Analysis of the Truck Inventory and Use Survey from the Truck Size and Weight Perspective for Trucks with Four-Axles or Less

U.S. Department of Transportation
Comprehensive Truck Size and Weight Study
Report No. 6

Activity I: Task B
Identify Market Segments—Competitive and Noncompetitive
TIUS Data Component

October 1996

Prepared by

Carina Tornow
Ben Ritchey
Alan Clayton
Phil Blow
Karen White

The primary objectives of the U.S. Department of Transportation's Comprehensive Truck Size and Weight (TS&W) Study are to:

- assess the potential economic, safety, and environmental impacts of changing existing TS&W limits; and
- identify opportunities to increase the efficiency of freight transportation while preserving safety and highway infrastructure.

Reports which have been completed for the TS&W Study, to date, include the following:

(1) Synthesis of Truck Size and Weight Studies and Issues
(2) Analysis of the Truck Inventory and Use Survey from the Truck Size and Weight Perspective for Trucks with Five-Axles or More
(3) Truck Size and Weight Modeling Workshop
(4) Truck Size and Weight Performance-Based Workshop
(5) Western U.S.-Canada Crossborder Case Study.
(6) Analysis of the Truck Inventory and Use Survey from the Truck Size and Weight Perspective for Trucks with Four-Axles or Less

For more information, call Karen E. White, FHWA, 202-366-9474, 202-366-7696 (FAX), or e:mail: Karen.White@fhwa.dot.gov

Executive Summary

This report, as part of the U.S. Department of Transportation (DOT) Comprehensive Truck Size and Weight (TS&W) Study, provides factual information and analysis of the U.S. freight hauling truck fleet, and is based on the Truck Inventory and Use Survey (TIUS) data bases from 1992 and 1987. The U.S. Bureau of the Census collects truck data every five years with 1992 being the latest data available. The TIUS can be used to help understand the U.S. truck fleet makeup, size, uses, location, and type of commodities hauled at the national, regional, and local levels. This information will be used to present a picture of the U.S. truck fleet and its uses as well as to evaluate the potential national/regional TS&W policy options.

The TIUS provides data on the physical and operational characteristics of the U.S. truck fleet. The survey sample is drawn from each state's registration records. The sample contains privately- and commercially-owned trucks, as well as, trucks used for personal transportation and freight hauling. In 1992, the sample size was approximately 150,000 trucks which reflected a population of 60 million commercially- and privately-owned trucks in the U.S.

This report on the 4-axles or less truck fleet compliments an earlier U.S. DOT TS&W Study (Report #2) of the 5-axles or more commercial freight hauling fleet. Specific 4-axles or less truck types analyzed:

- single unit straight truck
- single unit straight truck with trailer
- tractor with semitrailer.

This Executive Summary provides highlights of these analyses of the TIUS data, however, it is not a summary of the entire report. First, some cautions are provided about the use of the TIUS data analyses. Second, information is provided about how the data are organized in the analyses with reference to the portions of the main report that are relevant to each topic area. Third, a brief set of highlights, based on the more detailed analyses and findings contained in the body of this report, provides a snapshot of the 1992 U.S. 4-axles or less truck fleet.

Cautionary Note

There are a number of cautionary notes in reviewing this analysis of the TIUS (see Section 1.4 for more detail), including:

- Data reported in the TIUS is based on State registration data and the potential for registration-bias exists.

- Survey and population estimates are by registration state and care needs to be taken in conducting analysis at the state level. For example, triples are reported in Minnesota where the use of such vehicles is not permitted. This may be due to ownership in one state and use in another state.

Vehicle Categorization

In this report, the trucks from the TIUS data base were categorized into vehicle configuration classes, vehicle groups, and state of registration. The vehicle configuration class identifies the way the truck is most often operated or used. Each truck was classified based on three factors:

(1) Vehicle type: straight truck not pulling a trailer, straight truck pulling a trailer, tractor pulling a trailer
(2) Number of axles on truck or tractor
(3) Number of axles on a trailer.

