT district), 24-hour VMT mix correlated to functional classification, were multiplied by the fleet total link VMT to produce hourly link VMT estimates by the 28 vehicle types. Emissions factors were then matched with link-level VMT based on county, speed, road type, hour, and vehicle class. Emissions factors for link speeds that are not represented in the set of 14 MOBILE6 speed bin speeds were calculated by interpolation (see example calculation, Appendix C). For link speeds greater than or less than the MOBILE6 bounding speeds of 65 mph and 2.5 mph, the emissions factors corresponding to those bounding speeds were used, respectively. The link VMT were then multiplied by the emissions factors to produce the link-level emissions estimates.

Table 27 shows the correlation of the functional classes to the MOBILE6 drive cycles and to the VMT mix functional classification groups, as used in the emissions calculations.

**Table 27**
**HPMS Functional Class Groupings**
**Correlated to VMT Mix and MOBILE6 Drive Cycle Emissions Factors**

| MOBILE6 Drive Cycle | HPMS Functional Class | VMT mix Functional Group |
|---|---|---|
| Freeway | Interstate | Freeway |
| | Freeway | |
| Arterial | Other Principal Arterial | Arterial |
| | Minor Arterial | |
| | Major Collector | Collector |
| | Minor Collector | |
| | Local | |

**Summer Weekday (24-hour) Emissions**
For each county, the link-emissions estimates were summed for each hour, and the hourly emissions were summed for each day. The resulting composite VOC, CO, NOx, $SO_2$, $NH_3$, PM-10 and PM-2.5 emissions estimates are summarized in pounds by road type, vehicle type, and road type and vehicle type cross classification. VMT, VHT, VMT-weighted speeds, and other inventory data are included with the emissions summaries. The estimated annual VMT and emissions (discussed below) are also included in the summaries. These files (*.LST and a tab-

delimited version, *.TAB) are included with the set of data files provided on CD-ROM (see Appendix A). County total summary tables are included in Appendix B.

**Annual Emissions**
The methodology for producing annual estimates was an annualization of the summer weekday emissions estimates. One county-level VMT annualization factor was multiplied to county summer weekday emissions (for all pollutants) at the vehicle- and roadway-type level. The emissions rate annualization ratios were also multiplied by the summer weekday emissions, but on a pollutant- and vehicle-type specific basis (i.e., 28 ratios per pollutant).

The following example shows the calculation for the annualization of the summer weekday (SWKD) Anderson County Rural Minor Arterial (MA) LDGV VOC emissions:

Annual Rural MA LDGV VOC emissions = SWKD Rural MA LDGV VOC emissions × VMT annualization factor ×D22C3R2 County-group LDGV VOC emissions factor annualization ratio × lbs.-to-tons factor

Where:

SWKD LDGV Rural MA VOC emissions = 662.3332 lbs./day;
VMT annualization factor = 338.6716648 days/year; and
LDGV Rural MA VOC emissions factor annualization ratio = 1.09188

Anderson County Annual Rural MA LDGV VOC emissions = 662.3332 lbs./day × 338.6716648 days/year × 1.09188 ×(1 ton/ 2000 lbs.)
= 164408.2 tons/year.

The values for this example may be found in the EI input and output files provided as described in Appendix A. The emissions factor annualization rations are also summarized in Appendix M.

# APPENDIX A
# 2002 CERR EI ELECTRONIC SUBMITTAL DATA SET DESCRIPTION

**2002 CERR EI Electronic Data Submittal Description**

TTI previously provided the data described below on CD-ROM (1) to TCEQ to support the Texas 242 counties 2002 CERR NEI task. Files were “WinZipped”with paths so that Job Control Files (JCFs) provided in Part 5 can be used to locate emissions factor input/output files as used in the emissions factor and emissions runs. The parts to this data submittal are:

- Part 1, Detailed Emissions Data Summaries;
- Part 2, Emissions Factors;
- Part 3, Annualization Ratios;
- Part 4, Climate and Fuel Parameters; and
- Part 5, NIFv3.0 Emissions Files and Job Control Files.

County-level EI methods and data aggregation levels for input parameter development varied depending on: 1) whether the county was in one of the six AQP areas (see table below), and 2) AQP-county TDM availability. AQP counties with TDMs used the TDM-link-based methodology; other counties used the HPMS-based virtual link method. All AQP counties used county level vehicle registration distributions and AQP region-level: ATR factors, climate data, diesel fractions. The remaining counties (216) use climate data based on zones (eight zones/data sets), ATR factors and registration distributions developed at the TxDOT District level (25), and state level diesel fractions. Sample-survey-based fuel parameter input estimates were developed for five Texas cities and allocated to the 242 counties based on county/survey city proximity and fuel regulation boundaries.

| Area | Counties | Activity Basis |
|---|---|---|
| Houston-Galveston (HGA) nonattainment area (NAA) | Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller | TDM |
| Beaumont-Port Arthur (BPA) NAA | Jefferson, Hardin, Orange | TDM |
| El Paso (ELP) NAA | El Paso | TDM |
| Austin (AUS) Early Action Compact (EAC) area | Hays, Travis, Williamson<br>Bastrop, Caldwell | TDM<br>HPMS |
| San Antonio (SAN) EAC area | Bexar<br>Comal, Guadalupe, Wilson | TDM<br>HPMS |
| Tyler-Longview (TLM) EAC area | Gregg, Smith<br>Harrison, Rusk, Upshur | TDM<br>HPMS |
| Dallas/Fort Worth CMSA | Collin, Dallas, Denton, Ellis, Henderson, Hood, Hunt, Johnson, Kaufman, Parker, Rockwall, Tarrant | Excluded from analysis |
| Rest of Texas | 216 counties | HPMS |
| Totals | 18224 | TDM<br>HPMS |

**Part 1:** Detailed Emissions Data Summaries, consists of:

- A_02cerr_ems.zip (contains multiple emissions run output files), and
- 242_all_sum.xls (contains seasonal weekday and annual county-level VMT, speed, and emissions totals summaries).

The zip file contains the emissions calculation programs output files, i.e., combined IMPSUM hourly and SUMALL 24-hour results in the form of *.LOG, *.LST, and *.TAB files. (An additional set of SUMALL output files, EPA NIF version 3.0 report format EI data, is included as Part 5.) There were two emissions run jobs required for each county (or TDM network) to produce both the PM-10 (output with "pm1" in filename) and PM-2.5 (output with "pm2" in filename) emissions estimates. HPMS-method-based counties were run individually, however TDM-method counties within the same TDM network are calculated in the same run (see network counties in table above noting that Gregg [Longview] and Smith [Tyler] counties have separate TDM networks). This run/output file scheme yielded 1,396 output files (includes the fact that, due to size, the Houston-Galveston hourly and 24-hour estimates were output in separate files doubling the number of HGA files, and there is an additional set of output files for the El Paso CO season estimates).

The *.LOG files contain emissions run execution records, and the *.LST (and *.TAB, which is a reduced tab-delimited version of *.LST) is a tabulation of the hourly and 24-hour emissions data at the vehicle type and road type level. Data included are summaries of inputs as well as summer weekday (and winter weekday for El Paso CO season) and annual estimates of VMT, speeds, VHT, and emissions for the following pollutants: VOC, CO, NOx, $SO_2$, $NH_3$, total PM-10, total PM-2.5, and the following PM subcomponents (in MOBILE6 vernacular) $SO_4$, OCARBON, ECARBON, GASPM, LEAD, BRAKE, and TIRE.

The Microsoft Excel spreadsheet provides a summary (extract from the LST output) of county level summer weekday and annual estimates of VMT, Speed, VOC, CO, NOx, $SO_2$, $NH_3$, PM-10, and PM-2.5.

**Part 2:** Emissions Factors, consists of:

- P2a_02cerr_M6in.zip (command input and external data input files);
- P2b_02cerr_M6out.zip (hourly [*.rat] and daily [*.rtd] emissions factors, *.LOG files [run execution records], and *.LST files [MOBILE6 descriptive output for error checking]); and
- 216x47groupCodes.xls (lists the non-AQP-HPMS-based counties by county-group-code composed of three parts: TxDOT District, Climate Zone, and Fuel Group Code).

MOBILE6 input and output files are organized in folders named by AQP area label (e.g., HGA, BPA, AUS, ...) and an “HPMS” folder for the 216 remaining counties. AQP county emissions factors were developed at the county-level, whereas the remaining 216 counties emissions factors were developed based on input data aggregations forming 47 county-groupings (see table at end of this appendix from 216x47groupCodes.xls). For each set of emissions factors, two runs were required because PM-10 and PM-2.5 emissions factors cannot both be produced in the same run. Associated command input filenames and emissions factor output filenames generally use the convention *_$1.* and * _$2.* (where “$” may be a “c,” “z,” “s,” or “w,” representing CO season, ozone season, summer season, and winter season respectively, and the particular county is represented by first four letters of the county name for AQP counties, or by county group code for non-AQP counties).

Both hourly and daily emissions factors were used in the analysis. Hourly emissions factors were input to the IMPSUM62 program to estimate summer (or ozone season, for AQP counties) weekday hourly emissions which were summed by SUMALL62 program to produce 24-hour results. Daily summer season and winter season emissions factors at a nominal speed of 40 mph were used to produce emissions annualization ratios (used in conjunction with VMT annualization ratios, see Part 3 and Appendix E) to convert summer weekday 24-hour emissions estimates to annual emissions estimates.

**Part 3:** Annualization Ratios, contains P3_02cerr_annfac.zip
VMT and emissions factor annualization ratios used to convert summer/ozone season weekday emissions estimates to annual emissions estimates are included in this part of the data set. The emissions factor annualization ratio calculation spreadsheets are included as well. The “*EFannfac.*” files correspond to the PM-10 runs, and the “*EFp25annfac.*” files correspond to the PM-2.5 files.

**Part 4:** Climate and Fuel Parameter Inputs, contains:

- P4a_02cerr_climate.zip; and
- P4b_02cerr_fuel.zip.

This part contains the National Climatological Data Center (NCDC) hourly weather data files and MOBILE6 climate inputs calculation spreadsheets. The pair of spreadsheets containing the summer and winter NGB gasoline sample survey data and average fuel property calculations for Texas cities is also included.

**Part 5:** NIFv3.0 Emissions Files, contains:

- NIF_dataval.wpd (data dictionary and description of NIFv3.0 files);
- P5a_02cerr_nif.zip (the NIF files for 242 county CERR EIs);
- modrun_TRkey.CERR.xls, (model run/Transmittal Record (TR) index); and,
- P5b_02cerr_jcf.zip (emissions and emissions factor job control files listed in model run/TR record index).

The three files required for EIs per EPA NIFv3.0 specification are in *nif.zip. The "NIF_dataval.wpd" file describes the NIF records/files. The table in"modrun_TRkey.CERR.xls" identifies the emissions factor and emissions modeling runs (by JCF file name). The JCF files used for the analysis are in "P5b_02cerr_jcf.zip."

**Unique County Groups (47) for the 2002 Emissions Factor Analysis of 216 non-AQP Area Counties**

| Qty | County* | District Name | District Code | Climate Code | Fuel** Code | Unique Groups* |
|---|---|---|---|---|---|---|
| 1 | Borden | Abilene | D01 | C6 | R1 | |
| 2 | Callahan | Abilene | D01 | C6 | R1 | |
| 3 | Fisher | Abilene | D01 | C6 | R1 | |
| 4 | Haskell | Abilene | D01 | C6 | R1 | |
| 5 | Howard | Abilene | D01 | C6 | R1 | |
| 6 | Jones | Abilene | D01 | C6 | R1 | |
| 7 | Kent | Abilene | D01 | C6 | R1 | 1 |
| 8 | Mitchell | Abilene | D01 | C6 | R1 | |
| 9 | Nolan | Abilene | D01 | C6 | R1 | |
| 10 | Scurry | Abilene | D01 | C6 | R1 | |
| 11 | Shackelford | Abilene | D01 | C6 | R1 | |
| 12 | Stonewall | Abilene | D01 | C6 | R1 | |
| 13 | Taylor | Abilene | D01 | C6 | R1 | |
| 14 | Armstrong | Amarillo | D02 | C1 | R5 | |
| 15 | Carson | Amarillo | D02 | C1 | R5 | |
| 16 | Dallam | Amarillo | D02 | C1 | R5 | |
| 17 | Deaf Smith | Amarillo | D02 | C1 | R5 | |
| 18 | Gray | Amarillo | D02 | C1 | R5 | |
| 19 | Hansford | Amarillo | D02 | C1 | R5 | |
| 20 | Hartley | Amarillo | D02 | C1 | R5 | |
| 21 | Hemphill | Amarillo | D02 | C1 | R5 | |
| 22 | Hutchinson | Amarillo | D02 | C1 | R5 | 1 |
| 23 | Lipscomb | Amarillo | D02 | C1 | R5 | |
| 24 | Moore | Amarillo | D02 | C1 | R5 | |
| 25 | Ochiltree | Amarillo | D02 | C1 | R5 | |
| 26 | Oldham | Amarillo | D02 | C1 | R5 | |
| 27 | Potter | Amarillo | D02 | C1 | R5 | |
| 28 | Randall | Amarillo | D02 | C1 | R5 | |
| 29 | Roberts | Amarillo | D02 | C1 | R5 | |
| 30 | Sherman | Amarillo | D02 | C1 | R5 | |

| Qty | County* | District Name | District Code | Climate Code | Fuel** Code | Unique Groups* |
|---|---|---|---|---|---|---|
| 31 | Bowie | Atlanta | D03 | C3 | R2 | 1 |
| 32 | Camp | Atlanta | D03 | C3 | R2 | |
| 33 | Cass | Atlanta | D03 | C3 | R2 | |
| **34** | **Harrison** | **Atlanta** | **D03** | **C3** | **R2** | |
| 35 | Marion | Atlanta | D03 | C3 | R2 | |
| 36 | Morris | Atlanta | D03 | C3 | R2 | |
| 37 | Panola | Atlanta | D03 | C3 | R2 | |
| 38 | Titus | Atlanta | D03 | C3 | R2 | |
| **39** | **Upshur** | **Atlanta** | **D03** | **C3** | **R2** | |
| **40** | **Bastrop** | **Austin** | **D04** | **C8** | **R2** | 2 |
| 41 | Blanco | Austin | D04 | C8 | R1 | |
| 42 | Burnet | Austin | D04 | C8 | R1 | |
| **43** | **Caldwell** | **Austin** | **D04** | **C8** | **R2** | |
| 44 | Gillespie | Austin | D04 | C8 | R1 | |
| **45** | **Hays** | **Austin** | **D04** | **C8** | **R2** | |
| 46 | Lee | Austin | D04 | C8 | R2 | |
| 47 | Llano | Austin | D04 | C8 | R1 | |
| 48 | Mason | Austin | D04 | C8 | R1 | |
| **49** | **Travis** | **Austin** | **D04** | **C8** | **R2** | |
| **50** | **Williamson** | **Austin** | **D04** | **C8** | **R2** | |
| **51** | **Chambers** | **Beaumont** | **D05** | **C5** | **R4** | 1 |
| **52** | **Hardin** | **Beaumont** | **D05** | **C5** | **R2** | |
| 53 | Jasper | Beaumont | D05 | C5 | R2 | |
| **54** | **Jefferson** | **Beaumont** | **D05** | **C5** | **R2** | |
| **55** | **Liberty** | **Beaumont** | **D05** | **C5** | **R4** | |
| 56 | Newton | Beaumont | D05 | C5 | R2 | |
| **57** | **Orange** | **Beaumont** | **D05** | **C5** | **R2** | |
| 58 | Tyler | Beaumont | D05 | C5 | R2 | |

| Qty | County* | District Name | District Code | Climate Code | Fuel** Code | Unique Groups* |
|---|---|---|---|---|---|---|
| 59 | Brown | Brownwood | D06 | C7 | R1 | |
| 60 | Coleman | Brownwood | D06 | C7 | R1 | |
| 61 | Comanche | Brownwood | D06 | C3 | R1 | |
| 62 | Eastland | Brownwood | D06 | C6 | R1 | |
| 63 | Lampasas | Brownwood | D06 | C8 | R1 | 4 |
| 64 | McCulloch | Brownwood | D06 | C7 | R1 | |
| 65 | Mills | Brownwood | D06 | C8 | R1 | |
| 66 | San Saba | Brownwood | D06 | C8 | R1 | |
| 67 | Stephens | Brownwood | D06 | C6 | R1 | |
| 68 | Brazos | Bryan | D07 | C5 | R2 | |
| 69 | Burleson | Bryan | D07 | C8 | R2 | |
| 70 | Freestone | Bryan | D07 | C3 | R2 | |
| 71 | Grimes | Bryan | D07 | C5 | R2 | |
| 72 | Leon | Bryan | D07 | C5 | R2 | |
| 73 | Madison | Bryan | D07 | C5 | R2 | 3 |
| 74 | Milam | Bryan | D07 | C8 | R2 | |
| 75 | Robertson | Bryan | D07 | C5 | R2 | |
| 76 | Walker | Bryan | D07 | C5 | R2 | |
| 77 | Washington | Bryan | D07 | C8 | R2 | |
| 78 | Briscoe | Childress | D08 | C1 | R5 | |
| 79 | Childress | Childress | D08 | C1 | R5 | |
| 80 | Collingsworth | Childress | D08 | C1 | R5 | |
| 81 | Cottle | Childress | D08 | C6 | R5 | |
| 82 | Dickens | Childress | D08 | C6 | R5 | |
| 83 | Donley | Childress | D08 | C1 | R5 | |
| 84 | Foard | Childress | D08 | C6 | R5 | 2 |
| 85 | Hall | Childress | D08 | C1 | R5 | |
| 86 | Hardeman | Childress | D08 | C6 | R5 | |
| 87 | King | Childress | D08 | C6 | R5 | |
| 88 | Knox | Childress | D08 | C6 | R5 | |
| 89 | Motley | Childress | D08 | C6 | R5 | |
| 90 | Wheeler | Childress | D08 | C1 | R5 | |

| Qty | County* | District Name | District Code | Climate Code | Fuel** Code | Unique Groups* |
|---|---|---|---|---|---|---|
| 91 | Aransas | Corpus Christi | D09 | C2 | R2 | 2 |
| 92 | Bee | Corpus Christi | D09 | C2 | R2 | |
| 93 | Goliad | Corpus Christi | D09 | C2 | R2 | |
| 94 | Jim Wells | Corpus Christi | D09 | C2 | R1 | |
| 95 | Karnes | Corpus Christi | D09 | C2 | R2 | |
| 96 | Kleberg | Corpus Christi | D09 | C2 | R1 | |
| 97 | Live Oak | Corpus Christi | D09 | C2 | R2 | |
| 98 | Nueces | Corpus Christi | D09 | C2 | R2 | |
| 99 | Refugio | Corpus Christi | D09 | C2 | R2 | |
| 100 | San Patricio | Corpus Christi | D09 | C2 | R2 | |
| 101 | Collin | Dallas | D10 | C3 | na | 1 |
| 102 | Dallas | Dallas | D10 | C3 | na | |
| 103 | Denton | Dallas | D10 | C3 | na | |
| 104 | Ellis | Dallas | D10 | C3 | R2 | |
| 105 | Kaufman | Dallas | D10 | C3 | R2 | |
| 106 | Navarro | Dallas | D10 | C3 | R2 | |
| 107 | Rockwall | Dallas | D10 | C3 | R2 | |
| 108 | Brewster | El Paso | D11 | C7 | R1 | 2 |
| 109 | Culberson | El Paso | D11 | C7 | R1 | |
| **110** | **El Paso** | **El Paso** | **D11** | **C4** | **R3** | |
| 111 | Hudspeth | El Paso | D11 | C4 | R1 | |
| 112 | Jeff Davis | El Paso | D11 | C7 | R1 | |
| 113 | Presidio | El Paso | D11 | C7 | R1 | |
| 114 | Erath | Fort Worth | D12 | C3 | R1 | 2 |
| 115 | Hood | Fort Worth | D12 | C3 | R2 | |
| 116 | Jack | Fort Worth | D12 | C3 | R1 | |
| 117 | Johnson | Fort Worth | D12 | C3 | R2 | |
| 118 | Palo Pinto | Fort Worth | D12 | C3 | R1 | |
| 119 | Parker | Fort Worth | D12 | C3 | R2 | |
| 120 | Somervell | Fort Worth | D12 | C3 | R2 | |
| 121 | Tarrant | Fort Worth | D12 | C3 | na | |
| 122 | Wise | Fort Worth | D12 | C3 | R2 | |

| Qty | County* | District Name | District Code | Climate Code | Fuel** Code | Unique Groups* |
|---|---|---|---|---|---|---|
| **123** | **Brazoria** | **Houston** | **D13** | **C5** | **R4** | 0 |
| **124** | **Fort Bend** | **Houston** | **D13** | **C5** | **R4** | |
| **125** | **Galveston** | **Houston** | **D13** | **C5** | **R4** | |
| **126** | **Harris** | **Houston** | **D13** | **C5** | **R4** | |
| **127** | **Montgomery** | **Houston** | **D13** | **C5** | **R4** | |
| **128** | **Waller** | **Houston** | **D13** | **C5** | **R4** | |
| 129 | Dimmit | Laredo | D14 | C8 | R1 | 3 |
| 130 | Duval | Laredo | D14 | C2 | R1 | |
| 131 | Kinney | Laredo | D14 | C8 | R1 | |
| 132 | LaSalle | Laredo | D14 | C8 | R1 | |
| 133 | Maverick | Laredo | D14 | C8 | R1 | |
| 134 | Val Verde | Laredo | D14 | C7 | R1 | |
| 135 | Webb | Laredo | D14 | C8 | R1 | |
| 136 | Zavala | Laredo | D14 | C8 | R1 | |
| 137 | Bailey | Lubbock | D15 | C6 | R5 | 2 |
| 138 | Castro | Lubbock | D15 | C1 | R5 | |
| 139 | Cochran | Lubbock | D15 | C6 | R5 | |
| 140 | Crosby | Lubbock | D15 | C6 | R5 | |
| 141 | Dawson | Lubbock | D15 | C6 | R5 | |
| 142 | Floyd | Lubbock | D15 | C6 | R5 | |
| 143 | Gaines | Lubbock | D15 | C6 | R5 | |
| 144 | Garza | Lubbock | D15 | C6 | R5 | |
| 145 | Hale | Lubbock | D15 | C6 | R5 | |
| 146 | Hockley | Lubbock | D15 | C6 | R5 | |
| 147 | Lamb | Lubbock | D15 | C6 | R5 | |
| 148 | Lubbock | Lubbock | D15 | C6 | R5 | |
| 149 | Lynn | Lubbock | D15 | C6 | R5 | |
| 150 | Parmer | Lubbock | D15 | C1 | R5 | |
| 151 | Swisher | Lubbock | D15 | C1 | R5 | |
| 152 | Terry | Lubbock | D15 | C6 | R5 | |
| 153 | Yoakum | Lubbock | D15 | C6 | R5 | |

| Qty | County* | District Name | District Code | Climate Code | Fuel** Code | Unique Groups* |
|---|---|---|---|---|---|---|
| 154 | Angelina | Lufkin | D16 | C3 | R2 | |
| 155 | Houston | Lufkin | D16 | C5 | R2 | |
| 156 | Nacogdoches | Lufkin | D16 | C3 | R2 | |
| 157 | Polk | Lufkin | D16 | C5 | R2 | |
| 158 | Sabine | Lufkin | D16 | C3 | R2 | 2 |
| 159 | San Augustine | Lufkin | D16 | C3 | R2 | |
| 160 | San Jacinto | Lufkin | D16 | C5 | R2 | |
| 161 | Shelby | Lufkin | D16 | C3 | R2 | |
| 162 | Trinity | Lufkin | D16 | C5 | R2 | |
| 163 | Andrews | Odessa | D17 | C6 | R1 | |
| 164 | Crane | Odessa | D17 | C7 | R1 | |
| 165 | Ector | Odessa | D17 | C7 | R1 | |
| 166 | Loving | Odessa | D17 | C7 | R1 | |
| 167 | Martin | Odessa | D17 | C6 | R1 | |
| 168 | Midland | Odessa | D17 | C7 | R1 | |
| 169 | Pecos | Odessa | D17 | C7 | R1 | 2 |
| 170 | Reeves | Odessa | D17 | C7 | R1 | |
| 171 | Terrell | Odessa | D17 | C7 | R1 | |
| 172 | Upton | Odessa | D17 | C7 | R1 | |
| 173 | Ward | Odessa | D17 | C7 | R1 | |
| 174 | Winkler | Odessa | D17 | C7 | R1 | |
| 175 | Delta | Paris | D18 | C3 | R2 | |
| 176 | Fannin | Paris | D18 | C3 | R2 | |
| 177 | Franklin | Paris | D18 | C3 | R2 | |
| 178 | Grayson | Paris | D18 | C3 | R2 | |
| 179 | Hopkins | Paris | D18 | C3 | R2 | 1 |
| 180 | Hunt | Paris | D18 | C3 | R2 | |
| 181 | Lamar | Paris | D18 | C3 | R2 | |
| 182 | Rains | Paris | D18 | C3 | R2 | |
| 183 | Red River | Paris | D18 | C3 | R2 | |

| Qty | County* | District Name | District Code | Climate Code | Fuel** Code | Unique Groups* |
|---|---|---|---|---|---|---|
| 184 | Brooks | Pharr | D19 | C2 | R1 | 1 |
| 185 | Cameron | Pharr | D19 | C2 | R1 | |
| 186 | Hidalgo | Pharr | D19 | C2 | R1 | |
| 187 | Jim Hogg | Pharr | D19 | C2 | R1 | |
| 188 | Kenedy | Pharr | D19 | C2 | R1 | |
| 189 | Starr | Pharr | D19 | C2 | R1 | |
| 190 | Willacy | Pharr | D19 | C2 | R1 | |
| 191 | Zapata | Pharr | D19 | C2 | R1 | |
| 192 | Coke | San Angelo | D20 | C7 | R1 | 1 |
| 193 | Concho | San Angelo | D20 | C7 | R1 | |
| 194 | Crockett | San Angelo | D20 | C7 | R1 | |
| 195 | Edwards | San Angelo | D20 | C7 | R1 | |
| 196 | Glasscock | San Angelo | D20 | C7 | R1 | |
| 197 | Irion | San Angelo | D20 | C7 | R1 | |
| 198 | Kimble | San Angelo | D20 | C7 | R1 | |
| 199 | Menard | San Angelo | D20 | C7 | R1 | |
| 200 | Reagan | San Angelo | D20 | C7 | R1 | |
| 201 | Real | San Angelo | D20 | C7 | R1 | |
| 202 | Runnels | San Angelo | D20 | C7 | R1 | |
| 203 | Schleicher | San Angelo | D20 | C7 | R1 | |
| 204 | Sterling | San Angelo | D20 | C7 | R1 | |
| 205 | Sutton | San Angelo | D20 | C7 | R1 | |
| 206 | Tom Green | San Angelo | D20 | C7 | R1 | |

| Qty | County* | District Name | District Code | Climate Code | Fuel** Code | Unique Groups* |
|---|---|---|---|---|---|---|
| 207 | Atascosa | San Antonio | D21 | C8 | R2 | 3 |
| 208 | Bandera | San Antonio | D21 | C8 | R1 | |
| **209** | **Bexar** | **San Antonio** | **D21** | **C8** | **R2** | |
| **210** | **Comal** | **San Antonio** | **D21** | **C8** | **R2** | |
| 211 | Frio | San Antonio | D21 | C8 | R1 | |
| **212** | **Guadalupe** | **San Antonio** | **D21** | **C8** | **R2** | |
| 213 | Kendall | San Antonio | D21 | C8 | R1 | |
| 214 | Kerr | San Antonio | D21 | C8 | R1 | |
| 215 | McMullen | San Antonio | D21 | C2 | R1 | |
| 216 | Medina | San Antonio | D21 | C8 | R1 | |
| 217 | Uvalde | San Antonio | D21 | C8 | R1 | |
| **218** | **Wilson** | **San Antonio** | **D21** | **C8** | **R2** | |
| 219 | Anderson | Tyler | D22 | C3 | R2 | 1 |
| 220 | Cherokee | Tyler | D22 | C3 | R2 | |
| **221** | **Gregg** | **Tyler** | **D22** | **C3** | **R2** | |
| 222 | Henderson | Tyler | D22 | C3 | R2 | |
| **223** | **Rusk** | **Tyler** | **D22** | **C3** | **R2** | |
| **224** | **Smith** | **Tyler** | **D22** | **C3** | **R2** | |
| 225 | Van Zandt | Tyler | D22 | C3 | R2 | |
| 226 | Wood | Tyler | D22 | C3 | R2 | |
| 227 | Bell | Waco | D23 | C8 | R2 | 3 |
| 228 | Bosque | Waco | D23 | C3 | R2 | |
| 229 | Coryell | Waco | D23 | C8 | R2 | |
| 230 | Falls | Waco | D23 | C3 | R2 | |
| 231 | Hamilton | Waco | D23 | C3 | R1 | |
| 232 | Hill | Waco | D23 | C3 | R2 | |
| 233 | Limestone | Waco | D23 | C3 | R2 | |
| 234 | McLennan | Waco | D23 | C3 | R2 | |

| Qty | County* | District Name | District Code | Climate Code | Fuel** Code | Unique Groups* |
|---|---|---|---|---|---|---|
| 235 | Archer | Wichita Falls | D24 | C6 | R5 | |
| 236 | Baylor | Wichita Falls | D24 | C6 | R5 | |
| 237 | Clay | Wichita Falls | D24 | C3 | R5 | |
| 238 | Cooke | Wichita Falls | D24 | C3 | R2 | |
| 239 | Montague | Wichita Falls | D24 | C3 | R5 | 3 |
| 240 | Throckmorton | Wichita Falls | D24 | C6 | R5 | |
| 241 | Wichita | Wichita Falls | D24 | C6 | R5 | |
| 242 | Wilbarger | Wichita Falls | D24 | C6 | R5 | |
| 243 | Young | Wichita Falls | D24 | C6 | R5 | |
| 244 | Austin | Yoakum | D25 | C5 | R2 | |
| 245 | Calhoun | Yoakum | D25 | C2 | R2 | |
| 246 | Colorado | Yoakum | D25 | C5 | R2 | |
| 247 | DeWitt | Yoakum | D25 | C2 | R2 | |
| 248 | Fayette | Yoakum | D25 | C8 | R2 | |
| 249 | Gonzales | Yoakum | D25 | C8 | R2 | 3 |
| 250 | Jackson | Yoakum | D25 | C2 | R2 | |
| 251 | Lavaca | Yoakum | D25 | C2 | R2 | |
| 252 | Matagorda | Yoakum | D25 | C5 | R2 | |
| 253 | Victoria | Yoakum | D25 | C2 | R2 | |
| 254 | Wharton | Yoakum | D25 | C5 | R2 | |
| **Total Unique Combinations** | | | | | | 47 |

* Counties in "bold" and with grey shading (26 counties within the six "AQP areas" of this task) and counties with grey shading only (12 DFW CMSA counties excluded from this task) are excluded from computation of unique county groups.
** Fuel codes represent use of fuel parameter inputs from survey based estimates from the following cities: R1 = Midland, R2 = San Antonio, R3 = El Paso, R4 = Houston ( RFG), R5 = Amarillo.

# APPENDIX B
# COUNTY LEVEL EMISSIONS INVENTORY DATA SUMMARIES

**2002 CERR On-Road Mobile Source Summer Weekday VMT, Average Speed, and Emissions**
**(Includes El Paso CO Season Weekday Estimate)**
**24-Hour, Pounds**

| County | VMT | SPEED | VOC | CO | NOX | SO2 | NH3 | PM-10 | PM-2.5 |
|---|---|---|---|---|---|---|---|---|---|
| ANDERSON | 1,490,636 | 41.4 | 3,751.3 | 51,766.9 | 6,900.7 | 223.1 | 303.2 | 185.5 | 129.0 |
| ANDREWS | 545,234 | 41.0 | 1,564.6 | 20,958.0 | 3,823.4 | 179.3 | 103.7 | 120.7 | 95.0 |
| ANGELINA | 2,443,250 | 41.3 | 5,468.0 | 74,822.9 | 21,361.1 | 548.2 | 454.0 | 500.2 | 383.5 |
| ARANSAS | 570,143 | 41.9 | 1,324.6 | 18,685.7 | 3,626.6 | 107.1 | 110.2 | 106.0 | 80.6 |
| ARCHER | 420,638 | 43.3 | 1,175.3 | 15,274.9 | 3,254.6 | 93.2 | 79.7 | 90.6 | 70.4 |
| ARMSTRONG | 377,042 | 47.7 | 1,027.6 | 13,372.3 | 4,571.3 | 104.8 | 66.4 | 111.2 | 89.4 |
| ATASCOSA | 1,568,738 | 48.1 | 3,717.6 | 58,467.8 | 9,813.9 | 237.2 | 318.4 | 215.3 | 154.2 |
| AUSTIN | 1,284,681 | 48.6 | 2,750.4 | 42,031.6 | 21,417.0 | 347.8 | 225.2 | 373.3 | 300.2 |
| BAILEY | 315,027 | 40.1 | 894.6 | 11,298.5 | 2,500.0 | 67.1 | 60.3 | 72.5 | 57.0 |
| BANDERA | 448,198 | 40.6 | 1,256.2 | 17,770.1 | 1,950.4 | 124.8 | 91.8 | 59.0 | 42.2 |
| BASTROP | 2,075,609 | 42.6 | 5,370.3 | 73,653.5 | 8,386.8 | 280.5 | 429.1 | 223.1 | 149.1 |
| BAYLOR | 205,648 | 46.1 | 566.2 | 7,756.3 | 1,580.8 | 44.0 | 39.4 | 42.1 | 32.4 |
| BEE | 920,850 | 40.2 | 2,171.8 | 30,231.7 | 5,724.6 | 169.3 | 178.8 | 166.6 | 126.2 |
| BELL | 6,520,274 | 43.5 | 15,502.2 | 228,921.7 | 55,446.6 | 1,161.0 | 1,283.2 | 1,029.5 | 755.2 |
| BEXAR | 37,266,471 | 28.5 | 103,635.6 | 1,298,111.6 | 205,907.2 | 5,518.2 | 7,609.2 | 5,051.3 | 3,612.5 |
| BLANCO | 610,843 | 44.3 | 1,466.0 | 23,132.5 | 2,618.0 | 170.3 | 125.3 | 75.4 | 52.9 |
| BORDEN | 67,990 | 41.0 | 197.1 | 2,562.4 | 571.4 | 23.4 | 12.6 | 14.8 | 11.5 |
| BOSQUE | 545,712 | 42.3 | 1,341.3 | 19,052.5 | 2,394.9 | 78.3 | 111.3 | 68.0 | 47.5 |
| BOWIE | 3,152,558 | 45.3 | 7,732.6 | 110,199.6 | 41,109.6 | 741.6 | 583.7 | 1,055.2 | 869.9 |
| BRAZORIA | 5,752,709 | 45.7 | 10,867.6 | 173,801.0 | 28,276.5 | 664.8 | 1,189.5 | 675.8 | 464.8 |
| BRAZOS | 4,176,178 | 37.5 | 9,160.9 | 126,833.4 | 33,156.7 | 823.3 | 804.4 | 736.8 | 553.0 |
| BREWSTER | 309,079 | 39.8 | 1,156.9 | 14,089.5 | 1,322.6 | 80.5 | 64.5 | 36.1 | 25.0 |

| County | VMT | SPEED | VOC | CO | NOX | SO2 | NH3 | PM-10 | PM-2.5 |
|---|---|---|---|---|---|---|---|---|---|
| BRISCOE | 89,593 | 35.9 | 282.8 | 3,241.2 | 657.7 | 19.7 | 17.0 | 17.2 | 13.1 |
| BROOKS | 598,039 | 46.4 | 1,722.8 | 26,205.4 | 2,889.8 | 165.6 | 124.2 | 79.0 | 56.5 |
| BROWN | 968,102 | 42.3 | 3,074.4 | 41,526.5 | 6,075.2 | 303.2 | 189.9 | 161.5 | 121.0 |
| BURLESON | 769,748 | 44.3 | 1,632.7 | 24,485.7 | 5,227.6 | 146.0 | 149.5 | 130.0 | 96.8 |
| BURNET | 1,440,307 | 42.0 | 3,495.7 | 53,186.3 | 6,155.8 | 403.6 | 294.6 | 181.4 | 128.2 |
| CALDWELL | 1,023,775 | 43.8 | 2,699.5 | 37,588.3 | 4,648.2 | 141.1 | 211.0 | 112.6 | 75.7 |
| CALHOUN | 542,774 | 40.0 | 1,290.6 | 17,497.2 | 4,512.6 | 119.9 | 100.7 | 124.4 | 97.6 |
| CALLAHAN | 908,148 | 54.5 | 2,257.2 | 34,620.6 | 20,609.8 | 371.2 | 153.5 | 273.8 | 220.1 |
| CAMERON | 6,929,205 | 38.7 | 21,053.9 | 291,070.1 | 32,965.2 | 1,896.3 | 1,444.1 | 887.7 | 630.5 |
| CAMP | 352,858 | 41.9 | 902.4 | 12,213.3 | 2,477.4 | 67.1 | 68.6 | 85.3 | 67.9 |
| CARSON | 854,368 | 54.5 | 2,309.2 | 33,620.9 | 12,123.7 | 215.0 | 156.7 | 219.7 | 174.2 |
| CASS | 1,212,964 | 41.6 | 3,107.4 | 41,729.2 | 8,468.0 | 231.3 | 235.7 | 294.5 | 234.8 |
| CASTRO | 361,241 | 40.3 | 1,010.6 | 12,688.5 | 2,815.3 | 76.2 | 69.4 | 82.0 | 64.3 |
| CHAMBERS | 2,241,003 | 68.9 | 4,246.4 | 78,337.2 | 13,372.4 | 257.7 | 464.4 | 261.8 | 179.5 |
| CHEROKEE | 1,522,510 | 42.3 | 3,811.4 | 53,651.4 | 7,162.2 | 227.4 | 309.8 | 189.0 | 131.4 |
| CHILDRESS | 398,833 | 45.6 | 1,095.6 | 14,199.3 | 4,206.8 | 106.3 | 71.8 | 93.0 | 72.3 |
| CLAY | 942,879 | 45.7 | 2,619.1 | 36,206.0 | 6,966.8 | 201.3 | 181.0 | 191.9 | 147.8 |
| COCHRAN | 143,300 | 35.2 | 426.1 | 4,883.2 | 1,133.4 | 31.7 | 27.0 | 35.0 | 27.7 |
| COKE | 207,977 | 43.5 | 621.6 | 8,627.7 | 1,392.3 | 65.9 | 40.4 | 35.8 | 26.9 |
| COLEMAN | 389,550 | 42.3 | 1,241.5 | 16,793.1 | 2,379.6 | 120.9 | 76.7 | 63.5 | 47.4 |
| COLLINGSWORTH | 146,724 | 37.1 | 450.8 | 5,251.2 | 1,190.4 | 34.1 | 27.4 | 29.9 | 22.8 |
| COLORADO | 1,540,972 | 51.0 | 3,224.9 | 50,400.3 | 28,868.8 | 439.2 | 265.6 | 475.3 | 384.3 |
| COMAL | 3,566,246 | 46.2 | 8,685.7 | 131,539.1 | 21,984.0 | 532.0 | 726.8 | 484.9 | 346.7 |
| COMANCHE | 539,734 | 42.5 | 1,686.3 | 23,510.2 | 3,150.7 | 166.1 | 106.8 | 86.1 | 64.0 |
| CONCHO | 273,269 | 45.9 | 807.4 | 11,660.8 | 1,823.5 | 85.7 | 53.4 | 45.8 | 34.3 |

| County | VMT | SPEED | VOC | CO | NOX | SO2 | NH3 | PM-10 | PM-2.5 |
|---|---|---|---|---|---|---|---|---|---|
| COOKE | 1,599,572 | 48.7 | 4,149.3 | 63,207.4 | 14,482.7 | 318.0 | 305.2 | 332.7 | 256.9 |
| CORYELL | 1,102,235 | 34.7 | 2,872.3 | 36,802.4 | 4,643.8 | 156.8 | 225.5 | 135.5 | 94.3 |
| COTTLE | 109,040 | 40.1 | 322.4 | 3,901.8 | 1,002.4 | 27.3 | 20.0 | 23.9 | 18.4 |
| CRANE | 208,777 | 44.3 | 601.3 | 8,441.1 | 1,787.9 | 69.7 | 39.5 | 48.8 | 38.7 |
| CROCKETT | 495,290 | 52.1 | 1,266.4 | 19,252.6 | 11,041.3 | 206.0 | 82.1 | 151.8 | 122.1 |
| CROSBY | 270,587 | 40.8 | 764.0 | 9,817.5 | 2,151.0 | 57.1 | 52.0 | 61.4 | 48.2 |
| CULBERSON | 579,020 | 61.2 | 1,929.7 | 31,136.8 | 4,524.7 | 161.0 | 118.2 | 84.2 | 61.4 |
| DALLAM | 419,781 | 43.7 | 1,192.3 | 14,851.0 | 4,618.1 | 110.4 | 75.3 | 115.1 | 91.9 |
| DAWSON | 577,507 | 39.1 | 1,652.2 | 20,607.7 | 4,496.4 | 121.6 | 111.0 | 130.7 | 102.6 |
| DEAF SMITH | 551,483 | 40.3 | 1,627.6 | 19,509.9 | 5,681.0 | 138.4 | 100.4 | 141.9 | 112.6 |
| DELTA | 213,711 | 43.3 | 538.0 | 7,497.7 | 1,390.2 | 37.9 | 42.2 | 32.6 | 23.7 |
| DEWITT | 598,360 | 39.5 | 1,432.4 | 19,421.6 | 4,795.5 | 129.9 | 111.4 | 134.2 | 105.0 |
| DICKENS | 130,826 | 40.0 | 392.2 | 4,784.3 | 1,163.0 | 31.6 | 24.2 | 27.6 | 21.2 |
| DIMMIT | 327,369 | 43.7 | 914.2 | 12,796.0 | 2,446.7 | 109.9 | 61.6 | 67.9 | 52.6 |
| DONLEY | 531,183 | 49.7 | 1,373.6 | 18,485.3 | 8,266.1 | 160.3 | 91.4 | 143.6 | 113.3 |
| DUVAL | 456,939 | 41.3 | 1,314.1 | 18,147.2 | 3,373.0 | 153.4 | 85.8 | 95.4 | 73.9 |
| EASTLAND | 1,211,427 | 52.8 | 3,085.9 | 46,036.7 | 26,983.0 | 508.4 | 201.6 | 375.0 | 302.1 |
| ECTOR | 2,906,583 | 39.9 | 8,551.0 | 113,735.8 | 30,263.7 | 991.6 | 546.6 | 732.7 | 586.0 |
| EDWARDS | 97,723 | 38.9 | 296.4 | 3,775.6 | 734.2 | 32.8 | 18.3 | 19.5 | 15.0 |
| EL PASO (CO Wkd) | 14,319,056 | 35.2 | 54,069.4 | 759,211.9 | 75,403.7 | 2,499.9 | 2,978.2 | 1,664.5 | 1,146.2 |
| EL PASO (Oz Wkd) | 13,599,226 | 35.9 | 43,255.0 | 526,200.9 | 66,973.1 | 2,244.5 | 2,834.1 | 1,562.7 | 1,071.5 |
| ERATH | 1,310,236 | 42.9 | 3,092.5 | 47,400.6 | 8,353.6 | 399.4 | 259.3 | 194.1 | 141.1 |
| FALLS | 736,025 | 45.7 | 1,757.2 | 26,221.7 | 4,422.0 | 114.7 | 148.4 | 100.0 | 71.2 |
| FANNIN | 878,043 | 41.0 | 2,253.3 | 30,392.6 | 5,344.7 | 150.5 | 174.4 | 129.4 | 93.2 |
| FAYETTE | 1,459,268 | 47.4 | 3,190.0 | 47,291.1 | 21,524.4 | 380.2 | 258.9 | 405.9 | 325.1 |

| County | VMT | SPEED | VOC | CO | NOX | SO2 | NH3 | PM-10 | PM-2.5 |
|---|---|---|---|---|---|---|---|---|---|
| FISHER | 180,216 | 38.4 | 535.4 | 6,673.0 | 1,444.4 | 61.6 | 33.4 | 39.0 | 30.4 |
| FLOYD | 287,396 | 38.3 | 828.4 | 10,129.0 | 2,235.3 | 61.2 | 55.0 | 66.2 | 52.1 |
| FOARD | 88,545 | 38.5 | 269.4 | 3,191.5 | 754.4 | 21.2 | 16.4 | 18.6 | 14.2 |
| FORT BEND | 8,000,492 | 41.2 | 13,436.2 | 220,223.1 | 37,968.0 | 923.5 | 1,660.3 | 936.7 | 643.5 |
| FRANKLIN | 458,877 | 49.2 | 1,105.6 | 16,883.7 | 5,011.4 | 89.5 | 89.1 | 76.8 | 56.6 |
| FREESTONE | 1,548,757 | 50.6 | 3,134.9 | 51,246.4 | 18,163.6 | 329.3 | 293.4 | 296.7 | 225.3 |
| FRIO | 927,706 | 51.7 | 2,453.2 | 41,465.7 | 6,601.7 | 268.4 | 187.7 | 136.8 | 100.2 |
| GAINES | 620,241 | 40.5 | 1,753.5 | 22,298.4 | 4,892.5 | 131.1 | 119.0 | 141.1 | 110.8 |
| GALVESTON | 5,927,264 | 40.8 | 11,790.5 | 176,357.7 | 28,790.9 | 680.6 | 1,227.6 | 691.5 | 474.4 |
| GARZA | 481,559 | 48.0 | 1,289.9 | 18,049.1 | 3,821.3 | 98.8 | 93.5 | 104.4 | 81.5 |
| GILLESPIE | 807,984 | 41.8 | 1,964.2 | 30,090.7 | 3,665.5 | 227.4 | 165.0 | 103.0 | 73.0 |
| GLASSCOCK | 157,577 | 43.3 | 469.6 | 6,476.0 | 1,082.8 | 50.5 | 30.4 | 27.9 | 21.1 |
| GOLIAD | 417,689 | 43.8 | 959.7 | 14,063.8 | 2,726.0 | 78.0 | 80.8 | 77.0 | 58.5 |
| GONZALES | 1,138,589 | 49.4 | 2,437.8 | 37,105.0 | 19,150.1 | 311.1 | 199.0 | 334.6 | 269.4 |
| GRAY | 854,587 | 46.9 | 2,424.6 | 32,795.5 | 10,968.5 | 208.7 | 157.9 | 211.2 | 166.7 |
| GRAYSON | 3,785,704 | 41.8 | 9,499.8 | 132,684.6 | 34,297.3 | 724.6 | 736.6 | 624.1 | 459.2 |
| GREGG | 3,361,692 | 41.7 | 8,129.2 | 109,487.8 | 37,387.5 | 769.6 | 624.7 | 692.1 | 529.3 |
| GRIMES | 903,230 | 43.5 | 1,908.1 | 28,652.1 | 6,755.4 | 174.3 | 174.8 | 155.5 | 116.2 |
| GUADALUPE | 3,143,806 | 44.8 | 8,119.6 | 119,628.8 | 19,531.1 | 468.1 | 640.0 | 427.4 | 305.6 |
| HALE | 1,143,600 | 43.0 | 3,166.5 | 42,755.8 | 12,417.5 | 254.4 | 216.8 | 282.8 | 224.5 |
| HALL | 252,148 | 44.3 | 708.4 | 9,085.7 | 2,527.3 | 64.8 | 45.9 | 56.7 | 43.9 |
| HAMILTON | 337,569 | 43.6 | 934.5 | 13,731.5 | 1,534.7 | 94.4 | 69.1 | 43.4 | 30.8 |
| HANSFORD | 180,437 | 37.1 | 562.9 | 6,424.9 | 1,415.2 | 39.6 | 34.1 | 38.5 | 29.8 |
| HARDEMAN | 373,460 | 46.1 | 1,041.7 | 13,640.8 | 3,850.4 | 97.6 | 67.7 | 85.3 | 66.1 |
| HARDIN | 1,552,470 | 37.6 | 3,530.7 | 49,945.4 | 7,675.8 | 229.9 | 319.0 | 184.0 | 126.5 |

| County | VMT | SPEED | VOC | CO | NOX | SO2 | NH3 | PM-10 | PM-2.5 |
|---|---|---|---|---|---|---|---|---|---|
| HARRIS | 96,539,093 | 38.1 | 164,087.7 | 2,463,970.2 | 464,961.6 | 11,061.5 | 20,057.8 | 11,230.2 | 7,696.9 |
| HARRISON | 2,820,314 | 48.2 | 7,430.8 | 105,819.7 | 33,317.9 | 609.6 | 530.2 | 544.3 | 412.4 |
| HARTLEY | 366,426 | 45.4 | 1,022.1 | 12,963.3 | 4,189.8 | 98.6 | 65.2 | 103.5 | 82.9 |
| HASKELL | 264,820 | 41.8 | 763.6 | 10,169.0 | 2,288.4 | 91.0 | 49.1 | 57.6 | 44.8 |
| HAYS | 4,208,562 | 47.3 | 9,458.8 | 146,855.9 | 22,130.6 | 609.3 | 864.0 | 484.4 | 329.6 |
| HEMPHILL | 164,353 | 43.2 | 469.4 | 5,841.3 | 1,806.4 | 43.0 | 29.5 | 44.8 | 35.7 |
| HIDALGO | 11,606,213 | 38.2 | 35,459.9 | 489,959.8 | 56,133.0 | 3,173.5 | 2,419.2 | 1,485.1 | 1,054.8 |
| HILL | 2,227,786 | 52.3 | 5,003.7 | 81,229.1 | 23,466.5 | 431.1 | 430.7 | 386.2 | 287.9 |
| HOCKLEY | 838,334 | 39.3 | 2,393.2 | 29,695.4 | 6,496.3 | 177.1 | 160.9 | 190.6 | 149.7 |
| HOPKINS | 1,645,389 | 49.1 | 3,945.4 | 60,329.4 | 18,670.4 | 330.4 | 317.2 | 284.1 | 210.6 |
| HOUSTON | 675,561 | 42.1 | 1,502.5 | 21,100.0 | 5,750.3 | 148.8 | 126.1 | 135.4 | 103.5 |
| HOWARD | 1,266,184 | 45.7 | 3,407.0 | 47,820.2 | 21,818.3 | 486.1 | 221.9 | 341.2 | 271.7 |
| HUDSPETH | 977,702 | 62.2 | 3,266.8 | 52,716.0 | 7,958.7 | 272.6 | 199.4 | 143.4 | 104.8 |
| HUTCHINSON | 487,378 | 40.2 | 1,425.2 | 16,801.0 | 5,017.1 | 126.8 | 87.7 | 131.6 | 104.9 |
| IRION | 129,382 | 43.1 | 387.9 | 5,350.6 | 854.3 | 40.8 | 25.2 | 22.1 | 16.6 |
| JACK | 386,039 | 43.4 | 904.7 | 13,921.0 | 2,449.6 | 118.6 | 76.1 | 58.3 | 42.5 |
| JACKSON | 939,138 | 42.4 | 2,193.6 | 30,827.8 | 7,812.1 | 207.7 | 174.1 | 215.6 | 169.2 |
| JASPER | 1,455,433 | 42.9 | 3,180.7 | 47,544.1 | 7,519.3 | 231.2 | 294.6 | 190.0 | 134.0 |
| JEFF DAVIS | 180,140 | 47.8 | 639.0 | 8,889.0 | 1,084.9 | 48.4 | 37.2 | 23.4 | 16.6 |
| JEFFERSON | 7,272,119 | 38.6 | 15,977.9 | 229,385.0 | 59,456.7 | 1,317.9 | 1,438.9 | 1,061.2 | 763.4 |
| JIM HOGG | 181,001 | 39.6 | 550.0 | 7,441.1 | 709.9 | 48.3 | 38.1 | 21.3 | 14.8 |
| JIM WELLS | 1,667,770 | 42.2 | 4,394.3 | 64,596.1 | 11,289.7 | 533.4 | 322.2 | 321.4 | 247.0 |
| JONES | 618,152 | 41.4 | 1,786.8 | 23,678.9 | 5,384.1 | 212.8 | 114.6 | 134.7 | 104.9 |
| KARNES | 491,753 | 40.9 | 1,154.2 | 16,151.5 | 3,012.5 | 89.9 | 95.5 | 88.5 | 66.9 |
| KENDALL | 1,065,766 | 49.7 | 2,841.4 | 47,066.1 | 7,384.4 | 307.3 | 215.9 | 155.7 | 113.8 |

| County | VMT | SPEED | VOC | CO | NOX | SO2 | NH3 | PM-10 | PM-2.5 |
|---|---|---|---|---|---|---|---|---|---|
| KENEDY | 485,418 | 51.2 | 1,360.6 | 22,052.3 | 2,506.9 | 135.9 | 100.4 | 66.1 | 47.6 |
| KENT | 63,546 | 41.3 | 183.7 | 2,405.7 | 539.8 | 21.9 | 11.8 | 13.8 | 10.8 |
| KERR | 1,313,101 | 43.4 | 3,613.2 | 54,130.5 | 7,318.8 | 372.4 | 267.5 | 182.6 | 132.2 |
| KIMBLE | 483,128 | 55.9 | 1,218.1 | 19,272.7 | 10,782.0 | 198.8 | 80.8 | 144.8 | 116.3 |
| KING | 90,526 | 43.9 | 256.9 | 3,292.4 | 920.4 | 23.5 | 16.4 | 20.6 | 16.0 |
| KINNEY | 195,094 | 48.1 | 529.1 | 7,914.8 | 1,527.1 | 65.4 | 36.8 | 40.0 | 30.8 |
| KLEBERG | 1,170,769 | 38.7 | 3,167.8 | 43,750.5 | 7,497.7 | 372.0 | 226.8 | 222.2 | 170.4 |
| KNOX | 178,702 | 40.5 | 535.4 | 6,571.1 | 1,567.0 | 42.6 | 33.2 | 37.3 | 28.6 |
| LA SALLE | 542,724 | 60.0 | 1,451.3 | 25,881.4 | 4,920.2 | 170.3 | 106.2 | 95.2 | 71.8 |
| LAMAR | 1,488,529 | 39.6 | 3,844.3 | 50,860.2 | 9,285.7 | 260.9 | 294.3 | 224.8 | 162.8 |
| LAMB | 600,164 | 40.9 | 1,690.9 | 21,549.5 | 4,680.7 | 126.0 | 115.5 | 135.0 | 105.9 |
| LAMPASAS | 560,661 | 43.5 | 1,734.8 | 24,581.7 | 3,444.4 | 175.3 | 110.1 | 93.2 | 69.7 |
| LAVACA | 637,337 | 38.6 | 1,540.5 | 20,469.2 | 4,887.1 | 136.2 | 119.1 | 140.2 | 109.4 |
| LEE | 748,502 | 44.0 | 1,569.8 | 24,211.5 | 3,098.5 | 107.1 | 153.3 | 88.6 | 61.0 |
| LEON | 1,263,901 | 52.5 | 2,520.9 | 42,641.8 | 14,982.8 | 273.0 | 238.5 | 246.1 | 187.3 |
| LIBERTY | 2,273,707 | 53.1 | 4,670.6 | 75,930.2 | 11,803.2 | 264.3 | 467.9 | 269.5 | 185.9 |
| LIMESTONE | 743,938 | 40.3 | 1,850.9 | 25,274.7 | 3,189.6 | 106.9 | 151.7 | 92.9 | 64.9 |
| LIPSCOMB | 107,408 | 36.5 | 338.4 | 3,856.5 | 818.2 | 23.0 | 20.4 | 22.2 | 17.1 |
| LIVE OAK | 1,395,490 | 54.1 | 3,121.9 | 54,104.1 | 8,928.1 | 228.8 | 279.2 | 215.0 | 157.9 |
| LLANO | 556,530 | 39.9 | 1,366.3 | 20,116.6 | 2,390.2 | 156.9 | 113.4 | 71.8 | 51.1 |
| LOVING | 16,566 | 36.4 | 50.0 | 604.4 | 132.3 | 5.8 | 3.0 | 4.4 | 3.5 |
| LUBBOCK | 5,810,994 | 39.3 | 16,466.4 | 207,821.5 | 53,925.9 | 1,245.0 | 1,115.2 | 1,353.8 | 1,067.0 |
| LYNN | 428,467 | 42.3 | 1,194.5 | 15,659.3 | 3,403.2 | 89.8 | 82.5 | 96.2 | 75.5 |
| MADISON | 827,467 | 52.9 | 1,648.1 | 28,067.4 | 10,103.2 | 178.7 | 156.2 | 161.2 | 122.7 |
| MARION | 412,259 | 42.4 | 1,050.5 | 14,281.2 | 2,901.5 | 78.7 | 80.1 | 100.2 | 79.9 |

| County | VMT | SPEED | VOC | CO | NOX | SO2 | NH3 | PM-10 | PM-2.5 |
|---|---|---|---|---|---|---|---|---|---|
| MARTIN | 438,729 | 48.6 | 1,160.3 | 17,249.3 | 6,567.3 | 163.8 | 78.4 | 139.4 | 114.1 |
| MASON | 208,175 | 42.5 | 504.7 | 7,776.3 | 890.4 | 58.2 | 42.7 | 25.9 | 18.3 |
| MATAGORDA | 969,460 | 38.6 | 2,305.1 | 30,425.0 | 7,477.6 | 208.9 | 180.9 | 215.4 | 168.3 |
| MAVERICK | 788,195 | 41.7 | 2,228.4 | 30,176.5 | 5,778.3 | 264.5 | 148.3 | 163.0 | 126.0 |
| MCCULLOCH | 329,411 | 43.0 | 1,041.2 | 14,188.3 | 2,081.1 | 103.3 | 64.6 | 55.2 | 41.4 |
| MCLENNAN | 6,857,768 | 43.3 | 16,298.7 | 239,545.9 | 57,859.7 | 1,212.1 | 1,351.7 | 1,073.6 | 786.3 |
| MCMULLEN | 145,387 | 41.1 | 410.9 | 5,952.8 | 626.3 | 40.5 | 29.8 | 19.1 | 13.6 |
| MEDINA | 1,356,146 | 44.9 | 3,706.2 | 56,805.6 | 7,289.0 | 382.9 | 276.7 | 186.0 | 134.4 |
| MENARD | 146,413 | 42.3 | 439.3 | 5,944.6 | 998.5 | 46.9 | 28.2 | 26.0 | 19.7 |
| MIDLAND | 2,953,832 | 40.2 | 8,630.9 | 115,800.3 | 33,119.1 | 1,030.8 | 548.2 | 789.9 | 635.8 |
| MILAM | 963,311 | 41.6 | 2,084.5 | 30,132.5 | 6,207.5 | 178.8 | 187.9 | 158.9 | 118.0 |
| MILLS | 257,566 | 44.5 | 794.9 | 11,443.5 | 1,560.9 | 79.9 | 50.8 | 41.9 | 31.3 |
| MITCHELL | 560,078 | 56.4 | 1,365.2 | 21,389.1 | 13,857.8 | 234.1 | 93.3 | 175.7 | 141.6 |
| MONTAGUE | 826,108 | 43.4 | 2,318.2 | 30,877.8 | 6,681.3 | 190.7 | 154.1 | 189.4 | 148.3 |
| MONTGOMERY | 9,607,751 | 48.4 | 17,343.8 | 291,693.9 | 48,956.2 | 1,114.9 | 1,986.2 | 1,133.7 | 780.7 |
| MOORE | 600,312 | 43.2 | 1,716.3 | 21,149.0 | 6,409.1 | 156.1 | 108.1 | 162.0 | 129.1 |
| MORRIS | 560,166 | 46.2 | 1,377.8 | 19,684.0 | 6,203.0 | 123.2 | 105.5 | 169.7 | 138.6 |
| MOTLEY | 85,195 | 38.3 | 260.9 | 3,082.7 | 702.8 | 20.1 | 15.9 | 17.5 | 13.4 |
| NACOGDOCHES | 2,042,337 | 41.0 | 4,583.7 | 62,465.6 | 17,718.6 | 456.4 | 379.9 | 416.1 | 318.9 |
| NAVARRO | 3,759,006 | 52.4 | 7,157.2 | 124,912.1 | 25,875.3 | 597.3 | 761.3 | 473.1 | 327.9 |
| NEWTON | 579,276 | 39.1 | 1,304.2 | 18,333.2 | 2,673.5 | 87.6 | 118.4 | 71.8 | 50.0 |
| NOLAN | 878,398 | 50.4 | 2,256.5 | 33,363.9 | 18,170.3 | 350.9 | 150.5 | 254.5 | 204.0 |
| NUECES | 10,541,719 | 39.1 | 25,420.2 | 364,598.8 | 62,120.7 | 1,787.7 | 2,089.1 | 1,710.5 | 1,270.0 |
| OCHILTREE | 298,532 | 38.1 | 905.1 | 10,426.7 | 2,720.9 | 72.0 | 55.0 | 72.8 | 57.4 |
| OLDHAM | 824,927 | 62.9 | 2,154.6 | 33,963.3 | 13,340.3 | 207.4 | 152.0 | 211.5 | 167.7 |

