

Appendix C

Area Emissions Inventory Documentation

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List of Acronyms

Acronym	Definition
AEO	Annual Energy Outlook
ATADS	Air Traffic Activity Data System
BTS	Bureau of Transportation Statistics
BTU	British Thermal Units
CAIR	Clean Air Interstate Rule
CERR	Consolidated Emissions Reporting Rule
CMU	Carnegie Mellon University
CMV	Commercial Marine Vessel
CNG	Compressed Natural Gas
EDMS	Emissions and Dispersion Modeling System
EF	Emission Factor
EGAS 5.0	Economic Growth Analysis System version 5.0
EIA	Energy Information Administration
EIIP	Emissions Inventory Improvement Program
FAA	Federal Aviation Administration
GF	Growth Factor
HDD	Heavy Duty Diesel
IAQTR	Interstate Air Quality Transport Rule
LPG	Liquid Petroleum Gas
LTO	Landing and Takeoff
MSW	Municipal Solid Waste
NAAQS	National Ambient Air Quality Standards
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
NEI	National Emissions Inventory
NG	Natural Gas
NIF	National Emissions Inventory Input Format
NO _x	Nitrogen Oxides
NWR	National Wildlife Refuge
OTAQ	Office of Transportation and Air Quality
PFC	Portable Fuel Container
PM	Particulate Matter

QA	Quality Assurance
RIA	Regulatory Impact Analysis
SCC	Source Classification Code
SI	Spark-Ignition
SIC	Standard Industrial Classification
SIWG	Special Interest Workgroup
T4	Tier 4
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFA	U.S. Fire Administration
USFWS	U.S. Fish and Wildlife Service
USFS	U.S. Forest Service
VISTAS	Visibility Improvement State & Tribal Association of the Southeast
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compounds

1. INTRODUCTION AND SCOPE

The attainment modeling for the Charlotte-Gastonia-Rock Hill, NC-SC 8-hour ozone nonattainment area (referred to as the Metrolina area) was built upon the regional haze modeling being done by the Southeast Regional Planning Organization, Visibility Improvement State and Tribal Association of the Southeast (VISTAS) and the fine particulate matter (PM_{2.5}) and ozone modeling being done by the Association of Southeastern Integrated Planning (ASIP). VISTAS and ASIP are run by the ten Southeast states (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia and West Virginia). Since the regional haze and PM_{2.5} modeling uses annual simulations and includes an intermediate year that is the attainment year required for the Metrolina nonattainment area, the North Carolina Division of Air Quality (NCDAQ) decided to use the this modeling for its attainment demonstration.

The 2002 base year emissions inventory from the attainment demonstration was the starting point for the Reasonable Further Progress (RFP) demonstration. The 2008 emissions were developed by applying growth and control factors to the 2002 base year and these factors were applied through the Sparse Matrix Operator Kernel Emissions (SMOKE) preprocessor so that the 2002 and 2008 emissions estimates were comparable.

2. OVERALL METHODOLOGY

2.1 SOURCE CATEGORY IDENTIFICATION

The area source categories were identified from U. S. Environmental Protection Agency's (USEPA's) guidance document EPA-450/4-91-016, *Procedures for the Preparation of Emission Inventories of Carbon Monoxide and Precursors of Ozone, Vol. 1*, from this point on this document will be referred to as the Procedures document; the *Emissions Inventory Improvement Program (EIIP) Technical Reports, Volume 3, Area Sources* as of December 2002 (the most current version at the time of the inventory development), from this point on this document will be referred to as EIIP Tech Report; and a report entitled, *Documentation of the Base G 2002 Base Year, 2009 and 2018, Emission Inventories for VISTAS* and written by the VISTAS contractor company, MACTEC, Inc.

2.2 AREA SOURCE 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 Reports, the Procedures document or the USEPA's *AP-42 Compilation of Air Pollutant Emission Factors, Fifth Edition*, 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, using population or employment data. All of these methods were used to estimate area source emissions.

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 (SIC) code. 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 tables from the US Census showing the NAICS-SIC crosswalk are reproduced in Section 6 – Additional Data. It should be noted that the crosswalk is based on national totals and is not specific to any particular state. In Section 6.2, the employment fraction of the NAICS codes used to create the SIC code employment data is tabulated.

The employment numbers were obtained from the on-line 2002 County Business Patterns for the various NAICS codes at the county level for North Carolina. In addition to having employment values (or employment ranges due to confidentiality rules) 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 and were not considered in the calculations.

When a NAICS category gave a number of employees and there were no establishments with 100 employees or greater, then the value was used. However, in most cases the County Business Patterns gave a range of total employees in the county instead of the 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, a NAICS category for a county had a range of employment of 100-249 with two establishments with 1 – 4 employees, one with 20-49 employees, and one with 100-249 employees. Assuming 3 to be the mid-range of 1 –4 and 35 to be the mid-range of 20-49, the employment used for the area source calculation was estimated as:

$$(2 \times 3) + (1 \times 35) = 41 \text{ employees}$$

The larger establishment was assumed to be a point source and not taken into consideration for the area source calculation.

If a total number of employees was provided and there were establishments with 100 employees or greater, then the mid-range of the smaller facilities were used as described above. The estimated employment was compared to the value given to ensure that remainder would account for the large establishment. In cases where the remainder would not be enough employment to account for the larger establishment, the area source employment was adjusted down. For example, a NAICS category had 250 employees with one establishment with 20 – 49 employees (mid-range 35), two establishments with 50 – 99 employees (mid-range 75), and one establishment with 100 – 249 employees. The employment estimated for the area source and the remainder employment was estimated as:

$$(1 \times 35) + (2 \times 75) = 185 \text{ employees}$$
$$250 - 185 = 65 \text{ employees}$$

The remainder of 65 employees is not enough to account for an establishment of 100 – 249 employees. Therefore, the area source employment was adjusted down by 35 so that there were 100 employees remaining to account for the large establishment.

3. NORTH CAROLINA-DEVELOPED 2002 AREA SOURCE INVENTORY

Area sources represent a collection of many small, unidentified points of air pollution emissions within a specified geographical area, emitting less than the minimum level prescribed for point sources. 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 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. Emissions are calculated on an annual basis in tons per year.

3.1 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.

3.1.1 Gasoline Dispensing Facilities

Since service stations are so numerous, they are collectively considered as an area source. The area source emissions that are derived for this subsection involve determining the estimated emissions that occur at 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 estimated as part of the area source inventory.

As part of the air toxics program, Stage I controls for gasoline dispensing facilities were 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 they meet the quality standards of the State. The 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 with proper equipment maintenance and use and represents the actual degree of source compliance. Rule penetration is the percentage of facilities covered by the rule and thus require Stage I equipment. Control efficiency is the expected percent reduction from proper application of this control technology.

The volatile organic compound (VOC) emission factor for underground storage tank filling was calculated by using an equation from AP-42, in Section 5.2, Transportation And Marketing Of Petroleum Liquids on 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 (in pounds per square inch area)
 M = Molecular weight of vapors (lb/lb-mole)
 T = Temperature of bulk liquid (° Rankin)
 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. A worst case temperature estimate was used year round in calculating annual emissions. These temperatures were obtained from the North Carolina Climatological Data, 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 3.1.1-1.

Table 3.1.1-1 Factors Used For Calculating Emission Factor

S	P	M	T
1	6.49	67	537.6°R (77.6°F)

$$EF = 12.46 \frac{[1 \times 6.49 \times 67]}{[537.6]} \times [1 - (.97 \times .95 \times .99)]$$

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

The emission factors for tank truck transit, breathing losses and spillage were obtained from the EIIP Tech Report, Chapter 11 Gasoline Marketing, Table 11.3-1 and are listed below in Table 3.1.1-2. 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 3.1.1-2 Emission Factors For Gasoline Dispensing

Underground Storage Tank Filling	Tank Truck Transit	Breathing Losses	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 sold in 2002 to get an estimate of gallons of fuel per county.

According to the EIIP Tech Report, the activity days per week for truck transit and underground storage tank filling are 6 and 7 days per week and for spillage and breathing losses, respectively.

Note that diesel fuel used is combined with gasoline for the sake of simplification. This will result in some overestimation of VOC emissions because the volatility of gasoline is higher than diesel fuel.

Annual VOC emissions for underground storage tank filling, tank truck transit, breathing losses and spillage were calculated and SMOKE modeling was later used to allocate annual emissions to a daily level. Underground storage tank annual VOC emissions for each county were calculated using the following equation.

$$EM = FC \times (1/1000) \times EF \times (1 \text{ ton}/2000 \text{ lbs.})$$

where EM = annual county VOC emissions in tons per year
FC = county fuel consumption of gasoline and diesel in gallons
EF = emission factor in pounds of VOC per 1000 gallons

Tank truck transit, breathing losses, and spillage annual VOC emissions for each county were calculated individually, using the following equation.

$$EM = FC \times EF \times (1 \text{ ton}/2000 \text{ lbs.})$$

where EM = annual county VOC emissions in tons per year for tank truck transit, breathing losses, or spillage
 FC = county fuel consumption of gasoline and diesel in gallons
 EF = emission factor in pounds of VOC per gallon for tank truck transit, breathing losses, or spillage

3.1.2 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. There are a few small commuter and general aviation airports in the State; however, the amount of the emissions from these are typically negligible.

The emissions from aircraft refueling were determined by using the number of gallons of fuel supplied to the airports and multiplying it by the appropriate emission factor. The businesses that supply the fuel to the airports were contacted to determine the amount and type of fuel supplied to each airport during 2002. The information obtained was for the two fuel types supplied, Jet A Kerosene and Aviation Gasoline.

The emission factors used are 11.38 lb VOC/1000 gallons of aviation gasoline and 0.065 lb VOC/1000 gallons of Jet A kerosene. Airport refueling occurs on a daily basis, therefore the activity days per week are 7.

The annual emissions for the base year were calculated using equation 3.1.2-1.

$$EM = \frac{\text{Gallons/year} \times EF_i}{(2000 \text{ lbs/ton})} \quad 3.1.2-1$$

where EM_i = emissions for source category (i)
 EF_i = emission factor for source category (i)

3.2 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.

3.2.1 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 commercial) are small business entities. As a result of their size, dry cleaning emissions are typically not captured as point sources. However, dry cleaning operations can be a significant emission source for VOC emissions, 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 guidance also stated that the number of employees can be found in the County Business Patterns for SIC code 7215 (coin-operated) and 7216 (commercial). In 1997, the SIC code system was replaced with the NAICS. Thus, the number of employees was obtained for NAICS codes 812310 (coin-operated) and 812320 (commercial). The NAICS employment numbers were previously processed to exclude any facilities with 100 or more employees, which were deemed to be point sources. According to the SIC to NAICS crosswalk, 80% of employment for NAICS 812320 represents the number of employees for commercial dry cleaners (SIC 7216).

As reported in the EIIP Tech. Report, the activity days per week is 6 days. The annual emissions for 2002 were calculated using equation 3.2.1-1.

$$EM = \frac{\text{Employees} \times EF}{(2000 \text{ lb/tons})} \quad 3.2.1-1$$

where EM = emissions for source category tons/year
EF = emission factor for source category, 1800 lbs VOC/employee/yr

3.2.2 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 was obtained from the North Carolina Office of State Budget and Management (OSBM).

According to the Procedures document, Table 5.8-1, the activity days per week is 5. The annual emissions for the base year were calculated using equation 3.2.2-1.

$$EM = ((EF) * (Population_{2002}) * (1 \text{ ton}/2000 \text{ lb})) \quad 3.2.2-1$$

where EM = emissions for source category for county (a) ton/yr
EF = emission factor for source category, 1.3 lbs VOC/person/yr

3.2.3 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 therefore emit VOC emissions.

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 employee factors (from the EIIP Tech. Report, Chapter 6, Table 6.5-2) listed in Table 3.2.3-1 below:

Table 3.2.3-1 Emission Factors Cleaning & Degreasing

Source Category	lb VOC/employee/yr
Electronic and Other Elec: Open Top Degreasing	29
Miscellaneous Manufacturing: Open Top Degreasing	9.8
Miscellaneous Manufacturing: Cold Cleaning	24
Auto Repair Services: Cold Cleaning	270

Employment data was derived from the 2002 County Business Patterns provided by the U. S. Census Bureau. For each of these categories, employment in a number of SIC groups is needed. These employment numbers were generated from the NAICS employment numbers for each county and summed as needed. See SIC Codes from NAICS Codes for Employment Based Categories in Section 6 for the full listing of NAICS and SIC for each source category. Fractional employee numbers are a result of the NAICS to SIC conversion process.

The annual emissions for the base year were calculated using equation 3.2.3-1.

$$EM = \frac{(\text{Employment}_{2002}) \times EF}{(2000 \text{ lb/tons})} \quad 3.2.3-1$$

where EM = emissions for source category, tons per year
EF = emission factor for source category

3.2.4 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 is 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 1997 national VOC estimate provided by the EIIP Tech. Report was divided by the 1997 national employment data to create a per employee emission factor.

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 Patterns.

According to the EIIP Tech. Report the activity days per week is 5 days. The annual emissions for 2002 were calculated using equation 3.2.4-1.

$$EM = \text{Employees} \times EF \quad 3.2.4-1$$

where EM = emissions for source category
EF = emission factor for source category, 0.387 tons VOC/employee/yr

3.2.5 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, and an emissions factor for either water or solvent based coatings. This method entails gathering national architectural paint usage from the U.S. Census industrial report MA325F and generating per capita usage factors. 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 the factor for water based paints.