Vehicle Groups

In this report, the TIUS data for trucks with 4-axles or less were analyzed by dividing the data into seven vehicle groups, as follows (see Figure 2.2-1 in Section 2.2 for descriptions):

- 2-axle Straight Truck
- 3-axle Straight Truck
- 4-axle Straight Truck
- 2-axle Straight Truck pulling a 2-axle trailer
- 2-axle Tractor pulling a 1-axle semitrailer
- 2-axle Tractor pulling a 2-axle semitrailer
- 3-axle Tractor pulling a 1-axle semitrailer

Traffic Regions And States

The report organizes the TIUS truck data into five regions (North Central, North East, South Atlantic, South Gulf, and West) and for each of the 50 states and Washington, D.C. as shown in Figure ES-1 (see Section 2.3 of the report).

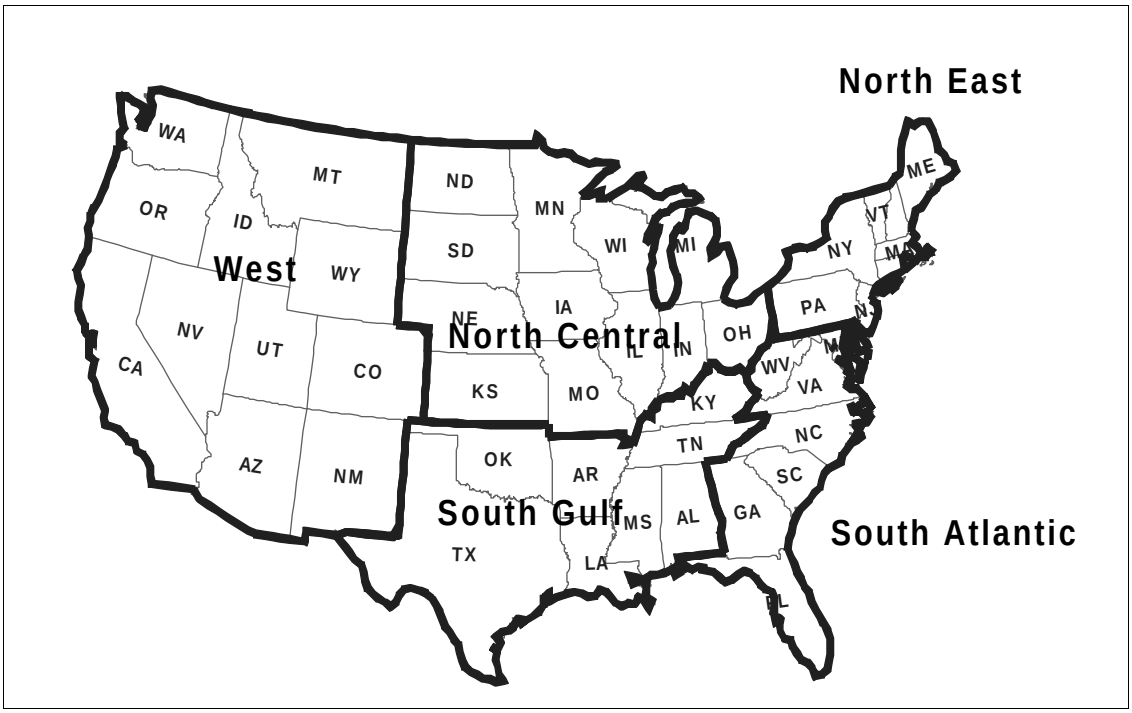


Figure ES-1. Five Regions For Analysis

Body Types

In this report, the TIUS data for trucks with 4-axles or less were analyzed by the various body types which include platforms, vans, tank trucks, etc. (see Section 4.0 for more details).

Commodities Hauled

For the above-mentioned vehicle groups and body types, the TIUS database was also analyzed by principal commodity types (see Sections 6.0 and 7.0). There were 29 commodity types ranging from raw materials to manufactured goods.

Highlights of the U.S. 4-Axles or Less Commercial Truck Fleet

The TIUS data provide a comprehensive factual base of U.S. commercial freight hauling trucks. The focus of this report is a selected subset of the U.S. truck fleet, trucks with 4-axles or less. Table ES-1 provides only a snapshot of the 4-axles or less truck fleet in 1992 and some changes since 1987.