| County | VMT | SPEED | VOC | CO | NOX | SO2 | NH3 | PM-10 | PM-2.5 |
|---|---|---|---|---|---|---|---|---|---|
| ORANGE | 3,072,658 | 40.2 | 7,132.0 | 102,730.5 | 24,551.2 | 539.7 | 611.0 | 435.2 | 311.3 |
| PALO PINTO | 1,172,529 | 45.4 | 2,751.3 | 44,451.1 | 8,135.5 | 355.1 | 232.9 | 170.8 | 123.6 |
| PANOLA | 1,181,616 | 42.7 | 3,001.7 | 40,914.0 | 8,506.4 | 228.6 | 229.0 | 293.7 | 234.8 |
| PARMER | 491,163 | 42.4 | 1,352.7 | 17,684.6 | 3,930.2 | 103.3 | 94.5 | 110.8 | 86.9 |
| PECOS | 1,011,733 | 51.6 | 2,707.9 | 41,866.4 | 15,932.0 | 378.6 | 181.1 | 324.8 | 266.0 |
| POLK | 1,666,997 | 44.5 | 3,628.8 | 52,286.9 | 14,957.9 | 380.1 | 308.5 | 347.4 | 267.0 |
| POTTER | 3,807,042 | 43.0 | 10,964.0 | 140,790.6 | 47,927.7 | 967.7 | 694.2 | 994.5 | 790.1 |
| PRESIDIO | 205,668 | 42.5 | 755.7 | 9,624.8 | 904.3 | 53.8 | 42.9 | 24.4 | 17.0 |
| RAINS | 339,991 | 42.1 | 866.5 | 11,898.4 | 2,105.5 | 58.4 | 67.5 | 50.3 | 36.2 |
| RANDALL | 2,292,659 | 40.8 | 6,744.2 | 83,421.8 | 26,675.7 | 572.0 | 419.8 | 584.2 | 462.8 |
| REAGAN | 119,534 | 39.3 | 363.5 | 4,689.9 | 863.2 | 39.4 | 22.7 | 22.8 | 17.5 |
| REAL | 100,932 | 40.8 | 304.6 | 4,021.2 | 709.7 | 32.8 | 19.3 | 18.7 | 14.2 |
| RED RIVER | 481,318 | 42.2 | 1,229.4 | 16,958.4 | 2,920.1 | 81.1 | 95.9 | 69.6 | 50.0 |
| REEVES | 870,866 | 54.5 | 2,272.0 | 36,312.5 | 16,033.6 | 338.7 | 152.6 | 307.5 | 253.9 |
| REFUGIO | 881,157 | 46.1 | 1,990.0 | 29,926.7 | 5,976.3 | 168.0 | 169.8 | 166.6 | 127.0 |
| ROBERTS | 91,377 | 38.0 | 282.2 | 3,285.4 | 752.4 | 20.3 | 17.2 | 19.9 | 15.4 |
| ROBERTSON | 795,199 | 43.0 | 1,688.4 | 25,075.7 | 5,302.7 | 151.0 | 154.4 | 134.4 | 100.2 |
| RUNNELS | 405,279 | 43.8 | 1,208.0 | 17,020.3 | 2,785.3 | 128.9 | 78.5 | 70.6 | 53.2 |
| RUSK | 1,547,701 | 41.1 | 4,464.4 | 58,604.1 | 7,377.6 | 228.8 | 314.8 | 189.0 | 130.7 |
| SABINE | 338,460 | 43.3 | 752.5 | 10,657.7 | 2,878.0 | 73.2 | 63.5 | 66.4 | 50.6 |
| SAN AUGUSTINE | 319,877 | 44.5 | 703.3 | 10,101.2 | 2,823.0 | 70.8 | 59.7 | 64.4 | 49.3 |
| SAN JACINTO | 803,568 | 43.7 | 1,762.9 | 25,215.6 | 7,036.4 | 180.3 | 149.3 | 164.5 | 126.1 |
| SAN PATRICIO | 2,486,683 | 45.0 | 5,749.1 | 87,946.2 | 15,337.6 | 431.3 | 490.5 | 415.0 | 309.7 |
| SAN SABA | 183,656 | 40.5 | 586.9 | 7,983.3 | 982.3 | 55.3 | 36.7 | 27.7 | 20.4 |
| SCHLEICHER | 166,145 | 43.5 | 495.1 | 6,927.1 | 1,163.5 | 53.3 | 32.0 | 29.6 | 22.4 |

| County | VMT | SPEED | VOC | CO | NOX | SO2 | NH3 | PM-10 | PM-2.5 |
|---|---|---|---|---|---|---|---|---|---|
| SCURRY | 733,083 | 43.0 | 2,085.9 | 28,241.8 | 6,765.4 | 254.2 | 135.5 | 161.6 | 126.0 |
| SHACKELFORD | 194,946 | 41.3 | 563.1 | 7,396.8 | 1,672.9 | 67.1 | 36.1 | 42.4 | 33.1 |
| SHELBY | 874,616 | 45.5 | 1,904.4 | 27,713.8 | 7,996.6 | 197.4 | 162.3 | 180.2 | 138.3 |
| SHERMAN | 313,215 | 44.0 | 890.9 | 11,186.4 | 3,425.4 | 81.4 | 56.4 | 84.5 | 67.4 |
| SMITH | 6,087,163 | 41.8 | 16,008.5 | 223,450.1 | 37,601.3 | 1,047.0 | 1,207.0 | 894.4 | 645.6 |
| SOMERVELL | 290,612 | 41.5 | 600.6 | 8,675.7 | 1,847.7 | 53.7 | 56.8 | 43.9 | 31.8 |
| STARR | 1,116,022 | 38.0 | 3,404.4 | 45,449.1 | 5,037.8 | 306.6 | 232.4 | 144.6 | 103.0 |
| STEPHENS | 278,412 | 41.8 | 860.7 | 11,458.6 | 1,702.6 | 87.0 | 54.7 | 46.2 | 34.5 |
| STERLING | 162,082 | 48.4 | 473.9 | 7,083.8 | 1,072.0 | 50.3 | 31.8 | 26.4 | 19.7 |
| STONEWALL | 117,852 | 42.6 | 337.0 | 4,494.8 | 1,020.1 | 40.6 | 21.8 | 25.7 | 20.0 |
| SUTTON | 477,549 | 56.9 | 1,200.1 | 19,253.8 | 10,638.1 | 196.0 | 80.1 | 142.4 | 114.3 |
| SWISHER | 447,857 | 47.8 | 1,188.8 | 17,114.1 | 5,595.3 | 102.3 | 84.3 | 115.4 | 92.1 |
| TAYLOR | 3,812,489 | 38.3 | 10,947.2 | 139,230.5 | 54,660.4 | 1,418.3 | 679.7 | 969.9 | 768.2 |
| TERRELL | 118,464 | 47.3 | 339.3 | 5,019.5 | 796.9 | 37.6 | 23.0 | 23.8 | 18.5 |
| TERRY | 544,027 | 42.3 | 1,515.2 | 19,824.5 | 4,269.7 | 113.2 | 105.0 | 120.8 | 94.6 |
| THROCKMORTON | 93,776 | 41.8 | 265.0 | 3,414.5 | 754.3 | 21.3 | 17.6 | 21.0 | 16.4 |
| TITUS | 1,282,397 | 45.1 | 3,163.6 | 44,785.5 | 15,616.2 | 290.0 | 239.7 | 404.7 | 331.9 |
| TOM GREEN | 2,560,141 | 37.2 | 7,816.6 | 99,947.5 | 25,694.3 | 874.1 | 478.3 | 529.1 | 408.9 |
| TRAVIS | 23,662,177 | 34.4 | 54,123.0 | 739,815.5 | 110,014.7 | 3,372.2 | 4,878.7 | 2,679.0 | 1,815.4 |
| TRINITY | 370,744 | 43.9 | 811.7 | 11,621.3 | 3,269.1 | 83.7 | 68.8 | 76.5 | 58.7 |
| TYLER | 675,831 | 42.9 | 1,479.2 | 22,123.4 | 3,431.1 | 106.2 | 137.1 | 87.2 | 61.3 |
| UPSHUR | 1,107,261 | 42.4 | 3,251.9 | 43,292.1 | 5,431.8 | 164.9 | 224.8 | 136.6 | 94.7 |
| UPTON | 162,150 | 40.7 | 481.0 | 6,403.8 | 1,127.6 | 53.3 | 30.8 | 35.8 | 28.2 |
| UVALDE | 882,177 | 41.7 | 2,454.3 | 35,432.2 | 3,918.0 | 246.2 | 180.7 | 116.7 | 83.7 |
| VAL VERDE | 718,684 | 40.4 | 2,092.4 | 27,274.0 | 5,414.4 | 241.1 | 135.2 | 148.5 | 114.9 |

| County | VMT | SPEED | VOC | CO | NOX | SO2 | NH3 | PM-10 | PM-2.5 |
|---|---|---|---|---|---|---|---|---|---|
| VAN ZANDT | 2,474,317 | 48.8 | 5,873.5 | 91,267.6 | 20,576.2 | 432.9 | 489.5 | 371.5 | 269.4 |
| VICTORIA | 2,631,886 | 39.3 | 6,263.4 | 84,161.9 | 22,770.2 | 597.8 | 484.8 | 624.5 | 491.9 |
| WALKER | 2,292,510 | 48.5 | 4,662.9 | 75,632.1 | 26,337.4 | 488.8 | 434.0 | 440.4 | 334.6 |
| WALLER | 1,928,743 | 62.5 | 4,243.0 | 70,526.4 | 11,208.8 | 223.8 | 396.5 | 228.7 | 157.6 |
| WARD | 662,322 | 53.5 | 1,731.8 | 27,293.1 | 12,141.6 | 259.0 | 115.5 | 236.1 | 195.0 |
| WASHINGTON | 1,281,447 | 44.0 | 2,712.9 | 40,558.9 | 9,537.7 | 248.8 | 247.6 | 222.0 | 166.1 |
| WEBB | 3,553,475 | 38.1 | 10,423.7 | 138,360.5 | 26,764.2 | 1,173.2 | 675.0 | 709.8 | 546.4 |
| WHARTON | 1,793,892 | 42.3 | 4,126.8 | 57,577.9 | 15,063.3 | 400.5 | 331.9 | 416.7 | 327.4 |
| WHEELER | 573,313 | 55.0 | 1,285.2 | 17,739.2 | 17,307.5 | 233.4 | 84.8 | 218.7 | 177.7 |
| WICHITA | 2,900,220 | 41.1 | 8,262.7 | 107,669.7 | 24,328.1 | 629.5 | 553.6 | 605.0 | 467.7 |
| WILBARGER | 764,109 | 44.9 | 2,119.9 | 28,320.6 | 5,609.4 | 160.6 | 147.4 | 151.8 | 116.5 |
| WILLACY | 508,718 | 42.4 | 1,505.9 | 21,679.3 | 2,313.4 | 139.2 | 106.1 | 64.9 | 46.0 |
| WILLIAMSON | 7,275,410 | 34.3 | 15,722.8 | 231,084.4 | 33,450.4 | 1,017.3 | 1,506.3 | 804.4 | 541.4 |
| WILSON | 908,526 | 41.9 | 2,362.5 | 32,366.3 | 3,878.0 | 125.2 | 187.3 | 111.0 | 77.4 |
| WINKLER | 181,826 | 40.0 | 541.9 | 7,133.6 | 1,256.7 | 59.7 | 34.6 | 40.1 | 31.5 |
| WISE | 2,542,507 | 41.7 | 5,247.7 | 75,576.4 | 16,025.3 | 469.2 | 497.2 | 382.9 | 277.1 |
| WOOD | 1,039,267 | 39.6 | 2,659.4 | 35,879.9 | 4,494.0 | 149.0 | 212.9 | 122.9 | 84.4 |
| YOAKUM | 309,685 | 38.1 | 893.2 | 10,790.6 | 2,407.4 | 66.5 | 59.0 | 72.2 | 56.9 |
| YOUNG | 475,744 | 40.9 | 1,353.7 | 17,061.4 | 3,674.3 | 106.1 | 89.9 | 103.6 | 80.6 |
| ZAPATA | 406,064 | 46.3 | 1,168.7 | 17,782.9 | 1,992.2 | 112.9 | 84.2 | 54.2 | 38.8 |
| ZAVALA | 333,203 | 42.9 | 933.3 | 12,812.5 | 2,441.9 | 111.8 | 62.7 | 68.6 | 53.0 |

**2002 CERR On-Road Mobile Source Annual VMT, Average Speed, and Emissions (Tons)**

| County | VMT | SPEED | VOC | CO | NOX | $SO_2$ | $NH_3$ | PM-10 | PM-2.5 |
|---|---|---|---|---|---|---|---|---|---|
| ANDERSON | 504,836,267 | 41.4 | 691.8 | 10,924.7 | 1,281.2 | 40.0 | 51.3 | 31.5 | 22.0 |
| ANDREWS | 179,356,430 | 41.0 | 260.6 | 4,152.4 | 662.9 | 25.6 | 17.0 | 19.7 | 15.4 |
| ANGELINA | 855,200,845 | 41.3 | 1,038.7 | 16,283.3 | 3,903.5 | 99.4 | 79.5 | 87.7 | 67.3 |
| ARANSAS | 181,718,494 | 41.9 | 240.1 | 3,564.1 | 601.6 | 17.8 | 17.6 | 16.9 | 12.9 |
| ARCHER | 144,512,560 | 43.3 | 207.1 | 3,253.0 | 588.0 | 15.3 | 13.7 | 15.5 | 12.0 |
| ARMSTRONG | 126,218,883 | 47.7 | 176.2 | 2,855.0 | 792.5 | 16.9 | 11.1 | 18.6 | 14.9 |
| ATASCOSA | 520,758,220 | 48.1 | 688.7 | 11,819.7 | 1,726.5 | 41.6 | 52.8 | 35.8 | 25.7 |
| AUSTIN | 461,365,057 | 48.6 | 546.1 | 9,117.1 | 3,920.4 | 64.2 | 40.4 | 67.1 | 54.0 |
| BAILEY | 107,993,231 | 40.1 | 156.7 | 2,396.9 | 450.3 | 10.9 | 10.3 | 12.4 | 9.7 |
| BANDERA | 148,783,721 | 40.6 | 216.1 | 3,348.4 | 346.3 | 17.5 | 15.2 | 9.6 | 6.9 |
| BASTROP | 710,311,906 | 42.6 | 916.6 | 14,476.4 | 1,521.0 | 51.1 | 73.7 | 37.3 | 25.7 |
| BAYLOR | 70,651,587 | 46.1 | 100.0 | 1,656.8 | 286.0 | 7.2 | 6.8 | 7.2 | 5.6 |
| BEE | 293,497,511 | 40.2 | 393.7 | 5,764.2 | 950.9 | 28.2 | 28.5 | 26.6 | 20.2 |
| BELL | 2,342,398,333 | 43.5 | 3,104.8 | 50,065.6 | 10,383.6 | 218.3 | 230.5 | 185.4 | 136.1 |
| BEXAR | 12,426,242,206 | 28.5 | 19,261.5 | 262,903.3 | 36,951.6 | 973.8 | 1,268.6 | 845.2 | 605.3 |
| BLANCO | 208,628,888 | 44.3 | 259.3 | 4,478.3 | 475.4 | 24.7 | 21.4 | 12.7 | 8.8 |
| BORDEN | 23,580,389 | 41.0 | 34.6 | 534.4 | 103.5 | 3.6 | 2.2 | 2.5 | 2.0 |
| BOSQUE | 196,046,267 | 42.3 | 262.0 | 4,251.7 | 473.2 | 14.9 | 20.0 | 12.3 | 8.6 |
| BOWIE | 1,080,992,037 | 45.3 | 1,433.7 | 23,302.5 | 7,270.0 | 131.3 | 100.1 | 181.1 | 149.4 |
| BRAZORIA | 1,949,907,682 | 45.7 | 2,044.0 | 36,342.7 | 5,194.4 | 127.3 | 201.6 | 115.3 | 79.5 |
| BRAZOS | 1,548,178,014 | 37.5 | 1,894.6 | 28,751.6 | 6,404.7 | 159.1 | 149.1 | 136.9 | 102.8 |
| BREWSTER | 106,177,614 | 39.8 | 199.6 | 2,898.9 | 251.0 | 11.5 | 11.1 | 6.1 | 4.2 |
| BRISCOE | 30,900,794 | 35.9 | 50.0 | 713.7 | 120.8 | 3.2 | 2.9 | 3.0 | 2.2 |

| County | VMT | SPEED | VOC | CO | NOX | $SO_2$ | $NH_3$ | PM-10 | PM-2.5 |
|---|---|---|---|---|---|---|---|---|---|
| BROOKS | 211,544,532 | 46.4 | 321.4 | 5,223.4 | 535.9 | 24.8 | 22.0 | 13.7 | 9.8 |
| BROWN | 338,523,090 | 42.3 | 539.7 | 8,575.8 | 1,129.0 | 45.6 | 33.2 | 27.9 | 20.8 |
| BURLESON | 285,358,100 | 44.3 | 338.1 | 5,578.2 | 1,016.7 | 28.3 | 27.7 | 24.1 | 18.0 |
| BURNET | 491,926,417 | 42.0 | 618.2 | 10,290.9 | 1,117.4 | 58.5 | 50.3 | 30.5 | 21.4 |
| CALDWELL | 350,354,803 | 43.8 | 461.1 | 7,386.9 | 838.3 | 25.6 | 36.2 | 18.8 | 13.0 |
| CALHOUN | 194,925,417 | 40.0 | 257.0 | 3,810.3 | 843.8 | 22.3 | 18.1 | 22.4 | 17.6 |
| CALLAHAN | 314,966,672 | 54.5 | 396.6 | 7,197.3 | 3,627.2 | 58.8 | 26.6 | 47.2 | 37.9 |
| CAMERON | 2,451,068,590 | 38.7 | 3,925.8 | 57,935.4 | 6,119.2 | 282.8 | 255.4 | 154.2 | 108.7 |
| CAMP | 120,992,880 | 41.9 | 167.9 | 2,599.6 | 451.0 | 12.0 | 11.8 | 14.6 | 11.7 |
| CARSON | 286,009,019 | 54.5 | 397.8 | 7,218.5 | 2,095.8 | 34.6 | 26.2 | 36.7 | 29.1 |
| CASS | 415,917,783 | 41.6 | 578.0 | 8,881.4 | 1,541.7 | 41.4 | 40.4 | 50.6 | 40.3 |
| CASTRO | 123,835,792 | 40.3 | 177.1 | 2,774.8 | 509.6 | 12.4 | 11.9 | 14.0 | 11.0 |
| CHAMBERS | 759,598,387 | 68.9 | 799.2 | 16,378.7 | 2,434.0 | 49.3 | 78.7 | 44.6 | 30.7 |
| CHEROKEE | 515,630,898 | 42.3 | 702.9 | 11,322.6 | 1,328.4 | 40.8 | 52.5 | 32.1 | 22.4 |
| CHILDRESS | 137,558,511 | 45.6 | 194.5 | 3,147.9 | 756.2 | 17.7 | 12.4 | 16.0 | 12.4 |
| CLAY | 323,930,873 | 45.7 | 462.9 | 7,360.6 | 1,259.7 | 32.9 | 31.1 | 32.9 | 25.3 |
| COCHRAN | 49,124,343 | 35.2 | 74.4 | 1,027.3 | 203.9 | 5.2 | 4.6 | 6.0 | 4.7 |
| COKE | 72,740,289 | 43.5 | 108.7 | 1,774.9 | 257.0 | 9.9 | 7.1 | 6.2 | 4.6 |
| COLEMAN | 136,216,610 | 42.3 | 218.0 | 3,468.9 | 443.1 | 18.2 | 13.4 | 11.0 | 8.1 |
| COLLINGSWORTH | 50,605,503 | 37.1 | 79.8 | 1,157.7 | 217.1 | 5.6 | 4.7 | 5.1 | 3.9 |
| COLORADO | 553,406,608 | 51.0 | 639.7 | 10,920.7 | 5,271.6 | 80.9 | 47.7 | 85.4 | 69.1 |
| COMAL | 1,189,139,613 | 46.2 | 1,616.5 | 26,708.8 | 3,910.1 | 93.9 | 121.2 | 81.1 | 58.1 |
| COMANCHE | 188,732,761 | 42.5 | 300.8 | 4,756.7 | 589.7 | 24.9 | 18.7 | 14.8 | 11.0 |
| CONCHO | 95,575,953 | 45.9 | 141.3 | 2,401.6 | 336.9 | 12.9 | 9.3 | 7.9 | 5.9 |
| COOKE | 549,541,550 | 48.7 | 767.4 | 13,191.8 | 2,607.5 | 56.9 | 52.4 | 57.3 | 44.2 |

| County | VMT | SPEED | VOC | CO | NOX | $SO_2$ | $NH_3$ | PM-10 | PM-2.5 |
|---|---|---|---|---|---|---|---|---|---|
| CORYELL | 395,976,110 | 34.7 | 576.1 | 8,063.0 | 908.9 | 29.9 | 40.5 | 24.4 | 17.0 |
| COTTLE | 37,608,086 | 40.1 | 57.1 | 839.0 | 180.9 | 4.5 | 3.4 | 4.1 | 3.2 |
| CRANE | 68,677,912 | 44.3 | 98.6 | 1,626.2 | 306.1 | 10.0 | 6.5 | 8.0 | 6.3 |
| CROCKETT | 173,228,084 | 52.1 | 220.4 | 3,898.5 | 1,957.2 | 32.9 | 14.3 | 26.4 | 21.2 |
| CROSBY | 92,759,045 | 40.8 | 134.0 | 2,085.5 | 387.6 | 9.3 | 8.9 | 10.5 | 8.2 |
| CULBERSON | 198,910,527 | 61.2 | 333.1 | 6,395.6 | 822.4 | 23.5 | 20.3 | 14.2 | 10.3 |
| DALLAM | 140,526,162 | 43.7 | 204.5 | 3,170.4 | 804.0 | 17.8 | 12.6 | 19.2 | 15.3 |
| DAWSON | 197,973,328 | 39.1 | 289.7 | 4,375.8 | 810.8 | 19.8 | 19.0 | 22.3 | 17.5 |
| DEAF SMITH | 184,615,147 | 40.3 | 279.2 | 4,164.9 | 992.4 | 22.2 | 16.8 | 23.7 | 18.8 |
| DELTA | 74,556,978 | 43.3 | 101.8 | 1,622.9 | 259.1 | 6.9 | 7.4 | 5.7 | 4.1 |
| DEWITT | 214,888,082 | 39.5 | 285.3 | 4,229.3 | 898.3 | 24.2 | 20.0 | 24.1 | 18.9 |
| DICKENS | 45,122,322 | 40.0 | 69.4 | 1,027.8 | 210.3 | 5.2 | 4.2 | 4.8 | 3.6 |
| DIMMIT | 119,749,377 | 43.7 | 172.7 | 2,674.1 | 464.8 | 17.6 | 11.3 | 12.3 | 9.5 |
| DONLEY | 183,206,250 | 49.7 | 243.6 | 4,079.2 | 1,464.1 | 26.8 | 15.8 | 24.7 | 19.5 |
| DUVAL | 167,145,349 | 41.3 | 250.8 | 3,696.6 | 634.9 | 24.6 | 15.7 | 17.3 | 13.4 |
| EASTLAND | 423,608,194 | 52.8 | 549.2 | 9,656.3 | 4,790.6 | 81.5 | 35.3 | 65.2 | 52.4 |
| ECTOR | 956,130,135 | 39.9 | 1,403.6 | 21,867.8 | 5,142.4 | 143.1 | 89.9 | 119.5 | 95.4 |
| EDWARDS | 34,178,753 | 38.9 | 51.6 | 771.6 | 134.4 | 5.0 | 3.2 | 3.4 | 2.6 |
| EL PASO | 4,745,110,197 | 35.9 | 7,882.6 | 109,058.3 | 12,752.1 | 402.9 | 494.4 | 273.3 | 187.6 |
| ERATH | 428,992,212 | 42.9 | 514.6 | 8,982.9 | 1,435.4 | 56.8 | 42.4 | 31.4 | 22.7 |
| FALLS | 264,415,810 | 45.7 | 343.2 | 5,850.5 | 851.8 | 21.7 | 26.7 | 18.0 | 12.8 |
| FANNIN | 306,321,488 | 41.0 | 426.7 | 6,578.1 | 1,000.6 | 27.6 | 30.4 | 22.6 | 16.3 |
| FAYETTE | 524,064,519 | 47.4 | 633.6 | 10,284.6 | 3,949.9 | 70.3 | 46.5 | 73.0 | 58.5 |
| FISHER | 62,503,124 | 38.4 | 93.8 | 1,388.5 | 262.1 | 9.4 | 5.8 | 6.7 | 5.2 |
| FLOYD | 98,521,276 | 38.3 | 145.1 | 2,146.9 | 402.9 | 10.0 | 9.4 | 11.3 | 8.9 |

| County | VMT | SPEED | VOC | CO | NOX | $SO_2$ | $NH_3$ | PM-10 | PM-2.5 |
|---|---|---|---|---|---|---|---|---|---|
| FOARD | 30,539,495 | 38.5 | 47.7 | 685.3 | 136.7 | 3.5 | 2.8 | 3.2 | 2.4 |
| FORT BEND | 2,711,804,514 | 41.2 | 2,523.6 | 45,994.2 | 6,951.0 | 176.8 | 281.4 | 159.7 | 110.1 |
| FRANKLIN | 160,087,554 | 49.2 | 209.3 | 3,651.6 | 909.5 | 16.3 | 15.5 | 13.4 | 9.9 |
| FREESTONE | 574,149,741 | 50.6 | 631.4 | 11,843.4 | 3,478.0 | 63.4 | 54.4 | 55.1 | 41.9 |
| FRIO | 307,961,176 | 51.7 | 422.2 | 7,810.9 | 1,143.2 | 38.1 | 31.2 | 22.4 | 16.3 |
| GAINES | 212,622,657 | 40.5 | 307.5 | 4,736.2 | 881.7 | 21.3 | 20.4 | 24.1 | 18.9 |
| GALVESTON | 2,009,074,106 | 40.8 | 2,217.0 | 36,851.1 | 5,295.4 | 130.4 | 208.0 | 118.0 | 81.2 |
| GARZA | 165,081,505 | 48.0 | 227.0 | 3,860.1 | 689.2 | 16.1 | 16.0 | 17.9 | 13.9 |
| GILLESPIE | 275,961,148 | 41.8 | 347.3 | 5,820.6 | 663.2 | 33.0 | 28.2 | 17.3 | 12.2 |
| GLASSCOCK | 55,112,643 | 43.3 | 82.1 | 1,331.0 | 199.5 | 7.6 | 5.3 | 4.8 | 3.6 |
| GOLIAD | 133,127,607 | 43.8 | 174.0 | 2,683.1 | 451.9 | 13.0 | 12.9 | 12.3 | 9.3 |
| GONZALES | 408,899,331 | 49.4 | 483.8 | 8,059.4 | 3,503.9 | 57.4 | 35.7 | 60.2 | 48.4 |
| GRAY | 286,082,543 | 46.9 | 417.2 | 7,030.1 | 1,902.7 | 33.5 | 26.4 | 35.3 | 27.8 |
| GRAYSON | 1,320,712,073 | 41.8 | 1,797.5 | 28,679.6 | 6,273.2 | 132.0 | 128.5 | 109.2 | 80.4 |
| GREGG | 1,211,953,141 | 41.7 | 1,588.8 | 24,541.0 | 6,994.7 | 143.4 | 112.6 | 125.0 | 95.6 |
| GRIMES | 334,842,258 | 43.5 | 395.1 | 6,507.6 | 1,308.5 | 33.7 | 32.4 | 28.9 | 21.6 |
| GUADALUPE | 1,048,279,943 | 44.8 | 1,511.5 | 24,293.2 | 3,480.4 | 82.6 | 106.7 | 71.5 | 51.2 |
| HALE | 392,033,818 | 43.0 | 555.1 | 9,051.4 | 2,207.6 | 41.6 | 37.2 | 48.4 | 38.4 |
| HALL | 86,966,421 | 44.3 | 125.7 | 2,012.1 | 455.6 | 10.7 | 7.9 | 9.8 | 7.5 |
| HAMILTON | 121,271,177 | 43.6 | 171.1 | 2,864.3 | 298.3 | 14.4 | 12.4 | 7.7 | 5.4 |
| HANSFORD | 60,403,136 | 37.1 | 96.6 | 1,373.3 | 251.0 | 6.3 | 5.7 | 6.4 | 5.0 |
| HARDEMAN | 128,807,357 | 46.1 | 184.7 | 2,940.8 | 691.2 | 16.2 | 11.7 | 14.7 | 11.4 |
| HARDIN | 522,466,480 | 37.6 | 667.5 | 10,427.6 | 1,387.3 | 41.0 | 53.7 | 31.1 | 21.4 |
| HARRIS | 32,722,381,311 | 38.1 | 30,671.0 | 511,083.1 | 85,032.9 | 2,118.3 | 3,399.3 | 1,915.8 | 1,317.0 |
| HARRISON | 1,016,776,123 | 48.2 | 1,455.5 | 23,756.9 | 6,240.3 | 113.9 | 95.6 | 98.3 | 74.5 |

| County | VMT | SPEED | VOC | CO | NOX | $SO_2$ | $NH_3$ | PM-10 | PM-2.5 |
|---|---|---|---|---|---|---|---|---|---|
| HARTLEY | 122,665,177 | 45.4 | 175.3 | 2,767.9 | 728.1 | 15.9 | 10.9 | 17.3 | 13.8 |
| HASKELL | 91,845,551 | 41.8 | 134.0 | 2,120.9 | 414.2 | 13.9 | 8.5 | 9.9 | 7.7 |
| HAYS | 1,440,247,801 | 47.3 | 1,800.5 | 31,069.4 | 4,088.6 | 110.4 | 147.8 | 83.2 | 56.7 |
| HEMPHILL | 55,019,024 | 43.2 | 80.5 | 1,246.7 | 314.6 | 6.9 | 4.9 | 7.5 | 6.0 |
| HIDALGO | 4,105,467,538 | 38.2 | 6,611.4 | 97,497.4 | 10,414.1 | 473.2 | 427.9 | 257.9 | 181.8 |
| HILL | 800,328,772 | 52.3 | 975.3 | 18,057.3 | 4,382.6 | 80.7 | 77.4 | 69.5 | 51.9 |
| HOCKLEY | 287,386,569 | 39.3 | 419.6 | 6,305.1 | 1,171.5 | 28.8 | 27.6 | 32.6 | 25.6 |
| HOPKINS | 574,024,044 | 49.1 | 746.7 | 13,042.5 | 3,382.7 | 60.0 | 55.3 | 49.7 | 36.8 |
| HOUSTON | 236,463,765 | 42.1 | 293.1 | 4,512.9 | 1,045.8 | 27.0 | 22.1 | 23.7 | 18.2 |
| HOWARD | 439,141,610 | 45.7 | 598.0 | 9,942.9 | 3,861.0 | 76.0 | 38.5 | 58.8 | 46.7 |
| HUDSPETH | 335,869,300 | 62.2 | 563.0 | 10,741.5 | 1,426.6 | 39.8 | 34.2 | 24.3 | 17.6 |
| HUTCHINSON | 163,155,221 | 40.2 | 244.3 | 3,584.4 | 875.7 | 20.4 | 14.7 | 22.0 | 17.5 |
| IRION | 45,251,596 | 43.1 | 67.8 | 1,101.0 | 157.8 | 6.2 | 4.4 | 3.8 | 2.8 |
| JACK | 126,395,169 | 43.4 | 150.5 | 2,638.0 | 420.9 | 16.9 | 12.5 | 9.4 | 6.8 |
| JACKSON | 337,271,061 | 42.4 | 437.0 | 6,719.4 | 1,460.9 | 38.7 | 31.3 | 38.8 | 30.4 |
| JASPER | 486,036,336 | 42.9 | 596.1 | 9,791.7 | 1,343.7 | 40.7 | 49.2 | 31.8 | 22.5 |
| JEFF DAVIS | 61,883,357 | 47.8 | 110.3 | 1,827.1 | 200.3 | 7.0 | 6.4 | 3.9 | 2.8 |
| JEFFERSON | 2,447,350,860 | 38.6 | 3,014.1 | 47,746.4 | 10,431.2 | 232.1 | 242.1 | 179.1 | 129.0 |
| JIM HOGG | 64,025,526 | 39.6 | 102.6 | 1,482.5 | 133.1 | 7.1 | 6.7 | 3.7 | 2.5 |
| JIM WELLS | 531,559,009 | 42.2 | 733.0 | 11,417.1 | 1,851.6 | 74.1 | 51.4 | 50.7 | 38.8 |
| JONES | 214,389,397 | 41.4 | 313.5 | 4,938.3 | 974.1 | 32.5 | 19.9 | 23.1 | 18.0 |
| KARNES | 156,733,733 | 40.9 | 209.3 | 3,080.3 | 500.7 | 15.0 | 15.2 | 14.1 | 10.7 |
| KENDALL | 353,791,662 | 49.7 | 489.0 | 8,865.0 | 1,280.1 | 43.6 | 35.8 | 25.5 | 18.5 |
| KENEDY | 171,706,957 | 51.2 | 253.8 | 4,396.6 | 463.5 | 20.4 | 17.8 | 11.5 | 8.2 |
| KENT | 22,039,055 | 41.3 | 32.2 | 501.9 | 97.7 | 3.3 | 2.0 | 2.4 | 1.8 |

| County | VMT | SPEED | VOC | CO | NOX | $SO_2$ | $NH_3$ | PM-10 | PM-2.5 |
|---|---|---|---|---|---|---|---|---|---|
| KERR | 435,897,086 | 43.4 | 621.7 | 10,196.9 | 1,281.0 | 52.6 | 44.4 | 29.9 | 21.5 |
| KIMBLE | 168,974,589 | 55.9 | 212.3 | 3,912.2 | 1,911.7 | 31.7 | 14.1 | 25.2 | 20.2 |
| KING | 31,222,743 | 43.9 | 45.5 | 709.1 | 165.3 | 3.9 | 2.8 | 3.5 | 2.7 |
| KINNEY | 71,364,211 | 48.1 | 100.1 | 1,657.1 | 289.7 | 10.5 | 6.7 | 7.2 | 5.6 |
| KLEBERG | 373,152,741 | 38.7 | 528.3 | 7,729.1 | 1,231.6 | 51.6 | 36.1 | 35.0 | 26.8 |
| KNOX | 61,634,824 | 40.5 | 94.8 | 1,411.8 | 283.6 | 7.0 | 5.7 | 6.4 | 4.9 |
| LA SALLE | 198,524,946 | 60.0 | 275.2 | 5,427.8 | 931.8 | 27.0 | 19.4 | 17.2 | 12.9 |
| LAMAR | 519,300,457 | 39.6 | 727.6 | 11,001.3 | 1,734.9 | 47.8 | 51.3 | 39.3 | 28.5 |
| LAMB | 205,740,076 | 40.9 | 296.7 | 4,583.0 | 844.1 | 20.5 | 19.8 | 23.1 | 18.1 |
| LAMPASAS | 196,050,217 | 43.5 | 314.1 | 4,881.2 | 635.2 | 26.4 | 19.2 | 16.1 | 12.0 |
| LAVACA | 228,885,569 | 38.6 | 306.9 | 4,457.8 | 917.2 | 25.4 | 21.4 | 25.2 | 19.7 |
| LEE | 255,645,395 | 44.0 | 300.7 | 5,069.9 | 572.7 | 19.4 | 26.2 | 15.2 | 10.5 |
| LEON | 468,548,811 | 52.5 | 521.3 | 9,671.5 | 2,855.2 | 52.5 | 44.2 | 45.7 | 34.8 |
| LIBERTY | 770,683,596 | 53.1 | 879.1 | 15,882.2 | 2,169.9 | 50.6 | 79.3 | 46.0 | 31.8 |
| LIMESTONE | 267,258,596 | 40.3 | 361.4 | 5,638.4 | 631.0 | 20.4 | 27.3 | 16.7 | 11.7 |
| LIPSCOMB | 35,956,064 | 36.5 | 58.1 | 824.2 | 145.5 | 3.7 | 3.4 | 3.7 | 2.8 |
| LIVE OAK | 444,776,559 | 54.1 | 568.0 | 10,361.8 | 1,486.3 | 38.4 | 44.5 | 34.3 | 25.3 |
| LLANO | 190,078,965 | 39.9 | 241.5 | 3,889.7 | 433.5 | 22.8 | 19.4 | 12.1 | 8.5 |
| LOVING | 5,449,381 | 36.4 | 8.2 | 115.2 | 22.6 | 0.8 | 0.5 | 0.7 | 0.6 |
| LUBBOCK | 1,992,047,687 | 39.3 | 2,891.3 | 44,125.7 | 9,645.3 | 202.9 | 191.1 | 231.5 | 182.4 |
| LYNN | 146,881,335 | 42.3 | 209.6 | 3,332.0 | 613.3 | 14.6 | 14.1 | 16.5 | 12.9 |
| MADISON | 306,755,697 | 52.9 | 340.8 | 6,364.8 | 1,923.9 | 34.4 | 28.9 | 29.9 | 22.8 |
| MARION | 141,360,992 | 42.4 | 195.4 | 3,040.2 | 528.0 | 14.1 | 13.7 | 17.2 | 13.7 |
| MARTIN | 144,321,388 | 48.6 | 193.2 | 3,400.6 | 1,105.8 | 24.1 | 12.9 | 22.8 | 18.6 |
| MASON | 71,100,513 | 42.5 | 89.3 | 1,504.9 | 161.7 | 8.4 | 7.3 | 4.4 | 3.1 |

| County | VMT | SPEED | VOC | CO | NOX | $SO_2$ | $NH_3$ | PM-10 | PM-2.5 |
|---|---|---|---|---|---|---|---|---|---|
| MATAGORDA | 348,160,512 | 38.6 | 459.1 | 6,626.2 | 1,402.6 | 39.0 | 32.5 | 38.7 | 30.3 |
| MAVERICK | 288,316,976 | 41.7 | 421.0 | 6,305.6 | 1,098.3 | 42.5 | 27.1 | 29.5 | 22.8 |
| MCCULLOCH | 115,187,513 | 43.0 | 182.8 | 2,930.5 | 386.6 | 15.6 | 11.3 | 9.5 | 7.1 |
| MCLENNAN | 2,463,642,226 | 43.3 | 3,179.0 | 53,292.5 | 10,916.0 | 228.0 | 242.8 | 193.3 | 141.7 |
| MCMULLEN | 48,262,608 | 41.1 | 71.4 | 1,092.4 | 109.4 | 5.7 | 4.9 | 3.1 | 2.2 |
| MEDINA | 450,186,169 | 44.9 | 637.8 | 10,703.0 | 1,278.6 | 54.0 | 45.9 | 30.4 | 21.8 |
| MENARD | 51,208,070 | 42.3 | 76.8 | 1,221.4 | 184.0 | 7.1 | 4.9 | 4.5 | 3.4 |
| MIDLAND | 971,672,797 | 40.2 | 1,415.4 | 22,225.3 | 5,612.4 | 149.5 | 90.2 | 128.9 | 103.6 |
| MILAM | 357,115,206 | 41.6 | 431.7 | 6,861.9 | 1,210.4 | 34.7 | 34.8 | 29.5 | 21.9 |
| MILLS | 90,064,755 | 44.5 | 144.0 | 2,272.9 | 288.2 | 12.0 | 8.9 | 7.2 | 5.4 |
| MITCHELL | 194,247,818 | 56.4 | 239.9 | 4,443.3 | 2,435.5 | 37.2 | 16.2 | 30.3 | 24.4 |
| MONTAGUE | 283,813,844 | 43.4 | 408.0 | 6,237.6 | 1,200.7 | 31.3 | 26.5 | 32.5 | 25.4 |
| MONTGOMERY | 3,256,592,500 | 48.4 | 3,260.9 | 60,968.9 | 8,951.5 | 213.4 | 336.6 | 193.3 | 133.5 |
| MOORE | 200,961,040 | 43.2 | 294.4 | 4,516.4 | 1,117.3 | 25.1 | 18.1 | 27.1 | 21.6 |
| MORRIS | 192,077,352 | 46.2 | 255.8 | 4,173.8 | 1,103.7 | 21.9 | 18.1 | 29.1 | 23.8 |
| MOTLEY | 29,384,047 | 38.3 | 46.2 | 661.8 | 127.6 | 3.3 | 2.7 | 3.0 | 2.3 |
| NACOGDOCHES | 714,870,740 | 41.0 | 870.8 | 13,593.7 | 3,239.1 | 82.7 | 66.5 | 73.0 | 56.0 |
| NAVARRO | 1,266,523,140 | 52.4 | 1,312.3 | 26,356.5 | 4,602.5 | 105.9 | 128.3 | 79.9 | 55.5 |
| NEWTON | 193,446,954 | 39.1 | 244.5 | 3,776.1 | 481.6 | 15.5 | 19.8 | 12.0 | 8.4 |
| NOLAN | 304,648,722 | 50.4 | 396.2 | 6,934.4 | 3,203.3 | 55.3 | 26.1 | 43.9 | 35.1 |
| NUECES | 3,359,903,084 | 39.1 | 4,613.8 | 69,604.7 | 10,365.1 | 299.3 | 332.9 | 273.3 | 203.1 |
| OCHILTREE | 99,936,701 | 38.1 | 155.2 | 2,225.7 | 478.1 | 11.5 | 9.2 | 12.2 | 9.6 |
| OLDHAM | 276,153,561 | 62.9 | 372.1 | 7,308.5 | 2,298.3 | 33.4 | 25.4 | 35.3 | 28.0 |
| ORANGE | 1,034,069,015 | 40.2 | 1,346.5 | 21,417.3 | 4,323.0 | 95.2 | 102.8 | 73.5 | 52.6 |
| PALO PINTO | 383,904,737 | 45.4 | 457.9 | 8,425.2 | 1,393.7 | 50.4 | 38.1 | 27.6 | 19.9 |

| County | VMT | SPEED | VOC | CO | NOX | $SO_2$ | $NH_3$ | PM-10 | PM-2.5 |
|---|---|---|---|---|---|---|---|---|---|
| PANOLA | 405,168,688 | 42.7 | 558.3 | 8,708.5 | 1,545.8 | 40.9 | 39.3 | 50.4 | 40.3 |
| PARMER | 168,373,978 | 42.4 | 237.2 | 3,871.3 | 710.7 | 16.8 | 16.2 | 18.9 | 14.9 |
| PECOS | 332,812,910 | 51.6 | 444.4 | 8,030.5 | 2,675.2 | 55.7 | 29.8 | 53.1 | 43.4 |
| POLK | 583,492,077 | 44.5 | 707.5 | 11,184.8 | 2,714.0 | 68.8 | 54.0 | 60.9 | 46.8 |
| POTTER | 1,274,449,179 | 43.0 | 1,884.0 | 30,107.7 | 8,312.3 | 155.7 | 116.2 | 166.1 | 131.9 |
| PRESIDIO | 70,653,007 | 42.5 | 130.4 | 1,981.0 | 171.2 | 7.7 | 7.4 | 4.1 | 2.8 |
| RAINS | 118,612,179 | 42.1 | 164.1 | 2,575.7 | 393.8 | 10.7 | 11.8 | 8.8 | 6.3 |
| RANDALL | 767,492,935 | 40.8 | 1,158.1 | 17,824.3 | 4,639.7 | 91.9 | 70.3 | 97.6 | 77.3 |
| REAGAN | 41,807,263 | 39.3 | 63.4 | 960.2 | 158.4 | 6.0 | 4.0 | 4.0 | 3.0 |
| REAL | 35,300,921 | 40.8 | 53.2 | 824.7 | 130.5 | 5.0 | 3.4 | 3.2 | 2.4 |
| RED RIVER | 167,916,634 | 42.2 | 232.8 | 3,671.6 | 547.1 | 14.9 | 16.7 | 12.2 | 8.8 |
| REEVES | 286,474,325 | 54.5 | 372.9 | 6,954.2 | 2,683.3 | 50.3 | 25.1 | 50.3 | 41.5 |
| REFUGIO | 280,846,131 | 46.1 | 360.8 | 5,711.6 | 989.1 | 27.9 | 27.1 | 26.6 | 20.3 |
| ROBERTS | 30,589,463 | 38.0 | 48.4 | 702.2 | 133.1 | 3.2 | 2.9 | 3.3 | 2.6 |
| ROBERTSON | 294,793,182 | 43.0 | 349.6 | 5,697.4 | 1,032.6 | 29.2 | 28.6 | 25.0 | 18.6 |
| RUNNELS | 141,746,648 | 43.8 | 211.2 | 3,499.3 | 513.5 | 19.5 | 13.7 | 12.2 | 9.1 |
| RUSK | 557,975,298 | 41.1 | 876.9 | 13,221.3 | 1,469.3 | 43.7 | 56.7 | 34.2 | 23.7 |
| SABINE | 118,469,890 | 43.3 | 143.1 | 2,321.5 | 526.9 | 13.3 | 11.1 | 11.6 | 8.9 |
| SAN AUGUSTINE | 111,965,085 | 44.5 | 133.7 | 2,200.2 | 515.9 | 12.8 | 10.4 | 11.3 | 8.6 |
| SAN JACINTO | 281,269,732 | 43.7 | 343.8 | 5,394.3 | 1,278.1 | 32.7 | 26.1 | 28.8 | 22.1 |
| SAN PATRICIO | 792,566,502 | 45.0 | 1,044.0 | 16,809.6 | 2,552.8 | 72.1 | 78.2 | 66.3 | 49.5 |
| SAN SABA | 64,220,268 | 40.5 | 106.3 | 1,585.6 | 182.8 | 8.2 | 6.4 | 4.8 | 3.5 |
| SCHLEICHER | 58,109,452 | 43.5 | 86.5 | 1,423.1 | 214.2 | 8.1 | 5.6 | 5.1 | 3.8 |
| SCURRY | 254,250,116 | 43.0 | 366.2 | 5,895.5 | 1,221.1 | 38.8 | 23.5 | 27.8 | 21.6 |
| SHACKELFORD | 67,611,855 | 41.3 | 98.8 | 1,543.6 | 302.8 | 10.2 | 6.3 | 7.3 | 5.7 |

| County | VMT | SPEED | VOC | CO | NOX | $SO_2$ | $NH_3$ | PM-10 | PM-2.5 |
|---|---|---|---|---|---|---|---|---|---|
| SHELBY | 306,138,218 | 45.5 | 361.9 | 6,035.9 | 1,458.9 | 35.8 | 28.4 | 31.6 | 24.3 |
| SHERMAN | 104,852,104 | 44.0 | 152.8 | 2,388.6 | 596.7 | 13.1 | 9.4 | 14.1 | 11.2 |
| SMITH | 2,194,536,375 | 41.8 | 3,138.5 | 50,302.0 | 7,295.6 | 198.0 | 217.6 | 161.7 | 116.8 |
| SOMERVELL | 95,150,824 | 41.5 | 106.8 | 1,771.1 | 320.2 | 9.2 | 9.3 | 7.2 | 5.2 |
| STARR | 394,770,454 | 38.0 | 634.8 | 9,050.7 | 937.1 | 45.8 | 41.1 | 25.1 | 17.8 |
| STEPHENS | 97,354,129 | 41.8 | 153.8 | 2,436.3 | 318.4 | 13.1 | 9.6 | 8.0 | 5.9 |
| STERLING | 56,688,288 | 48.4 | 83.0 | 1,460.6 | 198.3 | 7.6 | 5.6 | 4.6 | 3.4 |
| STONEWALL | 40,873,813 | 42.6 | 59.2 | 938.7 | 184.6 | 6.2 | 3.8 | 4.4 | 3.4 |
| SUTTON | 167,023,297 | 56.9 | 209.2 | 3,910.2 | 1,886.4 | 31.3 | 14.0 | 24.8 | 19.8 |
| SWISHER | 153,528,272 | 47.8 | 208.3 | 3,724.6 | 992.6 | 16.7 | 14.5 | 19.7 | 15.7 |
| TAYLOR | 1,322,258,750 | 38.3 | 1,919.4 | 28,902.6 | 9,715.5 | 220.2 | 117.9 | 166.9 | 131.9 |
| TERRELL | 38,968,979 | 47.3 | 55.7 | 970.4 | 138.2 | 5.3 | 3.8 | 3.9 | 3.0 |
| TERRY | 186,496,036 | 42.3 | 266.1 | 4,222.8 | 770.0 | 18.4 | 18.0 | 20.7 | 16.2 |
| THROCKMORTON | 32,217,171 | 41.8 | 46.6 | 724.7 | 136.0 | 3.5 | 3.0 | 3.6 | 2.8 |
| TITUS | 439,725,924 | 45.1 | 587.0 | 9,479.8 | 2,768.4 | 51.4 | 41.1 | 69.5 | 57.0 |
| TOM GREEN | 895,411,649 | 37.2 | 1,363.5 | 20,416.3 | 4,651.7 | 134.3 | 83.6 | 91.6 | 70.5 |
| TRAVIS | 8,097,634,935 | 34.4 | 10,294.4 | 156,396.0 | 20,486.4 | 611.9 | 834.8 | 460.2 | 312.4 |
| TRINITY | 129,769,884 | 43.9 | 158.3 | 2,486.1 | 593.6 | 15.2 | 12.0 | 13.4 | 10.3 |
| TYLER | 225,691,176 | 42.9 | 277.3 | 4,557.0 | 614.0 | 18.7 | 22.9 | 14.6 | 10.3 |
| UPSHUR | 399,188,357 | 42.4 | 639.0 | 9,776.2 | 1,082.3 | 31.5 | 40.5 | 24.7 | 17.2 |
| UPTON | 53,339,603 | 40.7 | 78.8 | 1,232.2 | 194.8 | 7.6 | 5.1 | 5.8 | 4.6 |
| UVALDE | 292,847,371 | 41.7 | 422.3 | 6,677.2 | 694.7 | 34.6 | 30.0 | 19.1 | 13.6 |
| VAL VERDE | 262,890,091 | 40.4 | 380.9 | 5,941.7 | 1,035.7 | 38.7 | 24.7 | 26.9 | 20.7 |
| VAN ZANDT | 837,981,010 | 48.8 | 1,082.0 | 19,212.1 | 3,668.7 | 76.9 | 82.9 | 63.1 | 45.8 |
| VICTORIA | 945,184,442 | 39.3 | 1,246.4 | 18,311.5 | 4,249.8 | 111.2 | 87.1 | 112.3 | 88.5 |

| County | VMT | SPEED | VOC | CO | NOX | $SO_2$ | $NH_3$ | PM-10 | PM-2.5 |
|---|---|---|---|---|---|---|---|---|---|
| WALKER | 849,871,026 | 48.5 | 964.1 | 17,147.7 | 5,023.1 | 94.1 | 80.4 | 81.8 | 62.2 |
| WALLER | 653,756,366 | 62.5 | 798.9 | 14,750.8 | 2,051.2 | 42.8 | 67.2 | 39.0 | 27.0 |
| WARD | 217,872,891 | 53.5 | 284.0 | 5,222.1 | 2,031.7 | 38.5 | 19.0 | 38.6 | 31.9 |
| WASHINGTON | 475,053,279 | 44.0 | 561.6 | 9,235.6 | 1,846.7 | 48.1 | 45.9 | 41.2 | 30.9 |
| WEBB | 1,299,838,934 | 38.1 | 1,969.1 | 28,874.6 | 5,086.8 | 187.8 | 123.4 | 128.4 | 98.5 |
| WHARTON | 644,237,329 | 42.3 | 821.9 | 12,549.2 | 2,815.1 | 74.6 | 59.6 | 75.0 | 58.9 |
| WHEELER | 197,737,049 | 55.0 | 226.5 | 3,837.7 | 3,018.3 | 39.5 | 14.6 | 37.7 | 30.6 |
| WICHITA | 996,385,979 | 41.1 | 1,456.8 | 22,912.2 | 4,381.6 | 103.0 | 95.1 | 103.7 | 80.1 |
| WILBARGER | 262,513,729 | 44.9 | 374.7 | 6,059.0 | 1,017.4 | 26.2 | 25.3 | 26.0 | 19.9 |
| WILLACY | 179,948,849 | 42.4 | 280.9 | 4,319.6 | 430.3 | 20.8 | 18.8 | 11.3 | 7.9 |
| WILLIAMSON | 2,489,779,945 | 34.3 | 2,990.3 | 48,856.2 | 6,231.9 | 184.9 | 257.7 | 138.2 | 93.2 |
| WILSON | 302,941,547 | 41.9 | 440.1 | 6,580.4 | 710.4 | 22.2 | 31.2 | 18.6 | 13.0 |
| WINKLER | 59,812,134 | 40.0 | 88.8 | 1,372.4 | 217.1 | 8.5 | 5.7 | 6.5 | 5.1 |
| WISE | 832,457,323 | 41.7 | 933.1 | 15,430.7 | 2,778.3 | 80.2 | 81.4 | 62.8 | 45.5 |
| WOOD | 351,970,170 | 39.6 | 490.5 | 7,571.9 | 840.2 | 26.8 | 36.0 | 20.9 | 14.4 |
| YOAKUM | 106,162,194 | 38.1 | 156.4 | 2,284.9 | 433.8 | 10.8 | 10.1 | 12.4 | 9.7 |
| YOUNG | 163,444,370 | 40.9 | 238.4 | 3,626.6 | 663.7 | 17.4 | 15.4 | 17.8 | 13.8 |
| ZAPATA | 143,637,132 | 46.3 | 218.0 | 3,544.4 | 369.1 | 16.9 | 14.9 | 9.4 | 6.7 |
| ZAVALA | 121,883,557 | 42.9 | 176.4 | 2,679.5 | 464.2 | 18.0 | 11.5 | 12.4 | 9.6 |

# APPENDIX C
# EMISSIONS ESTIMATION PROGRAMS

## TTI EMISSIONS ESTIMATION PROGRAMS

The following is a summary of programs developed by TTI that may be used to produce TDM network link-based and HPMS “virtual link”-based, hourly, on-road mobile source emissions estimates for air quality analyses.

For the TDM-based analyses the emissions estimates are made at the TDM network link level (for thousands of links) where geographical coordinates are associated.

For the HPMS-based analyses, emissions estimates are made at the functional classification/area type level which constitutes a 21-cell array defined by seven functional classifications and three area types, or road-type “cells.” These road-type cells may be viewed as a roadway network (analogous to the TDM network, but with larger and fewer links) consisting of up to 21 links (or, with directionality included, 42 links).

Hereafter, for the purpose of this discussion, the term “link” may be used to mean either a TDM network link or an HPMS “virtual link.”

The main emissions estimation programs are: PREPIN (2BW for TDM network analyses and 254HPMS for HPMS analyses), POLFAC62, RATEADJ62, RATEADJV62, IMPSUM62, and SUMALL62. PREPIN prepares activity input, POLFAC62 prepares emissions factor input, the RATEADJ programs make special adjustments to emissions factors when required, IMPSUM62 calculates emissions by time period, and SUMALL62 summarizes emissions at various levels by 24-hour period, performs EI data annualization calculations and summarizes annual EI results, and produces the results in EPA’s National Emissions Inventory Input Format (NIFv3.0).

### PREPIN

The PREPIN2BW program post-processes travel model output to produce time-of-day-specific, on-road vehicle fleet, link VMT and speed estimates for emissions inventory applications. The PREPIN2BW program was developed for use in urban areas that do not have all of the time-of-day assignments and operational speeds available as may be required for air quality analyses of particular temporal scales (e.g., hourly).

For example, PREPIN2BW reads a travel demand model traffic assignment data set from a directional four period time-of-day assignment (another common assignment read by PREPIN2BW is the nondirectional or directional 24-hour assignment). PREPIN2BW initially scales the assignment volumes on each link to the appropriate VMT (i.e., seasonal, day-of-week specific). Time-of-day (e.g., hourly) factors (and directional split factors for a nondirectional assignment) are applied to the adjusted assignment results on each link to estimate the directional time-of-day travel on the link. Speed models, originally developed for the Dallas/Fort Worth Region or optionally the Houston/Galveston Region, are used to estimate the operational time-of-day speeds by direction on the links. Special intrazonal links are defined (as intrazonal links are not a feature of travel demand models), and the VMT and speeds for intrazonal trips are estimated. These VMT and speeds by link are subsequently input to the IMPSUM62 program for the application of MOBILE6 emissions factors.

**PREPIN254HPMS**

The PREPIN254HPMS program processes the Statewide HPMS county AADT VMT, centerline miles, and lane miles by functional classification and area type to produce hourly, on-road vehicle fleet, seasonal and day-of-week-specific, actual or forecast VMT and directional speed estimates for EI applications. These estimated VMT and speeds are produced for 21 HPMS functional classification/area type combinations, or "links." The program was developed for use in areas that do not have TDM networks, and for EI applications where network link-based detail is not required. However, the HPMS link speeds are developed analogous to those produced from network travel model-based input data, except with a much smaller set of "links." The main inputs are:

- TxDOT statewide HPMS data set at the county level which includes AADT VMT, centerline miles, and lane miles by HPMS area type and functional class;
- county-level VMT control totals;
- list of Texas county names;
- hourly VMT distributions; and
- Dallas/Fort Worth speed modeling inputs to include volume/delay equation parameters adapted for HPMS, and freeflow speeds and lane capacities by HPMS functional classification and area type.

The program initially allocates the county control total VMT (VMT adjusted for season, etc.) to the link, proportional HPMS AADT VMT on each link. Hourly factors and directional split factors are applied to the adjusted VMT on each link to estimate the hourly directional VMT (and volumes) by HPMS link. Speed models, originally developed for the Dallas/Fort Worth Region, are used to estimate the hourly operational speeds by direction for each link. The operational speeds are based on v/c derived directional delay (minutes/mile) applied to the estimated freeflow speeds for each link. These HPMS link-VMT and speed estimates are subsequently input to the IMPSUM62 program for the application of MOBILE6 emissions factors.