Emission Factors: Water based = 0.74 lb VOC/gallon;
 Solvent Based= 3.87 lb VOC/gallon

The annual emissions for 2002 were calculated using equation 3.2.5-1.

$$\text{VOC}_a = (\text{POP}_a * \text{UF}_b * \text{EF}_b) / (2000 \text{ lbs/ton}) \text{ -- ton/year} \quad 3.2.5-1$$

where VOC_a = VOC emissions for county (a)
 POP_a = population for county (a)
 EF_b = emission factor for paint type (b)
 UF_b = usage factor for paint type (b)

The usage factor is found by dividing the national total architectural surface coating quantities for either solvent or water-based coatings by the U.S. population for that year. For 2002, the usage factor for each paint type is estimated below:

UF solvent: (127,703,000 gallons of solvent based) / (287,973,924) = 0.443 gal/person
 UF water : (589,527,000 gallons of water based) / (287,973,924) = 2.047 gal/person

3.2.6 Traffic Markings

The paint used in traffic markings operations (the painting of center lines, shoulders, etc.) emits VOC emissions 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 is not 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 3.2.6-1) and the estimated gallons used. 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.).

$$\text{Gallons Paint}_{\text{County}} = (\text{Gallons Paint}_{\text{State}}) \times \frac{(\# \text{ Lane Miles})_{\text{County}}}{(\# \text{ Lane Miles})_{\text{State}}} \quad 3.2.6-1$$

The annual emissions for 2002 were calculated using equation 3.2.6-2.

$$\text{EM} = \frac{\text{Gallons Paint} \times \text{EF}}{(2000 \text{ lb/ton})} \quad 3.2.6-2$$

where EM = emissions for source category
EF = emission factor for source category

3.2.7 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 VOC emissions 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 3.2.7-1 below.

Table 3.2.7-1 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 3.2.7-2.

Table 3.2.7-2 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 previously outlined in Subsection 3.2.1.

According to the EIIP Tech. Report the activity days per week is 5 days. The annual emissions for population and employment based emission factors were calculated using equations 3.2.7-1 and 3.2.7-2, respectively.

$$EM = \frac{\text{Population} \times EF}{(2000 \text{ lb/ton})} \quad 3.2.7-1$$

$$EM = \frac{\text{Employees} \times EF}{(2000 \text{ lb/ton})} \quad 3.2.7-2$$

where EM = emissions for source category
EF = emission factor for source category

3.2.8 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.

Cutback asphalt emissions are included in the asphalt paving category. Since the assembly of the final 2002 inventory, it was found that 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; which 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. Although cutback asphalt emissions are included in the 2002 inventory, the 93.04 tons of VOC per year represents a relatively small amount and does not significantly affect the accuracy of the inventory.

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 on 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:

$$\text{Square yard of hot-mix} = \frac{(\text{tons of hot-mix}) \times (2000 \text{ lbs./ton})}{(220 \text{ lbs/ square yard of hot-mix})} \quad 3.2.8-1$$

$$\text{Gallons of emulsified asphalt} = (\text{sq. yard. of hot-mix}) \times (0.08 \text{ gal./sq. yard. of hot-mix}) \quad 3.2.8-2$$

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.

The annual emissions for the base year were calculated using equation 3.2.8-3.

$$\text{EM} = \frac{(\text{gallons emulsified asphalt}) \times \text{EF}}{(42 \text{ gal/barrel}) \times (2000 \text{ lb/tons})} \quad 3.2.8-3$$

where EM = emissions for source category
 EF = emission factor for source category

3.2.9 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 2002. This information was ascertained from the Asphalt Roofing Manufacturing Association. The amount of asphalt used is given by the equation 3.2.9-1, which uses the default value of 20 lbs. of asphalt / square found in the EIIP Tech. Report. The emissions by county, shown in equation 3.2.9-2, were apportioned by roofing establishments in the county divided by the state total, using the number of establishments from NAISC code 23561 from the 2000 County Business Patterns. The 2000 County Business Patterns was the latest available data at the time of the inventory development.

$$\text{Asphalt (ton/yr)} = \frac{(\# \text{ squares}) \times (20 \text{ lbs of asphalt/square})}{(2000 \text{ lbs/ton})} \quad 3.2.9-1$$

$$\text{Asphalt}_{\text{County}} = \frac{(\text{tons asphalt}_{\text{State}}) \times (\# \text{ roofing establishments})_{\text{County}}}{(\# \text{ roofing establishments})_{\text{State}}} \quad 3.2.9-2$$

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.

The annual emissions for the base year inventory were calculated using equation 3.2.9-3.

$$\text{EM} = \frac{(\text{tons asphalt}) \times \text{EF}}{(2000 \text{ lb/tons})} \quad 3.2.9-3$$

where EM = emissions for source category
 EF = emission factor for source category

3.2.10 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 Cooperative Extension office. 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.

The planted crop acreage from the North Carolina Agricultural Statistic Division and crop profile reports prepared by the North Carolina Cooperative Extension office, 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 North Carolina Cooperative Extension office.

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 per year 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 3.2.10-1 and an example calculation for soybeans follows. Table 3.2.10-1 presents the pesticides associated with a particular crop, the % of treated acres, and the lbs. of active pesticide ingredient per year.

$$(\text{lbs AI/acre})_{\text{CROP}} = \sum (\% \text{ acres treated}) \times (\text{lb AI/acre})_{\text{PESTICIDE}} \quad 3.2.10-1$$

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 3.2.10-1 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	Chlorpyrifus	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>		
Dicrctophos	0.45	0.2	Terbufos	35	1
Acephate	2.1	0.5	Chlorpyrifus	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 VOC emissions. 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 3.2.10-2, with an example calculation for soybean following.

$$EF_{CROP} = (lb\ AI_{CROP}/acre) \times (2.45\ lb\ VOC/lb.\ of\ AI) \times (0.90) \quad 3.2.10-2$$

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 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 millimeters 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 3.2.10-2 list the pounds of active ingredients per acre and the calculated emission factor for each crop.

Table 3.2.10-2 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

The annual emissions for 2002 were calculated using equation 3.2.10-3.

$$EM_a = \frac{(\sum (CROP)_a \times EF_{CROP})}{(2000 \text{ lb/tons})} \quad 3.2.10-3$$

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

Nonagricultural Pesticide

Nonagricultural pesticide application is considered as part of the commercial/consumer solvent use emissions and no longer is a separate subcategory. Please refer to the next section.

3.2.11 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 VOC emissions.

There are seven categories. They are named and their emission factors listed in Table 3.2.11-1 below.

Table 3.2.11-1 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 are 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. The annual emissions for the base year inventory were calculated using equation 3.2.11-1.

$$EM = \frac{(\text{Population}_{2002}) \times EF}{(2000 \text{ lb/tons})} \quad 3.2.11-1$$

where EM = emissions for source category, tons per year
EF = emission factor for source category

3.3 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.

3.3.1 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 North Carolina Office of State Budget and Management 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. The annual emissions for the base year inventory were calculated using equation 3.3.1-1.

$$EM = \frac{(\text{Population})_b \times CF \times EF}{(2000 \text{ lb/tons})} \quad 3.3.1-1$$

where EM = emissions for source category
Population_b = Population in base year
CF = Consumption factor, 70 lb bread/person/year
EF = emission factor for source category, 0.5 lb VOC/1000 lb bread baked

3.4 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. The methodology used to calculate the emissions from these sources are described in detail in each subsection.

3.4.1 Structure Fires

Burning fires can produce short term emissions of organic compounds and nitrogen oxides (NO_x). 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 2001 population values were the latest data available at the time of the inventory development. 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 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 NO_x 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.

The annual emissions for the base year 2002 inventory were calculated using Equation 3.4.1-1.

$$EM_p = \frac{(2002 \text{ County population}) \times (FPP) \times (CF) \times (EF_p)}{(2000 \text{ lb/tons})} \quad 3.4.1-1$$

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)

3.4.2 Charbroiling

The commercial charbroiling of ground beef emits VOC emissions. 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.

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.

The annual emissions for the base year inventory were calculated using Equations 3.4.2-1.

$$EM_a = \frac{(\# \text{ restaurants}) \times (\% \text{ charbroiling}) \times (CF) \times (EF)}{(2000 \text{ lb/tons}) \times (1 \text{ yr}/52 \text{ wks})} \quad 3.4.2-1$$

where EM_a = emissions for source category in county (a), tons/yr
 CF = conversion factor, 1160 lb meat charbroiled/week
 EF = emission factor, lbs. pollutant/1000 lb meat charbroiled

3.4.3 Open Burning – Municipal Solid Waste and Yard Trimmings

This Subsection describes the combined emission inventory methodology for source classification code (SCC) 2610030000 Residential Open Burning – Household and SCC 2610000100 Open Burning – Yard Trimmings. Open burning is treated as a means of waste disposal in rural areas. Materials burned generally include agricultural refuse, landscaping refuse, or scrap wood. Local authorities could not provide assistance with estimating the tons of refuse burned or the amount burned. According to local authorities, burning permits are issued year round without requiring a notation for the amount burned.

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 rural population 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 populations for each county was obtained from the North Carolina Office of State Budget and Management, State Data Center. The 2000 total and rural populations was the latest data available.

VOC and NOx emission factors for open burning of MSW were obtained from EIIP Tech. Report, Table 16.4-1, Open Burning of Municipal Refuse. The emission factors are 6.676 pounds VOC per ton MSW burned and 6 pounds NOx per ton MSW burned.

The VOC emission factor for open burning of yard trimmings was obtained from EIIP Chapter 16, Table 16.4-7. The factor is 28 pounds VOC per ton yard trimmings. The rural percent of the populations were obtained from the 2000 census data. Since burning permits are issued year round, the activity days per year was 365. These values were used to calculate the tons per year emissions for the base year. The emissions from the burning of MSW for the base year 2002 inventory were calculated using equation 3.4.3-1. The annual emissions from the burning of yard trimmings for the base year 2002 inventory were calculated using equation 3.4.3-2.

$$EM_{P,MSW} = \frac{(\text{Rural Population in 2002}) \times (CF_{MSW}) \times (EF_P) \times (365 \text{ days/yr})}{(2000 \text{ lb/tons})} \quad 3.4.3-1$$

$$EM_{P,YT} = \frac{(\text{Rural Population in 2002}) \times (CF_{YT}) \times (EF_P) \times (365 \text{ days/yr})}{(2000 \text{ lb/tons})} \quad 3.4.3-2$$

where $EM_{P,MSW}$ = emissions from burning MSW for pollutant (P)
 $EM_{P,YT}$ = emissions from burning yard trimmings for pollutant (P)
 CF_{MSW} = conversion factor, 3.77 lb MSW/person/day
= 0.001885 ton MSW/person/day
 CF_{YT} = conversion factor, 0.64 lb yard trimmings/person/day
= 0.00032 ton yard trimmings/person/day
 EF_P = emission factor for pollutant (P)

3.4.4 Small Stationary Source Fossil Fuel Use

In general, fossil fuels are burned for space and hot water heating. This source category covers VOC and NOx 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.

The “demand for energy” for these fuel types is known as fuel usage. Fuel usage data for North Carolina was taken from NC Energy Outlook 2003 by Global Insight, Inc. for the base year 2002. The following table shows the data used.

Table 3.4.4-1 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 3.4.4-2 below.

Table 3.4.4-2 Combustion Emission Factors

Sector	Fuel	Units	VOC	NO _x
Residential	NG	lb/10 ⁶ ft ³	5.5	94
Residential	LPG	lb/gal	0.0003	0.014
Residential	Oil	lb/gal	0.000713	0.018
Residential	Coal	lb/ton	0.07	9.1
Residential	Wood	lb/ton	229.0	2.6
Commercial	NG	lb/10 ⁶ ft ³	5.5	167.5
Commercial	LPG	lb/gal	0.00035	0.0145
Commercial	Oil	lb/gal	0.000735	0.037
Commercial	Coal	lb/ton	0.07	15.8
Commercial	Wood	lb/ton	0.255326	3.304224
Industrial	NG	lb/10 ⁶ ft ³	4.96	163.33
Industrial	LPG	lb/gal	0.00035	0.02
Industrial	Oil	lb/gal	0.00024	0.039
Industrial	Coal	lb/ton	0.07	14.9
Industrial	Wood	lb/ton	0.255326	3.304224

3.4.4.1 Fuel Oil Combustion

Fuel oil consumption covers the use of kerosene, distillate oil and residual oil. Distillate oil includes fuel oil grades 1, 2, and 4; residual oil includes fuel grades 5 and 6. In most areas, residual oil is not used by residential sources. Kerosene and distillate oils are primarily used for space heating in domestic and small commercial buildings, while residual oils are used primarily for industrial and large commercial applications. It was assumed that residential fuel oils are normally used only for heating and therefore, no residential fuel oil emissions were calculated for summer months.

The base year statewide annual fuel oil demand for energy, obtained from the NC Energy Outlook 2003, was converted British Thermal Units (BTUs) to gallons of fuel used for each heating classification (i.e., residential, commercial, and industrial). The conversion factors used were obtained from the NC Energy Outlook 2003 and are 135,000 BTU per gallon of kerosene, 138,690 BTU per gallon of distillate oil, and 149,690 BTU per gallon of residual oil.

Once converted to gallons of fuel, the statewide fuel use was then apportioned to the county level. This was accomplished by multiplying the number of gallons of fuel used in the state by the fraction of housing units heated by fuel oils in the county compared to that of the whole state (see the equation below).

$$\# \text{ gallon fuel for County X} = (\# \text{ gal fuel oil for State}) \times \frac{(\# \text{ housing units heated by fuel oil in County X})}{(\# \text{ housing units heated by fuel oil in State})}$$

The fraction of housing units was used to distribute the fuel on a county level for the residential heating classifications. The number of housing units heated by fuel oils was obtained from the 2000 Census.

