

Appendix C.2

Area Source Inventory Documentation

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List of Acronyms

Acronym	Definition
EIIP	Emissions Inventory Improvement Program
E-GAS 5.0	Economic Growth Analysis System version 5.0
NAICS	North American Industry Classification System
NCDAQ	North Carolina Division of Air Quality
NCDFR	North Carolina Division of Forest Resources
NCDOT	North Carolina Department of Transportation
NCSU	North Carolina State University
NG	Natural Gas
NOx	Nitrogen Oxides
SIC	Standard Industrial Classification
USEPA	U.S. Environmental Protection Agency
USFA	U.S. Fire Administration
VMF	Vehicle Miles Traveled
VOC	Volatile Organic Compounds

1.0 INTRODUCTION AND SCOPE

Area sources represent a collection of many small points of air pollution emissions within a specified geographical area emitting less than the minimum level prescribed for point sources and therefore not individually identified. Because these sources are too small and/or too numerous to be surveyed and characterized individually, all area source activities are collectively estimated. The county is usually the geographic area for which emissions from area sources are compiled, primarily because counties are the smallest areas for which data used for estimating emissions is readily available.

The area source inventories detailed in this section have been developed for Edgecombe and Nash Counties as part of the process of redesignating them from nonattainment to attainment/maintenance for the 8-hour ozone standard. All emissions are calculated on a tons per summer day basis.

2.0 OVERALL METHODOLOGY

2.1 SOURCE CATEGORY IDENTIFICATION

The area source categories were identified from two U. S. Environmental Protection Agency (USEPA) guidance documents: EPA-450/4-91-016, *Procedures for the Preparation of Emission Inventories of Carbon Monoxide and Precursors of Ozone, Vol. 1*¹, from this point on this document will be referred to as the Procedures document, and the *Emissions Inventory Improvement Program (EIIP) Technical Reports, Vol. 3, Area Sources as of December 2002*² and referred to hereafter as EIIP Tech Report.

2.2 EMISSION ESTIMATION APPROACH

Area source emissions are estimated by multiplying an emission factor by some known indicator of collective activity for each source category within the inventory area. An indicator is any parameter associated with the activity level of a source that can be correlated with the air pollutant emissions from that source, such as production, number of employees, or population.

In general, one of the following emissions estimation approaches is used to calculate the area source emissions: per capita emission factors, employment-related emission factors, commodity consumption-related emission factors, and level of activity based emission factors. The emission factors used were obtained from the EIIP Tech Report, the Procedures document or the USEPA's *AP-42 Compilation of Air Pollutant Emission Factors, Fifth Edition*³, referred to as AP-42.

There are several methods for estimating the activity level for a specific area source category. These are: treating area sources as point sources, surveying local activity levels, apportioning national or statewide activity totals to local inventory areas, and using population or employment data. All of these methods were used to estimate area source emissions for the 2002 base year inventory. In general, 2002 was used as a base year because the data was on hand and all of the 2005 data needed for a direct 2005 calculation was not yet available or could not be gathered and processed in the time needed. The 2002 calculated base year was adjusted to the 2005 base year for the maintenance plan.

The estimated 2002 population data, from the 2000 census, was used in conjunction with per capita emission factors, and 2001 employment data from on-line County Business Patterns⁵, was used with per employee emission factors.

Table 2.2-1 contains the estimated population for the counties for this maintenance plan (2005, 2008, 2011, 2014, 2017) as well as the 2002 estimate used to calculate emissions.

Table 2.2-1 Population Data

COUNTY	2002	2005	2008	2011	2014	2017
Edgecombe	54,841	53,554	52,679	51,891	51,033	50,216
Nash	88,898	91,530	94,243	96,878	99,406	102,134

For creating future year emission estimates for many source categories, the base year emission inventory was projected with a source category specific growth factor generated with the USEPA's Economic Growth Analysis System⁷ version 5.0 beta (E-GAS 5.0) program. Source categories estimated by per-capita emission factors were grown using predicted future year populations provided by the North Carolina Office of State Budget and Management⁶ and were based originally on 2000 census data. Population growth factors were calculated to adjust 2002 values to future years by multiplication. These growth factors are listed in Table 2.2-2.

Table 2.2-2 Population Growth Factors

COUNTY	2005	2008	2011	2014	2017
Edgecombe	0.9765	0.9606	0.9462	0.9306	0.9157
Nash	1.0296	1.0601	1.0898	1.1182	1.1489

Certain emission categories were adjusted for such things as season or rule effectiveness and rule penetration. These are discussed in the particular source categories descriptions.

For certain categories, there can be overlap between the point source emissions and the area source emissions calculated with emission factors. The 2002 point source emissions in these categories were identified so that they could be subtracted where appropriate.

There are a number of categories where emissions were calculated with emission factors based on employment. These emission factors were developed by the USEPA when employment reports were organized by Standard Industrial Classification Code (SIC). Since 1997 employment statistics are organized by the North American Industry Classification System (NAICS). For the solvent cleaning industries, the SIC codes do not directly correspond to single NAICS code. Sometimes several partial NAICS employment values will relate to a SIC code. A

crosswalk was used to determine what percentage of a NAICS employment value would correspond to the SIC codes. The percentages used can be found in Section 5 – Additional Data.

The employment numbers were obtained from the 2001 County Business Patterns for the various NAICS codes and the appropriate percentages applied. In addition to having employment values by NAICS, the County Business Patterns breaks down the number of facilities by employment categories. The employment categories are 1 – 4, 5 – 9, 10 – 19, 20 – 49, 50 – 99, 100 – 249, 250 – 499, 500 – 999, >1000 employees. To account for point sources, it was assumed that facilities with 100 employees or greater were point sources, in accordance with the EIIP Tech. Report, and were not considered in the calculations.

There were instances where the County Business Patterns gave a range of employees instead of an actual number. When this occurred, facility sizes were considered and the mid-range of employees was assumed, in accordance with the EIIP Tech. Report. For example, if the total employment range was 1 – 19 employees, and there was one facility with 1 – 4 employees then the employment was assumed to be 3 employees.

For surface coating subcategories, 2000 employment data was readily available since the data was collected for an earlier modeling exercise. This data was based on numerous NAICS codes. In many cases various percentages of NAICS codes were added to arrive at a number approximating employment values corresponding to the old SIC method. Since there was a wide range of NAICS codes used to create these estimates and later numbers have not been developed, the existing data was used to estimate the emissions from this source category. Given the errors in producing this approximation of SIC employment it is reasonable to consider these to be good estimates for 2002. They were generally derived from a report of numbers of establishments with employee counts within a certain range. Midpoints of the various ranges were multiplied by number of establishments and then added together to produce a total.

3.0 QUALITY ASSURANCE MEASURES

The first issue in quality assurance is that of developing a complete list of area sources. The Procedures document and the EIIP Tech Report were the primary reference used in preparing the list for the inventory. Next, measures to ensure valid emission estimates were adopted using guidance provided by document EPA-450/4-88-023, *Guidance for the Preparation of Quality Assurance Plans for O₃/CO SIP Emission Inventories*⁴. Since many are based on AP-42 factors, factors given in the Procedures document or the EIIP Tech Report, sources of error would primarily be associated with the multiplier values and the accuracy of emission calculations.

Under the direction of the quality assurance coordinator, emission sources whose values appeared unusually high or low based on previous inventory experience and comparison with other emission sources were scrutinized more closely for reasonableness. The accuracy was addressed by performing independent checks of the calculations.

4.0 DISCUSSION OF AREA SOURCE CATEGORIES

There are five major area source categories comprising of a number of individual area source types. Sections 4.1 through 4.5 addresses each of these categories and include a number of subsections that corresponds to the contributory area sources. The objective of each subsection is to describe each source category and the emission estimation and/or projection procedures.

4.1 GASOLINE DISTRIBUTION

The area source emissions attributed to this category are associated with various operations related to gasoline and aircraft fuel handling and distribution. Since tank farms and bulk plants are specifically addressed in the point source inventory, the area source category is limited to fuel handling, storage, and distribution operations associated with the service stations and in the refueling of aircrafts.

4.1.1 Gasoline Dispensing Facilities

Since service stations are numerous, they are collectively considered as an area source. The area source emissions derived for this subsection include estimated emissions from each of the following operations: 1) losses during storage tank filling, 2) storage tank breathing and working losses, 3) spillage, and 4) truck transit losses. The emissions from vehicle refueling are captured in the mobile source inventory in the emission factors produced by the USEPA's MOBILE6.2 model and therefore are not included as part of the area source inventory.

As part of the air toxics program, Stage I controls for gasoline dispensing facilities was adopted by the State, effective May 1990 with final compliance by January 1, 1994. Stage I is the vapor recovery technology on the underground storage tanks and reduces the emissions during the tank filling operations at service stations.

The North Carolina Department of Agriculture, Standards Division is responsible for going to all gasoline dispensing facilities and testing the fuels to ensure that it meets the quality standards of the State. The North Carolina Division of Air Quality (NCDAQ) has worked out an agreement with the Standards Division to also check for Stage I controls. A notice is sent to the NCDAQ for every facility checked by the Standards Division verifying if a facility has properly maintained control equipment. If a facility is not found to be properly maintaining the control equipment, then the NCDAQ sends a notice of violation informing the facility that the controls are required and gives the facility time to correct the violation before fines are assessed. From this information the rule effectiveness and rule penetration can be estimated. The rule

effectiveness is the percentage of facilities complying with the rule, where as the rule penetration is the percentage of facilities requiring Stage I controls. Control efficiency is the expected percent reduction from this control technology. The compliance factors for Stage I controls for the Rocky Mount area are listed in Table 4.1.1-1.

Table 4.1.1-1 Compliance Factors for Stage I Controls

Rule Effectiveness	Rule Penetration	Control Efficiency
0.97	0.99	0.95

The volatile organic compound (VOC) emission factor for underground storage tank filling was calculated by using an equation from AP-42, page 5.2-4 (equation)

$$EF = 12.46 \frac{[SPM]}{[T]} \times [1 - (RE \times CE \times RP)]$$

where EF = emission factor in pounds of VOC per 1000 gallons
 S = Saturation factor
 P = True vapor pressure (psia)
 M = Molecular weight of vapors (lb/lb-mole)
 T = Temperature of bulk liquid (°R)
 RE = Rule Effectiveness
 CE = Control Efficiency
 RP = Rule Penetration

The saturation factor was obtained from AP-42, Table 5.2-1 and the true vapor pressure and molecular weight of vapors were obtained from AP-42, Table 7.1-2. For the temperature an average of the June, July and August average monthly temperature for 2002 was used. These temperatures were obtained from the North Carolina Climatological Data⁸, a publication of the National Oceanic and Atmospheric Administration. All of the factors used to calculate the emission factor for Stage I, i.e. balanced submerged filling, are listed in Table 4.1.1-2.

Table 4.1.1-2 Factors Used For Calculating Emission Factor

S	P	M	T
1	6.49	67	537.6°R (77.6°F)

$$EF_{EN} = 12.46 \left[\frac{1 \times 6.49 \times 67}{T} \right] \times [1 - (.97 \times .95 \times .99)]$$

$$= \frac{537.6}{600} = 0.884 \text{ lb VOC/1000 gal. Gasoline}$$

The emission factors for tank truck transit, breathing losses and spillage were obtained from the EIIP Tech Report, Table 11.3-1 and are listed below in Table 4.1.1-3. The tank truck transit emission factor includes the emission rate for an empty tank plus a full tank and was adjusted by a factor of 1.25 as recommended by the EIIP Tech Report, pg. 11.5-3.

Table 4.1.1-3 Emission Factors For Gasoline Dispensing

Storage Tank Filling	Tank Truck Transit	Breathing	Spillage
0.884 lb/1000gal	0.000075 lb/gal	0.001 lb/gal	0.00068 lb/gal

The activity data needed to calculate the emissions is number of gallons of fuel sold in each county per year. This was obtained from a report from the North Carolina Petroleum Marketers Association. A weighting factor was devised by producing the sum of county population (1000's), county registered vehicles (1000's), and county motor fuel outlets. The factors were summed for the 100 counties and a fractional part of the whole found for each county. This fraction was multiplied by the state total gallons of gasoline and diesel in 2002 to get an estimate of gallons of fuel per county.

Table 4.1.1-4 Fuel Use Data 2002

County	Population in 1000's	Vehicles in 1000's	Motor Fuel Outlets	Add Columns 2, 3, & 4	County Fraction of State	Gasoline Use 1000's gals	Diesel Use 1000's gals
Edgecombe	55	42.5	46	143.5	0.00641	27,227.20	7,573.82
Nash	89.3	76	108	273.3	0.0122	51,854.95	14,424.57
State Totals	8,320.00	6,802	7,271	22392.7	1	4,248,710	1,181,870

According to the EIIP Tech Report, the activity days per week for truck transit and underground tank loading are 6 days per week and for spillage and breathing losses 7 days per week. For the future year inventories the base year emissions were grown using the appropriate E-GAS 5.0 factors listed in Table 4.1.1-5.

Table 4.1.1-5 Growth Factors for Gasoline Dispensing

2005	2008	2011	2014	2017
1.0011	1.0246	1.0375	1.0327	1.0333

Note that diesel fuel used is combined with gasoline for sake of simplification. This will result in some overestimation of VOCs because of different volatility.

The following examples show calculations for Edgecombe County for 2005. The other years and Nash County emissions were done in like manner.

Tank Truck Transit

$$\text{VOC}_{2005} = ((27227200 + 7573820)\text{gal/yr}) * (.000075 \text{ lbvoc/gal}) * (1 \text{ ton}/2000 \text{ lb}) * (1.0011 \text{ EGAS}_{05/02}) * (1/365 \text{ yr/day}) * (7/6 \text{ dayswk/dayswk}) = 0.0042 \text{ tons/day}$$

Underground Storage Tank Filling

$$\text{VOC}_{2005} = ((27227200 + 7573820)\text{gal/yr}) * (.884 \text{ lbvoc}/1000\text{gal}) * (1 \text{ ton}/2000 \text{ lb}) * (1.0011 \text{ EGAS}_{05/02}) * (1/365 \text{ yr/day}) * (7/6 \text{ dayswk/dayswk}) = 0.0492 \text{ tons/day}$$

Breathing Loss

$$\text{VOC}_{2005} = ((27227200 + 7573820)\text{gal/yr}) * (0.001 \text{ lbvoc/gal}) * (1 \text{ ton}/2000 \text{ lb}) * (1.0011 \text{ EGAS}_{05/02}) * (1/365 \text{ yr/day}) = 0.0477 \text{ tons/day}$$

Spillage Loss

$$\text{VOC}_{2005} = ((27227200 + 7573820)\text{gal/yr}) * (0.00068 \text{ lbvoc/gal}) * (1 \text{ ton}/2000 \text{ lb}) * (1.0011 \text{ EGAS}_{05/02}) * (1/365 \text{ yr/day}) = 0.0325 \text{ tons/day}$$

The VOC emission estimates, in tons/day, from gasoline service stations for the Rocky Mount area are listed in Tables 4.1.1-6 through 4.1.1-9, and are totaled for this source category in Table 4.1.1-10.

Table 4.1.1-6 VOC Emissions From Tank Truck Transit

County	2005	2008	2011	2014	2017
Edgecombe	0.0042	0.0043	0.0043	0.0043	0.0043
Nash	0.0080	0.0081	0.0082	0.0082	0.0082
TOTAL	0.012	0.012	0.013	0.013	0.013

Table 4.1.1-7 VOC emissions From Underground Storage Tank Filling

County	2005	2008	2011	2014	2017
Edgecombe	0.0492	0.0504	0.0510	0.0508	0.0508
Nash	0.0937	0.0959	0.0971	0.0967	0.0968
TOTAL	0.143	0.146	0.148	0.148	0.148

Table 4.1.1-8 VOC Emissions From Breathing Loss

County	2005	2008	2011	2014	2017
Edgecombe	0.0477	0.0488	0.0495	0.0492	0.0493
Nash	0.0909	0.0930	0.0942	0.0938	0.0938
TOTAL	0.139	0.142	0.144	0.143	0.143

Table 4.1.1-9 VOC Emissions From Spillage

County	2005	2008	2011	2014	2017
Edgecombe	0.0325	0.0332	0.0336	0.0335	0.0335
Nash	0.0618	0.0633	0.0641	0.0638	0.0638
TOTAL	0.094	0.097	0.098	0.097	0.097

Table 4.1.1-10 Total VOC Emissions From Gasoline Dispensing Facilities

County	2005	2008	2011	2014	2017
Edgecombe	0.1336	0.1367	0.1384	0.1378	0.1379
Nash	0.2544	0.2604	0.2636	0.2624	0.2626
TOTAL	0.388	0.397	0.402	0.400	0.401

4.1.2 Aircraft Refueling

Like vehicle refueling, aircraft refueling results in VOC emissions from displacement of the vapor laden air in the aircraft's fuel tank. This source category is generally estimated only for large commercial airports. In Edgecombe and Nash Counties, the airports were found to be small commuter airports and the amount of the emissions would be negligible. Therefore emissions have not been quantified for this source category.

4.2 STATIONARY SOURCE SOLVENT EVAPORATION

There are eleven subcategories that involve stationary source solvent evaporative emissions. They include: dry cleaning, graphic arts, solvent cleaning, automotive refinishing, architectural coatings, traffic markings, industrial surface coating, asphalt paving, roofing operations, pesticide application, and consumer/commercial solvent use. The methodology used to calculate the emissions from these sources are described in detail in each subsection.

4.2.1 Dry Cleaning

The VOC emissions from dry cleaning vary with the type of process and the solvent used. For the most part, dry cleaners (coin-operated and conventional) are small business entities. As a result of their size, dry cleaning emissions are not captured as point sources. However, dry cleaning operations can be a significant emission source for VOCs, when taken collectively.

The emissions from dry cleaners are estimated by multiplying the number of employees at dry cleaners by a national per-employee emission factor, 1800 lbs. of VOC/employee/year, found in the EIIP Tech. Report. The number of employees was obtained from the County Business Patterns for NAICS codes 812310 and 812320.

For coin operated dry cleaners, the County Business Patterns provided the range of the number of employees and number of facilities for Edgecombe and Nash Counties. For conventional dry cleaners, the County Business Patterns provided the number of employees and facilities for Edgecombe County and the range of employees and number of facilities for Nash County. When actual number of employees were provided, this value was used. When a range of employees and number of establishments were provided, the estimated number of employees was calculated, based on the mid-point of the range of employees. For example, Edgecombe County has 0-19 employees for two coin-operated facilities. The number of employees for Edgecombe County was assumed to be six (see Table 4.2.1-1 below). The employment values assumed for all of the counties in the Rocky Mount area are listed in Table 4.2.1-2.

Table 4.2.1-1 Edgecombe County Employment Data for Dry Cleaners

	Number of Employees	Range of Employees	Mid-Point	Total Number of Employees
Coin-Operated Facility 1	Not Provided	1-4	3	3
Coin-Operated Facility 2	Not Provided	1-4	3	3
Conventional Facilities	86	--	--	86
Total	86		6	92

Table 4.2.1-2 Employment Data for Dry Cleaners

County	Estimated Number of Employees
Edgecombe	92
Nash	117

There were no point sources identified for dry cleaning operations in the effected counties; and as a consequence, no point source correction was needed. According to the EIIP Tech. Report, the activity days per week is 6 days. For the attainment year and future years inventories, the 2002 year emissions were grown using E-GAS 5.0 growth factors (Table 4.2.1-3).

Table 4.2.1-3 Growth Factors for Dry Cleaning

2005	2008	2011	2014	2017
1.0050	1.0224	1.0423	1.1146	1.1868

The emissions for 2002 were calculated using equation 4.2.1-1 and the emissions for the base year and future years were calculated using equation 4.2.1-2.

$$EM = \frac{\text{Employees} \times EF}{(2000 \text{ lb/tons}) \times (6 \text{ days/week}) \times (52 \text{ weeks/year})} \quad 4.2.1-1$$

$$PJ_a EM = EM \times GF_a \quad 4.2.1-2$$

where EM = emissions for source category
 EF = emission factor for source category, 1800 lbs VOC/employee/yr
 $PJ_a EM$ = projected base year (a) or projected future year (a) emissions
 GF_a = growth factor for base year or projected future year (a)

Examples of the emission calculation for Edgecombe County are listed below:

Number of employees = 92

Emission factor = 1800 lbs VOC/employee/year

Projection factor for 2005 = 1.005 (from Table 2.2-3 in Section 2.2 above)

From equation 4.2.1-1 and 4.2.1-2

$$\begin{aligned} VOC_{2002} &= \frac{(92 \text{ employees}) \times (1800 \text{ lb VOC/employee/yr})}{(2000 \text{ lb/ton}) (6 \text{ days/wk}) (52 \text{ wks/yr})} \\ &= 0.2654 \text{ tons VOC/day} \end{aligned}$$

$$\begin{aligned} VOC_{2005} &= 0.2654 \times 1.005 \\ &= 0.2667 \text{ tons VOC/day} \end{aligned}$$

The VOC emission estimates, in tons/day, from dry cleaning for the Rocky Mount area are listed in Table 4.2.1-4.

Table 4.2.1-4 VOC Emissions From Dry Cleaning Operations

County	2005	2008	2011	2014	2017
Edgecombe	0.2667	0.2706	0.2759	0.2950	0.3141
Nash	0.3383	0.3441	0.3508	0.3751	0.3994
TOTAL	0.605	0.615	0.627	0.670	0.714

4.2.2 Graphic Arts/Printing

Graphic arts include operations that are involved in printing of newspapers, magazines, books, and other printed materials, which can be divided into several subsets based upon printing technology. Over the last decade ink-jet and offset lithography have emerged as the dominant technologies. The use of oils as ink solvents and the reduction of alcohols in the fountain solution and in the cleanup solutions have resulted in notable reductions in emissions for offset lithography. Ink-jet printing results in essentially no VOC emissions.

A number of establishments that generate emissions in this source category are in-house graphic arts operations at plants that are in non-printing industries. Therefore, an employee per SIC code

emission factor is not very reliable. The per-capita emission factor of 1.3 lbs VOC/person/year provided by the EIIP Tech. Report was used to calculate the VOC emissions. This emission factor estimates the emissions from facilities less than 100 tons VOC/year. It assumes that facilities greater than 100 tons VOC/year will be in the point source inventory. The population used to calculate the base year emissions is found in Table 2.2-1, 2002 column.

According to the Procedures document, Table 5.8-1, the activity days per week is 5 and there is no seasonal adjustment needed. There were no graphic arts point sources, source classification code 4-05-xxx-xxx, that emit less than 100 tons/year, in the Rocky Mount area.

Since the emissions are calculated based on population, the future years inventories were grown using the population growth factors from Table 2.2-2. The emissions for the base year and future years were calculated using equations 4.2.2-1 and 4.2.2-2, respectively.

$$EM_a = ((EF) * (Population_{2002}) * (1 \text{ ton}/2000 \text{ lb})) \quad 4.2.2-1$$

$$PJ_b EM_a = EM_a \times GF_a \times (1 \text{ yr}/365 \text{ days}) \times (7 \text{ days}/5 \text{ days}) \quad 4.2.2-2$$

where EM = emissions for source category for county (a) t/yr
 EF = emission factor for source category, 1.3 lbs VOC/person/yr
 $PJ_b EM_a$ = projected future year (b) emissions for county (a) t/day
 GF_a = growth factor for county (a)

Examples of the emission calculation for Edgecombe County are listed below:

Population = 54841 people
 Emission factor = 1.3 lbs VOC/person/yr
 Point Source Emissions = 0 tons/day
 Projection factor for 2005 = 0.9765
 From equation 4.2.2-1 and 4.2.2-2

$$VOC_{2002} = (1.3) * (54841) * (1/2000) - 0 = 35.6467 \text{ t/y}$$

$$VOC_{2005} = (35.6467) * (0.9765) * (1/365) * (7/5) = 0.1335 \text{ t/d}$$

The VOC emission estimates, in tons/day, from graphic arts operations for the Rocky Mount area are listed in Table 4.2.2-1.

Table 4.2.2-1 VOC Emissions From Graphic Arts Operations

County	2005	2008	2011	2014	2017
Edgecombe	0.1335	0.1313	0.1293	0.1272	0.1252
Nash	0.2282	0.2349	0.2415	0.2478	0.2546
TOTAL	0.362	0.366	0.371	0.375	0.380

4.2.3 Solvent Cleaning and Degreasing

Solvent cleaning operations are integral to many businesses and industries, and are conducted for the purpose of removing grease, oils, waxes, carbon deposits, etc. from metals, plastic, or glass surfaces. Solvent cleaning is usually performed prior to painting, plating, inspection, repair, assembly, etc. The solvents used in the cleaning operations can be either in a liquid or vapor phase. Generally, these solvents have high vapor pressures and are therefore emit VOCs.

There are two basic types of solvent cleaning techniques, cold cleaning and vapor cleaning. Cold cleaning machines use solvents in the liquid phase to clean and remove foreign material such as oils and grease from the surface of materials. These machines are batch loaded, and cleaning operations include spraying/flushing solvent or parts agitation, wipe cleaning, brushing, and immersion.

The vapor cleaning technique can be further divided into open top degreasing and in-line cleaning. The open top degreasing machines are tanks designed to generate and contain solvent vapor. The tank is equipped with a heating system that boils the liquid solvent. As the solvent boils, dense solvent vapors rise and displace the air in the tank. Coolant is circulated in condensing coils on the top of the tank to create a controlled vapor zone within the tank. Condensing solvent vapors dissolve the contaminants on the surface of the workload and flush both the dissolved and undissolved contaminants from the workload.

In-line cleaning machines employ automated loading on a continuous basis. These machines are often custom made for large-scale operations. A continuous or multiple-batch loading system greatly reduces or even eliminates the manual parts handling associated with batch cleaning. In-line cleaning machines are enclosed to prevent solvent losses; however, entry and exit openings cannot be sealed.

The VOC emissions for this category are estimated by using the per capita factors listed in Table 4.2.3-1 below:

Table 4.2.3-1 Emission Factors Cleaning & Degreasing

Source Category	lb VOC/person/yr
Electronic and Other Elec: Open Top Degreasing	0.21
Miscellaneous Manufacturing: Open Top Degreasing	0.49
Miscellaneous Manufacturing: Cold Cleaning	1.1
Auto Repair Services: Cold Cleaning	2.5

The county population data, found in Table 2.2-1 and the population growth factors in Table 2.2-2, were used to estimate the emissions from this source category.

Federal rules are expected to reduce the VOC emission from solvent cleaning in the future years. The USEPA estimates that the federal rules will reduce the emissions from this source category by approximately 31%. This reduction was applied starting with the 2005 estimated emissions. The work week is 6 days for these categories. The emissions for the base year and future years were calculated using equations 4.2.3-1 and 4.2.3-2, respectively.

$$EM = \frac{(\text{Population}_{2002}) \times EF}{(2000 \text{ lb/tons})} \quad 4.2.3-1$$

$$PJ_b EM_a = EM \times GF_a \times [1 - RF] \times (1/365) \times (7/6) \quad 4.2.3-2$$

where EM = emissions for source category t/y
EF = emission factor for source category
PJ_bEM_a = projected future year (b) emissions for county in maintenance area (a)
GF_a = growth factor for maintenance area (a)
RF = Reduction factor

Examples of the emission calculation for Edgecombe County for the “electronic and other electrical: open top degreasing” subcategory are listed below:

2002 Population in Edgecombe County = 54841
2005 Growth Factor for Edgecombe County 0.9765
Emission Factor = 0.21 lb VOC/person/year
Reduction Factor = 0.31

From Equations 4.2.3-1

$$\begin{aligned}\text{VOC}_{2002} &= \frac{(54841 \text{ people}) \times (0.21 \text{ lb VOC/person year})}{(2000 \text{ lb/ton})} \\ &= 5.7583 \text{ tons VOC/year}\end{aligned}$$

$$\begin{aligned}\text{VOC}_{2005} &= \frac{(5.7583 \text{ t/y}) \times (0.9765 \text{ GF}_{2005/2002}) \times (7/6) \times [1 - 0.31]}{(365 \text{ days/year})} \\ &= 0.0124 \text{ tons VOC/day}\end{aligned}$$

The VOC emission estimates, in tons/day, from the four subcategories and the total for this source category are summarized in the tables below. All emission estimates are in tons/day.

Table 4.2.3-2 VOC Emissions From Electronic and Other Elec.: Open Top Degreasing

County	2005	2008	2011	2014	2017
Edgecombe	0.0124	0.0122	0.0120	0.0118	0.0116
Nash	0.0212	0.0218	0.0224	0.0230	0.0236
TOTAL	0.034	0.034	0.034	0.035	0.035

Table 4.2.3-3 VOC Emissions From Miscellaneous Manufacturing: Open Top Degreasing

County	2005	2008	2011	2014	2017
Edgecombe	0.0289	0.0285	0.0280	0.0276	0.0271
Nash	0.0495	0.0509	0.0523	0.0537	0.0552
TOTAL	0.078	0.079	0.080	0.081	0.082

Table 4.2.3-4 VOC Emissions From Miscellaneous Manufacturing: Cold Cleaning

County	2005	2008	2011	2014	2017
Edgecombe	0.0650	0.0639	0.0629	0.0619	0.0609
Nash	0.1110	0.1143	0.1175	0.1206	0.1239
TOTAL	0.176	0.178	0.180	0.183	0.185

Table 4.2.3-5 VOC Emissions From Auto Repair Services: Cold Cleaning

County	2005	2008	2011	2014	2017
Edgecombe	0.1476	0.1452	0.1431	0.1407	0.1384
Nash	0.2523	0.2598	0.2671	0.2740	0.2816
TOTAL	0.400	0.405	0.410	0.415	0.420

Table 4.2.3-6 Total VOC Emissions From Surface Cleaning and Degreasing

County	2005	2008	2011	2014	2017
Edgecombe	0.2539	0.2498	0.2460	0.2420	0.2381
Nash	0.4340	0.4469	0.4594	0.4713	0.4843
TOTAL	0.688	0.697	0.705	0.713	0.722

4.2.4 Auto Body Refinishing

Auto body refinishing operations consist of: vehicle preparation, primer application, topcoat application, and spray equipment cleaning. These operations result in significant VOC emissions. The solvent are typically 100% volatile and can constitute up to 6.5 pounds of VOC per gallon of cleaner or paint.

The EIIP methodology for estimating emissions from this source category recommends apportioning a national VOC emission estimate to the county level by the number of employees reported for NAISC code 811121. The national estimate of 79,429.59 tons of VOC per year was based on 1997 data. In order to estimate the emissions for 2002, the national VOC estimate provided by the EIIP Tech. Report was divided by the 1997 national employment data to create a per employee emission factor. See the calculation below:

$$\begin{aligned}\text{National Emissions} &= 79,429.59 \text{ tons/year} \\ \text{National Employment} &= 205,172 \text{ employees}\end{aligned}$$

$$\text{EF} = (79,429.59)/(205,172) = 0.387 \text{ tons/employee/year}$$

This emission factor was used with the 2002 employment data to estimate emissions from auto body refinishing. The employment data was obtained from the 2002 County Business Patterns² and is list in Table 4.2.4-1.

Table 4.2.4-1 Employment Values used for Auto Body Refinishing

County	# of Employees
Edgecombe	17
Nash	142

According to the EIIP Tech. Report the activity days per week is 5 days. For the base year and future year inventories, the 2002 year emissions were grown using E-GAS 5.0 growth factors (Table 4.2.4-2).

Table 4.2.4-2 Growth Factors for Auto Body Refinishing

2005	2008	2011	2014	2017
1.0553	1.1401	1.2193	1.3096	1.3868

Federal rules are expected to reduce the VOC emission from auto body refinishing in the future years. The USEPA estimates that the federal rules will reduce the emissions from this source category by approximately 37%. This reduction was applied starting with the 2005 estimated emissions. The emissions for 2002 were calculated using equation 4.2.4-1 and the emissions for the base year and future years were calculated using equation 4.2.4-2.

$$EM = \frac{\text{Employees} \times EF}{(5 \text{ days/week}) \times (52 \text{ weeks/year})} \quad 4.2.4-1$$

$$PJ_a EM = EM \times GF_a \times [1-RF] \quad 4.2.4-2$$

where EM = emissions for source category
EF = emission factor for source category, 0.387 tons VOC/employee/yr
PJ_aEM = projected base year (a) or projected future year (a) emissions
GF_a = growth factor for base year or projected future year (a)
RF = USEPA's estimated reduction factor

Examples of the emission calculation for Edgecombe County are listed below:

Number of employees = 17
 Emission factor = 0.387 tons VOC/employee/year
 Projection factor for 2005 = 1.0553
 Reduction factor = 0.37

From equation 4.2.3-1 and 4.2.3-2

$$\begin{aligned}
 \text{VOC}_{2002} &= \frac{(17 \text{ employees}) \times (0.387 \text{ ton VOC/employee/yr})}{(5 \text{ days/wk}) (52 \text{ wks/yr})} \\
 &= 0.0025 \text{ tons VOC/day}
 \end{aligned}$$

$$\begin{aligned}
 \text{VOC}_{2005} &= 0.0253 \times 1.0553 \times [1-0.37] \\
 &= 0.0168 \text{ tons VOC/day}
 \end{aligned}$$

The VOC emission estimates, in tons/day, from auto body refinishing for the Rocky Mount area are listed in Table 4.2.4-3.