**POLFAC62**

The POLFAC62 program is used to apply the EPA's MOBILE6 program (October 2002 version with additional pollutant capabilities) to calculate the on-road mobile emissions factors. The MOBILE6 emissions factors may be produced for each of the pollutant-specific emissions types (e.g., depending on the pollutant and vehicle type, the total composite, exhaust running, exhaust start, plus the six sub-component evaporative rates), 28 vehicle types, four MOBILE6 functional classifications (or drive cycles, i.e., Freeway, Arterial/Collector, Local, and Ramp), 14 speeds (i.e., 2.5 mph, and 5 mph through 65 mph at 5 mph increments for Freeway and Arterial functional classifications—MOBILE6 Local and Ramp functional classification rates are single speed only, 12.9 mph, and 34.6 mph, respectively), and each of the 24 hours of the day.

The POLFAC62 emissions factors are average vehicle class rates calculated from the MOBILE6 database output by weighting the by-model-year emissions rates within each vehicle class by its corresponding travel fraction. These emissions factors are tabulated individually by geographical area (county or county group) and analysis day for the evaluation year. These emissions factors are output to an ASCII file for subsequent input to the IMPSUM62 program. The IMPSUM62 program is then used to apply the hourly emissions factors to hourly VMT estimates by link. (POLFAC62 also optionally produces a set of daily emissions factors.) POLFAC62 also calculates the additional pollutant emissions factors provided by the MOBILE6 October 2002 version.

**RATEADJ62**
RATEADJ62 is a special utility program that produces a new set of emissions factors by linearly combining the emissions factors from multiple applications of POLFAC62. There is one set of linear factors. Each factor is applied to all emissions rates in a single data set.

A practical application of the RATEADJ program is the combining of two sets of emissions factors, where each set has different control program credits, into one set including the combined credits. For example, this program may be used to combine different ATP credits from two separate POLFAC62 runs into one set of emissions factors that includes the credits for both ATPs.

**RATEADJV62**
RATEADJV62 is a special utility program that produces a new set of emissions factors by linearly combining the emissions factors from multiple applications of POLFAC62 or RATEADJ62. There is a separate set of factors (that may be different for each pollutant-specific emissions type and vehicle type combination) for each of the input emissions factor data sets.

A practical application of RATEADJV62 is the application of emissions factor credits by individual vehicle class and/or individual pollutant. For example, for analyses requiring the effects of the Texas Low-Emissions Diesel Fuel Program in MOBILE6 emissions factors, RATEADJV62 is used to apply reduction factors to only the NOx emissions factors for diesel-fueled vehicle classes only.

**IMPSUM62**
The IMPSUM62 program applies the emissions factors from POLFAC62 (or from one of the RATEADJ programs, when used) and VMT mixes (fractions of fleet VMT attributable to each vehicle classification in the study) to the time-of-day fleet VMT and speed estimates to calculate emissions by the specified time periods. The five primary inputs to IMPSUM62 are:

- MOBILE6 emissions factors developed with POLFAC62 (or a RATEADJ6, if used);
- link-based hourly VMT and speeds developed using a PREPIN program. For each link, the following information is input to IMPSUM: county number, roadway type number, VMT on link, operational link-speed estimate, and link distance;

- VMT mix by time period, county and roadway type;

- X-Y coordinates (optional for gridded emissions); and

- data records associating the MOBILE6 drive cycle (Freeway, Arterial, Local, Ramp) emissions factors (or percentages thereof) to specific travel model functional classifications. These MOBILE6 drive cycle emissions factor percentages (valid from zero to 100) must sum to 100 percent for each travel model functional classification.

Using these input data, the VMT for each link is stratified by MOBILE6 drive cycle and the 28 vehicle types. The MOBILE6 emissions factors are matched to link VMT by drive cycle, speed, and vehicle type and are interpolated (for the speed that falls between the 14 MOBILE6 speeds, see the MOBILE6 interpolation methodology below) and multiplied by the link VMT to estimate the mobile source emissions for that link. Emissions factors for 65 mph are used for links with speeds greater than 65 mph and emissions factors for 2.5 mph are used for links with speeds lower than 2.5 mph. The emissions for the county and emissions type are reported by both roadway type and vehicle type for each of the subject time periods. A data set is produced for subsequent input to the SUMALL62 program. Also, link emissions may be written by county at the pollutant-specific emissions type sub-component level and 28 vehicle types level.

A tab-delimited output is optionally produced. This output includes all 28 vehicle types (or eight vehicle types in the compressed format) across a single output line. Each field in the output is separated by a tab character.

*Example Emissions Factor Interpolation*
To calculate emissions factors for average operational speeds that fall between two of the 14 MOBILE6 speed bin speeds, MOBILE6 interpolates each emissions factor using a factor developed from the inverse link speed and the inverse high and low bounding speed bin speeds (Section 5.3.4, MOBILE6 User's Guide, January 2002).

Using the MOBILE6 emissions factors tabulated by the 14 speeds, the IMPSUM62 program uses the MOBILE6 method to interpolate emissions factors as shown in the following example. This example interpolates an emissions factor corresponding to an average speed of 41.2 mph.

The interpolated emissions factor ($EF_{Interp}$) is expressed as:

$$EF_{Interp} = EF_{LowSpeed} - FAC_{Interp} \times (EF_{LowSpeed} - EF_{HighSpeed})$$

Where:

$EF_{LowSpeed}$ = emission factor (EF) corresponding to tabulated speed below the average link speed,

$EF_{HighSpeed}$ = EF corresponding to tabulated speed above the average link speed, and

$$FAC_{Interp} = \left(\frac{1}{Speed_{link}} - \frac{1}{Speed_{low}}\right) \bigg/ \left(\frac{1}{Speed_{high}} - \frac{1}{Speed_{low}}\right)$$

Given that:

$EF_{LowSpeed}$ = 0.7413 g/mi,
$EF_{HighSpeed}$ = 0.7274 g/mi,
$Speed_{lnk}$ = 41.2 mph,
$Speed_{low}$ = 40 mph, and
$Speed_{high}$ = 45 mph.

$$FAC_{Interp} = \left(\frac{1}{41.2mph} - \frac{1}{40mph}\right) \bigg/ \left(\frac{1}{45mph} - \frac{1}{40mph}\right) = \frac{-0.00073}{-0.00278} = 0.26214,$$

$$EF_{Interp} = 0.7413 \text{ g/mi} - (0.26214) \times (0.7413 \text{ g/mi} - 0.7274 \text{ g/mi})$$

$$= 0.7377 \text{ g/mi}$$

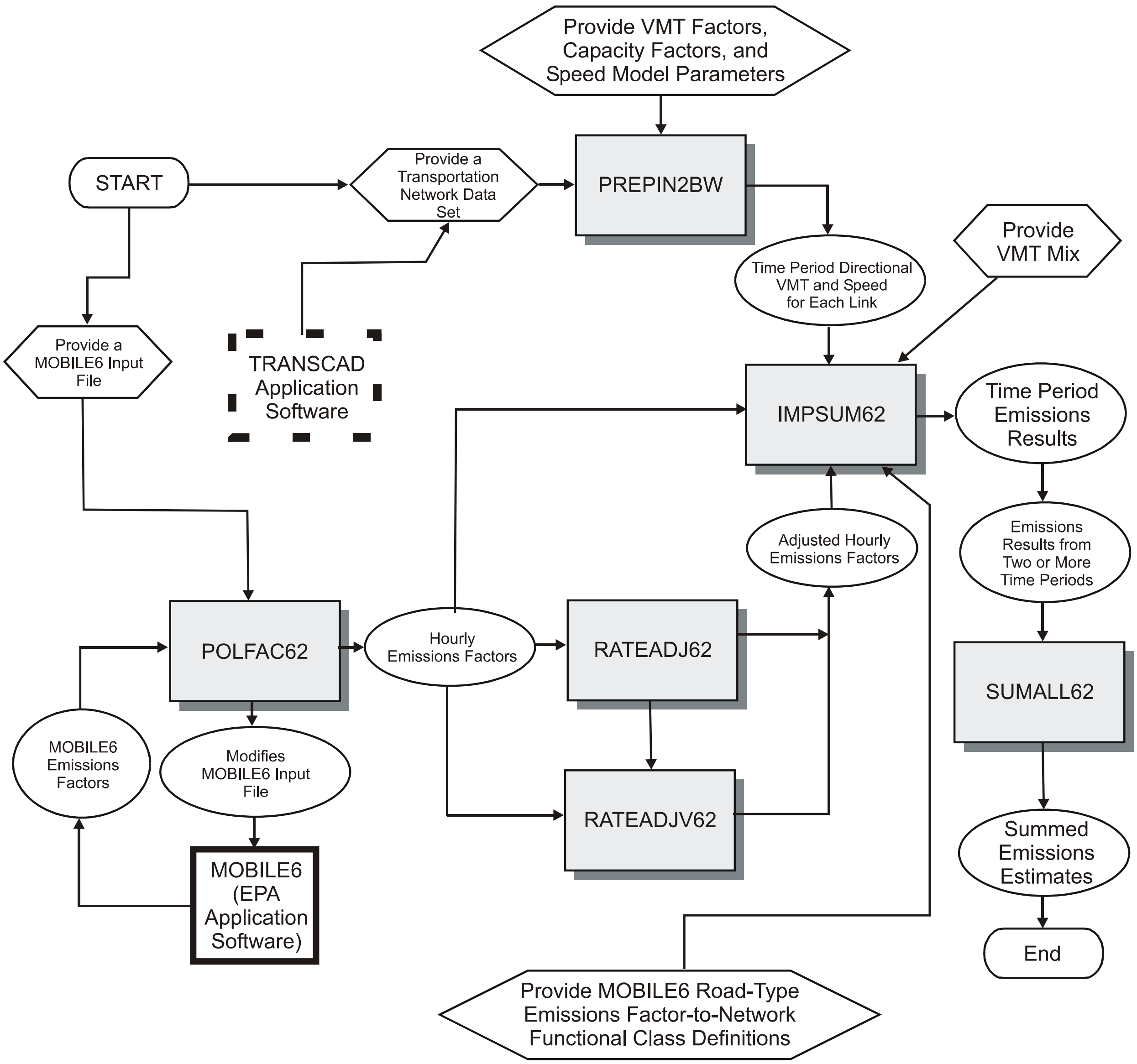
**SUMALL62**
The SUMALL62 program is used to sum the emissions estimates for the time-of-day periods (e.g., 24 periods in the case of hourly analyses) to develop 24-hour emissions estimates, and optionally applies EI annualization factors to the daily results to produce annual EI results . The emissions by pollutant type are reported by roadway type and 28 vehicle types (or optionally condensed to eight vehicle types).

A tab-delimited output is optionally produced. This output includes all 28 vehicle types (or eight vehicle types in the compressed format) across a single output line. Each field in the output is separated by a tab character. An additional output option is EI data formatted to the EPA NEI input format (NIF) specifications.

The overall emissions estimate process flow is shown in the diagram below.

# General Process Flow

## Travel Demand Model Network Link-Based Hourly MOBILE6 Emissions Estimates with Texas Mobile Source Emissions Software



# APPENDIX D
# TXDOT DISTRICTS

## TxDOT District County Key

**Abilene District**
Borden
Callahan
Fisher
Haskell
Howard
Jones
Kent
Mitchell
Nolan
Scurry
Shackelford
Stonewall
Taylor

**Amarillo District**
Armstrong
Carson
Dallam
Deaf Smith
Gray
Hansford
Hartley
Hemphill
Hutchinson
Lipscomb
Moore
Ochiltree
Oldham
Potter
Randall
Roberts
Sherman

**Atlanta District**
Bowie
Camp
Cass
Harrison
Marion
Morris
Panola
Titus
Upshur

**Austin District**
Bastrop
Blanco
Burnet
Caldwell
Gillespie
Hays
Lee
Llano
Mason
Travis
Williamson

**Beaumont District**
Chambers
Hardin
Jasper
Jefferson
Liberty
Newton
Orange
Tyler

**Brownwood District**
Brown
Coleman
Comanche
Eastland
Lampasas
McCulloch
Mills
SanSaba
Stephens

**Bryan District**
Brazos
Burleson
Freestone
Grimes
Leon
Madison
Milam
Robertson
Walker
Washington

**Childress District**
Briscoe
Childress
Collingsworth
Cottle
Dickens
Donley
Foard
Hall
Hardeman
King
Knox
Motley
Wheeler

**Corpus Christi District**
Aransas
Bee
Goliad
Jim Wells
Karnes
Kleberg
Live Oak
Nueces
Refugio
San Patricio

**Dallas District**
Collin
Dallas
Denton
Ellis
Kaufman
Navarro
Rockwall

**El Paso District**
Brewster
Culberson
El Paso
Hudspeth
Jeff Davis
Presidio

**Fort Worth District**
Erath
Hood
Jack
Johnson
Palo Pinto
Parker
Somervell
Tarrant
Wise

**Houston District**
Brazoria
FortBend
Galveston
Harris
Montgomery
Waller

**Laredo District**
Dimmit
Duval
Kinney
La Salle
Maverick
Val Verde
Webb
Zavala

**Lubbock District**
Bailey
Castro
Cochran
Crosby
Dawson
Floyd
Gaines
Garza
Hale
Hockley
Lamb
Lubbock
Lynn
Parmer
Swisher
Terry
Yoakum

**Lufkin District**
Angelina
Houston
Nacogdoches
Polk
Sabine
San Augustine
San Jacinto
Shelby
Trinity

**Odessa District**
Andrews
Crane
Ector
Loving
Martin
Midland
Pecos
Reeves
Terrell
Upton
Ward
Winkler

**Paris District**
Delta
Fannin
Franklin
Grayson
Hopkins
Hunt
Lamar
Rains
RedRiver

**Pharr District**
Brooks
Cameron
Hidalgo
Jim Hogg
Kenedy
Starr
Willacy
Zapata

**San Angelo District**
Coke
Concho
Crockett
Edwards
Glasscock
Irion
Kimble
Menard
Reagan
Real
Runnels
Schleicher
Sterling
Sutton
Tom Green

**San Antonio District**
Atascosa
Bandera
Bexar
Comal
Frio
Guadalupe
Kendall
Kerr
McMullen
Medina
Uvalde
Wilson

**Tyler District**
Anderson
Cherokee
Gregg
Henderson
Rusk
Smith
Van Zandt
Wood

**Waco District**
Bell
Bosque
Coryell
Falls
Hamilton
Hill
Limestone
McLennan

**Wichita Falls District**
Archer
Baylor
Clay
Cooke
Montague
Throckmorton
Wichita
Wilbarger
Young

**Yoakum District**
Austin
Calhoun
Colorado
DeWitt
Fayette
Gonzales
Jackson
Lavaca
Matagorda
Victoria
Wharton

# APPENDIX E
# AADT TO ASWT FACTORS

| County | AADT to ASWT Factor | TxDOT District* |
|---|---|---|
| Anderson | 1.07774 | Tyler District |
| Andrews | 1.10958 | Odessa District |
| Angelina | 1.04278 | Lufkin District |
| Aransas | 1.14519 | Corpus Christi District |
| Archer | 1.06242 | Wichita Falls District |
| Armstrong | 1.09033 | Amarillo District |
| Atascosa | 1.09953 | San Antonio District |
| Austin | 1.01635 | Yoakum District |
| Bailey | 1.06474 | Lubbock District |
| Bandera | 1.09953 | San Antonio District |
| Bastrop* | 1.06657 | Austin EAC Area |
| Baylor | 1.06242 | Wichita Falls District |
| Bee | 1.14519 | Corpus Christi District |
| Bell | 1.01601 | Waco District |
| Bexar* | 1.09464 | San Antonio EAC Area |
| Blanco | 1.06868 | Austin District |
| Borden | 1.05241 | Abilene District |
| Bosque | 1.01601 | Waco District |
| Bowie | 1.06447 | Atlanta District |
| Brazoria* | 1.07684 | HGA Nonattainment Area |
| Brazos | 0.98458 | Bryan District |
| Brewster | 1.06250 | El Paso District |
| Briscoe | 1.05827 | Childress District |
| Brooks | 1.03186 | Pharr District |
| Brown | 1.04382 | Brownwood District |
| Burleson | 0.98458 | Bryan District |
| Burnet | 1.06868 | Austin District |
| Caldwell* | 1.06657 | Austin EAC Area |
| Calhoun | 1.01635 | Yoakum District |

| County | AADT to ASWT Factor | TxDOT District* |
|---|---|---|
| Callahan | 1.05241 | Abilene District |
| Cameron | 1.03186 | Pharr District |
| Camp | 1.06447 | Atlanta District |
| Carson | 1.09033 | Amarillo District |
| Cass | 1.06447 | Atlanta District |
| Castro | 1.06474 | Lubbock District |
| Chambers* | 1.07684 | HGA Nonattainment Area |
| Cherokee | 1.07774 | Tyler District |
| Childress | 1.05827 | Childress District |
| Clay | 1.06242 | Wichita Falls District |
| Cochran | 1.06474 | Lubbock District |
| Coke | 1.04360 | San Angelo District |
| Coleman | 1.04382 | Brownwood District |
| Collin | 1.08331 | Dallas District |
| Collingsworth | 1.05827 | Childress District |
| Colorado | 1.01635 | Yoakum District |
| Comal* | 1.09464 | San Antonio EAC Area |
| Comanche | 1.04382 | Brownwood District |
| Concho | 1.04360 | San Angelo District |
| Cooke | 1.06242 | Wichita Falls District |
| Coryell | 1.01601 | Waco District |
| Cottle | 1.05827 | Childress District |
| Crane | 1.10958 | Odessa District |
| Crockett | 1.04360 | San Angelo District |
| Crosby | 1.06474 | Lubbock District |
| Culberson | 1.06250 | El Paso District |
| Dallam | 1.09033 | Amarillo District |
| Dallas | 1.08331 | Dallas District |
| Dawson | 1.06474 | Lubbock District |

| County | AADT to ASWT Factor | TxDOT District* |
|---|---|---|
| Deaf Smith | 1.09033 | Amarillo District |
| Delta | 1.04624 | Paris District |
| Denton | 1.08331 | Dallas District |
| DeWitt | 1.01635 | Yoakum District |
| Dickens | 1.05827 | Childress District |
| Dimmit | 0.99783 | Laredo District |
| Donley | 1.05827 | Childress District |
| Duval | 0.99783 | Laredo District |
| Eastland | 1.04382 | Brownwood District |
| Ector | 1.10958 | Odessa District |
| Edwards | 1.04360 | San Angelo District |
| Ellis | 1.08331 | Dallas District |
| El Paso* | 1.04607 | El Paso County |
| El Paso CO* | 1.10144 | El Paso County |
| Erath | 1.11479 | Fort Worth District |
| Falls | 1.01601 | Waco District |
| Fannin | 1.04624 | Paris District |
| Fayette | 1.01635 | Yoakum District |
| Fisher | 1.05241 | Abilene District |
| Floyd | 1.06474 | Lubbock District |
| Foard | 1.05827 | Childress District |
| Fort Bend* | 1.07684 | HGA Nonattainment Area |
| Franklin | 1.04624 | Paris District |
| Freestone | 0.98458 | Bryan District |
| Frio | 1.09953 | San Antonio District |
| Gaines | 1.06474 | Lubbock District |
| Galveston* | 1.07684 | HGA Nonattainment Area |
| Garza | 1.06474 | Lubbock District |
| Gillespie | 1.06868 | Austin District |

| County | AADT to ASWT Factor | TxDOT District* |
|---|---|---|
| Glasscock | 1.04360 | San Angelo District |
| Goliad | 1.14519 | Corpus Christi District |
| Gonzales | 1.01635 | Yoakum District |
| Gray | 1.09033 | Amarillo District |
| Grayson | 1.04624 | Paris District |
| Gregg* | 1.01243 | Northeast Texas EAC Area |
| Grimes | 0.98458 | Bryan District |
| Guadalupe* | 1.09464 | San Antonio EAC Area |
| Hale | 1.06474 | Lubbock District |
| Hall | 1.05827 | Childress District |
| Hamilton | 1.01601 | Waco District |
| Hansford | 1.09033 | Amarillo District |
| Hardeman | 1.05827 | Childress District |
| Hardin* | 1.08457 | HGA Nonattainment Area |
| Harris* | 1.07684 | HGA Nonattainment Area |
| Harrison* | 1.01243 | Northeast Texas EAC Area |
| Hartley | 1.09033 | Amarillo District |
| Haskell | 1.05241 | Abilene District |
| Hays* | 1.06657 | Austin EAC Area |
| Hemphill | 1.09033 | Amarillo District |
| Henderson | 1.07774 | Tyler District |
| Hidalgo | 1.03186 | Pharr District |
| Hill | 1.01601 | Waco District |
| Hockley | 1.06474 | Lubbock District |
| Hood | 1.11479 | Fort Worth District |
| Hopkins | 1.04624 | Paris District |
| Houston | 1.04278 | Lufkin District |
| Howard | 1.05241 | Abilene District |
| Hudspeth | 1.06250 | El Paso District |

| County | AADT to ASWT Factor | TxDOT District* |
|---|---|---|
| Hunt | 1.04624 | Paris District |
| Hutchinson | 1.09033 | Amarillo District |
| Irion | 1.04360 | San Angelo District |
| Jack | 1.11479 | Fort Worth District |
| Jackson | 1.01635 | Yoakum District |
| Jasper | 1.09299 | Beaumont District |
| Jeff Davis | 1.0625 | El Paso District |
| Jefferson* | 1.08457 | BPA Nonattainment Area |
| Jim Hogg | 1.03186 | Pharr District |
| Jim Wells | 1.14519 | Corpus Christi District |
| Johnson | 1.11479 | Fort Worth District |
| Jones | 1.05241 | Abilene District |
| Karnes | 1.14519 | Corpus Christi District |
| Kaufman | 1.08331 | Dallas District |
| Kendall | 1.09953 | San Antonio District |
| Kenedy | 1.03186 | Pharr District |
| Kent | 1.05241 | Abilene District |
| Kerr | 1.09953 | San Antonio District |
| Kimble | 1.04360 | San Angelo District |
| King | 1.05827 | Childress District |
| Kinney | 0.99783 | Laredo District |
| Kleberg | 1.14519 | Corpus Christi District |
| Knox | 1.05827 | Childress District |
| Lamar | 1.04624 | Paris District |
| Lamb | 1.06474 | Lubbock District |
| Lampasas | 1.04382 | Brownwood District |
| La Salle | 0.99783 | Laredo District |
| Lavaca | 1.01635 | Yoakum District |
| Lee | 1.06868 | Austin District |

| County | AADT to ASWT Factor | TxDOT District* |
|---|---|---|
| Leon | 0.98458 | Bryan District |
| Liberty* | 1.07684 | HGA Nonattainment Area |
| Limestone | 1.01601 | Waco District |
| Lipscomb | 1.09033 | Amarillo District |
| Live Oak | 1.14519 | Corpus Christi District |
| Llano | 1.06868 | Austin District |
| Loving | 1.10958 | Odessa District |
| Lubbock | 1.06474 | Lubbock District |
| Lynn | 1.06474 | Lubbock District |
| Madison | 0.98458 | Bryan District |
| Marion | 1.06447 | Atlanta District |
| Martin | 1.10958 | Odessa District |
| Mason | 1.06868 | Austin District |
| Matagorda | 1.01635 | Yoakum District |
| Maverick | 0.99783 | Laredo District |
| McCulloch | 1.04382 | Brownwood District |
| McLennan | 1.01601 | Waco District |
| McMullen | 1.09953 | San Antonio District |
| Medina | 1.09953 | San Antonio District |
| Menard | 1.04360 | San Angelo District |
| Midland | 1.10958 | Odessa District |
| Milam | 0.98458 | Bryan District |
| Mills | 1.04382 | Brownwood District |
| Mitchell | 1.05241 | Abilene District |
| Montague | 1.06242 | Wichita Falls District |
| Montgomery* | 1.07684 | HGA Nonattainment Area |
| Moore | 1.09033 | Amarillo District |
| Morris | 1.06447 | Atlanta District |
| Motley | 1.05827 | Childress District |

| County | AADT to ASWT Factor | TxDOT District* |
|---|---|---|
| Nacogdoches | 1.04278 | Lufkin District |
| Navarro | 1.08331 | Dallas District |
| Newton | 1.09299 | Beaumont District |
| Nolan | 1.05241 | Abilene District |
| Nueces | 1.14519 | Corpus Christi District |
| Ochiltree | 1.09033 | Amarillo District |
| Oldham | 1.09033 | Amarillo District |
| Orange* | 1.08457 | BPA Nonattainment Area |
| Palo Pinto | 1.11479 | Fort Worth District |
| Panola | 1.06447 | Atlanta District |
| Parker | 1.11479 | Fort Worth District |
| Parmer | 1.06474 | Lubbock District |
| Pecos | 1.10958 | Odessa District |
| Polk | 1.04278 | Lufkin District |
| Potter | 1.09033 | Amarillo District |
| Presidio | 1.06250 | El Paso District |
| Rains | 1.04624 | Paris District |
| Randall | 1.09033 | Amarillo District |
| Reagan | 1.04360 | San Angelo District |
| Real | 1.04360 | San Angelo District |
| Red River | 1.04624 | Paris District |
| Reeves | 1.10958 | Odessa District |
| Refugio | 1.14519 | Corpus Christi District |
| Roberts | 1.09033 | Amarillo District |
| Robertson | 0.98458 | Bryan District |
| Rockwall | 1.08331 | Dallas District |
| Runnels | 1.04360 | San Angelo District |
| Rusk* | 1.01243 | Northeast Texas EAC Area |
| Sabine | 1.04278 | Lufkin District |

| County | AADT to ASWT Factor | TxDOT District* |
|---|---|---|
| San Augustine | 1.04278 | Lufkin District |
| San Jacinto | 1.04278 | Lufkin District |
| San Patricio | 1.14519 | Corpus Christi District |
| San Saba | 1.04382 | Brownwood District |
| Schleicher | 1.04360 | San Angelo District |
| Scurry | 1.05241 | Abilene District |
| Shackelford | 1.05241 | Abilene District |
| Shelby | 1.04278 | Lufkin District |
| Sherman | 1.09033 | Amarillo District |
| Smith* | 1.01243 | Northeast Texas EAC Area |
| Somervell | 1.11479 | Fort Worth District |
| Starr | 1.03186 | Pharr District |
| Stephens | 1.04382 | Brownwood District |
| Sterling | 1.04360 | San Angelo District |
| Stonewall | 1.05241 | Abilene District |
| Sutton | 1.04360 | San Angelo District |
| Swisher | 1.06474 | Lubbock District |
| Tarrant | 1.11479 | Fort Worth District |
| Taylor | 1.05241 | Abilene District |
| Terrell | 1.10958 | Odessa District |
| Terry | 1.06474 | Lubbock District |
| Throckmorton | 1.06242 | Wichita Falls District |
| Titus | 1.06447 | Atlanta District |
| Tom Green | 1.04360 | SanAngelo District |
| Travis* | 1.06657 | Austin EAC Area |
| Trinity | 1.04278 | Lufkin District |
| Tyler | 1.09299 | Beaumont District |
| Upshur* | 1.01243 | Northeast Texas EAC Area |
| Upton | 1.10958 | Odessa District |

| County | AADT to ASWT Factor | TxDOT District* |
| --- | --- | --- |
| Uvalde | 1.09953 | San Antonio District |
| Val Verde | 0.99783 | Laredo District |
| Van Zandt | 1.07774 | Tyler District |
| Victoria | 1.01635 | Yoakum District |
| Walker | 0.98458 | Bryan District |
| Waller* | 1.07684 | HGA Nonattainment Area |
| Ward | 1.10958 | Odessa District |
| Washington | 0.98458 | Bryan District |
| Webb | 0.99783 | Laredo District |
| Wharton | 1.01635 | Yoakum District |
| Wheeler | 1.05827 | Childress District |
| Wichita | 1.06242 | Wichita Falls District |
| Wilbarger | 1.06242 | Wichita Falls District |
| Willacy | 1.03186 | Pharr District |
| Williamson* | 1.06657 | Austin EAC Area |
| Wilson* | 1.09464 | San Antonio EAC Area |
| Winkler | 1.10958 | Odessa District |
| Wise | 1.11479 | Fort Worth District |
| Wood | 1.07774 | Tyler District |
| Yoakum | 1.06474 | Lubbock District |
| Young | 1.06242 | Wichita Falls District |
| Zapata | 1.03186 | Pharr District |
| Zavala | 0.99783 | Laredo District |

* Note that the HGA, BPA , ELP, AUS, SAN, and TLM (Northeast Texas) AQP area counties use factors based on respective AQP area-county aggregate ATR data (i.e., not the TxDOT District level).
The El Paso CO (winter) season factor is also included.

# APPENDIX F
# 2002 SUMMER WEEKDAY VMT CONTROL TOTALS

| County | Summer Weekday Control Totals* | TxDOT District |
|---|---|---|
| Anderson | 1,490,637 | Tyler District |
| Andrews | 545,234 | Odessa District |
| Angelina | 2,443,250 | Lufkin District |
| Aransas | 570,141 | CorpusChristi District |
| Archer | 420,638 | WichitaFalls District |
| Armstrong | 377,043 | Amarillo District |
| Atascosa | 1,568,739 | SanAntonio District |
| Austin | 1,284,681 | Yoakum District |
| Bailey | 315,027 | Lubbock District |
| Bandera | 448,199 | SanAntonio District |
| Bastrop* | 2,075,610 | Austin EAC Area |
| Baylor | 205,648 | Wichita Falls District |
| Bee | 920,851 | Corpus Christi District |
| Bell | 6,520,276 | Waco District |
| Bexar* | 37,266,469 | San Antonio EAC Area |
| Blanco | 610,842 | Austin District |
| Borden | 67,989 | Abilene District |
| Bosque | 545,712 | Waco District |
| Bowie | 3,152,555 | Atlanta District |
| Brazoria* | 5752709 | HGA Nonattainment Area |
| Brazos | 4,176,177 | Bryan District |
| Brewster | 309,077 | El Paso District |
| Briscoe | 89,592 | Childress District |
| Brooks | 598,039 | Pharr District |
| Brown | 968,101 | Brownwood District |
| Burleson | 769,748 | Bryan District |
| Burnet | 1,440,308 | Austin EAC Area |
| Caldwell* | 1,023,774 | Austin District |
| Calhoun | 542,774 | Yoakum District |

| County | Summer Weekday Control Totals* | TxDOT District |
|---|---|---|
| Callahan | 908,148 | Abilene District |
| Cameron | 6,929,205 | Pharr District |
| Camp | 352,859 | Atlanta District |
| Carson | 854,368 | Amarillo District |
| Cass | 1,212,966 | Atlanta District |
| Castro | 361,240 | Lubbock District |
| Chambers* | 2,241,002 | HGA Nonattainment Area |
| Cherokee | 1,522,509 | Tyler District |
| Childress | 398,831 | Childress District |
| Clay | 942,879 | Wichita Falls District |
| Cochran | 143,301 | Lubbock District |
| Coke | 207,978 | San Angelo District |
| Coleman | 389,550 | Brownwood District |
| Collin | 11,937,135 | Dallas District |
| Collingsworth | 146,724 | Childress District |
| Colorado | 1,540,971 | Yoakum District |
| Comal* | 3,566,247 | San Antonio District |
| Comanche | 539,735 | Brownwood District |
| Concho | 273,268 | San Angelo District |
| Cooke | 1,599,573 | Wichita Falls District |
| Coryell | 1,102,235 | Waco District |
| Cottle | 109,040 | Childress District |
| Crane | 208,776 | Odessa District |
| Crockett | 495,290 | San Angelo District |
| Crosby | 270,588 | Lubbock District |
| Culberson | 579,020 | El Paso District |
| Dallam | 419,781 | Amarillo District |
| Dallas | 64,785,947 | Dallas District |
| Dawson | 577,507 | Lubbock District |

| County | Summer Weekday Control Totals* | TxDOT District |
|---|---|---|
| Deaf Smith | 551,485 | Amarillo District |
| Delta | 213,711 | Paris District |
| Denton | 10,850,679 | Dallas District |
| DeWitt | 598,360 | Yoakum District |
| Dickens | 130,826 | Childress District |
| Dimmit | 327,368 | Laredo District |
| Donley | 531,182 | Childress District |
| Duval | 456,938 | Laredo District |
| Eastland | 1,211,426 | Brownwood District |
| Ector | 2,906,584 | Odessa District |
| Edwards | 97,722 | San Angelo District |
| Ellis | 4,583,987 | Dallas District |
| El Paso* | 13,599,229 | El Paso County |
| El Paso CO* | 14,319,056 | El Paso County |
| Erath | 1,310,236 | Fort Worth District |
| Falls | 736,026 | Waco District |
| Fannin | 878,044 | Paris District |
| Fayette | 1,459,268 | Yoakum District |
| Fisher | 180,216 | Abilene District |
| Floyd | 287,396 | Lubbock District |
| Foard | 88,545 | Childress District |
| Fort Bend* | 8000492 | HGA Nonattainment Area |
| Franklin | 458,877 | Paris District |
| Freestone | 1,548,758 | Bryan District |
| Frio | 927,705 | San Antonio District |
| Gaines | 620,240 | Lubbock District |
| Galveston* | 5927264 | HGA Nonattainment Area |
| Garza | 481,559 | Lubbock District |
| Gillespie | 807,984 | Austin District |

| County | Summer Weekday Control Totals* | TxDOT District |
|---|---|---|
| Glasscock | 157,578 | San Angelo District |
| Goliad | 417,688 | Corpus Christi District |
| Gonzales | 1,138,587 | Yoakum District |
| Gray | 854,588 | Amarillo District |
| Grayson | 3,785,703 | Paris District |
| Gregg* | 3,361,693 | Northeast Texas EAC Area |
| Grimes | 903,230 | Bryan District |
| Guadalupe* | 3,143,804 | San Antonio EAC Area |
| Hale | 1,143,600 | Lubbock District |
| Hall | 252,148 | Childress District |
| Hamilton | 337,570 | Waco District |
| Hansford | 180,436 | Amarillo District |
| Hardeman | 373,460 | Childress District |
| Hardin* | 1552460 | BPA Nonattainment Area |
| Harris* | 96539095 | HGA Nonattainment Area |
| Harrison* | 2,820,314 | Northeast Texas EAC Area |
| Hartley | 366,425 | Amarillo District |
| Haskell | 264,821 | Abilene District |
| Hays* | 4,208,563 | Austin EAC Area |
| Hemphill | 164,353 | Amarillo District |
| Henderson | 2,103,188 | Tyler District |
| Hidalgo | 11,606,213 | Pharr District |
| Hill | 2,227,784 | Waco District |
| Hockley | 838,334 | Lubbock District |
| Hood | 1,146,823 | Fort Worth District |
| Hopkins | 1,645,387 | Paris District |
| Houston | 675,560 | Lufkin District |
| Howard | 1,266,183 | Abilene District |
| Hudspeth | 977,702 | El Paso District |

| County | Summer Weekday Control Totals* | TxDOT District |
|---|---|---|
| Hunt | 2,828,446 | Paris District |
| Hutchinson | 487,378 | Amarillo District |
| Irion | 129,382 | San Angelo District |
| Jack | 386,038 | Fort Worth District |
| Jackson | 939,137 | Yoakum District |
| Jasper | 1,455,432 | Beaumont District |
| Jeff Davis | 180,140 | El Paso District |
| Jefferson* | 7272113 | BPA Nonattainment Area |
| Jim Hogg | 181,001 | Pharr District |
| Jim Wells | 1,667,768 | Corpus Christi District |
| Johnson | 3,665,255 | Fort Worth District |
| Jones | 618,152 | Abilene District |
| Karnes | 491,753 | Corpus Christi District |
| Kaufman | 4,047,905 | Dallas District |
| Kendall | 1,065,765 | San Antonio District |
| Kenedy | 485,418 | Pharr District |
| Kent | 63,546 | Abilene District |
| Kerr | 1,313,102 | San Antonio District |
| Kimble | 483,129 | San Angelo District |
| King | 90,526 | Childress District |
| Kinney | 195,093 | Laredo District |
| Kleberg | 1,170,769 | Corpus Christi District |
| Knox | 178,702 | Childress District |
| Lamar | 1,488,528 | Paris District |
| Lamb | 600,164 | Lubbock District |
| Lampasas | 560,662 | Brownwood District |
| La Salle | 542,724 | Laredo District |
| Lavaca | 637,335 | Yoakum District |
| Lee | 748,502 | Austin District |

| County | Summer Weekday Control Totals* | TxDOT District |
|---|---|---|
| Leon | 1,263,901 | Bryan District |
| Liberty* | 2,273,706 | HGA Nonattainment Area |
| Limestone | 743,938 | Waco District |
| Lipscomb | 107,409 | Amarillo District |
| Live Oak | 1,395,489 | Corpus Christi District |
| Llano | 556,530 | Austin District |
| Loving | 16,565 | Odessa District |
| Lubbock | 5,810,996 | Lubbock District |
| Lynn | 428,467 | Lubbock District |
| Madison | 827,466 | Bryan District |
| Marion | 412,260 | Atlanta District |
| Martin | 438,729 | Odessa District |
| Mason | 208,174 | Austin District |
| Matagorda | 969,459 | Yoakum District |
| Maverick | 788,194 | Laredo District |
| McCulloch | 329,411 | Brownwood District |
| McLennan | 6,857,767 | Waco District |
| McMullen | 145,387 | San Antonio District |
| Medina | 1,356,147 | San Antonio District |
| Menard | 146,413 | San Angelo District |
| Midland | 2,953,831 | Odessa District |
| Milam | 963,313 | Bryan District |
| Mills | 257,565 | Brownwood District |
| Mitchell | 560,078 | Abilene District |
| Montague | 826,109 | Wichita Falls District |
| Montgomery* | 9,607,753 | HGA Nonattainment Area |
| Moore | 600,312 | Amarillo District |
| Morris | 560,166 | Atlanta District |
| Motley | 85,196 | Childress District |

| County | Summer Weekday Control Totals* | TxDOT District |
|---|---|---|
| Nacogdoches | 2,042,335 | Lufkin District |
| Navarro | 3,759,007 | Dallas District |
| Newton | 579,275 | Beaumont District |
| Nolan | 878,398 | Abilene District |
| Nueces | 10,541,718 | CorpusChristi District |
| Ochiltree | 298,531 | Amarillo District |
| Oldham | 824,928 | Amarillo District |
| Orange* | 3,072,655 | BPA Nonattainment Area |
| Palo Pinto | 1,172,528 | Fort Worth District |
| Panola | 1,181,617 | Atlanta District |
| Parker | 3,416,207 | Fort Worth District |
| Parmer | 491,163 | Lubbock District |
| Pecos | 1,011,732 | Odessa District |
| Polk | 1,666,995 | Lufkin District |
| Potter | 3,807,041 | Amarillo District |
| Presidio | 205,668 | El Paso District |
| Rains | 339,990 | Paris District |
| Randall | 2,292,660 | Amarillo District |
| Reagan | 119,533 | San Angelo District |
| Real | 100,932 | San Angelo District |
| Red River | 481,318 | Paris District |
| Reeves | 870,864 | Odessa District |
| Refugio | 881,156 | Corpus Christi District |
| Roberts | 91,377 | Amarillo District |
| Robertson | 795,197 | Bryan District |
| Rockwall | 1,547,554 | Dallas District |
| Runnels | 405,279 | San Angelo District |
| Rusk* | 1547701 | Northeast Texas EAC Area |
| Sabine | 338,460 | Lufkin District |

| County | Summer Weekday Control Totals* | TxDOT District |
|---|---|---|
| San Augustine | 319,877 | Lufkin District |
| San Jacinto | 803,568 | Lufkin District |
| San Patricio | 2,486,681 | CorpusChristi District |
| San Saba | 183,656 | Brownwood District |
| Schleicher | 166,145 | SanAngelo District |
| Scurry | 733,084 | Abilene District |
| Shackelford | 194,946 | Abilene District |
| Shelby | 874,616 | Lufkin District |
| Sherman | 313,214 | Amarillo District |
| Smith* | 6087162 | Northeast Texas EAC Area |
| Somervell | 290,611 | Fort Worth District |
| Starr | 1,116,022 | Pharr District |
| Stephens | 278,413 | Brownwood District |
| Sterling | 162,081 | San Angelo District |
| Stonewall | 117,852 | Abilene District |
| Sutton | 477,549 | San Angelo District |
| Swisher | 447,857 | Lubbock District |
| Tarrant | 42,387,707 | Fort Worth District |
| Taylor | 3,812,487 | Abilene District |
| Terrell | 118,465 | Odessa District |
| Terry | 544,027 | Lubbock District |
| Throckmorton | 93,776 | Wichita Falls District |
| Titus | 1,282,397 | Atlanta District |
| TomGreen | 2,560,141 | San Angelo District |
| Travis* | 23,662,177 | Austin EAC Area |
| Trinity | 370,743 | Lufkin District |
| Tyler | 675,832 | Beaumont District |
| Upshur* | 1,107,261 | Northeast Texas EAC Area |
| Upton | 162,149 | Odessa District |

| County | Summer Weekday Control Totals* | TxDOT District |
|---|---|---|
| Uvalde | 882,177 | San Antonio District |
| Val Verde | 718,684 | Laredo District |
| Van Zandt | 2,474,316 | Tyler District |
| Victoria | 2,631,887 | Yoakum District |
| Walker | 2,292,509 | Bryan District |
| Waller* | 1928743 | HGA Nonattainment Area |
| Ward | 662,321 | Odessa District |
| Washington | 1,281,447 | Bryan District |
| Webb | 3,553,475 | Laredo District |
| Wharton | 1,793,892 | Yoakum District |
| Wheeler | 573,312 | Childress District |
| Wichita | 2,900,221 | Wichita Falls District |
| Wilbarger | 764,110 | Wichita Falls District |
| Willacy | 508,717 | Pharr District |
| Williamson* | 7,275,408 | Austin EAC Area |
| Wilson* | 908,526 | San Antonio EAC Area |
| Winkler | 181,826 | Odessa District |
| Wise | 2,542,507 | Fort Worth District |
| Wood | 1,039,267 | Tyler District |
| Yoakum | 309,686 | Lubbock District |
| Young | 475,744 | Wichita Falls District |
| Zapata | 406,064 | Pharr District |
| Zavala | 333,202 | Laredo District |

* The counties in the HGA, BPA, ELP, AUS, SAN, and TLM (Northeast Texas) AQP areas use VMT adjustment factors based on respective AQP area county aggregate ATR data, as opposed to the TxDOT district-level data.

# APPENDIX G
# TxDOT DISTRICT HOURLY TRAVEL FACTORS

## Summer Weekday Hourly Travel Factors

**Abilene**

| Hour | Travel Factor |
|---|---|
| Hr01 | 0.015583 |
| Hr02 | 0.012857 |
| Hr03 | 0.011250 |
| Hr04 | 0.010785 |
| Hr05 | 0.012110 |
| Hr06 | 0.016754 |
| Hr07 | 0.029522 |
| Hr08 | 0.050532 |
| Hr09 | 0.048628 |
| Hr10 | 0.051993 |
| Hr11 | 0.054812 |
| Hr12 | 0.056828 |
| Hr13 | 0.058224 |
| Hr14 | 0.061358 |
| Hr15 | 0.063501 |
| Hr16 | 0.065706 |
| Hr17 | 0.068797 |
| Hr18 | 0.073756 |
| Hr19 | 0.061336 |
| Hr20 | 0.048090 |
| Hr21 | 0.041384 |
| Hr22 | 0.035403 |
| Hr23 | 0.029029 |
| Hr24 | 0.021762 |
| Total | 1.000000 |

**Amarillo**

| Hour | Travel Factor |
|---|---|
| Hr01 | 0.018047 |
| Hr02 | 0.012933 |
| Hr03 | 0.010924 |
| Hr04 | 0.010265 |
| Hr05 | 0.012687 |
| Hr06 | 0.019658 |
| Hr07 | 0.034141 |
| Hr08 | 0.054802 |
| Hr09 | 0.046053 |
| Hr10 | 0.049417 |
| Hr11 | 0.052174 |
| Hr12 | 0.054859 |
| Hr13 | 0.056314 |
| Hr14 | 0.058898 |
| Hr15 | 0.063907 |
| Hr16 | 0.067103 |
| Hr17 | 0.074315 |
| Hr18 | 0.071080 |
| Hr19 | 0.058981 |
| Hr20 | 0.046349 |
| Hr21 | 0.039370 |
| Hr22 | 0.034617 |
| Hr23 | 0.029054 |
| Hr24 | 0.024051 |
| Total | 1.000000 |

**Atlanta**

| Hour | Travel Factor |
|---|---|
| Hr01 | 0.014454 |
| Hr02 | 0.011858 |
| Hr03 | 0.010633 |
| Hr04 | 0.009800 |
| Hr05 | 0.011122 |
| Hr06 | 0.018506 |
| Hr07 | 0.033908 |
| Hr08 | 0.048229 |
| Hr09 | 0.046831 |
| Hr10 | 0.048905 |
| Hr11 | 0.052787 |
| Hr12 | 0.058247 |
| Hr13 | 0.061808 |
| Hr14 | 0.062006 |
| Hr15 | 0.063058 |
| Hr16 | 0.066654 |
| Hr17 | 0.068679 |
| Hr18 | 0.072840 |
| Hr19 | 0.060574 |
| Hr20 | 0.049632 |
| Hr21 | 0.042579 |
| Hr22 | 0.036591 |
| Hr23 | 0.028596 |
| Hr24 | 0.021699 |
| Total | 1.000000 |

| Austin | | Beaumont | | Brownwood | |
|---|---|---|---|---|---|
| Hour | Travel Factor | Hour | Travel Factor | Hour | Travel Factor |
| Hr01 | 0.012417 | Hr01 | 0.011377 | Hr01 | 0.007385 |
| Hr02 | 0.008563 | Hr02 | 0.008629 | Hr02 | 0.005061 |
| Hr03 | 0.007741 | Hr03 | 0.007575 | Hr03 | 0.004272 |
| Hr04 | 0.005902 | Hr04 | 0.007150 | Hr04 | 0.004460 |
| Hr05 | 0.007013 | Hr05 | 0.011508 | Hr05 | 0.008112 |
| Hr06 | 0.017987 | Hr06 | 0.024560 | Hr06 | 0.019631 |
| Hr07 | 0.050024 | Hr07 | 0.044383 | Hr07 | 0.035262 |
| Hr08 | 0.067369 | Hr08 | 0.058496 | Hr08 | 0.051646 |
| Hr09 | 0.060756 | Hr09 | 0.050099 | Hr09 | 0.051772 |
| Hr10 | 0.052744 | Hr10 | 0.048576 | Hr10 | 0.054458 |
| Hr11 | 0.048805 | Hr11 | 0.051693 | Hr11 | 0.058078 |
| Hr12 | 0.052956 | Hr12 | 0.056358 | Hr12 | 0.060222 |
| Hr13 | 0.055904 | Hr13 | 0.059444 | Hr13 | 0.060940 |
| Hr14 | 0.056528 | Hr14 | 0.060277 | Hr14 | 0.065039 |
| Hr15 | 0.058112 | Hr15 | 0.062441 | Hr15 | 0.068204 |
| Hr16 | 0.063723 | Hr16 | 0.069376 | Hr16 | 0.072087 |
| Hr17 | 0.067133 | Hr17 | 0.074071 | Hr17 | 0.075809 |
| Hr18 | 0.067240 | Hr18 | 0.076837 | Hr18 | 0.079480 |
| Hr19 | 0.062504 | Hr19 | 0.058317 | Hr19 | 0.064533 |
| Hr20 | 0.049850 | Hr20 | 0.045267 | Hr20 | 0.046621 |
| Hr21 | 0.040225 | Hr21 | 0.038205 | Hr21 | 0.038097 |
| Hr22 | 0.036659 | Hr22 | 0.032873 | Hr22 | 0.031112 |
| Hr23 | 0.029022 | Hr23 | 0.024322 | Hr23 | 0.023424 |
| Hr24 | 0.020825 | Hr24 | 0.018171 | Hr24 | 0.014296 |
| Total | 1.000000 | Total | 1.000000 | Total | 1.000000 |

| Bryan | | Childress | | Corpus Christi | |
|---|---|---|---|---|---|
| Hour | Travel Factor | Hour | Travel Factor | Hour | Travel Factor |
| Hr01 | 0.011055 | Hr01 | 0.020406 | Hr01 | 0.008892 |
| Hr02 | 0.008210 | Hr02 | 0.017734 | Hr02 | 0.005517 |
| Hr03 | 0.007212 | Hr03 | 0.015843 | Hr03 | 0.005114 |
| Hr04 | 0.007617 | Hr04 | 0.014226 | Hr04 | 0.003856 |
| Hr05 | 0.009769 | Hr05 | 0.014259 | Hr05 | 0.005717 |
| Hr06 | 0.016826 | Hr06 | 0.016371 | Hr06 | 0.015849 |
| Hr07 | 0.031389 | Hr07 | 0.022059 | Hr07 | 0.041520 |
| Hr08 | 0.055454 | Hr08 | 0.032215 | Hr08 | 0.066992 |
| Hr09 | 0.050778 | Hr09 | 0.042169 | Hr09 | 0.058458 |
| Hr10 | 0.049801 | Hr10 | 0.051768 | Hr10 | 0.048980 |
| Hr11 | 0.053120 | Hr11 | 0.058820 | Hr11 | 0.050492 |
| Hr12 | 0.058903 | Hr12 | 0.062105 | Hr12 | 0.056734 |
| Hr13 | 0.063950 | Hr13 | 0.062051 | Hr13 | 0.060133 |
| Hr14 | 0.064733 | Hr14 | 0.063163 | Hr14 | 0.060734 |
| Hr15 | 0.065077 | Hr15 | 0.065107 | Hr15 | 0.061198 |
| Hr16 | 0.067308 | Hr16 | 0.066359 | Hr16 | 0.067060 |
| Hr17 | 0.070525 | Hr17 | 0.065465 | Hr17 | 0.076572 |
| Hr18 | 0.079254 | Hr18 | 0.062956 | Hr18 | 0.087763 |
| Hr19 | 0.062584 | Hr19 | 0.056035 | Hr19 | 0.062517 |
| Hr20 | 0.049797 | Hr20 | 0.049325 | Hr20 | 0.045775 |
| Hr21 | 0.041441 | Hr21 | 0.043687 | Hr21 | 0.037462 |
| Hr22 | 0.033114 | Hr22 | 0.037895 | Hr22 | 0.032243 |
| Hr23 | 0.025416 | Hr23 | 0.032599 | Hr23 | 0.024124 |
| Hr24 | 0.016665 | Hr24 | 0.027382 | Hr24 | 0.016296 |
| Total | 1.000000 | Total | 1.000000 | Total | 1.000000 |

| Dallas | | El Paso | | Fort Worth | |
|---|---|---|---|---|---|
| Hour | Travel Factor | Hour | Travel Factor | Hour | Travel Factor |
| Hr01 | 0.012033 | Hr01 | 0.010765 | Hr01 | 0.010325 |
| Hr02 | 0.007894 | Hr02 | 0.007194 | Hr02 | 0.006414 |
| Hr03 | 0.006981 | Hr03 | 0.006017 | Hr03 | 0.005739 |
| Hr04 | 0.006357 | Hr04 | 0.004874 | Hr04 | 0.004693 |
| Hr05 | 0.009779 | Hr05 | 0.006929 | Hr05 | 0.006942 |
| Hr06 | 0.027421 | Hr06 | 0.018345 | Hr06 | 0.020552 |
| Hr07 | 0.056471 | Hr07 | 0.043270 | Hr07 | 0.051832 |
| Hr08 | 0.068245 | Hr08 | 0.072074 | Hr08 | 0.069792 |
| Hr09 | 0.059311 | Hr09 | 0.060852 | Hr09 | 0.058806 |
| Hr10 | 0.049384 | Hr10 | 0.050758 | Hr10 | 0.048624 |
| Hr11 | 0.047101 | Hr11 | 0.050982 | Hr11 | 0.048158 |
| Hr12 | 0.049842 | Hr12 | 0.054832 | Hr12 | 0.051634 |
| Hr13 | 0.052267 | Hr13 | 0.057921 | Hr13 | 0.054872 |
| Hr14 | 0.053503 | Hr14 | 0.058931 | Hr14 | 0.055008 |
| Hr15 | 0.057173 | Hr15 | 0.061792 | Hr15 | 0.057289 |
| Hr16 | 0.063155 | Hr16 | 0.068480 | Hr16 | 0.065866 |
| Hr17 | 0.068792 | Hr17 | 0.072930 | Hr17 | 0.075800 |
| Hr18 | 0.071919 | Hr18 | 0.076153 | Hr18 | 0.082994 |
| Hr19 | 0.061544 | Hr19 | 0.057787 | Hr19 | 0.064843 |
| Hr20 | 0.047850 | Hr20 | 0.043812 | Hr20 | 0.045921 |
| Hr21 | 0.038347 | Hr21 | 0.036575 | Hr21 | 0.035364 |
| Hr22 | 0.034797 | Hr22 | 0.033135 | Hr22 | 0.032004 |
| Hr23 | 0.028732 | Hr23 | 0.026942 | Hr23 | 0.027329 |
| Hr24 | 0.021099 | Hr24 | 0.018649 | Hr24 | 0.019198 |
| Total | 1.000000 | Total | 1.000000 | Total | 1.000000 |

| **Houston** | | **Laredo** | | **Lubbock** | |
|---|---|---|---|---|---|
| Hour | Travel Factor | Hour | Travel Factor | Hour | Travel Factor |
| Hr01 | 0.010103 | Hr01 | 0.017683 | Hr01 | 0.009920 |
| Hr02 | 0.006391 | Hr02 | 0.013349 | Hr02 | 0.006410 |
| Hr03 | 0.005739 | Hr03 | 0.011156 | Hr03 | 0.005038 |
| Hr04 | 0.004999 | Hr04 | 0.010069 | Hr04 | 0.004404 |
| Hr05 | 0.008270 | Hr05 | 0.011466 | Hr05 | 0.006000 |
| Hr06 | 0.025620 | Hr06 | 0.016803 | Hr06 | 0.012552 |
| Hr07 | 0.058731 | Hr07 | 0.030484 | Hr07 | 0.031025 |
| Hr08 | 0.071911 | Hr08 | 0.046450 | Hr08 | 0.069486 |
| Hr09 | 0.058893 | Hr09 | 0.049030 | Hr09 | 0.057108 |
| Hr10 | 0.051213 | Hr10 | 0.050404 | Hr10 | 0.053249 |
| Hr11 | 0.050246 | Hr11 | 0.053605 | Hr11 | 0.052650 |
| Hr12 | 0.052397 | Hr12 | 0.056007 | Hr12 | 0.054563 |
| Hr13 | 0.053925 | Hr13 | 0.057136 | Hr13 | 0.056093 |
| Hr14 | 0.054994 | Hr14 | 0.058188 | Hr14 | 0.058904 |
| Hr15 | 0.057798 | Hr15 | 0.059377 | Hr15 | 0.061700 |
| Hr16 | 0.063258 | Hr16 | 0.061697 | Hr16 | 0.065861 |
| Hr17 | 0.069119 | Hr17 | 0.065060 | Hr17 | 0.073518 |
| Hr18 | 0.073691 | Hr18 | 0.067655 | Hr18 | 0.085605 |
| Hr19 | 0.060767 | Hr19 | 0.062457 | Hr19 | 0.067729 |
| Hr20 | 0.046711 | Hr20 | 0.053665 | Hr20 | 0.048679 |
| Hr21 | 0.036720 | Hr21 | 0.047826 | Hr21 | 0.038657 |
| Hr22 | 0.033444 | Hr22 | 0.041987 | Hr22 | 0.035317 |
| Hr23 | 0.026712 | Hr23 | 0.032963 | Hr23 | 0.027749 |
| Hr24 | 0.018351 | Hr24 | 0.025484 | Hr24 | 0.017784 |
| Total | 1.000000 | Total | 1.000000 | Total | 1.000000 |

**Lufkin**

| Hour | Travel Factor |
|---|---|
| Hr01 | 0.010221 |
| Hr02 | 0.007360 |
| Hr03 | 0.006559 |
| Hr04 | 0.007052 |
| Hr05 | 0.010064 |
| Hr06 | 0.018743 |
| Hr07 | 0.035040 |
| Hr08 | 0.060304 |
| Hr09 | 0.051795 |
| Hr10 | 0.053705 |
| Hr11 | 0.056201 |
| Hr12 | 0.059763 |
| Hr13 | 0.062825 |
| Hr14 | 0.064558 |
| Hr15 | 0.066609 |
| Hr16 | 0.070449 |
| Hr17 | 0.072983 |
| Hr18 | 0.077388 |
| Hr19 | 0.057433 |
| Hr20 | 0.043230 |
| Hr21 | 0.036867 |
| Hr22 | 0.031350 |
| Hr23 | 0.023478 |
| Hr24 | 0.016022 |
| Total | 1.000000 |

**Odessa**

| Hour | Travel Factor |
|---|---|
| Hr01 | 0.009795 |
| Hr02 | 0.006878 |
| Hr03 | 0.005735 |
| Hr04 | 0.005319 |
| Hr05 | 0.007367 |
| Hr06 | 0.015455 |
| Hr07 | 0.038552 |
| Hr08 | 0.069820 |
| Hr09 | 0.058516 |
| Hr10 | 0.051843 |
| Hr11 | 0.052141 |
| Hr12 | 0.055370 |
| Hr13 | 0.056596 |
| Hr14 | 0.060628 |
| Hr15 | 0.062165 |
| Hr16 | 0.066158 |
| Hr17 | 0.072966 |
| Hr18 | 0.087539 |
| Hr19 | 0.064403 |
| Hr20 | 0.045694 |
| Hr21 | 0.035371 |
| Hr22 | 0.030860 |
| Hr23 | 0.024166 |
| Hr24 | 0.016663 |
| Total | 1.000000 |