Commercial and industrial fuel usage was 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. Industrial sources were calculated in a manner similar to commercial sources burning oil or coal.

For residential, commercial and industrial consumption, NOx and VOC emission factors were obtained from AP-42, Table 1.3-1 and Table 1.3-3, respectively. The residential emission factors were 0.018 pounds of NOx per gallon of fuel burned and 0.000713 pounds of VOC per gallon of fuel burned. The commercial emission factors were 0.037 pounds of NOx per gallon of fuel burned and 0.000735 pounds of VOC per gallon of fuel burned. The commercial emission factors were 0.039 pounds of NOx per gallon of fuel burned and 0.00024 pounds of VOC per gallon of fuel burned.

According to the Procedures document, Table 5.8-1, the activity days per week is 7 for residential heating and 6 for commercial and industrial heating.

Point source emissions with SCC 1-03-004-xx and 1-03-005-xx identified commercial residual oil and distillate oil emissions, respectively; while source emissions with SCC 1-02-004-xx and

1-02-005-xx identified industrial residual and distillate oil emissions, respectively. The point source emissions in tons per year were subtracted from the area source emissions.

3.4.4.2 Coal Combustion

There are three types of coal used for space heating: anthracite, bituminous and lignite. According to AP-42, anthracite, or hard coal, is mined almost exclusively in Pennsylvania and is consumed in Pennsylvania and in states that are within easy shipping distance. In addition, lignite coal is mined in North Dakota and Texas and is consumed near where it mined. Since the incidence of anthracite and lignite coal burning is low in North Carolina, the emissions from coal combustion were calculated utilizing only the emission factors for bituminous coal.

It was assumed that residential coal is normally used only for heating and therefore, no residential coal emissions were calculated for summer months.

The base year statewide annual coal demand for energy, obtained from the NC Energy Outlook 2003, were converted from BTU to tons of coal used for each heating classification (i.e., residential, commercial, and industrial). The conversion factor used was 21,100,000 BTU per ton of coal.

Once converted to tons of coal, the statewide coal use was then apportioned to the county level. This was calculated by multiplying the number of tons of coal used in the state by the fraction of housing units heated by coal in the county, compared to that of the whole state (see the equation below).

$$\# \text{ ton of coal for County X} = (\# \text{ ton of coal for State}) \times \frac{(\# \text{ housing units heated by coal in County X})}{(\# \text{ housing units heated by coal in State})}$$

The fraction of housing units was used to distribute the coal on a county level for both heating classifications. The number of housing units heated by coal was obtained from the Federal Bureau of the Census and the 2003 NC State Energy Plan (<http://www.doa.state.nc.us/doa/energy>).

There were several emission factors for bituminous coal combustion listed in AP-42, Table 1.1-3. For the purpose of estimating the emissions from coal combustion, the equipment listed in AP-42, Table 1.1-3 were grouped into industrial, commercial/institutional and residential type equipment. The emission factors were averaged for each type and the averaged emission factors were used to calculate the emissions. Table 3.4.4.2-1 lists the averaged emission factors used in the calculations. It should be noted that fluidized bed combustors (FBC)

were not included in the averaged emission factors because FBC does not constitute a significant percentage of the total boiler population, according to AP-42, Section 1.1. The Procedures document, Table 5.8-1, lists the activity days per week as 7 for residential heating and 6 for commercial and industrial heating. Point source emissions with SCC 1-03-002-xx identified commercial coal combustion emissions. The point source annual emissions in tons per year were subtracted from the area source emissions.

Table 3.4.4.2-1 Coal Combustion Emission Factors

Application/Equipment Type	Emission Factor (lb NO _x /ton Coal)	Emission Factor (lb VOC/ton Coal)
<i>Industrial Applications</i>		
Averaged Emission Factor	14.9	0.07
<i>Commercial Applications</i>		
Averaged Emission Factor	15.8	0.07
<i>Residential Applications</i>		
Hand-fed units	9.1	0.07

Residential Coal Combustion Emissions:

$$\text{Pollutant emitted by coal combustion} = \frac{(\# \text{ tons/year Coal}) \times \text{EF}}{(2000 \text{ pounds/ton})}$$

Commercial Coal Combustion Emissions:

$$\text{Pollutant emitted by coal combustion} = \frac{(\# \text{ tons/year Coal}) \times \text{EF}}{(2000 \text{ pounds/ton})}$$

Industrial Coal Combustion Emissions:

There is no industrial coal combustion in the area source inventory because it is included in the point source emissions inventory.

3.4.4.3 Natural Gas Combustion

Currently in the United States, natural gas is one of the major types of fuels used for heating. It is mainly used for industrial process stream and heat production, commercial and residential

space heating and for electric power generation. Although natural gas is a relatively clean burning fuel, some emissions can result from its combustion.

The base year statewide annual demand for natural gas energy, obtained from the NC Energy Outlook 2003, was converted from BTU to 10^6 cubic feet of natural gas used for each heating classification (i.e., residential, commercial, and industrial). The conversion factor used was 1,000 BTU per cubic foot of natural gas.

Once converted to cubic feet of natural gas, the statewide natural gas use was then apportioned to the county level. This was calculated by multiplying the number of cubic feet of natural gas used in the state by the fraction of housing units heated by natural gas in the county, in comparison to the state (see the equation below).

$$\# \text{ ft}^3 \text{ nat. gas for County X} = (\# \text{ ft}^3 \text{ nat. gas for State}) \times \frac{(\# \text{ housing units heated by nat. gas in County X})}{(\# \text{ housing units heated by nat. gas in State})}$$

The fraction of housing units was used to distribute the natural gas usage on a county level for each heating classification. The number of housing units heated by natural gas was obtained from the 2000 Census.

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.

There were several emission factors listed for industrial and commercial natural gas boilers in AP-42, Table 1.4-1. For the purpose of estimating the emissions from natural gas combustion, an average of the emission factors were used. Table 3.4.4.3-1 lists averaged emission factors used in the calculations. According to the Procedures document, Table 5.8-1, the activity days per week is 7 for residential heating and 6 for commercial and industrial heating.

Point source emissions with SCC 1-03-006-xxx and 1-02-006-xxx, identified commercial and industrial natural gas combustion emissions, respectively. Where point source emissions were indicated, these were deducted from the 2002 annual emission estimates.

Table 3.4.4.3-1 Emission Factors for Natural Gas

Application/Equipment Type	Emission Factor (lb NO _x /10 ⁶ ft ³)	Emission Factor (lb VOC/10 ⁶ ft ³)
<i>Industrial Applications</i>		
Averaged Emission Factor	163.33	4.96
<i>Commercial Applications</i>		
Averaged Emission Factor	167.5	5.5
<i>Residential Applications</i>		
Uncontrolled	94	5.5

Residential Natural Gas Combustion Emissions:

$$\text{Pollutant emitted by Natural gas combustion} = \frac{(\# \text{ ft}^3/\text{year natural gas}) \times \text{EF}}{(2000 \text{ pounds/ton})}$$

Commercial Natural Gas Combustion Emissions:

$$\text{Pollutant emitted by Natural gas combustion} = \frac{(\# \text{ ft}^3/\text{year natural gas}) \times \text{EF}}{(2000 \text{ pounds/ton})}$$

Industrial Natural Gas Combustion Emissions:

$$\text{Pollutant emitted by Natural gas combustion} = \frac{(\# \text{ ft}^3/\text{year natural gas}) \times \text{EF}}{(2000 \text{ pounds/ton})}$$

3.4.4.4 Liquefied Petroleum Gas Combustion

Liquefied petroleum gas (LPG) consists of propane, propylene, butane, and butylenes. The largest market for LPG is the domestic/commercial market, followed by the chemical industry and agricultural markets. LPG is also used as a stand-by fuel for facilities that have natural gas service contracts that can be interrupted. The form of LPG used primarily for domestic heating is propane. Liquefied petroleum gas is considered a clean fuel because it does not produce visible emissions. However, gaseous pollutants such as VOC do occur.

The base year statewide annual LPG demand for energy, obtained from the NC Energy Outlook 2003, was converted from BTU to 10³ gallons of LPG used for each heating classification (i.e.,

residential, commercial, and industrial). The conversion factor was 95,475 BTU per gallon of LPG.

Once converted to gallons of LPG, the statewide LPG use was then apportioned to the county level. This was accomplished by multiplying the number of gallons of LPG used in the state by the fraction of housing units heated by LPG in the county compared to that of the whole state (see the equation below).

$$\# \text{ gal LPG for County X} = (\# \text{ gal LPG for State}) \times \frac{(\# \text{ housing units heated by LPG in County X})}{(\# \text{ housing units heated by LPG in State})}$$

The fraction of housing units was used to distribute the LPG usage on a county level for each heating classification. The number of housing units heated by LPG was obtained from the 2000 Census.

The North Carolina Utilities Commission provided data from the U.S. Department of Energy, Energy Information Administration giving monthly usage of LPG by residential and commercial customers in North Carolina for 2002.

The emission factors listed in AP-42, Table 1.5-1 were averaged for industrial and commercial sources. There is no residential LPG emission factor listed in AP-42. Since the form of LPG used primarily for domestic heating is propane, the commercial propane emission factor was used for residential LPG combustion. The emission factors listed in AP-42, as well as the average emission factors used for estimating the emissions from LPG combustion are listed in Table 3.4.4.4-1. According to the Procedures document, Table 5.8-1, the activity days per week is 7 for residential heating and 6 for commercial and industrial heating. Point source emissions with SCC 1-03-010-xxx and 1-02-010-xxx, identified commercial and industrial LPG combustion emissions, respectively. Where point source emissions were indicated, these were deducted from the 2002 annual emission estimate.

Residential LPG Emissions:

$$\begin{array}{lcl} \text{Pollutant emitted by} & = & \frac{(\# \text{ gal/year LPG}) \times \text{EF}}{\text{LPG combustion}} \\ & & (2000 \text{ pounds/ton}) \end{array}$$

Commercial LPG Combustion Emissions:

$$\begin{array}{lcl} \text{Pollutant emitted by} & = & \frac{(\# \text{ gal/year LPG}) \times \text{EF}}{\text{LPG combustion}} \\ & & (2000 \text{ pounds/ton}) \end{array}$$

Industrial LPG Combustion Emissions:

$$\text{Pollutant emitted by LPG combustion} = \frac{(\# \text{ gal/year LPG}) \times \text{EF}}{(2000 \text{ pounds/ton})}$$

Table 3.4.4.4-1 Emission Factors for Liquefied Petroleum Gas

Application/Fuel Type	Emission Factors (lb /gallon)		
	<i>Industrial</i>	<i>Commercial</i>	<i>Residential</i>
Butane	0.021	0.015	
Propane	0.019	0.014	0.014
Averaged NOx Emission Factor	0.02	0.0145	
Butane	0.0004	0.0004	
Propane	0.0003	0.0003	0.0003
Averaged VOC Emission Factor	0.00035	0.00035	

3.4.4.5 Wood Combustion

The use of wood as a source of heat occurs in the residential and industrial sectors. It was assumed that residential wood is normally used only for heating and therefore, no residential wood emissions were calculated for summer months. The burning of wood waste in boilers is mostly confined to those industries where the wood is available as a byproduct. Most often this is in the lumber, furniture and plywood industries. These types of industries are included in the point source inventory, therefore, no area source emissions will be calculated for industrial wood combustion. Wood stoves, commonly used in residences as space heaters, are used both as the primary source of heat and as a supplement to conventional heating systems.

The base year statewide annual wood demand for energy, obtained from the NC Energy Outlook 2003, was converted from BTU to tons of wood used for residential heating. The conversion factor was 4,500 BTU per pound of wood, which is the mid-point of the range (4,000 to 5,000 BTU per pound of wood) given in AP-42, Section 1.6.

Once converted to tons of wood, the statewide wood use was then apportioned to the county level. This was accomplished by multiplying the number of tons of wood use in the state by the fraction of housing units heated by wood in the county compared to that of the whole state (see the equation below).

$$\# \text{ tons wood for County X} = (\# \text{ ton wood for State}) \times \frac{(\# \text{ housing units heated by wood in County X})}{(\# \text{ housing units heated by wood in State})}$$

The fraction of housing units was used to distribute the wood usage on a county level. The number of housing units heated by wood was obtained from the 2000 Census.

Wood combustion emission factors are 229 lb/ton burned and 2.6 lb/ton burned for VOC and NO_x, respectively. The residential wood combustion emission factors were obtained from the Table 2.4-1 of the EIIP Tech. Report, Volume III, Chapter II. According to the Procedures document, Table 5.8-1, the activity days per week is 7 for residential heating.

Wood Combustion Emissions:

$$\text{Pollutant emitted by wood combustion} = \frac{(\# \text{ ton/year wood}) \times \text{EF}}{(2000 \text{ pounds/ton})}$$

3.4.4.6 Small Electric Utility Boilers

This source subcategory has been treated as a point source since the information was available for each facility.

3.4.5 Vehicle Fires

Vehicle fire emissions within the State demonstration area are estimated by considering the estimated number vehicles burned in the State, 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.

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.

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 (0.25 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. The emission factors are 32 pounds of VOC per ton burned and 4 pounds of NOx per ton burned.