Table 4.2.4-3 VOC Emissions From Auto Body Refinishing

County	2005	2008	2011	2014	2017
Edgecombe	0.0168	0.0181	0.0194	0.0208	0.0220
Nash	0.1401	0.1514	0.1619	0.1739	0.1842
TOTAL	0.157	0.170	0.181	0.195	0.206

4.2.5 Architectural Coatings

This category includes the application of paint, primer, varnish or lacquer to architectural surfaces, and the use of solvents as thinners and for cleanup.

The VOC emissions for this source category were estimated by multiplying county population data by a usage factor for either water or solvent based coatings, an emissions factor for either water or solvent based coatings, and a seasonal adjustment factor (SAF); then dividing by 365 days/year to get a daily number. This method entails gathering national architectural paint usage from the County Business industrial report MA325F and generating per capita usage factors from them. It is important to be able to differentiate between the water based usage from the solvent based usage since the emission factor for solvent based paints is over 5 times higher than water based paints.

$$\text{SAF} = ((3\text{rd Quarter usage}) * 12 \text{ months}) / ((\text{total usage}) * 3 \text{ months})$$

$$(\text{For 2002}) = (189790000 \text{ gal} * 12 \text{ months}) / (718664000 \text{ gal} * 3 \text{ months}) = 1.06$$

Emissions Factor: Water based = .74 lb VOC/gallon;
 Solvent Based= 3.87 lb VOC/ gallon

$$\text{VOC}_{\text{ai}} = (\text{POP}_{\text{ai}} * \text{UF}_{\text{b}} * \text{EF}_{\text{b}} * \text{SAF}) / ((365 \text{ days/yr}) * (2000 \text{ lbs/ton})) \text{ -- ton/day}$$

Where: VOC_{ai} = VOC emissions for county a in year i
 POP_{ai} = Population for county a in year i
 EF_{b} = emission factor for paint type b
 SAF = Seasonal adjustment factor
 UF_{b} = Usage factor for paint type b
 = Usage/population

For 2002: The usage factor for each paint type is estimated below:

$$\text{UF solvent: } (127,703,000) / (287,973,924) = 0.443$$

$$\text{UF water : } (589,527,000) / (287,973,924) = 2.047$$

The SAF and usage factor calculated for 2002 was assumed to remain constant in future years. Additionally, federal rules are expected to reduce the VOC emission from architectural coatings in the future years. The USEPA estimates that the federal rules will reduce the emissions from this source category by approximately 25%. This reduction was applied starting with the 2005 estimated emissions. Examples of the emission calculations for Edgecombe County are listed below:

Solvent Based Emission Factor = 3.87 lb VOC/gallon

Water Based Emission Factor = 0.74 lb VOC/gallon

Seasonal Adjustment Factor = 1.06

Future Control Factor = (1 - 0.25) or 0.75

For 2005:

$$\text{VOC}_{\text{solvent}} = \frac{(53,554 \text{ people}) \times (0.443 \text{ gal/person}) \times (3.87 \text{ lb VOC/gallon/yr}) \times (1.06) \times (0.75)}{(365 \text{ days/yr}) \times (2000 \text{ lb/ton})}$$

$$= 0.10 \text{ tons VOC/day}$$

$$\text{VOC}_{\text{water}} = \frac{(53,554 \text{ people}) \times (2.047 \text{ gal/person}) \times (0.74 \text{ lb VOC/gallon/yr}) \times (1.06) \times (0.75)}{(365 \text{ days/yr}) \times (2000 \text{ lb/ton})}$$

$$= 0.088 \text{ tons VOC/day}$$

$$\text{VOC}_{2005} = (0.1 + 0.088) \text{ tons VOC/day} = 0.188 \text{ tons VOC/day}$$

The VOC emission estimates, in tons/day, from architectural coatings for the Rocky Mount area are listed in Table 4.2.5-1.

Table 4.2.5-1 VOC Emissions From Architectural Coatings

County	2005	2008	2011	2014	2017
Edgecombe	0.188	0.185	0.183	0.179	0.177
Nash	0.322	0.331	0.341	0.350	0.359
TOTAL	0.510	0.516	0.524	0.529	0.536

4.2.6 Traffic Markings

The paint used in traffic markings operations (the painting of center lines, shoulders, etc.) emits VOCs during the drying process. The extent of emissions is largely a function of the paint being solvent or water based. The North Carolina Department of Transportation (NCDOT) utilizes three general types of paint, which can be classified as water based paint, epoxy paint containing organic solvents, and thermoplastic paint. The use of thermoplastic paint results in negligible VOC emissions and therefore will not be included in the emissions inventory.

Although the NCDOT utilizes both water and solvent based paints, there is uncertainty with respect to what percentage of the paint used is organic solvent based. To avoid under estimating the emissions from this source category, it is assumed that all paint, excluding thermoplastic, is organic solvent based.

The NCDOT reported that 854,215 gallons of paint were used statewide in 2002. The gallons of paint by county were apportioned by number of lane miles in the county divided by the state total (Equation 4.2.6-1) and the estimated gallons used are listed in Table 4.2.6-1. The emission factors were obtained from the EIIP Tech. Report, Table-14.4-1 and Table-14.5-2, which gave emission factors as a function of gallons of paint (3.64 lb VOC/gal.). Additionally the EIIP Tech. Report stated that the activity days per week is 5 and the SAF is 1.3.

$$\text{Gallons Paint}_{\text{County}} = (\text{Gallons Paint}_{\text{State}}) \times \frac{(\# \text{ Lane Miles})_{\text{County}}}{(\# \text{ Lane Miles})_{\text{State}}} \quad 4.2.6-1$$

Table 4.2.6-1 Traffic Marking Paint Usage

County	Lane Miles	Paint (gallons)
Edgecombe	713.11	8,495
Nash	1,032.46	12,299
State Total	71,705.77	854,215

For the future years inventories, the base year emissions were grown using growth factors from the E-GAS 5.0 model and are listed in Table 4.2.6-2.

Table 4.2.6-2 Growth Factors for Traffic Marking Emissions

2005	2008	2011	2014	2017
1.0011	1.0246	1.0375	1.0327	1.0333

Additionally, federal rules are expected to reduce the VOC emission from traffic markings in the future years. The USEPA estimates that the federal rules will reduce the emissions from this source category by approximately 25%. This reduction was applied starting with the 2005 estimated emissions. The emissions for the base year and future years were calculated using equations 4.2.6-2 and 4.2.6-3, respectively.

$$EM_P = \frac{(\text{Paint used}) \times EF_P \times SAF}{(5 \text{ days/week}) \times (52 \text{ weeks/year}) \times (2000 \text{ lb/ton})} \quad 4.2.6-2$$

$$PJ_b EM_a = EM_P \times GF_a \times [1-RF] \quad 4.2.6-3$$

where EM_P = emissions for reported paint usage
 EF_P = emission factor for reported paint usage
 SAF = Seasonal adjustment factor, 1.3
 $PJ_b EM_a$ = projected future year (b) emissions for county in maintenance area (a)
 GF_a = growth factor for maintenance area (a)
 RF = Reduction Factor, 0.25

Examples of the emission calculation for Edgecombe County are listed below:

Gallons of paint used = 8495 gallons/year
Emission factor for gallons = 3.64 lb VOC/gallon

Projection factor for 2005 = 1.0011
Reduction factor = $[1 - 0.25] = 0.75$

From equation 4.2.6-1 and 4.2.6-2

$$\begin{aligned}\text{VOC}_{2002} &= \frac{(8495 \text{ gallons}) \times (3.64 \text{ lb VOC/gallon/year}) \times 1.3}{(5 \text{ days/wk}) \times (52 \text{ wks/yr}) \times (2000 \text{ lb/ton})} \\ &= 0.077 \text{ tons VOC/day}\end{aligned}$$

$$\begin{aligned}\text{VOC}_{2005} &= 0.077 \times 1.0011 \times 0.75 \\ &= 0.058 \text{ tons VOC/day}\end{aligned}$$

The VOC emission estimates, in tons/day, from traffic markings for the Rocky Mount area are listed in Table 4.2.6-3.

Table 4.2.6-3 VOC Emissions From Traffic Markings

County	2005	2008	2011	2014	2017
Edgecombe	0.058	0.059	0.060	0.060	0.060
Nash	0.084	0.086	0.087	0.087	0.087
TOTAL	0.142	0.145	0.147	0.147	0.147

4.2.7 Industrial Surface Coating

Surface coating operations involve applying a thin layer of coating (e.g. paint, lacquer, enamel, varnish, etc.) to the surface of an object for decorative or protective purposes. The coating products, which are solvent based, emit VOCs as the result of solvent evaporation during the drying or curing process.

Ideally, the VOC emissions from industrial surface coating activities should be captured as point sources. From a practical standpoint, this is not always accomplished. For example, three of the industrial surface coating subcategories, namely other product coatings, high-performance maintenance, and other special purpose coatings, only utilized per capita emission factors and have no NAICS associated with them. The emission factors, obtained from the EIIP Tech. Report, Table 8.5-2, for these surface coating subcategories are listed in the Table 4.2.7-1 below.

Table 4.2.7-1 Per Capita Emission Factors For Industrial Surface Coating

Subcategory	Per Capita Factor (lb/yr/person)
Other product coatings	0.6
High-performance maintenance.	0.8
Other special purpose coatings	0.8

The emissions for the remaining industrial surface coating subcategories were estimated using per employee emission factors. These emission factors were obtained from the EIIP Tech. Report, Table 8.5-1 and are listed below in Table 4.2.7-2.

Table 4.2.7-2 Per Employee Emission Factors for Industrial Surface Coating

Subcategory	Per Employee Factor (lb VOC/employee/yr)
Furniture & Fixtures	944
Metal Containers	6,029
Automobile (new)	794
Machinery & Equipment	77
Appliances	463
Other Transportation Equipment	35
Sheet, strip & Coil	2,877
Factory Finished Wood	131
Electrical Insulation	290
Marine Coatings	308

The EIIP Tech. Report also listed SIC codes for these industrial surface coating subcategories. As stated earlier, the SIC codes were replaced in 1997 with NAICS. The employment data was estimated using the method outlined in Section 2.2. See Table 4.2.7-3 for the employment numbers used.

Table 4.2.7-3 Employment Data for Surface Coating Subcategories

Subcategory	# of Employees	
	Edgecombe	Nash
Furniture & Fixtures	107	116
Metal Containers	0	0
Automobile (new)	0	0
Machinery & Equipment	140	332
Appliances	0	3
Other Transportation Equipment	50	7
Sheet, strip & Coil	0	0
Factory Finished Wood	85	175
Electrical Insulation	0	0
Marine Coatings	1	36

According to the EIIP Tech. Report the activity days per week is 5 days. To estimate the future year emissions from the subcategories that used a per capita emission factor, the population growth factors were used (Table 2.2-2). For the subcategories that used an employment based emission factor, the future year inventories were grown using the E-GAS 5.0 growth factors from Table 4.2.7-4.

Table 4.2.7-4 Growth Factors for Surface Coating Subcategories

Subcategory	2005	2008	2011	2014	2017
Furniture & Fixtures	1.0874	1.1191	1.1030	1.2816	1.4480
Machinery & Equipment	1.3257	1.8262	2.2745	2.4956	2.6729
Appliances	1.0293	1.0481	1.0335	1.2019	1.3609
Other Transport. Equip.	1.1481	1.2963	1.4074	1.5778	1.7556
Factory Finished Wood	1.0742	1.1772	1.2530	1.3447	1.4410
Marine Coatings	1.0307	1.0175	1.0132	1.0921	1.1711

Federal rules are expected to reduce the VOC emission from industrial surface coating operations in the future years with respect to the emission factors used. The USEPA estimates of

percent reduction of emissions for the federal rules are listed in Table 4.2.7-5 below. These reductions were applied starting with the 2005 estimated emissions.

Table 4.2.7-5 Industrial Surface Coating Percent Reductions from Federal Rules

Subcategory	Expected Reduction
Furniture & Fixtures	30%
Machinery & Equipment	36%
Appliances	36%
Other Transportation Equipment	36%
Factory Finished Wood	36%
Marine Coatings	24%
Other Product	25%
High-Performance Maintenance	36%
Other Special Purpose Coatings	25%

The following equations demonstrate the calculation of the 2005 emissions for Nash County for the various categories:

Factory Finished Wood

$$\begin{aligned}
 \text{VOC}_{2005} &= (131 \text{ lb VOC/empl. yr}) * (175 \text{ empl.}) * (1/2000 \text{ ton/lb}) * (1.0742 \text{ EGAS}_{05/02}) * \\
 &\quad (1/365 \text{ yr/day}) * (7/5 \text{ day/wrk day}) * (1-(36/100) \text{ ton/ton}) \\
 &= 0.0302 \text{ ton VOC/day}
 \end{aligned}$$

Surface Coating Wood Furniture

$$\begin{aligned}
 \text{VOC}_{2005} &= (944 \text{ lb VOC/empl. yr}) * (116 \text{ empl.}) * (1/2000 \text{ ton/lb}) * (1.0874 \text{ EGAS}_{05/02}) * \\
 &\quad (1/365 \text{ yr/day}) * (7/5 \text{ day/wrk day}) * (1-(30/100) \text{ ton/ton}) \\
 &= 0.1598 \text{ ton VOC/day}
 \end{aligned}$$

Metal Containers

No employees

Metal Coil

No employees

Machinery and Equipment

$$\begin{aligned}\text{VOC}_{2005} &= (77 \text{ lb VOC/empl. yr}) * (332 \text{ empl.}) * (1/2000 \text{ ton/lb}) * (1.3257 \text{ EGAS}_{05/02}) * \\ &\quad (1/365 \text{ yr/day}) * (7/5 \text{ day/wrk day}) * (1-(36/100) \text{ ton/ton}) \\ &= 0.0416 \text{ ton VOC/day}\end{aligned}$$

Large Appliances

$$\begin{aligned}\text{VOC}_{2005} &= (463 \text{ lb VOC/empl. yr}) * (3 \text{ empl.}) * (1/2000 \text{ ton/lb}) * (1.0293 \text{ EGAS}_{05/02}) * \\ &\quad (1/365 \text{ yr/day}) * (7/5 \text{ day/wrk day}) * (1-(36/100) \text{ ton/ton}) \\ &= 0.0017 \text{ ton VOC/day}\end{aligned}$$

Electronic and Electrical

No employees

Motor Vehicles

No employees

Marine Coatings

$$\begin{aligned}\text{VOC}_{2005} &= (308 \text{ lb VOC/empl. yr}) * (36 \text{ empl.}) * (1/2000 \text{ ton/lb}) * (1.0307 \text{ EGAS}_{05/02}) * \\ &\quad (1/365 \text{ yr/day}) * (7/5 \text{ day/wrk day}) * (1-(24/100) \text{ ton/ton}) \\ &= 0.0166 \text{ ton VOC/day}\end{aligned}$$

Railroad

$$\begin{aligned}\text{VOC}_{2005} &= (35 \text{ lb VOC/empl. yr}) * (7 \text{ empl.}) * (1/2000 \text{ ton/lb}) * (1.1481 \text{ EGAS}_{05/02}) * \\ &\quad (1/365 \text{ yr/day}) * (7/5 \text{ day/wrk day}) * (1-(36/100) \text{ ton/ton}) \\ &= 0.0003 \text{ ton VOC/day}\end{aligned}$$

Miscellaneous Manufacturing

$$\begin{aligned}\text{VOC}_{2005} &= (0.6 \text{ lb VOC/person yr}) * (88898 \text{ person}) * (1/2000 \text{ ton/lb}) * (1.0296 \text{ pop}_{05/02}) * \\ &\quad (1/365 \text{ yr/day}) * (7/5 \text{ day/wrk day}) * (1-(25/100) \text{ ton/ton}) \\ &= 0.0790 \text{ ton VOC/day}\end{aligned}$$

Industrial Maintenance Coatings

$$\begin{aligned}\text{VOC}_{2005} &= (0.8 \text{ lb VOC/person yr}) * (88898 \text{ person}) * (1/2000 \text{ ton/lb}) * (1.0296 \text{ pop}_{05/02}) * \\ &\quad (1/365 \text{ yr/day}) * (7/5 \text{ day/wrk day}) * (1-(36/100) \text{ ton/ton}) \\ &= 0.0899 \text{ ton VOC/day}\end{aligned}$$

Other Special Purpose Coatings

$$\begin{aligned}\text{VOC}_{2005} &= (0.8 \text{ lb VOC/person yr}) * (88898 \text{ person}) * (1/2000 \text{ ton/lb}) * (1.0296 \text{ pop}_{05/02}) * \\ &\quad (1/365 \text{ yr/day}) * (7/5 \text{ day/wrk day}) * (1-(25/100) \text{ ton/ton}) \\ &= 0.1053 \text{ ton VOC/day}\end{aligned}$$

The VOC emission estimates, in tons/day, from surface coating operations are listed in Tables 4.2.7-6 through 4.2.7-14 and are totaled for this source category in Table 4.2.7-15.

Table 4.2.7-6 VOC Emissions From Factory Finished Wood

County	2005	2008	2011	2014	2017
Edgecombe	0.0147	0.0161	0.0171	0.0184	0.0197
Nash	0.0302	0.0331	0.0352	0.0378	0.0405
TOTAL	0.045	0.049	0.052	0.056	0.060

Table 4.2.7-7 VOC Emissions From Wood Furniture

County	2005	2008	2011	2014	2017
Edgecombe	0.1474	0.1517	0.1496	0.1738	0.1963
Nash	0.1598	0.1645	0.1621	0.1884	0.2129
TOTAL	0.307	0.316	0.312	0.362	0.409

Table 4.2.7-8 VOC Emissions From Machinery and Equipment

County	2005	2008	2011	2014	2017
Edgecombe	0.0175	0.0242	0.0301	0.0330	0.0354
Nash	0.0416	0.0573	0.0714	0.0783	0.0839
TOTAL	0.059	0.082	0.102	0.111	0.119

Table 4.2.7-9 VOC Emissions From Large Appliances

County	2005	2008	2011	2014	2017
Edgecombe	0	0	0	0	0
Nash	0.0017	0.0018	0.0018	0.0020	0.0023
TOTAL	0.002	0.002	0.002	0.002	0.002

Table 4.2.7-10 VOC Emissions From Marine Coatings

County	2005	2008	2011	2014	2017
Edgecombe	0.0005	0.0004	0.0004	0.0005	0.0005
Nash	0.0166	0.0164	0.0164	0.0176	0.0189
TOTAL	0.017	0.017	0.017	0.018	0.019

Table 4.2.7-11 VOC Emissions From Railroad

County	2005	2008	2011	2014	2017
Edgecombe	0.0025	0.0028	0.0030	0.0034	0.0037
Nash	0.0003	0.0004	0.0004	0.0005	0.0005
TOTAL	0.003	0.003	0.003	0.004	0.004

Table 4.2.7-12 VOC Emissions From Miscellaneous Manufacturing

County	2005	2008	2011	2014	2017
Edgecombe	0.0462	0.0455	0.0448	0.0440	0.0433
Nash	0.0790	0.0813	0.0836	0.0858	0.0881
TOTAL	0.125	0.127	0.128	0.130	0.131

Table 4.2.7-13 VOC Emissions From Industrial Maintenance Coatings

County	2005	2008	2011	2014	2017
Edgecombe	0.0526	0.0517	0.0509	0.0501	0.0493
Nash	0.0899	0.0925	0.0951	0.0976	0.1003
TOTAL	0.143	0.144	0.146	0.148	0.150

Table 4.2.7-14 VOC Emissions From Other Special Purpose Coatings

County	2005	2008	2011	2014	2017
Edgecombe	0.0616	0.0606	0.0597	0.0587	0.0578
Nash	0.1053	0.1084	0.1114	0.1144	0.1175
TOTAL	0.167	0.169	0.171	0.173	0.175

Table 4.2.7-15 Total VOC Emissions From Industrial Surface Coatings

County	2005	2008	2011	2014	2017
Edgecombe	0.3429	0.3530	0.3556	0.3818	0.4060
Nash	0.5245	0.5557	0.5774	0.6223	0.6648
TOTAL	0.867	0.909	0.933	1.004	1.071

4.2.8 Asphalt Paving

Two types of asphalt paving are used for road paving and repair; emulsified asphalt and cutback asphalt. Emulsified asphalt is a type of liquefied road surfacing material made from a blend of water with an emulsifier. Cutback asphalt is a type of liquefied road surface that is prepared by blending or "cutting back" asphalt cement with various kinds of petroleum distillates. VOC emissions occur as the asphalt cures.

The NCDOT specification for asphalt in 2002 was hot mix and emulsified asphalt with hot mix but not cutback asphalt. Surrounding states have precluded the use of cut back by statutory provisions. This has driven asphalt manufactures to discontinue cutback production throughout the region. The absence of the use of cutback has resulted in substantial reductions in emissions from asphalt paving operations in North Carolina.

Hot-mix is composed of high molecular weight organics with minimal vapor pressures; consequently, VOC emissions are negligible. The use of emulsified asphalt does result in VOC emissions; but the emissions are significantly less than cutback. New formulations of emulsified asphalt, such as cationic, continue to result in reduced emissions. The use of emulsified asphalt is primarily for tack coating, which is a surface preparation for the hot-mix layer. The tonnage of hot-mix asphalt is accounted for by the NCDOT districts and not by a county basis. District tonnage was allocated on a county basis by apportioning county paved mileage as reported in the NCDOT 2000 Highway Summary Report. However, the amount of emulsified asphalt used is not tracked by the NCDOT in any useable way. As a consequence, the NCDOT provided the following methodology to predict emulsified usage:

$$\text{Square Yd. of hot-mix} = \frac{(\text{Tons of Hot-mix}) \times (2000 \text{ lbs./Ton})}{(220 \text{ lbs/ Square Yd. of Hot-mix})} \quad 4.2.8-1$$

$$\text{Gallons of Emulsified asphalt} = (\text{Sq. Yd. of hot-mix}) \times (0.08 \text{ gal./Sq. Yd. of hot-mix}) \quad 4.2.8-2$$

The estimated tonnage of hot-mix asphalt used by a county and the resulting calculated gallons of emulsified asphalt used in 2002 are listed in Table 4.2.8-1.

Table 4.2.8-1 Tons and Gallons of Asphalt used for Paving

County	Tons	Gallons
Edgecombe	55,095	40,069
Nash	79,768	58,013

The VOC emissions were calculated using the emissions factor for emulsified asphalt (9.2 lb VOC/barrel) and the number of gallons of emulsified asphalt per barrel (42 gal./barrel) from Table 17.5-2 of the EIIP Tech. Report. A SAF of 1.33 was applied to correct for the majority of paving operations occurring between March and November, as reported by the NCDOT.

For future year inventories, the base year emissions were grown using factors from the E-GAS 5.0 model and are listed in Table 4.2.8-2.

Table 4.2.8-2 Growth Factors for Asphalt Paving Emissions

2005	2008	2011	2014	2017
1.0876	1.2018	1.3001	1.3936	1.4841

The emissions for the base year and the future year inventories were calculated using equations 4.2.8-3 and 4.2.8-4, respectively.

$$EM = \frac{(\text{gallons Emulsified Asphalt}) \times EF \times SAF}{(42 \text{ gal/barrel}) \times (2000 \text{ lb/tons}) \times (365 \text{ days/year})} \quad 4.2.8-3$$

$$PJ_bEM_a = EM \times GF_a \quad 4.2.8-4$$

where EM = emissions for source category
 EF = emission factor for source category
 SAF = Seasonal adjustment factor, 1.33
 PJ_bEM_a = projected future year (b) emissions for county in maintenance area (a)
 GF_a = growth factor for maintenance area (a)

Examples of the emission calculation for Edgecombe County are listed below:

Number of gallons of emulsified asphalt used = 40,069

Emission Factor = 9.2 lb VOC/barrel of asphalt

Seasonal adjustment factor = 1.33

Projection factor for 2005 = 1.0876

From Equation 4.2.8-3 and 4.2.8-4:

$$\begin{aligned}\text{VOC}_{2002} &= \frac{(40,069 \text{ gallons}) \times (9.2 \text{ lb VOC/barrel of asphalt}) \times (1.33)}{(42 \text{ gal/barrel}) \times (2000 \text{ lb/ton}) \times (365 \text{ days/year})} \\ &= 0.0160 \text{ tons VOC/day}\end{aligned}$$

$$\begin{aligned}\text{VOC}_{2005} &= 0.0160 \times 1.0876 \\ &= 0.0174 \text{ tons VOC/day}\end{aligned}$$

The VOC emission estimates, in tons/day, from asphalt paving for the Rocky Mount area are listed in Table 4.2.8-3.

Table 4.2.8-3 VOCI Emissions From Asphalt Paving

County	2005	2008	2011	2014	2017
Edgecombe	0.0174	0.0192	0.0208	0.0223	0.0237
Nash	0.0252	0.0279	0.0302	0.0323	0.0344
TOTAL	0.043	0.047	0.051	0.055	0.058

4.2.9 Roofing Operations

This category covers the installation and repair of asphalt roofs on commercial and industrial buildings. This category includes only hot-applied asphalt roofing, for which the only significant emissions source is the kettle used to heat the asphalt. The amount of asphalt roofing activity is estimated by summing the number of felt, cap, and flashing squares used in North Carolina during the year 2000. This information was ascertained from the Asphalt Roofing Manufacturing Association. The amount of asphalt used is given by the Equation 4.2.9-1, which uses the default value of 20 lbs. of asphalt / square found in the EIIP Tech. Report. The emissions by county were apportioned by roofing establishments in the county divided by the state total (Equation 4.2.9-2), using the number of establishments from NAISC code 23561 from the 2000 County Business Patterns². See Table 4.2.9-1 for the number of commercial establishments and the estimated tons of asphalt used for each county.

$$\text{Asphalt (Ton/yr)} = \frac{(\# \text{ squares}) \times (20 \text{ lbs. of asphalt/square})}{(2000 \text{ lbs./ton})} \quad 4.2.9-1$$

$$\text{Asphalt}_{\text{County}} = (\text{Tons Asphalt}_{\text{State}}) \times \frac{(\# \text{ Roofing Establishments})_{\text{County}}}{(\# \text{ Roofing Establishments})_{\text{State}}} \quad 4.2.9-2$$

Table 4.2.9-1 Number of Commercial Establishments & Tons of Asphalt Used

County	# Establishments	Tons of Asphalt
Edgecombe	5	27.75
Nash	8	44.41
State Totals	973	5400.80

Asphalt roofing activities are assumed to have uniform operations throughout the year with a 5 day work week per the EIIP Tech. Report. Additionally, the EIIP Tech. Report reported the emissions factor as 6.2 lbs. VOC/ton asphalt for roofing operations. For future year inventories, the base year emissions were grown using growth factors from the E-GAS 5.0 model and are listed in Table 4.2.9-2.

Table 4.2.9-2 Growth Factors for Asphalt Roofing Emissions

2005	2008	2011	2014	2017
1.0876	1.2018	1.3001	1.3936	1.4841

The emissions for the base year and future year inventories were calculated using Equations 4.2.9-3 and 4.2.9-4, respectively.

$$\text{EM} = \frac{(\text{tons Asphalt}) \times \text{EF}}{(2000 \text{ lb/tons}) \times (5 \text{ days/week}) \times (52 \text{ weeks/year})} \quad 4.2.9-3$$

$$\text{PJ}_b\text{EM}_a = \text{EM} \times \text{GF}_a \quad 4.2.9-4$$

where EM = emissions for source category
 EF = emission factor for source category
 PJ_bEM_a = projected future year (b) emissions for county in maintenance area (a)
 GF_a = growth factor for maintenance area (a)

Examples of the emission calculation for Nash County are listed below:

Number of Roofing Establishments in Nash County = 8

Number of Roofing Establishments in State = 973

Tons of Asphalt in State = 5400.8 tons

Emission Factor == 6.2 lb VOC/tons of asphalt

Growth Factor = 1.094

From Equations 4.2.9-2

$$\begin{aligned}\text{Tons Asphalt}_{\text{Nash}} &= (5400.8 \text{ tons}) \times \frac{(8 \text{ establishments})_{\text{Nash}}}{(973 \text{ establishments})_{\text{State}}} \\ &= 44.41 \text{ tons}\end{aligned}$$

From Equation 4.2.9-3 and 4.2.9-4:

$$\begin{aligned}\text{VOC}_{2000} &= \frac{(44.41 \text{ tons}) \times (6.2 \text{ lb VOC/ton of asphalt})}{(2000 \text{ lb/ton}) \times (5 \text{ days/week}) \times (52 \text{ weeks/year})} \\ &= 0.0005 \text{ tons VOC/day}\end{aligned}$$

$$\begin{aligned}\text{VOC}_{2005} &= 0.0005 \times 1.0876 \\ &= 0.0005 \text{ tons VOC/day}\end{aligned}$$

The VOC emission estimates, in tons/day, from asphalt roofing for the Rocky Mount area are listed in Table 4.2.9-3.

Table 4.2.9-3 VOC Emissions From Asphalt Roofing

County	2005	2008	2011	2014	2017
Edgecombe	0.0003	0.0004	0.0004	0.0004	0.0004
Nash	0.0005	0.0006	0.0007	0.0007	0.0007
TOTAL	0.001	0.001	0.001	0.001	0.001

4.2.10 Pesticide Application

Pesticides broadly include any substance used to kill or retard the growth of insects, rodents, fungi, weeds, or microorganisms. Formulations of organic pesticides are commonly made by combining synthetic materials with various petroleum products. The petroleum products, or inert ingredients, act as a carrier of the active component and usually evaporate into the atmosphere.

Agricultural Pesticides

Agricultural pesticides are applied in various manners, which directly affect the possible emissions associated with the application, regardless of the amount of solvent contained in the pesticide. There are basically three types of pesticide/herbicide application methods. One is the "incorporated" type, in which the product is applied and immediately incorporated into the soil. It is expected that little if any evaporation of solvent occur in this type of application. The next type, "pre-emergence", is where the product is put on the ground immediately after the crop is planted. This provides a protective layer. Some evaporation of solvent would be expected with this type of application. The largest emissions would occur from "over the top" application of pesticides. These pesticides are sprayed directly on the foliage to kill weeds or insects. This application would provide an opportunity for a great deal of solvent to evaporate.

The overall pesticide usage associated with agricultural crop production continues to slowly decrease in North Carolina driven by conservative pest management practices and the cost of pesticides as reported by the North Carolina State University (NCSU) Extension Center. The large majority of pesticide usage is confined to the production of tobacco and cotton crops. Because of the small crop size and high cash value, significant tobacco acreage is found in North Carolina including the Rocky Mount area.

The planted crop acreage from the North Carolina Agricultural Statistic Division and crop profile reports prepared by the NCSU Extension Center, and other university extension services, for the US Department of Agriculture Pest Management Center were used to estimate agricultural pesticide usage. Crop acreage from the North Carolina Agricultural Statistic Division was obtained from <http://www.ncagr.com/stats/>. Crop profile reports conducted by NCSU are based on surveys; where participation is reported to be as high as 90 percent for the more important cash crops. Crop profile reports for grains and soybeans do not exist for North Carolina, therefore data for these crops were obtained from other state profiles and from discussions with representatives of the NCSU Extension Center.

The individual crop profiles outline the current agricultural pesticide practices, i.e. the pesticide agents (insecticides, herbicides, fungicides), the percentage of acres treated, and the pounds of active ingredient pesticide applied per acre. The crop profiles often reports the application of the active ingredient (pounds of active ingredient per acre) as a range of values. For the worst case scenario, the highest reported value was used. The number of applications of a single pesticide was usually one for all pesticides. The few exceptions to one application are more than accounted for by the conservative practice of using the highest value of application rate.

The pounds of active ingredients for each crop were calculated by using Equation 4.2.10-1 and an example calculation for soybeans follows. Table 4.2.10-1 presents the pesticides associated with a particular crop, the % of treated acres, and the lbs. of active pesticide ingredient per year.

$$(\text{lbs. AI/acre})_{\text{CROP}} = \sum (\% \text{ acres treated}) \times (\text{lb AI/acre})_{\text{PESTICIDE}} \quad 4.2.10-1$$

where AI = active ingredient.