TABLE ES-1
1992 U.S. COMMERCIAL FREIGHT
TRUCK FLEET HIGHLIGHTS
(Trucks with 4-axles or less, unless noted otherwise)

Truck Population

✔ 4.1 million total commercial trucks in 1992, a 4% increase from 1987.[1]

✔ Total U.S. commercial truck fleet distribution:[1]
- 68% straight trucks
- 4% straight trucks pulling trailer(s)
- 26% tractor-semitrailer
- 1% tractor with 2 or more trailers.

✔ 2,773,000 trucks with 4-axles or less in 1992, no growth from 1987.

✔ 2-axle straight trucks
- 49% of total truck fleet[1]
- 71% of trucks with 4-axles or less
- 6% decline in number of trucks between 1987/1992.

✔ 3-axle straight trucks
- 10% of total truck fleet[1]
- 15% of trucks with 4-axles or less
- 7% growth in number of trucks between 1987/1992.

✔ 4-axle straight trucks
- 2% of total truck fleet[1]
- 3% of trucks with 4-axles or less
- 44% growth in the number of trucks between 1987/1992.

✔ Truck + trailer (2-axle truck + 2-axle trailer)
- 3% of total truck fleet[1]
- Only 4% of trucks with 4-axles or less
- 30% growth in the number of trucks between 1987/1992.

[1]The data reflect the total commercial truck fleet including trucks with 4-axles or less and trucks with 5-axles or more, but excludes personal trucks.

TABLE ES-1
1992 U.S. COMMERCIAL FREIGHT
TRUCK FLEET HIGHLIGHTS
(Trucks with 4-axles or less, unless noted otherwise)

- ✔ 2-S (2-axle tractor with 1-axle semitrailer) trucks
  - 2% of total truck fleet[1]
  - 2% of trucks with 4-axles or less, little change from 1987.

- ✔ 2-S2 (2-axle tractor with 2-axle semitrailer) trucks
  - 3% of total truck fleet[1]
  - 5% of trucks with 4-axles or less, decrease of 9% from 1987.

- ✔ 3-S1 (3-axle tractor with 1-axle semitrailer) trucks
  - less than 1% of total truck fleet
  - less than 4% of trucks with 4-axles or less, with a notable decrease from 1987.

Regional Differences

- ✔ North Central Region contains the largest number of trucks with 4-axles or less with 33%, while the other four regions have about 16% each.

- ✔ California, Illinois, Texas, Pennsylvania, and Ohio account for 31% of trucks with 4-axles or less.

Body Types

- ✔ Platforms (i.e., Platform with Devices, Basic Platform, and Low Boy) accounted for 30% of the fleet with the Basic Platforms being the most prevalent type (21%) but a notable decrease from 1987.

- ✔ Van body type (i.e., Van, Multi-Stop Van, Insulated Non-Refrigerated, Insulated Refrigerated, Drop Frame, Open Top, and Basic Enclosed Van) accounted for 25% of the fleet with Basic Enclosed Vans being the most common (13%).

- ✔ Dump trucks accounted for 14% of the fleet.

- ✔ Grain Bodies accounted for 8.0% of the fleet.

- ✔ Each of the remaining body types accounted for less than 5% of the fleet.

- ✔ Garbage, Service, and Utility trucks had the largest increase between 1987/1992 with 38%, 31%, and 22%, respectively.

Commodities Hauled

TABLE ES-1
1992 U.S. COMMERCIAL FREIGHT
TRUCK FLEET HIGHLIGHTS
(Trucks with 4-axles or less, unless noted otherwise)

- ✔ Top 7 carried commodities are: Building Material, Processed Foods, Mixed Cargo, Craftsman's Equipment, Farm Products, Refuse, and Transport Equipment, respectively [as measured by total fleet vehicle miles of travel (VMT)].
- ✔ 2-axle trucks carry 59% (as measured by VMT) of all commodities, predominately processed food products.
- ✔ 3-axle and 2-S2 carry about 15%, each, of all commodities, predominately Building, Refuse, Processed Foods, and Mix Cargo commodities as measured by VMT.