**Paris**

| Hour | Travel Factor |
|---|---|
| Hr01 | 0.015436 |
| Hr02 | 0.012311 |
| Hr03 | 0.010647 |
| Hr04 | 0.011181 |
| Hr05 | 0.014885 |
| Hr06 | 0.021908 |
| Hr07 | 0.035258 |
| Hr08 | 0.048458 |
| Hr09 | 0.048435 |
| Hr10 | 0.052735 |
| Hr11 | 0.057760 |
| Hr12 | 0.058937 |
| Hr13 | 0.059295 |
| Hr14 | 0.061153 |
| Hr15 | 0.063039 |
| Hr16 | 0.065034 |
| Hr17 | 0.067181 |
| Hr18 | 0.068469 |
| Hr19 | 0.057781 |
| Hr20 | 0.046989 |
| Hr21 | 0.039905 |
| Hr22 | 0.033811 |
| Hr23 | 0.027744 |
| Hr24 | 0.021650 |
| Total | 1.000000 |

| Hour | Pharr Travel Factor | Hour | San Angelo Travel Factor | Hour | San Antonio Travel Factor |
|---|---|---|---|---|---|
| Hr01 | 0.011174 | Hr01 | 0.015993 | Hr01 | 0.010625 |
| Hr02 | 0.006658 | Hr02 | 0.012456 | Hr02 | 0.006578 |
| Hr03 | 0.005465 | Hr03 | 0.010281 | Hr03 | 0.005811 |
| Hr04 | 0.004333 | Hr04 | 0.009447 | Hr04 | 0.004513 |
| Hr05 | 0.005716 | Hr05 | 0.010281 | Hr05 | 0.006368 |
| Hr06 | 0.011932 | Hr06 | 0.014826 | Hr06 | 0.015814 |
| Hr07 | 0.030528 | Hr07 | 0.026241 | Hr07 | 0.047650 |
| Hr08 | 0.056046 | Hr08 | 0.048242 | Hr08 | 0.073897 |
| Hr09 | 0.053502 | Hr09 | 0.048925 | Hr09 | 0.060416 |
| Hr10 | 0.052008 | Hr10 | 0.052564 | Hr10 | 0.048685 |
| Hr11 | 0.054365 | Hr11 | 0.056258 | Hr11 | 0.048679 |
| Hr12 | 0.058933 | Hr12 | 0.059839 | Hr12 | 0.053288 |
| Hr13 | 0.062273 | Hr13 | 0.060408 | Hr13 | 0.055659 |
| Hr14 | 0.062864 | Hr14 | 0.063296 | Hr14 | 0.056856 |
| Hr15 | 0.063795 | Hr15 | 0.064783 | Hr15 | 0.059270 |
| Hr16 | 0.068239 | Hr16 | 0.066012 | Hr16 | 0.065463 |
| Hr17 | 0.073198 | Hr17 | 0.068944 | Hr17 | 0.073629 |
| Hr18 | 0.078708 | Hr18 | 0.071363 | Hr18 | 0.078004 |
| Hr19 | 0.063915 | Hr19 | 0.060251 | Hr19 | 0.062177 |
| Hr20 | 0.050842 | Hr20 | 0.049381 | Hr20 | 0.046416 |
| Hr21 | 0.042202 | Hr21 | 0.042375 | Hr21 | 0.038291 |
| Hr22 | 0.036071 | Hr22 | 0.035965 | Hr22 | 0.034787 |
| Hr23 | 0.027568 | Hr23 | 0.029247 | Hr23 | 0.027360 |
| Hr24 | 0.019665 | Hr24 | 0.022619 | Hr24 | 0.019762 |
| Total | 1.000000 | Total | 1.000000 | Total | 1.000000 |

| Tyler | | Waco | | Wichita Falls | |
|---|---|---|---|---|---|
| Hour | Travel Factor | Hour | Travel Factor | Hour | Travel Factor |
| Hr01 | 0.008674 | Hr01 | 0.016333 | Hr01 | 0.009782 |
| Hr02 | 0.005325 | Hr02 | 0.012837 | Hr02 | 0.007303 |
| Hr03 | 0.004538 | Hr03 | 0.011008 | Hr03 | 0.006643 |
| Hr04 | 0.004858 | Hr04 | 0.010777 | Hr04 | 0.005966 |
| Hr05 | 0.008092 | Hr05 | 0.012415 | Hr05 | 0.007394 |
| Hr06 | 0.019887 | Hr06 | 0.019374 | Hr06 | 0.015037 |
| Hr07 | 0.044489 | Hr07 | 0.032967 | Hr07 | 0.033311 |
| Hr08 | 0.067784 | Hr08 | 0.049648 | Hr08 | 0.051567 |
| Hr09 | 0.054707 | Hr09 | 0.045729 | Hr09 | 0.051926 |
| Hr10 | 0.049617 | Hr10 | 0.047325 | Hr10 | 0.056004 |
| Hr11 | 0.051208 | Hr11 | 0.051825 | Hr11 | 0.059388 |
| Hr12 | 0.051426 | Hr12 | 0.055930 | Hr12 | 0.060309 |
| Hr13 | 0.055225 | Hr13 | 0.058147 | Hr13 | 0.062214 |
| Hr14 | 0.056291 | Hr14 | 0.060650 | Hr14 | 0.065223 |
| Hr15 | 0.060632 | Hr15 | 0.064110 | Hr15 | 0.066679 |
| Hr16 | 0.068141 | Hr16 | 0.066441 | Hr16 | 0.071593 |
| Hr17 | 0.076301 | Hr17 | 0.068856 | Hr17 | 0.073822 |
| Hr18 | 0.085139 | Hr18 | 0.071115 | Hr18 | 0.076211 |
| Hr19 | 0.065436 | Hr19 | 0.059040 | Hr19 | 0.062169 |
| Hr20 | 0.048782 | Hr20 | 0.050430 | Hr20 | 0.047074 |
| Hr21 | 0.040725 | Hr21 | 0.044290 | Hr21 | 0.038253 |
| Hr22 | 0.033008 | Hr22 | 0.037594 | Hr22 | 0.031667 |
| Hr23 | 0.023577 | Hr23 | 0.030048 | Hr23 | 0.024029 |
| Hr24 | 0.016136 | Hr24 | 0.023110 | Hr24 | 0.016437 |
| Total | 1.000000 | Total | 1.000000 | Total | 1.000000 |

**Yoakum**

| Hour | Travel Factor |
|---|---|
| Hr01 | 0.014212 |
| Hr02 | 0.011097 |
| Hr03 | 0.009886 |
| Hr04 | 0.010078 |
| Hr05 | 0.012483 |
| Hr06 | 0.018592 |
| Hr07 | 0.032175 |
| Hr08 | 0.048235 |
| Hr09 | 0.047311 |
| Hr10 | 0.049856 |
| Hr11 | 0.055289 |
| Hr12 | 0.058790 |
| Hr13 | 0.060139 |
| Hr14 | 0.061633 |
| Hr15 | 0.064023 |
| Hr16 | 0.066402 |
| Hr17 | 0.068934 |
| Hr18 | 0.072172 |
| Hr19 | 0.059808 |
| Hr20 | 0.049718 |
| Hr21 | 0.044652 |
| Hr22 | 0.036347 |
| Hr23 | 0.027876 |
| Hr24 | 0.020293 |
| Total | 1.000000 |

## Winter Weekday Hourly Travel Factors

| Abilene | | Amarillo | | Atlanta | |
|---|---|---|---|---|---|
| Hour | Travel Factor | Hour | Travel Factor | Hour | Travel Factor |
| Hr01 | 0.013357 | Hr01 | 0.016385 | Hr01 | 0.013500 |
| Hr02 | 0.011344 | Hr02 | 0.011993 | Hr02 | 0.011381 |
| Hr03 | 0.010298 | Hr03 | 0.010336 | Hr03 | 0.010487 |
| Hr04 | 0.010194 | Hr04 | 0.010088 | Hr04 | 0.009785 |
| Hr05 | 0.011759 | Hr05 | 0.012859 | Hr05 | 0.011086 |
| Hr06 | 0.016151 | Hr06 | 0.020142 | Hr06 | 0.017841 |
| Hr07 | 0.028019 | Hr07 | 0.035895 | Hr07 | 0.033144 |
| Hr08 | 0.051552 | Hr08 | 0.059887 | Hr08 | 0.050200 |
| Hr09 | 0.048500 | Hr09 | 0.047213 | Hr09 | 0.048549 |
| Hr10 | 0.051907 | Hr10 | 0.049154 | Hr10 | 0.048504 |
| Hr11 | 0.055394 | Hr11 | 0.052201 | Hr11 | 0.052371 |
| Hr12 | 0.057517 | Hr12 | 0.054547 | Hr12 | 0.058439 |
| Hr13 | 0.059699 | Hr13 | 0.056134 | Hr13 | 0.062490 |
| Hr14 | 0.062928 | Hr14 | 0.058039 | Hr14 | 0.062788 |
| Hr15 | 0.066159 | Hr15 | 0.063981 | Hr15 | 0.064799 |
| Hr16 | 0.070337 | Hr16 | 0.068335 | Hr16 | 0.070019 |
| Hr17 | 0.074201 | Hr17 | 0.078183 | Hr17 | 0.071055 |
| Hr18 | 0.077854 | Hr18 | 0.075313 | Hr18 | 0.075201 |
| Hr19 | 0.061695 | Hr19 | 0.057872 | Hr19 | 0.061146 |
| Hr20 | 0.045012 | Hr20 | 0.042956 | Hr20 | 0.047267 |
| Hr21 | 0.037701 | Hr21 | 0.036675 | Hr21 | 0.039341 |
| Hr22 | 0.032845 | Hr22 | 0.032930 | Hr22 | 0.033804 |
| Hr23 | 0.026444 | Hr23 | 0.026884 | Hr23 | 0.026685 |
| Hr24 | 0.019131 | Hr24 | 0.021999 | Hr24 | 0.020118 |
| Total | 1.000000 | Total | 1.000000 | Total | 1.000000 |

| Austin | | Beaumont | | Brownwood | |
|---|---|---|---|---|---|
| Hour | Travel Factor | Hour | Travel Factor | Hour | Travel Factor |
| Hr01 | 0.011504 | Hr01 | 0.010156 | Hr01 | 0.006082 |
| Hr02 | 0.008259 | Hr02 | 0.008065 | Hr02 | 0.004386 |
| Hr03 | 0.007501 | Hr03 | 0.007178 | Hr03 | 0.003954 |
| Hr04 | 0.005691 | Hr04 | 0.006871 | Hr04 | 0.004082 |
| Hr05 | 0.006905 | Hr05 | 0.011594 | Hr05 | 0.007324 |
| Hr06 | 0.017743 | Hr06 | 0.024858 | Hr06 | 0.018247 |
| Hr07 | 0.049944 | Hr07 | 0.044752 | Hr07 | 0.034370 |
| Hr08 | 0.066962 | Hr08 | 0.060933 | Hr08 | 0.053090 |
| Hr09 | 0.060919 | Hr09 | 0.052354 | Hr09 | 0.051982 |
| Hr10 | 0.051811 | Hr10 | 0.049117 | Hr10 | 0.054207 |
| Hr11 | 0.049171 | Hr11 | 0.052460 | Hr11 | 0.059646 |
| Hr12 | 0.053337 | Hr12 | 0.056739 | Hr12 | 0.061811 |
| Hr13 | 0.056494 | Hr13 | 0.059960 | Hr13 | 0.063512 |
| Hr14 | 0.057812 | Hr14 | 0.061310 | Hr14 | 0.067843 |
| Hr15 | 0.060342 | Hr15 | 0.063269 | Hr15 | 0.071139 |
| Hr16 | 0.066636 | Hr16 | 0.071449 | Hr16 | 0.076412 |
| Hr17 | 0.070018 | Hr17 | 0.076372 | Hr17 | 0.081695 |
| Hr18 | 0.069470 | Hr18 | 0.079346 | Hr18 | 0.081718 |
| Hr19 | 0.064132 | Hr19 | 0.058848 | Hr19 | 0.063218 |
| Hr20 | 0.048620 | Hr20 | 0.042313 | Hr20 | 0.042342 |
| Hr21 | 0.037139 | Hr21 | 0.034286 | Hr21 | 0.033363 |
| Hr22 | 0.033661 | Hr22 | 0.029727 | Hr22 | 0.027359 |
| Hr23 | 0.026885 | Hr23 | 0.021904 | Hr23 | 0.020546 |
| Hr24 | 0.019043 | Hr24 | 0.016140 | Hr24 | 0.011673 |
| Total | 1.000000 | Total | 1.000000 | Total | 1.000000 |

| Bryan | | Childress | | Corpus Christi | |
|---|---|---|---|---|---|
| Hour | Travel Factor | Hour | Travel Factor | Hour | Travel Factor |
| Hr01 | 0.009544 | Hr01 | 0.020193 | Hr01 | 0.007256 |
| Hr02 | 0.007418 | Hr02 | 0.017528 | Hr02 | 0.004704 |
| Hr03 | 0.006768 | Hr03 | 0.015810 | Hr03 | 0.004491 |
| Hr04 | 0.007356 | Hr04 | 0.014868 | Hr04 | 0.003439 |
| Hr05 | 0.009705 | Hr05 | 0.014889 | Hr05 | 0.005444 |
| Hr06 | 0.016279 | Hr06 | 0.017024 | Hr06 | 0.016610 |
| Hr07 | 0.030527 | Hr07 | 0.021983 | Hr07 | 0.044285 |
| Hr08 | 0.058859 | Hr08 | 0.032947 | Hr08 | 0.072099 |
| Hr09 | 0.050405 | Hr09 | 0.042745 | Hr09 | 0.062475 |
| Hr10 | 0.048344 | Hr10 | 0.051017 | Hr10 | 0.051829 |
| Hr11 | 0.052602 | Hr11 | 0.057098 | Hr11 | 0.053045 |
| Hr12 | 0.058406 | Hr12 | 0.061028 | Hr12 | 0.057913 |
| Hr13 | 0.062791 | Hr13 | 0.062225 | Hr13 | 0.060876 |
| Hr14 | 0.064672 | Hr14 | 0.064258 | Hr14 | 0.061139 |
| Hr15 | 0.067167 | Hr15 | 0.066767 | Hr15 | 0.061908 |
| Hr16 | 0.072135 | Hr16 | 0.069037 | Hr16 | 0.068012 |
| Hr17 | 0.075655 | Hr17 | 0.068455 | Hr17 | 0.079193 |
| Hr18 | 0.082356 | Hr18 | 0.064195 | Hr18 | 0.091303 |
| Hr19 | 0.063782 | Hr19 | 0.054744 | Hr19 | 0.062783 |
| Hr20 | 0.047769 | Hr20 | 0.046079 | Hr20 | 0.040843 |
| Hr21 | 0.038406 | Hr21 | 0.041663 | Hr21 | 0.030570 |
| Hr22 | 0.031050 | Hr22 | 0.037109 | Hr22 | 0.026570 |
| Hr23 | 0.023139 | Hr23 | 0.032132 | Hr23 | 0.020024 |
| Hr24 | 0.014863 | Hr24 | 0.026207 | Hr24 | 0.013186 |
| Total | 1.000000 | Total | 1.000000 | Total | 1.000000 |

| Dallas | | El Paso | | Fort Worth | |
|---|---|---|---|---|---|
| Hour | Travel Factor | Hour | Travel Factor | Hour | Travel Factor |
| Hr01 | 0.010722 | Hr01 | 0.009241 | Hr01 | 0.009004 |
| Hr02 | 0.007377 | Hr02 | 0.006387 | Hr02 | 0.005919 |
| Hr03 | 0.006735 | Hr03 | 0.005445 | Hr03 | 0.005425 |
| Hr04 | 0.006175 | Hr04 | 0.004407 | Hr04 | 0.004530 |
| Hr05 | 0.009525 | Hr05 | 0.006083 | Hr05 | 0.006535 |
| Hr06 | 0.026118 | Hr06 | 0.016254 | Hr06 | 0.019243 |
| Hr07 | 0.054923 | Hr07 | 0.041678 | Hr07 | 0.050524 |
| Hr08 | 0.068675 | Hr08 | 0.075828 | Hr08 | 0.072182 |
| Hr09 | 0.060837 | Hr09 | 0.066412 | Hr09 | 0.061043 |
| Hr10 | 0.049612 | Hr10 | 0.051312 | Hr10 | 0.049025 |
| Hr11 | 0.047569 | Hr11 | 0.051413 | Hr11 | 0.048486 |
| Hr12 | 0.050512 | Hr12 | 0.056058 | Hr12 | 0.053136 |
| Hr13 | 0.053269 | Hr13 | 0.058648 | Hr13 | 0.056446 |
| Hr14 | 0.054732 | Hr14 | 0.059898 | Hr14 | 0.056928 |
| Hr15 | 0.058991 | Hr15 | 0.062399 | Hr15 | 0.059961 |
| Hr16 | 0.066110 | Hr16 | 0.072030 | Hr16 | 0.069392 |
| Hr17 | 0.072366 | Hr17 | 0.076147 | Hr17 | 0.079572 |
| Hr18 | 0.074480 | Hr18 | 0.077532 | Hr18 | 0.086064 |
| Hr19 | 0.062907 | Hr19 | 0.058352 | Hr19 | 0.065228 |
| Hr20 | 0.046603 | Hr20 | 0.041796 | Hr20 | 0.042992 |
| Hr21 | 0.035379 | Hr21 | 0.032846 | Hr21 | 0.031971 |
| Hr22 | 0.031662 | Hr22 | 0.030159 | Hr22 | 0.028038 |
| Hr23 | 0.026349 | Hr23 | 0.023684 | Hr23 | 0.022676 |
| Hr24 | 0.018373 | Hr24 | 0.015989 | Hr24 | 0.015681 |
| Total | 1.000000 | Total | 1.000000 | Total | 1.000000 |

**Houston**

| Hour | Travel Factor |
|---|---|
| Hr01 | 0.009062 |
| Hr02 | 0.006001 |
| Hr03 | 0.005465 |
| Hr04 | 0.004898 |
| Hr05 | 0.008240 |
| Hr06 | 0.026093 |
| Hr07 | 0.059938 |
| Hr08 | 0.073940 |
| Hr09 | 0.059818 |
| Hr10 | 0.050784 |
| Hr11 | 0.049828 |
| Hr12 | 0.052311 |
| Hr13 | 0.054255 |
| Hr14 | 0.055543 |
| Hr15 | 0.059068 |
| Hr16 | 0.066120 |
| Hr17 | 0.072181 |
| Hr18 | 0.076782 |
| Hr19 | 0.061788 |
| Hr20 | 0.044828 |
| Hr21 | 0.032930 |
| Hr22 | 0.029574 |
| Hr23 | 0.023931 |
| Hr24 | 0.016622 |
| Total | 1.000000 |

**Laredo**

| Hour | Travel Factor |
|---|---|
| Hr01 | 0.015260 |
| Hr02 | 0.011826 |
| Hr03 | 0.010491 |
| Hr04 | 0.009569 |
| Hr05 | 0.011053 |
| Hr06 | 0.017116 |
| Hr07 | 0.031702 |
| Hr08 | 0.049137 |
| Hr09 | 0.048812 |
| Hr10 | 0.050396 |
| Hr11 | 0.055236 |
| Hr12 | 0.058501 |
| Hr13 | 0.059918 |
| Hr14 | 0.060653 |
| Hr15 | 0.062552 |
| Hr16 | 0.065759 |
| Hr17 | 0.069926 |
| Hr18 | 0.073356 |
| Hr19 | 0.063548 |
| Hr20 | 0.049938 |
| Hr21 | 0.040616 |
| Hr22 | 0.034488 |
| Hr23 | 0.028007 |
| Hr24 | 0.022138 |
| Total | 1.000000 |

**Lubbock**

| Hour | Travel Factor |
|---|---|
| Hr01 | 0.008130 |
| Hr02 | 0.005384 |
| Hr03 | 0.004606 |
| Hr04 | 0.004253 |
| Hr05 | 0.005812 |
| Hr06 | 0.011910 |
| Hr07 | 0.028166 |
| Hr08 | 0.072838 |
| Hr09 | 0.058842 |
| Hr10 | 0.052678 |
| Hr11 | 0.053084 |
| Hr12 | 0.053843 |
| Hr13 | 0.057063 |
| Hr14 | 0.058406 |
| Hr15 | 0.063664 |
| Hr16 | 0.069960 |
| Hr17 | 0.078641 |
| Hr18 | 0.089762 |
| Hr19 | 0.069335 |
| Hr20 | 0.045642 |
| Hr21 | 0.035116 |
| Hr22 | 0.032521 |
| Hr23 | 0.025120 |
| Hr24 | 0.015224 |
| Total | 1.000000 |

| Lufkin | | Odessa | | Paris | |
|---|---|---|---|---|---|
| Hour | Travel Factor | Hour | Travel Factor | Hour | Travel Factor |
| Hr01 | 0.009094 | Hr01 | 0.008591 | Hr01 | 0.014393 |
| Hr02 | 0.006841 | Hr02 | 0.006311 | Hr02 | 0.012047 |
| Hr03 | 0.006310 | Hr03 | 0.005532 | Hr03 | 0.010846 |
| Hr04 | 0.006783 | Hr04 | 0.005245 | Hr04 | 0.011509 |
| Hr05 | 0.009768 | Hr05 | 0.007218 | Hr05 | 0.015454 |
| Hr06 | 0.017611 | Hr06 | 0.015266 | Hr06 | 0.022010 |
| Hr07 | 0.033912 | Hr07 | 0.037660 | Hr07 | 0.034062 |
| Hr08 | 0.063532 | Hr08 | 0.071502 | Hr08 | 0.049949 |
| Hr09 | 0.052634 | Hr09 | 0.059540 | Hr09 | 0.048443 |
| Hr10 | 0.052843 | Hr10 | 0.053052 | Hr10 | 0.052876 |
| Hr11 | 0.056668 | Hr11 | 0.053225 | Hr11 | 0.058339 |
| Hr12 | 0.060206 | Hr12 | 0.056695 | Hr12 | 0.059816 |
| Hr13 | 0.063893 | Hr13 | 0.057846 | Hr13 | 0.060715 |
| Hr14 | 0.065654 | Hr14 | 0.061668 | Hr14 | 0.062906 |
| Hr15 | 0.068766 | Hr15 | 0.063534 | Hr15 | 0.064183 |
| Hr16 | 0.075923 | Hr16 | 0.067524 | Hr16 | 0.068006 |
| Hr17 | 0.077667 | Hr17 | 0.075684 | Hr17 | 0.070684 |
| Hr18 | 0.079019 | Hr18 | 0.090443 | Hr18 | 0.070928 |
| Hr19 | 0.057029 | Hr19 | 0.064880 | Hr19 | 0.056517 |
| Hr20 | 0.039781 | Hr20 | 0.042577 | Hr20 | 0.043432 |
| Hr21 | 0.033019 | Hr21 | 0.031904 | Hr21 | 0.036308 |
| Hr22 | 0.028126 | Hr22 | 0.027808 | Hr22 | 0.031711 |
| Hr23 | 0.020855 | Hr23 | 0.021830 | Hr23 | 0.025336 |
| Hr24 | 0.014068 | Hr24 | 0.014466 | Hr24 | 0.019531 |
| Total | 1.000000 | Total | 1.000000 | Total | 1.000000 |

| **Pharr** | | **San Angelo** | | **San Antonio** | |
|---|---|---|---|---|---|
| Hour | Travel Factor | Hour | Travel Factor | Hour | Travel Factor |
| Hr01 | 0.008308 | Hr01 | 0.013721 | Hr01 | 0.009497 |
| Hr02 | 0.005292 | Hr02 | 0.011040 | Hr02 | 0.006138 |
| Hr03 | 0.004447 | Hr03 | 0.009353 | Hr03 | 0.005510 |
| Hr04 | 0.003847 | Hr04 | 0.008762 | Hr04 | 0.004318 |
| Hr05 | 0.005550 | Hr05 | 0.009990 | Hr05 | 0.006136 |
| Hr06 | 0.012205 | Hr06 | 0.014432 | Hr06 | 0.015306 |
| Hr07 | 0.030403 | Hr07 | 0.025559 | Hr07 | 0.046949 |
| Hr08 | 0.061141 | Hr08 | 0.049301 | Hr08 | 0.073954 |
| Hr09 | 0.056511 | Hr09 | 0.050046 | Hr09 | 0.060821 |
| Hr10 | 0.055312 | Hr10 | 0.054342 | Hr10 | 0.048544 |
| Hr11 | 0.058642 | Hr11 | 0.058941 | Hr11 | 0.048637 |
| Hr12 | 0.061902 | Hr12 | 0.062427 | Hr12 | 0.053490 |
| Hr13 | 0.063933 | Hr13 | 0.062849 | Hr13 | 0.056075 |
| Hr14 | 0.065115 | Hr14 | 0.065302 | Hr14 | 0.057716 |
| Hr15 | 0.066685 | Hr15 | 0.067684 | Hr15 | 0.060953 |
| Hr16 | 0.072371 | Hr16 | 0.069968 | Hr16 | 0.068330 |
| Hr17 | 0.078265 | Hr17 | 0.073290 | Hr17 | 0.076506 |
| Hr18 | 0.081141 | Hr18 | 0.073828 | Hr18 | 0.079701 |
| Hr19 | 0.063838 | Hr19 | 0.058938 | Hr19 | 0.064610 |
| Hr20 | 0.045833 | Hr20 | 0.044992 | Hr20 | 0.045932 |
| Hr21 | 0.034119 | Hr21 | 0.037447 | Hr21 | 0.035284 |
| Hr22 | 0.028455 | Hr22 | 0.032256 | Hr22 | 0.032115 |
| Hr23 | 0.021680 | Hr23 | 0.025772 | Hr23 | 0.025965 |
| Hr24 | 0.015006 | Hr24 | 0.019762 | Hr24 | 0.017516 |
| Total | 1.000000 | Total | 1.000000 | Total | 1.000000 |

**Tyler**

| Hour | Travel Factor |
|---|---|
| Hr01 | 0.007153 |
| Hr02 | 0.004602 |
| Hr03 | 0.004213 |
| Hr04 | 0.004125 |
| Hr05 | 0.007218 |
| Hr06 | 0.018862 |
| Hr07 | 0.042236 |
| Hr08 | 0.075831 |
| Hr09 | 0.056727 |
| Hr10 | 0.050932 |
| Hr11 | 0.051436 |
| Hr12 | 0.052929 |
| Hr13 | 0.055403 |
| Hr14 | 0.058528 |
| Hr15 | 0.063130 |
| Hr16 | 0.072203 |
| Hr17 | 0.081033 |
| Hr18 | 0.089733 |
| Hr19 | 0.065246 |
| Hr20 | 0.043445 |
| Hr21 | 0.034052 |
| Hr22 | 0.027315 |
| Hr23 | 0.020381 |
| Hr24 | 0.013267 |
| Total | 1.000000 |

**Waco**

| Hour | Travel Factor |
|---|---|
| Hr01 | 0.014575 |
| Hr02 | 0.011949 |
| Hr03 | 0.010826 |
| Hr04 | 0.010859 |
| Hr05 | 0.012468 |
| Hr06 | 0.019373 |
| Hr07 | 0.032461 |
| Hr08 | 0.050816 |
| Hr09 | 0.045602 |
| Hr10 | 0.047056 |
| Hr11 | 0.052263 |
| Hr12 | 0.056904 |
| Hr13 | 0.059135 |
| Hr14 | 0.062135 |
| Hr15 | 0.066802 |
| Hr16 | 0.070257 |
| Hr17 | 0.073255 |
| Hr18 | 0.074074 |
| Hr19 | 0.058378 |
| Hr20 | 0.047282 |
| Hr21 | 0.040824 |
| Hr22 | 0.034938 |
| Hr23 | 0.027245 |
| Hr24 | 0.020522 |
| Total | 1.000000 |

**Wichita Falls**

| Hour | Travel Factor |
|---|---|
| Hr01 | 0.008250 |
| Hr02 | 0.006679 |
| Hr03 | 0.006080 |
| Hr04 | 0.005547 |
| Hr05 | 0.006942 |
| Hr06 | 0.014761 |
| Hr07 | 0.030836 |
| Hr08 | 0.052310 |
| Hr09 | 0.050874 |
| Hr10 | 0.056415 |
| Hr11 | 0.060020 |
| Hr12 | 0.061429 |
| Hr13 | 0.063303 |
| Hr14 | 0.066673 |
| Hr15 | 0.070077 |
| Hr16 | 0.077329 |
| Hr17 | 0.081050 |
| Hr18 | 0.081636 |
| Hr19 | 0.060917 |
| Hr20 | 0.042597 |
| Hr21 | 0.033936 |
| Hr22 | 0.027958 |
| Hr23 | 0.020665 |
| Hr24 | 0.013716 |
| Total | 1.000000 |

**Yoakum**

| Hour | Travel Factor |
|---|---|
| Hr01 | 0.012819 |
| Hr02 | 0.010589 |
| Hr03 | 0.010020 |
| Hr04 | 0.010297 |
| Hr05 | 0.012939 |
| Hr06 | 0.019067 |
| Hr07 | 0.032809 |
| Hr08 | 0.050513 |
| Hr09 | 0.048297 |
| Hr10 | 0.050152 |
| Hr11 | 0.056307 |
| Hr12 | 0.059357 |
| Hr13 | 0.060840 |
| Hr14 | 0.063390 |
| Hr15 | 0.065864 |
| Hr16 | 0.068872 |
| Hr17 | 0.072253 |
| Hr18 | 0.074109 |
| Hr19 | 0.058896 |
| Hr20 | 0.045870 |
| Hr21 | 0.040308 |
| Hr22 | 0.033073 |
| Hr23 | 0.025119 |
| Hr24 | 0.018242 |
| Total | 1.000000 |

# APPENDIX H
# TxDOT DISTRICT-LEVEL 24-HOUR VMT MIX

| OBS | DISTRICT | FC | P_LDGV | P_LDGT1 | P_LDGT2 | P_LDGT3 | P_LDGT4 | P_HDGV2B | P_HDGV_3 | P_HDGV_4 | P_HDGV_5 | P_HDGV_6 | P_HDGV_7 | P_HDGV8A | P_HDGV8B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Abilene | Art | 0.465937 | 0.055391 | 0.184401 | 0.045771 | 0.021049 | 0.019143 | 0.008781 | 0.003732 | 0.002327 | 0.006015 | 0.002064 | 0.001668 | 0.000176 |
| 2 | Abilene | Col | 0.465281 | 0.055313 | 0.184142 | 0.045707 | 0.021019 | 0.023952 | 0.010987 | 0.004670 | 0.002912 | 0.007526 | 0.002582 | 0.002088 | 0.000220 |
| 3 | Abilene | Fway | 0.372594 | 0.044318 | 0.147539 | 0.036621 | 0.016841 | 0.012642 | 0.005799 | 0.002465 | 0.001537 | 0.003972 | 0.001363 | 0.001102 | 0.000116 |
| 4 | Amarillo | Art | 0.454981 | 0.044310 | 0.147512 | 0.038577 | 0.017740 | 0.017302 | 0.007937 | 0.003373 | 0.002103 | 0.005437 | 0.001865 | 0.001508 | 0.000159 |
| 5 | Amarillo | Col | 0.533954 | 0.051984 | 0.173061 | 0.045258 | 0.020813 | 0.018531 | 0.008501 | 0.003613 | 0.002253 | 0.005823 | 0.001998 | 0.001615 | 0.000170 |
| 6 | Amarillo | Fway | 0.506003 | 0.049268 | 0.164018 | 0.042893 | 0.019725 | 0.009953 | 0.004565 | 0.001940 | 0.001210 | 0.003127 | 0.001073 | 0.000867 | 0.000091 |
| 7 | Atlanta | Art | 0.503732 | 0.060129 | 0.200175 | 0.035685 | 0.016410 | 0.008193 | 0.003758 | 0.001597 | 0.000996 | 0.002574 | 0.000883 | 0.000714 | 0.000075 |
| 8 | Atlanta | Col | 0.531581 | 0.063447 | 0.211220 | 0.037654 | 0.017316 | 0.010410 | 0.004775 | 0.002029 | 0.001265 | 0.003271 | 0.001122 | 0.000907 | 0.000096 |
| 9 | Atlanta | Fway | 0.430571 | 0.051413 | 0.171160 | 0.030512 | 0.014032 | 0.007358 | 0.003375 | 0.001434 | 0.000894 | 0.002312 | 0.000793 | 0.000641 | 0.000068 |
| 10 | Austin | Art | 0.628472 | 0.051265 | 0.170668 | 0.034009 | 0.015640 | 0.008397 | 0.003852 | 0.001637 | 0.001021 | 0.002639 | 0.000905 | 0.000732 | 0.000077 |
| 11 | Austin | Col | 0.608799 | 0.049663 | 0.165334 | 0.032946 | 0.015151 | 0.012177 | 0.005586 | 0.002374 | 0.001480 | 0.003826 | 0.001313 | 0.001061 | 0.000112 |
| 12 | Austin | Fway | 0.615521 | 0.050211 | 0.167156 | 0.033310 | 0.015318 | 0.007198 | 0.003302 | 0.001403 | 0.000875 | 0.002262 | 0.000776 | 0.000627 | 0.000066 |
| 13 | Beaumont | Art | 0.501777 | 0.069720 | 0.232104 | 0.045015 | 0.020701 | 0.007765 | 0.003562 | 0.001514 | 0.000944 | 0.002440 | 0.000837 | 0.000677 | 0.000071 |
| 14 | Beaumont | Col | 0.521187 | 0.072411 | 0.241064 | 0.046753 | 0.021500 | 0.006392 | 0.002932 | 0.001246 | 0.000777 | 0.002008 | 0.000689 | 0.000557 | 0.000059 |
| 15 | Beaumont | Fway | 0.442936 | 0.061560 | 0.204940 | 0.039747 | 0.018279 | 0.007229 | 0.003316 | 0.001409 | 0.000879 | 0.002271 | 0.000779 | 0.000630 | 0.000066 |
| 16 | Brownwood | Art | 0.439201 | 0.069740 | 0.232171 | 0.064232 | 0.029539 | 0.011983 | 0.005497 | 0.002336 | 0.001457 | 0.003765 | 0.001292 | 0.001044 | 0.000110 |
| 17 | Brownwood | Col | 0.470936 | 0.074767 | 0.248908 | 0.068863 | 0.031668 | 0.011298 | 0.005183 | 0.002203 | 0.001373 | 0.003550 | 0.001218 | 0.000985 | 0.000104 |
| 18 | Brownwood | Fway | 0.274092 | 0.043582 | 0.145089 | 0.040140 | 0.018459 | 0.011694 | 0.005364 | 0.002280 | 0.001421 | 0.003674 | 0.001261 | 0.001019 | 0.000107 |
| 19 | Bryan | Art | 0.473292 | 0.059103 | 0.196762 | 0.057495 | 0.026441 | 0.008770 | 0.004023 | 0.001710 | 0.001066 | 0.002756 | 0.000945 | 0.000764 | 0.000080 |
| 20 | Bryan | Col | 0.507254 | 0.063336 | 0.210851 | 0.061612 | 0.028334 | 0.009792 | 0.004492 | 0.001909 | 0.001190 | 0.003077 | 0.001056 | 0.000853 | 0.000090 |
| 21 | Bryan | Fway | 0.440601 | 0.055030 | 0.183200 | 0.053532 | 0.024618 | 0.007381 | 0.003386 | 0.001439 | 0.000897 | 0.002319 | 0.000796 | 0.000643 | 0.000068 |
| 22 | Childress | Art | 0.419222 | 0.056766 | 0.188980 | 0.049139 | 0.022598 | 0.011635 | 0.005337 | 0.002268 | 0.001414 | 0.003656 | 0.001254 | 0.001014 | 0.000107 |
| 23 | Childress | Col | 0.467015 | 0.063222 | 0.210473 | 0.054727 | 0.025168 | 0.017287 | 0.007930 | 0.003370 | 0.002101 | 0.005432 | 0.001863 | 0.001507 | 0.000159 |
| 24 | Childress | Fway | 0.249131 | 0.033789 | 0.112487 | 0.029249 | 0.013451 | 0.011382 | 0.005221 | 0.002219 | 0.001384 | 0.003577 | 0.001227 | 0.000992 | 0.000104 |
| 25 | Corpus_Christi | Art | 0.523663 | 0.053020 | 0.176510 | 0.036602 | 0.016832 | 0.013667 | 0.006269 | 0.002664 | 0.001661 | 0.004294 | 0.001473 | 0.001191 | 0.000125 |
| 26 | Corpus_Christi | Col | 0.553176 | 0.056003 | 0.186439 | 0.038660 | 0.017779 | 0.014810 | 0.006793 | 0.002887 | 0.001800 | 0.004653 | 0.001596 | 0.001291 | 0.000136 |
| 27 | Corpus_Christi | Fway | 0.592706 | 0.059997 | 0.199738 | 0.041418 | 0.019047 | 0.007270 | 0.003335 | 0.001417 | 0.000884 | 0.002284 | 0.000784 | 0.000634 | 0.000067 |
| 28 | Dallas | Art | 0.657115 | 0.045113 | 0.150186 | 0.029128 | 0.013395 | 0.008664 | 0.003974 | 0.001689 | 0.001053 | 0.002722 | 0.000934 | 0.000755 | 0.000079 |
| 29 | Dallas | Col | 0.629575 | 0.043225 | 0.143901 | 0.027909 | 0.012835 | 0.013427 | 0.006159 | 0.002618 | 0.001632 | 0.004219 | 0.001447 | 0.001170 | 0.000123 |
| 30 | Dallas | Fway | 0.640535 | 0.043977 | 0.146402 | 0.028394 | 0.013058 | 0.008075 | 0.003704 | 0.001574 | 0.000982 | 0.002537 | 0.000870 | 0.000704 | 0.000074 |
| 31 | El_Paso | Art | 0.693967 | 0.048368 | 0.161022 | 0.017280 | 0.007947 | 0.007484 | 0.003433 | 0.001459 | 0.000910 | 0.002352 | 0.000807 | 0.000652 | 0.000069 |
| 32 | El_Paso | Col | 0.698856 | 0.048708 | 0.162155 | 0.017402 | 0.008003 | 0.008328 | 0.003820 | 0.001624 | 0.001012 | 0.002617 | 0.000898 | 0.000726 | 0.000076 |
| 33 | El_Paso | Fway | 0.668824 | 0.046618 | 0.155197 | 0.016655 | 0.007659 | 0.007516 | 0.003448 | 0.001465 | 0.000914 | 0.002362 | 0.000810 | 0.000655 | 0.000069 |
| 34 | Fort_Worth | Art | 0.601266 | 0.051109 | 0.170146 | 0.034133 | 0.015697 | 0.007468 | 0.003426 | 0.001456 | 0.000908 | 0.002347 | 0.000805 | 0.000651 | 0.000069 |
| 35 | Fort_Worth | Col | 0.550588 | 0.046808 | 0.155829 | 0.031261 | 0.014376 | 0.009740 | 0.004468 | 0.001899 | 0.001184 | 0.003061 | 0.001050 | 0.000849 | 0.000089 |
| 36 | Fort_Worth | Fway | 0.612372 | 0.052051 | 0.173284 | 0.034763 | 0.015986 | 0.005749 | 0.002637 | 0.001121 | 0.000699 | 0.001806 | 0.000620 | 0.000501 | 0.000053 |
| 37 | Houston | Art | 0.621798 | 0.054291 | 0.180740 | 0.039212 | 0.018033 | 0.007197 | 0.003301 | 0.001403 | 0.000875 | 0.002261 | 0.000776 | 0.000627 | 0.000066 |
| 38 | Houston | Col | 0.606287 | 0.052939 | 0.176239 | 0.038236 | 0.017584 | 0.010963 | 0.005029 | 0.002137 | 0.001333 | 0.003445 | 0.001182 | 0.000955 | 0.000101 |
| 39 | Houston | Fway | 0.619573 | 0.054097 | 0.180094 | 0.039072 | 0.017968 | 0.006306 | 0.002893 | 0.001229 | 0.000767 | 0.001982 | 0.000680 | 0.000550 | 0.000058 |
| 40 | Laredo | Art | 0.490396 | 0.058189 | 0.193718 | 0.035788 | 0.016458 | 0.016055 | 0.007365 | 0.003130 | 0.001952 | 0.005045 | 0.001731 | 0.001399 | 0.000147 |
| 41 | Laredo | Col | 0.479158 | 0.056859 | 0.189288 | 0.034970 | 0.016082 | 0.022825 | 0.010470 | 0.004450 | 0.002775 | 0.007172 | 0.002461 | 0.001989 | 0.000209 |
| 42 | Laredo | Fway | 0.524964 | 0.062283 | 0.207345 | 0.038306 | 0.017616 | 0.011552 | 0.005299 | 0.002252 | 0.001404 | 0.003630 | 0.001245 | 0.001007 | 0.000106 |
| 43 | Lubbock | Art | 0.545277 | 0.055085 | 0.183383 | 0.035809 | 0.016468 | 0.014480 | 0.006642 | 0.002823 | 0.001760 | 0.004550 | 0.001561 | 0.001262 | 0.000133 |
| 44 | Lubbock | Col | 0.514712 | 0.052003 | 0.173122 | 0.033806 | 0.015546 | 0.022560 | 0.010349 | 0.004398 | 0.002742 | 0.007089 | 0.002432 | 0.001966 | 0.000207 |
| 45 | Lubbock* | Fway | 0.512865 | 0.051816 | 0.172502 | 0.033685 | 0.015491 | 0.014871 | 0.006821 | 0.002899 | 0.001808 | 0.004673 | 0.001603 | 0.001296 | 0.000136 |
| 46 | Lufkin | Art | 0.441872 | 0.059355 | 0.197599 | 0.043968 | 0.020220 | 0.010205 | 0.004681 | 0.001989 | 0.001240 | 0.003206 | 0.001100 | 0.000889 | 0.000094 |
| 47 | Lufkin | Col | 0.477019 | 0.064065 | 0.213281 | 0.047457 | 0.021824 | 0.010833 | 0.004969 | 0.002112 | 0.001317 | 0.003404 | 0.001168 | 0.000944 | 0.000099 |
| 48 | Lufkin | Fway | 0.600210 | 0.051393 | 0.171094 | 0.034256 | 0.015754 | 0.007278 | 0.003339 | 0.001419 | 0.000885 | 0.002287 | 0.000785 | 0.000634 | 0.000067 |
| 49 | Odessa | Art | 0.509795 | 0.059736 | 0.198867 | 0.057486 | 0.026436 | 0.016990 | 0.007794 | 0.003312 | 0.002065 | 0.005339 | 0.001832 | 0.001481 | 0.000156 |
| 50 | Odessa | Col | 0.444904 | 0.052147 | 0.173603 | 0.050183 | 0.023078 | 0.029851 | 0.013693 | 0.005820 | 0.003629 | 0.009380 | 0.003218 | 0.002602 | 0.000274 |
| 51 | Odessa | Fway | 0.402709 | 0.047213 | 0.157176 | 0.045434 | 0.020894 | 0.015800 | 0.007248 | 0.003080 | 0.001921 | 0.004965 | 0.001703 | 0.001377 | 0.000145 |
| 52 | Paris | Art | 0.492864 | 0.060783 | 0.202354 | 0.042788 | 0.019677 | 0.010493 | 0.004813 | 0.002046 | 0.001275 | 0.003297 | 0.001131 | 0.000914 | 0.000096 |
| 53 | Paris | Col | 0.534376 | 0.065893 | 0.219363 | 0.046385 | 0.021331 | 0.010059 | 0.004614 | 0.001961 | 0.001223 | 0.003161 | 0.001084 | 0.000877 | 0.000092 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 54 | Paris | Fway | 0.467000 | 0.057600 | 0.191757 | 0.040548 | 0.018647 | 0.006720 | 0.003083 | 0.001310 | 0.000817 | 0.002112 | 0.000724 | 0.000586 | 0.000062 |
| 55 | Pharr | Art | 0.611419 | 0.059166 | 0.196968 | 0.026827 | 0.012337 | 0.006496 | 0.002980 | 0.001266 | 0.000790 | 0.002041 | 0.000700 | 0.000566 | 0.000060 |
| 56 | Pharr | Col | 0.630789 | 0.061037 | 0.203198 | 0.027676 | 0.012727 | 0.006890 | 0.003160 | 0.001343 | 0.000838 | 0.002165 | 0.000743 | 0.000600 | 0.000063 |
| 57 | Pharr | Fway | 0.612682 | 0.059288 | 0.197375 | 0.026883 | 0.012363 | 0.007847 | 0.003599 | 0.001530 | 0.000954 | 0.002466 | 0.000846 | 0.000684 | 0.000072 |
| 58 | San_Angelo | Art | 0.499580 | 0.063030 | 0.209833 | 0.057731 | 0.026549 | 0.014297 | 0.006558 | 0.002787 | 0.001738 | 0.004492 | 0.001541 | 0.001246 | 0.000131 |
| 59 | San_Angelo | Col | 0.451722 | 0.057004 | 0.189771 | 0.052211 | 0.024011 | 0.022457 | 0.010301 | 0.004378 | 0.002730 | 0.007056 | 0.002421 | 0.001957 | 0.000206 |
| 60 | San_Angelo | Fway | 0.340156 | 0.042956 | 0.143005 | 0.039345 | 0.018094 | 0.018304 | 0.008396 | 0.003568 | 0.002225 | 0.005752 | 0.001973 | 0.001595 | 0.000168 |
| 61 | San_Antonio | Art | 0.608356 | 0.054541 | 0.181573 | 0.035940 | 0.016528 | 0.008545 | 0.003920 | 0.001666 | 0.001039 | 0.002685 | 0.000921 | 0.000745 | 0.000078 |
| 62 | San_Antonio | Col | 0.610308 | 0.054716 | 0.182155 | 0.036055 | 0.016581 | 0.009795 | 0.004493 | 0.001910 | 0.001191 | 0.003078 | 0.001056 | 0.000854 | 0.000090 |
| 63 | San_Antonio | Fway | 0.591515 | 0.053034 | 0.176555 | 0.034946 | 0.016071 | 0.007251 | 0.003326 | 0.001414 | 0.000881 | 0.002278 | 0.000782 | 0.000632 | 0.000067 |
| 64 | Tyler | Art | 0.551840 | 0.062096 | 0.206723 | 0.041471 | 0.019071 | 0.008607 | 0.003948 | 0.001678 | 0.001046 | 0.002705 | 0.000928 | 0.000750 | 0.000079 |
| 65 | Tyler | Col | 0.571194 | 0.064270 | 0.213960 | 0.042923 | 0.019739 | 0.008460 | 0.003881 | 0.001649 | 0.001028 | 0.002658 | 0.000912 | 0.000737 | 0.000078 |
| 66 | Tyler | Fway | 0.504648 | 0.056795 | 0.189077 | 0.037931 | 0.017443 | 0.008290 | 0.003803 | 0.001616 | 0.001008 | 0.002605 | 0.000894 | 0.000723 | 0.000076 |
| 67 | Waco | Art | 0.605436 | 0.056499 | 0.188090 | 0.036479 | 0.016776 | 0.007946 | 0.003645 | 0.001549 | 0.000966 | 0.002497 | 0.000857 | 0.000693 | 0.000073 |
| 68 | Waco | Col | 0.590615 | 0.055118 | 0.183494 | 0.035587 | 0.016366 | 0.011342 | 0.005203 | 0.002211 | 0.001379 | 0.003564 | 0.001223 | 0.000989 | 0.000104 |
| 69 | Waco | Fway | 0.524696 | 0.048977 | 0.163048 | 0.031622 | 0.014542 | 0.007832 | 0.003593 | 0.001527 | 0.000952 | 0.002461 | 0.000844 | 0.000683 | 0.000072 |
| 70 | Wichita_Falls | Art | 0.539532 | 0.058918 | 0.196144 | 0.039349 | 0.018096 | 0.009311 | 0.004271 | 0.001815 | 0.001132 | 0.002926 | 0.001004 | 0.000812 | 0.000085 |
| 71 | Wichita_Falls | Col | 0.436574 | 0.047696 | 0.158784 | 0.031854 | 0.014649 | 0.026626 | 0.012214 | 0.005191 | 0.003237 | 0.008367 | 0.002870 | 0.002321 | 0.000244 |
| 72 | Wichita_Falls | Fway | 0.545890 | 0.059611 | 0.198452 | 0.039812 | 0.018308 | 0.007820 | 0.003587 | 0.001525 | 0.000951 | 0.002457 | 0.000843 | 0.000682 | 0.000072 |
| 73 | Yoakum | Art | 0.410839 | 0.060304 | 0.200759 | 0.059935 | 0.027563 | 0.013245 | 0.006076 | 0.002582 | 0.001610 | 0.004162 | 0.001428 | 0.001154 | 0.000122 |
| 74 | Yoakum | Col | 0.431875 | 0.063384 | 0.211013 | 0.062996 | 0.028970 | 0.014420 | 0.006615 | 0.002811 | 0.001753 | 0.004531 | 0.001554 | 0.001257 | 0.000132 |
| 75 | Yoakum | Fway | 0.335863 | 0.049326 | 0.164210 | 0.049024 | 0.022545 | 0.009514 | 0.004364 | 0.001855 | 0.001156 | 0.002989 | 0.001026 | 0.000829 | 0.000087 |

| OBS | P_LDDV | P_LDDT12 | P_HDDV2B | P_HDDV_3 | P_HDDV_4 | P_HDDV_5 | P_HDDV_6 | P_HDDV_7 | P_HDDV8A | P_HDDV8B | P_MC | P_HDGB | P_HDDBT | P_HDDBS | P_LDDT34 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.000768 | 0.000160 | 0.021825 | 0.008267 | 0.004696 | 0.003175 | 0.010912 | 0.006547 | 0.010714 | 0.107603 | 0.001000 | 0.001135 | 0.002182 | 0.003407 | 0.001153 |
| 2 | 0.000767 | 0.000160 | 0.027307 | 0.010343 | 0.005875 | 0.003972 | 0.013653 | 0.008192 | 0.013405 | 0.077677 | 0.001000 | 0.001705 | 0.003277 | 0.005116 | 0.001152 |
| 3 | 0.000614 | 0.000128 | 0.014412 | 0.005459 | 0.003101 | 0.002096 | 0.007206 | 0.004324 | 0.007075 | 0.299071 | 0.001000 | 0.001297 | 0.002493 | 0.003891 | 0.000923 |
| 4 | 0.000750 | 0.000128 | 0.014018 | 0.005310 | 0.003016 | 0.002039 | 0.007009 | 0.004205 | 0.006881 | 0.207231 | 0.001000 | 0.000791 | 0.001521 | 0.002374 | 0.000923 |
| 5 | 0.000880 | 0.000151 | 0.015013 | 0.005687 | 0.003230 | 0.002184 | 0.007507 | 0.004504 | 0.007370 | 0.079294 | 0.001000 | 0.000764 | 0.001469 | 0.002292 | 0.001082 |
| 6 | 0.000834 | 0.000143 | 0.008063 | 0.003054 | 0.001735 | 0.001173 | 0.004032 | 0.002419 | 0.003958 | 0.164586 | 0.001000 | 0.000547 | 0.001052 | 0.001643 | 0.001026 |
| 7 | 0.000830 | 0.000174 | 0.012477 | 0.004726 | 0.002684 | 0.001815 | 0.006238 | 0.003743 | 0.006125 | 0.122619 | 0.001000 | 0.000235 | 0.000453 | 0.000706 | 0.001252 |
| 8 | 0.000876 | 0.000184 | 0.015853 | 0.006005 | 0.003411 | 0.002306 | 0.007926 | 0.004756 | 0.007782 | 0.061732 | 0.001000 | 0.000296 | 0.000570 | 0.000889 | 0.001321 |
| 9 | 0.000710 | 0.000149 | 0.011205 | 0.004244 | 0.002411 | 0.001630 | 0.005603 | 0.003362 | 0.005501 | 0.245572 | 0.001000 | 0.000503 | 0.000967 | 0.001509 | 0.001070 |
| 10 | 0.001035 | 0.000149 | 0.012904 | 0.004888 | 0.002776 | 0.001877 | 0.006452 | 0.003871 | 0.006335 | 0.034260 | 0.001000 | 0.000687 | 0.001321 | 0.002062 | 0.001067 |
| 11 | 0.001003 | 0.000144 | 0.018712 | 0.007088 | 0.004026 | 0.002722 | 0.009356 | 0.005614 | 0.009186 | 0.031065 | 0.001000 | 0.001558 | 0.002995 | 0.004675 | 0.001034 |
| 12 | 0.001014 | 0.000145 | 0.011062 | 0.004190 | 0.002380 | 0.001609 | 0.005531 | 0.003319 | 0.005430 | 0.062297 | 0.001000 | 0.000499 | 0.000958 | 0.001496 | 0.001045 |
| 13 | 0.000827 | 0.000202 | 0.014319 | 0.005424 | 0.003081 | 0.002083 | 0.007159 | 0.004296 | 0.007029 | 0.062274 | 0.001000 | 0.000630 | 0.001211 | 0.001890 | 0.001452 |
| 14 | 0.000859 | 0.000210 | 0.011787 | 0.004465 | 0.002536 | 0.001714 | 0.005893 | 0.003536 | 0.005786 | 0.038321 | 0.001000 | 0.000812 | 0.001561 | 0.002437 | 0.001508 |
| 15 | 0.000730 | 0.000178 | 0.013331 | 0.005050 | 0.002868 | 0.001939 | 0.006665 | 0.003999 | 0.006544 | 0.168059 | 0.001000 | 0.000728 | 0.001399 | 0.002185 | 0.001282 |
| 16 | 0.000724 | 0.000202 | 0.018166 | 0.006881 | 0.003909 | 0.002642 | 0.009083 | 0.005450 | 0.008918 | 0.075050 | 0.001000 | 0.000702 | 0.001349 | 0.002105 | 0.001452 |
| 17 | 0.000776 | 0.000217 | 0.017128 | 0.006488 | 0.003685 | 0.002491 | 0.008564 | 0.005138 | 0.008408 | 0.020149 | 0.001000 | 0.000564 | 0.001084 | 0.001693 | 0.001557 |
| 18 | 0.000452 | 0.000126 | 0.017728 | 0.006715 | 0.003814 | 0.002579 | 0.008864 | 0.005318 | 0.008703 | 0.383449 | 0.001000 | 0.002053 | 0.003946 | 0.006160 | 0.000907 |
| 19 | 0.000780 | 0.000171 | 0.017677 | 0.006696 | 0.003803 | 0.002571 | 0.008839 | 0.005303 | 0.008678 | 0.106976 | 0.001000 | 0.000518 | 0.000995 | 0.001554 | 0.001231 |
| 20 | 0.000836 | 0.000184 | 0.019737 | 0.007476 | 0.004246 | 0.002871 | 0.009868 | 0.005921 | 0.009689 | 0.037882 | 0.001000 | 0.000866 | 0.001663 | 0.002597 | 0.001319 |
| 21 | 0.000726 | 0.000159 | 0.014878 | 0.005636 | 0.003201 | 0.002164 | 0.007439 | 0.004463 | 0.007304 | 0.175044 | 0.001000 | 0.000495 | 0.000951 | 0.001484 | 0.001146 |
| 22 | 0.000691 | 0.000164 | 0.010677 | 0.004044 | 0.002297 | 0.001553 | 0.005339 | 0.003203 | 0.005241 | 0.198579 | 0.001000 | 0.000445 | 0.000856 | 0.001336 | 0.001182 |
| 23 | 0.000770 | 0.000183 | 0.015863 | 0.006009 | 0.003413 | 0.002307 | 0.007931 | 0.004759 | 0.007787 | 0.079216 | 0.001000 | 0.001552 | 0.002983 | 0.004656 | 0.001316 |
| 24 | 0.000411 | 0.000098 | 0.010445 | 0.003956 | 0.002247 | 0.001519 | 0.005222 | 0.003133 | 0.005127 | 0.498599 | 0.001000 | 0.000561 | 0.001079 | 0.001684 | 0.000703 |
| 25 | 0.000863 | 0.000154 | 0.017538 | 0.006643 | 0.003773 | 0.002551 | 0.008769 | 0.005261 | 0.008609 | 0.099320 | 0.001000 | 0.001088 | 0.002091 | 0.003264 | 0.001104 |
| 26 | 0.000912 | 0.000162 | 0.019004 | 0.007199 | 0.004089 | 0.002764 | 0.009502 | 0.005701 | 0.009329 | 0.045777 | 0.001000 | 0.001245 | 0.002392 | 0.003734 | 0.001166 |
| 27 | 0.000977 | 0.000174 | 0.009329 | 0.003534 | 0.002007 | 0.001357 | 0.004665 | 0.002799 | 0.004580 | 0.035885 | 0.001000 | 0.000484 | 0.000930 | 0.001452 | 0.001249 |
| 28 | 0.001082 | 0.000131 | 0.009397 | 0.003560 | 0.002022 | 0.001367 | 0.004699 | 0.002819 | 0.004613 | 0.051557 | 0.001000 | 0.000339 | 0.000651 | 0.001017 | 0.000939 |
| 29 | 0.001037 | 0.000125 | 0.014564 | 0.005517 | 0.003133 | 0.002118 | 0.007282 | 0.004369 | 0.007150 | 0.063025 | 0.001000 | 0.000260 | 0.000499 | 0.000779 | 0.000900 |
| 30 | 0.001055 | 0.000127 | 0.008758 | 0.003318 | 0.001884 | 0.001274 | 0.004379 | 0.002628 | 0.004300 | 0.078186 | 0.001000 | 0.000218 | 0.000419 | 0.000653 | 0.000916 |
| 31 | 0.001143 | 0.000140 | 0.006039 | 0.002288 | 0.001299 | 0.000878 | 0.003020 | 0.001812 | 0.002965 | 0.028417 | 0.001000 | 0.000716 | 0.001377 | 0.002149 | 0.001007 |
| 32 | 0.001151 | 0.000141 | 0.006720 | 0.002545 | 0.001446 | 0.000977 | 0.003360 | 0.002016 | 0.003299 | 0.019683 | 0.001000 | 0.000409 | 0.000786 | 0.001228 | 0.001014 |
| 33 | 0.001102 | 0.000135 | 0.006065 | 0.002297 | 0.001305 | 0.000882 | 0.003032 | 0.001819 | 0.002977 | 0.063618 | 0.001000 | 0.000440 | 0.000845 | 0.001319 | 0.000971 |
| 34 | 0.000991 | 0.000148 | 0.013002 | 0.004925 | 0.002797 | 0.001891 | 0.006501 | 0.003901 | 0.006383 | 0.065966 | 0.001000 | 0.000330 | 0.000633 | 0.000989 | 0.001064 |
| 35 | 0.000907 | 0.000136 | 0.016958 | 0.006424 | 0.003649 | 0.002467 | 0.008479 | 0.005088 | 0.008325 | 0.122556 | 0.001000 | 0.000310 | 0.000595 | 0.000930 | 0.000975 |
| 36 | 0.001009 | 0.000151 | 0.010009 | 0.003791 | 0.002154 | 0.001456 | 0.005005 | 0.003003 | 0.004914 | 0.063793 | 0.001000 | 0.000167 | 0.000321 | 0.000502 | 0.001084 |
| 37 | 0.001024 | 0.000157 | 0.010296 | 0.003900 | 0.002215 | 0.001498 | 0.005148 | 0.003089 | 0.005054 | 0.032112 | 0.001000 | 0.000472 | 0.000908 | 0.001417 | 0.001130 |
| 38 | 0.000999 | 0.000153 | 0.015684 | 0.005941 | 0.003374 | 0.002281 | 0.007842 | 0.004705 | 0.007699 | 0.028062 | 0.001000 | 0.000798 | 0.001534 | 0.002395 | 0.001102 |
| 39 | 0.001021 | 0.000157 | 0.009022 | 0.003418 | 0.001941 | 0.001312 | 0.004511 | 0.002707 | 0.004429 | 0.041070 | 0.001000 | 0.000510 | 0.000979 | 0.001529 | 0.001126 |
| 40 | 0.000808 | 0.000169 | 0.017559 | 0.006651 | 0.003778 | 0.002554 | 0.008779 | 0.005268 | 0.008620 | 0.108067 | 0.001000 | 0.000703 | 0.001351 | 0.002109 | 0.001211 |
| 41 | 0.000790 | 0.000165 | 0.024964 | 0.009456 | 0.005371 | 0.003631 | 0.012482 | 0.007489 | 0.012255 | 0.078253 | 0.001000 | 0.002407 | 0.004626 | 0.007221 | 0.001184 |
| 42 | 0.000865 | 0.000180 | 0.012634 | 0.004786 | 0.002718 | 0.001838 | 0.006317 | 0.003790 | 0.006202 | 0.076672 | 0.001000 | 0.000792 | 0.001523 | 0.002377 | 0.001297 |
| 43 | 0.000899 | 0.000160 | 0.010614 | 0.004021 | 0.002284 | 0.001544 | 0.005307 | 0.003184 | 0.005211 | 0.091685 | 0.001000 | 0.000627 | 0.001205 | 0.001881 | 0.001147 |
| 44 | 0.000848 | 0.000151 | 0.016537 | 0.006264 | 0.003558 | 0.002405 | 0.008269 | 0.004961 | 0.008118 | 0.097977 | 0.001000 | 0.001333 | 0.002563 | 0.004000 | 0.001083 |
| 45 | 0.000845 | 0.000150 | 0.010901 | 0.004129 | 0.002345 | 0.001586 | 0.005450 | 0.003270 | 0.005351 | 0.137651 | 0.001000 | 0.000975 | 0.001874 | 0.002926 | 0.001079 |
| 46 | 0.000728 | 0.000172 | 0.017767 | 0.006730 | 0.003823 | 0.002584 | 0.008883 | 0.005330 | 0.008722 | 0.153394 | 0.001000 | 0.000543 | 0.001043 | 0.001628 | 0.001236 |
| 47 | 0.000786 | 0.000186 | 0.018861 | 0.007144 | 0.004058 | 0.002743 | 0.009430 | 0.005658 | 0.009259 | 0.088118 | 0.001000 | 0.000495 | 0.000951 | 0.001485 | 0.001334 |
| 48 | 0.000989 | 0.000149 | 0.009725 | 0.003684 | 0.002092 | 0.001415 | 0.004862 | 0.002917 | 0.004774 | 0.075180 | 0.001000 | 0.000463 | 0.000890 | 0.001389 | 0.001070 |
| 49 | 0.000840 | 0.000173 | 0.016169 | 0.006125 | 0.003479 | 0.002352 | 0.008084 | 0.004851 | 0.007937 | 0.049084 | 0.001000 | 0.001245 | 0.002393 | 0.003736 | 0.001244 |
| 50 | 0.000733 | 0.000151 | 0.028408 | 0.010760 | 0.006112 | 0.004132 | 0.014204 | 0.008522 | 0.013946 | 0.089520 | 0.001000 | 0.001527 | 0.002935 | 0.004582 | 0.001086 |
| 51 | 0.000664 | 0.000137 | 0.015036 | 0.005695 | 0.003235 | 0.002187 | 0.007518 | 0.004511 | 0.007381 | 0.235005 | 0.001000 | 0.001179 | 0.002267 | 0.003538 | 0.000983 |
| 52 | 0.000812 | 0.000176 | 0.013936 | 0.005279 | 0.002998 | 0.002027 | 0.006968 | 0.004181 | 0.006841 | 0.111334 | 0.001000 | 0.000110 | 0.000211 | 0.000329 | 0.001265 |
| 53 | 0.000881 | 0.000191 | 0.013361 | 0.005061 | 0.002875 | 0.001943 | 0.006680 | 0.004008 | 0.006559 | 0.044316 | 0.001000 | 0.000225 | 0.000433 | 0.000676 | 0.001372 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 54 | 0.000770 | 0.000167 | 0.008926 | 0.003381 | 0.001920 | 0.001298 | 0.004463 | 0.002678 | 0.004382 | 0.176892 | 0.001000 | 0.000331 | 0.000636 | 0.000993 | 0.001199 |
| 55 | 0.001007 | 0.000171 | 0.006959 | 0.002636 | 0.001497 | 0.001012 | 0.003480 | 0.002088 | 0.003416 | 0.049874 | 0.001000 | 0.000677 | 0.001301 | 0.002032 | 0.001232 |
| 56 | 0.001039 | 0.000177 | 0.007381 | 0.002796 | 0.001588 | 0.001074 | 0.003691 | 0.002214 | 0.003623 | 0.017921 | 0.001000 | 0.000844 | 0.001621 | 0.002531 | 0.001271 |
| 57 | 0.001009 | 0.000172 | 0.008407 | 0.003184 | 0.001809 | 0.001223 | 0.004203 | 0.002522 | 0.004127 | 0.040842 | 0.001000 | 0.000622 | 0.001195 | 0.001865 | 0.001234 |
| 58 | 0.000823 | 0.000183 | 0.015766 | 0.005972 | 0.003392 | 0.002293 | 0.007883 | 0.004730 | 0.007740 | 0.055151 | 0.001000 | 0.000716 | 0.001377 | 0.002149 | 0.001312 |
| 59 | 0.000745 | 0.000165 | 0.024765 | 0.009381 | 0.005328 | 0.003602 | 0.012382 | 0.007429 | 0.012157 | 0.088860 | 0.001000 | 0.001144 | 0.002198 | 0.003431 | 0.001187 |
| 60 | 0.000561 | 0.000124 | 0.020185 | 0.007646 | 0.004343 | 0.002936 | 0.010093 | 0.006056 | 0.009909 | 0.301933 | 0.001000 | 0.001483 | 0.002850 | 0.004449 | 0.000894 |
| 61 | 0.001002 | 0.000158 | 0.013191 | 0.004997 | 0.002838 | 0.001919 | 0.006596 | 0.003957 | 0.006476 | 0.034885 | 0.001000 | 0.000896 | 0.001723 | 0.002690 | 0.001136 |
| 62 | 0.001005 | 0.000159 | 0.015121 | 0.005728 | 0.003253 | 0.002199 | 0.007560 | 0.004536 | 0.007423 | 0.023146 | 0.001000 | 0.000920 | 0.001769 | 0.002761 | 0.001139 |
| 63 | 0.000975 | 0.000154 | 0.011193 | 0.004240 | 0.002408 | 0.001628 | 0.005596 | 0.003358 | 0.005495 | 0.071085 | 0.001000 | 0.000509 | 0.000978 | 0.001527 | 0.001104 |
| 64 | 0.000909 | 0.000180 | 0.011837 | 0.004484 | 0.002547 | 0.001722 | 0.005918 | 0.003551 | 0.005811 | 0.058246 | 0.001000 | 0.000263 | 0.000506 | 0.000790 | 0.001293 |
| 65 | 0.000941 | 0.000186 | 0.011635 | 0.004407 | 0.002503 | 0.001692 | 0.005817 | 0.003490 | 0.005712 | 0.027773 | 0.001000 | 0.000340 | 0.000653 | 0.001020 | 0.001338 |
| 66 | 0.000832 | 0.000165 | 0.011400 | 0.004318 | 0.002453 | 0.001658 | 0.005700 | 0.003420 | 0.005596 | 0.135061 | 0.001000 | 0.000390 | 0.000749 | 0.001169 | 0.001182 |
| 67 | 0.000997 | 0.000164 | 0.011939 | 0.004522 | 0.002569 | 0.001737 | 0.005970 | 0.003582 | 0.005861 | 0.035788 | 0.001000 | 0.000539 | 0.001035 | 0.001616 | 0.001176 |
| 68 | 0.000973 | 0.000160 | 0.017041 | 0.006455 | 0.003666 | 0.002479 | 0.008520 | 0.005112 | 0.008366 | 0.033499 | 0.001000 | 0.000741 | 0.001424 | 0.002223 | 0.001148 |
| 69 | 0.000865 | 0.000142 | 0.011767 | 0.004457 | 0.002532 | 0.001712 | 0.005883 | 0.003530 | 0.005777 | 0.155667 | 0.001000 | 0.000811 | 0.001558 | 0.002432 | 0.001020 |
| 70 | 0.000889 | 0.000171 | 0.010017 | 0.003794 | 0.002155 | 0.001457 | 0.005008 | 0.003005 | 0.004917 | 0.088322 | 0.001000 | 0.000784 | 0.001507 | 0.002352 | 0.001227 |
| 71 | 0.000720 | 0.000138 | 0.028643 | 0.010850 | 0.006163 | 0.004166 | 0.014322 | 0.008593 | 0.014061 | 0.148466 | 0.001000 | 0.001901 | 0.003654 | 0.005704 | 0.000993 |
| 72 | 0.000900 | 0.000173 | 0.008413 | 0.003187 | 0.001810 | 0.001224 | 0.004206 | 0.002524 | 0.004130 | 0.088120 | 0.001000 | 0.000518 | 0.000995 | 0.001553 | 0.001241 |
| 73 | 0.000677 | 0.000175 | 0.021303 | 0.008069 | 0.004583 | 0.003099 | 0.010652 | 0.006391 | 0.010458 | 0.133068 | 0.001000 | 0.001602 | 0.003080 | 0.004808 | 0.001256 |
| 74 | 0.000712 | 0.000184 | 0.023193 | 0.008785 | 0.004990 | 0.003374 | 0.011597 | 0.006958 | 0.011386 | 0.088433 | 0.001000 | 0.001141 | 0.002193 | 0.003423 | 0.001320 |
| 75 | 0.000554 | 0.000143 | 0.015301 | 0.005796 | 0.003292 | 0.002226 | 0.007651 | 0.004590 | 0.007512 | 0.297703 | 0.001000 | 0.001759 | 0.003381 | 0.005277 | 0.001027 |

* No Lubbock District Fway classification counts; statewide FWY VMT mix used.