The annual emissions for the base inventory were calculated using equation 3.4.5-1.

$$EM_P = \frac{(\# \text{ of Vehicle Fires per year}) \times (CF) \times (EF_P)}{(2000 \text{ lb/tons})} \quad 3.4.5-1$$

where EM_P = annual emissions for structure fires for pollutant (P)
 CF = conversion factor, 0.25 tons burned/vehicle fire
 EF_P = emission factor for pollutant (P)

3.4.6 Agricultural Burning

This source subcategory covers burning practices used to clear and/or prepare land for planting. These operations include stubble burning, burning of agricultural crop residues, and the burning of stand field crops as part of harvesting (e.g., sugar cane). According to the North Carolina Department of Agriculture, when soybeans are double cropped with wheat, the wheat stubble is usually burned back after harvest about one fourth of the time. According to Dr. J. Dunphy, a soybean specialist at North Carolina State University, the acres of soybean double cropped with wheat in North Carolina is approximately equal to the acres of wheat planted. Therefore, one fourth of the acreage of wheat planted in 2002 was used to calculate the emissions from agricultural burning practices in North Carolina.

The fuel loading factor and the yield of VOC for burning wheat stubble was obtained from AP-42, Table 2.5.5. The fuel loading factor is 1.9 tons of fuel consumed per acre burned. The yield of VOC was dependent upon whether the field was head-fire burned or back-fire burned. The percentage of each burning type used was not available, therefore, the assumption was made that each type was used 50 percent of the time. The yield of VOC used, 11 pounds of VOC per ton of fuel consumed, is an average of the two types of burning. To calculate the emission factor for VOC emissions, the fuel loading factor is multiplied by the yield of pollutant.

$$\begin{aligned} EF_{VOC} &= (1.9 \text{ tons/acre}) (11 \text{ lb VOC/ton burned}) \\ &= 20.9 \text{ lb VOC/acre burned} \end{aligned}$$

The annual emissions were calculated using the number of acres burned and the per acre emission factor. According to the North Carolina Department of Agriculture, field burning occurs only during June and July.

The number of acres of wheat planted was obtained from the North Carolina Department of Agriculture, Agriculture Statistics Division. The annual emissions for the 2002 base year inventory were calculated using equation 3.4.6-1.

$$EM = \frac{(\frac{1}{4} \times (\text{wheat acreage})) \times EF}{(2000 \text{ lb/ton})} \quad 3.4.6-1$$

where EM = emissions for source category for VOC
 EF = emission factor for VOC

3.4.7 On Site Incineration

On-site incineration is the confined burning of waste leaves, landscape refuse and other refuse or rubbish. In North Carolina, commercial/institutional and industrial incinerators are required to have an Air Quality Permit in order to operate. Therefore, all industrial incinerators are identified in the point source inventory. There may be small commercial/institutional incinerators that have not been identified in the point source inventory and as a result emissions were calculated for commercial on-site incinerators.

No data was available to determine the amount of waste burned in on-site incinerators. Therefore, the amount of solid waste burned was estimated with the fuel loading factor (L) given in Table 4.6-1 of the Procedures document. The commercial fuel loading factor is 23 tons of refuse/1,000 population/year. The yield for commercial incineration was obtained from several sources. The yield of NO_x (P) was obtained from AP-42, Table 2.1-12 and is listed in Table 3.4.7-1. The yield value used for NO_x was the average of the yield values listed in AP-42. The yield of VOC is 8.556 lb/ton of refuse and was obtained from EIIP Technical Report, Open Burning, Table 16.4-1.

Table 3.4.7-1 Yield of Pollutant Values for Uncontrolled Refuse Combustors

Pollutant	Multiple Chamber Combustor Yield Value (lb/ton refuse burned)	Single Chamber Combustor Yield Value (lb/ton refuse burned)	Yield Value (lb/ton refuse burned)
NO _x	3	2	2.5 (average)
VOC	-	-	8.556

To calculate the per capita pollutant emission factor (EF) for on-site commercial incinerators, the fuel loading factor was multiplied by the yield of the pollutant, as shown in the following equation.

$$\begin{aligned}
 EF_P &= L_{\text{COMMERCIAL}} \times P_{\text{INCINERATION}} \\
 &= (23 \text{ tons of refuse/1000 population/year}) \times (2.5 \text{ lb NO}_x\text{/ton of refuse burned}) \\
 &= 57.5 \text{ lb NO}_x\text{/1000 population/year}
 \end{aligned}$$

The annual emissions from commercial on-site incineration for the base year 2002 inventory were calculated using equation 3.4.7-1.

$$EM_P = \frac{(\text{rural population in 2002}) \times (EF_P)}{(2000 \text{ lb/tons})} \quad 3.4.7-1$$

where EM_P = emissions from on-site incineration for pollutant (P) in tons/year
 EF_P = emission factor for pollutant (P)

The percent rural population was obtained from the 2000 census data. The 2000 census data was the latest data available. According to the Procedures document, on-site incineration occurs uniformly year round and operates 7 days per week. Point source emissions with SCC 5-xx-xxx-xx identified waste incineration emissions. The point source emissions in tons per year were subtracted from the area source emissions.

4. VISTAS DEVELOPED 2002 AREA SOURCE INVENTORY

Section 4.0 details the portion of the 2002 base year area source inventory, which was developed for VISTAS/ASIP by the VISTAS contractor, MACTEC, Inc. This information was obtained from the report entitled *Documentation of the Base G 2002 Base Year, 2009, and 2018, Emission Inventories for VISTAS* prepared for VISTAS by MACTEC, Inc. This report is included in Appendix G.

Several major components of the area source sector of the inventory, which were developed by VISTAS, are discussed in Sections 4.1 through 4.2. Also, emissions from portable fuel containers were added and are discussed in Section 4.1. Section 4.2 describes the development of the fires emissions inventory and distinguishes the difference between an actual versus typical inventory with regards to fires.

The following Sections are based on excerpts, with some editing, taken from a document entitled, *Documentation of the Base G 2002 Base Year, 2009 and 2018 Emission Inventories for VISTAS* and prepared by MACTEC, Inc.

4.1 PORTABLE FUEL CONTAINERS

Portable fuel containers (PFCs), SCC 2501060300, covers emissions from residential and commercial sector portable gasoline containers. Permeation, diurnal, transport, spillage, and vapor displacement emissions are typically accounted for in this category. Spillage from refueling operations and vapor displacement emissions were not included in the inventory to avoid double counting refueling in the non-road sector.

MACTEC found that the USEPA had prepared a national inventory of emissions by State for portable fuel containers. Data on emissions from this source prepared by the USEPA were presented in the report, *Estimating Emissions Associated with Portable Fuel Containers (PFCs), Draft Report*, Office of Transportation and Air Quality, USEPA, Report # EPA420-D-06-003, February 2006.

The 2002 county-level emission estimates were obtained through an allocation method based on fuel usage. Initially, 2005 emission estimates, except those from vapor displacement and spillage from refueling operations, were obtained from the USEPA's report and assumed to be equal to 2002 values. Permeation, diurnal, and transport emission estimates were summed and allocated to the county-level, based on the fuel usage information obtained from the

NONROAD2005 model. The SCCs that use containers for refueling were acquired from the spillage file of the NONROAD model. Then the fuel usages by county from the NONROAD2005 runs prepared for VISTAS/ASIP were summed for those SCCs by county. The county level fuel use was then divided by the State total fuel use for the same SCCs to determine the fraction of total State fuel usage and that fraction was used to allocate the State-level emissions to the county.

4.2 FOREST FIRES

The fires source category includes wildfire, prescribed burning, and land clearing fires. These fires can be intermittent in nature, but many of these can produce large quantities of air pollutant emissions. Wildfires in certain rural areas can produce large, short-term organic emissions. Prescribed burning is used as a forest management practice to establish favorable seedbeds, remove competing underbrush, accelerate nutrient cycling, control tree pests and contribute other ecological benefits. Agricultural burning covers agricultural burning practices used to clear and/or prepare land for planting. In land clearing fires, waste from logging operations is often burned under controlled conditions to reduce the potential fire hazards in forests and to remove brush that can serve as a host for destructive insects.

The total wildfire acreage burned was obtained from the NCDFR for each county in the State. These numbers however are replaced with the 2002 “typical” year for the purpose of modeling. Fire emissions are not easily grown or projected. Thus, the replacement was done so that the fires represented in the area source inventory are considered typical and do not reflect an abnormally low or high year as far as fires. The typical year forest fire inventories were developed by MACTEC, Inc. with input from state and federal forest resource staff. The typical year covered wildfire, prescribed burning, agricultural fires and land clearing fires. The development of the typical year inventory is described below.

State level ratios of acres over a longer-term record (three or more years) developed for each fire type relative to 2002. The 2002 acreage was then scaled up or down based on these ratios to develop a typical year inventory. VISTAS Fire Special Interest Work Group based the ratio on county-level data for States that supplied long-term fire-by-fire acreage data rather than State-level ratios. Where States did not supply long-term fire-by-fire acreage data, MACTEC reverted to using State-level ratios. With one broad exception (wildfires) this method was implemented for all fires. MACTEC solicited long term fire-by-fire acreage data by fire type from each VISTAS State. A minimum of three or more years of data were used to develop the ratios. Those data were then used to develop a ratio for each county based on the number of acres burned in each county for each fire type relative to 2002.

If VISTAS had long term county prescribed fire data from a State, a county acreage ratio, described below, was developed.

$$\text{Ratio} = \frac{\text{Long term average county level Rx acres}}{\text{2002 actual county level Rx acreage}}$$

This ratio was then multiplied times the actual 2002 acreage to get a typical value (basically the long term average county level acres). Wherever possible this calculation was performed on a fire-by-fire basis. The acreage calculated using the ratio was then used with the fuel loading and emission factor values to calculate emissions.

There were three exceptions to this method.

Exception 1: Use of State Ratios for Wildfires

Wildfires estimates were developed using State ratios rather than county ratios because some counties were showing unrealistic ratios, which were created by very short term data records or missing data. In addition, exceptionally large and small fires were removed from the database. VISTAS also removed all fires less than 0.1 acres from the dataset.

Exception 2: Correction for Blackened Acres on Forest Service Lands

Acres, submitted by the U.S. Forest Service (USFS) for wildfires and prescribed fires on USFS lands, represented perimeter acres rather than “blackened” acres. Therefore, for prescribed fires greater than 100 acres in size, the acreage was adjusted to be 80 percent of the initial reported value. For prescribed fires of 100 acres or less, the acreage values were maintained as reported. All reported acreage values for wildfires were adjusted to be 66 percent of their values, as initially reported.

Exception 3: Missing/Non-reported data

When VISTAS did not receive data from a VISTAS State for a particular fire type, a composite average for the entire VISTAS region was used to determine the typical value for that type fire. This technique was applied to all fire types when data was missing.

For wildfires and prescribed burning, ratios were also developed for “northern” and “southern” tier States within the VISTAS region and those ratios were applied to each State with missing data depending upon whether they were considered a “northern” or “southern” tier State.

Development of “southern” and “northern” tier data was an attempt to account for a change from a predominantly pine/evergreen ecosystem (southern) to a pine/deciduous ecosystem (northern).

Table 4.2-1 below presents a comparison in tons per year of the 2002 actual fire emissions and the 2002 typical fire emissions for NO_x and VOC for wildfires, prescribed burning, agricultural fires and land clearing fires in North Carolina.

Table 4.2-1 2002 North Carolina Actual and Typical Fire Emissions

Fire Type	Actual Fire Emissions		Typical Fire Emissions	
	NO_x (tpy)	VOC (tpy)	NO_x (tpy)	VOC (tpy)
Wildfires	458.18	1005.04	733.62	1609.22
Prescribed Burning	282.28	619.19	810.38	1777.61
Agricultural Fires	-	1123.38	-	1609.22
Landclearing Fires	3460.84	8029.08	3460.84	8029.08

5. 2008 AREA SOURCE EMISSION INVENTORY DEVELOPMENT

This Section describes the methodology used to develop the 2008 area source inventory. The 2002 base year inventory emissions were used as a starting point for calculating the 2008 emissions. 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 System 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 Management and were based originally on 2000 census data. Population growth factors were calculated to adjust 2002 values to future years by multiplication.

As previously stated, certain emission categories were adjusted for season or rule effectiveness and rule penetration. Table 5-1 below illustrates the control efficiency, rule effectiveness and rule penetration rate that was applied to the 2008 area sources emission inventory. The controls are applied at the same rate across all of the counties.

**Table 5-1 Control Efficiency, Rule Effectiveness and Rule Penetration Rates Applied to the
2008 Area Sources**

SCC	Source Category	Pollutant	Control Efficiency	Rule Effectiveness	Rule Penetration Rate
2104008000	Small Stationary Fossil Fuel Use: Residential Wood	VOC	52.53	100	100
2401001000	Architectural Coating: All Solvent Types	VOC	25	100	100
2401005000	Auto Body Refinishing	VOC	37	100	100
2401008000	Traffic Markings	VOC	25	100	100
2401015000	Industrial Surface Coating: Factory Finished Wood	VOC	36	100	100
2401020000	Surface Coating: Wood Furniture	VOC	30	100	100
2401025000	Surface Coating: Metal Furniture	VOC	36	100	100
2401040000	Surface Coating: Metal Containers	VOC	36	100	100
2401050000	Surface Coating: Sheet, Strip and Coil	VOC	36	100	100
2401055000	Surface Coating: Machinery and Equipment	VOC	36	100	100
2401060000	Surface Coating: Appliances	VOC	36	100	100
2401065000	Surface Coating: Electrical Insulation	VOC	36	100	100
2401070000	Surface Coating: Automobile (New)	VOC	36	100	100
2401080000	Surface Coating: Marine Coatings	VOC	24	100	100
2401090000	Surface Coating: Other Product Coating	VOC	36	100	100
2401100000	Surface Coating: High-performance Maintenance	VOC	25	100	100
2415130000	Electronic and Other Elec.: Open Top Degreasing	VOC	31	100	100
2415145000	Miscellaneous Manufacturing: Open Top Degreasing	VOC	31	100	100
2415345000	Miscellaneous Manufacturing: Cold Cleaning Degreasing	VOC	43	100	100
2415360000	Auto Repair Services: Cold Cleaning Degreasing	VOC	43	100	100
2420000000	Dry Cleaning: All Processes	VOC	44	80	100
2465000000	Non-industrial: Consumer: All Products/Processes	VOC	25	100	100
2465100000	Non-industrial: Consumer: Personal Care Products	VOC	25	100	100
2465200000	Non-industrial: Consumer: Household Products	VOC	25	100	100
2465400000	Non-industrial: Consumer: Automotive Aftermarket Products	VOC	25	100	100
2465600000	Non-industrial: Consumer: Adhesives and Sealants	VOC	25	100	100
2465800000	Pesticide Application	VOC	25	100	100

5.1 2008 PROJECTION OF FIRES

5.1.1 2008 Projection of Forest Fires

It is assumed that the number of acres burned remains relatively constant, therefore, the emissions do not change from 2002 to 2008.