Vehicle Configuration Shifts

- ✔ Beverage trucks shifted (as a percent of configuration types) from 2-axle to 2-S2 between 1987/1992.
- ✔ Basic Platform trucks, still the largest (count) body type, decreased 25% between 1987/1992 predominately in the 2-axle configuration.
- ✔ Auto Transport trucks shifted from 2-axle to 2-S2 between 1987/1992.
- ✔ Grain Bodies trucks shifted from 2-axle to 3-axle between 1987/1992.
- ✔ Garbage trucks shifted from 2-axle to 3- and 4-axle trucks between 1987/1992.
- ✔ Dump and Concrete trucks shifted from 2- and 3- axle to 4-axle trucks between 1987/1992.

Trailer Width

- ✔ 102" trailer width not gaining favor in all major trailer body types for 2-S1 and 2-S2 except for the Basic Enclosed Vans.
- ✔ 96" trailer width still preferred by all major body for 2-S1 and 2-S2 types except for Basic Enclosed Van.

Truck Weights

TABLE ES-1
1992 U.S. COMMERCIAL FREIGHT
TRUCK FLEET HIGHLIGHTS
(Trucks with 4-axles or less, unless noted otherwise)

- ✔ Average tare weight increased about 1,000 lbs., for trucks with 4-axles or less between 1987/1992 (e.g., 2-axle Basic Platform increasing from 9,300 to 9,500 lbs.).
- ✔ Average payload weight decreased, about 2,000 lbs., for trucks with 4-axles or less between 1987/1992 (e.g., 2-axle Basic Platform decreased from 8,060 to 6,080 lbs.).
- ✔ Garbage and Concrete Mixer 3-axle trucks typically weight-out, under maximum loaded weights.

Truck VMT

- ✔ Almost all trucks travel intra-state and short-haul.
- ✔ Average annual VMT increased, 2 to 3 percent, for trucks with 4-axles or less between 1987/1992 (e.g., 2-axle Basic Platform VMT increased from 8,050 to 9,300).

Source: 1992 and 1987 TIUS data base.

Table of Contents

List of Tables

List of Figures

1.0 Introduction

1.1 Purpose and Scope

The purpose of Task B, Identify Market Segments, of the United States Department of Transportation (U.S. DOT) Comprehensive Truck Size and Weight (TS&W) Study is to better understand the relative size and location of freight markets in the U.S. Understanding the important market segments will provide insight into the extent and impact of Federal TS&W regulation on freight movements; will help in the analysis of case studies; and ultimately will support the analysis of the policy options. A topology of market segments is being developed under this TS&W task which will indicate the relative likelihood of various commodities being shipped by different modes or different truck types based upon a review of previous studies, including results of the U.S. Census of Bureau Commodity Flow Survey (CFS), the U.S. Census of Bureau Truck Inventory and Use Survey, and other databases.

The focus of this report and the TS&W Report No. 2, *Analysis of the Truck Inventory and Use Survey from the Truck Size and Weight Perspective for Trucks with Five-Axles or More*, is to provide factual information on and analysis of the U.S. freight hauling trucking industry using the U.S. Bureau of the Census Truck Inventory and Use Survey (TIUS) databases for 1992 and 1987. The TIUS is collected every five years with 1992 being the latest data base collected. The TIUS can be used to provide a better understanding of the U.S. truck fleet make-up, size, uses, location, and type of commodities hauled. This report utilizes this truck fleet database in order to provide a general picture of the U.S. national and regional truck fleets (see Section 1.3 for more details). The subject of interest in this report is the freight-hauling smaller truck fleet, specifically trucks with 4-axles or less.

1.2 Truck Inventory and Use Survey (TIUS)

The U.S. Bureau of the Census conducts the Truck Inventory and Use Survey (TIUS) every 5 years. TIUS provides data on the physical and operational characteristics of the United States truck population for that survey year. It is based on a statistical sample of private and commercial trucks registered (or licensed) in each State. In 1992, a sample of approximately 150,000 trucks was surveyed to measure the universe of 60 million trucks. The U.S. recipients of the survey were required by law to answer the questionnaire.