# APPENDIX I
# TEXAS COUNTIES BY CLIMATE ZONE
# AND
# SUMMER AND WINTER CLIMATIC INPUTS TO MOBILE6 BY CLIMATE ZONE

## Texas Counties by Climate Zone

**C1 - Amarillo**
Armstrong
Briscoe
Carson
Castor
Childress
Collingsworth
Dallam
Deaf Smith
Donley
Gray
Hall
Hansford
Hartley
Hemphill
Hutchinson
Lipscomb
Moore
Ochiltree
Oldham
Parmer
Potter
Randall
Roberts
Sherman
Swisher
Wheeler

**C2- Corpus Christi**
Aransas
Bee
Brooks
Calhoun
Cameron
DeWitt
Duval
Goliad
Hidalgo
Jackson
Jimm Hogg
Jim Wells
Karnes
Kenedy
Lavaca
Live Oak
McMullen
Nueces
Refugio
San Patricio
Starr
Victoria
Zapata

**C3 - Dallas**
Anderson
Angelina
Bosque
Bowie
Camp
Cass
Cherokee
Clay
Collin
Comanche
Cooke
Dallas
Delta
Denton
Ellis
Erath
Falls
Fannin
Franklin
Freestone
Grayson
Gregg
Hamilton
Harrison
Henderson
Hill
Hood
Hopkins
Hunt
Jack
Johnson
Kaufman
Lamar
Limestone
Marion
McLennan
Montague
Morris
Nacogdoches
Navarro
Palo Pinto
Panola
Parker
Rains
Red river
Rockwall
Rusk
Sabine
San Augustine
Shelby
Smith
Somervell
Tarrant
Titus
Upshur
Van Zandt
Wise
Wood

**C-4 El Paso**
El Paso
Hudspeth

**C-5 Houston**
Austin
Brazoria
Brazos
Chambers
Colorado
Fort Bend
Galveston
Grimes
Hardin
Harris
Houston

Jasper
Jefferson
Leon
Liberty
Madison
Matagorda
Montgomery
Newton
Orange
Polk
Robertson
San Jacinto
Trinity
Tyler
Walker
Waller
Wharton

**C-6 Lubbock**
Andrews
Archer
Bailey
Baylor
Borden
Callahan
Cochran
Cottle
Crosby
Dawson
Dickens
Eastland
Fisher
Floyd
Foard
Gaines
Garza
Hale
Hardeman
Haskell
Hockley
Howard
Jones
Kent
King
Knox
Lamb
Lubbock
Lynn
Martin
Mitchell
Motley
Nolan
Scurry
Shackelford
Stephens
Stonewall
Taylor
Terry
Throckmorton
Wichita
Wilbarger
Yoakum
Young

**C-7 Midland**
Brewster
Brown
Coke
Coleman
Concho
Crane
Crockett
Culberson
Ector
Edwards
Glasscock
Irion
Jeff Davis
Kimble
Loving
McCulloch
Menard
Midland
Pecos
Presidio
Reagan
Real
Reeves
Runnels
Schleicher
Sterlling
Sutton
Terrell
Tom Green
Upton
Val Verde
Ward
Winkler

**C-8 San Antonio**
Atascosa
Bandera
Bastrop
Bell
Bexar
Blanco
Burleson
Burnet
Caldwell
Comal
Coryell
Dimmit
Fayette
Frio
Gillespie
Gonzales
Guadalupe
Hays
Kendall
Kerr
Kinney
Lampasas
La Salle
Lee
Llano
Mason
Maverick
Medina
Milam
Mills
San Saba
Travis
Uvalde
Washington
Webb

Williamson
Wilson
Zavala

**Climatic Inputs to MOBILE6 by Climate Zone**
Hourly average temperatures and relative humidity; ordered as 6 a.m. to 12 a.m., 12 a.m. to 6 a.m.)

**Summer**

* C1: Amarillo Climate Zone: June through August, 2002
HOURLY TEMPERATURES: 72.0 76.2 79.5 82.5 84.9 86.7 88.3 89.0 88.6 88.1 86.5 83.3 80.6 77.4 75.2 73.5 72.2 71.1 69.9 68.9 68.2 67.2 66.8 68.2
RELATIVE HUMIDITY : 69.8 61.3 54.3 48.1 43.5 40.5 37.5 36.0 36.9 37.0 39.2 42.3 48.2 54.4 59.4 62.4 65.5 68.8 72.1 74.4 76.7 78.6 79.7 77.2
BAROMETRIC PRES : 26.4

* C2: Corpus Christi Climate Zone: June through August, 2002
HOURLY TEMPERATURES: 82.3 85.2 87.5 89.5 90.7 91.3 91.5 91.3 90.5 89.0 87.1 84.6 82.5 81.4 80.7 80.1 79.6 78.6 77.9 77.3 76.7 76.3 75.9 78.4
RELATIVE HUMIDITY : 82.5 73.4 66.7 61.3 58.8 57.8 58.3 58.5 59.3 61.8 66.4 73.0 79.3 82.7 84.8 86.3 87.5 89.4 90.4 92.0 92.7 92.9 93.3 90.9
BAROMETRIC PRES : 30.0

* C3: Dallas Climate Zone: June through August, 2002
HOURLY TEMPERATURES: 78.9 81.5 83.9 85.9 87.8 89.3 89.8 90.1 90.0 89.5 88.0 85.9 83.3 81.8 80.7 79.7 78.6 77.6 76.8 76.0 75.4 74.7 74.4 76.2
RELATIVE HUMIDITY : 79.3 72.5 66.5 61.9 57.5 54.4 52.6 51.8 51.3 51.8 54.1 57.7 63.5 67.7 70.1 71.7 74.8 78.0 80.1 82.5 84.7 86.6 88.0 85.0
BAROMETRIC PRES : 29.4

* C4: El Paso Climate Zone: June through August, 2002
HOURLY TEMPERATURES: 75.7 78.8 81.9 85.0 87.6 90.3 92.1 92.9 93.5 93.8 93.4 91.3 89.2 86.4 84.3 82.7 81.1 79.4 78.2 77.0 75.5 74.6 73.6 73.3
RELATIVE HUMIDITY : 53.3 48.1 43.3 38.5 34.4 30.7 28.1 27.3 26.5 25.9 26.1 28.4 31.2 34.3 37.8 40.3 41.7 44.3 47.4 49.8 52.3 54.0 56.0 56.8
BAROMETRIC PRES : 26.0

* C5: Houston Climate Zone: June through August, 2002
HOURLY TEMPERATURES: 80.3 83.0 85.5 87.2 88.3 89.0 89.2 88.7 88.3 87.6 86.5 84.4 82.6 81.0 80.0 79.1 78.4 77.7 77.1 76.5 76.2 75.8 75.5 77.4
RELATIVE HUMIDITY : 84.3 76.6 68.7 63.8 60.1 59.1 59.1 60.3 61.4 63.3 66.4 72.2 77.2 81.7 84.2 87.0 88.8 90.6 92.6 93.7 94.2 94.8 95.2 91.4
BAROMETRIC PRES : 29.9

* C6: Lubbock Climate Zone: June through August, 2002
HOURLY TEMPERATURES:  73.4  76.4  79.8  82.9  85.5  87.8  89.2  90.1  90.2  89.7  88.2
85.7  82.1  79.3  77.4  75.7  74.3  73.2  72.1  71.3  70.6  69.7  68.8  70.2
RELATIVE HUMIDITY  :  72.3  66.3  59.0  52.5  47.5  43.1  40.0  38.2  37.4  37.1  39.0  42.6
48.8  54.4  57.6  61.5  65.3  67.8  70.4  72.6  74.6  76.8  79.4  77.9
BAROMETRIC PRES    :  26.7

* C7: Midland Climate Zone: June through August, 2002
HOURLY TEMPERATURES:  75.6  78.8  82.0  85.2  87.9  90.3  92.0  92.8  93.4  92.9  90.8
89.6 85.8  84.4  82.4  80.8  79.5  78.1  76.4  75.1  74.0  73.0  72.2  73.0
RELATIVE HUMIDITY  :  70.4  63.9  57.3  50.2  44.6  40.0  36.7  34.9  33.3  34.0  36.4  38.8
42.3  46.2  50.6  53.8  57.1  59.6  63.3  66.7  69.6  72.6  75.5  74.9
BAROMETRIC PRES    :  27.0

* C8: San Antonio Climate Zone: June through August, 2002
HOURLY TEMPERATURES:  79.1  81.5  84.1  86.3  88.1  89.5  90.5  90.7  90.3  89.8  88.5
86.2  83.6  81.9  80.7  79.5  78.5  77.7  77.2  76.7  76.2  75.7  75.5  76.7
RELATIVE HUMIDITY  :  81.3  73.5  67.0  61.8  57.1  54.1  51.5  50.4  51.7  52.1  54.1  58.3
64.0  69.3  73.0  77.0  80.6  83.6  84.8  86.8  87.7  88.6  89.1  86.9
BAROMETRIC PRES    :  29.1

**Winter**

* C1: Amarillo Climate Zone: January, February, December, 2002
HOURLY TEMPERATURES: 29.2 28.8 31.9 36.7 40.9 44.0 46.5 48.1 48.9 48.9 47.8 43.7 39.6 37.8 36.0 34.9 34.0 33.5 32.5 32.2 31.3 30.7 30.0 29.9
RELATIVE HUMIDITY : 69.6 70.3 66.2 57.8 50.1 45.8 42.4 40.3 39.9 40.2 41.3 46.9 52.6 55.8 58.3 60.4 62.0 62.1 64.0 64.6 66.1 67.7 68.7 69.0
BAROMETRIC PRES : 26.4

* C2: Corpus Christi Climate Zone: January, February, December, 2002
HOURLY TEMPERATURES: 51.6 52.6 56.2 59.7 62.5 64.5 65.8 66.4 66.5 65.9 64.5 61.8 59.3 58.0 57.0 56.1 55.4 54.7 53.9 53.5 52.9 52.7 52.2 52.1
RELATIVE HUMIDITY : 86.3 85.2 80.0 72.8 66.5 61.9 59.1 57.8 57.9 59.2 62.3 68.5 73.9 76.6 79.1 80.8 81.8 82.6 82.6 83.1 83.9 84.2 85.1 85.9
BAROMETRIC PRES : 30.1

* C3: Dallas Climate Zone: January, February, December, 2002
HOURLY TEMPERATURES: 40.1 40.6 44.1 47.4 50.4 52.8 54.7 55.8 56.7 56.6 55.2 52.5 50.2 49.1 47.7 46.5 45.2 44.3 43.3 42.9 42.1 41.5 41.0 40.4
RELATIVE HUMIDITY : 80.7 80.6 74.4 66.7 59.8 55.0 51.9 49.8 48.8 49.1 51.3 55.2 59.3 61.8 64.7 67.4 70.6 73.0 74.5 74.7 77.3 78.3 79.1 80.3
BAROMETRIC PRES : 29.5

* C4: El Paso Climate Zone: January, February, December, 2002
HOURLY TEMPERATURES: 36.7 36.2 37.6 41.3 45.1 48.2 51.1 53.3 55.0 56.0 56.0 54.8 52.2 50.0 48.5 47.1 45.3 44.4 43.3 41.5 40.6 39.7 38.1 37.6
RELATIVE HUMIDITY : 63.3 63.5 61.4 55.7 48.7 43.6 39.6 35.6 33.0 32.0 31.5 33.4 36.8 40.0 42.5 45.1 48.8 50.3 51.4 55.2 56.7 58.6 61.1 62.1
BAROMETRIC PRES : 26.1

* C5: Houston Climate Zone: January, February, December, 2002
HOURLY TEMPERATURES: 46.1 47.4 50.8 54.5 57.4 59.2 60.2 61.5 62.0 61.8 60.6 57.8 55.5 54.3 53.1 51.9 50.7 49.9 49.1 48.4 47.9 47.4 47.0 46.4
RELATIVE HUMIDITY : 88.9 87.6 80.1 70.4 63.5 59.1 56.5 54.3 53.3 54.2 57.4 64.3 70.8 73.9 77.5 80.1 82.7 84.3 84.8 86.1 87.0 87.1 87.4 88.3
BAROMETRIC PRES : 30.0

* C6: Lubbock Climate Zone: January, February, December, 2002
HOURLY TEMPERATURES: 31.2 31.1 34.4 39.7 44.5 48.4 51.2 53.1 54.1 54.3 53.2 49.2 45.3 42.9 41.2 39.5 38.2 36.7 35.5 34.5 33.6 33.1 32.2 31.8
RELATIVE HUMIDITY : 72.2 72.5 67.7 58.7 50.0 44.3 40.0 37.5 36.1 35.4 36.3 41.7 46.9 51.5 54.4 57.8 60.3 62.5 64.1 66.0 67.4 68.9 71.3 71.9
BAROMETRIC PRES : 26.7

* C7: Midland Climate Zone: January, February, December, 2002
HOURLY TEMPERATURES: 33.8 33.6 37.6 42.8 46.5 49.1 51.4 53.1 54.2 54.8 54.3 51.7 47.4 44.6 42.9 41.3 40.5 39.5 38.0 37.1 36.4 35.1 34.8 34.3
RELATIVE HUMIDITY : 71.6 72.9 66.8 57.9 50.4 46.5 42.4 40.1 38.7 37.6 38.5 42.9 48.3 52.3 56.3 58.3 59.7 62.4 64.6 65.9 66.4 68.5 69.0 70.5
BAROMETRIC PRES : 27.1

* C8: San Antonio Climate Zone: January, February, December, 2002
HOURLY TEMPERATURES: 45.3 45.7 49.6 53.5 56.4 58.8 60.9 62.1 63.1 63.1 62.0 59.3 56.3 54.1 52.2 51.1 49.7 48.8 47.7 47.1 46.2 46.1 45.6 45.2
RELATIVE HUMIDITY : 80.7 79.4 72.6 64.4 58.5 54.4 50.4 48.1 46.1 45.6 46.9 51.8 56.6 62.2 67.1 70.4 74.1 76.3 77.5 77.8 79.5 80.0 80.9 81.5
BAROMETRIC PRES : 29.3

# APPENDIX J
# TxDOT DISTRICT REGISTRATION DISTRIBUTIONS AND STATEWIDE DIESEL FRACTIONS

## 2002 Statewide Diesel Fractions Estimates

```
* HDV fractions are estimated from TxDOT registration data (Mid-year July 2002);
* LDV, LDT, and Bus fractions are EPA defaults
DIESEL FRACTIONS:
 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00060 0.00010 0.00030
 0.00060 0.00130 0.00040 0.00040 0.00010 0.00270 0.00320 0.00970 0.01620 0.02410
 0.05100 0.07060 0.03900 0.02690 0.01140
 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
 0.00000 0.00000 0.00000 0.00000 0.00000 0.00070 0.00330 0.00480 0.01200 0.02230
 0.06560 0.06160 0.04390 0.03160 0.02590
 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
 0.00000 0.00000 0.00000 0.00000 0.00000 0.00070 0.00330 0.00480 0.01200 0.02230
 0.06560 0.06160 0.04390 0.03160 0.02590
 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01150 0.01110 0.01450
 0.01150 0.01290 0.00960 0.00830 0.00720 0.00820 0.01240 0.01350 0.01690 0.02090
 0.02560 0.00130 0.00060 0.00110 0.00010
 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01150 0.01110 0.01450
 0.01150 0.01290 0.00960 0.00830 0.00720 0.00820 0.01240 0.01350 0.01690 0.02090
 0.02560 0.00130 0.00060 0.00110 0.00010
 0.81361 0.75050 0.61397 0.66232 0.57703 0.47784 0.45121 0.20063 0.39808 0.37552
 0.32844 0.35352 0.27226 0.22309 0.17730 0.14483 0.20196 0.17056 0.19074 0.17148
 0.14044 0.00323 0.00000 0.00382 0.00303
 0.68374 0.64723 0.65615 0.64013 0.51450 0.57439 0.54389 0.32661 0.55020 0.58601
 0.62333 0.51890 0.51653 0.46856 0.35294 0.25512 0.29752 0.17664 0.22368 0.21759
 0.16066 0.03297 0.01508 0.00373 0.00406
 0.75174 0.71334 0.72152 0.63857 0.67967 0.73075 0.66667 0.44671 0.70203 0.69632
 0.65581 0.65789 0.57317 0.60350 0.35745 0.24855 0.13542 0.12313 0.18852 0.13253
 0.17797 0.14583 0.05000 0.03185 0.01034
 0.92205 0.86775 0.89367 0.88016 0.75422 0.72991 0.80476 0.45659 0.67857 0.72535
 0.65432 0.70483 0.60383 0.59509 0.41699 0.33654 0.25337 0.30960 0.25418 0.28244
 0.20767 0.23790 0.14394 0.12340 0.03350
 0.92645 0.87176 0.86671 0.86169 0.81933 0.74312 0.78239 0.54923 0.77170 0.75818
 0.57117 0.66954 0.72241 0.69427 0.56318 0.62198 0.54717 0.46968 0.43758 0.40440
 0.37461 0.43137 0.18953 0.14992 0.04644
 0.93134 0.87037 0.90479 0.88593 0.84672 0.75646 0.81899 0.48829 0.82916 0.84387
 0.84789 0.85788 0.83389 0.82784 0.81143 0.81176 0.78571 0.74359 0.73051 0.70909
 0.63052 0.70608 0.36715 0.27615 0.20888
 0.95095 0.93265 0.93355 0.94685 0.94189 0.86917 0.90694 0.67588 0.96360 0.95187
 0.94895 0.93046 0.94083 0.94469 0.95000 0.94092 0.91551 0.91340 0.92834 0.91875
 0.91908 0.88970 0.56726 0.56641 0.55152
 0.98020 0.98603 0.99167 0.98288 0.98189 0.95390 0.99119 0.78746 0.96058 0.98670
 0.96262 1.00000 0.95333 0.97500 0.95238 0.92424 0.92958 0.98969 0.95455 0.97143
 0.94286 0.96296 0.40000 0.44444 0.51064
 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.88570 0.85250 0.87950
 0.99000 0.91050 0.87600 0.77100 0.75020 0.73450 0.67330 0.51550 0.38450 0.32380
 0.32600 0.26390 0.05940 0.04600 0.02910
```

# Abilene District Registration Distributions

```
*  Calculated from Mid-Year (July) 2002 Registration data
*  LDV
    1  0.04328 0.07093 0.08182 0.07701 0.06994 0.06886 0.06373 0.07040 0.05801 0.05402
       0.04612 0.04442 0.03867 0.03551 0.02873 0.02053 0.02039 0.02011 0.01632 0.01082
       0.00808 0.00657 0.00471 0.00673 0.03429
*  LDT1
    2  0.11505 0.16766 0.11353 0.12126 0.05987 0.08493 0.05438 0.05258 0.03510 0.03019
       0.02159 0.01813 0.01365 0.01401 0.01119 0.00628 0.00997 0.01127 0.00939 0.00758
       0.00766 0.00426 0.00361 0.00498 0.02188
*  LDT2
    3  0.11505 0.16766 0.11353 0.12126 0.05987 0.08493 0.05438 0.05258 0.03510 0.03019
       0.02159 0.01813 0.01365 0.01401 0.01119 0.00628 0.00997 0.01127 0.00939 0.00758
       0.00766 0.00426 0.00361 0.00498 0.02188
*  LDT3
    4  0.06787 0.09986 0.08875 0.07865 0.06334 0.07191 0.05383 0.05615 0.05468 0.03997
       0.03292 0.03405 0.02705 0.02586 0.02309 0.01500 0.02027 0.01953 0.01744 0.01217
       0.01311 0.01154 0.00758 0.01047 0.05491
*  LDT4
    5  0.06787 0.09986 0.08875 0.07865 0.06334 0.07191 0.05383 0.05615 0.05468 0.03997
       0.03292 0.03405 0.02705 0.02586 0.02309 0.01500 0.02027 0.01953 0.01744 0.01217
       0.01311 0.01154 0.00758 0.01047 0.05491
*  HDV2
    6  0.14730 0.22782 0.09607 0.09058 0.07045 0.05581 0.02196 0.03751 0.01830 0.01281
       0.01830 0.01372 0.01281 0.02470 0.01372 0.00915 0.01830 0.01189 0.01189 0.00640
       0.01921 0.01098 0.00915 0.00640 0.03477
*  HDV3
    7  0.05190 0.12375 0.07984 0.09780 0.03393 0.07585 0.05788 0.06188 0.04391 0.04192
       0.03393 0.02196 0.02196 0.02395 0.01397 0.01397 0.01597 0.01796 0.00798 0.00798
       0.01198 0.02196 0.00200 0.00399 0.11178
*  HDV4
    8  0.04494 0.06742 0.08989 0.10674 0.05056 0.11236 0.05618 0.07303 0.03933 0.04494
       0.00000 0.01124 0.05618 0.01124 0.00562 0.00000 0.00562 0.00562 0.01124 0.00000
       0.01124 0.02809 0.00000 0.02809 0.14043
*  HDV5
    9  0.04082 0.07483 0.02041 0.04082 0.02721 0.04082 0.04082 0.02721 0.06122 0.02041
       0.01361 0.02721 0.02041 0.04762 0.05442 0.02721 0.02721 0.03401 0.01361 0.02721
       0.04082 0.05442 0.02041 0.02041 0.17685
*  HDV6
   10  0.02721 0.01134 0.03175 0.03401 0.03855 0.04308 0.03401 0.05215 0.04308 0.05215
       0.02948 0.06803 0.04308 0.02948 0.03401 0.02948 0.04535 0.04308 0.04535 0.02494
       0.02948 0.02948 0.03175 0.03175 0.11793
*  HDV7
   11  0.02400 0.03200 0.03600 0.04400 0.04400 0.02800 0.06800 0.09200 0.04000 0.04800
       0.04000 0.06800 0.03600 0.03600 0.02000 0.02400 0.05600 0.04000 0.04400 0.02000
       0.03200 0.03600 0.02000 0.02400 0.04800
*  HDV8A
   12  0.01862 0.01596 0.00798 0.03191 0.02128 0.04787 0.03457 0.06117 0.04787 0.05851
       0.02128 0.06915 0.05851 0.03723 0.04255 0.03457 0.03191 0.05319 0.04521 0.01596
       0.05053 0.02926 0.03191 0.02660 0.10640
*  HDV8B
   13  0.01724 0.01724 0.05172 0.06897 0.15517 0.06897 0.01724 0.18967 0.17241 0.10345
       0.00000 0.00000 0.03448 0.00000 0.01724 0.00000 0.00000 0.00000 0.01724 0.01724
       0.00000 0.01724 0.00000 0.00000 0.03448
*   HDBS is MOBILE6 default
*   HDBT is MOBILE6 default
*  MC
   16  0.14179 0.12846 0.09450 0.07140 0.05810 0.04445 0.04200 0.02835 0.02450 0.01680
       0.02135 0.01155 0.01050 0.01610 0.00980 0.01400 0.03080 0.02520 0.02275 0.02240
       0.03465 0.03045 0.02170 0.01540 0.06300
```

# Amarillo District Registration Distributions

```
*  Calculated from Mid-Year (July) 2002 Registration data
*  LDV
    1  0.03701 0.06001 0.07243 0.07195 0.06561 0.06796 0.06306 0.07284 0.06263 0.05899
       0.05176 0.04897 0.04331 0.03833 0.03060 0.02305 0.02167 0.02081 0.01624 0.01073
       0.00794 0.00638 0.00489 0.00716 0.03567
*  LDT1
    2  0.10468 0.12779 0.10043 0.12749 0.05980 0.08634 0.05580 0.05170 0.03705 0.03623
       0.02413 0.02003 0.01752 0.02326 0.01737 0.00897 0.01445 0.01312 0.01066 0.00825
       0.00856 0.00584 0.00461 0.00697 0.02895
*  LDT2
    3  0.10468 0.12779 0.10043 0.12749 0.05980 0.08634 0.05580 0.05170 0.03705 0.03623
       0.02413 0.02003 0.01752 0.02326 0.01737 0.00897 0.01445 0.01312 0.01066 0.00825
       0.00856 0.00584 0.00461 0.00697 0.02895
*  LDT3
    4  0.06112 0.07737 0.07490 0.07730 0.06363 0.07408 0.05340 0.05823 0.05789 0.04676
       0.03715 0.03295 0.02845 0.03303 0.02708 0.01800 0.02313 0.02001 0.01876 0.01370
       0.01362 0.01184 0.00798 0.01224 0.05738
*  LDT4
    5  0.06112 0.07737 0.07490 0.07730 0.06363 0.07408 0.05340 0.05823 0.05789 0.04676
       0.03715 0.03295 0.02845 0.03303 0.02708 0.01800 0.02313 0.02001 0.01876 0.01370
       0.01362 0.01184 0.00798 0.01224 0.05738
*  HDV2
    6  0.12128 0.15755 0.08264 0.11177 0.05945 0.05291 0.04459 0.05113 0.03448 0.03270
       0.02378 0.02200 0.02438 0.01546 0.02081 0.00713 0.01665 0.01308 0.01308 0.00892
       0.01665 0.01011 0.01011 0.00832 0.04102
*  HDV3
    7  0.03653 0.09708 0.07620 0.11482 0.02088 0.07411 0.03967 0.07829 0.04802 0.03445
       0.02923 0.02923 0.01879 0.02088 0.01879 0.01670 0.01566 0.00835 0.01253 0.00939
       0.02192 0.01775 0.01148 0.00835 0.14090
*  HDV4
    8  0.03641 0.12325 0.06723 0.06723 0.03361 0.13165 0.06162 0.05882 0.04762 0.02801
       0.01401 0.01401 0.01681 0.01961 0.01120 0.00560 0.00840 0.01120 0.00280 0.00840
       0.01120 0.01120 0.02521 0.01401 0.17089
*  HDV5
    9  0.02239 0.07090 0.05597 0.06716 0.02985 0.03358 0.02612 0.01866 0.02612 0.00746
       0.03358 0.02985 0.01493 0.02239 0.02239 0.02239 0.03358 0.01119 0.02239 0.01866
       0.04104 0.04104 0.02985 0.03358 0.26493
*  HDV6
   10  0.01619 0.13765 0.05803 0.06073 0.03779 0.01350 0.03509 0.03104 0.01889 0.02294
       0.02564 0.03779 0.03509 0.02699 0.01619 0.02024 0.02834 0.02564 0.03239 0.01350
       0.02294 0.03239 0.01889 0.03644 0.19568
*  HDV7
   11  0.01285 0.02314 0.04370 0.04884 0.04884 0.02057 0.04884 0.06170 0.04627 0.04627
       0.03085 0.05141 0.06427 0.03599 0.02828 0.02828 0.02828 0.05656 0.02828 0.01542
       0.02571 0.02828 0.03342 0.02828 0.11567
*  HDV8A
   12  0.00824 0.01647 0.02306 0.01812 0.03460 0.04613 0.03460 0.03295 0.03624 0.04613
       0.02306 0.02965 0.04613 0.03130 0.02471 0.01483 0.02636 0.05272 0.05437 0.01647
       0.03295 0.05601 0.05437 0.04778 0.19275
*  HDV8B
   13  0.01235 0.04938 0.12342 0.04938 0.06173 0.03704 0.07407 0.12346 0.09877 0.06173
       0.01235 0.00000 0.02469 0.09877 0.00000 0.00000 0.01235 0.00000 0.01235 0.02469
       0.01235 0.03704 0.01235 0.02469 0.03704
*   HDBS is MOBILE6 default
*   HDBT is MOBILE6 default
*  MC
   16  0.11093 0.12984 0.11130 0.08774 0.05750 0.04693 0.03970 0.03543 0.03061 0.01873
       0.01892 0.01150 0.01261 0.01280 0.01336 0.01391 0.02226 0.02337 0.02189 0.02152
       0.03283 0.02820 0.02300 0.01595 0.05917
```

# Atlanta District Registration Distributions

```
*  Calculated from Mid-Year (July) 2002 Registration data
*  LDV
    1  0.04183 0.06779 0.07888 0.07775 0.06930 0.06942 0.06861 0.07639 0.06185 0.05801
       0.04919 0.04416 0.03979 0.03561 0.03036 0.02193 0.01974 0.01912 0.01497 0.00935
       0.00685 0.00505 0.00378 0.00568 0.02459
*  LDT1
    2  0.08854 0.14211 0.10817 0.11489 0.05518 0.08243 0.05978 0.06024 0.04106 0.03872
       0.02612 0.02423 0.01812 0.01729 0.01525 0.00936 0.01585 0.01495 0.01344 0.00777
       0.00883 0.00491 0.00483 0.00747 0.02046
*  LDT2
    3  0.08854 0.14211 0.10817 0.11489 0.05518 0.08243 0.05978 0.06024 0.04106 0.03872
       0.02612 0.02423 0.01812 0.01729 0.01525 0.00936 0.01585 0.01495 0.01344 0.00777
       0.00883 0.00491 0.00483 0.00747 0.02046
*  LDT3
    4  0.05114 0.08279 0.07240 0.06751 0.06239 0.07054 0.05781 0.06530 0.06016 0.04805
       0.03966 0.03865 0.03202 0.03206 0.02696 0.02001 0.02532 0.02185 0.02049 0.01333
       0.01352 0.01163 0.00636 0.01079 0.04926
*  LDT4
    5  0.05114 0.08279 0.07240 0.06751 0.06239 0.07054 0.05781 0.06530 0.06016 0.04805
       0.03966 0.03865 0.03202 0.03206 0.02696 0.02001 0.02532 0.02185 0.02049 0.01333
       0.01352 0.01163 0.00636 0.01079 0.04926
*  HDV2
    6  0.14921 0.20943 0.12762 0.10995 0.08508 0.06806 0.02552 0.03599 0.01832 0.01571
       0.00982 0.01767 0.01309 0.01178 0.01113 0.00654 0.01047 0.01047 0.00393 0.00720
       0.01178 0.00524 0.00327 0.00785 0.02487
*  HDV3
    7  0.03650 0.13323 0.08577 0.11496 0.05839 0.08759 0.03832 0.04927 0.03650 0.04927
       0.04015 0.04197 0.03832 0.02555 0.00912 0.00547 0.01460 0.00730 0.01642 0.00912
       0.01095 0.00730 0.01277 0.00912 0.06204
*  HDV4
    8  0.03825 0.06011 0.12024 0.08197 0.02732 0.08743 0.06557 0.10383 0.05464 0.03825
       0.03825 0.03825 0.03279 0.01093 0.00546 0.02186 0.02186 0.00546 0.01093 0.00000
       0.00546 0.01639 0.01639 0.02732 0.07104
*  HDV5
    9  0.01681 0.11765 0.10084 0.07563 0.03361 0.02521 0.02521 0.03361 0.05882 0.00840
       0.00840 0.03361 0.05882 0.02521 0.01681 0.02521 0.02521 0.02521 0.02521 0.01681
       0.04202 0.04202 0.00840 0.01681 0.13446
*  HDV6
   10  0.03401 0.04308 0.09297 0.05442 0.08163 0.03628 0.04535 0.08844 0.03855 0.04082
       0.02041 0.04308 0.03628 0.03855 0.02721 0.02494 0.01814 0.03175 0.01587 0.01587
       0.01814 0.01587 0.02268 0.02041 0.09525
*  HDV7
   11  0.01351 0.03378 0.09459 0.06081 0.06757 0.09461 0.06081 0.04730 0.04054 0.04730
       0.04730 0.05405 0.04054 0.04730 0.01351 0.02703 0.03378 0.02027 0.03378 0.02027
       0.02027 0.02027 0.01351 0.00000 0.04730
*  HDV8A
   12  0.00806 0.01613 0.03629 0.03629 0.02419 0.04032 0.04032 0.06855 0.05645 0.04032
       0.03629 0.06452 0.04839 0.01613 0.02823 0.03226 0.03629 0.07259 0.04435 0.00806
       0.06452 0.05242 0.04032 0.02016 0.06855
*  HDV8B
   13  0.00000 0.08333 0.08333 0.08333 0.08333 0.00000 0.00000 0.00000 0.00000 0.08333
       0.00000 0.08333 0.00000 0.00000 0.00000 0.00000 0.16667 0.08333 0.25002 0.00000
       0.00000 0.00000 0.00000 0.00000 0.00000
*   HDBS is MOBILE6 default
*   HDBT is MOBILE6 default
*  MC
   16  0.14841 0.12304 0.10520 0.08829 0.06481 0.06418 0.05354 0.03381 0.03068 0.02286
       0.02129 0.01252 0.01096 0.01127 0.01033 0.01096 0.01910 0.02693 0.01753 0.01628
       0.02473 0.01472 0.01409 0.01064 0.04383
```

# Austin District Registration Distributions

```
*  Calculated from Mid-Year (July) 2002 Registration data
*  LDV
    1  0.07213 0.09487 0.09747 0.08783 0.07474 0.07192 0.06388 0.06982 0.05788 0.05301
       0.04387 0.03982 0.03278 0.02746 0.02157 0.01677 0.01425 0.01230 0.00956 0.00567
       0.00399 0.00305 0.00226 0.00302 0.02008
*  LDT1
    2  0.10571 0.15308 0.12585 0.13501 0.05985 0.08050 0.05648 0.05390 0.03803 0.03345
       0.02298 0.01724 0.01474 0.01462 0.01219 0.00693 0.01196 0.01225 0.01084 0.00550
       0.00509 0.00296 0.00254 0.00419 0.01411
*  LDT2
    3  0.10571 0.15308 0.12585 0.13501 0.05985 0.08050 0.05648 0.05390 0.03803 0.03345
       0.02298 0.01724 0.01474 0.01462 0.01219 0.00693 0.01196 0.01225 0.01084 0.00550
       0.00509 0.00296 0.00254 0.00419 0.01411
*  LDT3
    4  0.07794 0.10687 0.09993 0.08690 0.06885 0.07368 0.05568 0.05970 0.05940 0.04637
       0.03571 0.03127 0.02492 0.02396 0.01978 0.01482 0.01843 0.01680 0.01354 0.00846
       0.00871 0.00678 0.00397 0.00587 0.03166
*  LDT4
    5  0.07794 0.10687 0.09993 0.08690 0.06885 0.07368 0.05568 0.05970 0.05940 0.04637
       0.03571 0.03127 0.02492 0.02396 0.01978 0.01482 0.01843 0.01680 0.01354 0.00846
       0.00871 0.00678 0.00397 0.00587 0.03166
*  HDV2
    6  0.15161 0.18774 0.13055 0.13301 0.05229 0.07545 0.04229 0.04088 0.03071 0.02088
       0.01544 0.01614 0.01421 0.01105 0.00632 0.00509 0.00948 0.01141 0.00912 0.00474
       0.00667 0.00597 0.00193 0.00474 0.01228
*  HDV3
    7  0.04010 0.10476 0.14787 0.14835 0.04311 0.08120 0.05263 0.07769 0.06366 0.03609
       0.02356 0.02306 0.02256 0.01905 0.01103 0.01053 0.01203 0.01053 0.00602 0.00652
       0.00501 0.00301 0.00752 0.00551 0.03860
*  HDV4
    8  0.06113 0.10842 0.16148 0.13956 0.05190 0.08766 0.06920 0.07843 0.03922 0.01730
       0.04268 0.01961 0.01730 0.01961 0.00577 0.00807 0.01153 0.00807 0.00346 0.00231
       0.00461 0.00577 0.00115 0.00346 0.03230
*  HDV5
    9  0.06358 0.10790 0.13102 0.15416 0.03854 0.04624 0.03276 0.02890 0.03083 0.01734
       0.01927 0.02890 0.03276 0.02697 0.01541 0.03083 0.02119 0.01734 0.02890 0.01156
       0.02119 0.01541 0.00193 0.01927 0.05780
*  HDV6
   10  0.04048 0.07538 0.09353 0.10517 0.07166 0.04653 0.05631 0.06980 0.03350 0.04700
       0.03909 0.03537 0.02932 0.02280 0.02327 0.02745 0.02234 0.02978 0.02559 0.00884
       0.01908 0.01117 0.00605 0.01210 0.04839
*  HDV7
   11  0.03090 0.07210 0.08841 0.09441 0.06781 0.05322 0.06867 0.05751 0.04893 0.05236
       0.03090 0.05322 0.03863 0.02318 0.03262 0.03691 0.02575 0.03691 0.02489 0.01030
       0.00858 0.01288 0.00601 0.00773 0.01717
*  HDV8A
   12  0.01523 0.05697 0.06204 0.06035 0.04794 0.02764 0.04794 0.08293 0.06881 0.08065
       0.04625 0.05020 0.04681 0.05753 0.03610 0.02876 0.02538 0.02651 0.02312 0.01015
       0.01410 0.01466 0.01974 0.01748 0.03271
*  HDV8B
   13  0.07728 0.17330 0.17564 0.18738 0.04215 0.04450 0.03747 0.12646 0.02108 0.03981
       0.00468 0.00703 0.00703 0.00000 0.00703 0.00468 0.00234 0.02342 0.00468 0.00468
       0.00000 0.00234 0.00468 0.00000 0.00234
*   HDBS is MOBILE6 default
*   HDBT is MOBILE6 default
*  MC
   16  0.10979 0.12357 0.09995 0.08334 0.06254 0.05558 0.04779 0.03963 0.03094 0.03250
       0.02165 0.01529 0.01541 0.01361 0.01313 0.01379 0.02452 0.02141 0.01691 0.02021
       0.02536 0.01829 0.01493 0.01247 0.06739
```

## Beaumont District Registration Distributions

```
*  Calculated from Mid-Year (July) 2002 Registration data
*  LDV
    1  0.05108 0.07502 0.09022 0.07954 0.07366 0.07002 0.06480 0.07049 0.05881 0.05522
       0.04816 0.04448 0.03969 0.03566 0.02825 0.02167 0.01842 0.01729 0.01334 0.00805
       0.00545 0.00430 0.00322 0.00414 0.01902
*  LDT1
    2  0.11964 0.15504 0.11331 0.13611 0.05707 0.08506 0.06408 0.05435 0.03473 0.03257
       0.02496 0.01750 0.01458 0.01549 0.01098 0.00515 0.01079 0.00962 0.00916 0.00542
       0.00485 0.00295 0.00246 0.00428 0.00985
*  LDT2
    3  0.11964 0.15504 0.11331 0.13611 0.05707 0.08506 0.06408 0.05435 0.03473 0.03257
       0.02496 0.01750 0.01458 0.01549 0.01098 0.00515 0.01079 0.00962 0.00916 0.00542
       0.00485 0.00295 0.00246 0.00428 0.00985
*  LDT3
    4  0.07635 0.09659 0.08110 0.08300 0.06839 0.07244 0.05853 0.06089 0.05871 0.04489
       0.04042 0.03773 0.03139 0.03155 0.02519 0.01684 0.01924 0.01748 0.01626 0.01026
       0.01074 0.00876 0.00435 0.00610 0.02280
*  LDT4
    5  0.07635 0.09659 0.08110 0.08300 0.06839 0.07244 0.05853 0.06089 0.05871 0.04489
       0.04042 0.03773 0.03139 0.03155 0.02519 0.01684 0.01924 0.01748 0.01626 0.01026
       0.01074 0.00876 0.00435 0.00610 0.02280
*  HDV2
    6  0.15464 0.18435 0.11175 0.14515 0.07464 0.06515 0.03175 0.03546 0.02062 0.01979
       0.01361 0.02144 0.01567 0.00990 0.01237 0.00907 0.01237 0.00990 0.01031 0.00412
       0.00825 0.00412 0.00701 0.00371 0.01485
*  HDV3
    7  0.06503 0.09325 0.10552 0.11167 0.04663 0.07239 0.05644 0.08834 0.05399 0.03681
       0.02945 0.03558 0.02945 0.02577 0.02945 0.01104 0.00613 0.01104 0.00736 0.00859
       0.00613 0.01104 0.00123 0.01104 0.04663
*  HDV4
    8  0.04094 0.07602 0.08480 0.14036 0.05848 0.11111 0.08772 0.07895 0.03216 0.03509
       0.03216 0.03509 0.03801 0.01754 0.00877 0.01754 0.00292 0.00877 0.01170 0.00877
       0.00292 0.00292 0.01170 0.00000 0.05556
*  HDV5
    9  0.03797 0.11812 0.09283 0.11392 0.03797 0.07173 0.03797 0.05063 0.01688 0.02954
       0.01688 0.02110 0.02110 0.05063 0.02532 0.00844 0.02532 0.02110 0.02110 0.02532
       0.01266 0.02954 0.00844 0.00422 0.10127
*  HDV6
   10  0.03273 0.04848 0.08848 0.09453 0.05455 0.05212 0.04364 0.04000 0.03515 0.04970
       0.04242 0.05576 0.03273 0.02788 0.03030 0.03273 0.03273 0.03152 0.02182 0.00970
       0.02545 0.02667 0.01697 0.01818 0.05576
*  HDV7
   11  0.02128 0.03951 0.05775 0.04863 0.08814 0.04559 0.03647 0.05775 0.05471 0.04255
       0.05471 0.08815 0.05775 0.02432 0.03951 0.02736 0.01216 0.03951 0.02736 0.00608
       0.01520 0.02128 0.02128 0.03040 0.04255
*  HDV8A
   12  0.00795 0.00795 0.01854 0.04636 0.03179 0.01325 0.03179 0.05430 0.06623 0.07944
       0.05563 0.05298 0.05828 0.07947 0.05298 0.03841 0.02649 0.04901 0.04371 0.01325
       0.01589 0.03709 0.02252 0.02914 0.06755
*  HDV8B
   13  0.01095 0.09732 0.11071 0.09611 0.12409 0.08029 0.10219 0.17152 0.13990 0.03041
       0.00730 0.00487 0.00973 0.00365 0.00487 0.00000 0.00122 0.00000 0.00000 0.00000
       0.00000 0.00243 0.00000 0.00122 0.00122
*   HDBS is MOBILE6 default
*   HDBT is MOBILE6 default
*  MC
   16  0.11407 0.15383 0.12838 0.09141 0.06608 0.05538 0.05255 0.04012 0.03084 0.02234
       0.01715 0.00960 0.01023 0.01196 0.01101 0.01117 0.02093 0.01967 0.01259 0.01385
       0.01841 0.01479 0.01495 0.01007 0.04862
```

# Brownwood District Registration Distributions

```
*  Calculated from Mid-Year (July) 2002 Registration data
*  LDV
    1  0.03786 0.06632 0.07513 0.07100 0.06276 0.06610 0.06059 0.06959 0.05736 0.05703
       0.05183 0.04447 0.04144 0.03783 0.03224 0.02486 0.02302 0.02345 0.01803 0.01241
       0.00963 0.00705 0.00542 0.00751 0.03707
*  LDT1
    2  0.09505 0.16339 0.10386 0.11380 0.05296 0.07518 0.06125 0.05203 0.03964 0.04281
       0.02940 0.02469 0.01762 0.01690 0.01311 0.00819 0.01495 0.01157 0.01147 0.00850
       0.00768 0.00553 0.00481 0.00748 0.01813
*  LDT2
    3  0.09505 0.16339 0.10386 0.11380 0.05296 0.07518 0.06125 0.05203 0.03964 0.04281
       0.02940 0.02469 0.01762 0.01690 0.01311 0.00819 0.01495 0.01157 0.01147 0.00850
       0.00768 0.00553 0.00481 0.00748 0.01813
*  LDT3
    4  0.06383 0.10333 0.07844 0.07080 0.05924 0.06614 0.05436 0.05778 0.05393 0.04583
       0.03881 0.03442 0.02925 0.02956 0.02521 0.01839 0.02307 0.02038 0.01846 0.01240
       0.01334 0.01170 0.00673 0.01002 0.05458
*  LDT4
    5  0.06383 0.10333 0.07844 0.07080 0.05924 0.06614 0.05436 0.05778 0.05393 0.04583
       0.03881 0.03442 0.02925 0.02956 0.02521 0.01839 0.02307 0.02038 0.01846 0.01240
       0.01334 0.01170 0.00673 0.01002 0.05458
*  HDV2
    6  0.14932 0.22080 0.11567 0.11567 0.08728 0.08412 0.01893 0.02629 0.02419 0.02313
       0.00631 0.01052 0.00946 0.01367 0.01052 0.00210 0.01052 0.00315 0.00421 0.00421
       0.00841 0.01472 0.00210 0.00946 0.02524
*  HDV3
    7  0.06324 0.08696 0.07510 0.11854 0.02372 0.07115 0.03162 0.02372 0.07905 0.03953
       0.01976 0.04743 0.02372 0.02372 0.02767 0.00395 0.02767 0.02372 0.02372 0.00791
       0.02767 0.01581 0.01186 0.00395 0.09881
*  HDV4
    8  0.04082 0.02041 0.06122 0.10204 0.04082 0.00000 0.04082 0.02041 0.02041 0.06122
       0.02041 0.04082 0.02041 0.04082 0.02041 0.00000 0.02041 0.06122 0.00000 0.00000
       0.06122 0.00000 0.04082 0.06122 0.20407
*  HDV5
    9  0.04167 0.03125 0.01042 0.05208 0.04167 0.02083 0.01042 0.01042 0.02083 0.00000
       0.05208 0.08333 0.01042 0.01042 0.02083 0.03125 0.00000 0.03125 0.08333 0.03125
       0.05208 0.04167 0.02083 0.05208 0.23959
*  HDV6
   10  0.00727 0.00000 0.02182 0.05455 0.08727 0.05091 0.04000 0.04000 0.02545 0.05455
       0.04000 0.03273 0.04727 0.02182 0.03273 0.03636 0.04000 0.04364 0.02545 0.01455
       0.04727 0.02909 0.01818 0.04364 0.14545
*  HDV7
   11  0.01905 0.01905 0.02857 0.02857 0.00952 0.04762 0.05714 0.07620 0.07619 0.04762
       0.05714 0.05714 0.07619 0.00952 0.00952 0.04762 0.05714 0.03810 0.02857 0.02857
       0.02857 0.03810 0.01905 0.02857 0.06667
*  HDV8A
   12  0.00000 0.00585 0.04094 0.01754 0.04094 0.01754 0.01754 0.06433 0.03509 0.04094
       0.02339 0.05848 0.04678 0.04094 0.04094 0.03509 0.04094 0.05263 0.04678 0.00585
       0.03509 0.04094 0.05263 0.05848 0.14033
*  HDV8B
   13  0.07767 0.04854 0.15532 0.07767 0.07767 0.07767 0.07767 0.08738 0.08738 0.09709
       0.02913 0.00971 0.00971 0.00971 0.00971 0.00000 0.00000 0.00971 0.02913 0.01942
       0.00000 0.00971 0.00000 0.00000 0.00000
*   HDBS is MOBILE6 default
*   HDBT is MOBILE6 default
*  MC
   16  0.10261 0.09840 0.11018 0.06644 0.04962 0.05130 0.04205 0.02944 0.02860 0.03112
       0.01346 0.01177 0.01262 0.01850 0.01766 0.01934 0.02523 0.02775 0.02103 0.02860
       0.03701 0.03448 0.02691 0.01598 0.07990
```

## Bryan District Registration Distributions

```
*  Calculated from Mid-Year (July) 2002 Registration data
*  LDV
    1  0.07202 0.09869 0.08605 0.07633 0.06976 0.06808 0.06130 0.06638 0.05567 0.05186
       0.04454 0.04278 0.03563 0.03286 0.02603 0.01873 0.01723 0.01587 0.01266 0.00798
       0.00581 0.00459 0.00312 0.00445 0.02158
*  LDT1
    2  0.12132 0.16484 0.11012 0.12070 0.06060 0.07737 0.05738 0.05667 0.03677 0.03574
       0.02454 0.01990 0.01548 0.01495 0.01169 0.00647 0.01182 0.01160 0.01044 0.00562
       0.00602 0.00353 0.00210 0.00393 0.01040
*  LDT2
    3  0.12132 0.16484 0.11012 0.12070 0.06060 0.07737 0.05738 0.05667 0.03677 0.03574
       0.02454 0.01990 0.01548 0.01495 0.01169 0.00647 0.01182 0.01160 0.01044 0.00562
       0.00602 0.00353 0.00210 0.00393 0.01040
*  LDT3
    4  0.08235 0.11287 0.08675 0.08074 0.06379 0.07050 0.05509 0.05760 0.05452 0.04556
       0.03682 0.03442 0.02833 0.02828 0.02265 0.01530 0.01966 0.01801 0.01621 0.00973
       0.01122 0.00877 0.00401 0.00649 0.03033
*  LDT4
    5  0.08235 0.11287 0.08675 0.08074 0.06379 0.07050 0.05509 0.05760 0.05452 0.04556
       0.03682 0.03442 0.02833 0.02828 0.02265 0.01530 0.01966 0.01801 0.01621 0.00973
       0.01122 0.00877 0.00401 0.00649 0.03033
*  HDV2
    6  0.17821 0.24214 0.12577 0.11839 0.08521 0.06923 0.01925 0.02499 0.02130 0.01147
       0.00983 0.00983 0.00860 0.00778 0.00901 0.00410 0.00655 0.00778 0.00328 0.00328
       0.00655 0.00737 0.00287 0.00451 0.01270
*  HDV3
    7  0.05965 0.08947 0.12279 0.11930 0.03860 0.09649 0.05614 0.07018 0.04912 0.03684
       0.04211 0.02632 0.04035 0.01754 0.01404 0.01053 0.01228 0.01053 0.00877 0.00175
       0.01754 0.01053 0.00351 0.00351 0.04211
*  HDV4
    8  0.03828 0.09569 0.08134 0.07177 0.06699 0.10529 0.06220 0.08134 0.02392 0.05263
       0.02392 0.01435 0.01914 0.01435 0.03828 0.00957 0.01435 0.00000 0.00478 0.01435
       0.03349 0.00957 0.01914 0.00957 0.09569
*  HDV5
    9  0.03731 0.07463 0.09701 0.09701 0.01493 0.03731 0.01493 0.02239 0.03731 0.05970
       0.02985 0.02239 0.02239 0.05224 0.03731 0.00000 0.02239 0.05224 0.04478 0.00746
       0.02985 0.02985 0.01493 0.05224 0.08955
*  HDV6
   10  0.01779 0.02174 0.05731 0.06719 0.07312 0.05534 0.03360 0.07115 0.03162 0.07510
       0.03557 0.03557 0.04545 0.03162 0.02174 0.02174 0.04743 0.02767 0.02372 0.02964
       0.02767 0.03162 0.02767 0.02174 0.06719
*  HDV7
   11  0.07112 0.09673 0.10669 0.07255 0.08819 0.08250 0.07681 0.09104 0.04979 0.04410
       0.02560 0.03129 0.02560 0.00996 0.00996 0.00996 0.02134 0.01280 0.02134 0.00284
       0.00427 0.00853 0.00427 0.00996 0.02276
*  HDV8A
   12  0.00803 0.02610 0.02610 0.02410 0.03614 0.03414 0.04217 0.07430 0.04418 0.08435
       0.04217 0.06024 0.05622 0.04819 0.03614 0.04016 0.04819 0.04217 0.04016 0.01205
       0.02209 0.03012 0.03614 0.02209 0.06426
*  HDV8B
   13  0.00699 0.05594 0.06294 0.23777 0.11189 0.10490 0.02797 0.13986 0.03497 0.09790
       0.00000 0.00699 0.04196 0.01399 0.00699 0.00000 0.01399 0.00000 0.00699 0.00000
       0.00000 0.00699 0.00699 0.00699 0.00699
*   HDBS is MOBILE6 default
*   HDBT is MOBILE6 default
*  MC
   16  0.13122 0.13846 0.09583 0.08362 0.06514 0.04760 0.04134 0.03883 0.03226 0.03101
       0.01973 0.01691 0.01378 0.01691 0.01315 0.01002 0.02913 0.02255 0.01629 0.01816
       0.01910 0.02004 0.01503 0.01190 0.05199
```