For soybeans, the pounds of active ingredients for the crop is:

Pesticide	% Acres Treated	Lb AI/acre
Paraquat	20	0.47
Glyphosate	10	4
Sulfusate	5	4
Carbaryl	10	1.5

$$\begin{aligned}
 (\text{lbs. AI/acre})_{\text{SOYBEAN}} &= (0.20 \times 0.47) + (0.10 \times 4) + (0.05 \times 4) + (0.10 \times 1.5) \\
 &= 0.844 \text{ lbs. AI/acre for soybeans}
 \end{aligned}$$

Table 4.2.10-1 Agriculture Pesticides Application Rates

Crop/Agent	% Acres Treated	Lbs. active ingredient/Acre	Crop/Agent	% Acres Treated	Lbs. active ingredient/Acre
<i>Soybeans</i>			<i>Corn Silage</i>		
Paraquat	20	0.47	Terbufos	35	1
Glyphosate	10	4	Chloropyrifus	10	1
Sulfusate	5	4	Phorate	10	1
Carbaryl	10	1.5	Ethoprop	5	1
<i>Cotton</i>			Carbofuran	5	1
Tribufos	100	0.75	M Parathion	50	0.75
Aldicarb	91	0.75	Thiocarb	90	0.6
Prougite	0.45	0.73	Methomyl	50	0.45
Dicofol	0.55	1.6	<i>Corn Grain</i>		
Dicrotophos	0.45	0.2	Terbufos	35	1
Acephate	2.1	0.5	Chloropyrifus	10	1
M-Parathion	1	0.5	Phorate	10	1
L-cyhalothrin	99	0.145	Ethoprop	5	1
Thiocarb	40	0.75	Carbofuran	5	1
Aldicarb	50	0.725	M Parathion	50	0.75
<i>Tobacco</i>			Thiocarb	90	0.6
Acephate	70	1.5	Methomyl	50	0.45
Spinosad	13	0.05	<i>Oats</i>		
Methomyl	11	0.45	M Parathion	5	0.5
Endosulfan	7	1	<i>Wheat</i>		
Imidacloprid	62	0.03	M Parathion	5	0.5
Chloropicrin	41	79.8	<i>Sweet Potatoes</i>		
Dichloropropene	35	89.5	Napropamide	50	1.5
Clomazone	75	1	Clomazone	25	0.87
Metalaxyl	49	0.76	Fluazifop	20	0.17
<i>Barley</i>			Carbaryl	25	0.67
M Parathion	0.8	0.5	<i>Peanuts</i>		
<i>Irish Potatoes</i>			Chlorpyrifus	60	1
Phorate 3	40	1.20	Disulfoton	90	0.75
Glyphosate	6	5	Esfenvalerate	25	0.03
Metolachor	8	2	Folicur 1	51	0.51
Metribuzin	55	0.5	Vernolate	45	2.5
<i>Sorghum</i>			Dichloropropene	0.16	80
MethyParathion	1	0.75			
Chlorpyrifus	1	1			
Carbaryl	1	2			

The emission factors for each crop were calculated utilizing information from the EIIP Tech. Report, p 9.5-4, which relates active ingredients to VOCs. According to the EIIP Tech. Report, for every pound of active ingredient there are 2.45 pounds of VOC, of this 90% is evaporated. The emission factors for each crop were calculated using Equation 4.2.10-2, with an example calculation for soybean following.

$$EF_{CROP} = (lb\ AI_{CROP}/acre) \times (2.45\ lb.\ VOC/lb.\ of\ AI) \times (0.90) \quad 4.2.10-2$$

Where EF_{CROP} = Emission factor in lbs. VOC/active ingredient for each crop
 AI_{CROP} = Active ingredient for each crop

For soybeans the emission factor is:

Lbs. AI/acre for soybean = 0.844 lbs. AI/acre

$$\begin{aligned} EF_{SOYBEAN} &= (0.844\ lb\ active\ ingredient/acre) \times (2.45\ lb\ VOC/active\ ingredient) \times (0.90) \\ &= 1.861\ lbs.\ VOC/acre \end{aligned}$$

An exception to the above calculation was for the usage of the following pesticides: chloropicrin and 1,3 dichloropropene. These fumigants are widely used for treating tobacco beds for nematodes and constitute a major portion of the pesticide inventory. They have a moderate vapor pressure of 18.3 and 34 mm of mercury (at 77° F), respectively, and their formulation is approximately 96% to 98% of the active ingredient. In light of these properties, the VOC emissions are assumed to be equal to the application per acre, which are 79 pounds/acre for chloropicrin and 89.5 pounds/acre for 1,3 dichloropropene. Table 4.2.10-2 list the pounds of active ingredients per acre and the calculated emission factor for each crop. The number of acres of each crop planted in each county is listed in Table 4.2.10-3.

Table 4.2.10-2 Emission Factors by Crop Type

Crop	Lbs. Active Ingredients/acre	Lbs. VOC/Acre
Soybeans	0.844	1.861
Cotton	2.267	4.999
Barley	0.004	0.009
Corn – Silage	1.79	3.947
Corn – Grain	1.79	3.947
Wheat	0.025	0.055
Oats	0.025	0.055
Sweet Potato	1.169	2.578
Tobacco		
- <i>Non-fumigant</i>	2.317	5.109
- <i>Fumigant</i>	64.043	64.043
Total Tobacco		69.152
Peanuts		
- <i>Non-fumigant</i>	2.9175	6.433
- <i>Fumigant</i>	0.128	0.282
Total Peanuts		6.715
Irish Potatoes	1.9350	4.267
Sorghum	0.0375	0.083

Table 4.2.10-3 Acres of Crops Planted

County	Cotton	Tobacco	Soybean	Wheat	Sweet Potato	Oats
Edgecombe	54,700	4,440	19,700	3,000	3,350	430
Nash	22,300	6,310	24,200	4,500	6,150	450
County	Barley	Corn -Grain	Corn - Silage	Peanuts	Irish Potatoes	Sorghum
Edgecombe	36	11,000	7	11,425	18	74
Nash	36	2,600	7	2,685	13	74

A SAF of 2.4 is applied to correct for the almost exclusive use of agricultural pesticides from April to August. For base year and future year inventories, the 2002 year emissions were projected using growth factors that were generated by the E-GAS 5.0 model. These growth factors are listed below.

Table 4.2.10-4 Growth Factors for Pesticide Application

2005	2008	2011	2014	2017
1.0980	1.2042	1.3042	1.3847	1.4622

The emissions for 2002 were calculated using equation 4.2.10-3 and the emissions for the base year and future years were calculated using equation 4.2.10-4.

$$EM_a = \frac{(\sum (CROP)_a \times EF_{CROP}) \times SAF}{(2000 \text{ lb/tons}) \times (365 \text{ days/year})} \quad 4.2.10-3$$

$$PJ_b EM_a = EM \times GF_b \quad 4.2.10-4$$

where EM_a = emissions for source category in county (a)
 $CROP$ = acres of specific crop in county (a)
 EF_{CROP} = emission factor for specific crop
 SAF = Seasonal adjustment factor, 2.4
 $PJ_b EM_a$ = projected future year (b) emissions for county (a)
 GF_b = growth factor for projected future year (b)

Examples of the emission calculation for Edgecombe County are listed below:

Table 4.2.10-5 Emission Factors Sprayed Crops

Crop	Acres	Emission Factor (lbs. VOC/acre)
Cotton	54,700	4.999
Tobacco	4,440	69.152
Soybean	19,700	1.861
Wheat	3,000	0.055
Sweet Potato	3,350	2.578
Oats	430	0.055
Barley	36	0.009
Corn, Grain	11,000	3.947
Corn, Silage	7	3.947
Peanuts	11425	6.715
Irish Potatoes	18	4.267
Sorghum	74	0.083

$$\text{SAF} = 2.4$$

$$\text{Projection factor for 2005} = 1.0980$$

From Equation 4.2.10-3 and 4.2.10-4:

$$\begin{aligned}
 (\sum (\text{CROP})_a \times \text{EF}_{\text{CROP}}) &= [(54,700 \times 4.999) + (4,440 \times 69.152) + (19,700 \times 1.861) + \\
 &\quad (3,000 \times 0.055) + (3,350 \times 2.578) + (430 \times 0.055) + \\
 &\quad (36 \times 0.009) + (11,000 \times 3.947) + (7 \times 3.947) + \\
 &\quad (11,425 \times 6.715) + (18 \times 4.267) + (74 \times 0.083)] \\
 &= 746,213.5 \text{ lbs VOC/year}
 \end{aligned}$$

$$\begin{aligned}
 \text{VOC}_{2002} &= \frac{(746,213.5 \text{ lbs. VOC/year}) \times 2.4}{(2000 \text{ lb/ton}) \times (365 \text{ days/year})} \\
 &= 2.45 \text{ ton VOC/day}
 \end{aligned}$$

$$\begin{aligned}
 \text{VOC}_{2005} &= 2.45 \times 1.0980 \\
 &= 2.69 \text{ tons VOC/day}
 \end{aligned}$$

The VOC emission estimates, in tons/day, from agricultural pesticides for the Rocky Mount area are listed in Table 4.2.10-6.

Table 4.2.10-6 VOC Emissions From Agricultural Pesticides

County	2005	2008	2011	2014	2017
Edgecombe	2.69	2.95	3.20	3.39	3.58
Nash	2.29	2.52	2.73	2.89	3.06
TOTAL	4.980	5.470	5.930	6.280	6.640

Nonagricultural Pesticide

Nonagricultural pesticide applications are considered as part of the commercial/consumer solvent use emission factor and no longer a separate subcategory. Please refer to the next section.

4.2.11 Commercial/Consumer Solvent Use

This category includes only non-industrial solvents that are used in commercial or consumer applications. The solvent containing products consist of a diverse grouping, e.g. personal care products, household products, automotive aftermarket products, adhesives and sealants, pesticides, some coatings, and other commercial and consumer products that may emit VOCs.

There are seven categories. They are named and their emission factors listed in Table 4.2.11-1 below.

Table 4.2.11-1 Misc. Non-Industrial Consumer-Commercial Emission Factors

Subcategory	lb VOC/yr/person.
All Coatings and Related Products	0.95
All FIFRA Related Products	1.78
Miscellaneous Products (Not Otherwise Covered)	0.07
Personal Care Products	2.32
Household Products	0.079
Automotive Aftermarket Products	1.36
Adhesives and Sealants	0.57

VOC emissions for this category is estimated by using nationally based per capita emissions factors. The county population values listed in Table 2.2-1 and the population growth factors listed in Table 2.2-2 were used to estimate the emissions from this source category.

According to the EIIP Tech. Report, emissions from this source category occur 365 days per year and there is no seasonal adjustment required. Federal rules are expected to reduce the VOC emissions from consumer solvents in the future years. The USEPA estimates that the federal rules will reduce the emissions from this source category by approximately 25%. This reduction was applied starting with 2005 estimated emissions. The emissions for the base year and future year inventories were calculated using Equations 4.2.11-1 and 4.2.11-2, respectively.

$$EM = \frac{(\text{Population}_{2002}) \times EF}{(2000 \text{ lb/tons})} \quad 4.2.11-1$$

$$PJ_b EM_a = EM \times GF_a \times [1 - RF] \times (1/365) \quad 4.2.11-2$$

where EM = emissions for source category t/y
 EF = emission factor for source category
 $PJ_b EM_a$ = projected future year (b) emissions for county in maintenance area (a)
 GF_a = growth factor for maintenance area (a)
 RF = Reduction factor, 25%

Examples of the emission calculation for Edgecombe County for the “all coatings and related products” subcategory are listed below:

2002 Population in Edgecombe County = 54841
 2005 Growth Factor for Edgecombe County 0.9765
 Emission Factor = 0.95 lb VOC/person/year
 Reduction Factor = 0.25

From Equations 4.2.11-1

$$\begin{aligned} VOC_{2002} &= \frac{(54841 \text{ people}) \times (0.95 \text{ lb VOC/person year})}{(2000 \text{ lb/ton})} \\ &= 26.0495 \text{ tons VOC/year} \end{aligned}$$

$$\begin{aligned} VOC_{2005} &= \frac{(26.04925 \text{ t/y}) \times (0.9765 GF_{2005/2002}) \times [1 - 0.25]}{(365 \text{ days/year})} \\ &= 0.0523 \text{ tons VOC/day} \end{aligned}$$

The VOC emission estimates, in tons/day, from commercial/consumer solvents subcategories for the Rocky Mount area are listed in Tables 4.2.11-2 through 4.2.11-8, and are totaled for this source category in Table 4.2.11-9.

Table 4.2.11-2 VOC Emissions From All Coatings and Related Products

County	2005	2008	2011	2014	2017
Edgecombe	0.0523	0.0514	0.0506	0.0498	0.0490
Nash	0.0893	0.0920	0.0945	0.0970	0.0997
TOTAL	0.142	0.143	0.145	0.147	0.149

Table 4.2.11-3 VOC Emissions From All FIFRA Related Products

County	2005	2008	2011	2014	2017
Edgecombe	0.0979	0.0963	0.0949	0.0933	0.0918
Nash	0.1674	0.1723	0.1771	0.1818	0.1868
TOTAL	0.265	0.269	0.272	0.275	0.279

Table 4.2.11-4 VOC Emissions From Miscellaneous Products (Not Otherwise Covered)

County	2005	2008	2011	2014	2017
Edgecombe	0.0038	0.0038	0.0037	0.0037	0.0036
Nash	0.0066	0.0068	0.0070	0.0071	0.0073
TOTAL	0.010	0.011	0.011	0.011	0.011

Table 4.2.11-5 VOC Emissions From Personal Care Products

County	2005	2008	2011	2014	2017
Edgecombe	0.1276	0.1256	0.1237	0.1216	0.1197
Nash	0.2182	0.2246	0.2309	0.2369	0.2434
TOTAL	0.346	0.350	0.355	0.359	0.363

Table 4.2.11-6 VOC Emissions From Household Products

County	2005	2008	2011	2014	2017
Edgecombe	0.0043	0.0043	0.0042	0.0041	0.0041
Nash	0.0074	0.0076	0.0079	0.0081	0.0083
TOTAL	0.012	0.012	0.012	0.012	0.012

Table 4.2.11-7 VOC Emissions From Automotive Aftermarket Products

County	2005	2008	2011	2014	2017
Edgecombe	0.0748	0.0736	0.0725	0.0713	0.0702
Nash	0.1279	0.1317	0.1354	0.1389	0.1427
TOTAL	0.203	0.205	0.208	0.210	0.213

Table 4.2.11-8 VOC Emissions From Adhesives and Sealants

County	2005	2008	2011	2014	2017
Edgecombe	0.0313	0.0308	0.0304	0.0299	0.0294
Nash	0.0536	0.0552	0.0567	0.0582	0.0598
TOTAL	0.085	0.086	0.087	0.088	0.089

Table 4.2.11-9 Total VOC Emissions From Commercial/Consumer Solvent

County	2005	2008	2011	2014	2017
Edgecombe	0.3921	0.3857	0.3800	0.3737	0.3677
Nash	0.6703	0.6902	0.7095	0.7280	0.7480
TOTAL	1.062	1.076	1.090	1.102	1.116

4.3 BIOPROCESS EMISSION SOURCES

Bioprocess emission sources include those sources whose emissions result from biological processes (e.g., fermentations). Source categories include bakeries, breweries, wineries and distilleries. The methodology used to calculate the projected emissions from these sources are described in detail in each subsection.

4.3.1 Bakeries

Ethanol, a VOC, is a by-product of fermentation of bread dough. The ethanol emissions from large commercial bakeries are accounted for as point sources; however, ethanol emissions occur from grocery store bakery departments and small business bakeries not accounted for under the point source inventory.

The EIIP Tech. Report prescribes accounting for these emissions by the use of a per capita consumption factor of 70 pounds of bread per person per year and an emission factor of 0.5 pounds of VOC per 1000 pounds of baked bread. The county populations obtained from the 2002 Census (see Table 2.2-1) and growth factors from Table 2.2-2 were used to estimate the emissions from this source category.

According to the EIIP Tech. Report, emissions from this source category occur 365 days per year and there is no seasonal adjustment required. For future year inventories, the projected future year population was multiplied by the emission factor. The emissions for the base year and future year inventories were calculated using Equation 4.3.1-1.

$$EM_f = \frac{(\text{Population})_b \times CF \times EF \times GF_{f/b}}{(2000 \text{ lb/tons}) \times (365 \text{ days/year})} \quad 4.3.1-1$$

where EM_f = emissions for source category in future year
 $Population_b$ = Population in base year
 $GF_{f/b}$ = Growth factor base to future
 CF = Consumption factor, 70 lb bread/person/year
 EF = emission factor for source category, 0.5 lb VOC/1000 lb bread baked

Examples of the emission calculation for Edgecombe County are listed below:

2002 Population in Edgecombe County = 54841
 Consumption factor = 70 lb bread/person/year
 Emission Factor = 0.5 lb VOC/1000 lb bread baked = 0.0005 lb VOC/lb bread baked
 Growth factor = 0.9765

From Equations 4.3.1-1

$$\begin{aligned} VOC_{2005} &= \frac{(54841 \text{ per}) \times (70 \text{ lb br/per year}) \times (0.0005 \text{ lb VOC/lb br}) \times (0.9765_{2005/2002})}{(2000 \text{ lb/ton}) \times (365 \text{ days/year})} \\ &= 0.003 \text{ tons VOC/day} \end{aligned}$$

The VOC emission estimates, in tons/day, from bakeries for the Rocky Mount area are listed in Table 4.3.1-1.

Table 4.3.1-1 VOC Emissions From Bakeries

County	2005	2008	2011	2014	2017
Edgecombe	0.003	0.003	0.002	0.002	0.002
Nash	0.004	0.005	0.005	0.005	0.005
TOTAL	0.007	0.008	0.007	0.007	0.007

4.4 OTHER MAN MADE AREA SOURCES

Other man made area sources include forest fires, slash burning and prescribed burning, agricultural burning, structure fires, and orchard heaters. Some of these sources, such as orchard heaters and certain kinds of agricultural burning, are not active during the ozone season. The methodology used to calculate the emissions from these sources are described in detail in each subsection.

4.4.1 Forest Fires

There are two types of forest fires; wild fires, which are accidental or felonious fires and prescribed burns, which are intentionally set for the purpose of forest and/or grassland management practice. The number of acres burned in 2002 for each of these categories was ascertained from the North Carolina Division of Forest Resources (NCDFR) and are listed in Table 4.4.1-1.

Table 4.4.1-1 Acres of Land Burned by Fires

	Wild Fires	Prescribed	Total
Edgecombe	146.6	759	905.6
Nash	21.8	500	521.8

The makeup of the plant life burned in each fire can vary from woodland to brush to grassland. The emission factors for the southern region of the United States from AP42, Table 13.1-2, were used to estimate the emissions from forest burns. These factors are 0.108 tons VOC per acre burned and 0.018 tons nitrogen oxides (NOx) per acre burned.

The NCDFR was not able to provide seasonal numbers, so the daily emissions are estimated by dividing by 365 days per year. The number of acres burned in 2002 provided by the NCDFR

was used as an estimate of the number of acres burned in 2005. For the base year 2005 and future year inventories, it is assumed that the number of acres burned remains relatively constant and therefore the emissions do not change from year to year. The emissions for the 2005 year inventory were based on 2002 data and were calculated using Equation 4.4.1-1.

$$EM_P = \frac{(\# \text{ acres burned}) \times EF_P}{(365 \text{ days/year})} \quad 4.4.1-1$$

where EM_P = emissions for source category for pollutant (P)
 EF = emission factor for pollutant (P)

Examples of the emission calculation for Edgecombe County are listed below:

Number of acres burned in Edgecombe County = 905.6

VOC Emission Factor = 0.108 tons VOC/acre burned

NOx emission factor = 0.018 tons NOx/acre burned

From Equations 4.4.1-1

$$\begin{aligned} VOC_{2005} &= \frac{(905.6 \text{ acres burned}) \times (0.108 \text{ tons VOC/acre burned})}{(365 \text{ days/year})} \\ &= 0.2680 \text{ tons VOC/day} \end{aligned}$$

$$\begin{aligned} NOx_{2005} &= \frac{(905.6 \text{ acres burned}) \times (0.018 \text{ tons NOx/acre burned})}{(365 \text{ days/year})} \\ &= 0.0447 \text{ tons NOx/day} \end{aligned}$$

The VOC and NOx emission estimates, in tons/day, from forest fires for the Rocky Mount area are listed in Table 4.4.1-2.

Table 4.4.1-2 Emissions from Forest Fires

County	VOC	NOx
Edgecombe	0.2680	0.0447
Nash	0.1544	0.0257
TOTAL	0.422	0.070

4.4.2 Structure Fires

The U.S. Fire Administration (USFA) of the Department of Homeland Security maintains statistics on the number of fires per county. The number of fires per county for 2002 was

derived from 2001 and 2002 population statistics and 2001 USFA fire statistics. The USFA fire statistics were obtained from the USFA website at <http://www.usfa.fema.gov/safety/>. As 2002 fire statistics were not available, a fires per person factor for 2001 was calculated and found to be equal to 0.00184 fires/person. The 2001 county population values were obtained from the North Carolina State Demographics website at <http://demog.state.nc.us/>. The 0.00184 fires per person was applied to the 2002 population for each county to determine the number of fires in each county for 2002. The population values are listed in Table 2.2-1 in Section 2.

The emission factors and fuel loading factors were obtained from the EIIP Tech. Report, Table 18.4-1 and Table 18.4-2, respectively. The emission factors are 11 pounds of VOC per ton burned and 1.4 pounds of NOx per ton burned. The loading factor is 1.15 tons of material burned per structural fire.

According to the EIIP Tech. Report, emissions from this source category occur 365 days per year and there is no seasonal adjustment required. Base year 2005 emissions and future year inventories were obtained by applying growth factors to 2002 emissions data. Growth factors were provided by the North Carolina Office of State Budget and Management and were based originally on 2000 census data. These growth factors are listed in Table 2.2-2, Population Growth Factors, of Section 2.2 above.

For future year inventories, the base year emissions were grown using the percent growth in population for each county (see Table 2.2-2). The emissions for the 2002 were calculated using Equation 4.4.2-1. Base year 2005 and future year inventories were calculated using Equation 4.4.2-2.

$$EM_P = \frac{(2002 \text{ County population}) \times (FPP) \times (CF) \times (EF_P)}{(2000 \text{ lb/tons}) \times (365 \text{ days/year})} \quad 4.4.2-1$$

$$PJ_aEM = EM_P \times GF_a \quad 4.4.2-2$$

where EM_P = emissions for structure fires for pollutant (P)
 FPP = fires per person in 2001, 0.00184 fires/person
 CF = Conversion factor, 1.15 tons burned/structure fire
 EF_P = emission factor for pollutant (P)
 PJ_aEM = projected future year (a) emissions for county
 GF_a = growth factor for future year (a)

Examples of the emission calculation for Edgecombe County are listed below:

2002 Edgecombe Population = 54841 persons
 Fires per person in 2001 = 0.00184 fires/person
 Conversion factor = 1.15 tons burned/structure fire
 VOC Emission Factor = 11 lb VOC/tons burned
 NOx Emission Factor = 1.4 lb NOx/ton burned
 Growth Factor = 0.9765

From Equations 4.4.2-1 and 4.4.2-2

$$\begin{aligned} \text{VOC}_{2002} &= \frac{(54841) \times (0.00184 \text{ fires/person}) \times (1.15 \text{ tons burned/fire}) \times (11 \text{ lb VOC/ton burned})}{(2000 \text{ lb/ton}) \times (365 \text{ days/year})} \\ &= 0.0017 \text{ tons VOC/day} \end{aligned}$$

$$\begin{aligned} \text{VOC}_{2005} &= (0.0017 \text{ tons VOC/day}) \times 0.9765 \\ &= 0.0017 \text{ tons VOC/day} \end{aligned}$$

$$\begin{aligned} \text{NOx}_{2002} &= \frac{(54841) \times (0.00184 \text{ fires/person}) \times (1.15 \text{ tons burned/fire}) \times (1.4 \text{ lb NOx/ton burned})}{(2000 \text{ lb/ton}) \times (365 \text{ days/year})} \\ &= 0.0002 \text{ tons NOx/day} \end{aligned}$$

$$\begin{aligned} \text{NOx}_{2005} &= (0.0002 \text{ tons NOx/day}) \times 0.9765 \\ &= 0.0002 \text{ tons NOx/day} \end{aligned}$$

The VOC and NOx emission estimates, in tons/day, from structure fires for the Rocky Mount area are listed in Table 4.4.2-2 and Table 4.4.2-3.

Table 4.4.2-2 VOC Emissions From Structure Fire

County	2005	2008	2011	2014	2017
Edgecombe	0.0017	0.0017	0.0016	0.0016	0.0016
Nash	0.0029	0.0030	0.0031	0.0032	0.0032
TOTAL	0.005	0.005	0.005	0.005	0.005

Table 4.4.2-3 NO_x Emissions From Structure Fire

County	2005	2008	2011	2014	2017
Edgecombe	0.0002	0.0002	0.0002	0.0002	0.0002
Nash	0.0004	0.0004	0.0004	0.0004	0.0004
TOTAL	0.001	0.001	0.001	0.001	0.001

4.4.3 Charbroiling

The commercial charbroiling of ground beef emits VOCs. According to the methodology in the EIIP Tech. Report, county Health Departments should be able to provide the number of restaurants in a county as well as the percentage of those restaurants that charbroil meat. The NCDAQ was able to ascertain the number of restaurants in each county in 2002 from the North Carolina Division of Environmental Services, Inspection, Statistics, and Fee Branch. To determine the percentage of charbroiling restaurants, the county Health Departments of several counties were surveyed. Three of the seven counties responded. The average percentage of the three responding counties was used to calculate the number of charbroiling restaurants for Edgecombe and Nash Counties. See Table 4.4.3-1 for the number of restaurants in each county surveyed and the percentage of charbroiling restaurants. Edgecombe County had 58 restaurants and Nash County had 147.

Table 4.4.3-1 Restaurants in Each County Surveyed

County	# Restaurants	% Charbroiling (as reported)
Davidson	215	--
Davie	62	--
Durham	489	8%
Forsyth	595	--
Granville	74	--
Guilford	937	13%
Wake	1310	19%
Average		13%

According to the EIIP Tech. Report, the average throughput of meat per restaurant with a charbroiler is 1160 pounds per week and the emissions factor is 3.94 pounds of VOC per 1000

pounds of meat. Emissions from this source category occur 365 days per year and there is no seasonal adjustment required. For future year inventories, the base year emissions were projected using E-GAS 5.0 growth factors and are listed in Table 4.4.3-2.

Table 4.4.3-2 Growth Factors for Charbroiling

2005	2008	2011	2014	2017
1.0291	1.0688	1.1061	1.1352	1.1702

The emissions for the base year and future year inventories were calculated using Equations 4.4.3-1 and 4.4.3-2, respectively.

$$EM_a = \frac{(\# \text{ Restaurants}) \times (\% \text{ Charbroiling}) \times (CF) \times (EF)}{(2000 \text{ lb/tons}) \times (1 \text{ yr}/52 \text{ wks})} \quad 4.4.3-1$$

$$PJ_b EM_a = EM_a \times GF_{ab} \times (1 \text{ yr}/365 \text{ days}) \quad 4.4.3-2$$

where EM_a = emissions for source category in county (a) ton/yr
 CF = conversion factor, 1160 lb meat charbroiled/week
 EF = emission factor, 3.94 lb VOC/1000 lb meat charbroiled
 $PJ_b EM$ = projected future year (b) emissions for county in maintenance area ton/year
 GF_{ab} = growth factor for base year (a) to future year (b)

Examples of the emission calculation for Edgecombe County are listed below:

Restaurants in County = 58
 % of restaurants charbroiling = 13%
 Conversion factory = 1160 lb meat/week charbroiled
 Emission factor = 3.94 lb VOC/1000 lb meat charbroiled = 0.00394lb VOC/lb meat
 Projection factor for 2005 = 1.0291

From Equation 4.4.3-1 and 4.4.3-2:

$$\begin{aligned} VOC_{2002} &= \frac{(58 \text{ restaurants}) \times (0.13) \times (1160 \text{ lb/week}) \times (0.00394 \text{ lb VOC/lb meat})}{(2000 \text{ lb/ton}) \times (1 \text{ yr}/52 \text{ weeks})} \\ &= 0.8960 \text{ ton VOC/year} \end{aligned}$$

$$\begin{aligned} VOC_{2005} &= 0.8960 \times 1.0291 \times (1/365) \\ &= 0.0025 \text{ tons VOC/day} \end{aligned}$$

The VOC emission estimates, in tons/day, from charbroiling for the Rocky Mount area are listed in Table 4.4.3-3.

Table 4.4.3-3 VOC Emissions From Charbroiling

County	2005	2008	2011	2014	2017
Edgecombe	0.0025	0.0026	0.0027	0.0028	0.0029
Nash	0.0064	0.0066	0.0069	0.0071	0.0073
TOTAL	0.009	0.009	0.010	0.010	0.010

4.4.4 Open Burning – Municipal Solid Waste and Yard Trimmings

It was assumed that all municipal solid waste (MSW) and yard trimmings, were burned in the open for solid waste generated outside the municipal corporate limits. According to the EIIP Tech. Report, Table 16.5-1, it is estimated that 3.77 pounds of MSW is generated per person per day and 0.64 pounds of yard trimmings are generated per person per day. Since it is illegal to burn within the corporate limits, the population outside the corporate limit was estimated by using the same percentage of rural population in each county as what was reported in the 2000 census. The 2000 total and rural population for each county as well as the estimated 2002 rural population are listed in Table 4.4.4-1.

Table 4.4.4-1 2000 Total and Rural Populations

County	2000 Population Data		Estimated 2002 Rural Population
	Total	Rural	
Edgecombe	55,606	25,067	24,722
Nash	87,420	42,383	43,100

The emission factors for open burning of MSW were obtained from AP42, Table 2.5-1, and are 30 pounds VOC per ton MSW burned and 6 pounds NO_x per ton MSW burned. The emission factors for open burning of yard trimmings were obtained from AP42, Table 2.5-1 and EIIP Section 4.1.3, Table 16.4-7, and are 28 pounds VOC per ton yard trimmings burned and 6 pounds NO_x per ton yard trimmings burned. Emissions from these source categories occur 365 days per year and there is no seasonal adjustment required. For the base year and future year inventories, the 2002 year emissions were projected using the percent growth in the total county population. These growth factors are found in Table 2.2-2 in Section 2.2, above. The emissions

for the 2002 year were calculated using Equation 4.4.4-1 and the base year and future year inventories were calculated using Equation 4.4.4-2.

$$EM_p = \frac{(\text{Rural Population}) \times (CF) \times (EF_p)}{(2000 \text{ lb/tons})} \quad 4.4.4-1$$

$$PJ_a EM = EM \times GF_a \quad 4.4.4-2$$

where

EM	=	emissions for pollutant (P)
CF	=	conversion factor, 3.77 lb MSW/person/day
	=	0.001885 ton MSW/person/day
EF _p	=	emission factor for pollutant (P)
PJ _a EM	=	projected future year (a) emissions for county
GF _a	=	growth factor for future year (a)

Examples of the emission calculation for Edgecombe County are listed below:

Rural Population in County = 24,722
 Conversion factor = 0.001885 ton MSW/person/day
 VOC Emission factor = 30 lb VOC/ton MSW burned
 NOx Emission factor = 6 lb NOx/ton MSW burned
 Projection factor for 2005 = 0.9765

From Equation 4.4.4-1 and 4.4.4-2:

$$\begin{aligned} VOC_{2002} &= \frac{(24,722 \text{ people}) \times (0.001885 \text{ ton MSW/person/day}) \times (30 \text{ lb VOC/ton MSW})}{(2000 \text{ lb/ton})} \\ &= 0.6990 \text{ ton VOC/day} \end{aligned}$$

$$\begin{aligned} VOC_{2005} &= 0.6990 \times 0.9765 \\ &= 0.6826 \text{ ton VOC/day} \end{aligned}$$

$$\begin{aligned} NOx_{2002} &= \frac{(24,722 \text{ people}) \times (0.001885 \text{ ton MSW/person/day}) \times (6 \text{ lb NOx/ton MSW})}{(2000 \text{ lb/ton})} \\ &= 0.1398 \text{ ton NOx/day} \end{aligned}$$

$$\begin{aligned} NOx_{2005} &= 0.1398 \times 0.9765 \\ &= 0.1365 \text{ tons NOx/day} \end{aligned}$$

The VOC and NOx emission estimates, in tons/day, from the open burning of MSW and yard trimmings for the Rocky Mount area are listed in Table 4.4.4-2 through Table 4.4.4-5.