For a given year, there are two versions of the TIUS survey. Based on registration information, vehicle owners were given either the short form or the long form of the survey. In general, the long form was given to owners of large trucks (i.e., straight trucks and tractors). The short form was given to owners of small trucks (i.e., pick-ups, vans, station wagons on a truck chassis). The major difference between the two forms is that the long form had more questions related to commercial vehicles.

1.3 The Truck Fleet

The TIUS database contains information on trucks used for personal transportation and/or freight movement. This report's focus is on the smaller, freight-hauling trucks that would most likely be used in local and regional movements of commodities. Because the focus is on commercial trucks, some vehicles used primarily for personal transportation were excluded from this analysis.

Data on the following types of trucks were excluded from this analysis: (1) any truck whose body type was pick-up, mini-van, sport utility, or station wagon on a truck chassis; (2) any 2-axle truck or tractor with a total of four tires; and (3) any straight truck which hauled a 1-axle trailer or 1-axle utility trailer. Removal of these vehicles creates a data set referred to in this analysis as the "1992/1987 Total Fleet."

By removing the 5-axles or more trucks from the "Total Fleet" data set, a subset of 4-axles or less trucks and truck/tractor-trailer combinations was obtained. Because the TS&W study focuses on commercial vehicles, the "4-Axles or Less Fleet" database excluded any vehicle whose principal product was recorded as "passenger transportation", "personal transportation", or "not in use". In addition, information on vehicles provided with the TIUS Survey Form 9501 for small trucks were excluded.

Therefore, the "4-Axles or Less Fleet" database contained only information on various types of truck and truck/tractor-trailer combinations which were involved in commercial business and whose total number of axles was less than or equal to four. Three types of truck and truck/tractor-trailer combinations were evaluated: (1) straight truck; (2) straight truck pulling trailer; and (3) tractor pulling semitrailer.

1.4 Cautionary Notes

The values presented in the tables throughout this report were derived directly from TIUS databases. Conservative interpretations of the data are provided. Inferences based on the results of the analyses are left to the discretion of the reader. It should be noted that the TIUS is based on survey data which assumes that the respondents will devote some time and effort to giving accurate estimates and responses about their vehicle. The Bureau of the Census did do some quality checking of the data.

State of Registration. The data presented in this report have been analyzed on the basis of the registration state, which is defined as the state of vehicle registration. The TIUS data is also organized by home base state, which is defined as the location where the vehicle is parked when not in use. These data points were found to be highly correlated with the registration state.

Population Estimates. In the analysis of the TIUS databases, each record does not reflect one vehicle, but instead it represents a number of vehicles in the population. To make interpretations about the entire truck population from this small sample of surveyed vehicles, a weighting factor was applied to each record. This weighting factor varies for vehicles registered in different states and for vehicles belonging to different vehicle type classes. The weighting factor is not a constant number across all records because the truck population is sampled at the state level, not

the national level. In addition, in 1992 the Bureau of the Census intentionally surveyed certain vehicle types which accounted for only a small portion of the truck population (i.e., larger vehicles used for commercial purposes) at a higher sampling rate than other vehicle types.

Readers should keep in mind that this weighting process can create odd results in certain situations—particularly when the sample size relating to a particular group in the population is small. This is particularly true when analyzing the TIUS at the state level.

Small Sample Size. Readers should be aware of the potential for "small sample size problems" in parts of the analysis presented in this report. As the data set is sub-categorized from national statistics, to regional statistics, to state statistics—by configuration, by body type—and subsequently into individual statistical measures such as "empty weight" or "width," the sample used to estimate the population value for a particular cell may become very small. In a number of sections in this report, the sample sizes and population estimates associated with particular parameters are presented. *Readers must use judgment and caution in interpreting the results obtained from small samples.*

Differences between 1987 and 1992. Most of the analyses in this report focus on the 1992 TIUS database. However, comparisons were made with the 1987 TIUS database. Overall, the quality of the 1992 TIUS database is better than the 1987 TIUS based on key differences listed below:

- Sampling - For the 1992 TIUS database, the Bureau of the Census intentionally collected more sample data from truck-tractor vehicle owners than in the previous years. Truck-tractor vehicles only represent a small portion of the vehicle population; however, they are of great interest to a number of government agencies and organizations examining truck policy issues. By collecting a bigger sample, it is more likely that the statistics and inferences based on this larger data set will more accurately reflect the population than those made from a smaller sample set of data. It is vital to have a sufficiently large sample set when discussing the characteristics of some small portion of the vehicle population, such as STAA doubles.