# Childress District Registration Distributions

```
*  Calculated from Mid-Year (July) 2002 Registration data
*  LDV
    1  0.03724 0.06130 0.07296 0.06994 0.06559 0.06508 0.06278 0.06982 0.06002 0.05452
       0.05081 0.04723 0.04492 0.04268 0.03206 0.02476 0.02182 0.02176 0.01689 0.01312
       0.01088 0.00672 0.00557 0.00813 0.03340
*  LDT1
    2  0.08745 0.13196 0.10418 0.11863 0.06198 0.08327 0.05894 0.05741 0.04563 0.03764
       0.02966 0.02433 0.01673 0.02357 0.02129 0.00494 0.01103 0.01217 0.01103 0.00722
       0.00989 0.00646 0.00646 0.00532 0.02281
*  LDT2
    3  0.08745 0.13196 0.10418 0.11863 0.06198 0.08327 0.05894 0.05741 0.04563 0.03764
       0.02966 0.02433 0.01673 0.02357 0.02129 0.00494 0.01103 0.01217 0.01103 0.00722
       0.00989 0.00646 0.00646 0.00532 0.02281
*  LDT3
    4  0.05390 0.07840 0.07592 0.07181 0.06144 0.07224 0.05313 0.05613 0.05793 0.04730
       0.04010 0.03325 0.02931 0.03419 0.03162 0.01877 0.02425 0.02271 0.02039 0.01302
       0.01568 0.01251 0.00934 0.01405 0.05261
*  LDT4
    5  0.05390 0.07840 0.07592 0.07181 0.06144 0.07224 0.05313 0.05613 0.05793 0.04730
       0.04010 0.03325 0.02931 0.03419 0.03162 0.01877 0.02425 0.02271 0.02039 0.01302
       0.01568 0.01251 0.00934 0.01405 0.05261
*  HDV2
    6  0.15049 0.22334 0.12136 0.11650 0.04854 0.06796 0.01942 0.01942 0.02427 0.00971
       0.01456 0.02427 0.02427 0.02427 0.01456 0.01942 0.00485 0.00485 0.01456 0.00485
       0.00000 0.00000 0.00485 0.00485 0.03883
*  HDV3
    7  0.12766 0.04255 0.08511 0.08511 0.01064 0.01064 0.05319 0.03191 0.01064 0.03191
       0.03191 0.05319 0.07447 0.03191 0.04255 0.00000 0.02128 0.00000 0.01064 0.01064
       0.00000 0.02128 0.02128 0.01064 0.18085
*  HDV4
    8  0.06250 0.06250 0.00000 0.12500 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
       0.00000 0.06250 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.06250 0.00000
       0.00000 0.06250 0.06250 0.06250 0.43750
*  HDV5
    9  0.00000 0.00000 0.00000 0.04000 0.00000 0.00000 0.00000 0.00000 0.00000 0.04000
       0.12000 0.04000 0.00000 0.00000 0.08000 0.04000 0.00000 0.00000 0.00000 0.04000
       0.08000 0.00000 0.00000 0.12000 0.40000
*  HDV6
   10  0.07937 0.00000 0.03175 0.04762 0.01587 0.07937 0.01587 0.01587 0.06349 0.03175
       0.00000 0.09524 0.01587 0.01587 0.00000 0.06349 0.06349 0.04762 0.03175 0.00000
       0.06349 0.01587 0.01587 0.04762 0.14286
*  HDV7
   11  0.13636 0.04545 0.00000 0.02273 0.00000 0.00000 0.09091 0.00000 0.06818 0.06818
       0.04545 0.09091 0.09091 0.02273 0.02273 0.00000 0.02273 0.00000 0.00000 0.00000
       0.04545 0.06818 0.00000 0.02273 0.13637
*  HDV8A
   12  0.05405 0.02703 0.00000 0.02703 0.00000 0.05405 0.00000 0.00000 0.02703 0.05405
       0.02703 0.08108 0.02703 0.02703 0.10811 0.08108 0.02703 0.00000 0.00000 0.02703
       0.08108 0.05405 0.05405 0.00000 0.16216
*  HDV8B
   13  0.03995 0.09440 0.14251 0.13092 0.09466 0.08293 0.05985 0.08622 0.06355 0.04957
       0.01411 0.01991 0.01978 0.01582 0.01107 0.00870 0.00936 0.01279 0.01450 0.00461
       0.00461 0.00712 0.00330 0.00356 0.00620
*   HDBS is MOBILE6 default
*   HDBT is MOBILE6 default
*  MC
   16  0.11763 0.08951 0.07673 0.05882 0.05371 0.04859 0.05882 0.04092 0.03069 0.03581
       0.02046 0.00512 0.01279 0.02046 0.01790 0.01535 0.03325 0.03325 0.02813 0.03581
       0.03069 0.02558 0.03581 0.01535 0.05882
```

# Corpus Christi District Registration Distributions

```
*  Calculated from Mid-Year (July) 2002 Registration data
*  LDV
    1  0.05792 0.07803 0.08339 0.07957 0.07104 0.07023 0.06360 0.07314 0.06194 0.05749
       0.04702 0.04480 0.03769 0.03422 0.02719 0.02066 0.01895 0.01697 0.01261 0.00762
       0.00559 0.00428 0.00304 0.00393 0.01908
*  LDT1
    2  0.09964 0.14505 0.11235 0.12156 0.06474 0.08405 0.05296 0.05231 0.03849 0.03607
       0.02695 0.02504 0.01871 0.01843 0.01392 0.00805 0.01485 0.01387 0.01243 0.00684
       0.00828 0.00503 0.00265 0.00433 0.01340
*  LDT2
    3  0.09964 0.14505 0.11235 0.12156 0.06474 0.08405 0.05296 0.05231 0.03849 0.03607
       0.02695 0.02504 0.01871 0.01843 0.01392 0.00805 0.01485 0.01387 0.01243 0.00684
       0.00828 0.00503 0.00265 0.00433 0.01340
*  LDT3
    4  0.06556 0.09521 0.08098 0.07717 0.07121 0.07311 0.05497 0.05845 0.05797 0.04812
       0.03982 0.03867 0.03223 0.03184 0.02635 0.01868 0.02201 0.02032 0.01698 0.01060
       0.01231 0.00999 0.00463 0.00714 0.02568
*  LDT4
    5  0.06556 0.09521 0.08098 0.07717 0.07121 0.07311 0.05497 0.05845 0.05797 0.04812
       0.03982 0.03867 0.03223 0.03184 0.02635 0.01868 0.02201 0.02032 0.01698 0.01060
       0.01231 0.00999 0.00463 0.00714 0.02568
*  HDV2
    6  0.13584 0.19051 0.12003 0.11192 0.06536 0.07305 0.04229 0.03118 0.02520 0.01880
       0.02563 0.02307 0.01922 0.01282 0.01324 0.00513 0.01111 0.01794 0.01324 0.00513
       0.00982 0.00641 0.00470 0.00683 0.01153
*  HDV3
    7  0.05057 0.11455 0.09391 0.11762 0.04128 0.08566 0.04438 0.06502 0.05263 0.03302
       0.03612 0.03302 0.04025 0.02683 0.02374 0.01342 0.02064 0.01858 0.00929 0.00413
       0.00929 0.01135 0.01032 0.00413 0.04025
*  HDV4
    8  0.02950 0.07965 0.08850 0.15336 0.03835 0.12094 0.09440 0.05015 0.04720 0.03835
       0.04425 0.02950 0.02655 0.01475 0.02065 0.00295 0.01475 0.01475 0.00590 0.02065
       0.00000 0.00295 0.00590 0.01475 0.04130
*  HDV5
    9  0.03292 0.07407 0.07407 0.12343 0.02881 0.03292 0.02058 0.03704 0.04938 0.03704
       0.02058 0.02881 0.04938 0.03704 0.01235 0.03704 0.03704 0.03704 0.02881 0.00412
       0.03292 0.02881 0.01646 0.02881 0.09053
*  HDV6
   10  0.02763 0.04605 0.04868 0.06579 0.06447 0.04342 0.06447 0.06579 0.03947 0.05395
       0.03947 0.03289 0.03553 0.03158 0.02895 0.02237 0.03158 0.03553 0.03421 0.02763
       0.01974 0.02368 0.01974 0.02500 0.07238
*  HDV7
   11  0.03421 0.06439 0.05231 0.08048 0.09054 0.05030 0.04829 0.07445 0.02817 0.04427
       0.04628 0.04024 0.03823 0.03219 0.04427 0.02817 0.02213 0.02616 0.03018 0.01610
       0.02817 0.02012 0.01408 0.01006 0.03622
*  HDV8A
   12  0.01799 0.03148 0.01949 0.03598 0.03298 0.03298 0.04198 0.05397 0.07496 0.06897
       0.03898 0.03898 0.04648 0.04048 0.06147 0.04048 0.03898 0.03898 0.03148 0.02399
       0.02999 0.04648 0.03748 0.02999 0.04498
*  HDV8B
   13  0.04412 0.19116 0.08824 0.07353 0.01471 0.07353 0.04412 0.11765 0.02941 0.01471
       0.05882 0.00000 0.02941 0.02941 0.02941 0.02941 0.01471 0.04412 0.01471 0.00000
       0.00000 0.00000 0.00000 0.00000 0.05882
*   HDBS is MOBILE6 default
*   HDBT is MOBILE6 default
*  MC
   16  0.14172 0.13699 0.10977 0.08449 0.05683 0.04754 0.03608 0.03825 0.03414 0.02701
       0.02139 0.01491 0.01059 0.01383 0.01102 0.01340 0.02355 0.01923 0.01793 0.01621
       0.02615 0.01772 0.01232 0.01383 0.05510
```

## Dallas District Registration Distributions

```
*  Calculated from Mid-Year (July) 2002 Registration data
*  LDV
    1  0.07223 0.09536 0.09986 0.08745 0.07645 0.07157 0.06511 0.07278 0.05764 0.05106
       0.04263 0.03881 0.03403 0.02800 0.02234 0.01738 0.01434 0.01184 0.00896 0.00524
       0.00343 0.00247 0.00202 0.00286 0.01614
*  LDT1
    2  0.13883 0.18479 0.12842 0.14616 0.05416 0.07146 0.04718 0.04541 0.02878 0.02479
       0.01789 0.01314 0.01098 0.01163 0.01012 0.00613 0.00947 0.00996 0.00815 0.00489
       0.00461 0.00266 0.00211 0.00417 0.01411
*  LDT2
    3  0.13883 0.18479 0.12842 0.14616 0.05416 0.07146 0.04718 0.04541 0.02878 0.02479
       0.01789 0.01314 0.01098 0.01163 0.01012 0.00613 0.00947 0.00996 0.00815 0.00489
       0.00461 0.00266 0.00211 0.00417 0.01411
*  LDT3
    4  0.08982 0.11552 0.09899 0.08909 0.06949 0.07311 0.05330 0.05970 0.05558 0.04139
       0.03325 0.02831 0.02401 0.02388 0.02081 0.01451 0.01785 0.01530 0.01326 0.00809
       0.00748 0.00584 0.00357 0.00584 0.03201
*  LDT4
    5  0.08982 0.11552 0.09899 0.08909 0.06949 0.07311 0.05330 0.05970 0.05558 0.04139
       0.03325 0.02831 0.02401 0.02388 0.02081 0.01451 0.01785 0.01530 0.01326 0.00809
       0.00748 0.00584 0.00357 0.00584 0.03201
*  HDV2
    6  0.13396 0.15058 0.15846 0.12229 0.06241 0.08686 0.03413 0.05218 0.02959 0.02314
       0.01387 0.01408 0.01552 0.01154 0.01105 0.00886 0.01531 0.01016 0.01030 0.00433
       0.00652 0.00439 0.00254 0.00433 0.01360
*  HDV3
    7  0.04540 0.10370 0.12023 0.12284 0.04394 0.06135 0.03916 0.06657 0.06555 0.03988
       0.02944 0.02466 0.02654 0.01784 0.02350 0.04075 0.02669 0.04061 0.01624 0.00406
       0.00522 0.00363 0.00247 0.00493 0.02480
*  HDV4
    8  0.05784 0.09178 0.09915 0.10339 0.06275 0.11321 0.08263 0.07012 0.02657 0.01943
       0.01541 0.02635 0.02523 0.02501 0.01608 0.01653 0.03774 0.03305 0.00380 0.00223
       0.00246 0.00246 0.00246 0.00648 0.05784
*  HDV5
    9  0.04063 0.07048 0.09565 0.09746 0.02445 0.01906 0.05609 0.08738 0.02553 0.02733
       0.01079 0.05430 0.04495 0.04387 0.02193 0.03524 0.05034 0.03848 0.03452 0.00539
       0.04135 0.02193 0.00503 0.00647 0.04135
*  HDV6
   10  0.06302 0.08636 0.10915 0.10732 0.07085 0.09894 0.06330 0.07197 0.03438 0.03382
       0.02669 0.03102 0.02585 0.01859 0.01831 0.02026 0.01593 0.02096 0.01481 0.00866
       0.00783 0.00838 0.00559 0.00783 0.03018
*  HDV7
   11  0.04923 0.07068 0.09593 0.08425 0.07920 0.05806 0.06911 0.07952 0.05617 0.04292
       0.03187 0.04008 0.04986 0.01925 0.02840 0.02398 0.02714 0.02272 0.02146 0.01041
       0.00663 0.00757 0.00631 0.00694 0.01231
*  HDV8A
   12  0.02803 0.03967 0.04946 0.06427 0.05263 0.04047 0.04999 0.08012 0.06268 0.05343
       0.04443 0.04734 0.04443 0.04893 0.04576 0.03438 0.03280 0.03756 0.02856 0.01058
       0.01772 0.01402 0.01693 0.01640 0.03941
*  HDV8B
   13  0.04687 0.09860 0.19172 0.16677 0.16312 0.08947 0.06086 0.04504 0.03408 0.02130
       0.00974 0.00974 0.01400 0.00791 0.00365 0.00487 0.00852 0.00730 0.00609 0.00122
       0.00000 0.00183 0.00304 0.00183 0.00243
*   HDBS is MOBILE6 default
*   HDBT is MOBILE6 default
*  MC
   16  0.12892 0.14685 0.11598 0.08701 0.06646 0.04994 0.04752 0.03880 0.03151 0.02530
       0.01852 0.01266 0.01246 0.01332 0.01048 0.01249 0.01846 0.02025 0.01487 0.01652
       0.02219 0.01574 0.01440 0.01069 0.04866
```

## El Paso District Registration Distributions

```
*  Calculated from Mid-Year (July) 2002 Registration data
*  LDV
    1  0.05617 0.06549 0.07039 0.05949 0.05734 0.05574 0.05583 0.06914 0.06033 0.05525
       0.05106 0.04800 0.04487 0.04625 0.04026 0.03110 0.02594 0.02226 0.01693 0.00982
       0.00686 0.00583 0.00468 0.00626 0.03471
*  LDT1
    2  0.11543 0.10576 0.08016 0.09707 0.05338 0.07221 0.04479 0.05878 0.04269 0.03428
       0.03044 0.02057 0.02130 0.02459 0.02386 0.01143 0.01883 0.01590 0.01536 0.01216
       0.01024 0.00941 0.00905 0.01408 0.05823
*  LDT2
    3  0.11543 0.10576 0.08016 0.09707 0.05338 0.07221 0.04479 0.05878 0.04269 0.03428
       0.03044 0.02057 0.02130 0.02459 0.02386 0.01143 0.01883 0.01590 0.01536 0.01216
       0.01024 0.00941 0.00905 0.01408 0.05823
*  LDT3
    4  0.05583 0.07615 0.07521 0.05932 0.05456 0.06164 0.04300 0.05606 0.05750 0.04521
       0.03852 0.03314 0.02934 0.03444 0.03512 0.02463 0.02966 0.02494 0.02105 0.01442
       0.01540 0.01430 0.01003 0.01331 0.07722
*  LDT4
    5  0.05583 0.07615 0.07521 0.05932 0.05456 0.06164 0.04300 0.05606 0.05750 0.04521
       0.03852 0.03314 0.02934 0.03444 0.03512 0.02463 0.02966 0.02494 0.02105 0.01442
       0.01540 0.01430 0.01003 0.01331 0.07722
*  HDV2
    6  0.12367 0.13341 0.10424 0.08039 0.05565 0.05035 0.01855 0.04947 0.03357 0.02827
       0.01590 0.03710 0.02032 0.01767 0.01502 0.02297 0.03622 0.02120 0.01413 0.00883
       0.01502 0.01148 0.01237 0.01060 0.06360
*  HDV3
    7  0.02186 0.06011 0.06740 0.07832 0.04554 0.06011 0.03825 0.05829 0.06557 0.03461
       0.03461 0.04372 0.04007 0.03643 0.03643 0.03279 0.02550 0.03461 0.00729 0.00546
       0.00911 0.01093 0.01457 0.02004 0.11838
*  HDV4
    8  0.01493 0.03358 0.14924 0.07090 0.02985 0.05970 0.05970 0.07836 0.03731 0.03358
       0.04104 0.02612 0.04478 0.04478 0.01493 0.00746 0.02985 0.01493 0.01866 0.00373
       0.02985 0.01493 0.01119 0.02612 0.10448
*  HDV5
    9  0.02030 0.06091 0.06091 0.08629 0.03046 0.02538 0.02030 0.03553 0.04569 0.03046
       0.01523 0.03553 0.04569 0.03553 0.03553 0.03046 0.05076 0.04569 0.02538 0.03553
       0.01015 0.01523 0.02030 0.05076 0.13200
*  HDV6
   10  0.01574 0.02289 0.08155 0.05293 0.04435 0.02718 0.04006 0.05579 0.03863 0.03863
       0.03147 0.03433 0.04149 0.02575 0.04435 0.05436 0.03433 0.04435 0.03147 0.01717
       0.02861 0.02146 0.01860 0.03147 0.12304
*  HDV7
   11  0.00649 0.02273 0.07468 0.05195 0.04870 0.05195 0.01623 0.05844 0.03896 0.02922
       0.04221 0.06494 0.07143 0.03896 0.04870 0.03571 0.03247 0.03247 0.05519 0.01948
       0.00974 0.03571 0.01948 0.01948 0.07468
*  HDV8A
   12  0.00480 0.01439 0.03597 0.03597 0.02638 0.01439 0.02398 0.05276 0.04556 0.04077
       0.03837 0.05995 0.07674 0.06954 0.04077 0.04796 0.05516 0.03837 0.04077 0.01918
       0.00719 0.02398 0.03597 0.03597 0.11511
*  HDV8B
   13  0.00000 0.09859 0.08451 0.11268 0.02817 0.21127 0.01408 0.05634 0.02817 0.00000
       0.04225 0.02817 0.01408 0.00000 0.02817 0.08451 0.00000 0.02817 0.07042 0.02817
       0.00000 0.01408 0.00000 0.00000 0.02817
*   HDBS is MOBILE6 default
*   HDBT is MOBILE6 default
*  MC
   16  0.15635 0.13189 0.10225 0.09185 0.06187 0.04610 0.04593 0.03206 0.02738 0.02513
       0.01629 0.01144 0.01560 0.01144 0.01040 0.01231 0.02374 0.01854 0.01924 0.01906
       0.02114 0.01854 0.01733 0.01161 0.05251
```

## Fort Worth District Registration Distributions

```
*  Calculated from Mid-Year (July) 2002 Registration data
*  LDV
    1  0.08191 0.09324 0.09121 0.08314 0.07323 0.07037 0.06407 0.07046 0.05589 0.05111
       0.04282 0.03880 0.03454 0.02925 0.02347 0.01827 0.01588 0.01338 0.00972 0.00583
       0.00397 0.00300 0.00241 0.00348 0.02055
*  LDT1
    2  0.11237 0.16957 0.11919 0.14162 0.05378 0.07785 0.05365 0.05298 0.03313 0.02985
       0.02204 0.01732 0.01344 0.01428 0.01128 0.00619 0.01211 0.01136 0.00976 0.00559
       0.00535 0.00329 0.00257 0.00488 0.01655
*  LDT2
    3  0.11237 0.16957 0.11919 0.14162 0.05378 0.07785 0.05365 0.05298 0.03313 0.02985
       0.02204 0.01732 0.01344 0.01428 0.01128 0.00619 0.01211 0.01136 0.00976 0.00559
       0.00535 0.00329 0.00257 0.00488 0.01655
*  LDT3
    4  0.07736 0.10648 0.09154 0.08705 0.06983 0.07365 0.05462 0.05986 0.05617 0.04213
       0.03624 0.03034 0.02711 0.02640 0.02157 0.01535 0.01969 0.01665 0.01411 0.00853
       0.00827 0.00668 0.00419 0.00677 0.03941
*  LDT4
    5  0.07736 0.10648 0.09154 0.08705 0.06983 0.07365 0.05462 0.05986 0.05617 0.04213
       0.03624 0.03034 0.02711 0.02640 0.02157 0.01535 0.01969 0.01665 0.01411 0.00853
       0.00827 0.00668 0.00419 0.00677 0.03941
*  HDV2
    6  0.14207 0.19414 0.14273 0.11643 0.06515 0.05952 0.03166 0.04134 0.02865 0.01949
       0.01387 0.01557 0.01347 0.01230 0.01243 0.00706 0.01374 0.01295 0.00981 0.00772
       0.00785 0.00589 0.00353 0.00667 0.01596
*  HDV3
    7  0.06873 0.12231 0.14983 0.14170 0.04159 0.05851 0.03631 0.05957 0.06204 0.04688
       0.02820 0.02397 0.02714 0.01516 0.02009 0.00881 0.01269 0.01128 0.00740 0.00458
       0.00634 0.00634 0.00458 0.00458 0.03137
*  HDV4
    8  0.06603 0.08916 0.17833 0.19808 0.06716 0.08973 0.06998 0.05418 0.01919 0.02483
       0.01919 0.01862 0.01411 0.00959 0.01016 0.00508 0.00847 0.00451 0.00282 0.00169
       0.00282 0.00282 0.00395 0.00395 0.03555
*  HDV5
    9  0.03734 0.09129 0.18362 0.13485 0.04149 0.03320 0.03008 0.05809 0.02282 0.02801
       0.03008 0.01867 0.02075 0.02282 0.01763 0.02801 0.02801 0.02075 0.01763 0.00934
       0.00830 0.01245 0.01141 0.01763 0.07573
*  HDV6
   10  0.02714 0.07463 0.13648 0.12135 0.10151 0.05480 0.04697 0.05898 0.03523 0.03575
       0.02688 0.02818 0.02557 0.02871 0.01748 0.02140 0.02062 0.02479 0.02166 0.00966
       0.01122 0.00992 0.00992 0.01096 0.04019
*  HDV7
   11  0.02963 0.06263 0.08754 0.08889 0.10572 0.05051 0.07609 0.06532 0.04848 0.03636
       0.03300 0.04310 0.05455 0.03165 0.02357 0.02222 0.02088 0.02088 0.02222 0.00875
       0.01212 0.01010 0.00943 0.01077 0.02559
*  HDV8A
   12  0.02068 0.05745 0.04941 0.06243 0.05707 0.04175 0.05094 0.07927 0.07200 0.05745
       0.03409 0.03945 0.04673 0.04136 0.03370 0.02987 0.02451 0.04290 0.03217 0.00919
       0.01915 0.01532 0.01800 0.01609 0.04902
*  HDV8B
   13  0.02482 0.08790 0.19131 0.08170 0.10962 0.13133 0.11065 0.07032 0.08687 0.02172
       0.00827 0.00827 0.01138 0.00931 0.00827 0.00517 0.00517 0.00620 0.01034 0.00000
       0.00207 0.00207 0.00207 0.00103 0.00414
*   HDBS is MOBILE6 default
*   HDBT is MOBILE6 default
*  MC
   16  0.13922 0.14112 0.10296 0.07935 0.05911 0.04879 0.04798 0.03900 0.03083 0.02522
       0.01688 0.01234 0.01095 0.01293 0.01144 0.01293 0.02172 0.02437 0.01750 0.01759
       0.02486 0.01961 0.01705 0.01302 0.05323
```

## Houston District Registration Distributions

```
*  Calculated from Mid-Year (July) 2002 Registration data
*  LDV
    1  0.07185 0.09185 0.09483 0.08230 0.07633 0.07162 0.06488 0.06968 0.05633 0.05307
       0.04561 0.04229 0.03684 0.03071 0.02411 0.01791 0.01461 0.01275 0.00963 0.00558
       0.00413 0.00303 0.00229 0.00286 0.01491
*  LDT1
    2  0.13893 0.17902 0.12513 0.14593 0.05653 0.07589 0.05056 0.04822 0.03044 0.02700
       0.01998 0.01590 0.01278 0.01248 0.00949 0.00532 0.00754 0.00744 0.00720 0.00401
       0.00462 0.00231 0.00186 0.00314 0.00828
*  LDT2
    3  0.13893 0.17902 0.12513 0.14593 0.05653 0.07589 0.05056 0.04822 0.03044 0.02700
       0.01998 0.01590 0.01278 0.01248 0.00949 0.00532 0.00754 0.00744 0.00720 0.00401
       0.00462 0.00231 0.00186 0.00314 0.00828
*  LDT3
    4  0.09613 0.11434 0.09652 0.09144 0.07213 0.07424 0.05355 0.05885 0.05449 0.04445
       0.03622 0.03140 0.02666 0.02571 0.02084 0.01456 0.01511 0.01397 0.01245 0.00698
       0.00808 0.00593 0.00308 0.00440 0.01847
*  LDT4
    5  0.09613 0.11434 0.09652 0.09144 0.07213 0.07424 0.05355 0.05885 0.05449 0.04445
       0.03622 0.03140 0.02666 0.02571 0.02084 0.01456 0.01511 0.01397 0.01245 0.00698
       0.00808 0.00593 0.00308 0.00440 0.01847
*  HDV2
    6  0.13127 0.16001 0.14504 0.09993 0.06348 0.08323 0.03842 0.05250 0.02941 0.03245
       0.02212 0.01817 0.01721 0.01483 0.01433 0.00992 0.00972 0.01002 0.00926 0.00532
       0.00795 0.00643 0.00395 0.00415 0.01088
*  HDV3
    7  0.05520 0.10591 0.12325 0.13373 0.03574 0.08350 0.04411 0.08032 0.07371 0.04623
       0.03526 0.02972 0.02937 0.02217 0.02158 0.01073 0.01002 0.01109 0.00625 0.00413
       0.00531 0.00543 0.00271 0.00448 0.02005
*  HDV4
    8  0.06957 0.10510 0.14970 0.13526 0.05363 0.09347 0.07926 0.08744 0.04264 0.03231
       0.02585 0.01917 0.02132 0.01529 0.01120 0.00517 0.00517 0.00517 0.00538 0.00323
       0.00409 0.00323 0.00172 0.00495 0.02068
*  HDV5
    9  0.06912 0.11506 0.14622 0.16539 0.04714 0.05274 0.03516 0.04555 0.03116 0.02277
       0.02637 0.02397 0.02517 0.01958 0.01998 0.02437 0.01918 0.01239 0.01318 0.00839
       0.01159 0.01278 0.00639 0.01039 0.03596
*  HDV6
   10  0.04139 0.08900 0.10368 0.11677 0.08252 0.05607 0.04523 0.07802 0.03835 0.04734
       0.03240 0.03504 0.04086 0.02764 0.02261 0.02182 0.01732 0.01759 0.01494 0.00952
       0.01296 0.01098 0.00608 0.00912 0.02275
*  HDV7
   11  0.04075 0.06667 0.08952 0.10082 0.07138 0.06690 0.06502 0.08999 0.04570 0.03816
       0.04146 0.05630 0.04829 0.03157 0.02356 0.01932 0.01720 0.01720 0.01696 0.00730
       0.00612 0.01084 0.00636 0.00777 0.01484
*  HDV8A
   12  0.03321 0.03835 0.05502 0.05246 0.04419 0.03150 0.04533 0.06872 0.06130 0.05531
       0.04590 0.05659 0.05745 0.06101 0.05032 0.03550 0.02737 0.03207 0.02937 0.00912
       0.01796 0.01853 0.01953 0.01896 0.03493
*  HDV8B
   13  0.06590 0.09443 0.10938 0.14944 0.06114 0.06386 0.02038 0.09307 0.03804 0.06182
       0.02378 0.04076 0.04008 0.04416 0.02446 0.01834 0.01019 0.00883 0.01019 0.00204
       0.00679 0.00204 0.00204 0.00408 0.00476
*   HDBS is MOBILE6 default
*   HDBT is MOBILE6 default
*  MC
   16  0.12861 0.14319 0.11282 0.09273 0.06639 0.05047 0.04956 0.04192 0.03426 0.03042
       0.01840 0.01311 0.01423 0.01318 0.01241 0.01170 0.02073 0.01701 0.01350 0.01501
       0.01847 0.01227 0.01234 0.00988 0.04739
```

# Laredo District Registration Distributions

```
*  Calculated from Mid-Year (July) 2002 Registration data
*  LDV
    1  0.05113 0.06802 0.07935 0.06376 0.06038 0.06051 0.05880 0.06959 0.06383 0.06049
       0.05388 0.05183 0.04583 0.04316 0.03567 0.02496 0.02334 0.02029 0.01529 0.00918
       0.00622 0.00535 0.00369 0.00501 0.02044
*  LDT1
    2  0.12756 0.17055 0.10820 0.11344 0.04333 0.06513 0.04170 0.04749 0.03763 0.03573
       0.02434 0.02244 0.01773 0.01990 0.01818 0.00868 0.01592 0.01312 0.01456 0.00669
       0.00923 0.00507 0.00416 0.00651 0.02271
*  LDT2
    3  0.12756 0.17055 0.10820 0.11344 0.04333 0.06513 0.04170 0.04749 0.03763 0.03573
       0.02434 0.02244 0.01773 0.01990 0.01818 0.00868 0.01592 0.01312 0.01456 0.00669
       0.00923 0.00507 0.00416 0.00651 0.02271
*  LDT3
    4  0.07855 0.10958 0.09017 0.07094 0.05263 0.06252 0.04299 0.05311 0.05712 0.04773
       0.03852 0.03340 0.02722 0.02835 0.02475 0.01754 0.02293 0.02147 0.01985 0.01265
       0.01522 0.01289 0.00670 0.01015 0.04302
*  LDT4
    5  0.07855 0.10958 0.09017 0.07094 0.05263 0.06252 0.04299 0.05311 0.05712 0.04773
       0.03852 0.03340 0.02722 0.02835 0.02475 0.01754 0.02293 0.02147 0.01985 0.01265
       0.01522 0.01289 0.00670 0.01015 0.04302
*  HDV2
    6  0.14236 0.17595 0.11458 0.07986 0.04398 0.07407 0.03704 0.04977 0.03009 0.02546
       0.01389 0.01273 0.01852 0.00926 0.03009 0.01157 0.02315 0.01620 0.01157 0.00463
       0.01389 0.01157 0.00926 0.01273 0.02778
*  HDV3
    7  0.03979 0.07692 0.05836 0.09812 0.04775 0.07427 0.03979 0.08753 0.06366 0.04244
       0.02387 0.01857 0.03183 0.03183 0.02387 0.00796 0.02387 0.02653 0.02122 0.01592
       0.01326 0.00531 0.01857 0.01857 0.09019
*  HDV4
    8  0.04688 0.08594 0.10935 0.08594 0.05469 0.07031 0.02344 0.07031 0.03125 0.04688
       0.02344 0.03906 0.01563 0.03906 0.01563 0.03125 0.01563 0.00781 0.01563 0.00781
       0.00781 0.00781 0.02344 0.02344 0.10156
*  HDV5
    9  0.00746 0.03731 0.05970 0.09701 0.00746 0.03731 0.01493 0.03731 0.03731 0.02239
       0.03731 0.04478 0.02239 0.02239 0.02985 0.00746 0.02985 0.04478 0.07463 0.00000
       0.02239 0.03731 0.05224 0.11195 0.10448
*  HDV6
   10  0.00728 0.01456 0.03155 0.02670 0.07524 0.03883 0.04612 0.06553 0.06068 0.05097
       0.02913 0.04369 0.03398 0.05825 0.02184 0.06553 0.03398 0.04126 0.02184 0.02427
       0.03398 0.01942 0.02184 0.04126 0.09227
*  HDV7
   11  0.01835 0.02752 0.04587 0.04587 0.03211 0.07800 0.03211 0.06422 0.05505 0.06422
       0.07339 0.07339 0.03211 0.05505 0.03670 0.03211 0.03670 0.04128 0.02752 0.01376
       0.02752 0.01376 0.02294 0.00917 0.04128
*  HDV8A
   12  0.02092 0.02929 0.01255 0.01674 0.00837 0.01674 0.02929 0.04184 0.05021 0.04603
       0.06276 0.05021 0.05021 0.06276 0.03347 0.05858 0.03766 0.03766 0.05021 0.01255
       0.04184 0.04184 0.02929 0.03766 0.12132
*  HDV8B
   13  0.00000 0.26000 0.17000 0.12000 0.05000 0.04000 0.00000 0.04000 0.06000 0.13000
       0.01000 0.00000 0.03000 0.03000 0.01000 0.01000 0.00000 0.00000 0.00000 0.00000
       0.02000 0.00000 0.01000 0.00000 0.01000
*   HDBS is MOBILE6 default
*   HDBT is MOBILE6 default
*  MC
   16  0.13362 0.14723 0.10723 0.07915 0.06128 0.04851 0.03830 0.02809 0.03404 0.03149
       0.02213 0.01106 0.01106 0.01277 0.01021 0.01787 0.02553 0.02723 0.01277 0.02298
       0.02553 0.02468 0.01617 0.01447 0.03660
```

# Lubbock District Registration Distributions

```
*  Calculated from Mid-Year (July) 2002 Registration data
*  LDV
    1  0.05197 0.07324 0.08326 0.08028 0.06866 0.06813 0.06178 0.06949 0.06097 0.05514
       0.04563 0.04355 0.03891 0.03545 0.02835 0.02086 0.01992 0.01872 0.01482 0.00949
       0.00697 0.00564 0.00407 0.00596 0.02874
*  LDT1
    2  0.10538 0.13225 0.11232 0.13010 0.06158 0.08885 0.05595 0.05803 0.03853 0.03598
       0.02300 0.01837 0.01274 0.01588 0.01434 0.00788 0.01191 0.01257 0.01025 0.00859
       0.00794 0.00533 0.00533 0.00616 0.02074
*  LDT2
    3  0.10538 0.13225 0.11232 0.13010 0.06158 0.08885 0.05595 0.05803 0.03853 0.03598
       0.02300 0.01837 0.01274 0.01588 0.01434 0.00788 0.01191 0.01257 0.01025 0.00859
       0.00794 0.00533 0.00533 0.00616 0.02074
*  LDT3
    4  0.06140 0.07923 0.08365 0.07743 0.06353 0.07383 0.05163 0.05792 0.05898 0.04494
       0.03518 0.03358 0.02886 0.03065 0.02704 0.01712 0.02353 0.02269 0.01861 0.01317
       0.01337 0.01192 0.00806 0.01065 0.05303
*  LDT4
    5  0.06140 0.07923 0.08365 0.07743 0.06353 0.07383 0.05163 0.05792 0.05898 0.04494
       0.03518 0.03358 0.02886 0.03065 0.02704 0.01712 0.02353 0.02269 0.01861 0.01317
       0.01337 0.01192 0.00806 0.01065 0.05303
*  HDV2
    6  0.13208 0.14360 0.09495 0.07243 0.06939 0.09434 0.04139 0.04139 0.02678 0.03713
       0.01887 0.02678 0.01887 0.01461 0.02191 0.00670 0.01887 0.01826 0.00913 0.00974
       0.01278 0.00974 0.01035 0.00609 0.04382
*  HDV3
    7  0.04000 0.08485 0.07030 0.07273 0.03879 0.05697 0.04364 0.06303 0.05697 0.06424
       0.02545 0.03030 0.02909 0.02303 0.03152 0.01939 0.01939 0.01697 0.00606 0.01333
       0.01091 0.01576 0.00970 0.01455 0.14303
*  HDV4
    8  0.02807 0.04211 0.08070 0.08070 0.04211 0.08772 0.03509 0.09123 0.04561 0.01754
       0.01404 0.01754 0.03509 0.02456 0.01053 0.00351 0.02105 0.02105 0.01053 0.00351
       0.01053 0.02807 0.01404 0.02456 0.21051
*  HDV5
    9  0.00730 0.04015 0.05839 0.04745 0.02190 0.08029 0.03285 0.02920 0.01825 0.01825
       0.01825 0.04015 0.05109 0.01825 0.03285 0.00730 0.02920 0.04015 0.02555 0.01825
       0.04745 0.02920 0.01095 0.03650 0.24083
*  HDV6
   10  0.02854 0.03226 0.03722 0.04467 0.07320 0.04094 0.05211 0.06203 0.02978 0.01365
       0.02854 0.03970 0.04342 0.02605 0.02854 0.03474 0.03474 0.03846 0.03226 0.01861
       0.03102 0.03226 0.01241 0.02978 0.15507
*  HDV7
   11  0.00713 0.02317 0.02852 0.03743 0.07665 0.04456 0.04813 0.04813 0.04456 0.03922
       0.03030 0.10161 0.06417 0.03209 0.03743 0.05169 0.04991 0.04635 0.01961 0.01961
       0.02317 0.03030 0.01961 0.01604 0.06061
*  HDV8A
   12  0.00680 0.00680 0.08503 0.03401 0.02381 0.01701 0.03912 0.04082 0.03401 0.04592
       0.04082 0.05272 0.03571 0.03912 0.04252 0.03741 0.02551 0.04762 0.04082 0.02041
       0.03741 0.05442 0.02381 0.04252 0.12585
*  HDV8B
   13  0.01538 0.00000 0.04615 0.01538 0.12310 0.06154 0.01538 0.07692 0.09231 0.12308
       0.01538 0.04615 0.03077 0.00000 0.06154 0.03077 0.00000 0.03077 0.06154 0.00000
       0.03077 0.04615 0.04615 0.00000 0.03077
*   HDBS is MOBILE6 default
*   HDBT is MOBILE6 default
*  MC
   16  0.12085 0.12109 0.11693 0.08164 0.05950 0.05950 0.04912 0.03298 0.02145 0.02422
       0.01499 0.01338 0.01245 0.01407 0.01153 0.01245 0.02375 0.02352 0.02145 0.02237
       0.03067 0.02560 0.01799 0.01661 0.05189
```

# Lufkin District Registration Distributions

```
*  Calculated from Mid-Year (July) 2002 Registration data
*  LDV
    1  0.04724 0.07397 0.08643 0.08254 0.07314 0.07105 0.06599 0.07114 0.05923 0.05609
       0.04731 0.04347 0.03851 0.03403 0.02806 0.02138 0.01870 0.01780 0.01377 0.00824
       0.00667 0.00486 0.00343 0.00490 0.02205
*  LDT1
    2  0.09562 0.14053 0.10954 0.11980 0.06041 0.08422 0.06885 0.05921 0.03924 0.04195
       0.03023 0.02280 0.01814 0.01745 0.01071 0.00756 0.01184 0.01121 0.01096 0.00661
       0.00661 0.00491 0.00346 0.00479 0.01335
*  LDT2
    3  0.09562 0.14053 0.10954 0.11980 0.06041 0.08422 0.06885 0.05921 0.03924 0.04195
       0.03023 0.02280 0.01814 0.01745 0.01071 0.00756 0.01184 0.01121 0.01096 0.00661
       0.00661 0.00491 0.00346 0.00479 0.01335
*  LDT3
    4  0.06323 0.09339 0.07927 0.07409 0.06524 0.07354 0.05849 0.06248 0.05773 0.04796
       0.03915 0.03636 0.03145 0.03098 0.02538 0.01882 0.02267 0.02014 0.01925 0.01154
       0.01194 0.00958 0.00514 0.00843 0.03375
*  LDT4
    5  0.06323 0.09339 0.07927 0.07409 0.06524 0.07354 0.05849 0.06248 0.05773 0.04796
       0.03915 0.03636 0.03145 0.03098 0.02538 0.01882 0.02267 0.02014 0.01925 0.01154
       0.01194 0.00958 0.00514 0.00843 0.03375
*  HDV2
    6  0.12785 0.21693 0.12058 0.16465 0.08281 0.07361 0.02131 0.02809 0.01840 0.01404
       0.01162 0.01550 0.00872 0.01211 0.00581 0.00678 0.00678 0.01211 0.00872 0.00581
       0.00969 0.00726 0.00436 0.00387 0.01259
*  HDV3
    7  0.06182 0.12983 0.12519 0.16075 0.04328 0.06182 0.04328 0.06646 0.03864 0.04019
       0.02473 0.02473 0.02473 0.01546 0.01546 0.00927 0.01391 0.00927 0.00464 0.00309
       0.01082 0.01236 0.00309 0.00618 0.05100
*  HDV4
    8  0.03738 0.08411 0.14486 0.12617 0.05140 0.10280 0.06075 0.06075 0.02336 0.02336
       0.03271 0.04206 0.01869 0.03271 0.00935 0.00467 0.01402 0.00935 0.00467 0.01869
       0.00467 0.00935 0.00935 0.00935 0.06542
*  HDV5
    9  0.02273 0.07273 0.12724 0.12273 0.10909 0.06818 0.03182 0.05909 0.04091 0.00909
       0.01364 0.00909 0.02273 0.00909 0.01818 0.02727 0.03182 0.00455 0.01364 0.01364
       0.03182 0.01364 0.00455 0.02273 0.10000
*  HDV6
   10  0.01818 0.05818 0.07091 0.08182 0.07455 0.04727 0.03455 0.11087 0.03636 0.03455
       0.03273 0.04000 0.03273 0.02182 0.02364 0.02364 0.04000 0.03455 0.02000 0.01455
       0.01636 0.01273 0.01273 0.03273 0.07455
*  HDV7
   11  0.01553 0.01553 0.06522 0.08075 0.10868 0.07143 0.05280 0.10559 0.04037 0.03416
       0.05280 0.06211 0.04969 0.03727 0.03106 0.01863 0.04037 0.01242 0.01242 0.00932
       0.00932 0.01242 0.00621 0.01863 0.03727
*  HDV8A
   12  0.00490 0.03186 0.04412 0.04167 0.05637 0.04902 0.04902 0.10293 0.04902 0.03676
       0.02451 0.03922 0.06373 0.03186 0.02941 0.03676 0.04412 0.06373 0.02696 0.00980
       0.04412 0.01961 0.01471 0.02206 0.06373
*  HDV8B
   13  0.00000 0.07895 0.07895 0.14474 0.01316 0.15788 0.15789 0.00000 0.11842 0.15789
       0.00000 0.00000 0.00000 0.00000 0.01316 0.00000 0.01316 0.01316 0.02632 0.00000
       0.01316 0.00000 0.00000 0.01316 0.00000
*   HDBS is MOBILE6 default
*   HDBT is MOBILE6 default
*  MC
   16  0.10885 0.13358 0.10965 0.08333 0.05901 0.04625 0.05223 0.03628 0.03469 0.02632
       0.01994 0.01236 0.01715 0.01834 0.01196 0.01435 0.02153 0.02432 0.02233 0.01954
       0.02432 0.01834 0.01396 0.01555 0.05582
```

## Odessa District Registration Distributions

```
*  Calculated from Mid-Year (July) 2002 Registration data
*  LDV
    1  0.05073 0.07767 0.08428 0.07387 0.06947 0.07085 0.06099 0.06593 0.05934 0.05307
       0.04608 0.04376 0.03928 0.03377 0.02923 0.02069 0.01932 0.01942 0.01509 0.00968
       0.00858 0.00675 0.00511 0.00653 0.03051
*  LDT1
    2  0.11239 0.16667 0.11141 0.11664 0.06352 0.09223 0.05654 0.05336 0.03393 0.03203
       0.02138 0.01836 0.01431 0.01460 0.01245 0.00478 0.01045 0.00928 0.00762 0.00557
       0.00835 0.00630 0.00327 0.00532 0.01924
*  LDT2
    3  0.11239 0.16667 0.11141 0.11664 0.06352 0.09223 0.05654 0.05336 0.03393 0.03203
       0.02138 0.01836 0.01431 0.01460 0.01245 0.00478 0.01045 0.00928 0.00762 0.00557
       0.00835 0.00630 0.00327 0.00532 0.01924
*  LDT3
    4  0.06491 0.10294 0.08149 0.07783 0.06912 0.08042 0.05335 0.05649 0.05641 0.04348
       0.03311 0.03327 0.02916 0.02735 0.02561 0.01468 0.01899 0.01950 0.01563 0.00958
       0.01334 0.01187 0.00615 0.00971 0.04561
*  LDT4
    5  0.06491 0.10294 0.08149 0.07783 0.06912 0.08042 0.05335 0.05649 0.05641 0.04348
       0.03311 0.03327 0.02916 0.02735 0.02561 0.01468 0.01899 0.01950 0.01563 0.00958
       0.01334 0.01187 0.00615 0.00971 0.04561
*  HDV2
    6  0.12629 0.16802 0.09143 0.08914 0.06114 0.08800 0.04286 0.03257 0.03657 0.02114
       0.02000 0.02971 0.01943 0.01943 0.01371 0.00686 0.01600 0.01600 0.00857 0.00400
       0.01543 0.02114 0.00914 0.01371 0.02971
*  HDV3
    7  0.05739 0.11285 0.08366 0.09241 0.04767 0.11187 0.06323 0.06031 0.04183 0.03405
       0.02529 0.03502 0.03307 0.02335 0.01848 0.00973 0.02432 0.01946 0.00973 0.00875
       0.01556 0.01167 0.00778 0.00875 0.04377
*  HDV4
    8  0.04910 0.10078 0.08269 0.08269 0.02842 0.12920 0.05685 0.06718 0.05685 0.04393
       0.03618 0.04134 0.02584 0.02067 0.01550 0.00258 0.00775 0.02842 0.01550 0.01550
       0.01292 0.01034 0.00000 0.00775 0.06202
*  HDV5
    9  0.03860 0.09123 0.05965 0.06316 0.01754 0.06667 0.02807 0.07368 0.03509 0.03860
       0.02105 0.04912 0.04211 0.02105 0.02456 0.02456 0.04561 0.04912 0.03860 0.00702
       0.02105 0.02105 0.01754 0.03509 0.07018
*  HDV6
   10  0.03312 0.05605 0.04459 0.03949 0.09045 0.06242 0.05605 0.05350 0.03312 0.05096
       0.04331 0.04713 0.03567 0.03694 0.02930 0.02293 0.02548 0.02930 0.02930 0.00764
       0.02166 0.03694 0.01401 0.01911 0.08153
*  HDV7
   11  0.04412 0.05462 0.04622 0.04832 0.09453 0.07353 0.05882 0.08193 0.04202 0.04622
       0.04832 0.05672 0.02521 0.01891 0.02101 0.02731 0.02941 0.03571 0.02311 0.00420
       0.02311 0.01471 0.01681 0.02101 0.04412
*  HDV8A
   12  0.01372 0.02058 0.01544 0.02230 0.04460 0.04288 0.02401 0.04288 0.03602 0.02744
       0.02744 0.02916 0.03945 0.03087 0.03431 0.02573 0.04117 0.05660 0.05489 0.01887
       0.08576 0.08233 0.03602 0.04288 0.10465
*  HDV8B
   13  0.04545 0.00000 0.02273 0.11363 0.09091 0.09091 0.02273 0.06818 0.04545 0.00000
       0.00000 0.06818 0.02273 0.02273 0.02273 0.06818 0.00000 0.06818 0.02273 0.00000
       0.06818 0.09091 0.00000 0.02273 0.02273
*   HDBS is MOBILE6 default
*   HDBT is MOBILE6 default
*  MC
   16  0.16324 0.13919 0.09912 0.08095 0.05317 0.03767 0.04488 0.02992 0.02324 0.02084
       0.01630 0.00935 0.00828 0.00935 0.01683 0.01469 0.02618 0.01897 0.01523 0.02458
       0.02752 0.02485 0.02431 0.01363 0.05771
```

## Paris District Registration Distributions

```
*  Calculated from Mid-Year (July) 2002 Registration data
*  LDV
    1  0.04818 0.07339 0.08594 0.07700 0.06743 0.06646 0.06313 0.07401 0.05890 0.05516
       0.04637 0.04427 0.03938 0.03576 0.02965 0.02270 0.02097 0.01878 0.01467 0.00945
       0.00587 0.00487 0.00383 0.00579 0.02804
*  LDT1
    2  0.09872 0.15138 0.11001 0.12811 0.05357 0.07736 0.05683 0.05501 0.03708 0.03448
       0.02523 0.02092 0.01644 0.01721 0.01311 0.00714 0.01660 0.01450 0.01295 0.00919
       0.00847 0.00448 0.00371 0.00686 0.02064
*  LDT2
    3  0.09872 0.15138 0.11001 0.12811 0.05357 0.07736 0.05683 0.05501 0.03708 0.03448
       0.02523 0.02092 0.01644 0.01721 0.01311 0.00714 0.01660 0.01450 0.01295 0.00919
       0.00847 0.00448 0.00371 0.00686 0.02064
*  LDT3
    4  0.06284 0.09514 0.08221 0.07711 0.06181 0.06674 0.05354 0.05912 0.05617 0.04482
       0.03701 0.03347 0.02873 0.03076 0.02530 0.01751 0.02441 0.02208 0.01943 0.01299
       0.01222 0.01016 0.00627 0.01022 0.04994
*  LDT4
    5  0.06284 0.09514 0.08221 0.07711 0.06181 0.06674 0.05354 0.05912 0.05617 0.04482
       0.03701 0.03347 0.02873 0.03076 0.02530 0.01751 0.02441 0.02208 0.01943 0.01299
       0.01222 0.01016 0.00627 0.01022 0.04994
*  HDV2
    6  0.14615 0.22821 0.14014 0.14264 0.09009 0.05055 0.01902 0.02653 0.02352 0.01351
       0.00901 0.00801 0.01051 0.01001 0.00801 0.00651 0.00701 0.01201 0.00400 0.00651
       0.00651 0.00501 0.00350 0.00501 0.01802
*  HDV3
    7  0.05138 0.08073 0.11193 0.13214 0.05688 0.05688 0.03486 0.06972 0.04587 0.02936
       0.01651 0.02018 0.03303 0.02385 0.01835 0.00917 0.01284 0.00734 0.01101 0.01468
       0.01651 0.00917 0.00917 0.02202 0.10642
*  HDV4
    8  0.03659 0.05488 0.12195 0.10366 0.09756 0.06707 0.04878 0.04878 0.04268 0.02439
       0.01829 0.02439 0.03659 0.01829 0.01829 0.00000 0.01220 0.01829 0.02439 0.00000
       0.00610 0.00000 0.00610 0.00610 0.16463
*  HDV5
    9  0.02128 0.10638 0.11348 0.04255 0.04965 0.02837 0.02837 0.04965 0.03546 0.00000
       0.02128 0.04965 0.06383 0.02128 0.02837 0.00709 0.01418 0.02837 0.03546 0.00709
       0.05674 0.02128 0.00709 0.00709 0.15601
*  HDV6
   10  0.01349 0.04216 0.04216 0.06071 0.05059 0.05902 0.05734 0.07251 0.04890 0.03373
       0.01518 0.04216 0.04890 0.02867 0.03541 0.02698 0.03373 0.02698 0.04216 0.01012
       0.03035 0.02024 0.01349 0.03035 0.11467
*  HDV7
   11  0.01838 0.01838 0.05515 0.04044 0.05515 0.05882 0.06250 0.09556 0.02941 0.05515
       0.02206 0.02206 0.04412 0.04412 0.04412 0.03309 0.07721 0.02574 0.02206 0.02206
       0.04044 0.02206 0.01103 0.02574 0.05515
*  HDV8A
   12  0.01003 0.01754 0.04511 0.05013 0.02506 0.02757 0.03008 0.05514 0.03509 0.03509
       0.03509 0.05263 0.05514 0.05514 0.04010 0.02757 0.03509 0.07268 0.05514 0.01754
       0.03008 0.03509 0.01504 0.04010 0.10273
*  HDV8B
   13  0.06452 0.09677 0.09677 0.09677 0.00000 0.22581 0.12903 0.16129 0.03226 0.00000
       0.00000 0.00000 0.00000 0.00000 0.00000 0.03226 0.00000 0.00000 0.06452 0.00000
       0.00000 0.00000 0.00000 0.00000 0.00000
*   HDBS is MOBILE6 default
*   HDBT is MOBILE6 default
*  MC
   16  0.11580 0.13837 0.10869 0.07000 0.05648 0.04983 0.04675 0.03654 0.02729 0.02159
       0.01732 0.00997 0.01210 0.01329 0.01210 0.01400 0.02539 0.03037 0.01970 0.01780
       0.03180 0.02895 0.02183 0.01448 0.05956
```

# Pharr District Registration Distributions

```
*  Calculated from Mid-Year (July) 2002 Registration data
*  LDV
    1  0.04377 0.05899 0.06658 0.06052 0.05665 0.05901 0.06363 0.07680 0.06801 0.06418
       0.06177 0.05725 0.05085 0.04914 0.03946 0.02789 0.02298 0.02016 0.01420 0.00795
       0.00579 0.00393 0.00267 0.00360 0.01422
*  LDT1
    2  0.16011 0.15760 0.10734 0.12204 0.03867 0.06702 0.04451 0.04531 0.03664 0.03467
       0.02402 0.01903 0.01601 0.01795 0.01630 0.00824 0.01324 0.01512 0.01008 0.00692
       0.00730 0.00565 0.00292 0.00499 0.01832
*  LDT2
    3  0.16011 0.15760 0.10734 0.12204 0.03867 0.06702 0.04451 0.04531 0.03664 0.03467
       0.02402 0.01903 0.01601 0.01795 0.01630 0.00824 0.01324 0.01512 0.01008 0.00692
       0.00730 0.00565 0.00292 0.00499 0.01832
*  LDT3
    4  0.07833 0.09747 0.07846 0.06926 0.05347 0.07242 0.04717 0.05866 0.06375 0.05084
       0.04101 0.03458 0.03039 0.03249 0.03026 0.02058 0.02309 0.02140 0.01845 0.01164
       0.01312 0.01055 0.00511 0.00721 0.03029
*  LDT4
    5  0.07833 0.09747 0.07846 0.06926 0.05347 0.07242 0.04717 0.05866 0.06375 0.05084
       0.04101 0.03458 0.03039 0.03249 0.03026 0.02058 0.02309 0.02140 0.01845 0.01164
       0.01312 0.01055 0.00511 0.00721 0.03029
*  HDV2
    6  0.13897 0.13293 0.10453 0.07976 0.04350 0.05680 0.02961 0.04653 0.04471 0.03625
       0.02659 0.01390 0.02659 0.01631 0.02477 0.01692 0.03263 0.02417 0.02356 0.00846
       0.00967 0.00906 0.00665 0.00846 0.03867
*  HDV3
    7  0.02889 0.07889 0.07222 0.08667 0.04667 0.06111 0.04889 0.08333 0.06000 0.04222
       0.03667 0.03778 0.03000 0.03778 0.03556 0.01556 0.00778 0.02778 0.00556 0.00556
       0.00778 0.01556 0.00889 0.01333 0.10552
*  HDV4
    8  0.03406 0.12409 0.06326 0.09002 0.05839 0.06326 0.08273 0.01703 0.02676 0.02190
       0.02676 0.02676 0.01217 0.01703 0.01460 0.03406 0.01703 0.01946 0.01703 0.00973
       0.01460 0.01217 0.01217 0.01217 0.17276
*  HDV5
    9  0.03828 0.06699 0.02871 0.05263 0.02153 0.03110 0.02871 0.03828 0.01196 0.01675
       0.03110 0.03828 0.01675 0.01675 0.02632 0.04067 0.05263 0.03349 0.04067 0.01914
       0.04067 0.03589 0.03589 0.05263 0.18418
*  HDV6
   10  0.00809 0.04651 0.06370 0.05056 0.04146 0.02629 0.03236 0.06168 0.05258 0.03741
       0.03033 0.04550 0.03943 0.04449 0.02022 0.04044 0.04044 0.05662 0.02528 0.01416
       0.02932 0.03134 0.02123 0.03337 0.10719
*  HDV7
   11  0.01587 0.02646 0.07231 0.03880 0.02822 0.01764 0.02998 0.04586 0.03351 0.04586
       0.04586 0.03704 0.06702 0.02998 0.03175 0.03880 0.05291 0.03351 0.04233 0.03527
       0.01587 0.02822 0.03175 0.02293 0.13225
*  HDV8A
   12  0.00589 0.02120 0.03180 0.03180 0.03298 0.01767 0.01767 0.03769 0.06478 0.04476
       0.03534 0.03298 0.05771 0.04947 0.05183 0.04240 0.04122 0.04947 0.05300 0.01178
       0.02945 0.04476 0.02473 0.05654 0.11308
*  HDV8B
   13  0.01739 0.02174 0.13478 0.14348 0.08696 0.04783 0.05652 0.12174 0.05217 0.06957
       0.03913 0.03478 0.04348 0.01739 0.00435 0.01304 0.01304 0.02174 0.02609 0.00435
       0.00435 0.01304 0.00000 0.00000 0.01304
*   HDBS is MOBILE6 default
*   HDBT is MOBILE6 default
*  MC
   16  0.19876 0.20761 0.11405 0.07301 0.04653 0.03555 0.02768 0.02863 0.01909 0.01599
       0.01193 0.00811 0.00668 0.00978 0.00931 0.01455 0.02004 0.02291 0.01241 0.01455
       0.01813 0.01623 0.01646 0.00978 0.04223
```