Table 4.4.4-2 VOC Emissions From MSW Burning

County	2005	2008	2011	2014	2017
Edgecombe	0.6826	0.6715	0.6614	0.6505	0.6401
Nash	1.2547	1.2919	1.3281	1.3627	1.4001
TOTAL	1.937	1.963	1.990	2.013	2.040

Table 4.4.4-3 VOC Emissions From Burning of Yard Trimmings

County	2005	2008	2011	2014	2017
Edgecombe	0.1082	0.1064	0.1048	0.1031	0.1014
Nash	0.1988	0.2047	0.2104	0.2159	0.2218
TOTAL	0.307	0.311	0.315	0.319	0.323

Table 4.4.4-4 NOx Emissions From MSW Burning

County	2005	2008	2011	2014	2017
Edgecombe	0.1365	0.1343	0.1323	0.1301	0.1280
Nash	0.2509	0.2584	0.2656	0.2725	0.2800
TOTAL	0.387	0.393	0.398	0.403	0.408

Table 4.4.4-5 NOx Emissions From Burning of Yard Trimmings

County	2005	2008	2011	2014	2017
Edgecombe	0.0232	0.0228	0.0225	0.0221	0.0217
Nash	0.0426	0.0439	0.0451	0.0463	0.0475
TOTAL	0.066	0.067	0.068	0.068	0.069

4.4.5 Natural Gas, Liquid Petroleum Gas, Oil, Coal, and Wood Combustion

This source category covers emissions from natural gas (NG) and liquid petroleum gas (LPG), oil, coal, and wood combustion in the residential, commercial/institutional (called commercial), and industrial sectors.

Fuel usage data for North Carolina for 2002 was taken from NC Energy Outlook 2003 by Global Insight, Inc. The following table shows the data used.

Table 4.4.5-1 Fuel Use in North Carolina 2002

Fuel	Units	Residential	Commercial	Industrial
NG	10 ⁶ ft ³	64,014	40,580	95,718
LPG	gallons	282,775,596	47,960,199	198,606,965
Oil	gallons	215,804,019	113,088,933	343,414,390
Coal	tons	46,872	85,735	0
Wood	tons	1,625,111	164,327	8,583,778

Emission factors used are shown in Table 4.4.5-2 below.

Table 4.4.5-2 Combustion Emission Factors

Fuel	Units	Res VOC	Res NOx	Com VOC	Com NOx	Ind VOC	Ind NOx
NG	lb/10 ⁶ ft ³	5.5	94	5.5	167.5	4.96	163.33
LPG	lb/gal	0.0003	0.014	0.00035	0.0145	0.00035	0.02
Oil	lb/gal	0.000713	0.018	0.000735	0.037	0.00024	0.039
Coal	lb/ton	0.07	9.1	0.07	15.8	0.07	14.9
Wood	lb/ton	107.6	2.6	0.255326	3.304224	0.255326	3.304224

Residential NG and LPG for Edgecombe and Nash Counties was found by apportioning the state total fuel by the number of households heated with NG or LPG in the two counties relative to total households in the State. This data, shown in Table 4.4.5-3, is from the 2000 Census.

Table 4.4.5-3 Households Heated with NG or LPG

County	Natural Gas	LPG
Edgecombe	6,276	4,827
Nash	8,481	8,461
North Carolina	757,777	39,4275

Commercial and industrial fuels were apportioned according to the number of business establishments in the State and counties. The numbers were taken from 1997 (last year of SIC based statistics) County Business Patterns. Establishments with SICs from 50xx through 99xx were summed. The apportionment numbers are in Table 4.4.5-4 below.

Table 4.4.5-4 Commercial and Industrial Fuel Apportionment

	Business Establishments
Edgecombe	734
Nash	1,751
State	148,762

All emission were calculated and apportioned for 2002 annual basis, grown with E-GAS 5.0 factors (Table 4.4.5-5) and then adjusted for season (Residential and Commercial NG and LPG only) and day. Where point source emissions are indicated in Table 4.4.5-6, these were deducted from the 2002 annual number.

Table 4.4.5-5 Growth Factors for Fuel Combustion

Source Category	2005	2008	2011	2014	2017
<i>Residential Fuel Combustion</i>					
Natural Gas	1.0814	1.1627	1.2341	1.2837	1.3364
Liquid Petroleum Gas	0.9867	1.0435	1.0811	1.1222	1.1608
<i>Commercial Fuel Combustion</i>					
Natural Gas	1.0390	1.1237	1.2415	1.2943	1.3705
Liquid Petroleum Gas	1.0635	1.0455	1.0671	1.0771	1.0982
Oil	1.1711	1.2584	1.3240	1.3846	1.4441
Coal	1.0645	1.0426	1.0503	1.0458	1.0467
Wood	1.0000	1.0000	1.0000	1.0000	1.0000
<i>Industrial Fuel Combustion</i>					
Natural Gas	1.0776	1.1290	1.1746	1.1971	1.2438
Liquid Petroleum Gas	0.9900	1.0395	1.0699	1.1132	1.1620
Oil	0.9970	1.0148	1.0358	1.0937	1.1317

Table 4.4.5-6 Point Source Emissions for Fuel Combustion

County	Commercial Natural Gas		Industrial Fuel Oil		Industrial Natural Gas	
	NO _x (tons/yr)	VOC (tons/yr)	NO _x (tons/yr)	VOC (tons/yr)	NO _x (tons/yr)	VOC (tons/yr)
Edgecombe	0	0	5.2	0.15	0.27	0.019
Nash	7.12	0.402	0	0	1.661	0.091

Residential NG and LPG usage is influenced strongly by seasonal temperatures. During the summer months usage will be confined to cooking, heating water, and possibly heating clothes dryers. Commercial NG and LPG usage is also seasonal but less so. The North Carolina Utilities Commission provided data from the U.S. Department of Energy, Energy Information Administration giving monthly usage of natural gas by residential and commercial customers in North Carolina for 2002. It is assumed that LPG is used seasonally like NG. From this information July adjustment factors were calculated that adjust an average day to a summer day. For residential customers the factor is 0.2027 and for commercial it is 0.4425. Other fuel users were considered to have even fuel usage throughout the year.

It was assumed that during the summer months no residential oil, coal, or wood were used since these are normally used only for heating.

The following equation demonstrates the calculation of residential VOC for Edgecombe County from natural gas in 2005. All residential VOC and NO_x for NG and LPG were done in an analogous manner.

$$\begin{aligned}
 EM_{2005} &= (64,014 * 10^6 \text{ ft}^3/\text{yr}) * (5.5 \text{ lb VOC}/10^6 \text{ ft}^3) * (1 \text{ ton}/2000 \text{ lb}) * \\
 &\quad (6,276 \text{ households}/757,777 \text{ households}) * (1 \text{ yr}/365 \text{ days}) * \\
 &\quad (0.2027 \text{ July day/day}) * (1.0814 \text{ EGAS}_{2005/2002}) \\
 &= 0.0009 \text{ tons VOC/day}
 \end{aligned}$$

The VOC and NO_x emission estimates, in tons/day, from residential fuel combustion for the Rocky Mount area are listed in Tables 4.4.5-7 and 4.4.5-8.

Table 4.4.5-7 VOC Emissions From NG and LPG Residential Fuel Combustion

County	2005	2008	2011	2014	2017
<i>Natural Gas</i>					
Edgecombe	0.0009	0.0009	0.0010	0.0010	0.0011
Nash	0.0012	0.0013	0.0014	0.0014	0.0015
TOTAL	0.002	0.002	0.002	0.002	0.003
<i>Liquid Petroleum Gas</i>					
Edgecombe	0.0003	0.0003	0.0003	0.0003	0.0003
Nash	0.0005	0.0005	0.0005	0.0006	0.0006
TOTAL	0.001	0.001	0.001	0.001	0.001

Table 4.4.5-8 NOx Emissions From NG and LPG Residential Fuel Combustion

County	2005	2008	2011	2014	2017
<i>Natural Gas</i>					
Edgecombe	0.0150	0.0161	0.0171	0.0178	0.0185
Nash	0.0202	0.0217	0.0231	0.0240	0.0250
TOTAL	0.035	0.038	0.040	0.042	0.044
<i>Liquid Petroleum Gas</i>					
Edgecombe	0.0133	0.0140	0.0145	0.0151	0.0156
Nash	0.0233	0.0246	0.0255	0.0265	0.0274
TOTAL	0.037	0.039	0.040	0.042	0.043

The following equation demonstrates the calculation of commercial VOC for Edgecombe County from NG in 2005. All commercial VOC and NOx for NG and LPG were done in an analogous manner.

$$\begin{aligned}
 EM_{2005} &= ((40580 * 10^6 \text{ ft}^3/\text{yr}) * (5.5 \text{ lb VOC}/10^6 \text{ ft}^3) * (1 \text{ ton}/2000 \text{ lb}) * \\
 &\quad (734 \text{ bus.}/148762 \text{ bus.}) - 0 \text{ ton/year point adj.}) * (1 \text{ yr}/365 \text{ days}) * \\
 &\quad (0.4425 \text{ July day/day}) * (1.0390 \text{ EGAS}_{2005/2002}) \\
 &= 0.0007 \text{ tons VOC/day}
 \end{aligned}$$

The VOC and NOx emission estimates, in tons/day, from commercial fuel combustion for the Rocky Mount area are listed in the tables below.

Table 4.4.5-9 VOC Emissions From NG and LPG Commercial Fuel Combustion

County	2005	2008	2011	2014	2017
<i>Natural Gas</i>					
Edgecombe	0.0007	0.0008	0.0008	0.0009	0.0009
Nash	0.0011	0.0012	0.0014	0.0014	0.0015
TOTAL	0.002	0.002	0.002	0.002	0.002
<i>Liquid Petroleum Gas</i>					
Edgecombe	0.0001	0.0001	0.0001	0.0001	0.0001
Nash	0.0001	0.0001	0.0001	0.0001	0.0001
TOTAL	0.000	0.000	0.000	0.000	0.000

Table 4.4.5-10 NOx Emissions From NG and LPG Commercial Fuel Combustion

County	2005	2008	2011	2014	2017
<i>Natural Gas</i>					
Edgecombe	0.0211	0.0228	0.0252	0.0263	0.0279
Nash	0.0414	0.0448	0.0495	0.0516	0.0546
TOTAL	0.063	0.068	0.075	0.078	0.083
<i>Liquid Petroleum Gas</i>					
Edgecombe	0.0022	0.0022	0.0022	0.0022	0.0023
Nash	0.0053	0.0052	0.0053	0.0053	0.0054
TOTAL	0.008	0.007	0.008	0.008	0.008

The following equation demonstrates the calculation of commercial VOC for Edgecombe County from oil in 2005. All commercial VOC and NOx for oil were done in an analogous manner.

$$\begin{aligned}
 EM_{2005} &= ((113088933 \text{ gal/yr}) * (0.000735 \text{ lb VOC/gal}) * (1 \text{ ton}/2000 \text{ lb}) * \\
 &\quad (734 \text{ bus.}/148,762 \text{ bus.}) - 0 \text{ ton/year point adj}) * (1 \text{ yr}/365 \text{ days}) * \\
 &\quad (1.1711 \text{ EGAS}_{2005/2002}) \\
 &= 0.0006 \text{ tons VOC/day}
 \end{aligned}$$

Table 4.4.5-11 VOC Emissions From Commercial Oil Fuel Combustion

County	2005	2008	2011	2014	2017
Edgecombe	0.0006	0.0007	0.0007	0.0008	0.0008
Nash	0.0015	0.0017	0.0017	0.0018	0.0019
TOTAL	0.002	0.002	0.002	0.003	0.003

Table 4.4.5-12 NOx Emissions From Commercial Oil Fuel Combustion

County	2005	2008	2011	2014	2017
Edgecombe	0.0331	0.0356	0.0374	0.0391	0.0408
Nash	0.0790	0.0849	0.0893	0.0934	0.0974
TOTAL	0.112	0.121	0.127	0.133	0.138

The following equation demonstrates the calculation of commercial NOx for Edgecombe County from coal in 2005. All commercial VOC and NOx for coal were done in an analogous manner.

$$\begin{aligned}
 EM_{2005} &= ((85735 \text{ ton/year}) * (15.8 \text{ lb NOx/ton}) * (1 \text{ ton}/2000 \text{ lb}) * \\
 &\quad (734 \text{ bus.}/148762 \text{ bus.}) - 0 \text{ ton/year point adj}) * (1 \text{ yr}/365 \text{ days}) * \\
 &\quad (1.0645 \text{ EGAS}_{2005/2002}) \\
 &= 0.0097 \text{ tons NOx/day}
 \end{aligned}$$

Table 4.4.5-13 VOC Emissions From Commercial Coal Fuel Combustion

County	2005	2008	2011	2014	2017
Edgecombe	0.0000	0.0000	0.0000	0.0000	0.0000
Nash	0.0001	0.0001	0.0001	0.0001	0.0001
TOTAL	0.000	0.000	0.000	0.000	0.000

Table 4.4.5-14 NOx Emissions From Commercial Coal Fuel Combustion

County	2005	2008	2011	2014	2017
Edgecombe	0.0097	0.0095	0.0096	0.0096	0.0096
Nash	0.0232	0.0228	0.0229	0.0228	0.0229
TOTAL	0.033	0.032	0.033	0.032	0.033

The following equation demonstrates the calculation of commercial NOx for Edgecombe County from wood in 2005. All commercial VOC and NOx for wood were done in an analogous manner.

$$\begin{aligned}
 EM_{2005} &= ((164327 \text{ ton/year}) * (3.3042 \text{ lb NOx/ton}) * (1 \text{ ton}/2000 \text{ lb}) * \\
 &\quad (734 \text{ bus.}/148762 \text{ bus.}) - 0 \text{ ton/year point adj}) * (1 \text{ yr}/365 \text{ days}) * \\
 &\quad (1.0000 \text{ EGAS}_{2005/2002}) \\
 &= 0.0036 \text{ tons NOx/day}
 \end{aligned}$$

Table 4.4.5-15 VOC Emissions From Commercial Wood Fuel Combustion

County	2005	2008	2011	2014	2017
Edgecombe	0.0003	0.0003	0.0003	0.0003	0.0003
Nash	0.0007	0.0007	0.0007	0.0007	0.0007
TOTAL	0.001	0.001	0.001	0.001	0.001

Table 4.4.5-16 NOx Emissions From Commercial Wood Fuel Combustion

County	2005	2008	2011	2014	2017
Edgecombe	0.0036	0.0036	0.0036	0.0036	0.0036
Nash	0.0087	0.0087	0.0087	0.0087	0.0087
TOTAL	0.012	0.012	0.012	0.012	0.012

Industrial sources were calculated in a manner similar to commercial sources burning oil or coal. There were no industrial coal burning sources. It was decided to not report any industrial wood burning as it was thought that any such sources must be captured in the point source inventory.

The VOC and NOx emission estimates, in tons/day, from industrial fuel combustion for the Rocky Mount area are listed in the tables below.

Table 4.4.5-17 VOC Emissions From Industrial NG Fuel Combustion

County	2005	2008	2011	2014	2017
Edgecombe	0.0034	0.0036	0.0037	0.0038	0.0039
Nash	0.0080	0.0084	0.0087	0.0089	0.0092
TOTAL	0.011	0.012	0.012	0.013	0.013

Table 4.4.5-18 NOx Emissions From Industrial NG Fuel Combustion

County	2005	2008	2011	2014	2017
Edgecombe	0.1130	0.1184	0.1232	0.1256	0.1305
Nash	0.2667	0.2794	0.2907	0.2963	0.3078
TOTAL	0.380	0.398	0.414	0.422	0.438

Table 4.4.5-19 VOC Emissions From Industrial LPG Fuel Combustion

County	2005	2008	2011	2014	2017
Edgecombe	0.0005	0.0005	0.0005	0.0005	0.0005
Nash	0.0011	0.0011	0.0012	0.0012	0.0013
TOTAL	0.002	0.002	0.002	0.002	0.002

Table 4.4.5-20 NOx Emissions From Industrial LPG Fuel Combustion

County	2005	2008	2011	2014	2017
Edgecombe	0.0266	0.0279	0.0287	0.0299	0.0312
Nash	0.0634	0.0666	0.0685	0.0713	0.0744
TOTAL	0.090	0.095	0.097	0.101	0.106

Table 4.4.5-21 VOC Emissions From Industrial Oil Fuel Combustion

County	2005	2008	2011	2014	2017
Edgecombe	0.0001	0.0001	0.0001	0.0001	0.0002
Nash	0.0013	0.0013	0.0014	0.0014	0.0015
TOTAL	0.001	0.001	0.002	0.002	0.002

Table 4.4.5-22 NO_x Emissions From Industrial Oil Fuel Combustion

County	2005	2008	2011	2014	2017
Edgecombe	0.0760	0.0774	0.0790	0.0834	0.0863
Nash	0.2153	0.2191	0.2237	0.2362	0.2444
TOTAL	0.291	0.297	0.303	0.320	0.331

4.4.6 Vehicle Fires

Vehicle fire emissions within the nonattainment area are estimated by considering the estimated number vehicles burned in Edgecombe and Nash Counties, the amount of material burned (the fuel loading) in a vehicle fire, and the emission factors for the open burning of automobile components. The assumptions for amount of material burned and the emission factors were based on the USEPA's AP-42, Section 2.5 Open Burning, 1996.

The estimated number of vehicle fires was determined by apportioning a national fire statistic to a county level. The USFA of the Department of Homeland Security maintains national-level fire statistics. The number of fires nationwide in 2002 was 1,734,500 and was available from the USFA website at <http://www.usfa.fema.gov/statistics/national/>. The percentage of vehicle fires was applied to the national-level total number of fires. The number of national-level vehicle fires was then apportioned to a state-level. The ratio of North Carolina vehicle miles traveled (VMT) to U.S. VMT (92,894,000,000 VMT / 2,855,756,000,000 VMT) was applied to the number of national-level vehicle fires to obtain the number of North Carolina vehicle fires. The VMT statistics were obtained from the U.S. Department of Transportation, Federal Highway Administration website at <http://www.fhwa.dot.gov/policy/ohim/hs02/vm2.htm>. The number of state-level vehicle fires was then apportioned to a county level based on paved mile per county in 2002. Paved mile per county data was obtained from the NCDOT.

Using the above method, 2002 vehicle fire emissions were calculated. Base year 2005 emissions were calculated by applying growth factors to 2002 vehicle fire emissions data. For 2002, 105 vehicle fires were estimated in Edgecombe County and 154 vehicle fires were estimated in Nash County.

The amount of vehicle material burned (the fuel loading) in a vehicle fire was estimated by assuming that an average vehicle has 500 pounds of components (.25 tons) that can burn in a fire, based on a 3,700 pounds average vehicle weight (CARB, 1995).

The emission factors were obtained from Table 2.5-1, Emission Factors for Open Burning of Municipal Refuse, of the USEPA's AP-42, Section 2.5 Open Burning, 1996. The emission factors are 32 pounds of VOC per ton burned and 4 pounds of NOx per ton burned.

The 2005 base year and the future year inventories were grown from the 2002 estimated emissions using growth factors generated by the E-GAS 5.0 model. These growth factors are listed in Table 4.4.6-1 below.

Table 4.4.6-1 Growth Factors for Vehicle Fires

2005	2008	2011	2014	2017
1.0541	1.1047	1.1538	1.2035	1.2538

The emissions for the base year and future year inventories were calculated using Equations 4.4.6-1 and 4.4.6-2, respectively.

$$EM_P = \frac{(\# \text{ of Vehicle Fires per year}) \times (CF) \times (EF_P)}{(2000 \text{ lb/tons}) \times (365 \text{ days/year})} \quad 4.4.6-1$$

$$PJ_a EM = EM_P \times GF_a \quad 4.4.6-2$$

where EM_P = emissions for structure fires for pollutant (P)
 CF = Conversion factor, 0.25 tons burned/vehicle fire
 EF_P = emission factor for pollutant (P)
 $PJ_a EM$ = projected future year (a) emissions for county in nonattainment area
 GF_a = growth factor for future year (a)

Examples of the emission calculation for Edgecombe County are listed below:

of Vehicle fires in Edgecombe County = 105
 Conversion factor = 0.25 tons burned/vehicle fire
 VOC Emission Factor = 32 lb VOC/tons burned
 NOx Emission Factor = 4 lb NOx/ton burned
 Growth Factor (2002-2005) = 1.0541

From Equations 4.4.6-1 and 4.4.6-2

$$VOC_{2002} = \frac{(105 \text{ fires}) \times (0.25 \text{ tons burned/fire}) \times (32 \text{ lb VOC/ton burned})}{(2000 \text{ lb/ton}) \times (365 \text{ days/year})}$$

$$= 0.00115 \text{ tons VOC/day}$$

$$\begin{aligned} \text{VOC}_{2005} &= (0.00115 \text{ tons VOC/day}) \times 1.0541 \\ &= 0.0012 \text{ tons VOC/day} \end{aligned}$$

$$\begin{aligned} \text{NOx}_{2002} &= \frac{(105 \text{ fires}) \times (0.25 \text{ tons burned/fire}) \times (4 \text{ lb VOC/ton burned})}{(2000 \text{ lb/ton}) \times (365 \text{ days/year})} \\ &= 0.00014 \text{ tons NOx/day} \end{aligned}$$

$$\begin{aligned} \text{NOx}_{2005} &= (0.00014 \text{ tons NOx/day}) \times 1.0541 \\ &= 0.0001 \text{ tons NOx/day} \end{aligned}$$

The VOC and NOx emission estimates, in tons/day, from vehicle fires for the Rocky Mount area are listed in Table 4.4.6-2 and Table 4.4.6-3.

Table 4.4.6-2 VOC Emissions From Vehicle Fires

County	2005	2008	2011	2014	2017
Edgecombe	0.0012	0.0013	0.0013	0.0014	0.0014
Nash	0.0018	0.0018	0.0019	0.0020	0.0021
TOTAL	0.003	0.003	0.003	0.003	0.004

Table 4.4.6-3 NOx Emissions From Vehicle Fires

County	2005	2008	2011	2014	2017
Edgecombe	0.0001	0.0002	0.0002	0.0002	0.0002
Nash	0.0002	0.0002	0.0002	0.0002	0.0002
TOTAL	0.000	0.000	0.000	0.000	0.000

4.4.7 Agricultural Burning

Agricultural burning is intentionally set for the purpose of land clearing. Crop acreage data was obtained from the NC Agriculture Statistic Division (<http://www.ncagr.com/stats/>). Statistics for the year 2000 indicate that one-quarter of wheat acreage is burned. The VOC emission factor is 20.9 lbs. VOC per acre burned.

Table 4.4.7-1 Acres of Land Burned by Agricultural Burning

County	Acres
Edgecombe	3000
Nash	4500

For the base year and future years inventories, the 2002 year emissions were grown using E-GAS 5.0 growth factors and are listed in Table 4.4.7-2 below. The emissions for 2002 were calculated using equation 4.4.7-1 and the emissions for the base year and future years were calculated using equation 4.4.7-2.

Table 4.4.7-2 Growth Factors for Agricultural Burning

2005	2008	2011	2014	2017
1.0980	1.2042	1.3042	1.3847	1.4622

$$EM_P = \frac{(\text{wheat crop acreage}) \times EF_P}{4 \times (365 \text{ days/year})} \quad 4.4.7-1$$

where EM_P = emissions for source category for pollutant (P)
 EF_P = emission factor for pollutant (P)

$$PJ_a EM = EM_P \times GF_a \quad 4.4.7-2$$

where EM_P = emissions for agricultural burning for pollutant (P)
 $PJ_a EM$ = projected future year (a) emissions for county in nonattainment area
 GF_a = growth factor for future year (a)

Examples of the emission calculation for Edgecombe County are listed below:

Number of wheat acres in Edgecombe County = 3000
VOC Emission Factor = 0.0105 tons VOC/acre burned

From Equations 4.4.7-1

$$\begin{aligned} VOC_{2002} &= \frac{(3000 \text{ acres burned}) \times (0.0105 \text{ tons VOC/acre burned})}{4 \times (365 \text{ days/year})} \\ &= 0.0216 \text{ tons VOC/day} \end{aligned}$$

$$\begin{aligned}\text{VOC}_{2005} &= (0.0216 \text{ tons VOC/day}) \times 1.0980 \\ &= 0.0237 \text{ tons VOC/day}\end{aligned}$$

The VOC emission estimates, in tons/day, from agricultural burning for the Rocky Mount area are listed in Table 4.4.7-3.

Table 4.4.7-3 VOC Emissions From Agricultural Burning

County	2005	2008	2011	2014	2017
Edgecombe	0.0237	0.0286	0.0372	0.0516	0.0754
Nash	0.0356	0.0428	0.0559	0.0774	0.1131
TOTAL	0.059	0.071	0.093	0.129	0.189

4.4.8 On Site Incineration

On site incineration occurs at industrial and commercial facilities. Normally these facilities would be captured in the point source inventory. This entry is in case emissions have gone unreported for some reason.

Emissions are calculated and projected based on population of the county (Table 2.2-1 and Table 2.2-3). The emission factors are 8.556 lb VOC/ton waste and 2.5 lb NO_x/ton waste. Waste loading is 0.023 tons refuse per person per year. Industrial and commercial facilities have the same emissions.

The VOC and NO_x emission estimates, in tons/day, from on-site incineration for the Rocky Mount area are listed in the tables below.

Table 4.4.8-1 VOC Emissions From Commercial On Site Incineration

County	2005	2008	2011	2014	2017
Edgecombe	0.0144	0.0142	0.0140	0.0137	0.0135
Nash	0.0247	0.0254	0.0261	0.0268	0.0275
TOTAL	0.039	0.040	0.040	0.041	0.041

Table 4.4.8-2 NOx Emissions From Commercial On Site Incineration

County	2005	2008	2011	2014	2017
Edgecombe	0.0042	0.0041	0.0041	0.0040	0.0039
Nash	0.0072	0.0074	0.0076	0.0078	0.0080
TOTAL	0.011	0.012	0.012	0.012	0.012

Table 4.4.8-3 VOC Emissions From Industrial On Site Incineration

County	2005	2008	2011	2014	2017
Edgecombe	0.0144	0.0142	0.0140	0.0137	0.0135
Nash	0.0247	0.0254	0.0261	0.0268	0.0275
TOTAL	0.039	0.040	0.040	0.041	0.041

Table 4.4.8-4 NOx Emissions From Industrial On Site Incineration

County	2005	2008	2011	2014	2017
Edgecombe	0.0042	0.0041	0.0041	0.0040	0.0039
Nash	0.0072	0.0074	0.0076	0.0078	0.0080
TOTAL	0.011	0.012	0.012	0.012	0.012

4.5 BIOGENIC EMISSIONS

Biogenic emissions are primarily VOC emissions from vegetation and are kept constant through all years when modeling ozone. Since the maintenance plan is a comparison of future year to base year emissions and the biogenic emissions are kept constant, the biogenic emissions do not play a part in the maintenance demonstration. Upon discussions with the USEPA Region 4, it was agreed that the biogenic emissions did not need to be estimated for the maintenance plan.

4.6 SUMMARY OF AREA SOURCE EMISSIONS

The total area source emissions for the Rocky Mount area are summarized in the tables below. These emissions are in tons per day.

Table 4.6-1 Total Area Source VOC Emissions

County	2005	2008	2011	2014	2017
Edgecombe	5.620	5.878	6.123	6.346	6.580
Nash	7.035	7.427	7.788	8.140	8.519
TOTAL	12.655	13.305	13.911	14.486	15.099

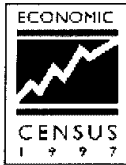
Table 4.6-2 Total Area Source NOx Emissions

County	2005	2008	2011	2014	2017
Edgecombe	0.527	0.538	0.549	0.558	0.569
Nash	1.081	1.121	1.159	1.197	1.238
TOTAL	1.608	1.659	1.708	1.755	1.807

5.0 ADDITIONAL DATA

5.1 SIC TO NAICS CROSSWALK

U.S. Census Bureau



1997 Economic Census: Bridge Between SIC and NAICS

SIC: Manufacturing

SIC 24: Lumber and wood products - Finder by 3-digit SIC

Includes only establishments with payroll. [Introductory text](#) includes scope and methodology.

Go to bridge	SIC	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
	24	<u>Lumber and wood products</u>	36,735	111,930,684	757,267	18,668,558
↓	241	<u>Logging</u>	13,533	13,625,734	83,212	2,014,254
↓	242	<u>Sawmills and planing mills</u>	6,270	32,750,181	178,575	4,477,618
↓	243	<u>Millwork, plywood, and structural members</u>	9,373	33,200,977	260,726	6,599,370
↓	244	<u>Wood containers</u>	2,922	4,332,491	49,580	936,731
↓	245	<u>Wood buildings and mobile homes</u>	1,028	13,179,370	91,234	2,362,873
↓	249	<u>Miscellaneous wood products</u>	3,609	14,841,931	93,940	2,277,712









N=Comparable data not available D=Withheld to avoid disclosure

SIC 24: Lumber and wood products - 4-digit SIC to 6-digit NAICS












Includes only establishments with payroll. [Introductory text](#) includes scope and methodology. Figures to the left of NAICS codes indicate the percent of NAICS receipts represented by this part; and link to Table 1 where other parts of the NAICS are shown.

⁹/₂ links to 1997 and 1992 Comparative Statistics for whole SICs.


SIC	NAICS	Pt	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
241	⁹ / ₂		<u>Logging</u>	13,533	13,625,734	83,212	2,014,254
2411			<u>Logging</u>	13,533	13,625,734	83,212	2,014,254
0% of 113310	10		<u>Logging</u>	13,533	13,625,734	83,212	2,014,254
SIC	NAICS	Pt	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
242	⁹ / ₂		<u>Sawmills and planing mills</u>	6,270	32,750,181	178,575	4,477,618
2421							


		<u>Sawmills & planing mills, general</u>	5,176	29,414,116	143,292	3,741,583
100% of	321113 10	<u>Sawmills (pt)</u>	4,334	24,743,160	119,456	3,191,780
74% of	321912 10	<u>Cut stock, resawing lumber, & planing (pt)</u>	761	4,447,045	22,105	515,145
0% of	321918 10	<u>Other millwork (including flooring) (pt)</u>	5	19,285	91	2,695
5% of	321999 10	<u>All other miscellaneous wood product mfg (pt)</u>	76	204,626	1,640	31,963
2426		<u>Hardwood dimension & flooring mills</u>	992	3,206,954	33,940	708,100
24% of	321912 20	<u>Cut stock, resawing lumber, & planing (pt)</u>	619	1,455,914	17,109	357,168
30% of	321918 20	<u>Other millwork (including flooring) (pt)</u>	127	1,368,123	10,521	235,924
5% of	337215 10	<u>Showcase, partition, shelving, & locker mfg (pt)</u>	246	382,917	6,310	115,008
2429		<u>Special product sawmills, n.e.c.</u>	102	129,111	1,343	27,935
0% of	321113 20	<u>Sawmills (pt)</u>	70	26,457	304	5,750
2% of	321920 10	<u>Wood container & pallet mfg (pt)</u>	24	68,695	684	14,493
1% of	321999 20	<u>All other miscellaneous wood product mfg (pt)</u>	8	33,959	355	7,692
SIC	NAICS Pt	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
243	97/92	<u>Millwork, plywood, and structural members</u>	9,373	33,200,977	260,726	6,599,370
2431		<u>Millwork</u>	2,745	12,013,383	92,259	2,344,586
	321911	<u>Wood window & door mfg</u>	1,409	8,896,734	64,771	1,714,686
69% of	321918 30	<u>Other millwork (including flooring) (pt)</u>	1,336	3,116,649	27,488	629,900
2434		<u>Wood kitchen cabinets</u>	5,096	7,483,209	79,579	1,866,940
82% of	337110 10	<u>Wood kitchen cabinet & counter top mfg (pt)</u>	5,096	7,483,209	79,579	1,866,940
2435		<u>Hardwood veneer & plywood</u>	332	2,856,487	22,151	525,887
	321211	<u>Hardwood veneer & plywood mfg</u>	332	2,856,487	22,151	525,887
2436		<u>Softwood veneer & plywood</u>	155	5,762,664	28,843	912,613
	321212	<u>Softwood veneer & plywood mfg</u>	155	5,762,664	28,843	912,613
2439		<u>Structural wood members, n.e.c.</u>	1,045	5,085,234	37,894	949,344
0% of	321113 30	<u>Sawmills (pt)</u>	0	0	0	0
	321213	<u>Engineered wood member (except truss) mfg</u>	53	1,431,123	5,372	154,564
	321214	<u>Truss mfg</u>	992	3,654,111	32,522	794,780
0% of	321912 30	<u>Cut stock, resawing lumber, & planing (pt)</u>	0	0	0	0


SIC	NAICS Pt	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
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244		97/92	Wood containers	2,922	4,332,491	49,580	936,731
2441			<u>Nailed wood boxes & shook</u>	318	405,966	4,885	108,629
		<u>9% of 321920</u>	<u>20 Wood container & pallet mfg (pt)</u>	318	405,966	4,885	108,629
2448			<u>Wood pallets & skids</u>	2,347	3,449,491	38,994	717,863
		<u>77% of 321920</u>	<u>30 Wood container & pallet mfg (pt)</u>	2,347	3,449,491	38,994	717,863
2449			<u>Wood containers, n.e.c.</u>	257	477,034	5,701	110,239
		<u>11% of 321920</u>	<u>40 Wood container & pallet mfg (pt)</u>	257	477,034	5,701	110,239
SIC	NAICS	Pt	Description	<u>Establish- ments</u>	<u>Value of Shipments (\$1,000)</u>	<u>Paid employees</u>	<u>Annual payroll (\$1,000)</u>
245		97/92	Wood buildings and mobile homes	1,028	13,179,370	91,234	2,362,873
2451			<u>Mobile homes</u>	319	10,167,746	68,269	1,788,646
		<u>321991</u>	<u>Manufactured home (mobile home) mfg</u>	319	10,167,746	68,269	1,788,646
2452			<u>Prefabricated wood buildings</u>	709	3,011,624	22,965	574,227
		<u>321992</u>	<u>Prefabricated wood building mfg</u>	709	3,011,624	22,965	574,227
SIC	NAICS	Pt	Description	<u>Establish- ments</u>	<u>Value of Shipments (\$1,000)</u>	<u>Paid employees</u>	<u>Annual payroll (\$1,000)</u>
249		97/92	Miscellaneous wood products	3,609	14,841,931	93,940	2,277,712
2491			<u>Wood preserving</u>	451	4,461,521	11,668	298,123
		<u>321114</u>	<u>Wood preservation</u>	451	4,461,521	11,668	298,123
2493			<u>Reconstituted wood products</u>	316	5,273,794	25,269	797,838
		<u>321219</u>	<u>Reconstituted wood product mfg</u>	316	5,273,794	25,269	797,838
2499			<u>Wood products, n.e.c.</u>	2,842	5,106,616	57,003	1,181,751
		<u>1% of 321912</u>	<u>40 Cut stock, resawing lumber, & planing (pt)</u>	20	73,251	549	12,847
		<u>2% of 321920</u>	<u>50 Wood container & pallet mfg (pt)</u>	49	65,184	870	18,727
		<u>94% of 321999</u>	<u>30 All other miscellaneous wood product mfg (pt)</u>	2,324	3,740,920	41,844	879,178
		<u>0% of 332321</u>	<u>10 Metal window & door mfg (pt)</u>	0	0	0	0
		<u>15% of 339999</u>	<u>10 All other miscellaneous mfg (pt)</u>	449	1,227,261	13,740	270,999

N=Comparable data not available D=Withheld to avoid disclosure

Σ=sum of NAICS parts listed below the symbol  links to Comparative Statistics for 1992 and 1997

 (Bridge complete.) Comparable SIC derivable from NAICS data.