- Survey - The 1987 and 1992 TIUS surveys differ in format and in the wording of the survey questions. In general, the clarity of the 1992 survey questions is better than the 1987 survey questions. This may have had an effect on how persons interpreted and responded to the questions. An example of a question that differs in format between 1987 and 1992 is the survey question on vehicle trailer width. On the 1987 survey, respondents were asked to give an estimate of trailer width in inches, while on the 1992 survey, respondents were given four categories from which to choose. It was noticed in the 1987 width data that a number of people responded with zero as their trailer width and that a number of respondents gave widths that are not typically found on trailers. Other instances of these differences are noted throughout the report. A copy of each year's survey Form #9502 is attached in Appendix F.

- Error Checking and Correction - A more thorough examination of the quality of the data was conducted by the Bureau of the Census on the 1992 TIUS database than on the 1987 TIUS database. All data variables in the 1992 database were examined for such problems as variable values lying outside of the defined range. Only a limited number of variables in the 1987 database were checked and corrected by the Bureau. As a result, some corrections to variables in the 1987 database were conducted before analysis.

2.0 Categorization of Vehicles

For analysis and interpretation of the data in terms of TS&W issues, trucks were categorized into vehicle groups based on their vehicle axle-configuration class such that vehicles with similar axle-configurations were placed into the same vehicle group. In addition, vehicles were categorized by geographical region which was determined by the vehicle's registration state. This truck classification scheme was used in the analysis and reporting of the TIUS data.

2.1 Vehicle Configuration Classes

Based on survey results, the U.S. Bureau of the Census placed each registered truck into a configuration class. The configuration class identifies the way in which the truck was most often operated. 'Most often' is a subjective term used on the TIUS survey which has no quantitative number associated with it, such as percent of VMT. Some of the commodities hauled by a particular truck may not be hauled in the vehicle configuration/body type that the truck travels in 'most often' (e.g., an auto transporter hauling farm products). However, the analysis assumed that a particular truck hauls all its commodities in the configuration identified with it.

Classification of a truck's vehicle configuration was based on the three following factors:

- vehicle type (straight truck not pulling trailer, straight truck pulling trailer, tractor pulling trailer, or other);
- total number of axles on the truck or tractor;
- number and kind of trailers most often hauled, including total number of axles.

The survey questions used for this categorization were #5, 6, and 9 on the 1987 survey, and #5, 6, and 10 on the 1992 survey as shown in Appendix F.

Vehicles were placed in one of the major vehicle configuration classes, and these were further partitioned into 31 subclasses based on the number of axles on the truck unit and the number of axles on the trailer(s). The five major configuration classes and their subclasses are presented in Table 2.1-1. The seven subclasses that comprised the **4-axles or less truck fleet are highlighted**.

Table 2.1-1 The 5 Major Vehicle Configurations and the 31 Subclasses
(*4-axles or less truck fleet are highlighted*)

Truck	Truck & Trailer	Tractor-Semitrailer	Tractor + Doubles	Tractor + Triples
2	**2 + 2**	**2-S1**	2-S1-2	2-S1-2-2
3	2 + *3	**2-S2**	3-S1-2	3-S1-2-2
4	3 + 2	2-*S3	2-S2-2	other
	3 + *3	**3-S1**	3-S2-2	
	*4 + 2	3-S2	other @ *7-axle	
	*4 + *3	3-*S3	3-S2-3	
		4-S1	other @ *8-axle	
		4-S2	3-S2-4	
		4-*S3	other @ *9-axle	
			other @ *10-axle	

Notes:

- A semitrailer is classified by S and its number of axles (e.g., S2 means a semitrailer with 2 axles).
- The * means "equal to or more" (e.g., *4 + 2 means a straight truck with "4 or more" axles pulling a trailer with 2 axles).
- The bolded subclasses identify those subclasses evaluated in this report's analysis of the 4-axles or less truck fleet.