5.1.2 2008 Projection of Structure Fires

The 2008 emission inventory was 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 from the 2000 census data.

For the 2008 structure fire emission inventory, the base year emissions were grown using the percent growth in population for each county. The 2008 structure fire emission inventory was calculated using Equation 5.1.2-1.

$$PJ_aEM = EM_P \times GF_a \quad 5.1.2-1$$

where EM_P = emissions for structure fires for pollutant (P)
 PJ_aEM = projected future year (a) emissions for county
 GF_a = growth factor for future year (a).

6. ADDITIONAL DATA

6.1 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		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</u>	321920	20 <u>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</u>	321920	30 <u>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</u>	321920	40 <u>Wood container & pallet mfg (pt)</u>	257	477,034	5,701	110,239	
SIC	NAICS	Pt	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
245		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	
	321991	<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	
	321992	<u>Prefabricated wood building mfg</u>	709	3,011,624	22,965	574,227	
SIC	NAICS	Pt	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
249		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	
	321114	<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	
	321219	<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</u>	321912	40 <u>Cut stock, resawing lumber, & planing (pt)</u>	20	73,251	549	12,847	
<u>2% of</u>	321920	50 <u>Wood container & pallet mfg (pt)</u>	49	65,184	870	18,727	
<u>94% of</u>	321999	30 <u>All other miscellaneous wood product mfg (pt)</u>	2,324	3,740,920	41,844	879,178	
<u>0% of</u>	332321	10 <u>Metal window & door mfg (pt)</u>	0	0	0	0	
<u>15% of</u>	339999	10 <u>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			<u>Mattresses & bedsprings</u>	742	4,067,225	24,673	643,390
	2% of 337121	20	<u>Upholstered household furniture mfg (pt)</u>	35	159,199	1,601	31,760
	337910		<u>Mattress mfg</u>	707	3,908,026	23,072	611,630
2517			<u>Wood TV & radio cabinets</u>	100	320,714	4,273	84,391
	337129		<u>Wood television, radio, & sewing machine cabinet mfg</u>	100	320,714	4,273	84,391
2519			<u>Household furniture, n.e.c.</u>	217	549,298	4,708	111,758
	337125		<u>Household furniture (except wood & metal) mfg</u>	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	97/92		<u>Office furniture</u>	1,036	11,340,955	74,863	2,402,387
2521			<u>Wood office furniture</u>	677	3,110,020	30,641	781,220
	337211		<u>Wood office furniture mfg</u>	677	3,110,020	30,641	781,220
2522			<u>Office furniture, except wood</u>	359	8,230,935	44,222	1,621,167
	337214		<u>Office furniture (except wood) mfg</u>	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	97/92		<u>Public building and related furniture</u>	468	7,869,175	36,979	1,022,978
2531			<u>Public building & related furniture</u>	468	7,869,175	36,979	1,022,978
	57% of 336360	30	<u>Motor vehicle seating & interior trim mfg (pt)</u>	184	6,060,320	20,784	610,043
	42% of 337127	10	<u>Institutional furniture mfg (pt)</u>	267	1,697,870	15,254	385,680
	9% of 339942	10	<u>Lead pencil & art good mfg (pt)</u>	17	110,985	941	27,255
SIC	NAICS	Pt	Description	Establish-ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
254	97/92		<u>Partitions and fixtures</u>	3,751	10,637,959	101,925	2,899,667
2541			<u>Wood partitions & fixtures</u>	2,825	5,388,485	57,453	1,624,792
	10% of 337110	20	<u>Wood kitchen cabinet & counter top mfg (pt)</u>	812	938,353	9,785	254,585
	337212		<u>Custom architectural woodwork & millwork mfg</u>	1,105	2,197,493	24,363	715,011
	28% of 337215	20	<u>Showcase, partition, shelving, & locker mfg (pt)</u>	908	2,252,639	23,305	655,196
2542			<u>Partitions & fixtures, except wood</u>	926	5,249,474	44,472	1,274,875
	66% of 337215	30	<u>Showcase, partition, shelving, & locker mfg (pt)</u>	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	^{9%} / 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	<u>Blind & shade mfg</u>	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

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

Σ=sum of NAICS parts listed below the symbol ^{3%}/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.

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

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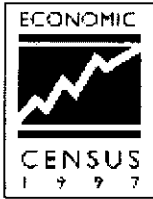
Source: 1997 Economic Census, Comparative Statistics

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1997 Economic Census: Bridge Between SIC and NAICS

SIC: Manufacturing

SIC 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












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

SIC 33: Primary metal 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)
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 324	199	20	All other petroleum & coal products mfg (pt)	8	438,107	1,731	74,553
99% of 331	111	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	33%	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	33%	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	33%	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 $\frac{97}{92}$ 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

Last modified: 6/27/00

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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
↓	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>Ordinance 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











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	37/32		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	37/32		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	37/32		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			<u>Fabricated plate work, boiler shops</u>	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	<u>AC & warm air heating & commercial/industrial refrig equip mfg (p</u>	9	43,264	339	8,218
3444			<u>Sheet metal work</u>	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	<u>Other metal container mfg (pt)</u>	126	275,440	2,074	60,030
3446			Architectural metal work	1,744	3,536,413	30,960	875,174
88% of	332323	10	<u>Ornamental & architectural metal work mfg (pt)</u>	1,744	3,536,413	30,960	875,174
3448			<u>Prefabricated metal buildings</u>	604	4,199,550	25,946	776,575
	332311		<u>Prefabricated metal building & component mfg</u>	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	<u>Fabricated structural metal mfg (pt)</u>	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	<u>Ornamental & architectural metal work mfg (pt)</u>	6	91,939	349	9,455









SIC	NAICS	Pt	Description	Establish-ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
345	9/32		<u>Screw machine products, bolts, etc.</u>	3,785	16,460,738	133,399	4,573,452
3451			<u>Screw machine products</u>	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			<u>Bolts, nuts, rivets, & washers</u>	1,040	8,134,661	52,995	1,939,377
	332722		<u>Bolt, nut, screw, rivet, & washer mfg</u>	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	9/32		<u>Metal forgings and stampings</u>	3,625	44,832,778	267,958	10,486,353
3462			<u>Iron & steel forgings</u>	421	4,924,426	26,432	1,035,345
	332111		<u>Iron & steel forging</u>	421	4,924,426	26,432	1,035,345
3463			<u>Nonferrous forgings</u>	84	1,858,708	9,129	366,879
	332112		Nonferrous forging	84	1,858,708	9,129	366,879
3465			<u>Automotive stampings</u>	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	97/92		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	97/92		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	97/92		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		<u>Fluid power valves & hose fittings</u>	424	6,602,909	37,132	1,324,392
100% of	332912 10	<u>Fluid power valve & hose fitting mfg (pt)</u>	424	6,602,909	37,132	1,324,392
3493		<u>Steel springs, except wire</u>	129	761,711	5,381	174,467
	332611	<u>Spring (heavy gauge) mfg</u>	129	761,711	5,381	174,467
3494		<u>Valves & pipe fittings, n.e.c.</u>	245	2,827,380	18,216	576,136
94% of	332919 20	<u>Other metal valve & pipe fitting mfg (pt)</u>	222	2,753,397	17,652	558,712
1% of	332999 30	<u>All other miscellaneous fabricated metal product mfg (pt)</u>	23	73,983	564	17,424
3495		<u>Wire springs</u>	396	D	(10k-24999)	D
	332612	<u>Spring (light gauge) mfg</u>	394	2,481,151	18,798	564,372
D	334518 10	<u>Watch, clock, & part mfg (pt)</u>	2	D	(100-249)	D
3496		<u>Miscellaneous fabricated wire products</u>	1,253	4,587,656	41,821	1,025,279
87% of	332618 30	<u>Other fabricated wire product mfg (pt)</u>	1,253	4,587,656	41,821	1,025,279
3497		<u>Metal foil & leaf</u>	107	3,257,743	10,615	418,574
	322225	<u>Laminated aluminum foil mfg for flexible packaging uses</u>	43	1,546,143	4,967	211,497
16% of	332999 40	<u>All other miscellaneous fabricated metal product mfg (pt)</u>	64	1,711,600	5,648	207,077
3498		<u>Fabricated pipe & fittings</u>	856	4,024,999	29,364	870,291
100% of	332996 20	<u>Fabricated pipe & pipe fitting mfg (pt)</u>	856	4,024,999	29,364	870,291
3499		<u>Fabricated metal products, n.e.c.</u>	3,043	D	(50k-99999)	D
	332117	<u>Powder metallurgy part mfg</u>	128	1,317,301	10,760	367,623
12% of	332439 40	<u>Other metal container mfg (pt)</u>	98	273,541	2,331	70,293
4% of	332510 20	<u>Hardware mfg (pt)</u>	58	435,815	3,401	93,516
D	332919 30	<u>Other metal valve & pipe fitting mfg (pt)</u>	7	D	(250-499)	D
72% of	332999 50	<u>All other miscellaneous fabricated metal product mfg (pt)</u>	2,592	7,558,137	63,736	1,870,813
2% of	337215 40	<u>Showcase, partition, shelving, & locker mfg (pt)</u>	78	123,057	1,295	35,369
4% of	339914 20	<u>Costume jewelry & novelty mfg (pt)</u>	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 ^{3%} 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	<u>Industrial machinery and equipment</u>	56,383	407,393,276	1,978,226	74,550,422
↓	351	<u>Engines and turbines</u>	390	D (50k-99999)	D	
↓	352	<u>Farm and garden machinery</u>	1,656	D (50k-99999)	D	
↓	353	<u>Construction and related machinery</u>	3,523	47,935,156	213,334	8,081,030
↓	354	<u>Metalworking machinery</u>	11,706	39,692,950	296,489	11,812,262
↓	355	<u>Special industry machinery</u>	4,781	D (100,000+)	D	
↓	356	<u>General industrial machinery</u>	4,479	44,080,890	265,359	9,752,818
↓	357	<u>Computer and office equipment</u>	2,181	D (100,000+)	D	
↓	358	<u>Refrigeration and service machinery</u>	2,277	39,317,539	204,675	6,800,658
↓	359	<u>Industrial machinery, n.e.c.</u>	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	<u>Engines and turbines</u>	390	D	(50k-99999)	D
3511		<u>Turbines & turbine generator sets</u>	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	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
354		97/792	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	Establish- ments	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		Speed changer, industrial high-speed drive, & gear mfg	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	$\frac{97}{32}$		<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	$\frac{97}{32}$		<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>97/32</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 97/32 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.

 (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
















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








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.






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


							24999)		
	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	97/32			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	97/32			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	97/32			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	97/92		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	97/92	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









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










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	<u>Automobile mfg</u>	194	95,385,563	114,060	6,411,952
	336112	<u>Light truck & utility vehicle mfg</u>	112	110,400,169	94,033	5,361,980
	336120	<u>Heavy duty truck mfg</u>	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	97/92		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	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	97/92		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)	D
SIC	NAICS	Pt	Description	Establish- ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
376	97/92		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	97/92		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	506,058
3795			Tanks & tank components	37	D	(5000- 9999)	D
D	336992	20	Military armored vehicle, tank, & tank component mfg (pt)	37	D	(5000- 9999)	D
3799			Transportation equipment, n.e.c.	877	D	(25k- 49999)	D

<u>D</u> 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%}2 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.