 (Drawbridge slightly open.) Almost comparable Sales or receipts from NAICS are within 3% of SIC sales or receipts.

 (Drawbridge open.) Not comparable SIC sales or receipts cannot be estimated within 3% from NAICS data.

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1997 Economic Census: Bridge Between SIC and NAICS

SIC: Manufacturing

SIC 25: Furniture and fixtures - Finder by 3-digit SIC

Includes only establishments with payroll. [Introductory text](#) includes scope and methodology.

Go to bridge	SIC	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
	25	<u>Furniture and fixtures</u>	12,095	61,527,902	523,872	13,344,344
↓	251	<u>Household furniture</u>	5,609	26,334,791	265,115	5,861,109
↓	252	<u>Office furniture</u>	1,036	11,340,955	74,863	2,402,387
↓	253	<u>Public building and related furniture</u>	468	7,869,175	36,979	1,022,978
↓	254	<u>Partitions and fixtures</u>	3,751	10,637,959	101,925	2,899,667
↓	259	<u>Miscellaneous furniture and fixtures</u>	1,231	5,345,022	44,990	1,158,203









N=Comparable data not available D=Withheld to avoid disclosure



SIC 25: Furniture and fixtures - 4-digit SIC to 6-digit NAICS

Includes only establishments with payroll. Introductory text includes scope and methodology. Figures to the left of NAICS codes indicate the percent of NAICS receipts represented by this part; and link to Table 1 where other parts of the NAICS are shown.

⁹⁷/₉₂ links to 1997 and 1992 Comparative Statistics for whole SICs.


SIC	NAICS	Pt	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
251	⁹⁷ / ₉₂		<u>Household furniture</u>	5,609	26,334,791	265,115	5,861,109
2511			<u>Wood household furniture</u>	3,035	10,940,684	123,368	2,587,446
	97% of 337122	10	<u>Nonupholstered wood household furniture mfg (pt)</u>	3,035	10,940,684	123,368	2,587,446
2512			<u>Upholstered household furniture</u>	1,095	8,034,017	85,258	1,930,167
	96% of 337121	10	<u>Upholstered household furniture mfg (pt)</u>	1,095	8,034,017	85,258	1,930,167
2514			<u>Metal household furniture</u>	420	2,422,853	22,835	503,957
	337124		<u>Metal household furniture mfg</u>	420	2,422,853	22,835	503,957


2515			Mattresses & bedsprings	742	4,067,225	24,673	643,390
2% of	337121	20	Upholstered household furniture mfg (pt)	35	159,199	1,601	31,760
	337910		Mattress mfg	707	3,908,026	23,072	611,630
2517			Wood TV & radio cabinets	100	320,714	4,273	84,391
	337129		Wood television, radio, & sewing machine cabinet mfg	100	320,714	4,273	84,391
2519			Household furniture, n.e.c.	217	549,298	4,708	111,758
	337125		Household furniture (except wood & metal) mfg	217	549,298	4,708	111,758
SIC	NAICS	Pt	Description	Establish-ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
252	9792		Office furniture	1,036	11,340,955	74,863	2,402,387
2521			Wood office furniture	677	3,110,020	30,641	781,220
	337211		Wood office furniture mfg	677	3,110,020	30,641	781,220
2522			Office furniture, except wood	359	8,230,935	44,222	1,621,167
	337214		Office furniture (except wood) mfg	359	8,230,935	44,222	1,621,167
SIC	NAICS	Pt	Description	Establish-ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
253	9792		Public building and related furniture	468	7,869,175	36,979	1,022,978
2531			Public building & related furniture	468	7,869,175	36,979	1,022,978
57% of	336360	30	Motor vehicle seating & interior trim mfg (pt)	184	6,060,320	20,784	610,043
42% of	337127	10	Institutional furniture mfg (pt)	267	1,697,870	15,254	385,680
9% of	339942	10	Lead pencil & art good mfg (pt)	17	110,985	941	27,255
SIC	NAICS	Pt	Description	Establish-ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
254	9792		Partitions and fixtures	3,751	10,637,959	101,925	2,899,667
2541			Wood partitions & fixtures	2,825	5,388,485	57,453	1,624,792
10% of	337110	20	Wood kitchen cabinet & counter top mfg (pt)	812	938,353	9,785	254,585
	337212		Custom architectural woodwork & millwork mfg	1,105	2,197,493	24,363	715,011
28% of	337215	20	Showcase, partition, shelving, & locker mfg (pt)	908	2,252,639	23,305	655,196
2542			Partitions & fixtures, except wood	926	5,249,474	44,472	1,274,875
66% of	337215	30	Showcase, partition, shelving, & locker mfg (pt)	926	5,249,474	44,472	1,274,875
SIC	NAICS	Pt	Description	Establish-	Value of Shipments	Paid	Annual payroll

			<u>ments</u>	<u>(\$1,000)</u>	<u>employees</u>	<u>(\$1,000)</u>
259	^{97%} / ₃₂	<u>Miscellaneous furniture and fixtures</u>	1,231	5,345,022	44,990	1,158,203
2591		<u>Drapery hardware, blinds, & shades</u>	488	2,393,564	19,617	436,757
	337920	Blind & shade mfg	488	2,393,564	19,617	436,757
2599		<u>Furniture & fixtures, n.e.c.</u>	743	2,951,458	25,373	721,446
	57% of 337127 20	<u>Institutional furniture mfg (pt)</u>	727	2,305,770	22,448	605,971
	4% of 339113 10	<u>Surgical appliance & supplies mfg (pt)</u>	16	645,688	2,925	115,475

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Σ=sum of NAICS parts listed below the symbol ^{97%}/₃₂ links to Comparative Statistics for 1992 and 1997

 (Bridge complete.) Comparable SIC derivable from NAICS data.

 (Drawbridge slightly open.) Almost comparable Sales or receipts from NAICS are within 3% of SIC sales or receipts.

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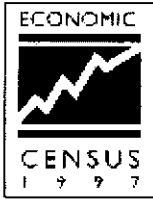
Source: 1997 Economic Census, Comparative Statistics

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Helping You Make Informed Decisions



1997 Economic Census: Bridge Between SIC and NAICS

SIC: Manufacturing

SIC 33: Primary metal industries - Finder by 3-digit SIC

Includes only establishments with payroll. [Introductory text](#) includes scope and methodology.

Go to bridge	SIC	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
	33	<u>Primary metal industries</u>	6,275	188,774,795	692,175	26,829,622
↓	331	<u>Blast furnace and basic steel products</u>	954	77,532,783	217,679	10,059,589
↓	332	<u>Iron and steel foundries</u>	1,144	17,533,215	132,853	4,666,674
↓	333	<u>Primary nonferrous metals</u>	179	16,320,560	33,255	1,404,870
↓	334	<u>Secondary nonferrous metals</u>	256	6,977,168	13,479	468,021
↓	335	<u>Nonferrous rolling and drawing</u>	1,011	52,863,733	166,344	6,093,518
↓	336	<u>Nonferrous foundries (castings)</u>	1,676	11,598,177	94,496	2,897,629
↓	339	<u>Miscellaneous primary metal products</u>	1,055	5,949,159	34,069	1,239,321












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SIC 33: Primary metal industries - 4-digit SIC to 6-digit NAICS








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



^{97/92} links to 1997 and 1992 Comparative Statistics for whole SICs.



SIC	NAICS	Pt	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
331	^{97/92}		<u>Blast furnace and basic steel products</u>	954	77,532,783	217,679	10,059,589
3312			<u>Blast furnaces & steel mills</u>	201	56,796,871	145,805	7,446,304
25% of	324199	20	All other petroleum & coal products mfg (pt)	8	438,107	1,731	74,553
99% of	331111	10	<u>Iron & steel mills (pt)</u>	193	56,358,764	144,074	7,371,751
3313			<u>Electrometallurgical products</u>	28	1,535,779	4,035	168,728


	331112		<u>Electrometallurgical ferroalloy product mfg</u>	24	1,409,834	3,724	156,946
3% of	331492	10	<u>Other nonferrous metal secondary smelting, refining, & alloying (</u>	4	125,945	311	11,782
3315			<u>Steel wire & related products</u>	304	5,291,290	25,754	799,508
	331222		<u>Steel wire drawing</u>	273	4,920,798	23,489	733,281
7% of	332618	10	<u>Other fabricated wire product mfg (pt)</u>	31	370,492	2,265	66,227
3316			<u>Cold finishing of steel shapes</u>	186	6,343,466	14,362	639,349
	331221		<u>Cold-rolled steel shape mfg</u>	186	6,343,466	14,362	639,349
3317			<u>Steel pipe & tubes</u>	235	7,565,377	27,723	1,005,700
	331210		<u>Iron & steel pipes & tubes mfg from purchased steel</u>	235	7,565,377	27,723	1,005,700
SIC	NAICS	Pt	Description	Establish-ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
332	9% 32		<u>Iron and steel foundries</u>	1,144	17,533,215	132,853	4,666,674
3321			<u>Gray iron foundries</u>	669	11,911,623	83,570	3,120,450
97% of	331511	10	<u>Iron foundries (pt)</u>	669	11,911,623	83,570	3,120,450
3322			<u>Malleable iron foundries</u>	28	352,615	2,628	113,937
3% of	331511	20	<u>Iron foundries (pt)</u>	28	352,615	2,628	113,937
3324			<u>Steel investment foundries</u>	159	2,341,737	22,673	669,452
	331512		<u>Steel investment foundries</u>	159	2,341,737	22,673	669,452
3325			<u>Steel foundries, n.e.c.</u>	288	2,927,240	23,982	762,835
	331513		<u>Steel foundries (except investment)</u>	288	2,927,240	23,982	762,835
SIC	NAICS	Pt	Description	Establish-ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
333	9% 32		<u>Primary nonferrous metals</u>	179	16,320,560	33,255	1,404,870
3331			<u>Primary copper</u>	16	6,540,441	7,360	287,382
	331411		<u>Primary smelting & refining of copper</u>	16	6,540,441	7,360	287,382
3334			<u>Primary aluminum</u>	21	6,224,610	15,763	707,402
	331312		<u>Primary aluminum production</u>	21	6,224,610	15,763	707,402
3339			<u>Primary nonferrous metals, n.e.c.</u>	142	3,555,509	10,132	410,086
	331419		<u>Other nonferrous metal primary smelting & refining</u>	142	3,555,509	10,132	410,086
SIC	NAICS	Pt	Description	Establish-ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
334	9% 32		<u>Secondary nonferrous metals</u>	256	6,977,168	13,479	468,021
3341			<u>Secondary nonferrous metals</u>	256	6,977,168	13,479	468,021

95% of	331314	10	Secondary smelting & alloying of aluminum (pt)	101	3,478,625	6,226	210,318
85% of	331423	10	Secondary smelting, refining, & alloying of copper (pt)	24	1,082,052	1,768	69,988
64% of	331492	20	Other nonferrous metal secondary smelting, refining, & alloying (	131	2,416,491	5,485	187,715


SIC	NAICS	Pt	Description	Establish-ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
335		97/32	Nonferrous rolling and drawing	1,011	52,863,733	166,344	6,093,518
3351			Copper rolling & drawing	129	7,679,080	21,150	786,621
	331421		Copper rolling, drawing, & extruding	129	7,679,080	21,150	786,621
3353			Aluminum sheet, plate, & foil	70	13,755,566	25,111	1,199,382
	331315		Aluminum sheet, plate, & foil mfg	70	13,755,566	25,111	1,199,382
0% of	332996	10	Fabricated pipe & pipe fitting mfg (pt)	0	0	0	0
3354			Aluminum extruded products	160	6,177,701	30,357	944,829
	331316		Aluminum extruded product mfg	160	6,177,701	30,357	944,829
3355			Aluminum rolling & drawing, n.e.c.	20	1,295,284	2,657	97,537
78% of	331319	10	Other aluminum rolling & drawing (pt)	20	1,295,284	2,657	97,537
3356			Nonferrous rolling & drawing, n.e.c.	184	4,839,547	17,237	709,102
66% of	331491	10	Other nonferrous metal rolling, drawing, & extruding (pt)	184	4,839,547	17,237	709,102
3357			Nonferrous wire drawing & insulating	448	19,116,555	69,832	2,356,047
22% of	331319	20	Other aluminum rolling & drawing (pt)	16	361,323	1,649	46,377
	331422		Copper wire (except mechanical) drawing	36	1,029,653	4,692	131,549
34% of	331491	20	Other nonferrous metal rolling, drawing, & extruding (pt)	83	2,475,702	8,635	280,606
	335921		Fiber optic cable mfg	38	2,767,017	8,589	364,654
	335929		Other communication & energy wire mfg	275	12,482,860	46,267	1,532,861


SIC	NAICS	Pt	Description	Establish-ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
336		97/32	Nonferrous foundries (castings)	1,676	11,598,177	94,496	2,897,629
3363			Aluminum die-castings	318	3,791,717	27,717	906,108
	331521		Aluminum die-casting foundries	318	3,791,717	27,717	906,108
3364			Nonferrous die-casting, except aluminum	279	2,055,264	17,243	502,552
	331522		Nonferrous (except aluminum) die-casting foundries	279	2,055,264	17,243	502,552
3365			Aluminum foundries	626	3,937,406	34,098	1,013,843
	331524		Aluminum foundries (except die-casting)	626	3,937,406	34,098	1,013,843


3366		Copper foundries	312	854,704	8,909	260,340
		331525 Copper foundries (except die-casting)	312	854,704	8,909	260,340
3369		Nonferrous foundries, n.e.c.	141	959,086	6,529	214,786
		331528 Other nonferrous foundries (except die-casting)	141	959,086	6,529	214,786

SIC	NAICS	Pt	Description	Establish-ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
339		97/92	Miscellaneous primary metal products	1,055	5,949,159	34,069	1,239,321
3398			Metal heat treating	808	3,485,459	22,674	802,930
		332811	Metal heat treating	808	3,485,459	22,674	802,930
3399			Primary metal products, n.e.c.	247	2,463,700	11,395	436,391
		1% of 331111 20	Iron & steel mills (pt)	82	596,791	2,440	95,739
		5% of 331314 20	Secondary smelting & alloying of aluminum (pt)	10	172,555	488	18,975
		15% of 331423 20	Secondary smelting, refining, & alloying of copper (pt)	11	187,036	565	21,117
		32% of 331492 30	Other nonferrous metal secondary smelting, refining, & alloying (	117	1,207,951	5,814	225,722
		6% of 332618 20	Other fabricated wire product mfg (pt)	27	299,367	2,088	74,838

N=Comparable data not available D=Withheld to avoid disclosure

Σ=sum of NAICS parts listed below the symbol  97/92 links to Comparative Statistics for 1992 and 1997

 (Bridge complete.) Comparable SIC derivable from NAICS data.

 (Drawbridge slightly open.) Almost comparable Sales or receipts from NAICS are within 3% of SIC sales or receipts.

 (Drawbridge open.) Not comparable SIC sales or receipts cannot be estimated within 3% from NAICS data.

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Source: 1997 Economic Census, Comparative Statistics

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1997 Economic Census: Bridge Between SIC and NAICS

SIC: Manufacturing

SIC 34: Fabricated metal products - Finder by 3-digit SIC

Includes only establishments with payroll. Introductory text includes scope and methodology.


Go to bridge	SIC	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
	34	<u>Fabricated metal products</u>	37,985	231,704,012	1,549,494	50,904,372
↓	341	<u>Metal cans and shipping containers</u>	425	13,352,606	33,634	1,377,932
↓	342	<u>Cutlery, handtools, and hardware</u>	2,494	D (100,000+)	D	D
↓	343	<u>Plumbing and heating, except electric</u>	662	8,671,083	49,165	1,501,147
↓	344	<u>Fabricated structural metal products</u>	13,959	65,206,295	459,789	14,111,998
↓	345	<u>Screw machine products, bolts, etc.</u>	3,785	16,460,738	133,399	4,573,452
↓	346	<u>Metal forgings and stampings</u>	3,625	44,832,778	267,958	10,486,353
↓	347	<u>Metal services, n.e.c.</u>	5,610	14,454,652	130,755	3,722,220
↓	348	<u>Ordnance and accessories, n.e.c.</u>	434	5,438,140	38,482	1,489,257
↓	349	<u>Miscellaneous fabricated metal products</u>	6,991	D (100,000+)	D	D











N=Comparable data not available D=Withheld to avoid disclosure






SIC 34: Fabricated metal products - 4-digit SIC to 6-digit NAICS






Includes only establishments with payroll. Introductory text includes scope and methodology. Figures to the left of NAICS codes indicate the percent of NAICS receipts represented by this part; and link to Table 1 where other parts of the NAICS are shown.


⁹⁷/₉₂ links to 1997 and 1992 Comparative Statistics for whole SICs.



SIC	NAICS	Pt	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
341	⁹⁷ / ₉₂		<u>Metal cans and shipping containers</u>	425	13,352,606	33,634	1,377,932
3411			<u>Metal cans</u>	274	12,042,011	27,316	1,185,705





	332431		Metal can mfg	274	12,042,011	27,316	1,185,705
3412			Metal barrels, drums, & pails	151	1,310,595	6,318	192,227
	58% of 332439	10	Other metal container mfg (pt)	151	1,310,595	6,318	192,227
SIC	NAICS	Pt	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
342	97/32		Cutlery, handtools, and hardware	2,494	D	(100,000+)	D
3421			Cutlery	164	2,198,365	11,129	357,283
	100% of 332211	10	Cutlery & flatware (except precious) mfg (pt)	164	2,198,365	11,129	357,283
3423			Hand & edge tools, n.e.c.	1,069	5,677,903	42,947	1,329,593
	86% of 332212	10	Hand & edge tool mfg (pt)	1,069	5,677,903	42,947	1,329,593
3425			Hand saws & saw blades	176	1,452,540	9,149	300,538
	332213		Saw blade & handsaw mfg	176	1,452,540	9,149	300,538
3429			Hardware, n.e.c.	1,085	D	(50k-99999)	D
	18% of 332439	20	Other metal container mfg (pt)	117	402,378	4,135	116,588
	96% of 332510	10	Hardware mfg (pt)	952	10,359,952	70,884	2,186,800
	D 332919	10	Other metal valve & pipe fitting mfg (pt)	16	D	(500-999)	D
SIC	NAICS	Pt	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
343	97/32		Plumbing and heating, except electric	662	8,671,083	49,165	1,501,147
3431			Metal sanitary ware	88	1,575,505	9,994	280,462
	332998		Enameled iron & metal sanitary ware mfg	88	1,575,505	9,994	280,462
3432			Plumbing fittings & brass goods	121	3,708,187	16,676	510,498
	332913		Plumbing fixture fitting & trim mfg	116	3,590,128	16,202	499,675
	1% of 332999	20	All other miscellaneous fabricated metal product mfg (pt)	5	118,059	474	10,823
3433			Heating equipment, except electric	453	3,387,391	22,495	710,187
	91% of 333414	10	Heating equipment (except warm air furnaces) mfg (pt)	453	3,387,391	22,495	710,187
SIC	NAICS	Pt	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
344	97/32		Fabricated structural metal products	13,959	65,206,295	459,789	14,111,998
3441			Fabricated structural metal	2,900	14,200,270	84,704	2,672,087
	87% of 332312	10	Fabricated structural metal mfg (pt)	2,900	14,200,270	84,704	2,672,087
3442			Metal doors, sash, & trim	1,384	9,876,049	72,970	1,896,135

96% of	332321	20	Metal window & door mfg (pt)	1,384	9,876,049	72,970	1,896,135
3443			Fabricated plate work, boiler shops	2,130	11,463,395	87,038	2,886,191
	332313		Plate work mfg	1,035	2,806,913	25,453	797,131
	332410		Power boiler & heat exchanger mfg	472	3,849,100	27,542	946,401
	332420		Metal tank (heavy gauge) mfg	614	4,764,118	33,704	1,134,441
0% of	333415	10	AC & warm air heating & commercial/industrial refriger equip mfg (p	9	43,264	339	8,218
3444			Sheet metal work	4,605	16,233,432	131,900	4,128,514
	332322		Sheet metal work mfg	4,479	15,957,992	129,826	4,068,484
12% of	332439	30	Other metal container mfg (pt)	126	275,440	2,074	60,030
3446			Architectural metal work	1,744	3,536,413	30,960	875,174
88% of	332323	10	Ornamental & architectural metal work mfg (pt)	1,744	3,536,413	30,960	875,174
3448			Prefabricated metal buildings	604	4,199,550	25,946	776,575
	332311		Prefabricated metal building & component mfg	604	4,199,550	25,946	776,575
3449			Miscellaneous metal work	592	5,697,186	26,271	877,322
	332114		Custom roll forming	401	3,074,662	15,219	500,899
13% of	332312	20	Fabricated structural metal mfg (pt)	152	2,166,021	8,729	302,853
4% of	332321	30	Metal window & door mfg (pt)	33	364,564	1,974	64,115
2% of	332323	20	Ornamental & architectural metal work mfg (pt)	6	91,939	349	9,455









SIC	NAICS	Pt	Description	Establish-ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
345	97/32		Screw machine products, bolts, etc.	3,785	16,460,738	133,399	4,573,452
3451			Screw machine products	2,745	8,326,077	80,404	2,634,075
	332721		Precision turned product mfg	2,745	8,326,077	80,404	2,634,075
3452			Bolts, nuts, rivets, & washers	1,040	8,134,661	52,995	1,939,377
	332722		Bolt, nut, screw, rivet, & washer mfg	1,040	8,134,661	52,995	1,939,377
SIC	NAICS	Pt	Description	Establish-ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
346	97/32		Metal forgings and stampings	3,625	44,832,778	267,958	10,486,353
3462			Iron & steel forgings	421	4,924,426	26,432	1,035,345
	332111		Iron & steel forging	421	4,924,426	26,432	1,035,345
3463			Nonferrous forgings	84	1,858,708	9,129	366,879
	332112		Nonferrous forging	84	1,858,708	9,129	366,879
3465			Automotive stampings	810	23,668,110	126,905	5,647,964

	336370		Motor vehicle metal stamping	810	23,668,110	126,905	5,647,964
3466			Crowns & closures	67	969,982	4,682	167,443
	332115		Crown & closure mfg	67	969,982	4,682	167,443
3469			Metal stampings, n.e.c.	2,243	13,411,552	100,810	3,268,722
	332116		Metal stamping	2,166	12,041,638	93,086	3,039,459
	332214		Kitchen utensil, pot, & pan mfg	77	1,369,914	7,724	229,263

SIC	NAICS	Pt	Description	Establish-ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
347	9/92		Metal services, n.e.c.	5,610	14,454,652	130,755	3,722,220
3471			Plating & polishing	3,404	5,979,405	74,640	2,089,261
	332813		Electroplating, plating, polishing, anodizing, & coloring	3,404	5,979,405	74,640	2,089,261
3479			Metal coating & allied services	2,206	8,475,247	56,115	1,632,959
	332812		Metal coating/engraving (exc jewelry/silverware)/allied services	2,156	8,460,896	55,904	1,628,585
0% of	339911	10	Jewelry (except costume) mfg (pt)	22	5,798	79	1,620
1% of	339912	10	Silverware & plated ware mfg (pt)	12	6,296	103	2,091
0% of	339914	10	Costume jewelry & novelty mfg (pt)	16	2,257	29	663


SIC	NAICS	Pt	Description	Establish-ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
348	9/92		Ordnance and accessories, n.e.c.	434	5,438,140	38,482	1,489,257
3482			Small arms ammunition	113	938,818	6,863	242,068
	332992		Small arms ammunition mfg	113	938,818	6,863	242,068
3483			Ammunition, except small arms, n.e.c.	53	1,497,045	9,427	379,450
	332993		Ammunition (except small arms) mfg	53	1,497,045	9,427	379,450
3484			Small arms	198	1,251,792	9,907	320,614
	332994		Small arms mfg	198	1,251,792	9,907	320,614
3489			Ordnance & accessories, n.e.c.	70	1,750,485	12,285	547,125
	332995		Other ordnance & accessories mfg	70	1,750,485	12,285	547,125


SIC	NAICS	Pt	Description	Establish-ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
349	9/92		Miscellaneous fabricated metal products	6,991		D (100,000+)	D
3491			Industrial valves	538	8,699,300	53,459	1,904,134
	332911		Industrial valve mfg	538	8,699,300	53,459	1,904,134

3492		Fluid power valves & hose fittings	424	6,602,909	37,132	1,324,392
100% of	332912 10	Fluid power valve & hose fitting mfg (pt)	424	6,602,909	37,132	1,324,392
3493		Steel springs, except wire	129	761,711	5,381	174,467
	332611	Spring (heavy gauge) mfg	129	761,711	5,381	174,467
3494		Valves & pipe fittings, n.e.c.	245	2,827,380	18,216	576,136
94% of	332919 20	Other metal valve & pipe fitting mfg (pt)	222	2,753,397	17,652	558,712
1% of	332999 30	All other miscellaneous fabricated metal product mfg (pt)	23	73,983	564	17,424
3495		Wire springs	396	D	(10k-24999)	D
	332612	Spring (light gauge) mfg	394	2,481,151	18,798	564,372
D	334518 10	Watch, clock, & part mfg (pt)	2	D	(100-249)	D
3496		Miscellaneous fabricated wire products	1,253	4,587,656	41,821	1,025,279
87% of	332618 30	Other fabricated wire product mfg (pt)	1,253	4,587,656	41,821	1,025,279
3497		Metal foil & leaf	107	3,257,743	10,615	418,574
	322225	Laminated aluminum foil mfg for flexible packaging uses	43	1,546,143	4,967	211,497
16% of	332999 40	All other miscellaneous fabricated metal product mfg (pt)	64	1,711,600	5,648	207,077
3498		Fabricated pipe & fittings	856	4,024,999	29,364	870,291
100% of	332996 20	Fabricated pipe & pipe fitting mfg (pt)	856	4,024,999	29,364	870,291
3499		Fabricated metal products, n.e.c.	3,043	D	(50k-99999)	D
	332117	Powder metallurgy part mfg	128	1,317,301	10,760	367,623
12% of	332439 40	Other metal container mfg (pt)	98	273,541	2,331	70,293
4% of	332510 20	Hardware mfg (pt)	58	435,815	3,401	93,516
D	332919 30	Other metal valve & pipe fitting mfg (pt)	7	D	(250-499)	D
72% of	332999 50	All other miscellaneous fabricated metal product mfg (pt)	2,592	7,558,137	63,736	1,870,813
2% of	337215 40	Showcase, partition, shelving, & locker mfg (pt)	78	123,057	1,295	35,369
4% of	339914 20	Costume jewelry & novelty mfg (pt)	82	49,953	568	10,912

N=Comparable data not available D=Withheld to avoid disclosure

Σ=sum of NAICS parts listed below the symbol ⁹⁷/₉₂ links to Comparative Statistics for 1992 and 1997

 (Bridge complete.) Comparable SIC derivable from NAICS data.

 (Drawbridge slightly open.) Almost comparable Sales or receipts from NAICS are within 3% of SIC sales or receipts.

 (Drawbridge open.) Not comparable SIC sales or receipts cannot be estimated within 3% from NAICS data.

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Source: 1997 Economic Census, Comparative Statistics



1997 Economic Census: Bridge Between SIC and NAICS

SIC: Manufacturing

SIC 35: Industrial machinery and equipment - Finder by 3-digit SIC

Includes only establishments with payroll. [Introductory text](#) includes scope and methodology.

Go to bridge	SIC	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
	35	Industrial machinery and equipment	56,383	407,393,276	1,978,226	74,550,422
↓	351	Engines and turbines	390	D	(50k-99999)	D
↓	352	Farm and garden machinery	1,656	D	(50k-99999)	D
↓	353	Construction and related machinery	3,523	47,935,156	213,334	8,081,030
↓	354	Metalworking machinery	11,706	39,692,950	296,489	11,812,262
↓	355	Special industry machinery	4,781	D	(100,000+)	D
↓	356	General industrial machinery	4,479	44,080,890	265,359	9,752,818
↓	357	Computer and office equipment	2,181	D	(100,000+)	D
↓	358	Refrigeration and service machinery	2,277	39,317,539	204,675	6,800,658
↓	359	Industrial machinery, n.e.c.	25,390	38,647,841	368,481	12,360,014












N=Comparable data not available D=Withheld to avoid disclosure











SIC 35: Industrial machinery and equipment - 4-digit SIC to 6-digit NAICS













Includes only establishments with payroll. [Introductory text](#) includes scope and methodology. Figures to the left of NAICS codes indicate the percent of NAICS receipts represented by this part; and link to Table 1 where other parts of the NAICS are shown.











^{97/92} links to 1997 and 1992 Comparative Statistics for whole SICs.