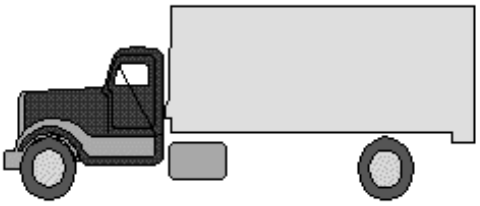
2.2 Vehicle Groups

In the analysis of the 4-axles or less fleet, trucks were categorized into 7 vehicle groups based on their vehicle configuration (see Figure 2.2-1 for pictures of various configurations in each group):

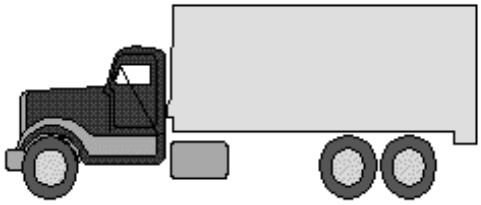
- 2-Axle Straight Truck (i.e., 2-axle)
- 3-Axle Straight Truck (i.e., 3-axle)
- 4-Axle Straight Truck (i.e., 4-axle)
- 2-Axle Straight Truck Pulling 2-Axle Trailer (i.e., 2+2)
- 2-Axle Tractor Pulling 1-Axle Semitrailer (i.e., 2-S1)
- 2-Axle Tractor Pulling 2-Axle Semitrailer (i.e., 2-S2)
- 3-Axle Tractor Pulling 1-Axle Semitrailer (i.e., 3-S1)