[All-sector menu](#)

[Menu of all 2-digit SICs](#)

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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 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	<u>Instruments and related products</u>	11,727		D (100,000+)	D
↓	381	<u>Search and navigation equipment</u>	680	32,497,776	187,557	9,958,084
↓	382	<u>Measuring and controlling devices</u>	4,787	46,449,122	263,237	11,037,829
↓	384	<u>Medical instruments and supplies</u>	4,818		D (100,000+)	D
↓	385	<u>Ophthalmic goods</u>	575	3,607,813	26,366	814,242
↓	386	<u>Photographic equipment and supplies</u>	739	21,305,761	63,642	2,928,089
↓	387	<u>Watches, clocks, watchcases, and parts</u>	128	718,191	5,646	155,180













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


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		<u>Search and navigation equipment</u>	680	32,497,776	187,557	9,958,084
3812			<u>Search & navigation equipment</u>	680	32,497,776	187,557	9,958,084
100% of	334511	20	<u>Search, detection, navigation, & guidance instrument mfg (pt)</u>	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		<u>Measuring and controlling devices</u>	4,787	46,449,122	263,237	11,037,829
3821							


		<u>Laboratory apparatus & furniture</u>	385	2,471,153	18,253	686,742
339111		<u>Laboratory apparatus & furniture mfg</u>	385	2,471,153	18,253	686,742
3822		<u>Environmental controls</u>	317	2,935,692	21,450	664,820
334512		<u>Automatic environmental control mfg</u>	317	2,935,692	21,450	664,820
3823		<u>Process control instruments</u>	1,002	7,890,923	49,196	2,004,259
334513		<u>Industrial process control instrument mfg</u>	1,002	7,890,923	49,196	2,004,259
3824		<u>Fluid meters & counting devices</u>	222	3,765,769	17,390	683,294
334514		<u>Totalizing fluid meter & counting device mfg</u>	222	3,765,769	17,390	683,294
3825		<u>Instruments to measure electricity</u>	843	13,877,200	63,522	3,008,675
2% of 334416	30	<u>Electronic coil, transformer, & other inductor mfg (pt)</u>	17	24,303	190	6,985
334515		<u>Electricity measuring & testing instrument mfg</u>	826	13,852,897	63,332	3,001,690
3826		<u>Analytical instruments</u>	664	7,157,038	38,200	1,782,600
100% of 334516	20	<u>Analytical laboratory instrument mfg (pt)</u>	664	7,157,038	38,200	1,782,600
3827		<u>Optical instruments & lenses</u>	495	3,174,652	20,801	833,784
100% of 333314	20	<u>Optical instrument & lens mfg (pt)</u>	495	3,174,652	20,801	833,784
3829		<u>Measuring & controlling devices, n.e.c.</u>	859	5,176,695	34,425	1,373,655
100% of 334519	20	<u>Other measuring & controlling device mfg (pt)</u>	853	5,114,547	33,904	1,356,368
0% of 339112	10	<u>Surgical & medical instrument mfg (pt)</u>	6	62,148	521	17,287
SIC	NAICS Pt	Description	Establish-ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
384	9/92	Medical instruments and supplies	4,818	D	(100,000+)	D
3841		<u>Surgical & medical instruments</u>	1,598	18,450,024	107,298	4,139,100
100% of 339112	20	<u>Surgical & medical instrument mfg (pt)</u>	1,598	18,450,024	107,298	4,139,100
3842		<u>Surgical appliances & supplies</u>	1,728	D	(50k-99999)	D
D 322121	30	<u>Paper (except newsprint) mills (pt)</u>	2	D	(250-499)	D
7% of 322291	20	<u>Sanitary paper product mfg (pt)</u>	16	651,398	2,236	68,411
7% of 334510	20	<u>Electromedical & electrotherapeutic apparatus mfg (pt)</u>	74	807,427	6,722	224,883
96% of 339113	20	<u>Surgical appliance & supplies mfg (pt)</u>	1,636	14,743,779	82,390	2,865,055
3843		<u>Dental equipment & supplies</u>	877	2,699,867	18,072	613,286
100% of 339114	20	<u>Dental equipment & supplies mfg (pt)</u>	877	2,699,867	18,072	613,286
3844		<u>X-ray apparatus & tubes</u>	155	3,942,256	14,276	664,233
334517		<u>Irradiation apparatus mfg</u>	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	Establish-ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
385	9/32		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	Establish-ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
386	9/32		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	Establish-ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
387	9/32		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

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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.

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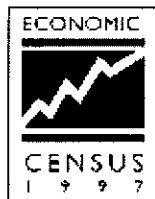
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1997 Economic Census: Bridge Between SIC and NAICS

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	<u>Miscellaneous manufacturing industries</u>	18,043	50,997,838	393,972	10,563,481
↓	391	<u>Jewelry, silverware, and plated ware</u>	2,828	7,243,618	46,547	1,208,070
↓	393	<u>Musical instruments</u>	576	1,356,651	13,411	363,022
↓	394	<u>Toys and sporting goods</u>	3,600	D (100,000+)		D
↓	395	<u>Pens, pencils, office, and art supplies</u>	1,017	3,987,200	28,150	738,265
↓	396	<u>Costume jewelry and notions</u>	1,075	D (10k-24999)		D
↓	399	<u>Miscellaneous manufactures</u>	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.

⁹/₃₂ 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)
391	⁹ / ₃₂		<u>Jewelry, silverware, and plated ware</u>	2,828	7,243,618	46,547	1,208,070
3911			<u>Jewelry, precious metal</u>	2,272	5,416,836	34,694	884,942
100% of	339911	20	<u>Jewelry (except costume) mfg (pt)</u>	2,272	5,416,836	34,694	884,942
3914			<u>Silverware & plated ware</u>	162	907,716	6,457	187,774
0% of	332211	20	<u>Cutlery & flatware (except precious) mfg (pt)</u>	11	8,032	101	2,699
99% of	339912	20	<u>Silverware & plated ware mfg (pt)</u>	151	899,684	6,356	185,075


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

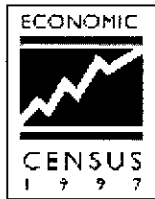
96% of	339914	30	Costume jewelry & novelty mfg (pt)	826	1,223,475	13,976	314,581
3965			Fasteners, buttons, needles, & pins	249	D	(5000-9999)	D
	D 339993	20	Fastener, button, needle, & pin mfg (pt)	249	D	(5000-9999)	D
SIC	NAICS	Pt	Description	Establish-ments	Value of Shipments (\$1,000)	Paid employees	Annual payroll (\$1,000)
399	9% 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

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.

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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	<u>Local and interurban passenger transportation</u>	19,621	D	(100,000+)	D
↓	411	<u>Local and suburban passenger transportation</u>	10,147	D	(100,000+)	D
↓	412	<u>Taxi service</u>	3,184	1,280,597	27,850	392,759
↓	413	<u>Interurban and rural bus transportation</u>	407	1,147,432	19,900	549,727
↓	414	<u>Charter bus service</u>	1,531	1,768,199	31,483	548,026
↓	415	<u>School bus service</u>	4,326	4,233,836	147,441	1,810,695
↓	417	<u>Bus terminal and service facilities</u>	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.


^{9/32} 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	^{9/32}	<u>Local and suburban passenger transportation</u>	10,147	D	(100,000+)	D
4111	↗	<u>Local & suburban transit</u>	1,152	D	(25k-49999)	D
	485111	<u>Mixed mode transit systems</u>	28	51,567	759	24,112
	485112	<u>Commuter rail systems</u>	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	97/32		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	97/32		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	97/32		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	97/32		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	97/32		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	<u>Terminal or maintenance facilities for motor vehicle pass trans</u>	26	15,253	220	5,190
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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

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All-sector menu	Menu of all 2-digit SICs	Data in formats for downloading	PDF report
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Source: 1997 Economic Census, Comparative Statistics

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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 Ce

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.

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

SIC	NAICS	Pt	Description	Establishments	Revenue (\$1,000)	Paid employees	Annual payroll (\$1,000)
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	<u>Establishments</u>	<u>Revenue (\$1,000)</u>	<u>Paid employees</u>	<u>Annual payroll (\$1,000)</u>
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		<u>Farm product warehousing & storage</u>	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 493110</u>	10	<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 493110</u>	20	<u>General warehousing & storage in foreign trade zones</u>		3	718	7	111
<u>0% of 493120</u>	20	<u>Fur storage</u>		5	1,504	12	249
<u>100% of 493190</u>	Σ	<u>Other warehousing & storage</u>		1,213	2,393,011	6,158	574,965
	493190 10	Household goods warehousing & storage		317	451,574	6,158	141,630
	493190 20	Specialized goods warehousing & storage		896	1,941,437	13,417	433,335
SIC	NAICS	Pt	Description	<u>Establish- ments</u>	<u>Revenue (\$1,000)</u>	<u>Paid employees</u>	<u>Annual payroll (\$1,000)</u>
423	97/92		<u>Trucking terminal facilities</u>	14	12,989	120	3,955
4231			<u>Trucking terminal facilities</u>	14	12,989	120	3,955
<u>3% of 488490</u>	20		<u>Motor freight terminal & joint terminal maint facility trans</u>	14	12,989	120	3,955


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

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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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







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
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	9732		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	9732		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	9732		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	9732		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	9732		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	9732		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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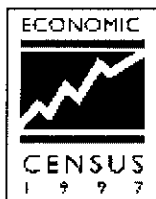
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1997 Economic Census: Bridge Between SIC and NAICS

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











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

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	92	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	92	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

6.2 FRACTION OF NAICS CODE EMPLOYMENT USED TO CREATE SIC EMPLOYMENT

SIC	NAICS	SIC Employees 1997	NAICS Employees '1997	Employee Fraction	NAICS description
Factory Finished Wood Surface Coating					
2426	321918	10521	38100	0.276	Other millwork (including flooring)
2426	337215	6310	75382	0.084	Showcase, partition, shelving, & locker mfg
2426	321912	17109	39763	0.430	Cut stock, resawing lumber, & planing
2429	321113	304	119760	0.003	Sawmills
2429	321920	684	51134	0.013	Wood container & pallet mfg
2429	321999	355	43839	0.008	All other miscellaneous wood product mfg
2431	321911	64771	64771	1.000	Wood window & door mfg
2431	321918	27488	38100	0.721	Other millwork (including flooring)
2434	337110	79579	99257	0.802	Wood kitchen cabinet & counter top mfg
2435	321211	22151	22151	1.000	Hardwood veneer & plywood mfg
2436	321212	28843	28843	1.000	Softwood veneer & plywood mfg
2439	321912	0	39763	0.000	Cut stock, resawing lumber, & planing
2439	321214	32522	32522	1.000	Truss mfg
2439	321113	0	119760	0.000	Sawmills
2439	321213	5372	5372	1.000	Engineered wood member (except truss) mfg
2441	321920	4885	51134	0.096	Wood container & pallet mfg
2448	321920	38994	51134	0.763	Wood container & pallet mfg
2449	321920	5701	51134	0.111	Wood container & pallet mfg
2451	321991	68269	68269	1.000	Manufactured home (mobile home) mfg
2452	321992	22965	22965	1.000	Prefabricated wood building mfg
2493	321219	25269	25269	1.000	Reconstituted wood product mfg
2499	339999	13740	74137	0.185	All other miscellaneous mfg
2499	332321	0	74944	0.000	Metal window & door mfg
2499	321920	870	51134	0.017	Wood container & pallet mfg
2499	321912	549	39763	0.014	Cut stock, resawing lumber, & planing
2499	321999	41844	43839	0.954	All other miscellaneous wood product mfg
Furniture & Fixtures Surface Coating and Part of Miscellaneous Degreasing					
2511	337122	123368	128248	0.962	Nonupholstered wood household furniture mfg
2512	337121	85258	90009	0.947	Upholstered household furniture mfg
2514	337124	22835	22835	1.000	Metal household furniture mfg
2515	337121	1601	90009	0.018	Upholstered household furniture mfg

SIC	NAICS	SIC Employees 1997	NAICS Employees '1997	Employee Fraction	NAICS description
2515	337910	23072	23072	1.000	Mattress mfg
2517	337129	4273	4273	1.000	Wood television, radio, & sewing machine cabinet mfg
2519	337125	4708	4708	1.000	Household furniture (except wood & metal) mfg
2521	337211	30641	30641	1.000	Wood office furniture mfg
2522	337214	44222	44222	1.000	Office furniture (except wood) mfg
2531	336360	20784	45600	0.456	Motor vehicle seating & interior trim mfg
2531	337127	15254	38218	0.399	Institutional furniture mfg
2531	339942	941	7990	0.118	Lead pencil & art good mfg
2541	337110	9785	99257	0.099	Wood kitchen cabinet & counter top mfg
2541	337212	24363	24363	1.000	Custom architectural woodwork & millwork mfg
2541	337215	23305	75382	0.309	Showcase, partition, shelving, & locker mfg
2542	337215	44472	75382	0.590	Showcase, partition, shelving, & locker mfg
2591	337920	19617	19617	1.000	Blind & shade mfg
2599	337127	22448	38218	0.587	Institutional furniture mfg
2599	339113	2925	85315	0.034	Surgical appliance & supplies mfg
Part of Misc. Degreasing					
3312	324199	1731	3671	0.472	All other petroleum & coal products mfg
3312	331111	144074	146514	0.983	Iron & steel mills
3313	331112	3724	3724	1.000	Electrometallurgical ferroalloy product mfg
3313	331492	311	11610	0.027	Other nonferrous metal secondary smelting, refining, & alloying
3315	331222	23489	23489	1.000	Steel wire drawing
3315	332618	2265	46174	0.049	Other fabricated wire product mfg
3316	331221	14362	14362	1.000	Cold-rolled steel shape mfg
3317	331210	27723	27723	1.000	Iron & steel pipes & tubes mfg from purchased steel
3321	331511	83570	86198	0.970	Iron foundries
3322	331511	2628	86198	0.030	Iron foundries
3324	331512	22673	22673	1.000	Steel investment foundries
3325	331513	23982	23982	1.000	Steel foundries (except investment)
3331	331411	7360	7360	1.000	Primary smelting & refining of copper
3334	331312	15763	15763	1.000	Primary aluminum production
3339	331419	10132	10132	1.000	Other nonferrous metal primary smelting & refining