SIC	NAICS Pt	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
351	^{97/92}	Engines and turbines	390	D	(50k-99999)	D
3511		Turbines & turbine generator sets	86	5,783,057	19,529	910,316

	333611		Turbine & turbine generator set unit mfg	86	5,783,057	19,529	910,316
3519			Internal combustion engines, n.e.c.	304	D	(50k-99999)	D
	D 333618	10	Other engine equipment mfg (pt)	297	D	(50k-99999)	D
	0% of 336399	10	All other motor vehicle parts mfg (pt)	7	123,954	896	24,247
SIC	NAICS	Pt	Description	Establish-ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
352		9/32	Farm and garden machinery	1,656	D	(50k-99999)	D
3523			Farm machinery & equipment	1,508	D	(50k-99999)	D
	D 332212	20	Hand & edge tool mfg (pt)	1	D	(20-99)	D
	10% of 332323	30	Ornamental & architectural metal work mfg (pt)	140	380,152	3,082	86,294
	333111		Farm machinery & equipment mfg	1,339	15,921,455	66,370	2,370,599
	1% of 333922	10	Conveyor & conveying equipment mfg (pt)	28	33,377	320	6,663
3524			Lawn & garden equipment	148	D	(25k-49999)	D
	D 332212	30	Hand & edge tool mfg (pt)	3	D	(20-99)	D
	333112		Lawn & garden tractor & home lawn & garden equipment mfg	145	7,454,511	28,617	739,727
SIC	NAICS	Pt	Description	Establish-ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
353		9/32	Construction and related machinery	3,523	47,935,156	213,334	8,081,030
3531			Construction machinery	897	24,117,413	87,607	3,374,527
	333120		Construction machinery mfg	785	21,965,455	74,965	2,998,967
	57% of 333923	10	Overhead traveling crane, hoist, & monorail system mfg (pt)	87	1,805,198	10,263	290,989
	4% of 336510	10	Railroad rolling stock mfg (pt)	25	346,760	2,379	84,571
3532			Mining machinery	292	2,710,923	13,547	486,496
	333131		Mining machinery & equipment mfg	292	2,710,923	13,547	486,496
3533			Oil field machinery	563	6,240,079	29,451	1,166,759
	333132		Oil & gas field machinery & equipment mfg	563	6,240,079	29,451	1,166,759
3534			Elevators & moving stairways	196	1,607,066	9,442	340,525
	333921		Elevator & moving stairway mfg	196	1,607,066	9,442	340,525
3535			Conveyors & conveying equipment	871	6,346,525	39,279	1,531,625
	100% of 333922	20	Conveyor & conveying equipment mfg (pt)	871	6,346,525	39,279	1,531,625
3536			Hoists, cranes, & monorails	220	1,340,561	7,751	278,899

43% of	333923	20	Overhead traveling crane, hoist, & monorail system mfg (pt)	220	1,340,561	7,751	278,899
3537			Industrial trucks & tractors	484	5,572,589	26,257	902,199
0% of	332439	50	Other metal container mfg (pt)	4	6,775	64	1,492
0% of	332999	60	All other miscellaneous fabricated metal product mfg (pt)	19	27,488	240	6,939
	333924		Industrial truck, tractor, trailer, & stacker machinery mfg	461	5,538,326	25,953	893,768
SIC	NAICS	Pt	Description	Establishments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
354	97/92		Metalworking machinery	11,706	39,692,950	296,489	11,812,262
3541			Machine tools, metal cutting types	393	5,183,521	28,849	1,241,372
97% of	333512	10	Machine tool (metal cutting types) mfg (pt)	393	5,183,521	28,849	1,241,372
3542			Machine tools, metal forming types	225	2,255,011	14,185	598,606
	333513		Machine tool (metal forming types) mfg	225	2,255,011	14,185	598,606
3543			Industrial patterns	673	623,927	7,959	285,038
	332997		Industrial pattern mfg	673	623,927	7,959	285,038
3544			Special dies, tools, jigs, & fixtures	7,275	13,361,490	128,770	5,318,715
	333511		Industrial mold mfg	2,529	5,116,635	48,657	2,088,950
	333514		Special die & tool, die set, jig, & fixture mfg	4,746	8,244,855	80,113	3,229,765
3545			Machine tool accessories	2,105	6,061,450	54,304	1,897,399
11% of	332212	40	Hand & edge tool mfg (pt)	185	714,277	6,379	254,257
	333515		Cutting tool & machine tool accessory mfg	1,920	5,347,173	47,925	1,643,142
3546			Power-driven handtools	217	3,609,779	16,816	531,378
	333991		Power-driven handtool mfg	217	3,609,779	16,816	531,378
3547			Rolling mill machinery	100	700,084	4,149	167,312
	333516		Rolling mill machinery & equipment mfg	100	700,084	4,149	167,312
3548			Welding apparatus	244	4,433,877	22,434	915,152
100% of	333992	10	Welding & soldering equipment mfg (pt)	244	4,433,877	22,434	915,152
0% of	335311	10	Power, distribution, & specialty transformer mfg (pt)	0	0	0	0
3549			Metalworking machinery, n.e.c.	474	3,463,811	19,023	857,290
	333518		Other metalworking machinery mfg	474	3,463,811	19,023	857,290
SIC	NAICS	Pt	Description	Establishments	Value of Shipments	Paid employees	Annual payroll


					(\$1,000)		(\$1,000)
355	97/32	Special industry machinery		4,781	D	(100,000+)	D
3552		<u>Textile machinery</u>		478	1,779,034	13,600	449,014
100% of	333292	10	<u>Textile machinery mfg (pt)</u>	478	1,779,034	13,600	449,014
3553		<u>Woodworking machinery</u>		327	1,321,752	9,117	302,233
	333210		<u>Sawmill & woodworking machinery mfg</u>	327	1,321,752	9,117	302,233
3554		<u>Paper industries machinery</u>		366	3,438,235	18,594	772,659
	333291		<u>Paper industry machinery mfg</u>	366	3,438,235	18,594	772,659
3555		<u>Printing trades machinery</u>		546	D	(10k-24999)	D
D	333293	10	<u>Printing machinery & equipment mfg (pt)</u>	546	D	(10k-24999)	D
3556		<u>Food products machinery</u>		597	2,877,841	19,026	715,068
	333294		<u>Food product machinery mfg</u>	597	2,877,841	19,026	715,068
3559		<u>Special industry machinery, n.e.c.</u>		2,467	D	(100,000+)	D
	333220		<u>Plastics & rubber industry machinery mfg</u>	455	3,584,992	18,574	743,901
	333295		<u>Semiconductor machinery mfg</u>	257	11,158,627	40,087	1,701,669
D	333298	10	<u>All other industrial machinery mfg (pt)</u>	1,677	D	(50k-99999)	D
7% of	333319	10	<u>Other commercial & service industry machinery mfg (pt)</u>	78	644,019	2,890	96,069
SIC	NAICS	Pt	Description	Establishments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
356	97/32		General industrial machinery	4,479	44,080,890	265,359	9,752,818
3561			<u>Pumps & pumping equipment</u>	489	6,826,043	36,552	1,422,919
100% of	333911	10	<u>Pump & pumping equipment mfg (pt)</u>	489	6,826,043	36,552	1,422,919
3562			<u>Ball & roller bearings</u>	185	6,120,940	36,991	1,386,126
	332991		<u>Ball & roller bearing mfg</u>	185	6,120,940	36,991	1,386,126
3563			<u>Air & gas compressors</u>	314	5,633,008	24,821	940,349
	333912		<u>Air & gas compressor mfg</u>	314	5,633,008	24,821	940,349
3564			<u>Blowers & fans</u>	574	4,075,925	29,906	902,298
	333411		<u>Air purification equipment mfg</u>	370	2,174,729	16,183	470,103
	333412		<u>Industrial & commercial fan & blower mfg</u>	204	1,901,196	13,723	432,195
3565			<u>Packaging machinery</u>	689	4,858,270	31,581	1,255,960
	333993		<u>Packaging machinery mfg</u>	689	4,858,270	31,581	1,255,960
3566			<u>Speed changers, drives, & gears</u>	268	2,402,392	16,231	597,248


	333612		<u>Speed changer, industrial high-speed drive, & gear mfg</u>	268	2,402,392	16,231	597,248
3567			<u>Industrial furnaces & ovens</u>	404	2,871,475	17,585	657,191
	333994		<u>Industrial process furnace & oven mfg</u>	404	2,871,475	17,585	657,191
3568			<u>Power transmission equipment, n.e.c.</u>	299	3,301,091	21,604	770,962
	333613		<u>Mechanical power transmission equipment mfg</u>	299	3,301,091	21,604	770,962
3569			<u>General industrial machinery, n.e.c.</u>	1,257	7,991,746	50,088	1,819,765
88% of	333999	10	<u>All other miscellaneous general-purpose machinery mfg (pt)</u>	1,257	7,991,746	50,088	1,819,765
SIC	NAICS	Pt	Description	Establish-ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
357	97/32		<u>Computer and office equipment</u>	2,181	D	(100,000+)	D
3571			<u>Electronic computers</u>	563	66,331,909	100,115	4,282,451
	334111		<u>Electronic computer mfg</u>	563	66,331,909	100,115	4,282,451
3572			<u>Computer storage devices</u>	211	13,907,367	42,364	1,950,230
	334112		<u>Computer storage device mfg</u>	211	13,907,367	42,364	1,950,230
3575			<u>Computer terminals</u>	142	1,483,460	5,764	253,087
	334113		<u>Computer terminal mfg</u>	142	1,483,460	5,764	253,087
3577			<u>Computer peripheral equipment, n.e.c.</u>	1,006	25,130,308	87,253	4,337,970
93% of	334119	10	<u>Other computer peripheral equipment mfg (pt)</u>	1,006	25,130,308	87,253	4,337,970
3578			<u>Calculating & accounting equipment</u>	96	2,014,806	7,683	275,962
5% of	333313	10	<u>Office machinery mfg (pt)</u>	35	144,380	966	30,889
7% of	334119	20	<u>Other computer peripheral equipment mfg (pt)</u>	61	1,870,426	6,717	245,073
3579			<u>Office machines, n.e.c.</u>	163	D	(10k-24999)	D
96% of	333313	20	<u>Office machinery mfg (pt)</u>	134	3,047,549	13,865	427,315
D	334518	20	<u>Watch, clock, & part mfg (pt)</u>	16	D	(500-999)	D
21% of	339942	20	<u>Lead pencil & art good mfg (pt)</u>	13	257,020	1,234	30,572
SIC	NAICS	Pt	Description	Establish-ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
358	97/32		<u>Refrigeration and service machinery</u>	2,277	39,317,539	204,675	6,800,658
3581			<u>Automatic merchandising machines</u>	121	1,325,960	8,178	215,627
	333311		<u>Automatic vending machine mfg</u>	121	1,325,960	8,178	215,627
3582							


			<u>Commercial laundry equipment</u>	68	604,966	4,523	136,783
	333312		<u>Commercial laundry, drycleaning, & pressing machine mfg</u>	68	604,966	4,523	136,783
3585			<u>Refrigeration & heating equipment</u>	852	28,473,461	140,978	4,736,239
<u>100% of</u>	333415	20	<u>AC & warm air heating & commercial/industrial refriger equip mfg (p</u>	792	22,846,865	119,456	3,682,296
	336391		<u>Motor vehicle air-conditioning mfg</u>	60	5,626,596	21,522	1,053,943
3586			<u>Measuring & dispensing pumps</u>	71	1,316,899	6,824	251,438
	333913		<u>Measuring & dispensing pump mfg</u>	71	1,316,899	6,824	251,438
3589			<u>Service industry machinery, n.e.c.</u>	1,165	7,596,253	44,172	1,460,571
<u>81% of</u>	333319	20	<u>Other commercial & service industry machinery mfg (pt)</u>	1,165	7,596,253	44,172	1,460,571
SIC	NAICS	Pt	Description	Establishments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
359	<u>97/92</u>		<u>Industrial machinery, n.e.c.</u>	25,390	38,647,841	368,481	12,360,014
3592			<u>Carburetors, pistons, rings, & valves</u>	141	2,755,311	17,518	672,786
	336311		<u>Carburetor, piston, piston ring, & valve mfg</u>	141	2,755,311	17,518	672,786
3593			<u>Fluid power cylinders & actuators</u>	320	3,528,906	23,062	900,438
<u>100% of</u>	333995	10	<u>Fluid power cylinder & actuator mfg (pt)</u>	320	3,528,906	23,062	900,438
3594			<u>Fluid power pumps & motors</u>	170	2,712,058	15,482	605,485
<u>100% of</u>	333996	10	<u>Fluid power pump & motor mfg (pt)</u>	170	2,712,058	15,482	605,485
3596			<u>Scales & balances, except laboratory</u>	122	682,940	4,871	148,755
	333997		<u>Scale & balance (except laboratory) mfg</u>	122	682,940	4,871	148,755
3599			<u>Industrial machinery, n.e.c.</u>	24,637	28,968,626	307,548	10,032,550
	332710		<u>Machine shops</u>	23,619	27,143,131	290,951	9,497,047
<u>5% of</u>	332999	70	<u>All other miscellaneous fabricated metal product mfg (pt)</u>	132	506,611	4,199	136,429
<u>2% of</u>	333319	30	<u>Other commercial & service industry machinery mfg (pt)</u>	50	172,536	1,335	35,719
<u>13% of</u>	333999	20	<u>All other miscellaneous general-purpose machinery mfg (pt)</u>	836	1,146,348	11,063	363,355

N=Comparable data not available D=Withheld to avoid disclosure

Σ=sum of NAICS parts listed below the symbol 97/92 links to Comparative Statistics for 1992 and 1997

 (Bridge complete.) Comparable SIC derivable from NAICS data.

 (Drawbridge slightly open.) Almost comparable Sales or receipts from NAICS are within 3% of SIC sales or receipts.

 (Drawbridge open.) Not comparable SIC sales or receipts cannot be estimated within 3% from NAICS data.



1997 Economic Census: Bridge Between SIC and NAICS

SIC: Manufacturing

SIC 36: Electronic and other electric equipment - Finder by 3-digit SIC

Includes only establishments with payroll. [Introductory text](#) includes scope and methodology.

Go to bridge	SIC	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
	36	<u>Electronic and other electric equipment</u>	17,104	348,559,508	1,582,348	58,256,420
↓	361	<u>Electric distribution equipment</u>	901	12,325,326	67,929	2,276,264
↓	362	<u>Electrical industrial apparatus</u>	2,388	28,643,846	169,046	5,474,383
↓	363	<u>Household appliances</u>	356		D (100,000+)	D
↓	364	<u>Electric lighting and wiring equipment</u>	2,106	26,197,139	158,615	4,888,856
↓	365	<u>Household audio and video equipment</u>	834	10,699,568	48,325	1,438,451
↓	366	<u>Communications equipment</u>	2,213	80,949,148	283,751	13,272,409
↓	367	<u>Electronic components and accessories</u>	6,605	141,997,578	611,693	22,958,642
↓	369	<u>Miscellaneous electrical equipment and supplies</u>	1,701		D (100,000+)	D













N=Comparable data not available D=Withheld to avoid disclosure

SIC 36: Electronic and other electric equipment - 4-digit SIC to 6-digit NAICS

Includes only establishments with payroll. [Introductory text](#) includes scope and methodology. Figures to the left of NAICS codes indicate the percent of NAICS receipts represented by this part; and link to Table 1 where other parts of the NAICS are shown.








^{97/92} links to 1997 and 1992 Comparative Statistics for whole SICs.



SIC	NAICS	Pt	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
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361	97/32		Electric distribution equipment	901	12,325,326	67,929	2,276,264
3612			<u>Transformers</u>	318	4,716,162	26,638	822,096
100% of	335311	20	<u>Power, distribution, & specialty transformer mfg (pt)</u>	318	4,716,162	26,638	822,096
3613			<u>Switchgear & switchboard apparatus</u>	583	7,609,164	41,291	1,454,168
	335313		<u>Switchgear & switchboard apparatus mfg</u>	583	7,609,164	41,291	1,454,168
SIC	NAICS	Pt	Description	Establish-ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
362	97/32		Electrical industrial apparatus	2,388	28,643,846	169,046	5,474,383
3621			<u>Motors & generators</u>	528	11,788,281	71,112	2,072,046
96% of	335312	10	<u>Motor & generator mfg (pt)</u>	528	11,788,281	71,112	2,072,046
3624			<u>Carbon & graphite products</u>	126	2,254,410	10,887	407,987
	335991		<u>Carbon & graphite product mfg</u>	126	2,254,410	10,887	407,987
3625			<u>Relays & industrial controls</u>	1,321	11,762,789	68,365	2,429,039
	335314		<u>Relay & industrial control mfg</u>	1,321	11,762,789	68,365	2,429,039
3629			<u>Electrical industrial apparatus, n.e.c.</u>	413	2,838,366	18,682	565,311
41% of	335999	10	<u>All other miscellaneous electrical equipment & component mfg (pt)</u>	413	2,838,366	18,682	565,311
SIC	NAICS	Pt	Description	Establish-ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
363	97/32		Household appliances	356	D (100,000+)		D
3631			<u>Household cooking equipment</u>	84	3,543,231	17,543	480,836
	335221		<u>Household cooking appliance mfg</u>	84	3,543,231	17,543	480,836
3632			<u>Household refrigerators & freezers</u>	27	4,887,364	24,597	801,717
	335222		<u>Household refrigerator & home freezer mfg</u>	27	4,887,364	24,597	801,717
3633			<u>Household laundry equipment</u>	17	3,723,375	14,801	480,076
	335224		<u>Household laundry equipment mfg</u>	17	3,723,375	14,801	480,076
3634			<u>Electric housewares & fans</u>	154	3,817,521	19,229	458,176
9% of	333414	20	<u>Heating equipment (except warm air furnaces) mfg (pt)</u>	16	329,270	2,171	46,787
	335211		<u>Electric housewares & household fan mfg</u>	138	3,488,251	17,058	411,389
3635			<u>Household vacuum cleaners</u>	34	2,399,206	10,537	340,498
100% of	335212	10	<u>Household vacuum cleaner mfg (pt)</u>	34	2,399,206	10,537	340,498
3639			<u>Household appliances, n.e.c.</u>	40	D	(10k-	D











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





D	333298	20	All other industrial machinery mfg (pt)	4	D	(20-99)	D
0% of	335212	20	Household vacuum cleaner mfg (pt)	0	0	0	0
	335228		Other major household appliance mfg	36	3,300,662	13,309	425,991

SIC	NAICS	Pt	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
364	9/32		Electric lighting and wiring equipment	2,106	26,197,139	158,615	4,888,856
3641			Electric lamps	82	3,306,009	15,903	574,696
	335110		Electric lamp bulb & part mfg	82	3,306,009	15,903	574,696
3643			Current-carrying wiring devices	519	5,877,522	44,907	1,293,583
	335931		Current-carrying wiring device mfg	519	5,877,522	44,907	1,293,583
3644			Noncurrent-carrying wiring devices	219	4,451,186	23,540	787,075
	335932		Noncurrent-carrying wiring device mfg	219	4,451,186	23,540	787,075
3645			Residential lighting fixtures	497	2,177,355	16,395	406,444
97% of	335121	20	Residential electric lighting fixture mfg (pt)	497	2,177,355	16,395	406,444
3646			Commercial lighting fixtures	356	4,047,437	23,090	657,341
	335122		Commercial/industrial/institutional electric lighting fixture mfg	356	4,047,437	23,090	657,341
3647			Vehicular lighting equipment	106	3,282,824	16,506	628,534
	336321		Vehicular lighting equipment mfg	106	3,282,824	16,506	628,534
3648			Lighting equipment, n.e.c.	327	3,054,806	18,274	541,183
100% of	335129	10	Other lighting equipment mfg (pt)	327	3,054,806	18,274	541,183

SIC	NAICS	Pt	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
365	9/32		Household audio and video equipment	834	10,699,568	48,325	1,438,451
3651			Household audio & video equipment	554	8,454,194	31,727	944,647
	334310		Audio & video equipment mfg	554	8,454,194	31,727	944,647
3652			Prerecorded records & tapes	280	2,245,374	16,598	493,804
58% of	334612	10	Prerecorded CD (except software), tape, & record reproducing (pt)	280	2,245,374	16,598	493,804


SIC	NAICS	Pt	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
366	9/32		Communications equipment	2,213	80,949,148	283,751	13,272,409
3661			Telephone & telegraph apparatus	625	39,673,619	110,408	5,591,933

	334210		Telephone apparatus mfg	598	38,300,044	104,262	5,329,203
1% of	334416	10	Electronic coil, transformer, & other inductor mfg (pt)	7	8,904	63	1,836
5% of	334418	10	Printed circuit assembly (electronic assembly) mfg (pt)	20	1,364,671	6,083	260,894
3663			Radio & TV communications equipment	1,091	37,042,241	148,156	6,765,352
94% of	334220	10	Radio & TV broadcasting & wireless communications equipment mfg (	1,091	37,042,241	148,156	6,765,352
3669			Communications equipment, n.e.c.	497	4,233,288	25,187	915,124
	334290		Other communications equipment mfg	497	4,233,288	25,187	915,124
SIC	NAICS	Pt	Description	Establish-ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
367	97/32		Electronic components and accessories	6,605	141,997,578	611,693	22,958,642
3671			Electron tubes	159	3,858,499	21,976	742,074
	334411		Electron tube mfg	159	3,858,499	21,976	742,074
3672			Printed circuit boards	1,401	9,787,576	76,702	2,313,578
	334412		Bare printed circuit board mfg	1,401	9,787,576	76,702	2,313,578
3674			Semiconductors & related devices	1,099	78,539,562	199,497	10,112,757
	334413		Semiconductor & related device mfg	1,099	78,539,562	199,497	10,112,757
3675			Electronic capacitors	129	2,482,163	18,882	531,259
	334414		Electronic capacitor mfg	129	2,482,163	18,882	531,259
3676			Electronic resistors	119	1,280,527	11,964	314,045
	334415		Electronic resistor mfg	119	1,280,527	11,964	314,045
3677			Electronic coils & transformers	426	1,512,232	19,178	450,160
98% of	334416	20	Electronic coil, transformer, & other inductor mfg (pt)	426	1,512,232	19,178	450,160
3678			Electronic connectors	347	5,598,906	37,232	1,172,969
	334417		Electronic connector mfg	347	5,598,906	37,232	1,172,969
3679			Electronic components, n.e.c.	2,925	38,938,113	226,262	7,321,800
6% of	334220	20	Radio & TV broadcasting & wireless communications equipment mfg (	126	2,265,873	16,305	606,528
95% of	334418	20	Printed circuit assembly (electronic assembly) mfg (pt)	695	24,704,154	104,971	3,582,172
	334419		Other electronic component mfg	1,851	10,547,090	92,200	2,769,216
8% of	336322	10	Other motor vehicle electrical & electronic equipment mfg (pt)	253	1,420,996	12,786	363,884
SIC	NAICS	Pt	Description	Establish-ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)

369		Miscellaneous electrical equipment and supplies	1,701	D (100,000+)		D
3691		Storage batteries	137	4,432,112	23,288	789,579
	335911	Storage battery mfg	137	4,432,112	23,288	789,579
3692		Primary batteries, dry & wet	45	2,322,896	8,917	281,467
	335912	Primary battery mfg	45	2,322,896	8,917	281,467
3694		Engine electrical equipment	569	9,074,335	52,216	1,642,014
54% of	336322 20	Other motor vehicle electrical & electronic equipment mfg (pt)	569	9,074,335	52,216	1,642,014
3695		Magnetic & optical recording media	259	4,726,363	21,345	815,970
	334613	Magnetic & optical recording media mfg	259	4,726,363	21,345	815,970
3699		Electrical equipment & supplies, n.e.c.	691	D	(25k-49999)	D
2% of	332212 50	Hand & edge tool mfg (pt)	4	140,811	424	32,361
0% of	333292 20	Textile machinery mfg (pt)	0	0	0	0
D	333293 20	Printing machinery & equipment mfg (pt)	5	D	(100-249)	D
0% of	333314 10	Optical instrument & lens mfg (pt)	5	7,320	56	1,871
0% of	333315 10	Photographic & photocopying equipment mfg (pt)	0	0	0	0
10% of	333319 40	Other commercial & service industry machinery mfg (pt)	57	934,728	8,513	382,013
3% of	333512 20	Machine tool (metal cutting types) mfg (pt)	8	151,363	522	27,050
D	333618 20	Other engine equipment mfg (pt)	2	D	(1-19)	D
0% of	333992 20	Welding & soldering equipment mfg (pt)	6	11,101	71	3,028
0% of	334119 30	Other computer peripheral equipment mfg (pt)	0	0	0	0
1% of	334510 10	Electromedical & electrotherapeutic apparatus mfg (pt)	11	52,855	542	20,770
0% of	334511 10	Search, detection, navigation, & guidance instrument mfg (pt)	7	77,832	604	24,725
1% of	334516 10	Analytical laboratory instrument mfg (pt)	10	36,473	159	7,518
0% of	334519 10	Other measuring & controlling device mfg (pt)	5	6,174	29	1,621
0% of	335129 20	Other lighting equipment mfg (pt)	4	859	8	180
59% of	335999 20	All other miscellaneous electrical equipment & component mfg (pt)	567	4,051,267	26,072	923,183
0% of	339114 10	Dental equipment & supplies mfg (pt)	0	0	0	0


N=Comparable data not available D=Withheld to avoid disclosure

Σ=sum of NAICS parts listed below the symbol ^{97/92} links to Comparative Statistics for 1992 and 1997


 (Bridge complete.)

Comparable

SIC derivable from NAICS data.

 (Drawbridge slightly open.)

Almost comparable Sales or receipts from NAICS are within 3% of SIC sales or receipts.

 (Drawbridge open.)

Not comparable

SIC sales or receipts cannot be estimated within 3% from NAICS data.

Data in formats for



1997 Economic Census: Bridge Between SIC and NAICS

SIC: Manufacturing

SIC 37: Transportation equipment - Finder by 3-digit SIC

Includes only establishments with payroll. [Introductory text](#) includes scope and methodology.

Go to bridge	SIC	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
	37	<u>Transportation equipment</u>	12,387	515,881,602	1,561,662	68,298,623
↓	371	<u>Motor vehicles and equipment</u>	5,274	D	(100,000+)	D
↓	372	<u>Aircraft and parts</u>	1,711	98,963,996	411,247	20,703,396
↓	373	<u>Ship and boat building and repairing</u>	3,482	17,015,123	148,261	4,641,293
↓	374	<u>Railroad equipment</u>	207	7,916,635	31,633	1,234,564
↓	375	<u>Motorcycles, bicycles, and parts</u>	385	D	(10k-24999)	D
↓	376	<u>Guided missiles, space vehicles, parts</u>	99	18,929,257	76,808	4,500,660
↓	379	<u>Miscellaneous transportation equipment</u>	1,229	D	(50k-99999)	D









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











SIC 37: Transportation equipment - 4-digit SIC to 6-digit NAICS

Includes only establishments with payroll. Introductory text includes scope and methodology. Figures to the left of NAICS codes indicate the percent of NAICS receipts represented by this part; and link to Table 1 where other parts of the NAICS are shown.

^{97/92} links to 1997 and 1992 Comparative Statistics for whole SICs.

SIC	NAICS Pt	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
371	^{97/92}	<u>Motor vehicles and equipment</u>	5,274	D	(100,000+)	D
3711	↙ ↘	<u>Motor vehicles & car bodies</u>	472	D	(100,000+)	D
	336111	Automobile mfg	194	95,385,563	114,060	6,411,952
	336112	Light truck & utility vehicle mfg	112	110,400,169	94,033	5,361,980
	336120	Heavy duty truck mfg	84	14,490,344	28,214	1,212,651


1% of	336211	10	Motor vehicle body mfg (pt)	76	82,633	404	10,503
D	336992	10	Military armored vehicle, tank, & tank component mfg (pt)	6	D	(250-499)	D
3713			Truck & bus bodies	715	8,719,326	41,779	1,189,519
96% of	336211	20	Motor vehicle body mfg (pt)	715	8,719,326	41,779	1,189,519
3714			Motor vehicle parts & accessories	3,609	120,951,593	490,657	19,565,925
3% of	336211	30	Motor vehicle body mfg (pt)	23	265,552	1,201	40,558
	336312		Gasoline engine & engine parts mfg	881	25,974,369	81,368	3,555,964
38% of	336322	30	Other motor vehicle electrical & electronic equipment mfg (pt)	193	6,446,681	30,489	1,054,750
	336330		Motor vehicle steering & suspension component (except spring) mfg	212	10,750,312	48,944	2,336,212
100% of	336340	20	Motor vehicle brake system mfg (pt)	269	10,033,288	43,132	1,486,119
	336350		Motor vehicle transmission & power train parts mfg	523	33,288,093	111,954	5,564,722
100% of	336399	20	All other motor vehicle parts mfg (pt)	1,508	34,193,298	173,569	5,527,600
3715			Truck trailers	390	5,507,768	30,678	836,590
	336212		Truck trailer mfg	390	5,507,768	30,678	836,590
3716			Motor homes	88	3,943,709	18,086	507,700
	336213		Motor home mfg	88	3,943,709	18,086	507,700
SIC	NAICS	Pt	Description	Establish-ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
372	37/32		Aircraft and parts	1,711	98,963,996	411,247	20,703,396
3721			Aircraft	204	56,273,651	200,961	10,733,030
	336411		Aircraft mfg	204	56,273,651	200,961	10,733,030
3724			Aircraft engines & engine parts	369	22,617,284	82,557	4,223,020
	336412		Aircraft engine & engine parts mfg	369	22,617,284	82,557	4,223,020
3728			Aircraft parts & equipment, n.e.c.	1,138	20,073,061	127,729	5,747,346
0% of	332912	20	Fluid power valve & hose fitting mfg (pt)	0	0	0	0
0% of	333995	20	Fluid power cylinder & actuator mfg (pt)	0	0	0	0
0% of	333996	20	Fluid power pump & motor mfg (pt)	0	0	0	0
	336413		Other aircraft part & auxiliary equipment mfg	1,138	20,073,061	127,729	5,747,346
SIC	NAICS	Pt	Description	Establish-ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
373	37/32		Ship and boat building and repairing	3,482	17,015,123	148,261	4,641,293
3731			Ship building & repairing	700	10,571,810	97,385	3,366,404
	336611		Ship building & repairing	700	10,571,810	97,385	3,366,404


3732			Boat building & repairing	2,782	6,443,313	50,876	1,274,889
	336612		Boat building	1,043	5,622,040	41,422	1,033,974
18% of	811490	20	Boat repair	1,739	821,273	9,454	240,915
SIC	NAICS	Pt	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
374		97/32	Railroad equipment	207	7,916,635	31,633	1,234,564
3743			Railroad equipment	207	7,916,635	31,633	1,234,564
	0% of	333911	20	Pump & pumping equipment mfg (pt)	0	0	0
96% of	336510	20	Railroad rolling stock mfg (pt)	207	7,916,635	31,633	1,234,564
SIC	NAICS	Pt	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
375		97/32	Motorcycles, bicycles, and parts	385	D	(10k- 24999)	D
3751			Motorcycles, bicycles, & parts	385	D	(10k- 24999)	D
	D	336991	10	Motorcycle, bicycle, & parts mfg (pt)	385	D	(10k- 24999)
SIC	NAICS	Pt	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
376		97/32	Guided missiles, space vehicles, parts	99	18,929,257	76,808	4,500,660
3761			Guided missiles & space vehicles	22	14,791,466	52,158	3,156,221
	336414		Guided missile & space vehicle mfg	22	14,791,466	52,158	3,156,221
3764			Space propulsion units & parts	28	3,239,033	18,540	1,066,084
	336415		Guided missile & space vehicle propulsion unit & parts mfg	28	3,239,033	18,540	1,066,084
3769			Space vehicle equipment, n.e.c.	49	898,758	6,110	278,355
	336419		Other guided missile & space vehicle parts & auxiliary equip mfg	49	898,758	6,110	278,355
SIC	NAICS	Pt	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
379		97/32	Miscellaneous transportation equipment	1,229	D	(50k- 99999)	D
3792			Travel trailer & campers	315	3,076,049	20,112	506,058
	67% of	336214	10	Travel trailer & camper mfg (pt)	315	3,076,049	20,112
3795			Tanks & tank components	37	D	(5000- 9999)	D
	D	336992	20	Military armored vehicle, tank, & tank component mfg (pt)	37	D	(5000- 9999)
3799			Transportation equipment, n.e.c.	877	D	(25k- 49999)	D


D 332212 60	Hand & edge tool mfg (pt)	1	D	(20-99)	D
33% of 336214 20	Travel trailer & camper mfg (pt)	498	1,485,367	13,240	299,845
336999	All other transportation equipment mfg	378	4,557,989	19,466	512,362

N=Comparable data not available D=Withheld to avoid disclosure

Σ=sum of NAICS parts listed below the symbol ^{9%}92 links to Comparative Statistics for 1992 and 1997

 (Bridge complete.) Comparable SIC derivable from NAICS data.

 (Drawbridge slightly open.) Almost comparable Sales or receipts from NAICS are within 3% of SIC sales or receipts.

 (Drawbridge open.) Not comparable SIC sales or receipts cannot be estimated within 3% from NAICS data.

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1997 Economic Census: Bridge Between SIC and NAICS

SIC: Manufacturing

SIC 38: Instruments and related products - Finder by 3-digit SIC

Includes only establishments with payroll. [Introductory text](#) includes scope and methodology.

Go to bridge	SIC	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
	38	Instruments and related products	11,727		D (100,000+)	D
↓	381	Search and navigation equipment	680	32,497,776	187,557	9,958,084
↓	382	Measuring and controlling devices	4,787	46,449,122	263,237	11,037,829
↓	384	Medical instruments and supplies	4,818		D (100,000+)	D
↓	385	Ophthalmic goods	575	3,607,813	26,366	814,242
↓	386	Photographic equipment and supplies	739	21,305,761	63,642	2,928,089
↓	387	Watches, clocks, watchcases, and parts	128	718,191	5,646	155,180













N=Comparable data not available D=Withheld to avoid disclosure





SIC 38: Instruments and related products - 4-digit SIC to 6-digit NAICS

Includes only establishments with payroll. [Introductory text](#) includes scope and methodology. Figures to the left of NAICS codes indicate the percent of NAICS receipts represented by this part; and link to Table 1 where other parts of the NAICS are shown.

⁹⁷/₃₂ links to 1997 and 1992 Comparative Statistics for whole SICs.