# San Angelo District Registration Distributions

```
*  Calculated from Mid-Year (July) 2002 Registration data
*  LDV
    1  0.04028 0.07057 0.08555 0.08462 0.07156 0.07350 0.06513 0.06966 0.05758 0.05626
       0.04865 0.04401 0.03763 0.03297 0.02778 0.01959 0.01812 0.01786 0.01435 0.00967
       0.00695 0.00531 0.00490 0.00640 0.03110
*  LDT1
    2  0.09537 0.13873 0.10134 0.12374 0.05175 0.09439 0.06055 0.05947 0.04177 0.03981
       0.02670 0.02181 0.01516 0.01565 0.01575 0.00665 0.01497 0.01184 0.00968 0.00753
       0.00988 0.00606 0.00381 0.00695 0.02064
*  LDT2
    3  0.09537 0.13873 0.10134 0.12374 0.05175 0.09439 0.06055 0.05947 0.04177 0.03981
       0.02670 0.02181 0.01516 0.01565 0.01575 0.00665 0.01497 0.01184 0.00968 0.00753
       0.00988 0.00606 0.00381 0.00695 0.02064
*  LDT3
    4  0.05665 0.08948 0.07932 0.07845 0.06489 0.07466 0.05423 0.05716 0.05401 0.04312
       0.03819 0.03659 0.02972 0.02913 0.02588 0.01655 0.02346 0.02057 0.01712 0.01317
       0.01431 0.01139 0.00692 0.01091 0.05412
*  LDT4
    5  0.05665 0.08948 0.07932 0.07845 0.06489 0.07466 0.05423 0.05716 0.05401 0.04312
       0.03819 0.03659 0.02972 0.02913 0.02588 0.01655 0.02346 0.02057 0.01712 0.01317
       0.01431 0.01139 0.00692 0.01091 0.05412
*  HDV2
    6  0.15006 0.19794 0.09314 0.10996 0.04657 0.08150 0.02329 0.05433 0.04140 0.02070
       0.02199 0.01811 0.01811 0.00388 0.00776 0.00259 0.00647 0.01164 0.00776 0.00388
       0.00776 0.01682 0.00259 0.01423 0.03752
*  HDV3
    7  0.02842 0.08010 0.11111 0.16021 0.02326 0.08786 0.03359 0.05685 0.05943 0.02326
       0.03876 0.05426 0.03876 0.02326 0.01550 0.01034 0.02067 0.02067 0.00775 0.00258
       0.00775 0.01034 0.01034 0.01550 0.05943
*  HDV4
    8  0.10828 0.21017 0.07643 0.03185 0.00637 0.13376 0.04459 0.02548 0.03185 0.01274
       0.02548 0.06369 0.01911 0.00637 0.00000 0.00000 0.01274 0.01274 0.00637 0.01911
       0.03185 0.00637 0.00637 0.01911 0.08917
*  HDV5
    9  0.02000 0.11000 0.09000 0.03000 0.02000 0.02000 0.01000 0.01000 0.03000 0.02000
       0.00000 0.04000 0.07000 0.04000 0.06000 0.03000 0.02000 0.02000 0.05000 0.03000
       0.00000 0.04000 0.02000 0.05000 0.17000
*  HDV6
   10  0.01460 0.02920 0.04380 0.03650 0.04015 0.04745 0.04745 0.05109 0.02555 0.04015
       0.04380 0.02920 0.02555 0.03285 0.04015 0.03650 0.06204 0.05109 0.02190 0.01095
       0.04380 0.06204 0.00730 0.02920 0.12769
*  HDV7
   11  0.01515 0.02525 0.04040 0.02020 0.05556 0.04040 0.02525 0.05556 0.07576 0.06061
       0.02525 0.05051 0.05051 0.03030 0.02020 0.03535 0.04040 0.01515 0.03535 0.02525
       0.03535 0.03030 0.04545 0.05556 0.09093
*  HDV8A
   12  0.01167 0.01946 0.00778 0.02335 0.02724 0.06226 0.06226 0.08170 0.05058 0.04669
       0.04280 0.05058 0.03891 0.02335 0.05447 0.01946 0.02724 0.07782 0.03113 0.02335
       0.06226 0.03502 0.03502 0.04280 0.04280
*  HDV8B
   13  0.00000 0.00000 0.06452 0.19354 0.09677 0.06452 0.06452 0.12903 0.03226 0.09677
       0.06452 0.09677 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
       0.00000 0.00000 0.00000 0.03226 0.06452
*   HDBS is MOBILE6 default
*   HDBT is MOBILE6 default
*  MC
   16  0.09803 0.11026 0.08373 0.07148 0.05446 0.04561 0.04901 0.03744 0.03336 0.01906
       0.01702 0.00953 0.01225 0.01566 0.01634 0.01498 0.02451 0.02995 0.02246 0.02383
       0.03880 0.03404 0.02859 0.02519 0.08441
```

# San Antonio District Registration Distributions

```
*  Calculated from Mid-Year (July) 2002 Registration data
*  LDV
    1  0.06935 0.08822 0.08933 0.07754 0.06909 0.06600 0.05992 0.06906 0.05853 0.05440
       0.04466 0.04225 0.03431 0.03120 0.02518 0.02050 0.01868 0.01621 0.01307 0.00804
       0.00567 0.00456 0.00361 0.00474 0.02588
*  LDT1
    2  0.11119 0.14356 0.10630 0.13161 0.05154 0.07854 0.05419 0.05511 0.04170 0.03486
       0.02507 0.01920 0.01682 0.01644 0.01365 0.00785 0.01397 0.01308 0.01168 0.00694
       0.00707 0.00444 0.00505 0.00646 0.02368
*  LDT2
    3  0.11119 0.14356 0.10630 0.13161 0.05154 0.07854 0.05419 0.05511 0.04170 0.03486
       0.02507 0.01920 0.01682 0.01644 0.01365 0.00785 0.01397 0.01308 0.01168 0.00694
       0.00707 0.00444 0.00505 0.00646 0.02368
*  LDT3
    4  0.07892 0.10162 0.08331 0.07786 0.05935 0.06691 0.05064 0.05729 0.05776 0.04494
       0.03629 0.03281 0.02621 0.02678 0.02313 0.01771 0.02304 0.02023 0.01784 0.01138
       0.01182 0.01022 0.00650 0.00891 0.04853
*  LDT4
    5  0.07892 0.10162 0.08331 0.07786 0.05935 0.06691 0.05064 0.05729 0.05776 0.04494
       0.03629 0.03281 0.02621 0.02678 0.02313 0.01771 0.02304 0.02023 0.01784 0.01138
       0.01182 0.01022 0.00650 0.00891 0.04853
*  HDV2
    6  0.15770 0.16850 0.09890 0.08940 0.04784 0.05992 0.02771 0.04253 0.03431 0.03206
       0.02175 0.02062 0.01401 0.01466 0.01563 0.00966 0.02593 0.02223 0.01595 0.00870
       0.01836 0.00789 0.00805 0.00902 0.02867
*  HDV3
    7  0.04520 0.09267 0.08052 0.10559 0.03836 0.08280 0.04823 0.07064 0.05355 0.05811
       0.03152 0.03304 0.03266 0.02469 0.02051 0.01519 0.01329 0.02051 0.01329 0.00987
       0.01253 0.00760 0.00836 0.01215 0.06912
*  HDV4
    8  0.05779 0.08231 0.11734 0.12961 0.04378 0.09107 0.08406 0.05954 0.03940 0.03678
       0.02715 0.02014 0.02277 0.01576 0.01401 0.01401 0.00438 0.00701 0.01226 0.00613
       0.01138 0.00350 0.00788 0.01576 0.07618
*  HDV5
    9  0.05322 0.05322 0.12129 0.13613 0.05446 0.04084 0.03837 0.04455 0.02351 0.02104
       0.01733 0.02228 0.02104 0.02104 0.02351 0.02351 0.01485 0.03342 0.01485 0.01485
       0.03218 0.02599 0.01485 0.02228 0.11139
*  HDV6
   10  0.04249 0.07891 0.08562 0.08147 0.09270 0.03770 0.04121 0.07348 0.03962 0.04153
       0.02428 0.02843 0.03035 0.02204 0.02236 0.02364 0.02428 0.02843 0.02492 0.01661
       0.02364 0.01821 0.01246 0.01885 0.06677
*  HDV7
   11  0.03821 0.07343 0.09792 0.06866 0.06567 0.05194 0.04836 0.05910 0.03821 0.04716
       0.03940 0.05612 0.04418 0.03224 0.02925 0.03104 0.03284 0.03045 0.02567 0.01791
       0.01612 0.01134 0.00896 0.01313 0.02269
*  HDV8A
   12  0.05278 0.04676 0.05602 0.05556 0.04213 0.02870 0.03704 0.06390 0.05463 0.05648
       0.03704 0.05278 0.04583 0.04722 0.04444 0.04120 0.03796 0.03796 0.03009 0.01296
       0.02731 0.01991 0.01435 0.02176 0.03519
*  HDV8B
   13  0.02864 0.08095 0.12576 0.09963 0.03861 0.07098 0.05978 0.03985 0.08842 0.09091
       0.01370 0.03611 0.01121 0.00747 0.00747 0.00498 0.02740 0.03487 0.04608 0.02491
       0.01370 0.03113 0.00623 0.00747 0.00374
*   HDBS is MOBILE6 default
*   HDBT is MOBILE6 default
*  MC
   16  0.13783 0.13242 0.10545 0.08040 0.05800 0.04365 0.04120 0.03637 0.03135 0.02491
       0.02002 0.01358 0.01390 0.01519 0.01217 0.01345 0.02466 0.02388 0.01674 0.02047
       0.02633 0.01809 0.01584 0.01056 0.06354
```

# Tyler District Registration Distributions

```
*  Calculated from Mid-Year (July) 2002 Registration data
*  LDV
    1  0.05264 0.07309 0.08093 0.07808 0.06829 0.06899 0.06613 0.07391 0.05999 0.05558
       0.04801 0.04483 0.03947 0.03377 0.02796 0.02150 0.01938 0.01774 0.01418 0.00959
       0.00638 0.00499 0.00381 0.00561 0.02515
*  LDT1
    2  0.11013 0.14800 0.10918 0.11669 0.05456 0.07619 0.06038 0.05922 0.03818 0.03531
       0.02605 0.02226 0.01613 0.01665 0.01360 0.00799 0.01297 0.01367 0.01196 0.00715
       0.00719 0.00438 0.00435 0.00670 0.02111
*  LDT2
    3  0.11013 0.14800 0.10918 0.11669 0.05456 0.07619 0.06038 0.05922 0.03818 0.03531
       0.02605 0.02226 0.01613 0.01665 0.01360 0.00799 0.01297 0.01367 0.01196 0.00715
       0.00719 0.00438 0.00435 0.00670 0.02111
*  LDT3
    4  0.06132 0.09074 0.07705 0.06930 0.06192 0.06997 0.05612 0.06392 0.05821 0.04677
       0.03893 0.03476 0.03009 0.03016 0.02570 0.01901 0.02358 0.02186 0.01967 0.01329
       0.01334 0.01117 0.00680 0.01006 0.04626
*  LDT4
    5  0.06132 0.09074 0.07705 0.06930 0.06192 0.06997 0.05612 0.06392 0.05821 0.04677
       0.03893 0.03476 0.03009 0.03016 0.02570 0.01901 0.02358 0.02186 0.01967 0.01329
       0.01334 0.01117 0.00680 0.01006 0.04626
*  HDV2
    6  0.14126 0.21280 0.11212 0.11889 0.07122 0.05915 0.02531 0.03826 0.02796 0.01795
       0.01677 0.01677 0.01118 0.01442 0.01295 0.00765 0.01501 0.01619 0.00853 0.00706
       0.01001 0.00559 0.00500 0.00706 0.02089
*  HDV3
    7  0.04919 0.10857 0.12638 0.13486 0.03986 0.07125 0.03647 0.05683 0.04665 0.04495
       0.02969 0.03053 0.02799 0.03053 0.01696 0.00933 0.01951 0.01442 0.01612 0.00594
       0.01442 0.00509 0.00424 0.00848 0.05174
*  HDV4
    8  0.03407 0.08016 0.14028 0.13026 0.05812 0.06814 0.05010 0.06212 0.06012 0.05210
       0.03607 0.02204 0.02806 0.02405 0.01002 0.00000 0.00401 0.01202 0.00802 0.01202
       0.01804 0.00401 0.01202 0.01804 0.05611
*  HDV5
    9  0.06806 0.11518 0.12829 0.06545 0.03141 0.04188 0.01309 0.04188 0.03927 0.04188
       0.01309 0.03141 0.03665 0.01047 0.01832 0.02094 0.03403 0.01571 0.03141 0.02618
       0.01571 0.02356 0.01571 0.02356 0.09686
*  HDV6
   10  0.02974 0.04758 0.05862 0.06202 0.07560 0.05098 0.05098 0.06117 0.05268 0.05183
       0.04163 0.03908 0.03144 0.02549 0.02549 0.03144 0.03738 0.02804 0.02719 0.02379
       0.02039 0.01869 0.01869 0.01869 0.07137
*  HDV7
   11  0.04861 0.03819 0.04861 0.04861 0.06597 0.08161 0.05382 0.04514 0.05729 0.05382
       0.05035 0.06944 0.03472 0.03472 0.03125 0.03472 0.02083 0.04861 0.03646 0.01042
       0.01389 0.02951 0.01042 0.01736 0.01563
*  HDV8A
   12  0.01235 0.03549 0.02315 0.04012 0.04167 0.03395 0.06481 0.08641 0.05556 0.05556
       0.03704 0.05710 0.04938 0.04012 0.03704 0.04321 0.04475 0.05710 0.02778 0.00772
       0.01698 0.02778 0.02006 0.02623 0.05864
*  HDV8B
   13  0.09783 0.06522 0.11957 0.19563 0.03261 0.11957 0.03261 0.16304 0.02174 0.01087
       0.00000 0.00000 0.03261 0.01087 0.03261 0.01087 0.02174 0.01087 0.01087 0.00000
       0.00000 0.00000 0.00000 0.00000 0.01087
*   HDBS is MOBILE6 default
*   HDBT is MOBILE6 default
*  MC
   16  0.11368 0.12273 0.10025 0.09072 0.06465 0.05325 0.04622 0.03888 0.03279 0.02764
       0.01593 0.01265 0.01093 0.01421 0.01265 0.01140 0.02405 0.02764 0.02171 0.02420
       0.02858 0.02092 0.01733 0.01187 0.05512
```

# Waco District Registration Distributions

```
*  Calculated from Mid-Year (July) 2002 Registration data
*  LDV
    1  0.05767 0.08233 0.08926 0.08221 0.07350 0.07342 0.06645 0.07174 0.05651 0.05340
       0.04527 0.04024 0.03461 0.03200 0.02576 0.02056 0.01673 0.01551 0.01226 0.00775
       0.00538 0.00461 0.00318 0.00496 0.02469
*  LDT1
    2  0.09572 0.14481 0.10669 0.11670 0.05672 0.07861 0.06125 0.05977 0.04018 0.03704
       0.02677 0.01981 0.01658 0.01963 0.01650 0.00710 0.01550 0.01345 0.01402 0.00792
       0.00897 0.00470 0.00366 0.00692 0.02098
*  LDT2
    3  0.09572 0.14481 0.10669 0.11670 0.05672 0.07861 0.06125 0.05977 0.04018 0.03704
       0.02677 0.01981 0.01658 0.01963 0.01650 0.00710 0.01550 0.01345 0.01402 0.00792
       0.00897 0.00470 0.00366 0.00692 0.02098
*  LDT3
    4  0.06097 0.09088 0.07879 0.07388 0.06414 0.06979 0.05762 0.06035 0.05662 0.04627
       0.03920 0.03428 0.02956 0.03055 0.02512 0.01695 0.02274 0.02065 0.01832 0.01244
       0.01264 0.01008 0.00606 0.00961 0.05249
*  LDT4
    5  0.06097 0.09088 0.07879 0.07388 0.06414 0.06979 0.05762 0.06035 0.05662 0.04627
       0.03920 0.03428 0.02956 0.03055 0.02512 0.01695 0.02274 0.02065 0.01832 0.01244
       0.01264 0.01008 0.00606 0.00961 0.05249
*  HDV2
    6  0.13532 0.19913 0.13021 0.13064 0.07404 0.05915 0.02511 0.03064 0.02511 0.02298
       0.01106 0.01617 0.01106 0.01319 0.00979 0.00426 0.01404 0.01191 0.00936 0.00979
       0.01277 0.00681 0.00511 0.00809 0.02426
*  HDV3
    7  0.02945 0.07426 0.12035 0.09219 0.03073 0.05506 0.04738 0.07810 0.05378 0.06658
       0.03073 0.03073 0.03073 0.03585 0.01793 0.02689 0.02433 0.01793 0.01793 0.00640
       0.00896 0.00640 0.00640 0.01024 0.08067
*  HDV4
    8  0.02251 0.07074 0.10932 0.08039 0.04502 0.07074 0.04823 0.08360 0.04180 0.06109
       0.03537 0.03859 0.02572 0.01929 0.01286 0.00643 0.01286 0.01608 0.01286 0.00643
       0.00965 0.01608 0.01286 0.01929 0.12219
*  HDV5
    9  0.03084 0.05286 0.11013 0.03524 0.03524 0.02203 0.01762 0.07489 0.02643 0.02203
       0.02203 0.03524 0.02203 0.03965 0.00441 0.02203 0.04846 0.06167 0.03965 0.00881
       0.04405 0.00881 0.01762 0.01762 0.18061
*  HDV6
   10  0.01392 0.02204 0.04408 0.04292 0.05336 0.03944 0.05452 0.07425 0.06381 0.04176
       0.04060 0.03364 0.03480 0.03016 0.02088 0.02900 0.04988 0.03828 0.03480 0.02204
       0.02784 0.02900 0.01624 0.02320 0.11954
*  HDV7
   11  0.02730 0.02978 0.02730 0.07940 0.07692 0.08187 0.02978 0.07196 0.05211 0.04963
       0.02730 0.02481 0.04467 0.04218 0.01985 0.04715 0.02481 0.03970 0.02730 0.01241
       0.02233 0.03722 0.01241 0.02233 0.06948
*  HDV8A
   12  0.00748 0.02743 0.03117 0.03616 0.05112 0.02743 0.03367 0.06359 0.05486 0.04489
       0.04613 0.03865 0.04613 0.05112 0.06983 0.02993 0.03865 0.04863 0.05237 0.01496
       0.02494 0.02120 0.03865 0.02494 0.07607
*  HDV8B
   13  0.07080 0.16813 0.11504 0.08850 0.06195 0.03540 0.03540 0.15929 0.02655 0.15044
       0.00885 0.04425 0.00885 0.00000 0.00885 0.00000 0.00000 0.00885 0.00885 0.00000
       0.00000 0.00000 0.00000 0.00000 0.00000
*   HDBS is MOBILE6 default
*   HDBT is MOBILE6 default
*  MC
   16  0.14092 0.13819 0.10342 0.08074 0.05866 0.05095 0.04596 0.03402 0.03266 0.02888
       0.01784 0.01225 0.01028 0.01451 0.01194 0.01240 0.02540 0.02404 0.01769 0.01905
       0.02449 0.01693 0.01603 0.01104 0.05171
```

# Wichita Falls District Registration Distributions

```
*  Calculated from Mid-Year (July) 2002 Registration data
*  LDV
    1  0.04489 0.07089 0.08071 0.07802 0.06952 0.07123 0.06606 0.07179 0.05889 0.05644
       0.04807 0.04477 0.03854 0.03485 0.02830 0.02117 0.01973 0.01777 0.01474 0.00948
       0.00691 0.00517 0.00419 0.00654 0.03133
*  LDT1
    2  0.09911 0.14881 0.10788 0.12152 0.05235 0.07688 0.05722 0.05545 0.04012 0.03596
       0.02489 0.02073 0.01621 0.01736 0.01258 0.00850 0.01364 0.01506 0.01063 0.00762
       0.00797 0.00735 0.00585 0.00903 0.02728
*  LDT2
    3  0.09911 0.14881 0.10788 0.12152 0.05235 0.07688 0.05722 0.05545 0.04012 0.03596
       0.02489 0.02073 0.01621 0.01736 0.01258 0.00850 0.01364 0.01506 0.01063 0.00762
       0.00797 0.00735 0.00585 0.00903 0.02728
*  LDT3
    4  0.05840 0.08623 0.07677 0.07280 0.06123 0.06644 0.05464 0.05873 0.06025 0.04644
       0.03857 0.03512 0.03086 0.03283 0.02463 0.01793 0.02482 0.02299 0.01992 0.01274
       0.01297 0.01142 0.00739 0.01246 0.05342
*  LDT4
    5  0.05840 0.08623 0.07677 0.07280 0.06123 0.06644 0.05464 0.05873 0.06025 0.04644
       0.03857 0.03512 0.03086 0.03283 0.02463 0.01793 0.02482 0.02299 0.01992 0.01274
       0.01297 0.01142 0.00739 0.01246 0.05342
*  HDV2
    6  0.13165 0.19296 0.11362 0.10189 0.06132 0.06222 0.02435 0.04418 0.01443 0.02254
       0.01353 0.01894 0.01623 0.01262 0.01894 0.00721 0.01623 0.02164 0.01353 0.00812
       0.01262 0.02074 0.00541 0.00721 0.03787
*  HDV3
    7  0.06402 0.09490 0.09051 0.09272 0.02870 0.06843 0.02428 0.05077 0.04636 0.03753
       0.03532 0.03532 0.02870 0.03091 0.02428 0.00662 0.02870 0.02428 0.01325 0.00883
       0.01104 0.02208 0.01766 0.01987 0.09492
*  HDV4
    8  0.03145 0.06918 0.11950 0.05660 0.03774 0.07547 0.05031 0.09434 0.04403 0.03145
       0.01258 0.01258 0.00629 0.05031 0.00629 0.00629 0.03774 0.02516 0.03145 0.00000
       0.00629 0.01258 0.02516 0.02516 0.13205
*  HDV5
    9  0.03279 0.03279 0.05738 0.01639 0.02459 0.03279 0.00820 0.00820 0.01639 0.00000
       0.04098 0.00000 0.00000 0.04918 0.03279 0.03279 0.01639 0.03279 0.00820 0.01639
       0.04098 0.02459 0.04098 0.07377 0.36065
*  HDV6
   10  0.01754 0.02256 0.02757 0.03509 0.04511 0.02757 0.04261 0.06266 0.03258 0.03759
       0.03509 0.04010 0.04010 0.02256 0.03509 0.01504 0.04261 0.05514 0.03258 0.01504
       0.02757 0.05263 0.03008 0.06767 0.13782
*  HDV7
   11  0.02165 0.02597 0.01732 0.04329 0.06926 0.03896 0.06061 0.04762 0.04329 0.03463
       0.02165 0.03030 0.07792 0.04762 0.05195 0.01299 0.02597 0.05195 0.03463 0.00866
       0.05195 0.03896 0.02597 0.02597 0.09091
*  HDV8A
   12  0.01303 0.02280 0.02932 0.03909 0.02280 0.02932 0.02280 0.05212 0.05212 0.02932
       0.03909 0.03257 0.03257 0.03583 0.04560 0.02932 0.04235 0.04560 0.02280 0.01629
       0.06189 0.07818 0.04235 0.04886 0.11398
*  HDV8B
   13  0.00000 0.07353 0.08824 0.14701 0.08824 0.02941 0.01471 0.02941 0.11765 0.05882
       0.01471 0.01471 0.01471 0.01471 0.00000 0.00000 0.00000 0.08824 0.04412 0.00000
       0.01471 0.01471 0.01471 0.04412 0.07353
*   HDBS is MOBILE6 default
*   HDBT is MOBILE6 default
*  MC
   16  0.11629 0.12486 0.10010 0.06938 0.05385 0.04955 0.04460 0.03898 0.03171 0.02577
       0.02015 0.01354 0.01222 0.01156 0.01520 0.01388 0.02973 0.02445 0.01652 0.02412
       0.03469 0.02412 0.02610 0.01751 0.06112
```

# Yoakum District Registration Distributions

```
*  Calculated from Mid-Year (July) 2002 Registration data
*  LDV
    1  0.04703 0.07451 0.08543 0.07777 0.07168 0.07116 0.06497 0.06983 0.05741 0.05470
       0.04722 0.04415 0.03846 0.03486 0.02832 0.02050 0.01865 0.01864 0.01523 0.00967
       0.00754 0.00593 0.00474 0.00563 0.02597
*  LDT1
    2  0.10862 0.15221 0.11132 0.12673 0.05650 0.08441 0.05852 0.05384 0.04065 0.03684
       0.02648 0.02188 0.01652 0.01719 0.01294 0.00635 0.01088 0.01167 0.01068 0.00516
       0.00691 0.00401 0.00314 0.00512 0.01143
*  LDT2
    3  0.10862 0.15221 0.11132 0.12673 0.05650 0.08441 0.05852 0.05384 0.04065 0.03684
       0.02648 0.02188 0.01652 0.01719 0.01294 0.00635 0.01088 0.01167 0.01068 0.00516
       0.00691 0.00401 0.00314 0.00512 0.01143
*  LDT3
    4  0.07008 0.09832 0.08283 0.08211 0.06458 0.07235 0.05533 0.06085 0.05700 0.04688
       0.03902 0.03650 0.03092 0.02972 0.02429 0.01628 0.01971 0.01973 0.01805 0.00988
       0.01209 0.00942 0.00559 0.00786 0.03061
*  LDT4
    5  0.07008 0.09832 0.08283 0.08211 0.06458 0.07235 0.05533 0.06085 0.05700 0.04688
       0.03902 0.03650 0.03092 0.02972 0.02429 0.01628 0.01971 0.01973 0.01805 0.00988
       0.01209 0.00942 0.00559 0.00786 0.03061
*  HDV2
    6  0.16019 0.21895 0.10778 0.11412 0.06298 0.06128 0.03339 0.03212 0.02409 0.01775
       0.01310 0.01775 0.01986 0.01141 0.01141 0.00676 0.01352 0.01099 0.00972 0.00338
       0.00761 0.00845 0.00465 0.00634 0.02240
*  HDV3
    7  0.04825 0.11339 0.10012 0.09771 0.05187 0.07720 0.04704 0.06634 0.06514 0.02533
       0.03619 0.03619 0.03981 0.02895 0.01809 0.01327 0.02292 0.01568 0.01448 0.00844
       0.01086 0.01086 0.00483 0.00965 0.03739
*  HDV4
    8  0.04490 0.06122 0.08571 0.08980 0.06531 0.06122 0.03265 0.09388 0.06939 0.03265
       0.02857 0.01633 0.03265 0.02041 0.04490 0.00816 0.00816 0.01633 0.01224 0.00816
       0.02041 0.02041 0.02449 0.00408 0.09797
*  HDV5
    9  0.03241 0.10648 0.09722 0.07870 0.01852 0.06481 0.04167 0.03241 0.04167 0.04167
       0.04167 0.01852 0.01852 0.00463 0.02778 0.01389 0.02315 0.04167 0.01852 0.00926
       0.01389 0.03241 0.01389 0.04167 0.12497
*  HDV6
   10  0.01220 0.03811 0.04878 0.04116 0.04878 0.03201 0.04268 0.04726 0.04116 0.05793
       0.03659 0.05030 0.04573 0.01982 0.03354 0.02896 0.03811 0.01982 0.03049 0.01524
       0.04116 0.04268 0.01372 0.03354 0.14023
*  HDV7
   11  0.01305 0.02872 0.04439 0.06266 0.05222 0.05483 0.08356 0.06789 0.03394 0.03394
       0.04961 0.04178 0.06005 0.03655 0.04178 0.05744 0.03916 0.03133 0.02350 0.00783
       0.01828 0.03394 0.01567 0.01305 0.05483
*  HDV8A
   12  0.01314 0.03284 0.03612 0.03612 0.02791 0.02299 0.03612 0.03941 0.03120 0.07225
       0.03941 0.05090 0.04762 0.04762 0.04269 0.03284 0.03777 0.05583 0.03448 0.01642
       0.02791 0.05419 0.03941 0.03941 0.08540
*  HDV8B
   13  0.00000 0.02941 0.13232 0.11765 0.05882 0.11765 0.07353 0.04412 0.07353 0.07353
       0.04412 0.04412 0.02941 0.01471 0.02941 0.01471 0.01471 0.02941 0.01471 0.00000
       0.01471 0.00000 0.01471 0.01471 0.00000
*   HDBS is MOBILE6 default
*   HDBT is MOBILE6 default
*  MC
   16  0.13953 0.12157 0.09346 0.07619 0.06468 0.04368 0.04572 0.04131 0.03183 0.02303
       0.01693 0.01761 0.01321 0.01355 0.01118 0.01964 0.02777 0.02641 0.02133 0.01625
       0.02574 0.02032 0.02032 0.00948 0.05926
```

# APPENDIX K
# SUMMER AND WINTER FUEL PROPERTY INPUTS TO MOBILE6 BY COUNTY

## Summer Fuel Property Inputs to MOBILE6

| County | District Name | County Group Code* | RVP (psi) | Sulfur (ppm) | Ave. Oxy.(wt. %) |
|---|---|---|---|---|---|
| Borden | Abilene District | D01C6R1 | 8.4 | 425 | - |
| Callahan | Abilene District | D01C6R1 | 8.4 | 425 | - |
| Fisher | Abilene District | D01C6R1 | 8.4 | 425 | - |
| Haskell | Abilene District | D01C6R1 | 8.4 | 425 | - |
| Howard | Abilene District | D01C6R1 | 8.4 | 425 | - |
| Jones | Abilene District | D01C6R1 | 8.4 | 425 | - |
| Kent | Abilene District | D01C6R1 | 8.4 | 425 | - |
| Mitchell | Abilene District | D01C6R1 | 8.4 | 425 | - |
| Nolan | Abilene District | D01C6R1 | 8.4 | 425 | - |
| Scurry | Abilene District | D01C6R1 | 8.4 | 425 | - |
| Shackelford | Abilene District | D01C6R1 | 8.4 | 425 | - |
| Stonewall | Abilene District | D01C6R1 | 8.4 | 425 | - |
| Taylor | Abilene District | D01C6R1 | 8.4 | 425 | - |
| Armstrong | Amarillo District | D02C1R5 | 8.3 | 203 | - |
| Carson | Amarillo District | D02C1R5 | 8.3 | 203 | - |
| Dallam | Amarillo District | D02C1R5 | 8.3 | 203 | - |
| Deaf Smith | Amarillo District | D02C1R5 | 8.3 | 203 | - |
| Gray | Amarillo District | D02C1R5 | 8.3 | 203 | - |
| Hansford | Amarillo District | D02C1R5 | 8.3 | 203 | - |
| Hartley | Amarillo District | D02C1R5 | 8.3 | 203 | - |

| County | District Name | County Group Code* | RVP (psi) | Sulfur (ppm) | Ave. Oxy.(wt. %) |
|---|---|---|---|---|---|
| Hemphill | Amarillo District | D02C1R5 | 8.3 | 203 | - |
| Hutchinson | Amarillo District | D02C1R5 | 8.3 | 203 | - |
| Lipscomb | Amarillo District | D02C1R5 | 8.3 | 203 | - |
| Moore | Amarillo District | D02C1R5 | 8.3 | 203 | - |
| Ochiltree | Amarillo District | D02C1R5 | 8.3 | 203 | - |
| Oldham | Amarillo District | D02C1R5 | 8.3 | 203 | - |
| Potter | Amarillo District | D02C1R5 | 8.3 | 203 | - |
| Randall | Amarillo District | D02C1R5 | 8.3 | 203 | - |
| Roberts | Amarillo District | D02C1R5 | 8.3 | 203 | - |
| Sherman | Amarillo District | D02C1R5 | 8.3 | 203 | - |
| Bowie | Atlanta District | D03C3R2 | 7.5 | 166 | - |
| Camp | Atlanta District | D03C3R2 | 7.5 | 166 | - |
| Cass | Atlanta District | D03C3R2 | 7.5 | 166 | - |
| Harrison | Atlanta District | D03C3R2 | 7.5 | 166 | - |
| Marion | Atlanta District | D03C3R2 | 7.5 | 166 | - |
| Morris | Atlanta District | D03C3R2 | 7.5 | 166 | - |
| Panola | Atlanta District | D03C3R2 | 7.5 | 166 | - |
| Titus | Atlanta District | D03C3R2 | 7.5 | 166 | - |
| Upshur | Atlanta District | D03C3R2 | 7.5 | 166 | - |
| Bastrop | Austin District | D04C8R2 | 7.5 | 166 | - |
| Blanco | Austin District | D04C8R1 | 8.4 | 425 | - |

| County | District Name | County Group Code* | RVP (psi) | Sulfur (ppm) | Ave. Oxy.(wt. %) |
|---|---|---|---|---|---|
| Burnet | Austin District | D04C8R1 | 8.4 | 425 | - |
| Caldwell | Austin District | D04C8R2 | 7.5 | 166 | - |
| Gillespie | Austin District | D04C8R1 | 8.4 | 425 | - |
| Hays | Austin District | D04C8R2 | 7.5 | 166 | - |
| Lee | Austin District | D04C8R2 | 7.5 | 166 | - |
| Llano | Austin District | D04C8R1 | 8.4 | 425 | - |
| Mason | Austin District | D04C8R1 | 8.4 | 425 | - |
| Travis | Austin District | D04C8R2 | 7.5 | 166 | - |
| Williamson | Austin District | D04C8R2 | 7.5 | 166 | - |
| Chambers | Beaumont District | D05C5R4 | 6.8 | 119 | 2.1 |
| Hardin | Beaumont District | D05C5R2 | 7.5 | 166 | - |
| Jasper | Beaumont District | D05C5R2 | 7.5 | 166 | - |
| Jefferson | Beaumont District | D05C5R2 | 7.5 | 166 | - |
| Liberty | Beaumont District | D05C5R4 | 6.8 | 119 | 2.1 |
| Newton | Beaumont District | D05C5R2 | 7.5 | 166 | - |
| Orange | Beaumont District | D05C5R2 | 7.5 | 166 | - |
| Tyler | Beaumont District | D05C5R2 | 7.5 | 166 | - |
| Brown | Brownwood District | D06C7R1 | 8.4 | 425 | - |
| Coleman | Brownwood District | D06C7R1 | 8.4 | 425 | - |
| Comanche | Brownwood District | D06C3R1 | 8.4 | 425 | - |
| Eastland | Brownwood District | D06C6R1 | 8.4 | 425 | - |

| County | District Name | County Group Code* | RVP (psi) | Sulfur (ppm) | Ave. Oxy.(wt. %) |
|---|---|---|---|---|---|
| Lampasas | Brownwood District | D06C8R1 | 8.4 | 425 | - |
| McCulloch | Brownwood District | D06C7R1 | 8.4 | 425 | - |
| Mills | Brownwood District | D06C8R1 | 8.4 | 425 | - |
| San Saba | Brownwood District | D06C8R1 | 8.4 | 425 | - |
| Stephens | Brownwood District | D06C6R1 | 8.4 | 425 | - |
| Brazos | Bryan District | D07C5R2 | 7.5 | 166 | - |
| Burleson | Bryan District | D07C8R2 | 7.5 | 166 | - |
| Freestone | Bryan District | D07C3R2 | 7.5 | 166 | - |
| Grimes | Bryan District | D07C5R2 | 7.5 | 166 | - |
| Leon | Bryan District | D07C5R2 | 7.5 | 166 | - |
| Madison | Bryan District | D07C5R2 | 7.5 | 166 | - |
| Milam | Bryan District | D07C8R2 | 7.5 | 166 | - |
| Robertson | Bryan District | D07C5R2 | 7.5 | 166 | - |
| Walker | Bryan District | D07C5R2 | 7.5 | 166 | - |
| Washington | Bryan District | D07C8R2 | 7.5 | 166 | - |
| Briscoe | Childress District | D08C1R5 | 8.3 | 203 | - |
| Childress | Childress District | D08C1R5 | 8.3 | 203 | - |
| Collingsworth | Childress District | D08C1R5 | 8.3 | 203 | - |
| Cottle | Childress District | D08C6R5 | 8.3 | 203 | - |
| Dickens | Childress District | D08C6R5 | 8.3 | 203 | - |
| Donley | Childress District | D08C1R5 | 8.3 | 203 | - |

| County | District Name | County Group Code* | RVP (psi) | Sulfur (ppm) | Ave. Oxy.(wt. %) |
|---|---|---|---|---|---|
| Foard | Childress District | D08C6R5 | 8.3 | 203 | - |
| Hall | Childress District | D08C1R5 | 8.3 | 203 | - |
| Hardeman | Childress District | D08C6R5 | 8.3 | 203 | - |
| King | Childress District | D08C6R5 | 8.3 | 203 | - |
| Knox | Childress District | D08C6R5 | 8.3 | 203 | - |
| Motley | Childress District | D08C6R5 | 8.3 | 203 | - |
| Wheeler | Childress District | D08C1R5 | 8.3 | 203 | - |
| Aransas | Corpus Christi District | D09C2R2 | 7.5 | 166 | - |
| Bee | Corpus Christi District | D09C2R2 | 7.5 | 166 | - |
| Goliad | Corpus Christi District | D09C2R2 | 7.5 | 166 | - |
| Jim Wells | Corpus Christi District | D09C2R1 | 8.4 | 425 | - |
| Karnes | Corpus Christi District | D09C2R2 | 7.5 | 166 | - |
| Kleberg | Corpus Christi District | D09C2R1 | 8.4 | 425 | - |
| LiveOak | Corpus Christi District | D09C2R2 | 7.5 | 166 | - |
| Nueces | Corpus Christi District | D09C2R2 | 7.5 | 166 | - |
| Refugio | Corpus Christi District | D09C2R2 | 7.5 | 166 | - |
| SanPatricio | Corpus Christi District | D09C2R2 | 7.5 | 166 | - |
| Collin | Dallas District | na | na | na | na |
| Dallas | Dallas District | na | na | na | na |
| Denton | Dallas District | na | na | na | na |
| Ellis | Dallas District | na | na | na | na |

| County | District Name | County Group Code* | RVP (psi) | Sulfur (ppm) | Ave. Oxy.(wt. %) |
|---|---|---|---|---|---|
| Kaufman | Dallas District | na | na | na | na |
| Navarro | Dallas District | D10C3R2 | 7.5 | 166 | - |
| Rockwall | Dallas District | na | na | na | na |
| Brewster | El Paso District | D11C7R1 | 8.4 | 425 | - |
| Culberson | El Paso District | D11C7R1 | 8.4 | 425 | - |
| El Paso | El Paso District | D11C4R3 | 6.8 | 245 | - |
| Hudspeth | El Paso District | D11C4R1 | 8.4 | 425 | - |
| Jeff Davis | El Paso District | D11C7R1 | 8.4 | 425 | - |
| Presidio | El Paso District | D11C7R1 | 8.4 | 425 | - |
| Erath | Fort Worth District | D12C3R1 | 8.4 | 425 | - |
| Hood | Fort Worth District | na | na | na | na |
| Jack | Fort Worth District | D12C3R1 | 8.4 | 425 | - |
| Johnson | Fort Worth District | na | na | na | na |
| Palo Pinto | Fort Worth District | D12C3R1 | 8.4 | 425 | - |
| Parker | Fort Worth District | na | na | na | na |
| Somervell | Fort Worth District | D12C3R2 | 7.5 | 166 | - |
| Tarrant | Fort Worth District | na | na | na | na |
| Wise | Fort Worth District | D12C3R2 | 7.5 | 166 | - |
| Brazoria | Houston District | D13C5R4 | 6.8 | 119 | 2.1 |
| Fort Bend | Houston District | D13C5R4 | 6.8 | 119 | 2.1 |
| Galveston | Houston District | D13C5R4 | 6.8 | 119 | 2.1 |

| County | District Name | County Group Code* | RVP (psi) | Sulfur (ppm) | Ave. Oxy.(wt. %) |
|---|---|---|---|---|---|
| Harris | Houston District | D13C5R4 | 6.8 | 119 | 2.1 |
| Montgomery | Houston District | D13C5R4 | 6.8 | 119 | 2.1 |
| Waller | Houston District | D13C5R4 | 6.8 | 119 | 2.1 |
| Dimmit | Laredo District | D14C8R1 | 8.4 | 425 | - |
| Duval | Laredo District | D14C2R1 | 8.4 | 425 | - |
| Kinney | Laredo District | D14C8R1 | 8.4 | 425 | - |
| La Salle | Laredo District | D14C8R1 | 8.4 | 425 | - |
| Maverick | Laredo District | D14C8R1 | 8.4 | 425 | - |
| Val Verde | Laredo District | D14C7R1 | 8.4 | 425 | - |
| Webb | Laredo District | D14C8R1 | 8.4 | 425 | - |
| Zavala | Laredo District | D14C8R1 | 8.4 | 425 | - |
| Bailey | Lubbock District | D15C6R5 | 8.3 | 203 | - |
| Castro | Lubbock District | D15C1R5 | 8.3 | 203 | - |
| Cochran | Lubbock District | D15C6R5 | 8.3 | 203 | - |
| Crosby | Lubbock District | D15C6R5 | 8.3 | 203 | - |
| Dawson | Lubbock District | D15C6R5 | 8.3 | 203 | - |
| Floyd | Lubbock District | D15C6R5 | 8.3 | 203 | - |
| Gaines | Lubbock District | D15C6R5 | 8.3 | 203 | - |
| Garza | Lubbock District | D15C6R5 | 8.3 | 203 | - |
| Hale | Lubbock District | D15C6R5 | 8.3 | 203 | - |
| Hockley | Lubbock District | D15C6R5 | 8.3 | 203 | - |

| County | District Name | County Group Code* | RVP (psi) | Sulfur (ppm) | Ave. Oxy.(wt. %) |
|---|---|---|---|---|---|
| Lamb | Lubbock District | D15C6R5 | 8.3 | 203 | - |
| Lubbock | Lubbock District | D15C6R5 | 8.3 | 203 | - |
| Lynn | Lubbock District | D15C6R5 | 8.3 | 203 | - |
| Parmer | Lubbock District | D15C1R5 | 8.3 | 203 | - |
| Swisher | Lubbock District | D15C1R5 | 8.3 | 203 | - |
| Terry | Lubbock District | D15C6R5 | 8.3 | 203 | - |
| Yoakum | Lubbock District | D15C6R5 | 8.3 | 203 | - |
| Angelina | Lufkin District | D16C3R2 | 7.5 | 166 | - |
| Houston | Lufkin District | D16C5R2 | 7.5 | 166 | - |
| Nacogdoches | Lufkin District | D16C3R2 | 7.5 | 166 | - |
| Polk | Lufkin District | D16C5R2 | 7.5 | 166 | - |
| Sabine | Lufkin District | D16C3R2 | 7.5 | 166 | - |
| San Augustine | Lufkin District | D16C3R2 | 7.5 | 166 | - |
| San Jacinto | Lufkin District | D16C5R2 | 7.5 | 166 | - |
| Shelby | Lufkin District | D16C3R2 | 7.5 | 166 | - |
| Trinity | Lufkin District | D16C5R2 | 7.5 | 166 | - |
| Andrews | Odessa District | D17C6R1 | 8.4 | 425 | - |
| Crane | Odessa District | D17C7R1 | 8.4 | 425 | - |
| Ector | Odessa District | D17C7R1 | 8.4 | 425 | - |
| Loving | Odessa District | D17C7R1 | 8.4 | 425 | - |
| Martin | Odessa District | D17C6R1 | 8.4 | 425 | - |

| County | District Name | County Group Code* | RVP (psi) | Sulfur (ppm) | Ave. Oxy.(wt. %) |
|---|---|---|---|---|---|
| Midland | Odessa District | D17C7R1 | 8.4 | 425 | - |
| Pecos | Odessa District | D17C7R1 | 8.4 | 425 | - |
| Reeves | Odessa District | D17C7R1 | 8.4 | 425 | - |
| Terrell | Odessa District | D17C7R1 | 8.4 | 425 | - |
| Upton | Odessa District | D17C7R1 | 8.4 | 425 | - |
| Ward | Odessa District | D17C7R1 | 8.4 | 425 | - |
| Winkler | Odessa District | D17C7R1 | 8.4 | 425 | - |
| Delta | Paris District | D18C3R2 | 7.5 | 166 | - |
| Fannin | Paris District | D18C3R2 | 7.5 | 166 | - |
| Franklin | Paris District | D18C3R2 | 7.5 | 166 | - |
| Grayson | Paris District | D18C3R2 | 7.5 | 166 | - |
| Hopkins | Paris District | D18C3R2 | 7.5 | 166 | - |
| Hunt | Paris District | na | na | na | na |
| Lamar | Paris District | D18C3R2 | 7.5 | 166 | - |
| Rains | Paris District | D18C3R2 | 7.5 | 166 | - |
| Red River | Paris District | D18C3R2 | 7.5 | 166 | - |
| Brooks | Pharr District | D19C2R1 | 8.4 | 425 | - |
| Cameron | Pharr District | D19C2R1 | 8.4 | 425 | - |
| Hidalgo | Pharr District | D19C2R1 | 8.4 | 425 | - |
| Jim Hogg | Pharr District | D19C2R1 | 8.4 | 425 | - |
| Kenedy | Pharr District | D19C2R1 | 8.4 | 425 | - |

| County | District Name | County Group Code* | RVP (psi) | Sulfur (ppm) | Ave. Oxy.(wt. %) |
|---|---|---|---|---|---|
| Starr | Pharr District | D19C2R1 | 8.4 | 425 | - |
| Willacy | Pharr District | D19C2R1 | 8.4 | 425 | - |
| Zapata | Pharr District | D19C2R1 | 8.4 | 425 | - |
| Coke | San Angelo District | D20C7R1 | 8.4 | 425 | - |
| Concho | San Angelo District | D20C7R1 | 8.4 | 425 | - |
| Crockett | San Angelo District | D20C7R1 | 8.4 | 425 | - |
| Edwards | San Angelo District | D20C7R1 | 8.4 | 425 | - |
| Glasscock | San Angelo District | D20C7R1 | 8.4 | 425 | - |
| Irion | San Angelo District | D20C7R1 | 8.4 | 425 | - |
| Kimble | San Angelo District | D20C7R1 | 8.4 | 425 | - |
| Menard | San Angelo District | D20C7R1 | 8.4 | 425 | - |
| Reagan | San Angelo District | D20C7R1 | 8.4 | 425 | - |
| Real | San Angelo District | D20C7R1 | 8.4 | 425 | - |
| Runnels | San Angelo District | D20C7R1 | 8.4 | 425 | - |
| Schleicher | San Angelo District | D20C7R1 | 8.4 | 425 | - |
| Sterling | San Angelo District | D20C7R1 | 8.4 | 425 | - |
| Sutton | San Angelo District | D20C7R1 | 8.4 | 425 | - |
| Tom Green | San Angelo District | D20C7R1 | 8.4 | 425 | - |
| Atascosa | San Antonio District | D21C8R2 | 7.5 | 166 | - |
| Bandera | San Antonio District | D21C8R1 | 8.4 | 425 | - |
| Bexar | San Antonio District | D21C8R2 | 7.5 | 166 | - |

| County | District Name | County Group Code* | RVP (psi) | Sulfur (ppm) | Ave. Oxy.(wt. %) |
|---|---|---|---|---|---|
| Comal | San Antonio District | D21C8R2 | 7.5 | 166 | - |
| Frio | San Antonio District | D21C8R1 | 8.4 | 425 | - |
| Guadalupe | San Antonio District | D21C8R2 | 7.5 | 166 | - |
| Kendall | San Antonio District | D21C8R1 | 8.4 | 425 | - |
| Kerr | San Antonio District | D21C8R1 | 8.4 | 425 | - |
| McMullen | San Antonio District | D21C2R1 | 8.4 | 425 | - |
| Medina | San Antonio District | D21C8R1 | 8.4 | 425 | - |
| Uvalde | San Antonio District | D21C8R1 | 8.4 | 425 | - |
| Wilson | San Antonio District | D21C8R2 | 7.5 | 166 | - |
| Anderson | Tyler District | D22C3R2 | 7.5 | 166 | - |
| Cherokee | Tyler District | D22C3R2 | 7.5 | 166 | - |
| Gregg | Tyler District | D22C3R2 | 7.5 | 166 | - |
| Henderson | Tyler District | na | na | na | na |
| Rusk | Tyler District | D22C3R2 | 7.5 | 166 | - |
| Smith | Tyler District | D22C3R2 | 7.5 | 166 | - |
| Van Zandt | Tyler District | D22C3R2 | 7.5 | 166 | - |
| Wood | Tyler District | D22C3R2 | 7.5 | 166 | - |
| Bell | Waco District | D23C8R2 | 7.5 | 166 | - |
| Bosque | Waco District | D23C3R2 | 7.5 | 166 | - |
| Coryell | Waco District | D23C8R2 | 7.5 | 166 | - |
| Falls | Waco District | D23C3R2 | 7.5 | 166 | - |

| County | District Name | County Group Code* | RVP (psi) | Sulfur (ppm) | Ave. Oxy.(wt. %) |
|---|---|---|---|---|---|
| Hamilton | Waco District | D23C3R1 | 8.4 | 425 | - |
| Hill | Waco District | D23C3R2 | 7.5 | 166 | - |
| Limestone | Waco District | D23C3R2 | 7.5 | 166 | - |
| McLennan | Waco District | D23C3R2 | 7.5 | 166 | - |
| Archer | Wichita Falls District | D24C6R5 | 8.3 | 203 | - |
| Baylor | Wichita Falls District | D24C6R5 | 8.3 | 203 | - |
| Clay | Wichita Falls District | D24C3R5 | 8.3 | 203 | - |
| Cooke | Wichita Falls District | D24C3R2 | 7.5 | 166 | - |
| Montague | Wichita Falls District | D24C3R5 | 8.3 | 203 | - |
| Throckmorton | Wichita Falls District | D24C6R5 | 8.3 | 203 | - |
| Wichita | Wichita Falls District | D24C6R5 | 8.3 | 203 | - |
| Wilbarger | Wichita Falls District | D24C6R5 | 8.3 | 203 | - |
| Young | Wichita Falls District | D24C6R5 | 8.3 | 203 | - |
| Austin | Yoakum District | D25C5R2 | 7.5 | 166 | - |
| Calhoun | Yoakum District | D25C2R2 | 7.5 | 166 | - |
| Colorado | Yoakum District | D25C5R2 | 7.5 | 166 | - |
| DeWitt | Yoakum District | D25C2R2 | 7.5 | 166 | - |
| Fayette | Yoakum District | D25C8R2 | 7.5 | 166 | - |
| Gonzales | Yoakum District | D25C8R2 | 7.5 | 166 | - |
| Jackson | Yoakum District | D25C2R2 | 7.5 | 166 | - |
| Lavaca | Yoakum District | D25C2R2 | 7.5 | 166 | - |

| County | District Name | County Group Code* | RVP (psi) | Sulfur (ppm) | Ave. Oxy.(wt. %) |
|---|---|---|---|---|---|
| Matagorda | Yoakum District | D25C5R2 | 7.5 | 166 | - |
| Victoria | Yoakum District | D25C2R2 | 7.5 | 166 | - |
| Wharton | Yoakum District | D25C5R2 | 7.5 | 166 | - |

* For the CERR task, the county group codes apply only to the 216 non-AQP area counties in the study, however the fuels input values as shown were applied for all 242 counties in analysis (12 DFW CMSA counties excluded).

**Winter Fuel Property Inputs to MOBILE6**

| County | District Name | County Group Code* | RVP (psi) | Sulfur (ppm) | Ave. Oxy.(wt. %) |
|---|---|---|---|---|---|
| Borden | Abilene District | D01C6R1 | 11.5 | 264 | - |
| Callahan | Abilene District | D01C6R1 | 11.5 | 264 | - |
| Fisher | Abilene District | D01C6R1 | 11.5 | 264 | - |
| Haskell | Abilene District | D01C6R1 | 11.5 | 264 | - |
| Howard | Abilene District | D01C6R1 | 11.5 | 264 | - |
| Jones | Abilene District | D01C6R1 | 11.5 | 264 | - |
| Kent | Abilene District | D01C6R1 | 11.5 | 264 | - |
| Mitchell | Abilene District | D01C6R1 | 11.5 | 264 | - |
| Nolan | Abilene District | D01C6R1 | 11.5 | 264 | - |
| Scurry | Abilene District | D01C6R1 | 11.5 | 264 | - |
| Shackelford | Abilene District | D01C6R1 | 11.5 | 264 | - |
| Stonewall | Abilene District | D01C6R1 | 11.5 | 264 | - |
| Taylor | Abilene District | D01C6R1 | 11.5 | 264 | - |
| Armstrong | Amarillo District | D02C1R5 | 11.5 | 162 | - |
| Carson | Amarillo District | D02C1R5 | 11.5 | 162 | - |
| Dallam | Amarillo District | D02C1R5 | 11.5 | 162 | - |
| Deaf Smith | Amarillo District | D02C1R5 | 11.5 | 162 | - |
| Gray | Amarillo District | D02C1R5 | 11.5 | 162 | - |
| Hansford | Amarillo District | D02C1R5 | 11.5 | 162 | - |
| Hartley | Amarillo District | D02C1R5 | 11.5 | 162 | - |

| County | District Name | County Group Code* | RVP (psi) | Sulfur (ppm) | Ave. Oxy.(wt. %) |
|---|---|---|---|---|---|
| Hemphill | Amarillo District | D02C1R5 | 11.5 | 162 | - |
| Hutchinson | Amarillo District | D02C1R5 | 11.5 | 162 | - |
| Lipscomb | Amarillo District | D02C1R5 | 11.5 | 162 | - |
| Moore | Amarillo District | D02C1R5 | 11.5 | 162 | - |
| Ochiltree | Amarillo District | D02C1R5 | 11.5 | 162 | - |
| Oldham | Amarillo District | D02C1R5 | 11.5 | 162 | - |
| Potter | Amarillo District | D02C1R5 | 11.5 | 162 | - |
| Randall | Amarillo District | D02C1R5 | 11.5 | 162 | - |
| Roberts | Amarillo District | D02C1R5 | 11.5 | 162 | - |
| Sherman | Amarillo District | D02C1R5 | 11.5 | 162 | - |
| Bowie | Atlanta District | D03C3R2 | 12.3 | 199 | - |
| Camp | Atlanta District | D03C3R2 | 12.3 | 199 | - |
| Cass | Atlanta District | D03C3R2 | 12.3 | 199 | - |
| Harrison | Atlanta District | D03C3R2 | 12.3 | 199 | - |
| Marion | Atlanta District | D03C3R2 | 12.3 | 199 | - |
| Morris | Atlanta District | D03C3R2 | 12.3 | 199 | - |
| Panola | Atlanta District | D03C3R2 | 12.3 | 199 | - |
| Titus | Atlanta District | D03C3R2 | 12.3 | 199 | - |
| Upshur | Atlanta District | D03C3R2 | 12.3 | 199 | - |
| Bastrop | Austin District | D04C8R2 | 12.3 | 199 | - |
| Blanco | Austin District | D04C8R1 | 11.5 | 264 | - |

| County | District Name | County Group Code* | RVP (psi) | Sulfur (ppm) | Ave. Oxy.(wt. %) |
|---|---|---|---|---|---|
| Burnet | Austin District | D04C8R1 | 11.5 | 264 | - |
| Caldwell | Austin District | D04C8R2 | 12.3 | 199 | - |
| Gillespie | Austin District | D04C8R1 | 11.5 | 264 | - |
| Hays | Austin District | D04C8R2 | 12.3 | 199 | - |
| Lee | Austin District | D04C8R2 | 12.3 | 199 | - |
| Llano | Austin District | D04C8R1 | 11.5 | 264 | - |
| Mason | Austin District | D04C8R1 | 11.5 | 264 | - |
| Travis | Austin District | D04C8R2 | 12.3 | 199 | - |
| Williamson | Austin District | D04C8R2 | 12.3 | 199 | - |
| Chambers | Beaumont District | D05C5R4 | 11.4 | 175 | 2 |
| Hardin | Beaumont District | D05C5R2 | 12.3 | 199 | - |
| Jasper | Beaumont District | D05C5R2 | 12.3 | 199 | - |
| Jefferson | Beaumont District | D05C5R2 | 12.3 | 199 | - |
| Liberty | Beaumont District | D05C5R4 | 11.4 | 175 | 2 |
| Newton | Beaumont District | D05C5R2 | 12.3 | 199 | - |
| Orange | Beaumont District | D05C5R2 | 12.3 | 199 | - |
| Tyler | Beaumont District | D05C5R2 | 12.3 | 199 | - |
| Brown | Brownwood District | D06C7R1 | 11.5 | 264 | - |
| Coleman | Brownwood District | D06C7R1 | 11.5 | 264 | - |
| Comanche | Brownwood District | D06C3R1 | 11.5 | 264 | - |
| Eastland | Brownwood District | D06C6R1 | 11.5 | 264 | - |

| County | District Name | County Group Code* | RVP (psi) | Sulfur (ppm) | Ave. Oxy.(wt. %) |
|---|---|---|---|---|---|
| Lampasas | Brownwood District | D06C8R1 | 11.5 | 264 | - |
| McCulloch | Brownwood District | D06C7R1 | 11.5 | 264 | - |
| Mills | Brownwood District | D06C8R1 | 11.5 | 264 | - |
| SanSaba | Brownwood District | D06C8R1 | 11.5 | 264 | - |
| Stephens | Brownwood District | D06C6R1 | 11.5 | 264 | - |
| Brazos | Bryan District | D07C5R2 | 12.3 | 199 | - |
| Burleson | Bryan District | D07C8R2 | 12.3 | 199 | - |
| Freestone | Bryan District | D07C3R2 | 12.3 | 199 | - |
| Grimes | Bryan District | D07C5R2 | 12.3 | 199 | - |
| Leon | Bryan District | D07C5R2 | 12.3 | 199 | - |
| Madison | Bryan District | D07C5R2 | 12.3 | 199 | - |
| Milam | Bryan District | D07C8R2 | 12.3 | 199 | - |
| Robertson | Bryan District | D07C5R2 | 12.3 | 199 | - |
| Walker | Bryan District | D07C5R2 | 12.3 | 199 | - |
| Washington | Bryan District | D07C8R2 | 12.3 | 199 | - |
| Briscoe | Childress District | D08C1R5 | 11.5 | 162 | - |
| Childress | Childress District | D08C1R5 | 11.5 | 162 | - |
| Collingsworth | Childress District | D08C1R5 | 11.5 | 162 | - |
| Cottle | Childress District | D08C6R5 | 11.5 | 162 | - |
| Dickens | Childress District | D08C6R5 | 11.5 | 162 | - |
| Donley | Childress District | D08C1R5 | 11.5 | 162 | - |

| County | District Name | County Group Code* | RVP (psi) | Sulfur (ppm) | Ave. Oxy.(wt. %) |
|---|---|---|---|---|---|
| Foard | Childress District | D08C6R5 | 11.5 | 162 | - |
| Hall | Childress District | D08C1R5 | 11.5 | 162 | - |
| Hardeman | Childress District | D08C6R5 | 11.5 | 162 | - |
| King | Childress District | D08C6R5 | 11.5 | 162 | - |
| Knox | Childress District | D08C6R5 | 11.5 | 162 | - |
| Motley | Childress District | D08C6R5 | 11.5 | 162 | - |
| Wheeler | Childress District | D08C1R5 | 11.5 | 162 | - |
| Aransas | Corpus Christi District | D09C2R2 | 12.3 | 199 | - |
| Bee | Corpus Christi District | D09C2R2 | 12.3 | 199 | - |
| Goliad | Corpus Christi District | D09C2R2 | 12.3 | 199 | - |
| Jim Wells | Corpus Christi District | D09C2R1 | 11.5 | 264 | - |
| Karnes | Corpus Christi District | D09C2R2 | 12.3 | 199 | - |
| Kleberg | Corpus Christi District | D09C2R1 | 11.5 | 264 | - |
| LiveOak | Corpus Christi District | D09C2R2 | 12.3 | 199 | - |
| Nueces | Corpus Christi District | D09C2R2 | 12.3 | 199 | - |
| Refugio | Corpus Christi District | D09C2R2 | 12.3 | 199 | - |
| San Patricio | Corpus Christi District | D09C2R2 | 12.3 | 199 | - |
| Collin | Dallas District | na | na | na | na |
| Dallas | Dallas District | na | na | na | na |
| Denton | Dallas District | D10C3na | na | na | na |
| Ellis | Dallas District | na | na | na | na |

| County | District Name | County Group Code* | RVP (psi) | Sulfur (ppm) | Ave. Oxy.(wt. %) |
|---|---|---|---|---|---|
| Kaufman | Dallas District | na | na | na | na |
| Navarro | Dallas District | D10C3R2 | 12.3 | 199 | - |
| Rockwall | Dallas District | na | na | na | na |
| Brewster | El Paso District | D11C7R1 | 11.5 | 264 | - |
| Culberson | El Paso District | D11C7R1 | 11.5 | 264 | - |
| El Paso | El Paso District | D11C4R3 | 12.3 | 263 | 2.7 |
| Hudspeth | El Paso District | D11C4R1 | 11.5 | 264 | - |
| Jeff Davis | El Paso District | D11C7R1 | 11.5 | 264 | - |
| Presidio | El Paso District | D11C7R1 | 11.5 | 264 | - |
| Erath | Fort Worth District | D12C3R1 | 11.5 | 264 | - |
| Hood | Fort Worth District | na | na | na | na |
| Jack | Fort Worth District | D12C3R1 | 11.5 | 264 | - |
| Johnson | Fort Worth District | na | na | na | na |
| Palo Pinto | Fort Worth District | D12C3R1 | 11.5 | 264 | - |
| Parker | Fort Worth District | na | na | na | na |
| Somervell | Fort Worth District | D12C3R2 | 12.3 | 199 | - |
| Tarrant | Fort Worth District | na | na | na | na |
| Wise | Fort Worth District | D12C3R2 | 12.3 | 199 | - |
| Brazoria | Houston District | D13C5R4 | 11.4 | 175 | 2 |
| Fort Bend | Houston District | D13C5R4 | 11.4 | 175 | 2 |
| Galveston | Houston District | D13C5R4 | 11.4 | 175 | 2 |