SIC	NAICS	SIC Employees 1997	NAICS Employees '1997	Employee Fraction	NAICS description
3341	331423	1768	2333	0.758	Secondary smelting, refining, & alloying of copper
3341	331492	5485	11610	0.472	Other nonferrous metal secondary smelting, refining, & alloying
3341	331314	6226	6714	0.927	Secondary smelting & alloying of aluminum
3351	331421	21150	21150	1.000	Copper rolling, drawing, & extruding
3353	331315	25111	25111	1.000	Aluminum sheet, plate, & foil mfg
3353	332996	0	29364	0.000	Fabricated pipe & pipe fitting mfg
3354	331316	30357	30357	1.000	Aluminum extruded product mfg
3355	331319	2657	4306	0.617	Other aluminum rolling & drawing
3356	331491	17237	25872	0.666	Other nonferrous metal rolling, drawing, & extruding
Part of Misc. Degreasing and Part of Electrical Insulation Surface Coating					
3357	331319	1649	4306	0.383	Other aluminum rolling & drawing
3357	331422	4692	4692	1.000	Copper wire (except mechanical) drawing
3357	331491	8635	25872	0.334	Other nonferrous metal rolling, drawing, & extruding
3357	335921	8589	8589	1.000	Fiber optic cable mfg
3357	335929	46267	46267	1.000	Other communication & energy wire mfg
Part of Misc. Degreasing					
3363	331521	27717	27717	1.000	Aluminum die-casting foundries
3364	331522	17243	17243	1.000	Nonferrous (except aluminum) die-casting foundries
3365	331524	34098	34098	1.000	Aluminum foundries (except die-casting)
3366	331525	8909	8909	1.000	Copper foundries (except die-casting)
3369	331528	6529	6529	1.000	Other nonferrous foundries (except die-casting)
3398	332811	22674	22674	1.000	Metal heat treating
3399	331111	2440	146514	0.017	Iron & steel mills
3399	331314	488	6714	0.073	Secondary smelting & alloying of aluminum
3399	331423	565	2333	0.242	Secondary smelting, refining, & alloying of copper
3399	331492	5814	11610	0.501	Other nonferrous metal secondary smelting, refining, & alloying
3399	332618	2088	46174	0.045	Other fabricated wire product mfg
Part of Misc. Degreasing and Metal Containers Surface Coating					
3411	332431	27316	27316	1.000	Metal can mfg

SIC	NAICS	SIC Employees 1997	NAICS Employees '1997	Employee Fraction	NAICS description
3412	332439	6318	14922	0.423	Other metal container mfg
Part of Misc. Degreasing					
3421	332211	11129	11230	0.991	Cutlery & flatware (except precious) mfg
3423	332212	42947	50388	0.852	Hand & edge tool mfg
3425	332213	9149	9149	1.000	Saw blade & handsaw mfg
3429	332439	4135	14922	0.277	Other metal container mfg
3429	332510	70884	74285	0.954	Hardware mfg
3429	332919	750	18739	0.040	Other metal valve & pipe fitting mfg
3431	332998	9994	9994	1.000	Enameled iron & metal sanitary ware mfg
3432	332913	16202	16202	1.000	Plumbing fixture fitting & trim mfg
3432	332999	474	79070	0.006	All other miscellaneous fabricated metal product mfg
3433	333414	22495	24666	0.912	Heating equipment (except warm air furnaces) mfg
3441	332312	84704	93433	0.907	Fabricated structural metal mfg
3442	332321	72970	74944	0.974	Metal window & door mfg
3443	333415	339	119795	0.003	AC & warm air heating & commercial/industrial refrig equip mfg
3443	332420	33704	33704	1.000	Metal tank (heavy gauge) mfg
3443	332313	25453	25453	1.000	Plate work mfg
3443	332410	27542	27542	1.000	Power boiler & heat exchanger mfg
3444	332322	129826	129826	1.000	Sheet metal work mfg
3444	332439	2074	14922	0.139	Other metal container mfg
3446	332323	30960	34391	0.900	Ornamental & architectural metal work mfg
3448	332311	25946	25946	1.000	Prefabricated metal building & component mfg
3449	332114	15219	15219	1.000	Custom roll forming
3449	332312	8729	93433	0.093	Fabricated structural metal mfg
3449	332321	1974	74944	0.026	Metal window & door mfg
3449	332323	349	34391	0.010	Ornamental & architectural metal work mfg
3451	332721	80404	80404	1.000	Precision turned product mfg
3452	332722	52995	52995	1.000	Bolt, nut, screw, rivet, & washer mfg
3462	332111	26432	26432	1.000	Iron & steel forging
3463	332112	9129	9129	1.000	Nonferrous forging
3465	336370	126905	126905	1.000	Motor vehicle metal stamping
3466	332115	4682	4682	1.000	Crown & closure mfg
3469	332116	93086	93086	1.000	Metal stamping

SIC	NAICS	SIC Employees 1997	NAICS Employees '1997	Employee Fraction	NAICS description
3469	332214	7724	7724	1.000	Kitchen utensil, pot, & pan mfg
3471	332813	74640	74640	1.000	Electroplating, plating, polishing, anodizing, & coloring
Part of Misc. Degreasing and Sheet, Strip & Coil Surface Coating					
3479	332812	55904	55904	1.000	Metal coating/engraving (exc jewelry/silverware)/allied services
3479	339911	79	34773	0.002	Jewelry (except costume) mfg
3479	339912	103	6459	0.016	Silverware & plated ware mfg
3479	339914	29	14573	0.002	Costume jewelry & novelty mfg
Part of Misc. Degreasing					
3482	332992	6863	6863	1.000	Small arms ammunition mfg
3483	332993	9427	9427	1.000	Ammunition (except small arms) mfg
3484	332994	9907	9907	1.000	Small arms mfg
3489	332995	12285	12285	1.000	Other ordnance & accessories mfg
3491	332911	53459	53459	1.000	Industrial valve mfg
3492	332912	37132	37132	1.000	Fluid power valve & hose fitting mfg
3493	332611	5381	5381	1.000	Spring (heavy gauge) mfg
3494	332919	17652	18739	0.942	Other metal valve & pipe fitting mfg
3494	332999	564	79070	0.007	All other miscellaneous fabricated metal product mfg
3495	332612	18798	18798	1.000	Spring (light gauge) mfg
3495	334518	175	6333	0.028	Watch, clock, & part mfg
3496	332618	41821	46174	0.906	Other fabricated wire product mfg
3497	332999	5648	79070	0.071	All other miscellaneous fabricated metal product mfg
3497	322225	4967	4967	1.000	Laminated aluminum foil mfg for flexible packaging uses
3498	332996	29364	29364	1.000	Fabricated pipe & pipe fitting mfg
3499	332439	2331	14922	0.156	Other metal container mfg
3499	332510	3401	74285	0.046	Hardware mfg
3499	332919	375	18739	0.020	Other metal valve & pipe fitting mfg
3499	332999	63736	79070	0.806	All other miscellaneous fabricated metal product mfg
3499	337215	1295	75382	0.017	Showcase, partition, shelving, & locker mfg
3499	339914	568	14573	0.039	Costume jewelry & novelty mfg
3499	332117	10760	10760	1.000	Powder metallurgy part mfg

SIC	NAICS	SIC Employees 1997	NAICS Employees '1997	Employee Fraction	NAICS description
Part of Misc. Degreasing and Machinery & Equipment Surface Coating					
3511	333611	19529	19529	1.000	Turbine & turbine generator set unit mfg
3519	333618	56338	56348	1.000	Other engine equipment mfg
3519	336399	896	174465	0.005	All other motor vehicle parts mfg
3523	332212	60	50388	0.001	Hand & edge tool mfg
3523	333922	320	39599	0.008	Conveyor & conveying equipment mfg
3523	333111	66370	66370	1.000	Farm machinery & equipment mfg
3523	332323	3082	34391	0.090	Ornamental & architectural metal work mfg
3524	332212	60	50388	0.001	Hand & edge tool mfg
3524	333112	28617	28617	1.000	Lawn & garden tractor & home lawn & garden equipment mfg
3531	333120	74965	74965	1.000	Construction machinery mfg
3531	333923	10263	18014	0.570	Overhead traveling crane, hoist, & monorail system mfg
3531	336510	2379	34012	0.070	Railroad rolling stock mfg
3532	333131	13547	13547	1.000	Mining machinery & equipment mfg
3533	333132	29451	29451	1.000	Oil & gas field machinery & equipment mfg
3534	333921	9442	9442	1.000	Elevator & moving stairway mfg
3535	333922	39279	39599	0.992	Conveyor & conveying equipment mfg
3536	333923	7751	18014	0.430	Overhead traveling crane, hoist, & monorail system mfg
3537	333924	25953	25953	1.000	Industrial truck, tractor, trailer, & stacker machinery mfg
3537	332439	64	14922	0.004	Other metal container mfg
3537	332999	240	79070	0.003	All other miscellaneous fabricated metal product mfg
3541	333512	28849	29371	0.982	Machine tool (metal cutting types) mfg
3542	333513	14185	14185	1.000	Machine tool (metal forming types) mfg
3543	332997	7959	7959	1.000	Industrial pattern mfg
3544	333511	48657	48657	1.000	Industrial mold mfg
3544	333514	80113	80113	1.000	Special die & tool, die set, jig, & fixture mfg
3545	332212	6379	50388	0.127	Hand & edge tool mfg
3545	333515	47925	47925	1.000	Cutting tool & machine tool accessory mfg
3546	333991	16816	16816	1.000	Power-driven handtool mfg
3547	333516	4149	4149	1.000	Rolling mill machinery & equipment mfg
3548	335311	0	26638	0.000	Power, distribution, & specialty transformer mfg

SIC	NAICS	SIC Employees 1997	NAICS Employees '1997	Employee Fraction	NAICS description
3548	333992	22434	22505	0.997	Welding & soldering equipment mfg
3549	333518	19023	19023	1.000	Other metalworking machinery mfg
3552	333292	13600	13600	1.000	Textile machinery mfg
3553	333210	9117	9117	1.000	Sawmill & woodworking machinery mfg
3554	333291	18594	18594	1.000	Paper industry machinery mfg
3555	333293	17500	21000	0.833	Printing machinery & equipment mfg
3556	333294	19026	19026	1.000	Food product machinery mfg
3559	333319	2890	56910	0.051	Other commercial & service industry machinery mfg
3559	333220	18574	18574	1.000	Plastics & rubber industry machinery mfg
3559	333295	40087	40087	1.000	Semiconductor machinery mfg
3559	333298	53046	53106	0.999	All other industrial machinery mfg
3561	333911	36552	36552	1.000	Pump & pumping equipment mfg
3562	332991	36991	36991	1.000	Ball & roller bearing mfg
3563	333912	24821	24821	1.000	Air & gas compressor mfg
3564	333411	16183	16183	1.000	Air purification equipment mfg
3564	333412	13723	13723	1.000	Industrial & commercial fan & blower mfg
3565	333993	31581	31581	1.000	Packaging machinery mfg
3566	333612	16231	16231	1.000	Speed changer, industrial high-speed drive, & gear mfg
3567	333994	17585	17585	1.000	Industrial process furnace & oven mfg
3568	333613	21604	21604	1.000	Mechanical power transmission equipment mfg
3569	333999	50088	61151	0.819	All other miscellaneous general-purpose machinery mfg
3571	334111	100115	100115	1.000	Electronic computer mfg
3572	334112	42364	42364	1.000	Computer storage device mfg
3575	334113	5764	5764	1.000	Computer terminal mfg
3577	334119	87253	93970	0.929	Other computer peripheral equipment mfg
3578	333313	966	14831	0.065	Office machinery mfg
3578	334119	6717	93970	0.071	Other computer peripheral equipment mfg
3579	333313	13865	14831	0.935	Office machinery mfg
3579	334518	750	6333	0.118	Watch, clock, & part mfg
3579	339942	1234	7990	0.154	Lead pencil & art good mfg
3581	333311	8178	8178	1.000	Automatic vending machine mfg
3582	333312	4523	4523	1.000	Commercial laundry, drycleaning, & pressing machine mfg

SIC	NAICS	SIC Employees 1997	NAICS Employees '1997	Employee Fraction	NAICS description
3585	333415	119456	119795	0.997	AC & warm air heating & commercial/industrial refrig equip mfg
3585	336391	21522	21522	1.000	Motor vehicle air-conditioning mfg
3586	333913	6824	6824	1.000	Measuring & dispensing pump mfg
3589	333319	44172	56910	0.776	Other commercial & service industry machinery mfg
3592	336311	17518	17518	1.000	Carburetor, piston, piston ring, & valve mfg
3593	333995	23062	23062	1.000	Fluid power cylinder & actuator mfg
3594	333996	15482	15482	1.000	Fluid power pump & motor mfg
3596	333997	4871	4871	1.000	Scale & balance (except laboratory) mfg
3599	332710	290951	290951	1.000	Machine shops
3599	332999	4199	79070	0.053	All other miscellaneous fabricated metal product mfg
3599	333319	1335	56910	0.023	Other commercial & service industry machinery mfg
3599	333999	11063	61151	0.181	All other miscellaneous general-purpose machinery mfg
Part of Misc. & Electronic Degreasing and Part of Electrical Insulation Surface Coating					
3612	335311	26638	26638	1.000	Power, distribution, & specialty transformer mfg
Part of Misc. & Electronic Degreasing					
3613	335313	41291	41291	1.000	Switchgear & switchboard apparatus mfg
3621	335312	71112	74666	0.952	Motor & generator mfg
3624	335991	10887	10887	1.000	Carbon & graphite product mfg
3625	335314	68365	68365	1.000	Relay & industrial control mfg
3629	335999	18682	44754	0.417	All other miscellaneous electrical equipment & component mfg
Part of Misc. & Electronic Degreasing and Appliance Surface Coating					
3631	335221	17543	17543	1.000	Household cooking appliance mfg
3632	335222	24597	24597	1.000	Household refrigerator & home freezer mfg
3633	335224	14801	14801	1.000	Household laundry equipment mfg
3634	333414	2171	24666	0.088	Heating equipment (except warm air furnaces) mfg
3634	335211	17058	17058	1.000	Electric housewares & household fan mfg
3635	335212	10537	10537	1.000	Household vacuum cleaner mfg
3639	333298	60	53106	0.001	All other industrial machinery mfg
3639	335212	0	10537	0.000	Household vacuum cleaner mfg
3639	335228	13309	13309	1.000	Other major household appliance mfg