SIC	NAICS	Pt	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
381	⁹⁷ / ₃₂		Search and navigation equipment	680	32,497,776	187,557	9,958,084
3812			Search & navigation equipment	680	32,497,776	187,557	9,958,084
100% of	334511	20	Search, detection, navigation, & guidance instrument mfg (pt)	680	32,497,776	187,557	9,958,084
SIC	NAICS	Pt	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
382	⁹⁷ / ₃₂		Measuring and controlling devices	4,787	46,449,122	263,237	11,037,829
3821							


		Laboratory apparatus & furniture	385	2,471,153	18,253	686,742	
	339111	Laboratory apparatus & furniture mfg	385	2,471,153	18,253	686,742	
3822		Environmental controls	317	2,935,692	21,450	664,820	
	334512	Automatic environmental control mfg	317	2,935,692	21,450	664,820	
3823		Process control instruments	1,002	7,890,923	49,196	2,004,259	
	334513	Industrial process control instrument mfg	1,002	7,890,923	49,196	2,004,259	
3824		Fluid meters & counting devices	222	3,765,769	17,390	683,294	
	334514	Totalizing fluid meter & counting device mfg	222	3,765,769	17,390	683,294	
3825		Instruments to measure electricity	843	13,877,200	63,522	3,008,675	
2% of	334416 30	Electronic coil, transformer, & other inductor mfg (pt)	17	24,303	190	6,985	
	334515	Electricity measuring & testing instrument mfg	826	13,852,897	63,332	3,001,690	
3826		Analytical instruments	664	7,157,038	38,200	1,782,600	
100% of	334516 20	Analytical laboratory instrument mfg (pt)	664	7,157,038	38,200	1,782,600	
3827		Optical instruments & lenses	495	3,174,652	20,801	833,784	
100% of	333314 20	Optical instrument & lens mfg (pt)	495	3,174,652	20,801	833,784	
3829		Measuring & controlling devices, n.e.c.	859	5,176,695	34,425	1,373,655	
100% of	334519 20	Other measuring & controlling device mfg (pt)	853	5,114,547	33,904	1,356,368	
0% of	339112 10	Surgical & medical instrument mfg (pt)	6	62,148	521	17,287	
SIC	NAICS	Pt	Description	Establish-ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
384	37	32	Medical instruments and supplies	4,818	D	(100,000+)	D
3841			Surgical & medical instruments	1,598	18,450,024	107,298	4,139,100
100% of	339112 20		Surgical & medical instrument mfg (pt)	1,598	18,450,024	107,298	4,139,100
3842			Surgical appliances & supplies	1,728	D	(50k-99999)	D
D	322121 30		Paper (except newsprint) mills (pt)	2	D	(250-499)	D
7% of	322291 20		Sanitary paper product mfg (pt)	16	651,398	2,236	68,411
7% of	334510 20		Electromedical & electrotherapeutic apparatus mfg (pt)	74	807,427	6,722	224,883
96% of	339113 20		Surgical appliance & supplies mfg (pt)	1,636	14,743,779	82,390	2,865,055
3843			Dental equipment & supplies	877	2,699,867	18,072	613,286
100% of	339114 20		Dental equipment & supplies mfg (pt)	877	2,699,867	18,072	613,286
3844			X-ray apparatus & tubes	155	3,942,256	14,276	664,233
	334517		Irradiation apparatus mfg	155	3,942,256	14,276	664,233


3845			Electromedical equipment	460	10,567,566	47,121	2,372,703
92% of 334510	30		Electromedical & electrotherapeutic apparatus mfg (pt)	460	10,567,566	47,121	2,372,703
SIC	NAICS	Pt	Description	Establishments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
385	97/32		Ophthalmic goods	575	3,607,813	26,366	814,242
3851			Ophthalmic goods	575	3,607,813	26,366	814,242
	339115		Ophthalmic goods mfg	575	3,607,813	26,366	814,242
SIC	NAICS	Pt	Description	Establishments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
386	97/32		Photographic equipment and supplies	739	21,305,761	63,642	2,928,089
3861			Photographic equipment & supplies	739	21,305,761	63,642	2,928,089
	325992		Photographic film, paper, plate, & chemical mfg	311	12,895,637	38,935	1,828,139
100% of 333315	20		Photographic & photocopying equipment mfg (pt)	428	8,410,124	24,707	1,099,950
SIC	NAICS	Pt	Description	Establishments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
387	97/32		Watches, clocks, watchcases, and parts	128	718,191	5,646	155,180
3873			Watches, clocks, & watchcases	128	718,191	5,646	155,180
78% of 334518	30		Watch, clock, & part mfg (pt)	128	718,191	5,646	155,180

N=Comparable data not available D=Withheld to avoid disclosure

Σ=sum of NAICS parts listed below the symbol 97/32 links to Comparative Statistics for 1992 and 1997

 (Bridge complete.) Comparable SIC derivable from NAICS data.

 (Drawbridge slightly open.) Almost comparable Sales or receipts from NAICS are within 3% of SIC sales or receipts.

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1997 Economic Census: Bridge Between SIC and NAICS

SIC: Manufacturing

SIC 39: Miscellaneous manufacturing industries - Finder by 3-digit SIC

Includes only establishments with payroll. [Introductory text](#) includes scope and methodology.

Go to bridge	SIC	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
	39	Miscellaneous manufacturing industries	18,043	50,997,838	393,972	10,563,481
↓	391	Jewelry, silverware, and plated ware	2,828	7,243,618	46,547	1,208,070
↓	393	Musical instruments	576	1,356,651	13,411	363,022
↓	394	Toys and sporting goods	3,600	D (100,000+)		D
↓	395	Pens, pencils, office, and art supplies	1,017	3,987,200	28,150	738,265
↓	396	Costume jewelry and notions	1,075	D (10k-24999)		D
↓	399	Miscellaneous manufactures	8,947	D (100,000+)		D











N=Comparable data not available D=Withheld to avoid disclosure







SIC 39: Miscellaneous manufacturing industries - 4-digit SIC to 6-digit NAICS

Includes only establishments with payroll. [Introductory text](#) includes scope and methodology. Figures to the left of NAICS codes indicate the percent of NAICS receipts represented by this part; and link to Table 1 where other parts of the NAICS are shown.

⁹⁷/₉₂ links to 1997 and 1992 Comparative Statistics for whole SICs.


SIC	NAICS	Pt	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
391	⁹⁷ / ₉₂		Jewelry, silverware, and plated ware	2,828	7,243,618	46,547	1,208,070
3911			Jewelry, precious metal	2,272	5,416,836	34,694	884,942
100% of	339911	20	Jewelry (except costume) mfg (pt)	2,272	5,416,836	34,694	884,942
3914			Silverware & plated ware	162	907,716	6,457	187,774
0% of	332211	20	Cutlery & flatware (except precious) mfg (pt)	11	8,032	101	2,699
99% of	339912	20	Silverware & plated ware mfg (pt)	151	899,684	6,356	185,075


3915			<u>Jewelers' materials & lapidary work</u>	394	919,066	5,396	135,354
	339913		<u>Jewelers' material & lapidary work mfg</u>	394	919,066	5,396	135,354
SIC	NAICS	Pt	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
393	97/32		Musical instruments	576	1,356,651	13,411	363,022
3931			<u>Musical instruments</u>	576	1,356,651	13,411	363,022
	339992		<u>Musical instrument mfg</u>	576	1,356,651	13,411	363,022
SIC	NAICS	Pt	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
394	97/32		Toys and sporting goods	3,600	D	(100,000+)	D
3942			<u>Dolls</u>	240	299,821	3,393	63,722
	339931		<u>Doll & stuffed toy mfg</u>	240	299,821	3,393	63,722
3944			<u>Games, toys, & children's vehicles</u>	789	D	(25k-49999)	D
	D 336991 20		<u>Motorcycle, bicycle, & parts mfg (pt)</u>	4	D	(20-99)	D
	339932		<u>Game, toy, & children's vehicle mfg</u>	785	4,534,497	29,622	773,459
3949			<u>Sporting & athletic goods, n.e.c.</u>	2,571	10,591,160	69,664	1,831,218
	339920		<u>Sporting & athletic goods mfg</u>	2,571	10,591,160	69,664	1,831,218
SIC	NAICS	Pt	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
395	97/32		Pens, pencils, office, and art supplies	1,017	3,987,200	28,150	738,265
3951			<u>Pens & mechanical pencils</u>	112	1,590,770	8,394	261,580
	339941		<u>Pen & mechanical pencil mfg</u>	112	1,590,770	8,394	261,580
3952			<u>Lead pencils & art goods</u>	152	883,200	6,002	143,660
	0% of 325998 30		<u>All other miscellaneous chemical product & preparation mfg (pt)</u>	0	0	0	0
	0% of 337127 30		<u>Institutional furniture mfg (pt)</u>	9	16,749	187	5,901
	70% of 339942 30		<u>Lead pencil & art good mfg (pt)</u>	143	866,451	5,815	137,759
3953			<u>Marking devices</u>	634	643,007	7,831	185,316
	339943		<u>Marking device mfg</u>	634	643,007	7,831	185,316
3955			<u>Carbon paper & inked ribbons</u>	119	870,223	5,923	147,709
	339944		<u>Carbon paper & inked ribbon mfg</u>	119	870,223	5,923	147,709
SIC	NAICS	Pt	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
396	97/32		Costume jewelry and notions	1,075	D	(10k-24999)	D
3961			<u>Costume jewelry</u>	826	1,223,475	13,976	314,581

96% of	339914	30	Costume jewelry & novelty mfg (pt)	826	1,223,475	13,976	314,581	
3965			Fasteners, buttons, needles, & pins	249	D	(5000-9999)	D	
	D	339993	20	Fastener, button, needle, & pin mfg (pt)	249	D	(5000-9999)	D
SIC	NAICS	Pt	Description	Establishments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)	
399	⁹⁷ / ₉₂		Miscellaneous manufactures	8,947	D	(100,000+)	D	
3991			Brooms & brushes	274	1,703,139	13,882	372,010	
	84% of	339994	20	Broom, brush, & mop mfg (pt)	274	1,703,139	13,882	372,010
3993			Signs & advertising displays	5,709	7,910,809	82,956	2,382,461	
		339950	Sign mfg	5,709	7,910,809	82,956	2,382,461	
3995			Burial caskets	177	1,271,184	6,962	212,491	
		339995	Burial casket mfg	177	1,271,184	6,962	212,491	
3996			Hard surface floor coverings	26	1,819,931	5,614	255,635	
	97% of	326192	20	Resilient floor covering mfg (pt)	26	1,819,931	5,614	255,635
3999			Mfg industries, n.e.c.	2,761	D	(50k-99999)	D	
	3% of	314999	50	All other miscellaneous textile product mills (pt)	52	173,353	2,167	42,673
	1% of	316110	20	Leather & hide tanning & finishing (pt)	26	24,625	329	7,616
	0% of	321999	50	All other miscellaneous wood product mfg (pt)	0	0	0	0
	0% of	322299	30	All other converted paper product mfg (pt)	0	0	0	0
	0% of	323110	30	Commercial lithographic printing (pt)	0	0	0	0
	0% of	323111	30	Commercial gravure printing (pt)	0	0	0	0
	0% of	323112	30	Commercial flexographic printing (pt)	0	0	0	0
	0% of	323113	40	Commercial screen printing (pt)	0	0	0	0
	0% of	323119	30	Other commercial printing (pt)	0	0	0	0
	1% of	325998	40	All other miscellaneous chemical product & preparation mfg (pt)	9	80,624	572	18,596
	1% of	326199	20	All other plastics product mfg (pt)	140	319,241	3,141	77,397
	D	332212	70	Hand & edge tool mfg (pt)	7	D	(500-999)	D
	3% of	332999	80	All other miscellaneous fabricated metal product mfg (pt)	185	285,362	3,231	85,799
	3% of	335121	30	Residential electric lighting fixture mfg (pt)	53	69,864	1,216	22,121
	1% of	337127	40	Institutional furniture mfg (pt)	5	28,296	329	8,183
	85% of	339999	20	All other miscellaneous mfg (pt)	2,284	7,183,815	60,397	1,563,790

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1997 Economic Census:

Bridge Between SIC and NAICS

SIC: Transportation, communications, and utilities % %

**

SIC 41: Local and interurban passenger transportation - Finder by 3-digit SIC

Includes only establishments with payroll. [Introductory text](#) includes scope and methodology.

Go to bridge	SIC	Description	Establishments	Revenue (\$1,000)	Paid employees	Annual payroll (\$1,000)
	41	Local and interurban passenger transportation	19,621	D	(100,000+)	D
↓	411	Local and suburban passenger transportation	10,147	D	(100,000+)	D
↓	412	Taxi service	3,184	1,280,597	27,850	392,759
↓	413	Interurban and rural bus transportation	407	1,147,432	19,900	549,727
↓	414	Charter bus service	1,531	1,768,199	31,483	548,026
↓	415	School bus service	4,326	4,233,836	147,441	1,810,695
↓	417	Bus terminal and service facilities	26	15,253	220	5,190

N=Comparable data not available D=Withheld to avoid disclosure

% Data do not include large certificated passenger carriers that report to the Office of Airline Statistics, U.S. Department of Transportation

** Railroad transportation and U.S. Postal Service industries are out of scope for the 1997 Economic Ce


SIC 41: Local and interurban passenger transportation - 4-digit SIC to 6-digit NAICS


Includes only establishments with payroll. [Introductory text](#) includes scope and methodology. Figures to the left of NAICS codes indicate the percent of NAICS receipts represented by this part; and link to Table 1 where other parts of the NAICS are shown.


^{9/92} links to 1997 and 1992 Comparative Statistics for whole SICs.



SIC	NAICS	Pt	Description	Establishments	Revenue (\$1,000)	Paid employees	Annual payroll (\$1,000)
411	^{9/92}		Local and suburban passenger transportation	10,147	D	(100,000+)	D
4111	↙		Local & suburban transit	1,152	D	(25k-49999)	D
	485111		Mixed mode transit systems	28	51,567	759	24,112
	485112		Commuter rail systems	16	D	(2500-	D


4999)

485113		Bus & motor vehicle transit systems	542	1,152,525	27,448	744,397
485119		Other urban transit systems	32	D	(500-999)	D
90% of 485999	10	Scheduled airport shuttle service	534	601,988	13,435	217,633
4119		Other local passenger transportation	8,995	8,147,039	179,736	3,183,251
485320		Limousine service	3,234	1,873,924	29,432	487,867
4% of 485410	20	Employee bus service	158	158,947	4,223	67,261
485991		Special needs transportation	1,789	1,141,413	31,791	486,676
10% of 485999	20	All other passenger transportation	232	67,395	1,078	15,557
83% of 487110	10	Sightseeing buses	307	462,186	6,858	145,734
88% of 621910	90	Ambulance or rescue service (except by air)	3,275	4,443,174	106,354	1,980,156

SIC	NAICS	Pt	Description	Establish-ments	Revenue (\$1,000)	Paid employees	Annual payroll (\$1,000)
412	97/92		Taxi service	3,184	1,280,597	27,850	392,759
4121			Taxi service	3,184	1,280,597	27,850	392,759
485310			Taxi service	3,184	1,280,597	27,850	392,759

SIC	NAICS	Pt	Description	Establish-ments	Revenue (\$1,000)	Paid employees	Annual payroll (\$1,000)
413	97/92		Interurban and rural bus transportation	407	1,147,432	19,900	549,727
4131			Interurban & rural bus transportation	407	1,147,432	19,900	549,727
485210			Interurban & rural bus transportation	407	1,147,432	19,900	549,727

SIC	NAICS	Pt	Description	Establish-ments	Revenue (\$1,000)	Paid employees	Annual payroll (\$1,000)
414	97/92		Charter bus service	1,531	1,768,199	31,483	548,026
4141			Charter bus service, local	482	459,953	8,694	143,572
26% of 485510	10		Charter bus service, local	482	459,953	8,694	143,572
4142			Charter bus service, interstate/interurban	1,049	1,308,246	22,789	404,454
74% of 485510	20		Charter bus service, interstate/interurban	1,049	1,308,246	22,789	404,454

SIC	NAICS	Pt	Description	Establish-ments	Revenue (\$1,000)	Paid employees	Annual payroll (\$1,000)
415	97/92		School bus service	4,326	4,233,836	147,441	1,810,695
4151			School bus service	4,326	4,233,836	147,441	1,810,695
96% of 485410	10		School bus service	4,326	4,233,836	147,441	1,810,695

SIC	NAICS	Pt	Description	Establish-ments	Revenue (\$1,000)	Paid employees	Annual payroll (\$1,000)
417	97/92		Bus terminal and service facilities	26	15,253	220	5,190
4173			Bus terminal & service facilities	26	15,253	220	5,190

4% of 488490 10

Terminal or maintenance facilities for motor
vehicle pass trans

26

15,253

220

5,190

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** Railroad transportation and U.S. Postal Service industries are out of scope for the 1997 Economic Ce

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(Bridge complete.)

Comparable

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1997 Economic Census:

Bridge Between SIC and NAICS

SIC: Transportation, communications, and utilities % %

**

SIC 42: Motor freight transportation and warehousing - Finder by 3-digit SIC

Includes only establishments with payroll. Introductory text includes scope and methodology.

Go to bridge	SIC	Description	Establishments	Revenue (\$1,000)	Paid employees	Annual payroll (\$1,000)
	42	Motor freight transportation and warehousing	133,373	197,375,341	1,960,130	55,739,452
↓	421	Trucking and courier services, except air	119,868	184,178,773	1,831,577	52,513,343
↓	422	Public warehousing and storage	13,491	13,183,579	128,433	3,222,154
↓	423	Trucking terminal facilities	14	12,989	120	3,955

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% Data do not include large certificated passenger carriers that report to the Office of Airline Statistics, U.S. Department of Transportation






** Railroad transportation and U.S. Postal Service industries are out of scope for the 1997 Economic Census

SIC 42: Motor freight transportation and warehousing - 4-digit SIC to 6-digit NAICS


Includes only establishments with payroll. Introductory text includes scope and methodology. Figures to the left of NAICS codes indicate the percent of NAICS receipts represented by this part; and link to Table 1 where other parts of the NAICS are shown.

97% links to 1997 and 1992 Comparative Statistics for whole SICs.

SIC	NAICS	Pt	Description	Establishments	Revenue (\$1,000)	Paid employees	Annual payroll (\$1,000)
421	97%	92	Trucking and courier services, except air	119,868	184,178,773	1,831,577	52,513,343
4212			Local trucking without storage	61,063	51,384,852	473,694	12,642,812
90% of	484110	Σ	General freight trucking, local	14,545	11,108,345	73,967	3,166,529
	484110	10	General freight trucking without storage, local, truckload	10,296	7,783,545	73,967	1,934,702
	484110	20	General freight trucking w/o storage, local, less than truckload	4,249	3,324,800	47,246	1,231,827
10% of	484210	10	Used household & office goods moving, local, without storage	3,259	1,198,983	20,858	395,383
96% of	484220	Σ	Specialized freight (except used goods) trucking, local	34,935	18,932,851	10,951	4,514,945

484220	10		Hazardous materials trucking (except waste), local	1,434	1,267,441	10,951	366,278
484220	20		Agricultural products trucking without storage, local	8,065	2,785,495	29,925	629,234
484220	30		Dump trucking	17,440	9,748,351	81,553	2,083,930
484220	40		Specialized trucking without storage, local	7,996	5,131,564	56,450	1,435,503
562111			Solid waste collection	7,083	18,211,495	137,049	4,048,032
562112			Hazardous waste collection	414	1,095,553	8,468	317,464
562119			Other waste collection	827	837,625	7,227	200,459
4213			<u>Trucking, except local</u>	47,315	105,764,108	915,091	28,992,807
484121			<u>General freight trucking, long-distance, truckload</u>	23,111	51,142,148	425,758	12,690,093
484122			<u>General freight trucking, long-distance, less than truckload</u>	6,210	25,010,091	258,972	9,509,916
72% of 484210	20		<u>Used household & office goods moving, long-distance</u>	3,555	9,111,477	65,734	1,741,891
100% of 484230	Σ		<u>Specialized freight (except used goods) trucking, long-distance</u>	14,439	20,500,392	28,396	5,050,907
484230	10		Hazardous materials trucking (except waste), long-distance	2,043	3,840,724	28,396	918,360
484230	20		Agricultural products trucking, long-distance	5,389	3,693,332	32,371	789,921
484230	30		Other specialized trucking, long-distance	7,007	12,966,336	103,860	3,342,626
4214			<u>Local trucking with storage</u>	3,744	4,221,111	57,749	1,401,608
10% of 484110	Σ		<u>General freight trucking, local</u>	915	1,164,931	7,468	355,591
484110	30		General freight trucking with storage, local, truckload	542	678,272	7,468	199,953
484110	40		General freight trucking with storage, local, less than truckload	373	486,659	6,096	155,638
18% of 484210	30		<u>Used household & office goods moving, local, with storage</u>	2,286	2,273,241	34,958	806,674
4% of 484220	50		<u>Specialized trucking with storage, local</u>	543	782,939	9,227	239,343
4215			<u>Courier services, except by air</u>	7,746	22,808,702	385,043	9,476,116
53% of 492110	10		Courier services (except by air)	2,362	19,289,602	317,630	8,234,379
492210			Local messengers & local delivery	5,384	3,519,100	67,413	1,241,737
SIC	NAICS	Pt	Description	Establish-ments	Revenue (\$1,000)	Paid employees	Annual payroll (\$1,000)
422	97/32		Public warehousing and storage	13,491	13,183,579	128,433	3,222,154
4221			<u>Farm product warehousing & storage facilities</u>	486	673,198	5,280	118,542
	493130		Farm product warehousing & storage	486	673,198	5,280	118,542
4222			<u>Refrigerated products warehousing</u>	872	2,268,823	22,109	609,335
100% of 493120	10		Refrigerated products warehousing	872	2,268,823	22,109	609,335

4225		<u>General warehousing & storage</u>	10,912	7,846,325	81,450	1,918,952
<u>100% of</u>	493110	<u>10</u>	<u>General warehousing & storage (except in foreign trade zones)</u>			
			3,918	5,320,671	62,777	1,622,917
	531130		<u>Lessors of miniwarehouses & self storage units</u>			
			6,994	2,525,654	18,673	296,035
4226		<u>Other special warehousing & storage</u>	1,221	2,395,233	19,594	575,325
<u>0% of</u>	493110	<u>20</u>	<u>General warehousing & storage in foreign trade zones</u>			
			3	718	7	111
<u>0% of</u>	493120	<u>20</u>	<u>Fur storage</u>			
			5	1,504	12	249
<u>100% of</u>	493190	Σ	<u>Other warehousing & storage</u>			
			1,213	2,393,011	6,158	574,965
	493190	<u>10</u>	<u>Household goods warehousing & storage</u>			
			317	451,574	6,158	141,630
	493190	<u>20</u>	<u>Specialized goods warehousing & storage</u>			
			896	1,941,437	13,417	433,335


SIC	NAICS	Pt	Description	Establish- ments	Revenue (\$1,000)	Paid employees	Annual payroll (\$1,000)
423	<u>9%</u>	<u>92</u>	Trucking terminal facilities	14	12,989	120	3,955
4231			<u>Trucking terminal facilities</u>	14	12,989	120	3,955
	<u>3% of</u>	488490	<u>20</u>	<u>Motor freight terminal & joint terminal maint facility trans</u>			
				14	12,989	120	3,955


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1997 Economic Census: Bridge Between SIC and NAICS

SIC: Retail trade

SIC 55: Automotive dealers and gasoline service stations - Finder by 3-digit SIC

Includes only establishments with payroll. [Introductory text](#) includes scope and methodology.

Go to bridge	SIC	Description	Establishments	Sales (\$1,000)	Paid employees	Annual payroll (\$1,000)
	55	<u>Automotive dealers and gasoline service stations</u>	202,237	788,231,182	2,283,756	55,502,391
↓	551	<u>Motor vehicle dealers (new and used)</u>	25,897	518,971,824	1,046,243	35,202,751
↓	552	<u>Motor vehicle dealers (used only)</u>	23,340	34,680,468	92,752	2,197,396
↓	553	<u>Auto and home supply stores</u>	40,565	35,028,316	300,953	6,044,147
↓	554	<u>Gasoline service stations</u>	98,846	170,660,068	741,040	9,488,181
↓	555	<u>Boat dealers</u>	5,262	8,934,230	35,134	839,296
↓	556	<u>Recreational vehicle dealers</u>	3,014	10,069,749	29,463	813,962
↓	557	<u>Motorcycle dealers</u>	3,635	7,369,260	29,026	712,065
↓	559	<u>Automotive dealers, not elsewhere classified</u>	1,678	2,517,267	9,145	204,593







N=Comparable data not available D=Withheld to avoid disclosure


SIC 55: Automotive dealers and gasoline service stations - 4-digit SIC to 6-digit NAICS

Includes only establishments with payroll. [Introductory text](#) includes scope and methodology. Figures to the left of NAICS codes indicate the percent of NAICS receipts represented by this part; and link to Table 1 where other parts of the NAICS are shown.

^{97/92} links to 1997 and 1992 Comparative Statistics for whole SICs.

SIC	NAICS Pt	Description	Establishments	Sales (\$1,000)	Paid employees	Annual payroll (\$1,000)
551	^{97/92}	<u>Motor vehicle dealers (new and used)</u>	25,897	518,971,824	1,046,243	35,202,751
5511		<u>Motor vehicle dealers (new & used)</u>	25,897	518,971,824	1,046,243	35,202,751
441110		<u>New car dealers</u>	25,897	518,971,824	1,046,243	35,202,751


SIC	NAICS	Pt	Description	Establish- ments	Sales (\$1,000)	Paid employees	Annual payroll (\$1,000)
552	9/32		Motor vehicle dealers (used only)	23,340	34,680,468	92,752	2,197,396
5521			<u>Motor vehicle dealers (used only)</u>	23,340	34,680,468	92,752	2,197,396
	441120		<u>Used car dealers</u>	23,340	34,680,468	92,752	2,197,396
SIC	NAICS	Pt	Description	Establish- ments	Sales (\$1,000)	Paid employees	Annual payroll (\$1,000)
553	9/32		Auto and home supply stores	40,565	35,028,316	300,953	6,044,147
5531			<u>Auto & home supply stores</u>	40,565	35,028,316	300,953	6,044,147
	47% of 441310	10	<u>Auto supplies stores</u>	24,508	20,143,722	175,587	3,096,231
	68% of 441320	10	<u>New tire dealers</u>	14,814	13,312,367	113,807	2,761,880
	6% of 452990	32	<u>Other auto & home supplies stores</u>	1,243	1,572,227	11,559	186,036
SIC	NAICS	Pt	Description	Establish- ments	Sales (\$1,000)	Paid employees	Annual payroll (\$1,000)
554	9/32		Gasoline service stations	98,846	170,660,068	741,040	9,488,181
5541			<u>Gasoline service stations</u>	98,846	170,660,068	741,040	9,488,181
	78% of 447110	20	<u>Gasoline stations with convenience stores</u>	53,641	100,103,399	432,935	5,234,676
	100% of 447190	Σ	<u>Other gasoline stations</u>	45,205	70,556,669	238,465	4,253,505
	447190	10	Gasoline stations with no convenience stores	42,270	55,523,140	238,465	3,338,637
	447190	20	Truck stops	2,935	15,033,529	69,640	914,868
SIC	NAICS	Pt	Description	Establish- ments	Sales (\$1,000)	Paid employees	Annual payroll (\$1,000)
555	9/32		Boat dealers	5,262	8,934,230	35,134	839,296
5551			<u>Boat dealers</u>	5,262	8,934,230	35,134	839,296
	441222		<u>Boat dealers</u>	5,262	8,934,230	35,134	839,296
SIC	NAICS	Pt	Description	Establish- ments	Sales (\$1,000)	Paid employees	Annual payroll (\$1,000)
556	9/32		Recreational vehicle dealers	3,014	10,069,749	29,463	813,962
5561			<u>Recreational vehicle dealers</u>	3,014	10,069,749	29,463	813,962
	441210		<u>Recreational vehicle dealers</u>	3,014	10,069,749	29,463	813,962
SIC	NAICS	Pt	Description	Establish- ments	Sales (\$1,000)	Paid employees	Annual payroll (\$1,000)
557	9/32		Motorcycle dealers	3,635	7,369,260	29,026	712,065
5571			<u>Motorcycle dealers</u>	3,635	7,369,260	29,026	712,065
	441221		<u>Motorcycle dealers</u>	3,635	7,369,260	29,026	712,065
SIC	NAICS	Pt	Description	Establish-	Sales	Paid	Annual payroll


			<u>ments</u>	<u>(\$1,000)</u>	<u>employees</u>	<u>(\$1,000)</u>
559	⁹⁷ / ₉₂	<u>Automotive dealers, not elsewhere classified</u>	1,678	2,517,267	9,145	204,593
5599		<u>Automotive dealers, not elsewhere classified</u>	1,678	2,517,267	9,145	204,593
441229		<u>All other motor vehicle dealers</u>	1,678	2,517,267	9,145	204,593


N=Comparable data not available D=Withheld to avoid disclosure

\$\$ 1992 sales data include sales from catalog order desks. 1997 sales data exclude sales from catalog order desks

Σ=sum of NAICS parts listed below the symbol ⁹⁷/₉₂ links to Comparative Statistics for 1992 and 1997

 (Bridge complete.) Comparable SIC derivable from NAICS data.

 (Drawbridge slightly open.) Almost comparable Sales or receipts from NAICS are within 3% of SIC sales or receipts.

 (Drawbridge open.) Not comparable SIC sales or receipts cannot be estimated within 3% from NAICS data.

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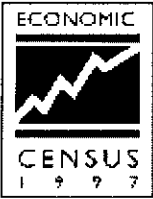
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1997 Economic Census: Bridge Between SIC and NAICS

SIC: Service industries

SIC 75: Truck rental services, without drivers - Finder by 3-digit SIC

Includes only establishments with payroll. [Introductory text](#) includes scope and methodology.

Go to bridge	SIC	Description		Establish- ments	Receipts (\$1,000)	Paid employees	Annual payroll (\$1,000)
	75	Automotive repair, services, and parking	Taxable	191,907	99,574,966	1,094,161	22,643,253
↓	751	Automotive rental and leasing, without drivers	Taxable	10,542	28,921,850	158,062	3,870,601
↓	752	Automobile parking	Taxable	10,358	5,174,724	76,166	967,701
↓	753	Automotive repair shops	Taxable	142,372	55,685,916	630,614	14,808,177
↓	754	Automotive services, except repair	Taxable	28,635	9,792,476	229,319	2,996,774











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SIC 75: Truck rental services, without drivers - 4-digit SIC to 6-digit NAICS



Includes only establishments with payroll. [Introductory text](#) includes scope and methodology. Figures to the left of NAICS codes indicate the percent of NAICS receipts represented by this part; and link to Table 1 where other parts of the NAICS are shown.

^{97/92} links to 1997 and 1992 Comparative Statistics for whole SICs.