| County | District Name | County Group Code* | RVP (psi) | Sulfur (ppm) | Ave. Oxy.(wt. %) |
|---|---|---|---|---|---|
| Harris | Houston District | D13C5R4 | 11.4 | 175 | 2 |
| Montgomery | Houston District | D13C5R4 | 11.4 | 175 | 2 |
| Waller | Houston District | D13C5R4 | 11.4 | 175 | 2 |
| Dimmit | Laredo District | D14C8R1 | 11.5 | 264 | - |
| Duval | Laredo District | D14C2R1 | 11.5 | 264 | - |
| Kinney | Laredo District | D14C8R1 | 11.5 | 264 | - |
| LaSalle | Laredo District | D14C8R1 | 11.5 | 264 | - |
| Maverick | Laredo District | D14C8R1 | 11.5 | 264 | - |
| Val Verde | Laredo District | D14C7R1 | 11.5 | 264 | - |
| Webb | Laredo District | D14C8R1 | 11.5 | 264 | - |
| Zavala | Laredo District | D14C8R1 | 11.5 | 264 | - |
| Bailey | Lubbock District | D15C6R5 | 11.5 | 162 | - |
| Castro | Lubbock District | D15C1R5 | 11.5 | 162 | - |
| Cochran | Lubbock District | D15C6R5 | 11.5 | 162 | - |
| Crosby | Lubbock District | D15C6R5 | 11.5 | 162 | - |
| Dawson | Lubbock District | D15C6R5 | 11.5 | 162 | - |
| Floyd | Lubbock District | D15C6R5 | 11.5 | 162 | - |
| Gaines | Lubbock District | D15C6R5 | 11.5 | 162 | - |
| Garza | Lubbock District | D15C6R5 | 11.5 | 162 | - |
| Hale | Lubbock District | D15C6R5 | 11.5 | 162 | - |
| Hockley | Lubbock District | D15C6R5 | 11.5 | 162 | - |

| County | District Name | County Group Code* | RVP (psi) | Sulfur (ppm) | Ave. Oxy.(wt. %) |
|---|---|---|---|---|---|
| Lamb | Lubbock District | D15C6R5 | 11.5 | 162 | - |
| Lubbock | Lubbock District | D15C6R5 | 11.5 | 162 | - |
| Lynn | Lubbock District | D15C6R5 | 11.5 | 162 | - |
| Parmer | Lubbock District | D15C1R5 | 11.5 | 162 | - |
| Swisher | Lubbock District | D15C1R5 | 11.5 | 162 | - |
| Terry | Lubbock District | D15C6R5 | 11.5 | 162 | - |
| Yoakum | Lubbock District | D15C6R5 | 11.5 | 162 | - |
| Angelina | Lufkin District | D16C3R2 | 12.3 | 199 | - |
| Houston | Lufkin District | D16C5R2 | 12.3 | 199 | - |
| Nacogdoches | Lufkin District | D16C3R2 | 12.3 | 199 | - |
| Polk | Lufkin District | D16C5R2 | 12.3 | 199 | - |
| Sabine | Lufkin District | D16C3R2 | 12.3 | 199 | - |
| San Augustine | Lufkin District | D16C3R2 | 12.3 | 199 | - |
| San Jacinto | Lufkin District | D16C5R2 | 12.3 | 199 | - |
| Shelby | Lufkin District | D16C3R2 | 12.3 | 199 | - |
| Trinity | Lufkin District | D16C5R2 | 12.3 | 199 | - |
| Andrews | Odessa District | D17C6R1 | 11.5 | 264 | - |
| Crane | Odessa District | D17C7R1 | 11.5 | 264 | - |
| Ector | Odessa District | D17C7R1 | 11.5 | 264 | - |
| Loving | Odessa District | D17C7R1 | 11.5 | 264 | - |
| Martin | Odessa District | D17C6R1 | 11.5 | 264 | - |

| County | District Name | County Group Code* | RVP (psi) | Sulfur (ppm) | Ave. Oxy.(wt. %) |
|---|---|---|---|---|---|
| Midland | Odessa District | D17C7R1 | 11.5 | 264 | - |
| Pecos | Odessa District | D17C7R1 | 11.5 | 264 | - |
| Reeves | Odessa District | D17C7R1 | 11.5 | 264 | - |
| Terrell | Odessa District | D17C7R1 | 11.5 | 264 | - |
| Upton | Odessa District | D17C7R1 | 11.5 | 264 | - |
| Ward | Odessa District | D17C7R1 | 11.5 | 264 | - |
| Winkler | Odessa District | D17C7R1 | 11.5 | 264 | - |
| Delta | Paris District | D18C3R2 | 12.3 | 199 | - |
| Fannin | Paris District | D18C3R2 | 12.3 | 199 | - |
| Franklin | Paris District | D18C3R2 | 12.3 | 199 | - |
| Grayson | Paris District | D18C3R2 | 12.3 | 199 | - |
| Hopkins | Paris District | D18C3R2 | 12.3 | 199 | - |
| Hunt | Paris District | na | na | na | na |
| Lamar | Paris District | D18C3R2 | 12.3 | 199 | - |
| Rains | Paris District | D18C3R2 | 12.3 | 199 | - |
| Red River | Paris District | D18C3R2 | 12.3 | 199 | - |
| Brooks | Pharr District | D19C2R1 | 11.5 | 264 | - |
| Cameron | Pharr District | D19C2R1 | 11.5 | 264 | - |
| Hidalgo | Pharr District | D19C2R1 | 11.5 | 264 | - |
| Jim Hogg | Pharr District | D19C2R1 | 11.5 | 264 | - |
| Kenedy | Pharr District | D19C2R1 | 11.5 | 264 | - |

| County | District Name | County Group Code* | RVP (psi) | Sulfur (ppm) | Ave. Oxy.(wt. %) |
|---|---|---|---|---|---|
| Starr | Pharr District | D19C2R1 | 11.5 | 264 | - |
| Willacy | Pharr District | D19C2R1 | 11.5 | 264 | - |
| Zapata | Pharr District | D19C2R1 | 11.5 | 264 | - |
| Coke | San Angelo District | D20C7R1 | 11.5 | 264 | - |
| Concho | San Angelo District | D20C7R1 | 11.5 | 264 | - |
| Crockett | San Angelo District | D20C7R1 | 11.5 | 264 | - |
| Edwards | San Angelo District | D20C7R1 | 11.5 | 264 | - |
| Glasscock | San Angelo District | D20C7R1 | 11.5 | 264 | - |
| Irion | San Angelo District | D20C7R1 | 11.5 | 264 | - |
| Kimble | San Angelo District | D20C7R1 | 11.5 | 264 | - |
| Menard | San Angelo District | D20C7R1 | 11.5 | 264 | - |
| Reagan | San Angelo District | D20C7R1 | 11.5 | 264 | - |
| Real | San Angelo District | D20C7R1 | 11.5 | 264 | - |
| Runnels | San Angelo District | D20C7R1 | 11.5 | 264 | - |
| Schleicher | San Angelo District | D20C7R1 | 11.5 | 264 | - |
| Sterling | San Angelo District | D20C7R1 | 11.5 | 264 | - |
| Sutton | San Angelo District | D20C7R1 | 11.5 | 264 | - |
| Tom Green | San Angelo District | D20C7R1 | 11.5 | 264 | - |
| Atascosa | San Antonio District | D21C8R2 | 12.3 | 199 | - |
| Bandera | San Antonio District | D21C8R1 | 11.5 | 264 | - |
| Bexar | San Antonio District | D21C8R2 | 12.3 | 199 | - |

| County | District Name | County Group Code* | RVP (psi) | Sulfur (ppm) | Ave. Oxy.(wt. %) |
|---|---|---|---|---|---|
| Comal | San Antonio District | D21C8R2 | 12.3 | 199 | - |
| Frio | San Antonio District | D21C8R1 | 11.5 | 264 | - |
| Guadalupe | San Antonio District | D21C8R2 | 12.3 | 199 | - |
| Kendall | San Antonio District | D21C8R1 | 11.5 | 264 | - |
| Kerr | San Antonio District | D21C8R1 | 11.5 | 264 | - |
| McMullen | San Antonio District | D21C2R1 | 11.5 | 264 | - |
| Medina | San Antonio District | D21C8R1 | 11.5 | 264 | - |
| Uvalde | San Antonio District | D21C8R1 | 11.5 | 264 | - |
| Wilson | San Antonio District | D21C8R2 | 12.3 | 199 | - |
| Anderson | Tyler District | D22C3R2 | 12.3 | 199 | - |
| Cherokee | Tyler District | D22C3R2 | 12.3 | 199 | - |
| Gregg | Tyler District | D22C3R2 | 12.3 | 199 | - |
| Henderson | Tyler District | na | na | na | na |
| Rusk | Tyler District | D22C3R2 | 12.3 | 199 | - |
| Smith | Tyler District | D22C3R2 | 12.3 | 199 | - |
| Van Zandt | Tyler District | D22C3R2 | 12.3 | 199 | - |
| Wood | Tyler District | D22C3R2 | 12.3 | 199 | - |
| Bell | Waco District | D23C8R2 | 12.3 | 199 | - |
| Bosque | Waco District | D23C3R2 | 12.3 | 199 | - |
| Coryell | Waco District | D23C8R2 | 12.3 | 199 | - |
| Falls | Waco District | D23C3R2 | 12.3 | 199 | - |

| County | District Name | County Group Code* | RVP (psi) | Sulfur (ppm) | Ave. Oxy.(wt. %) |
|---|---|---|---|---|---|
| Hamilton | Waco District | D23C3R1 | 11.5 | 264 | - |
| Hill | Waco District | D23C3R2 | 12.3 | 199 | - |
| Limestone | Waco District | D23C3R2 | 12.3 | 199 | - |
| McLennan | Waco District | D23C3R2 | 12.3 | 199 | - |
| Archer | Wichita Falls District | D24C6R5 | 11.5 | 162 | - |
| Baylor | Wichita Falls District | D24C6R5 | 11.5 | 162 | - |
| Clay | Wichita Falls District | D24C3R5 | 11.5 | 162 | - |
| Cooke | Wichita Falls District | D24C3R2 | 12.3 | 199 | - |
| Montague | Wichita Falls District | D24C3R5 | 11.5 | 162 | - |
| Throckmorton | Wichita Falls District | D24C6R5 | 11.5 | 162 | - |
| Wichita | Wichita Falls District | D24C6R5 | 11.5 | 162 | - |
| Wilbarger | Wichita Falls District | D24C6R5 | 11.5 | 162 | - |
| Young | Wichita Falls District | D24C6R5 | 11.5 | 162 | - |
| Austin | Yoakum District | D25C5R2 | 12.3 | 199 | - |
| Calhoun | Yoakum District | D25C2R2 | 12.3 | 199 | - |
| Colorado | Yoakum District | D25C5R2 | 12.3 | 199 | - |
| DeWitt | Yoakum District | D25C2R2 | 12.3 | 199 | - |
| Fayette | Yoakum District | D25C8R2 | 12.3 | 199 | - |
| Gonzales | Yoakum District | D25C8R2 | 12.3 | 199 | - |
| Jackson | Yoakum District | D25C2R2 | 12.3 | 199 | - |
| Lavaca | Yoakum District | D25C2R2 | 12.3 | 199 | - |

| County | District Name | County Group Code* | RVP (psi) | Sulfur (ppm) | Ave. Oxy.(wt. %) |
|---|---|---|---|---|---|
| Matagorda | Yoakum District | D25C5R2 | 12.3 | 199 | - |
| Victoria | Yoakum District | D25C2R2 | 12.3 | 199 | - |
| Wharton | Yoakum District | D25C5R2 | 12.3 | 199 | - |

* For the CERR task, the county group codes apply only to the 216 non-AQP area counties in the study, however the fuels input values as shown were applied for all 242 counties in analysis (12 DFW CMSA counties excluded).

# APPENDIX L
# VMT ANNUALIZATION FACTORS

## County VMT Annualization Factors

| | | | |
|---|---|---|---|
| Anderson | 338.6716648 | Collin | 336.9303339 |
| Andrews | 328.9532976 | Collingsworth | 344.9025296 |
| Angelina | 350.0258923 | Colorado | 359.1282531 |
| Aransas | 318.7244038 | Comal | 331.9600193 |
| Archer | 343.5552795 | Comanche | 349.6771474 |
| Armstrong | 334.7610356 | Concho | 349.7508624 |
| Atascosa | 331.9600193 | Cooke | 343.5552795 |
| Austin | 359.1282531 | Coryell | 359.2484326 |
| Bailey | 342.8066946 | Cottle | 344.9025296 |
| Bandera | 331.9600193 | Crane | 328.9532976 |
| Bastrop | 341.5428379 | Crockett | 349.7508624 |
| Baylor | 343.5552795 | Crosby | 342.8066946 |
| Bee | 318.7244038 | Culberson | 343.5294118 |
| Bell | 359.2484326 | Dallam | 334.7610356 |
| Bexar | 331.9600193 | Dallas | 336.9303339 |
| Blanco | 341.5428379 | Dawson | 342.8066946 |
| Borden | 346.8230062 | Deaf Smith | 334.7610356 |
| Bosque | 359.2484326 | Delta | 348.8683285 |
| Bowie | 342.8936466 | Denton | 336.9303339 |
| Brazoria | 347.1660785 | DeWitt | 359.1282531 |
| Brazos | 370.7164476 | Dickens | 344.9025296 |
| Brewster | 343.5294118 | Dimmit | 365.7937725 |
| Briscoe | 344.9025296 | Donley | 344.9025296 |
| Brooks | 353.7301572 | Duval | 365.7937725 |
| Brown | 349.6771474 | Eastland | 349.6771474 |
| Burleson | 370.7164476 | Ector | 328.9532976 |
| Burnet | 341.5428379 | Edwards | 349.7508624 |
| Caldwell | 341.5428379 | Ellis | 336.9303339 |
| Calhoun | 359.1282531 | El Paso | 343.5294118 |
| Callahan | 346.8230062 | Erath | 327.4159259 |
| Cameron | 353.7301572 | Falls | 359.2484326 |
| Camp | 342.8936466 | Fannin | 348.8683285 |
| Carson | 334.7610356 | Fayette | 359.1282531 |
| Cass | 342.8936466 | Fisher | 346.8230062 |
| Castro | 342.8066946 | Floyd | 342.8066946 |
| Chambers | 333.9463307 | Foard | 344.9025296 |
| Cherokee | 338.6716648 | Fort Bend | 347.1660785 |
| Childress | 344.9025296 | Franklin | 348.8683285 |
| Clay | 343.5552795 | Freestone | 370.7164476 |
| Cochran | 342.8066946 | Frio | 331.9600193 |
| Coke | 349.7508624 | Gaines | 342.8066946 |
| Coleman | 349.6771474 | Galveston | 347.1660785 |

| | | | |
|---|---|---|---|
| Garza | 342.8066946 | Kendall | 331.9600193 |
| Gillespie | 341.5428379 | Kenedy | 353.7301572 |
| Glasscock | 349.7508624 | Kent | 346.8230062 |
| Goliad | 318.7244038 | Kerr | 331.9600193 |
| Gonzales | 359.1282531 | Kimble | 349.7508624 |
| Gray | 334.7610356 | King | 344.9025296 |
| Grayson | 348.8683285 | Kinney | 365.7937725 |
| Gregg | 338.6716648 | Kleberg | 318.7244038 |
| Grimes | 370.7164476 | Knox | 344.9025296 |
| Guadalupe | 331.9600193 | Lamar | 348.8683285 |
| Hale | 342.8066946 | Lamb | 342.8066946 |
| Hall | 344.9025296 | Lampasas | 349.6771474 |
| Hamilton | 359.2484326 | La Salle | 365.7937725 |
| Hansford | 334.7610356 | Lavaca | 359.1282531 |
| Hardeman | 344.9025296 | Lee | 341.5428379 |
| Hardin | 333.9463307 | Leon | 370.7164476 |
| Harris | 347.1660785 | Liberty | 333.9463307 |
| Harrison | 342.8936466 | Limestone | 359.2484326 |
| Hartley | 334.7610356 | Lipscomb | 334.7610356 |
| Haskell | 346.8230062 | Live Oak | 318.7244038 |
| Hays | 341.5428379 | Llano | 341.5428379 |
| Hemphill | 334.7610356 | Loving | 328.9532976 |
| Henderson | 338.6716648 | Lubbock | 342.8066946 |
| Hidalgo | 353.7301572 | Lynn | 342.8066946 |
| Hill | 359.2484326 | Madison | 370.7164476 |
| Hockley | 342.8066946 | Marion | 342.8936466 |
| Hood | 327.4159259 | Martin | 328.9532976 |
| Hopkins | 348.8683285 | Mason | 341.5428379 |
| Houston | 350.0258923 | Matagorda | 359.1282531 |
| Howard | 346.8230062 | Maverick | 365.7937725 |
| Hudspeth | 343.5294118 | McCulloch | 349.6771474 |
| Hunt | 348.8683285 | McLennan | 359.2484326 |
| Hutchinson | 334.7610356 | McMullen | 331.9600193 |
| Irion | 349.7508624 | Medina | 331.9600193 |
| Jack | 327.4159259 | Menard | 349.7508624 |
| Jackson | 359.1282531 | Midland | 328.9532976 |
| Jasper | 333.9463307 | Milam | 370.7164476 |
| Jeff Davis | 343.5294118 | Mills | 349.6771474 |
| Jefferson | 333.9463307 | Mitchell | 346.8230062 |
| Jim Hogg | 353.7301572 | Montague | 343.5552795 |
| Jim Wells | 318.7244038 | Montgomery | 347.1660785 |
| Johnson | 327.4159259 | Moore | 334.7610356 |
| Jones | 346.8230062 | Morris | 342.8936466 |
| Karnes | 318.7244038 | Motley | 344.9025296 |
| Kaufman | 336.9303339 | Nacogdoches | 350.0258923 |

| | | | |
|---|---|---|---|
| Navarro | 336.9303339 | Tarrant | 327.4159259 |
| Newton | 333.9463307 | Taylor | 346.8230062 |
| Nolan | 346.8230062 | Terrell | 328.9532976 |
| Nueces | 318.7244038 | Terry | 342.8066946 |
| Ochiltree | 334.7610356 | Throckmorton | 343.5552795 |
| Oldham | 334.7610356 | Titus | 342.8936466 |
| Orange | 333.9463307 | Tom Green | 349.7508624 |
| PaloPinto | 327.4159259 | Travis | 341.5428379 |
| Panola | 342.8936466 | Trinity | 350.0258923 |
| Parker | 327.4159259 | Tyler | 333.9463307 |
| Parmer | 342.8066946 | Upshur | 342.8936466 |
| Pecos | 328.9532976 | Upton | 328.9532976 |
| Polk | 350.0258923 | Uvalde | 331.9600193 |
| Potter | 334.7610356 | Val Verde | 365.7937725 |
| Presidio | 343.5294118 | Van Zandt | 338.6716648 |
| Rains | 348.8683285 | Victoria | 359.1282531 |
| Randall | 334.7610356 | Walker | 370.7164476 |
| Reagan | 349.7508624 | Waller | 347.1660785 |
| Real | 349.7508624 | Ward | 328.9532976 |
| Red River | 348.8683285 | Washington | 370.7164476 |
| Reeves | 328.9532976 | Webb | 365.7937725 |
| Refugio | 318.7244038 | Wharton | 359.1282531 |
| Roberts | 334.7610356 | Wheeler | 344.9025296 |
| Robertson | 370.7164476 | Wichita | 343.5552795 |
| Rockwall | 336.9303339 | Wilbarger | 343.5552795 |
| Runnels | 349.7508624 | Willacy | 353.7301572 |
| Rusk | 338.6716648 | Williamson | 341.5428379 |
| Sabine | 350.0258923 | Wilson | 331.9600193 |
| San Augustine | 350.0258923 | Winkler | 328.9532976 |
| San Jacinto | 350.0258923 | Wise | 327.4159259 |
| San Patricio | 318.7244038 | Wood | 338.6716648 |
| San Saba | 349.6771474 | Yoakum | 342.8066946 |
| Schleicher | 349.7508624 | Young | 343.5552795 |
| Scurry | 346.8230062 | Zapata | 353.7301572 |
| Shackelford | 346.8230062 | Zavala | 365.7937725 |
| Shelby | 350.0258923 | | |
| Sherman | 334.7610356 | | |
| Smith | 338.6716648 | | |
| Somervell | 327.4159259 | | |
| Starr | 353.7301572 | | |
| Stephens | 349.6771474 | | |
| Sterling | 349.7508624 | | |
| Stonewall | 346.8230062 | | |
| Sutton | 349.7508624 | | |
| Swisher | 342.8066946 | | |

# APPENDIX M
# EMISSIONS FACTOR ANNUALIZATION RATIOS BY COUNTY GROUP

## Abilene District Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.02247 | 1.22695 | 1.17328 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.04274 | 1.26821 | 1.16562 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.05029 | 1.25905 | 1.17780 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.04131 | 1.21520 | 1.19993 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.04394 | 1.21457 | 1.19620 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 0.89239 | 1.01062 | 0.99721 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 0.90275 | 0.98715 | 1.01385 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.86018 | 0.98191 | 1.03449 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.85713 | 0.97115 | 1.03941 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.86257 | 0.97553 | 1.04246 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.88122 | 0.98249 | 1.03383 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.86849 | 0.97066 | 1.04085 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 0.91761 | 1.01076 | 1.02586 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.92717 | 1.00659 | 1.31658 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.90351 | 0.96119 | 1.05669 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## Amarillo District Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.03473 | 1.31702 | 1.20917 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.07447 | 1.36382 | 1.21336 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89902 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.08191 | 1.34665 | 1.21703 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89902 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.06297 | 1.28278 | 1.22975 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.06637 | 1.28175 | 1.22779 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 0.87930 | 1.02726 | 1.02492 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 0.89257 | 0.99798 | 1.03636 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.84813 | 0.99771 | 1.03878 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.84349 | 0.98596 | 1.05170 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.85201 | 0.99019 | 1.05156 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89902 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.86647 | 0.99230 | 1.04346 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89902 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.85802 | 0.98127 | 1.05283 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 0.88330 | 0.98883 | 1.03513 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.92595 | 1.03184 | 1.31468 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.89763 | 0.98109 | 1.05640 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

**Atlanta District (Excludes Northeast Texas EAC Counties of Harrison and Upshur) Emissions Factor Annualization Ratios***

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.09240 | 1.24760 | 1.21438 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.10509 | 1.30531 | 1.24708 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.11188 | 1.29329 | 1.24393 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.09556 | 1.23833 | 1.25041 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.09870 | 1.23802 | 1.25082 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 0.99280 | 1.03056 | 1.00753 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 0.98051 | 0.98390 | 1.01768 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.95151 | 0.98788 | 1.01230 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.94631 | 0.96035 | 1.03031 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.94762 | 0.96842 | 1.02173 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.96682 | 0.98160 | 1.01746 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.94568 | 0.95772 | 1.02551 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 1.00338 | 1.01482 | 1.05810 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.97612 | 0.96888 | 1.35450 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.97973 | 0.94210 | 1.05498 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

**Austin District (Excludes Austin EAC Counties of Bastrop, Caldwell, Hays, Travis, and Williamson) (Blanco, Burnet, Gillespie, Llano, and Mason Counties) Emissions Factor Annualization Ratios***

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.03894 | 1.12676 | 1.12818 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.03859 | 1.16522 | 1.14646 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.04494 | 1.17141 | 1.15635 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.04323 | 1.15894 | 1.17409 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.04519 | 1.15911 | 1.17138 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 0.97835 | 1.03599 | 0.97141 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 0.96409 | 0.99812 | 0.98074 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.95642 | 1.02316 | 0.99907 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.92935 | 0.96742 | 1.01704 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.93488 | 0.97644 | 1.01197 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.95349 | 0.99989 | 1.00464 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.92784 | 0.97268 | 1.00826 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 0.98138 | 1.04455 | 0.99597 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.95899 | 0.95454 | 1.32483 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.94847 | 0.93117 | 1.05182 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## Austin District (Excludes Austin EAC Counties of Bastrop, Caldwell, Hays, Travis, and Williamson) (Lee County) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.13053 | 1.22376 | 1.18091 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.12546 | 1.28150 | 1.21711 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.13248 | 1.27480 | 1.21390 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.11968 | 1.23484 | 1.21695 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.12336 | 1.23480 | 1.21881 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 1.06042 | 1.06061 | 0.99273 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 1.03661 | 1.01322 | 0.99715 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 1.03690 | 1.04196 | 0.98962 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 1.00713 | 0.97769 | 1.00909 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 1.01208 | 0.98764 | 1.00358 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 1.02991 | 1.01544 | 0.99567 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.99898 | 0.98190 | 0.99993 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 1.05132 | 1.06768 | 0.98638 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.98958 | 0.95454 | 1.32483 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 1.01866 | 0.93455 | 1.04785 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## Beaumont District (Excludes 1-Hour Ozone NAAQS Nonattainment Counties of Chambers, Hardin, Jefferson, Liberty and Orange) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.13189 | 1.22727 | 1.18668 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.12647 | 1.28049 | 1.22370 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.13386 | 1.27416 | 1.22023 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.12681 | 1.25016 | 1.22348 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.13002 | 1.24998 | 1.22516 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 1.05684 | 1.05586 | 0.99309 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 1.03542 | 1.00401 | 0.99807 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 1.01790 | 1.01073 | 0.99528 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 1.00189 | 0.97226 | 1.01062 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 1.00712 | 0.97915 | 1.00553 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.99988 | 0.97571 | 1.00515 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.98608 | 0.95934 | 1.01457 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 1.08400 | 1.12826 | 0.98284 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.98134 | 0.95648 | 1.33340 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 1.02282 | 0.93892 | 1.04569 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.


230

**Brownwood District (Brown, Coleman, and McCullough Counties) Emissions Factor Annualization Ratios***

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.00527 | 1.18568 | 1.15858 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.02544 | 1.23135 | 1.15279 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.03253 | 1.22783 | 1.16230 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.02347 | 1.18611 | 1.18543 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.02607 | 1.18578 | 1.18085 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 0.88939 | 0.99300 | 0.98762 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 0.88819 | 0.95042 | 1.01982 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.83749 | 0.93734 | 1.04301 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.84035 | 0.92741 | 1.07680 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.84700 | 0.93685 | 1.04737 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.86277 | 0.94375 | 1.03678 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.84664 | 0.92740 | 1.05434 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 0.93956 | 1.03934 | 1.01626 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.91792 | 0.96952 | 1.32996 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00001 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.88881 | 0.92395 | 1.07031 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## Brownwood District (Comanche County) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.02559 | 1.15806 | 1.17511 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.03293 | 1.19654 | 1.17354 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.03915 | 1.19752 | 1.18279 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.03133 | 1.16740 | 1.20603 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.03331 | 1.16726 | 1.20147 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 0.92597 | 1.00427 | 0.98159 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 0.91970 | 0.96066 | 1.01235 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.87356 | 0.94783 | 1.03525 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.87597 | 0.93693 | 1.06584 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.88291 | 0.94707 | 1.03908 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.89692 | 0.95431 | 1.02924 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.87870 | 0.93758 | 1.04578 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 0.96912 | 1.05014 | 1.00965 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.96161 | 0.97227 | 1.35432 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00001 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.91964 | 0.93384 | 1.06041 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## Brownwood District (Lampasas, Mills, and San Saba Counties) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.04510 | 1.13498 | 1.14644 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.04246 | 1.16790 | 1.14516 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.04797 | 1.17487 | 1.15403 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.03937 | 1.15070 | 1.17728 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.04093 | 1.15092 | 1.17283 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 0.96217 | 1.00678 | 0.96862 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 0.94651 | 0.95416 | 1.00067 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.90199 | 0.94111 | 1.02590 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.90423 | 0.92596 | 1.05715 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.91223 | 0.93933 | 1.02921 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.92589 | 0.94850 | 1.01826 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.90119 | 0.92890 | 1.03767 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 1.00180 | 1.05704 | 0.99506 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.96561 | 0.95246 | 1.32259 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00001 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.94765 | 0.92396 | 1.05341 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## Brownwood District (Eastland and Stephens Counties) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.02360 | 1.22407 | 1.17317 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.04413 | 1.26576 | 1.16801 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.05082 | 1.25879 | 1.17777 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.04132 | 1.21576 | 1.19775 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.04376 | 1.21517 | 1.19377 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 0.90215 | 1.01604 | 0.99027 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 0.90241 | 0.97999 | 1.01823 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.85020 | 0.96678 | 1.03801 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.85384 | 0.95974 | 1.06522 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.85992 | 0.96704 | 1.04202 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.87628 | 0.97268 | 1.03421 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.86065 | 0.95806 | 1.04644 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 0.95500 | 1.05870 | 1.01969 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.93152 | 1.00591 | 1.31716 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00001 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.90245 | 0.95535 | 1.05862 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## Bryan District (Freestone County) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.09249 | 1.25012 | 1.20900 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.10780 | 1.31810 | 1.24337 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.11615 | 1.30300 | 1.23972 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.10477 | 1.25088 | 1.24262 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.10896 | 1.25033 | 1.24402 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 1.00676 | 1.05017 | 1.00594 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 0.99240 | 0.99965 | 1.01124 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.94953 | 0.96997 | 1.01493 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.94552 | 0.96472 | 1.03093 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.95133 | 0.96541 | 1.02126 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.97926 | 1.01385 | 1.00695 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.94597 | 0.96034 | 1.02253 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 0.98226 | 1.01326 | 1.00292 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.97854 | 0.96850 | 1.35492 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.97934 | 0.93950 | 1.05592 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

**Bryan District (Brazos, Grimes, Leon, Madison, Robertson, and Walker Counties) Emissions Factor Annualization Ratios***

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.13058 | 1.22335 | 1.18683 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.12750 | 1.28272 | 1.22227 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.13456 | 1.27653 | 1.21853 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.12195 | 1.23704 | 1.22139 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.12535 | 1.23701 | 1.22298 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 1.06197 | 1.06300 | 0.99160 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 1.03923 | 1.00519 | 0.99743 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.99941 | 0.97250 | 1.00230 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.99561 | 0.96520 | 1.01829 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 1.00209 | 0.96744 | 1.00902 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 1.02762 | 1.02042 | 0.99290 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.98744 | 0.96157 | 1.01049 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 1.02253 | 1.02247 | 0.98934 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.98425 | 0.95696 | 1.33252 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 1.02297 | 0.93711 | 1.04595 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## Bryan District (Burleson, Milam, and Washington Counties) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.13016 | 1.22719 | 1.18003 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.12828 | 1.28806 | 1.21271 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.13530 | 1.28101 | 1.20929 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.12194 | 1.23791 | 1.21246 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.12537 | 1.23787 | 1.21389 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 1.05952 | 1.05888 | 0.99134 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 1.03634 | 0.99922 | 0.99755 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.99669 | 0.96590 | 1.00286 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.99289 | 0.95828 | 1.01952 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.99958 | 0.96076 | 1.00987 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 1.02518 | 1.01473 | 0.99295 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.98412 | 0.95476 | 1.01144 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 1.01961 | 1.01725 | 0.98927 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.98657 | 0.94932 | 1.32359 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 1.01842 | 0.92979 | 1.04878 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## Childress District (Briscoe, Childress, Collingsworth, Donley, Hall, and Wheeler Counties) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.03528 | 1.32031 | 1.20858 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.07264 | 1.36437 | 1.21279 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.08022 | 1.34752 | 1.21599 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.06473 | 1.28563 | 1.22963 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.06794 | 1.28460 | 1.22749 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 0.88582 | 1.04395 | 1.02316 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 0.88532 | 0.99333 | 1.03950 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.83779 | 0.98139 | 1.07199 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.83387 | 0.97591 | 1.05337 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.85234 | 0.99169 | 1.04598 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.86568 | 0.98320 | 1.04482 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.85931 | 0.97862 | 1.05017 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 0.91680 | 1.03260 | 1.02855 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.92771 | 1.03501 | 1.31275 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.89695 | 0.97948 | 1.05652 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## Childress District (Cottle, Dickens, Foard, Hardeman, King, Knox, and Motley Counties) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.03593 | 1.28014 | 1.19779 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.06589 | 1.32379 | 1.20259 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.07304 | 1.31157 | 1.20561 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.05822 | 1.25547 | 1.22100 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.06120 | 1.25475 | 1.21860 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 0.90022 | 1.03245 | 1.01574 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 0.89415 | 0.97642 | 1.03569 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.84884 | 0.96228 | 1.07357 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.84666 | 0.95867 | 1.05413 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.86482 | 0.97559 | 1.04286 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.87589 | 0.96650 | 1.04269 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.86868 | 0.96155 | 1.04983 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 0.92425 | 1.02233 | 1.02133 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.93208 | 1.01003 | 1.31542 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.90781 | 0.96227 | 1.05640 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## Corpus Christi District (Jim Wells and Kleberg Counties) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.05709 | 1.10498 | 1.09592 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.04720 | 1.13571 | 1.11431 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.05252 | 1.14847 | 1.12228 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.05462 | 1.15381 | 1.14060 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.05583 | 1.15426 | 1.13758 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 0.99871 | 1.02616 | 0.96198 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 0.98303 | 0.98515 | 0.97464 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.96222 | 0.98935 | 0.99155 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.94190 | 0.94860 | 1.01173 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.94250 | 0.94447 | 1.01146 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.95707 | 0.95885 | 1.00149 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.92851 | 0.93653 | 1.01074 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 0.94584 | 0.95186 | 1.00647 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.94826 | 0.93002 | 1.29700 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.96316 | 0.91394 | 1.05007 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## Corpus Christi District (Aransas, Bee, Goliad, Karnes, Live Oak, Nueces, Refugio, and San Patricio Counties) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.15870 | 1.19970 | 1.14224 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.13957 | 1.24983 | 1.17841 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.14520 | 1.25135 | 1.17530 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.13648 | 1.23204 | 1.17967 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.13908 | 1.23235 | 1.18101 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 1.09555 | 1.05274 | 0.98068 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 1.06707 | 1.00126 | 0.98662 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 1.05467 | 1.00623 | 0.98221 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 1.03185 | 0.95818 | 1.00395 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 1.02929 | 0.95353 | 1.00369 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 1.04066 | 0.97061 | 0.99293 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 1.00636 | 0.94300 | 1.00349 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 1.01369 | 0.95946 | 0.99764 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.98020 | 0.93002 | 1.29700 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 1.04172 | 0.91752 | 1.04585 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## Dallas District (Excludes DFW CMSA Counties of Collin, Denton, Ellis, Kaufman, and Rockwall) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.09230 | 1.25434 | 1.20807 | 1.09939 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.10477 | 1.31509 | 1.24989 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.11414 | 1.29753 | 1.24499 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.10274 | 1.24790 | 1.24786 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.10748 | 1.24731 | 1.24979 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 1.00473 | 1.05686 | 1.00704 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 1.00464 | 1.03856 | 1.01028 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.97216 | 1.03153 | 1.00614 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.96818 | 0.99878 | 1.01742 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.96987 | 1.00949 | 1.00979 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.98433 | 1.02637 | 1.00682 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.95783 | 0.98525 | 1.01382 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 1.00162 | 1.04070 | 1.00233 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.97675 | 0.97191 | 1.35612 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.97978 | 0.94599 | 1.05425 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## El Paso District (Hudspeth County) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.00250 | 1.19510 | 1.11977 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.02571 | 1.21916 | 1.12468 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.03015 | 1.21560 | 1.13048 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.01666 | 1.17398 | 1.15299 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.01863 | 1.17382 | 1.14760 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 0.87302 | 0.97172 | 1.00174 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00003 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 0.88357 | 0.95065 | 1.01873 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.85444 | 0.94866 | 1.03273 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.84806 | 0.94204 | 1.04070 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.85250 | 0.93827 | 1.04344 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.86582 | 0.94058 | 1.04237 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.85300 | 0.92883 | 1.04875 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 0.89672 | 0.96114 | 1.03315 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.91284 | 0.95259 | 1.27593 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.89164 | 0.91915 | 1.07031 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## El Paso District (Brewster, Culberson, Jeff Davis, Presidio) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.00343 | 1.20357 | 1.16429 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.03100 | 1.23117 | 1.17160 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.03557 | 1.22693 | 1.17762 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.02077 | 1.18503 | 1.20069 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.02280 | 1.18478 | 1.19528 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 0.86963 | 0.98080 | 1.00446 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00003 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 0.88200 | 0.96080 | 1.02059 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.85116 | 0.95883 | 1.03455 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.84468 | 0.95237 | 1.04178 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.84953 | 0.94895 | 1.04435 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.86393 | 0.95142 | 1.04362 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.85127 | 0.93964 | 1.04883 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 0.89652 | 0.97225 | 1.03548 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.90655 | 0.96692 | 1.33262 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.89006 | 0.93032 | 1.06852 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## Fort Worth District (Erath, Jack, and Palo Pinto Counties) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.01560 | 1.15358 | 1.15462 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.02783 | 1.19275 | 1.17071 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.03540 | 1.19292 | 1.18236 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.03182 | 1.17159 | 1.20313 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.03437 | 1.17137 | 1.19979 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 0.93252 | 1.02163 | 0.98435 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 0.93805 | 1.00236 | 0.99037 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.91791 | 1.01820 | 1.01221 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.89045 | 0.97595 | 1.02594 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.90146 | 0.98310 | 1.02217 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.91254 | 0.98861 | 1.01863 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.89792 | 0.97076 | 1.02354 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 0.95030 | 1.02970 | 1.01086 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.95208 | 0.97071 | 1.35593 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.92038 | 0.93961 | 1.05894 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

**Fort Worth District (Excludes DFW CMSA Counties of Hood, Johnson, and Tarrant) Emissions Factor Annualization Ratios***

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.09159 | 1.24906 | 1.20934 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.10497 | 1.30880 | 1.24643 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.11345 | 1.29406 | 1.24250 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.09889 | 1.24135 | 1.24669 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.10323 | 1.24090 | 1.24815 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 0.99865 | 1.04177 | 1.00749 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 0.99829 | 1.01714 | 1.01017 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.98082 | 1.03408 | 1.00317 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.95277 | 0.98471 | 1.01816 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.96292 | 0.99370 | 1.01402 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.97180 | 1.00019 | 1.01025 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.95533 | 0.97804 | 1.01577 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 1.00631 | 1.04820 | 1.00172 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.97881 | 0.97071 | 1.35593 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.97956 | 0.94285 | 1.05517 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## Laredo District (Duval County) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.06166 | 1.12562 | 1.10779 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.04640 | 1.13804 | 1.11890 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.05176 | 1.15137 | 1.12879 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.04704 | 1.13949 | 1.14875 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.04831 | 1.14004 | 1.14480 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 0.98278 | 1.00535 | 0.96838 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 0.96083 | 0.95593 | 0.99144 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.93482 | 0.95828 | 1.00394 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.92176 | 0.93285 | 1.03057 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.93825 | 0.94602 | 1.01134 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.95572 | 0.96389 | 1.00163 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.91888 | 0.92716 | 1.02955 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 0.95064 | 0.96861 | 0.99455 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.94772 | 0.93321 | 1.29454 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00001 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.96520 | 0.91899 | 1.04750 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## Laredo District (Val Verde County) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 0.99996 | 1.21309 | 1.15293 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.02735 | 1.24610 | 1.15813 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.03426 | 1.24093 | 1.16942 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.02875 | 1.19748 | 1.18962 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.03140 | 1.19701 | 1.18545 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 0.87986 | 0.99565 | 0.99822 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 0.88584 | 0.96090 | 1.01945 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.84773 | 0.96277 | 1.03267 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.83845 | 0.94352 | 1.05615 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.84969 | 0.95119 | 1.03744 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.87002 | 0.96533 | 1.03039 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.85189 | 0.93860 | 1.05229 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 0.88791 | 0.96581 | 1.02302 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.90526 | 0.96874 | 1.32975 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00001 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.89072 | 0.93238 | 1.06733 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## Laredo District (Dimmit, Kinney, LaSalle, Webb, and Zavala Counties) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.04652 | 1.15632 | 1.14171 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.04350 | 1.17520 | 1.15075 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.04899 | 1.18162 | 1.16133 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.04395 | 1.15907 | 1.18118 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.04548 | 1.15922 | 1.17719 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 0.95728 | 1.00676 | 0.97909 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 0.94468 | 0.96433 | 1.00057 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.91644 | 0.96647 | 1.01332 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.90483 | 0.94395 | 1.03722 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.91887 | 0.95471 | 1.01934 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.93620 | 0.97072 | 1.01117 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.90748 | 0.93872 | 1.03518 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 0.93850 | 0.97369 | 1.00440 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.95448 | 0.95233 | 1.32308 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00001 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.94931 | 0.93143 | 1.05091 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## Lubbock District (Castro, Parmer, and Swisher Counties) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.03124 | 1.31402 | 1.19965 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.07337 | 1.35913 | 1.20951 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.08176 | 1.34156 | 1.21364 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.06397 | 1.28297 | 1.22728 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.06751 | 1.28189 | 1.22543 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 0.87918 | 1.02826 | 1.02410 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89902 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 0.88982 | 0.99809 | 1.03511 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.84732 | 0.99583 | 1.04292 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.84611 | 0.98843 | 1.05009 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.85445 | 0.99235 | 1.04682 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.87118 | 0.99935 | 1.03669 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.86043 | 0.98321 | 1.04707 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 0.87962 | 0.97997 | 1.03982 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.92398 | 1.02911 | 1.31569 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89902 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.89701 | 0.97895 | 1.05727 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## Lubbock District (Bailey, Cochran, Crosby, Dawson, Floyd, Gaines, Garza, Hale, Hockley, Lamb, Lubbock, Lynn, Terry, and Yoakum Counties) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.03316 | 1.27293 | 1.18812 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.06635 | 1.31667 | 1.19862 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.07428 | 1.30420 | 1.20256 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.05779 | 1.25222 | 1.21800 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.06106 | 1.25147 | 1.21590 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 0.89463 | 1.01658 | 1.01680 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89902 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 0.89943 | 0.98169 | 1.03025 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.85995 | 0.97863 | 1.03892 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.85895 | 0.97075 | 1.04774 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.86685 | 0.97499 | 1.04339 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.88288 | 0.98437 | 1.03155 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.87012 | 0.96589 | 1.04497 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 0.88645 | 0.96441 | 1.03623 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.92789 | 1.00404 | 1.31840 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89902 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.90810 | 0.96097 | 1.05720 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## Lufkin District (Angelina, Nacogdoches, Sabine, San Augustine, and Shelby Counties) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.09276 | 1.24553 | 1.20843 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.10723 | 1.31029 | 1.24268 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.11490 | 1.29764 | 1.23999 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.10278 | 1.25088 | 1.24502 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.10642 | 1.25040 | 1.24594 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 1.00303 | 1.04160 | 1.00701 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 0.98930 | 0.99539 | 1.01217 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.95973 | 0.98993 | 1.00944 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.94866 | 0.96746 | 1.02084 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.95137 | 0.97385 | 1.01868 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.96758 | 0.99336 | 1.00919 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.95417 | 0.97123 | 1.01718 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 0.96813 | 0.98813 | 1.00886 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.98015 | 0.96895 | 1.35547 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.97900 | 0.93876 | 1.05627 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

# Lufkin District (Houston, Polk, San Jacinto, and Triniy Counties) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.13050 | 1.22042 | 1.18587 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.12615 | 1.27856 | 1.22134 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.13261 | 1.27357 | 1.21849 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.11985 | 1.23743 | 1.22339 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.12283 | 1.23739 | 1.22454 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 1.05927 | 1.05271 | 0.99268 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 1.03384 | 1.00030 | 0.99847 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 1.01080 | 0.99445 | 0.99614 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.99724 | 0.96867 | 1.00827 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 1.00053 | 0.97591 | 1.00590 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 1.01589 | 0.99824 | 0.99578 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.99668 | 0.97324 | 1.00454 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 1.00454 | 0.99421 | 0.99569 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.98577 | 0.95709 | 1.33295 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 1.02259 | 0.93610 | 1.04640 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

# Odessa District (Andrews and Martin Counties) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.02098 | 1.22537 | 1.16904 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.04131 | 1.26373 | 1.16550 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.04915 | 1.25527 | 1.17769 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.04312 | 1.21977 | 1.19873 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.04588 | 1.21909 | 1.19513 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 0.89040 | 1.00982 | 1.00084 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 0.91056 | 1.00001 | 1.00758 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.87753 | 1.00151 | 1.02820 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.86594 | 0.99184 | 1.03591 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.86787 | 0.98235 | 1.03605 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.88275 | 0.99010 | 1.02936 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00002 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.86617 | 0.96197 | 1.04460 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 0.89002 | 0.97115 | 1.03112 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.92442 | 1.00319 | 1.31933 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.90328 | 0.96000 | 1.05771 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## Odessa District (Crane, Ector, Loving, Midland, Pecos, Reeves, Terrell, Upton, Ward, and Winkler Counties) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.00318 | 1.18681 | 1.15355 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.02270 | 1.22757 | 1.14991 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.03097 | 1.22300 | 1.16187 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.02543 | 1.18985 | 1.18560 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.02836 | 1.18946 | 1.18151 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 0.87807 | 0.98549 | 0.99850 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 0.89709 | 0.97352 | 1.00625 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.86468 | 0.97401 | 1.02752 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.85298 | 0.96295 | 1.03740 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.85489 | 0.95261 | 1.03827 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.86895 | 0.96207 | 1.02954 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00002 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.85218 | 0.93137 | 1.05171 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 0.87579 | 0.94255 | 1.03300 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.91010 | 0.96658 | 1.33215 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.88965 | 0.92828 | 1.06922 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## Paris District (Excludes DFW CMSA County of Hunt) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.09125 | 1.24477 | 1.21828 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.10520 | 1.30579 | 1.24760 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.11230 | 1.29281 | 1.24407 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.09461 | 1.23386 | 1.25025 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.09810 | 1.23355 | 1.25095 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 1.00095 | 1.04400 | 1.00762 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 0.97026 | 0.96815 | 1.02311 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.94520 | 0.97668 | 1.02584 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.94557 | 0.96109 | 1.03476 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.94649 | 0.96473 | 1.03057 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.96026 | 0.97457 | 1.01742 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.94356 | 0.95635 | 1.03289 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 1.02888 | 1.08792 | 1.00312 | 1.09939 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.98214 | 0.97271 | 1.35444 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.97963 | 0.94289 | 1.05483 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

# Pharr District Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.06383 | 1.13013 | 1.09932 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.04473 | 1.13054 | 1.11079 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.05080 | 1.14512 | 1.12198 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.05417 | 1.15347 | 1.14219 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.05531 | 1.15390 | 1.13862 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 0.98244 | 0.99847 | 0.97254 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 0.96122 | 0.95478 | 0.98818 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.92682 | 0.94164 | 1.01352 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.92474 | 0.92860 | 1.02916 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.93629 | 0.94081 | 1.01466 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.92782 | 0.92668 | 1.02806 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.91598 | 0.92173 | 1.03071 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 0.98689 | 1.00822 | 0.98902 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.94229 | 0.92633 | 1.29627 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.96366 | 0.91348 | 1.04960 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## San Angelo District Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.00263 | 1.18251 | 1.15308 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.02630 | 1.23336 | 1.15635 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.03326 | 1.22857 | 1.16501 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.02451 | 1.18928 | 1.18865 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.02711 | 1.18892 | 1.18409 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 0.87968 | 0.98715 | 0.99570 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 0.89034 | 0.97086 | 1.00709 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.85492 | 0.95253 | 1.03045 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.84026 | 0.94077 | 1.05587 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.85223 | 0.94541 | 1.04265 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.85303 | 0.93455 | 1.04514 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.85439 | 0.94294 | 1.03265 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 0.87152 | 0.94170 | 1.03907 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.92038 | 0.97373 | 1.32914 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.88961 | 0.92823 | 1.06877 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## San Antonio District (Excludes San Antonio EAC Counties of Bexar, Comal, Guadalupe, and Wilson) (McMullen County) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.05445 | 1.09949 | 1.10205 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.04224 | 1.13032 | 1.11767 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.04755 | 1.14273 | 1.12570 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.04242 | 1.13210 | 1.14735 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.04384 | 1.13271 | 1.14335 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 0.98316 | 0.99989 | 0.96962 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 0.96865 | 0.96458 | 0.98395 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.94318 | 0.96705 | 0.99901 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.93448 | 0.94202 | 1.01359 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.94479 | 0.95103 | 1.00804 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.96510 | 0.97624 | 0.99715 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.94334 | 0.95897 | 1.00156 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 0.95433 | 0.96199 | 1.00097 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.95002 | 0.93252 | 1.29690 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.96361 | 0.91616 | 1.04948 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## San Antonio District (Excludes San Antonio EAC Counties of Bexar, Comal, Guadalupe, and Wilson) (Bandera, Frio, Kendall, Kerr, Medina and Uvalde Counties) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.04154 | 1.13158 | 1.13602 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.03996 | 1.16587 | 1.14980 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.04546 | 1.17177 | 1.15857 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.03970 | 1.15214 | 1.17991 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.04137 | 1.15235 | 1.17585 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 0.95784 | 1.00251 | 0.98023 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 0.95129 | 0.97223 | 0.99358 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.92464 | 0.97472 | 1.00904 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.91618 | 0.95188 | 1.02131 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.92555 | 0.96015 | 1.01683 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.94448 | 0.98188 | 1.00731 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.92682 | 0.96637 | 1.01077 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 0.94125 | 0.96868 | 1.01052 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.95740 | 0.95226 | 1.32488 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.94819 | 0.92940 | 1.05236 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## San Antonio District (Excludes San Antonio EAC Counties of Bexar, Comal, Guadalupe, and Wilson) (Atascosa County) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.12681 | 1.22042 | 1.18599 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.11863 | 1.27093 | 1.21746 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.12484 | 1.26510 | 1.21406 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.10944 | 1.21567 | 1.21967 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.11258 | 1.21581 | 1.22040 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 1.04026 | 1.02029 | 0.99633 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 1.02168 | 0.98281 | 1.00395 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 1.00031 | 0.98510 | 1.00041 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.99113 | 0.95909 | 1.01414 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 1.00037 | 0.96885 | 1.00906 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 1.01901 | 0.99486 | 0.99873 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.99781 | 0.97517 | 1.00268 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 1.00467 | 0.97917 | 1.00243 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.98839 | 0.95226 | 1.32488 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 1.01849 | 0.93279 | 1.04838 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

**Tyler District (Excludes Northeast Texas EAC Counties of Gregg, Rusk, and Smith and DFW CMSA County of Henderson) Emissions Factor Annualization Ratios***

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.09188 | 1.24442 | 1.21363 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.10348 | 1.30443 | 1.24636 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.11074 | 1.29147 | 1.24291 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.09636 | 1.23697 | 1.24895 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.09972 | 1.23665 | 1.24952 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 0.99412 | 1.03472 | 1.00755 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 0.98825 | 0.99573 | 1.01533 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.95719 | 0.98763 | 1.01054 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.94765 | 0.96644 | 1.02774 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.95282 | 0.97221 | 1.02133 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.96970 | 0.99412 | 1.01277 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.95099 | 0.97071 | 1.01792 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 1.01237 | 1.05873 | 1.00114 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.98049 | 0.97084 | 1.35540 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.97949 | 0.94131 | 1.05559 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## Waco District (Hamilton County) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.01961 | 1.15667 | 1.16287 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 0.99999 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.03422 | 1.20323 | 1.17901 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.04012 | 1.20269 | 1.18752 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.03258 | 1.17416 | 1.21015 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.03455 | 1.17396 | 1.20580 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 0.92514 | 1.00675 | 0.98445 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 0.92289 | 0.97973 | 1.00774 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.88570 | 0.96863 | 1.02670 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.88478 | 0.96217 | 1.04059 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.88890 | 0.95942 | 1.03557 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.89988 | 0.96417 | 1.02787 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.88720 | 0.95450 | 1.03346 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 0.98045 | 1.09055 | 1.00691 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.95154 | 0.97099 | 1.35384 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.92086 | 0.94004 | 1.05817 | 0.81059 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.81059 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## Waco District (Bosque, Falls, Hill, Limestone, and McLennan Counties) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.09235 | 1.24548 | 1.21391 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 0.99999 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.10536 | 1.30801 | 1.24745 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.11229 | 1.29527 | 1.24430 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.09385 | 1.23329 | 1.25006 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.09731 | 1.23299 | 1.25070 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 0.99066 | 1.02420 | 1.00906 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 0.98169 | 0.98935 | 1.01784 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.94655 | 0.97560 | 1.01914 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.94564 | 0.96901 | 1.03408 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.94855 | 0.96580 | 1.02893 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.95677 | 0.97106 | 1.02065 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.94360 | 0.95923 | 1.02703 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 1.04213 | 1.12465 | 0.99745 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.97837 | 0.97099 | 1.35384 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.98010 | 0.94331 | 1.05445 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## Waco District (Bell and Coryell Counties) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.12855 | 1.22274 | 1.18542 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 0.99999 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.12262 | 1.27930 | 1.21761 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.12852 | 1.27335 | 1.21461 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.10891 | 1.21814 | 1.22105 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.11183 | 1.21825 | 1.22166 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 1.04328 | 1.02785 | 0.99498 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 1.02256 | 0.98534 | 1.00472 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.99104 | 0.97016 | 1.00699 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.99001 | 0.96161 | 1.02296 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.99322 | 0.95890 | 1.01786 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.99759 | 0.96572 | 1.00895 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.97990 | 0.95254 | 1.01652 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 1.09428 | 1.14356 | 0.98254 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.98642 | 0.95182 | 1.32338 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 1.01916 | 0.93360 | 1.04741 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## Wichita Falls District (Cooke County) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.09121 | 1.23261 | 1.21409 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.10116 | 1.29176 | 1.24315 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.10800 | 1.28031 | 1.23953 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.09286 | 1.22875 | 1.24713 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.09611 | 1.22852 | 1.24738 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 0.98336 | 1.00678 | 1.01009 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 0.97286 | 0.96842 | 1.02124 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.94538 | 0.97290 | 1.02427 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.92577 | 0.93901 | 1.05274 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.93914 | 0.95023 | 1.03461 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.94975 | 0.95359 | 1.02948 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.93640 | 0.94057 | 1.03629 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 0.93812 | 0.93436 | 1.04719 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.98314 | 0.96976 | 1.35453 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.97931 | 0.93753 | 1.05640 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## Wichita Falls District (Clay and Montague Counties) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.03697 | 1.19558 | 1.18786 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.05328 | 1.23916 | 1.20327 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.05977 | 1.23549 | 1.20606 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.04725 | 1.20195 | 1.22451 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.04985 | 1.20167 | 1.22171 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 0.92379 | 0.99594 | 1.00740 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 0.92058 | 0.96280 | 1.02123 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89902 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.88915 | 0.96718 | 1.03101 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.87173 | 0.93703 | 1.05654 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.88516 | 0.94660 | 1.03982 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.89848 | 0.94937 | 1.03522 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.88618 | 0.93821 | 1.04094 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89902 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 0.89332 | 0.93293 | 1.05101 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.95963 | 0.96976 | 1.35453 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.92515 | 0.93519 | 1.05983 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## Wichita Falls District (Archer, Baylor, Throckmorton, Wichita, Wilbarger, and Young Counties) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.03338 | 1.26463 | 1.18616 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.06551 | 1.31021 | 1.19685 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.07270 | 1.29905 | 1.20040 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.05708 | 1.25112 | 1.21569 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.06019 | 1.25041 | 1.21340 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 0.89715 | 1.01034 | 1.01596 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 0.90204 | 0.98140 | 1.02718 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89902 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.86564 | 0.98724 | 1.03680 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.84847 | 0.95878 | 1.05476 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.86177 | 0.96660 | 1.04237 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 0.87823 | 0.96921 | 1.03891 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.86724 | 0.95817 | 1.04209 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89902 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 0.87970 | 0.95402 | 1.05017 | 0.89901 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.93038 | 1.00325 | 1.31737 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 0.90738 | 0.95692 | 1.05805 | 0.89902 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 0.89901 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

# Yoakum District (Calhoun, DeWitt, Jackson, Lavaca, and Victoria Counties) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.15225 | 1.19415 | 1.15075 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.13896 | 1.25284 | 1.18097 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.14497 | 1.25384 | 1.17769 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.13178 | 1.22465 | 1.18244 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.13450 | 1.22503 | 1.18367 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 1.08484 | 1.04155 | 0.98184 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 1.06751 | 0.99878 | 0.98795 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 1.03058 | 0.96552 | 0.99457 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 1.01449 | 0.95071 | 1.00727 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 1.01372 | 0.93739 | 1.01621 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 1.03372 | 0.96730 | 0.99517 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.99444 | 0.93341 | 1.01545 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 1.00898 | 0.96919 | 0.98796 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.98237 | 0.93304 | 1.29533 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 1.04262 | 0.92009 | 1.04438 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## Yoakum District (Austin, Colorado, Matagorda, and Wharton Counties) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.12864 | 1.21998 | 1.19239 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.12660 | 1.28259 | 1.22463 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.13332 | 1.27659 | 1.22112 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.12125 | 1.23990 | 1.22483 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.12439 | 1.23984 | 1.22625 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 1.05009 | 1.04371 | 0.99376 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 1.03945 | 1.00748 | 0.99871 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 1.00169 | 0.97872 | 1.00354 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.98937 | 0.96600 | 1.01428 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.98947 | 0.95457 | 1.02183 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 1.00711 | 0.98024 | 1.00409 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.97773 | 0.94987 | 1.02040 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 0.99185 | 0.97789 | 0.99705 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.98653 | 0.95961 | 1.33197 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 1.02329 | 0.93934 | 1.04518 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.

## Yoakum District (Fayette County) Emissions Factor Annualization Ratios*

| | VOC | CO | NOx | $SO_4$ | OCARBON | ECARBON | GASPM | LEAD | $SO_2$ | $NH_3$ | BRAKE | TIRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LDGV | 1.12788 | 1.22288 | 1.18605 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT1 | 1.12706 | 1.28720 | 1.21558 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT2 | 1.13375 | 1.28041 | 1.21238 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT3 | 1.12100 | 1.24021 | 1.21635 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDGT4 | 1.12418 | 1.24014 | 1.21760 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV2b | 1.04724 | 1.03881 | 0.99375 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV3 | 1.03647 | 1.00159 | 0.99900 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV4 | 0.99898 | 0.97224 | 1.00423 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV5 | 0.98642 | 0.95927 | 1.01549 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV6 | 0.98654 | 0.94763 | 1.02341 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV7 | 1.00455 | 0.97378 | 1.00479 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8a | 0.97422 | 0.94302 | 1.02195 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGV8b | 0.98831 | 0.97195 | 0.99742 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| LDDV | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT12 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV2b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV3 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV4 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV5 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV6 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV7 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8a | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDV8b | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| MC | 0.98898 | 0.95210 | 1.32347 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDGB | 1.01870 | 0.93219 | 1.04802 | 1.09940 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.09940 | 1.00000 | 1.00000 | 1.00000 |
| HDDBT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| HDDBS | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| LDDT34 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |

* The PM component annualization ratios apply to both PM-10 and PM-2.5 pollutants.