SIC	NAICS	SIC Employees 1997	NAICS Employees '1997	Employee Fraction	NAICS description
Part of Misc. & Electronic Degreasing					
3641	335110	15903	15903	1.000	Electric lamp bulb & part mfg
3643	335931	44907	44907	1.000	Current-carrying wiring device mfg
3644	335932	23540	23540	1.000	Noncurrent-carrying wiring device mfg
3645	335121	16395	17685	0.927	Residential electric lighting fixture mfg
3646	335122	23090	23090	1.000	Commercial/industrial/institutional electric lighting fixture mfg
3647	336321	16506	16506	1.000	Vehicular lighting equipment mfg
3648	335129	18274	18282	1.000	Other lighting equipment mfg
3651	334310	31727	31727	1.000	Audio & video equipment mfg
3652	334612	16598	25554	0.650	Prerecorded CD (except software), tape, & record reproducing
3661	334210	104262	104262	1.000	Telephone apparatus mfg
3661	334416	63	19431	0.003	Electronic coil, transformer, & other inductor mfg
3661	334418	6083	111054	0.055	Printed circuit assembly (electronic assembly) mfg
3663	334220	148156	164461	0.901	Radio & TV broadcasting & wireless communications equipment mfg
3669	334290	25187	25187	1.000	Other communications equipment mfg
3671	334411	21976	21976	1.000	Electron tube mfg
3672	334412	76702	76702	1.000	Bare printed circuit board mfg
3674	334413	199497	199497	1.000	Semiconductor & related device mfg
3675	334414	18882	18882	1.000	Electronic capacitor mfg
3676	334415	11964	11964	1.000	Electronic resistor mfg
3677	334416	19178	19431	0.987	Electronic coil, transformer, & other inductor mfg
3678	334417	37232	37232	1.000	Electronic connector mfg
3679	336322	12786	95491	0.134	Other motor vehicle electrical & electronic equipment mfg
3679	334220	16305	164461	0.099	Radio & TV broadcasting & wireless communications equipment mfg
3679	334418	104971	111054	0.945	Printed circuit assembly (electronic assembly) mfg
3679	334419	92200	92200	1.000	Other electronic component mfg
3691	335911	23288	23288	1.000	Storage battery mfg
3692	335912	8917	8917	1.000	Primary battery mfg
3694	336322	52216	95491	0.547	Other motor vehicle electrical & electronic equipment mfg

SIC	NAICS	SIC Employees 1997	NAICS Employees '1997	Employee Fraction	NAICS description
3695	334613	21345	21345	1.000	Magnetic & optical recording media mfg
3699	333992	71	22505	0.003	Welding & soldering equipment mfg
3699	335999	26072	44754	0.583	All other miscellaneous electrical equipment & component mfg
3699	335129	8	18282	0.000	Other lighting equipment mfg
3699	334519	29	33933	0.001	Other measuring & controlling device mfg
3699	334516	159	38359	0.004	Analytical laboratory instrument mfg
3699	334119	0	93970	0.000	Other computer peripheral equipment mfg
3699	334510	542	54385	0.010	Electromedical & electrotherapeutic apparatus mfg
3699	339114	0	18072	0.000	Dental equipment & supplies mfg
3699	333512	522	29371	0.018	Machine tool (metal cutting types) mfg
3699	333319	8513	56910	0.150	Other commercial & service industry machinery mfg
3699	333315	0	24707	0.000	Photographic & photocopying equipment mfg
3699	333314	56	20857	0.003	Optical instrument & lens mfg
3699	333293	175	21000	0.008	Printing machinery & equipment mfg
3699	333292	0	13600	0.000	Textile machinery mfg
3699	332212	424	50388	0.008	Hand & edge tool mfg
3699	334511	604	188161	0.003	Search, detection, navigation, & guidance instrument mfg
3699	333618	10	56348	0.000	Other engine equipment mfg
Part of Misc. Degreasing and New Automobile Surface Coating					
3711	336992	375	5788	0.065	Military armored vehicle, tank, & tank component mfg
3711	336111	114060	114060	1.000	Automobile mfg
3711	336112	94033	94033	1.000	Light truck & utility vehicle mfg
3711	336120	28214	28214	1.000	Heavy duty truck mfg
3711	336211	404	43384	0.009	Motor vehicle body mfg
Part of Misc. Degreasing and Part of Other Transportation Equipment Surface Coating					
3713	336211	41779	43384	0.963	Motor vehicle body mfg
3714	336312	81368	81368	1.000	Gasoline engine & engine parts mfg
3714	336322	30489	95491	0.319	Other motor vehicle electrical & electronic equipment mfg
3714	336330	48944	48944	1.000	Motor vehicle steering & suspension component (except spring) mfg
3714	336340	43132	43132	1.000	Motor vehicle brake system mfg
3714	336350	111954	111954	1.000	Motor vehicle transmission & power train

SIC	NAICS	SIC Employees 1997	NAICS Employees '1997	Employee Fraction	NAICS description
					parts mfg
3714	336399	173569	174465	0.995	All other motor vehicle parts mfg
3714	336211	1201	43384	0.028	Motor vehicle body mfg
3715	336212	30678	30678	1.000	Truck trailer mfg
3716	336213	18086	18086	1.000	Motor home mfg
3721	336411	200961	200961	1.000	Aircraft mfg
3724	336412	82557	82557	1.000	Aircraft engine & engine parts mfg
3728	332912	0	37132	0.000	Fluid power valve & hose fitting mfg
3728	336413	127729	127729	1.000	Other aircraft part & auxiliary equipment mfg
3728	333995	0	23062	0.000	Fluid power cylinder & actuator mfg
3728	333996	0	15482	0.000	Fluid power pump & motor mfg
Part of Misc. Degreasing and Marine Surface Coating					
3731	336611	97385	97385	1.000	Ship building & repairing
3732	336612	41422	41422	1.000	Boat building
3732	811490	9454	65213	0.145	Other personal & household goods repair & maintenance
Part of Misc. Degreasing and Part of Other Transportation Equipment Surface Coating					
3743	333911	0	36552	0.000	Pump & pumping equipment mfg
3743	336510	31633	34012	0.930	Railroad rolling stock mfg
3751	336991	17158	17218	0.997	Motorcycle, bicycle, & parts mfg
3761	336414	52158	52158	1.000	Guided missile & space vehicle mfg
3764	336415	18540	18540	1.000	Guided missile & space vehicle propulsion unit & parts mfg
3769	336419	6110	6110	1.000	Other guided missile & space vehicle parts & auxiliary equip mfg
3792	336214	20112	33352	0.603	Travel trailer & camper mfg
3795	336992	5415	5788	0.936	Military armored vehicle, tank, & tank component mfg
3799	336214	13240	33352	0.397	Travel trailer & camper mfg
3799	336999	19466	19466	1.000	All other transportation equipment mfg
3799	332212	60	50388	0.001	Hand & edge tool mfg
Part of Misc. Degreasing					
3812	334511	187557	188161	0.997	Search, detection, navigation, & guidance instrument mfg
3821	339111	18253	18253	1.000	Laboratory apparatus & furniture mfg
3822	334512	21450	21450	1.000	Automatic environmental control mfg
3823	334513	49196	49196	1.000	Industrial process control instrument mfg

SIC	NAICS	SIC Employees 1997	NAICS Employees '1997	Employee Fraction	NAICS description
3824	334514	17390	17390	1.000	Totalizing fluid meter & counting device mfg
3825	334416	190	19431	0.010	Electronic coil, transformer, & other inductor mfg
3825	334515	63332	63332	1.000	Electricity measuring & testing instrument mfg
3826	334516	38200	38359	0.996	Analytical laboratory instrument mfg
3827	333314	20801	20857	0.997	Optical instrument & lens mfg
3829	339112	521	107819	0.005	Surgical & medical instrument mfg
3829	334519	33904	33933	0.999	Other measuring & controlling device mfg
3841	339112	107298	107819	0.995	Surgical & medical instrument mfg
3842	322121	375	120176	0.003	Paper (except newsprint) mills
3842	322291	2236	21791	0.103	Sanitary paper product mfg
3842	334510	6722	54385	0.124	Electromedical & electrotherapeutic apparatus mfg
3842	339113	82390	85315	0.966	Surgical appliance & supplies mfg
3843	339114	18072	18072	1.000	Dental equipment & supplies mfg
3844	334517	14276	14276	1.000	Irradiation apparatus mfg
3845	334510	47121	54385	0.866	Electromedical & electrotherapeutic apparatus mfg
3851	339115	26366	26366	1.000	Ophthalmic goods mfg
3861	325992	38935	38935	1.000	Photographic film, paper, plate, & chemical mfg
3861	333315	24707	24707	1.000	Photographic & photocopying equipment mfg
3873	334518	5646	6333	0.892	Watch, clock, & part mfg
3911	339911	34694	34773	0.998	Jewelry (except costume) mfg
3914	332211	101	11230	0.009	Cutlery & flatware (except precious) mfg
3914	339912	6356	6459	0.984	Silverware & plated ware mfg
3915	339913	5396	5396	1.000	Jewelers' material & lapidary work mfg
3931	339992	13411	13411	1.000	Musical instrument mfg
3942	339931	3393	3393	1.000	Doll & stuffed toy mfg
3944	336991	60	17218	0.003	Motorcycle, bicycle, & parts mfg
3944	339932	29622	29622	1.000	Game, toy, & children's vehicle mfg
3949	339920	69664	69664	1.000	Sporting & athletic goods mfg
3951	339941	8394	8394	1.000	Pen & mechanical pencil mfg
3952	339942	5815	7990	0.728	Lead pencil & art good mfg
3952	337127	187	38218	0.005	Institutional furniture mfg
3952	325998	0	35915	0.000	All other miscellaneous chemical product &

SIC	NAICS	SIC Employees 1997	NAICS Employees '1997	Employee Fraction	NAICS description
					preparation mfg
3953	339943	7831	7831	1.000	Marking device mfg
3955	339944	5923	5923	1.000	Carbon paper & inked ribbon mfg
3961	339914	13976	14573	0.959	Costume jewelry & novelty mfg
3965	339993	7500	7842	0.956	Fastener, button, needle, & pin mfg
3991	339994	13882	16826	0.825	Broom, brush, & mop mfg
3993	339950	82956	82956	1.000	Sign mfg
3995	339995	6962	6962	1.000	Burial casket mfg
3996	326192	5614	6070	0.925	Resilient floor covering mfg
3999	323119	0	33016	0.000	Other commercial printing
3999	337127	329	38218	0.009	Institutional furniture mfg
3999	335121	1216	17685	0.069	Residential electric lighting fixture mfg
3999	332999	3231	79070	0.041	All other miscellaneous fabricated metal product mfg
3999	332212	750	50388	0.015	Hand & edge tool mfg
3999	326199	3141	526382	0.006	All other plastics product mfg
3999	325998	572	35915	0.016	All other miscellaneous chemical product & preparation mfg
3999	314999	2167	64480	0.034	All other miscellaneous textile product mills
3999	323113	0	72221	0.000	Commercial screen printing
3999	339999	60397	74137	0.815	All other miscellaneous mfg
3999	316110	329	15317	0.021	Leather & hide tanning & finishing
3999	321999	0	43839	0.000	All other miscellaneous wood product mfg
3999	322299	0	24302	0.000	All other converted paper product mfg
3999	323110	0	415117	0.000	Commercial lithographic printing
3999	323111	0	23260	0.000	Commercial gravure printing
3999	323112	0	30588	0.000	Commercial flexographic printing
Part of Misc. Open Top Degreasing & Auto Repair Cold Cleaning					
4173	488490	220	7480	0.029	Other support activities for road transportation
4231	488490	120	7480	0.016	Other support activities for road transportation
5511	441110	1046243	1046243	1.000	New car dealers
5521	441120	92752	92752	1.000	Used car dealers
5541	447190	69640	308105	0.226	Other gasoline stations
5541	447110	432935	613957	0.705	Gasoline stations with convenience stores
5541	447190	238465	308105	0.774	Other gasoline stations

SIC	NAICS	SIC Employees 1997	NAICS Employees '1997	Employee Fraction	NAICS description
5551	441222	35134	35134	1.000	Boat dealers
5561	441210	29463	29463	1.000	Recreational vehicle dealers
7532	811121	192853	205172	0.940	Automotive body, paint, & interior repair & maintenance
7532	811121	6507	205172	0.032	Automotive body, paint, & interior repair & maintenance
7532	811121	5812	205172	0.028	Automotive body, paint, & interior repair & maintenance
7533	811112	23015	23015	1.000	Automotive exhaust system repair
7534	811198	2991	14780	0.202	All other automotive repair & maintenance
7534	326212	7939	7939	1.000	Tire retreading
7536	811122	29187	29187	1.000	Automotive glass replacement shops
7537	811113	29442	29442	1.000	Automotive transmission repair
7538	811111	290634	290634	1.000	General automotive repair
7539	811118	3954	42234	0.094	Other automotive mechanical & electrical repair & maintenance
7539	811118	4802	42234	0.114	Other automotive mechanical & electrical repair & maintenance
7539	811118	18216	42234	0.431	Other automotive mechanical & electrical repair & maintenance
7539	811118	6890	42234	0.163	Other automotive mechanical & electrical repair & maintenance
7539	811118	8372	42234	0.198	Other automotive mechanical & electrical repair & maintenance
<hr/> Dry Cleaning <hr/>					
7215	812310	53023	53023	1.000	Dry cleaning, coin operated
7216	812320	166208	203777	0.816	Dry cleaning, commercial