SIC	NAICS	Pt	Description		Establish- ments	Receipts (\$1,000)	Paid employees	Annual payroll (\$1,000)
751	^{97/92}		Automotive rental and leasing, without drivers	Taxable	10,542	28,921,850	158,062	3,870,601
7513			Truck rental services, without drivers	Taxable	4,936	10,081,603	45,224	1,377,581
98% of	532120	Σ	Truck, utility trailer, & RV rental & leasing	Taxable	4,936	10,081,603	13,138	1,377,581
	532120	10	Truck rental	Taxable	2,498	2,420,548	13,138	296,754
	532120	20	Truck leasing	Taxable	2,438	7,661,055	32,086	1,080,827
7514			Passenger car rental	Taxable	4,367	14,783,704	102,623	2,129,602

	532111		Passenger car rental	Taxable	4,367	14,783,704	102,623	2,129,602
7515			Passenger car leasing	Taxable	879	3,800,424	8,325	315,960
	532112		Passenger car leasing	Taxable	879	3,800,424	8,325	315,960
7519			Utility trailer & recreational vehicle rental	Taxable	360	256,119	1,890	47,458
3% of	532120	90	Utility trailer & RV (recreational vehicle) rental & leasing	Taxable	360	256,119	1,890	47,458
SIC	NAICS	Pt	Description		Establish- ments	Receipts (\$1,000)	Paid employees	Annual payroll (\$1,000)
752	97/32		Automobile parking	Taxable	10,358	5,174,724	76,166	967,701
7521			Automobile parking	Taxable	10,358	5,174,724	76,166	967,701
	812930		Parking lots & garages	Taxable	10,358	5,174,724	76,166	967,701
SIC	NAICS	Pt	Description		Establish- ments	Receipts (\$1,000)	Paid employees	Annual payroll (\$1,000)
753	97/32		Automotive repair shops	Taxable	142,372	55,685,916	630,614	14,808,177
7532			Top, body, & upholstery repair shops & paint shops	Taxable	35,569	17,755,296	205,172	5,172,206
100% of	811121	Σ	Automotive body, paint, & interior repair & maintenance	Taxable	35,569	17,755,296	192,853	5,172,206
	811121	10	Paint or body repair shops	Taxable	33,144	16,645,229	192,853	4,899,276
	811121	20	Van conversion services	Taxable	639	723,189	6,507	156,778
	811121	30	Upholstery & interior repair shops	Taxable	1,786	386,878	5,812	116,152
7533			Automotive exhaust system repair shops	Taxable	5,251	1,985,377	23,015	524,940
	811112		Automotive exhaust system repair	Taxable	5,251	1,985,377	23,015	524,940
7534			Tire retreading & repair shops	Taxable	1,760	1,270,577	10,930	248,727
	326212		Tire retreading	Taxable	754	982,607	7,939	192,387
27% of	811198	10	Tire repair shops	Taxable	1,006	287,970	2,991	56,340
7536			Automotive glass replacement shops	Taxable	5,599	3,149,984	29,187	753,574
	811122		Automotive glass replacement shops	Taxable	5,599	3,149,984	29,187	753,574
7537			Automotive transmission repair shops	Taxable	6,768	2,431,584	29,442	709,254
	811113		Automotive transmission repair	Taxable	6,768	2,431,584	29,442	709,254
7538			General automotive repair shops	Taxable	77,751	25,598,455	290,634	6,438,842
	811111		General automotive repair	Taxable	77,751	25,598,455	290,634	6,438,842
7539			Automotive repair shops, n.e.c.	Taxable	9,674	3,494,643	42,234	960,634
100% of	811118	Σ	Other automotive mechanical & electrical repair & maintenance	Taxable	9,674	3,494,643	4,802	960,634
	811118	10	Carburetor repair shops	Taxable	1,091	363,763	4,802	106,409


811118 20	Brake, front end, & wheel alignment	Taxable	3,741	1,553,732	18,216	449,563
811118 30	Electrical repair shops, motor vehicle	Taxable	1,679	494,744	6,890	135,846
811118 40	Radiator repair	Taxable	2,295	728,297	8,372	174,076
811118 90	All other motor vehicle repair shops	Taxable	868	354,107	3,954	94,740


SIC	NAICS Pt	Description		<u>Establish- ments</u>	<u>Receipts (\$1,000)</u>	<u>Paid employees</u>	<u>Annual payroll (\$1,000)</u>
754	⁹⁷ / ₉₂	<u>Automotive services, except repair</u>	Taxable	28,635	9,792,476	229,319	2,996,774
7542		<u>Carwashes</u>	Taxable	13,683	3,911,344	123,602	1,252,587
	811192	<u>Carwashes</u>	Taxable	13,683	3,911,344	123,602	1,252,587
7549		<u>Automotive services, except repair & carwashes</u>	Taxable	14,952	5,881,132	105,717	1,744,187
	488410	<u>Motor vehicle towing</u>	Taxable	5,893	2,295,188	36,845	747,355
	811191	<u>Automotive oil change & lubrication shops</u>	Taxable	7,413	2,787,318	57,083	778,632
	⁷⁴ % of 811198 20	<u>All other motor vehicle services (except repair & carwashes)</u>	Taxable	1,646	798,626	11,789	218,200


N=Comparable data not available D=Withheld to avoid disclosure

% Comparability may be limited because of changes in assignment of tax status by industry.

Σ=sum of NAICS parts listed below the symbol ⁹⁷/₉₂ links to Comparative Statistics for 1992 and 1997

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5.2 PERCENT OF SIC EMPLOYMENT PER PARTIAL NAICS CODE

Surface Cleaning

		Establishments	% of Establishments	Employees	% of Employees
314999	<u>All other miscellaneous textile product mills</u>	2,238		64,480	
2299	<u>Textile goods, n.e.c. (pt)</u>	253		11,164	
2395	<u>Pleating & stitching (pt)</u>	805		15,001	
2396	<u>Automotive & apparel trimmings (pt)</u>	262		3,677	
2399	<u>Fabricated textile products, n.e.c. (pt)</u>	866		32,471	
3999	<u>Manufacturing industries, n.e.c. (pt)</u>	52	2.3%	2,167	3.4%
316110	<u>Leather & hide tanning & finishing</u>	358		15,317	
3111	<u>Leather tanning & finishing</u>	332		14,988	
3999	<u>Manufacturing industries, n.e.c. (pt)</u>	26	7.3%	329	2.1%
322121	<u>Paper (except newsprint) mills</u>	262		120,176	
2621	<u>Paper mills (pt)</u>	225		93,537	
2676	<u>Sanitary paper products (pt)</u>	35		(25k-49999)	
3842	<u>Surgical appliances & supplies (pt)</u>	2	0.8%	499	0.4%
* assuming worst case employment of 499 (250-499) for 3842					
322291	<u>Sanitary paper product mfg</u>	141		21,791	
2676	<u>Sanitary paper products (pt)</u>	125		19,555	
3842	<u>Surgical appliances & supplies (pt)</u>	16	11.3%	2,236	10.3%
324199	<u>All other petroleum & coal products mfg</u>	74		3,671	
2999	<u>Petroleum & coal products, n.e.c.</u>	66		1,940	
3312	<u>Blast furnaces & steel mills (pt)</u>	8	10.8%	1,731	47.2%
325998	<u>All other miscellaneous chemical product & preparation mfg</u>	1,149		35,915	
2819	<u>Industrial inorganic chemicals, n.e.c. (pt)</u>	22		1,484	
2899	<u>Chemical preparations, n.e.c. (pt)</u>	1,118		33,859	
3952	<u>Lead pencils & art goods (pt)</u>	0	0.0%	0	0.0%
3999	<u>Manufacturing industries, n.e.c. (pt)</u>	9	0.8%	572	1.6%
			0.8%		1.6%
326199	<u>All other plastics product mfg</u>	8,611		526,382	
3089	<u>Plastics products, n.e.c. (pt)</u>	8,471		523,241	
3999	<u>Manufacturing industries, n.e.c. (pt)</u>	140	1.6%	3,141	0.6%

		Establishments	% of Establishments	Employees	% of Employees
332999	All other miscellaneous fabricated metal product mfg	3,028		79,070	
3291	Abrasive products (pt)	8		978	
3432	Plumbing fittings & brass goods (pt)	5	0.2%	474	0.6%
3494	Valves & pipe fittings, n.e.c. (pt)	23	0.8%	564	0.7%
3497	Metal foil & leaf (pt)	64	2.1%	5,648	7.1%
3499	Fabricated metal products, n.e.c. (pt)	2,592	85.6%	63,736	80.6%
3537	Industrial trucks & tractors (pt)	19	0.6%	240	0.3%
3599	Industrial machinery, n.e.c. (pt)	132	4.4%	4,199	5.3%
3999	Manufacturing industries, n.e.c. (pt)	185	6.1%	3,231	4.1%
			99.7%		98.8%
334612	Prerecorded CD (except software), tape, & record reproducing	531		25,554	
3652	Prerecorded records & tapes	280	52.7%	16,598	65.0%
7819	Services allied to motion picture production (pt)	251		8,956	
335121	Residential electric lighting fixture mfg	557		17,685	
3089	Plastics products, n.e.c. (pt)	7		74	
3645	Residential lighting fixtures	497	89.2%	16,395	92.7%
3999	Manufacturing industries, n.e.c. (pt)	53	9.5%	1,216	6.9%
			98.7%		99.6%
335312	Motor & generator mfg	723		74,666	
3621	Motors & generators	528	73.0%	71,112	95.2%
7694	Armature rewinding shops (pt)	195		3,554	
337110	Wood kitchen cabinet & counter top mfg	7,963		99,257	
2434	Wood kitchen cabinets	5,096		79,579	
2541	Wood partitions & fixtures (pt)	812	10.2%	9,785	9.9%
5712	Furniture stores (pt)	2,055		9,893	
337121	Upholstered household furniture mfg	1,706		90,009	
2512	Upholstered household furniture	1,095	64.2%	85,258	94.7%
2515	Mattresses & bedsprings (pt)	35	2.1%	1,601	1.8%
5712	Furniture stores (pt)	576		3,150	
			66.2%		96.5%
337122	Nonupholstered wood household furniture mfg	3,850		128,248	
2511	Wood household furniture	3,035	78.8%	123,368	96.2%
5712	Furniture stores (pt)	815		4,880	
339993	Fastener, button, needle, & pin mfg	251		7,842	
3131	Footwear cut stock & findings (pt)	2		(1-19)	
3965	Fasteners, buttons, needles, & pins	249	99.2%	7836	99.9%

* Assumed 3 people per facility for SIC3131 therefore employment for SIC 3965 is 7836 range was (5000-9999)

		Establishments	% of Establishments	Employees	% of Employees
339994	<u>Broom, brush, & mop mfg</u>	332		16,826	
2392	<u>Housefurnishings, n.e.c. (pt)</u>	58		2,944	
3991	<u>Brooms & brushes</u>	274	82.5%	13,882	82.5%
339999	<u>All other miscellaneous mfg</u>	2,733		74,137	
2499	<u>Wood products, n.e.c. (pt)</u>	449		13,740	
3999	<u>Manufacturing industries, n.e.c. (pt)</u>	2,284	83.6%	60,397	81.5%
447110	<u>Gasoline stations with convenience stores</u>	81,684		613,957	
5411	<u>Convenience stores selling gasoline</u>	28,043		181,022	
5541	<u>Gasoline stations with convenience stores</u>	53,641	65.7%	432,935	70.5%
488490	<u>Other support activities for road transportation</u>	531		7,480	
4173	<u>Terminal or maintenance facilities for motor vehicle</u>	26	4.9%	220	2.9%
4231	<u>Motor freight terminal or joint terminal maintenance</u>	14	2.6%	120	1.6%
4785	<u>Fixed facilities & insp & weighing serv for motor v</u>	165		1,751	
4789	<u>Support activities incidental to road transportation</u>	326		5,389	
			7.5%		4.5%
811198	<u>All other automotive repair & maintenance</u>	2,652		14,780	
7534	<u>Tire repair shops</u>	1,006	37.9%	2,991	20.2%
7549	<u>MV services, exc repair & carwashes (exc lubrica</u>	1,646		11,789	
811490	<u>Other personal & household goods repair & maintenance</u>	14,641		65,213	
3732	<u>Boat repair</u>	1,739	11.9%	9,454	14.5%
7219	<u>Garment repair & alteration services</u>	2,400		9,015	
7631	<u>Watch, clock, & jewelry repair</u>	1,716		5,599	
7692	<u>Welding repair</u>	4,840		22,291	
7699	<u>All other repair & related services</u>	3,946		18,854	

Surface Coating

		Establishments	% of Establishments	Employees	% of Employees
2426					
321912	Cut stock, resawing lumber, & planing	1,400		39,763	
2421	Sawmills & planing mills, general (pt)	761		22,105	
2426	Hardwood dimension & flooring mills (pt)	619	44.2%	17,109	43.0%
2439	Structural wood members, n.e.c. (pt)	0	0.0%	0	0.0%
2499	Wood products, n.e.c. (pt)	20	1.4%	549	1.4%
					44.4%
321918	Other millwork (including flooring)	1,468		38,100	
2421	Sawmills & planing mills, general (pt)	5		91	
2426	Hardwood dimension & flooring mills (pt)	127	8.7%	10,521	27.6%
2431	Millwork (pt)	1,336	91.0%	27,488	72.1%
					99.8%
337215	Showcase, partition, shelving, & locker mfg	2,158		75,382	
2426	Hardwood dimension & flooring mills (pt)	246	11.4%	6,310	8.4%
2541	Wood partitions & fixtures (pt)	908		23,305	
2542	Partitions & fixtures, except wood	926		44,472	
3499	Fabricated metal products, n.e.c. (pt)	78		1,295	
2429					
321113	Sawmills	4,404		119,760	
2421	Sawmills & planing mills, general (pt)	4,334		119,456	
2429	Special product sawmills, n.e.c. (pt)	70	1.6%	304	0.3%
2439	Structural wood members, n.e.c. (pt)	0	0.0%	0	0.0%
					0.3%
321920	Wood container & pallet mfg	2,995		51,134	
2429	Special product sawmills, n.e.c. (pt)	24	0.8%	684	1.3%
2441	Nailed wood boxes & shook	318	10.6%	4,885	9.6%
2448	Wood pallets & skids	2,347	78.4%	38,994	76.3%
2449	Wood containers, n.e.c.	257	8.6%	5,701	11.1%
2499	Wood products, n.e.c. (pt)	49	1.6%	870	1.7%
					100.0%
321999	All other miscellaneous wood product mfg	2,408		43,839	
2421	Sawmills & planing mills, general (pt)	76		1,640	
2429	Special product sawmills, n.e.c. (pt)	8	0.3%	355	0.8%
2499	Wood products, n.e.c. (pt)	2,324	96.5%	41,844	95.4%
3131	Footwear cut stock & findings (pt)	0		0	
3999	Manufacturing industries, n.e.c. (pt)	0		0	
					96.3%

		Establishments	% of Establishments	Employees	% of Employees
243					
321918	<u>Other millwork (including flooring)</u>	1,468		38,100	
	See above				
337110	<u>Wood kitchen cabinet & counter top mfg</u>	7,963		99,257	
2434	<u>Wood kitchen cabinets</u>	5,096	64.0%	79,579	80.2%
2541	<u>Wood partitions & fixtures (pt)</u>	812		9,785	
5712	<u>Furniture stores (pt)</u>	2,055		9,893	
321113	<u>Sawmills</u>	4,404		119,760	
	See above				
321912	<u>Cut stock, resawing lumber, & planing</u>	1,400		39,763	
	See above				
244					
321920	<u>Wood container & pallet mfg</u>	2,995		51,134	
	See above				
2499					
321912	<u>Cut stock, resawing lumber, & planing</u>	1,400		39,763	
	See above				
321920	<u>Wood container & pallet mfg</u>	2,995		51,134	
	See above				
321999	<u>All other miscellaneous wood product mfg</u>	2,408		43,839	
	See above				
332321	<u>Metal window & door mfg</u>	1,417		74,944	
2499	<u>Wood products, n.e.c. (pt)</u>	0	0.0%	0	0.0%
3442	<u>Metal doors, sash, & trim</u>	1,384		72,970	
3449	<u>Miscellaneous metal work (pt)</u>	33		1,974	
339999	<u>All other miscellaneous mfg</u>	2,733		74,137	
2499	<u>Wood products, n.e.c. (pt)</u>	449	16.4%	13,740	18.5%
3999	<u>Manufacturing industries, n.e.c. (pt)</u>	2,284		60,397	

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		Establishments	% of Establishments	Employees	% of Employees
337110	Wood kitchen cabinet & counter top mfg	7,963		99,257	
2434	Wood kitchen cabinets	5,096		79,579	
2541	Wood partitions & fixtures (pt)	812	10.2%	9,785	9.9%
5712	Furniture stores (pt)	2,055		9,893	
337121	Upholstered household furniture mfg	1,706		90,009	
2512	Upholstered household furniture	1,095	64.2%	85,258	94.7%
2515	Mattresses & bedsprings (pt)	35	2.1%	1,601	1.8%
5712	Furniture stores (pt)	576		3,150	
			66.2%		96.5%
337122	Nonupholstered wood household furniture mfg	3,850		128,248	
2511	Wood household furniture	3,035	78.8%	123,368	96.2%
5712	Furniture stores (pt)	815		4,880	
337127	Institutional furniture mfg	1,008		38,218	
2531	Public building & related furniture (pt)	267	26.5%	15,254	39.9%
2599	Furniture & fixtures, n.e.c. (pt)	727	72.1%	22,448	58.7%
3952	Lead pencils & art goods (pt)	9		187	
3999	Manufacturing industries, n.e.c. (pt)	5		329	
			98.6%		98.6%
337215	Showcase, partition, shelving, & locker mfg	2,158		75,382	
2426	Hardwood dimension & flooring mills (pt)	246		6,310	
2541	Wood partitions & fixtures (pt)	908	42.1%	23,305	30.9%
2542	Partitions & fixtures, except wood	926	42.9%	44,472	59.0%
3499	Fabricated metal products, n.e.c. (pt)	78		1,295	
			85.0%		89.9%
336360	Motor vehicle seating & interior trim mfg	358		45,600	
2396	Automotive & apparel trimmings (pt)	117		22,043	
2399	Fabricated textile products, n.e.c. (pt)	57		2,773	
2531	Public building & related furniture (pt)	184	51.4%	20,784	45.6%
339113	Surgical appliance & supplies mfg	1,652		85,315	
2599	Furniture & fixtures, n.e.c. (pt)	16	1.0%	2,925	3.4%
3842	Surgical appliances & supplies (pt)	1,636		82,390	
339942	Lead pencil & art good mfg	173		7,990	
2531	Public building & related furniture (pt)	17	9.8%	941	11.8%
3579	Office machines, n.e.c. (pt)	13		1,234	
3952	Lead pencils & art goods (pt)	143		5,815	

		Establishments	% of Establishments	Employees	% of Employees
3357					
331319	<u>Other aluminum rolling & drawing</u>	36		4,306	
3355	<u>Aluminum rolling & drawing, n.e.c.</u>	20		2,657	
3357	<u>Nonferrous wire drawing & insulating (pt)</u>	16	44.4%	1,649	38.3%
331491	<u>Other nonferrous metal rolling, drawing, & extruding</u>	267		25,872	
3356	<u>Nonferrous rolling & drawing, n.e.c.</u>	184		17,237	
3357	<u>Nonferrous wire drawing & insulating (pt)</u>	83	31.1%	8,635	33.4%

		Establishments	% of Establishments	Employees	% of Employees
341					
332439	Other metal container mfg	496		14,922	
3412	<u>Metal barrels, drums, & pails</u>	151	30.4%	6,318	42.3%
3429	<u>Hardware, n.e.c. (pt)</u>	117		4,135	
3444	<u>Sheet metal work (pt)</u>	126		2,074	
3499	<u>Fabricated metal products, n.e.c. (pt)</u>	98		2,331	
3537	<u>Industrial trucks & tractors (pt)</u>	4		64	
3479					
339911	Jewelry (except costume) mfg	2,294		34,773	
3479	<u>Metal coating & allied services (pt)</u>	22	1.0%	79	0.2%
3911	<u>Jewelry, precious metal</u>	2,272		34,694	
339912	Silverware & plated ware mfg	163		6,459	
3479	<u>Metal coating & allied services (pt)</u>	12	7.4%	103	1.6%
3914	<u>Silverware & plated ware (pt)</u>	151		6,356	
339914	Costume jewelry & novelty mfg	924		14,573	
3479	<u>Metal coating & allied services (pt)</u>	16	1.7%	29	0.2%
3499	<u>Fabricated metal products, n.e.c. (pt)</u>	82		568	
3961	<u>Costume jewelry</u>	826		13,976	

		Establishments	% of Establishments	Employees	% of Employees
35					
333618	Other engine equipment mfg	299		56,348	
3519	Internal combustion engines, n.e.c. (pt)	297	99.3%	56,346	100.0%
3699	Electrical equipment & supplies, n.e.c. (pt)	2		(1-19)	
*3519 was (50,000-99,000). Worst case would be 56,348-2=56,344					
336399	All other motor vehicle parts mfg	1,515		174,465	
3519	Internal combustion engines, n.e.c. (pt)	7	0.5%	896	0.5%
3714	Motor vehicle parts & accessories (pt)	1,508		173,569	
332212	Hand & edge tool mfg	1,270		50,388	
3423	Hand & edge tools, n.e.c.	1,069		42,947	
3523	Farm machinery & equipment (pt)	1	0.1%	59	0.1%
3524	Lawn & garden equipment (pt)	3	0.2%	59	0.1%
3545	Machine tool accessories (pt)	185	14.6%	6,379	12.7%
3699	Electrical equipment & supplies, n.e.c. (pt)	4		424	
3799	Transportation equipment, n.e.c. (pt)	1		(20-99)	
3999	Manufacturing industries, n.e.c. (pt)	7		(500-999)	
			14.9%		12.9%
*3523, 3524 were (20-99). Worst case is 59 each after subtracting minimum values from others					
332323	Ornamental & architectural metal work mfg	1,890		34,391	
3446	Architectural metal work	1,744		30,960	
3449	Miscellaneous metal work (pt)	6		349	
3523	Farm machinery & equipment (pt)	140	7.4%	3,082	9.0%
333922	Conveyor & conveying equipment mfg	899		39,599	
3523	Farm machinery & equipment (pt)	28	3.1%	320	0.8%
3535	Conveyors & conveying equipment	871	96.9%	39,279	99.2%
			100.0%		100.0%
333923	Overhead traveling crane, hoist, & monorail system mfg	307		18,014	
3531	Construction machinery (pt)	87	28.3%	10,263	57.0%
3536	Hoists, cranes, & monorails	220	71.7%	7,751	43.0%
			100.0%		100.0%

		Establishments	% of Establishments	Employees	% of Employees
336510	<u>Railroad rolling stock mfg</u>	232		34,012	
3531	<u>Construction machinery (pt)</u>	25	10.8%	2,379	7.0%
3743	<u>Railroad equipment (pt)</u>	207		31,633	
332439	<u>Other metal container mfg</u>	496		14,922	
3412	<u>Metal barrels, drums, & pails</u>	151		6,318	
3429	<u>Hardware, n.e.c. (pt)</u>	117		4,135	
3444	<u>Sheet metal work (pt)</u>	126		2,074	
3499	<u>Fabricated metal products, n.e.c. (pt)</u>	98		2,331	
3537	<u>Industrial trucks & tractors (pt)</u>	4	0.8%	64	0.4%
332999	<u>All other miscellaneous fabricated metal product mfg</u>	3,028		79,070	
3291	<u>Abrasive products (pt)</u>	8		978	
3432	<u>Plumbing fittings & brass goods (pt)</u>	5		474	
3494	<u>Valves & pipe fittings, n.e.c. (pt)</u>	23		564	
3497	<u>Metal foil & leaf (pt)</u>	64		5,648	
3499	<u>Fabricated metal products, n.e.c. (pt)</u>	2,592		63,736	
3537	<u>Industrial trucks & tractors (pt)</u>	19	0.6%	240	0.3%
3599	<u>Industrial machinery, n.e.c. (pt)</u>	132	4.4%	4,199	5.3%
3999	<u>Manufacturing industries, n.e.c. (pt)</u>	185		3,231	
			5.0%		5.6%
333512	<u>Machine tool (metal cutting types) mfg</u>	401		29,371	
3541	<u>Machine tools, metal cutting types</u>	393	98.0%	28,849	98.2%
3699	<u>Electrical equipment & supplies, n.e.c. (pt)</u>	8		522	
333992	<u>Welding & soldering equipment mfg</u>	250		22,505	
3548	<u>Welding apparatus (pt)</u>	244	97.6%	22,434	99.7%
3699	<u>Electrical equipment & supplies, n.e.c. (pt)</u>	6		71	
335311	<u>Power, distribution, & specialty transformer mfg</u>	318		26,638	
3548	<u>Welding apparatus (pt)</u>	0	0.0%	0	0.0%
3612	<u>Transformers</u>	318		26,638	
333292	<u>Textile machinery mfg</u>	478		13,600	
3552	<u>Textile machinery</u>	478	100.0%	13,600	100.0%

		Establishments	% of Establishments	Employees	% of Employees
333293	Printing machinery & equipment mfg	551		21,000	
3555	Printing trades machinery	546	99.1%	20900	99.5%
3699	Electrical equipment & supplies, n.e.c. (pt)	5		(100-249)	
*3555 was (10,000-24,999). Worst case would be 21,000-100=20,900					
333298	All other industrial machinery mfg	1,681		53,106	
3559	Special industry machinery, n.e.c. (pt)	1,677	99.8%	53,007	99.8%
3639	Household appliances, n.e.c. (pt)	4		(20-99)	
* 3559 was (50,000-99,999). 99 was assumed for 3639, remaining =53,007					
333319	Other commercial & service industry machinery mfg	1,350		56,910	
3559	Special industry machinery, n.e.c. (pt)	78	5.8%	2,890	5.1%
3589	Service industry machinery, n.e.c.	1,165	86.3%	44,172	77.6%
3599	Industrial machinery, n.e.c. (pt)	50	3.7%	1,335	2.3%
3699	Electrical equipment & supplies, n.e.c. (pt)	57		8,513	
			95.8%		85.0%
333911	Pump & pumping equipment mfg	489		36,552	
3561	Pumps & pumping equipment	489	100.0%	36,552	100.0%
3743	Railroad equipment (pt)	0		0	
333999	All other miscellaneous general-purpose machinery mfg	2,093		61,151	
3569	General industrial machinery, n.e.c.	1,257	60.1%	50,088	81.9%
3599	Industrial machinery, n.e.c. (pt)	836	39.9%	11,063	18.1%
			100.0%		100.0%
334119	Other computer peripheral equipment mfg	1,067		93,970	
3577	Computer peripheral equipment, n.e.c.	1,006	94.3%	87,253	92.9%
3578	Calculating & accounting equipment (pt)	61	5.7%	6,717	7.1%
3699	Electrical equipment & supplies, n.e.c. (pt)	0		0	
			100.0%		100.0%
333313	Office machinery mfg	169		14,831	
3578	Calculating & accounting equipment (pt)	35	20.7%	966	6.5%
3579	Office machines, n.e.c. (pt)	134	79.3%	13,865	93.5%
			100.0%		100.0%

		Establishments	% of Establishments	Employees	% of Employees
334518	<u>Watch, clock, & part mfg</u>	146		6,333	
3495	<u>Wire springs (pt)</u>	2		(100-249)	
3579	<u>Office machines, n.e.c. (pt)</u>	16	11.0%	587	9.3%
3873	<u>Watches, clocks, & watchcases</u>	128		5,646	
* 3579 was (500-999) employees. Worst case would be 587					
339942	<u>Lead pencil & art good mfg</u>	173		7,990	
2531	<u>Public building & related furniture (pt)</u>	17		941	
3579	<u>Office machines, n.e.c. (pt)</u>	13	7.5%	1,234	15.4%
3952	<u>Lead pencils & art goods (pt)</u>	143		5,815	
333415	<u>AC & warm air heating & commercial/industrial refig equip mfg</u>	801		119,795	
3443	<u>Fabricated plate work, boiler shops (pt)</u>	9		339	
3585	<u>Refrigeration & heating equipment (pt)</u>	792	98.9%	119,456	99.7%
333995	<u>Fluid power cylinder & actuator mfg</u>	320		23,062	
3593	<u>Fluid power cylinders & actuators</u>	320	100.0%	23,062	100.0%
3728	<u>Aircraft parts & equipment, n.e.c. (pt)</u>	0		0	
333996	<u>Fluid power pump & motor mfg</u>	170		15,482	
3594	<u>Fluid power pumps & motors</u>	170	100.0%	15,482	100.0%
3728	<u>Aircraft parts & equipment, n.e.c. (pt)</u>	0		0	

		Establishments	% of Establishments	Employees	% of Employees
3612					
335311	<u>Power, distribution, & specialty transformer mfg</u>	318		26,638	
3548	<u>Welding apparatus (pt)</u>	0		0	
3612	<u>Transformers</u>	318	100.0%	26,638	100.0%
363					
333414	<u>Heating equipment (except warm air furnaces) mfg</u>	469		24,666	
3433	<u>Heating equipment, except electric</u>	453		22,495	
3634	<u>Electric housewares & fans (pt)</u>	16	3.4%	2,171	8.8%
335212	<u>Household vacuum cleaner mfg</u>	34		10,537	
3635	<u>Household vacuum cleaners</u>	34	100.0%	10,537	100.0%
3639	<u>Household appliances, n.e.c. (pt)</u>	0	0.0%	0	0.0%
333298	<u>All other industrial machinery mfg</u>	1,681		53,106	
3559	<u>Special industry machinery, n.e.c. (pt)</u>	1,677		99999	
3639	<u>Household appliances, n.e.c. (pt)</u>	4	0.2%	99	0.2%

* 3639 was (20-99). Worst case, 99, was assumed

		Establishments	% of Establishments	Employees	% of Employees
3711					
336211	<u>Motor vehicle body mfg</u>	814		43,384	
3711	<u>Motor vehicles & car bodies (pt)</u>	76	9.3%	404	0.9%
3713	<u>Truck & bus bodies</u>	715		41,779	
3714	<u>Motor vehicle parts & accessories (pt)</u>	23		1,201	
336992	<u>Military armored vehicle, tank, & tank component mfg</u>	43		5,788	
3711	<u>Motor vehicles & car bodies (pt)</u>	6	14.0%	375	6.5%
3795	<u>Tanks & tank components</u>	37		9999	
*3711 was (250-499). Assumed to be 375 since the employment values for 3795 will be picked up below					
373					
811490	<u>Other personal & household goods repair & maintenance</u>	14,641		65,213	
3732	<u>Boat repair</u>	1,739	11.9%	9,454	14.5%
7219	<u>Garment repair & alteration services</u>	2,400		9,015	
7631	<u>Watch, clock, & jewelry repair</u>	1,716		5,599	
7692	<u>Welding repair</u>	4,840		22,291	
7699	<u>All other repair & related services</u>	3,946		18,854	
37 except 3711 & 373					
336322	<u>Other motor vehicle electrical & electronic equipment mfg</u>	1,015		95,491	
3679	<u>Electronic components, n.e.c. (pt)</u>	253		12,786	
3694	<u>Engine electrical equipment</u>	569		52,216	
3714	<u>Motor vehicle parts & accessories (pt)</u>	193	19.0%	30,489	31.9%
336211	<u>Motor vehicle body mfg</u>	814		43,384	
3711	<u>Motor vehicles & car bodies (pt)</u>	76		404	
3713	<u>Truck & bus bodies</u>	715	87.8%	41,779	96.3%
3714	<u>Motor vehicle parts & accessories (pt)</u>	23	2.8%	1,201	2.8%
			90.7%		99.1%
336340	<u>Motor vehicle brake system mfg</u>	269		43,132	
3292	<u>Asbestos products (pt)</u>	0		0	
3714	<u>Motor vehicle parts & accessories (pt)</u>	269	100.0%	43,132	100.0%
336399	<u>All other motor vehicle parts mfg</u>	1,515		174,465	
3519	<u>Internal combustion engines, n.e.c. (pt)</u>	7		896	
3714	<u>Motor vehicle parts & accessories (pt)</u>	1,508	99.5%	173,569	99.5%

		Establishments	% of Establishments	Employees	% of Employees
332912	<u>Fluid power valve & hose fitting mfg</u>	424		37,132	
3492	<u>Fluid power valves & hose fittings</u>	424		37,132	
3728	<u>Aircraft parts & equipment, n.e.c. (pt)</u>	0	0.0%	0	0.0%
333995	<u>Fluid power cylinder & actuator mfg</u>	320		23,062	
3593	<u>Fluid power cylinders & actuators</u>	320		23,062	
3728	<u>Aircraft parts & equipment, n.e.c. (pt)</u>	0	0.0%	0	0.0%
333996	<u>Fluid power pump & motor mfg</u>	170		15,482	
3594	<u>Fluid power pumps & motors</u>	170		15,482	
3728	<u>Aircraft parts & equipment, n.e.c. (pt)</u>	0	0.0%	0	0.0%
333911	<u>Pump & pumping equipment mfg</u>	489		36,552	
3561	<u>Pumps & pumping equipment</u>	489		36,552	
3743	<u>Railroad equipment (pt)</u>	0	0.0%	0	0.0%
336510	<u>Railroad rolling stock mfg</u>	232		34,012	
3531	<u>Construction machinery (pt)</u>	25		2,379	
3743	<u>Railroad equipment (pt)</u>	207	89.2%	31,633	93.0%
336991	<u>Motorcycle, bicycle, & parts mfg</u>	389		17,218	
3751	<u>Motorcycles, bicycles, & parts</u>	385	99.0%	17,198	99.9%
3944	<u>Games, toys, & children's vehicles (pt)</u>	4		(20-99)	
*3751 was (10,000-24,999). Assumed worst case 17,218-20=17,198					
336992	<u>Military armored vehicle, tank, & tank component mfg</u>	43		5,788	
3711	<u>Motor vehicles & car bodies (pt)</u>	6		(250-499)	
3795	<u>Tanks & tank components</u>	37	86.0%	5413	93.5%
*3795 was (5000-9999). Assumed to be 5413 since the employment values for 3711 (375) are picked up above					
336214	<u>Travel trailer & camper mfg</u>	813		33,352	
3792	<u>Travel trailer & campers</u>	315	38.7%	20,112	60.3%
3799	<u>Transportation equipment, n.e.c. (pt)</u>	498	61.3%	13,240	39.7%
			100.0%		100.0%
332212	<u>Hand & edge tool mfg</u>	1,270		50,388	
3423	<u>Hand & edge tools, n.e.c.</u>	1,069		42,947	
3523	<u>Farm machinery & equipment (pt)</u>	1		(20-99)	
3524	<u>Lawn & garden equipment (pt)</u>	3		(20-99)	
3545	<u>Machine tool accessories (pt)</u>	185		6,379	
3699	<u>Electrical equipment & supplies, n.e.c. (pt)</u>	4		424	
3799	<u>Transportation equipment, n.e.c. (pt)</u>	1	0.1%	20	0.0%
3999	<u>Manufacturing industries, n.e.c. (pt)</u>	7		(500-999)	

*3799 was (20-99). Employment for 3523 & 3524 were assumed to be 59 each for earlier emission calculation so assumed 20 for 3799

6.0 REFERENCES

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