Figure 2.2-1
Vehicle Group Descriptions for the 4-axles or Less Truck Fleet

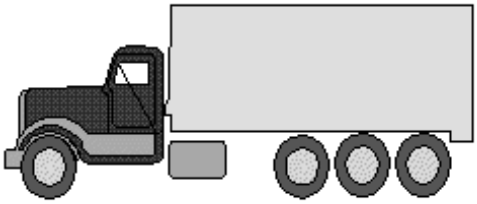
1) 2-Axle Straight Truck



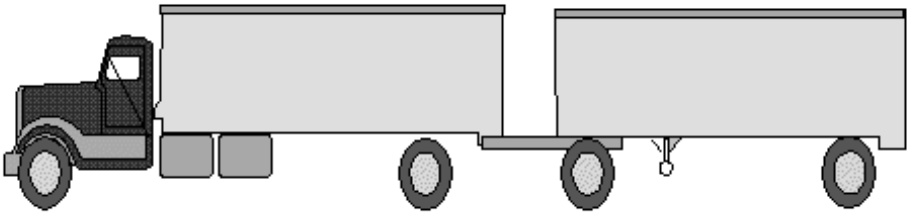
2) 3-Axle Straight Truck



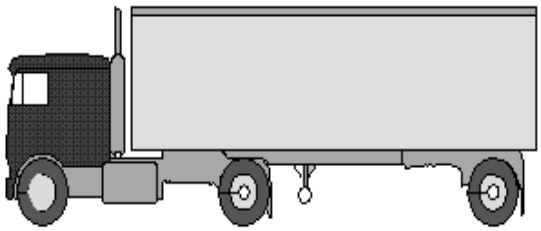
3) 4-Axle Straight Truck



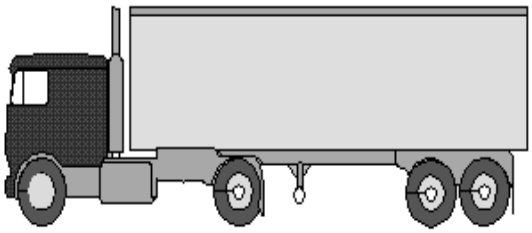
4) Truck-Trailer @ 4-axles



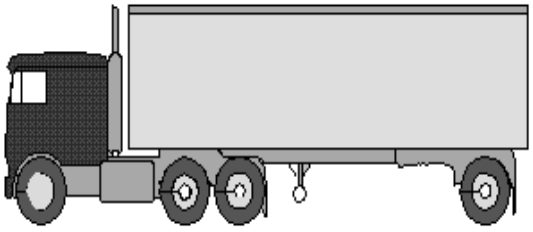
5) 2-S1



6) 2-S2



7) 3-S1

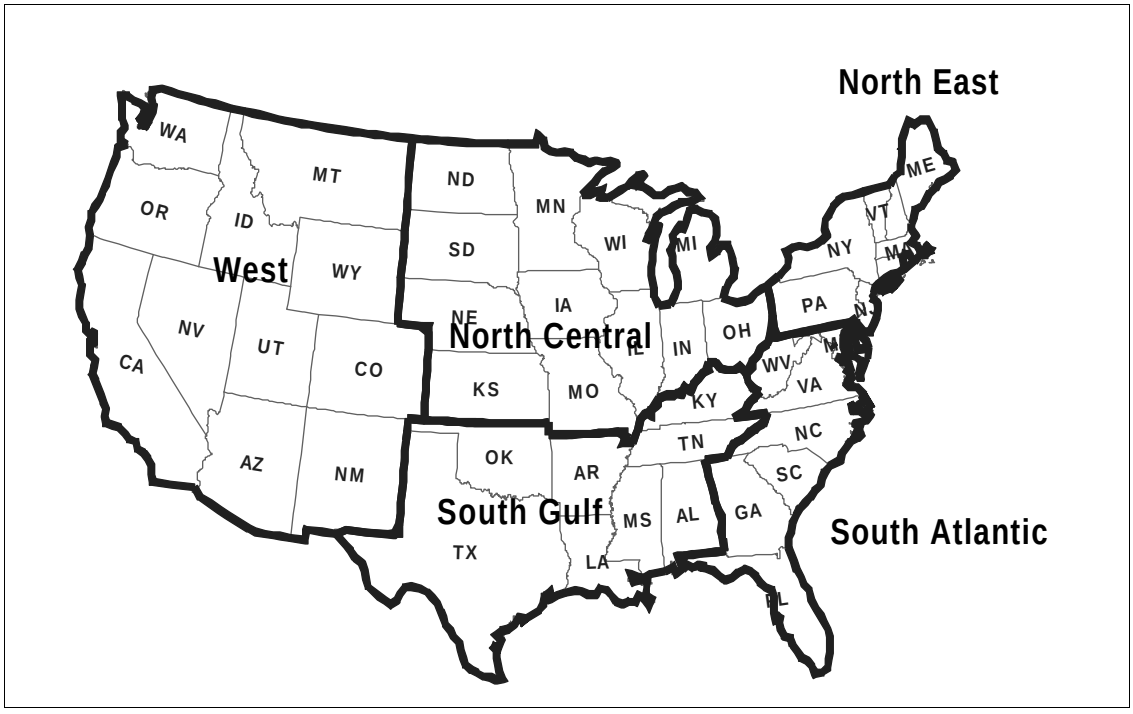


2.3 Traffic Regions and States

In addition to evaluating the truck fleet at the national level, this analysis also focused on regional truck fleets. Given the small sample of trucks surveyed, little analysis was conducted at the state level.

- 5 traffic regions (see Figure 2.3-1)
  - North Central
  - North East
  - South Atlantic
  - South Gulf
  - West
- 50 States and Washington, D.C.

Figure 2.3-1 Traffic Data Regions



3.0 Analysis of the Distribution of the Truck Fleet

This section reports the distribution of the truck fleet by vehicle configuration, region, and state. The first part of this section summarizes the distribution of the total truck fleet. The 4-axles or less truck fleet is described in the second part of this section and is the fleet of interest in all of the following chapters.

3.1 Analysis Structure

This section evaluates the TIUS databases by the following variables:

- 7 Vehicle Groups (as defined in Section 2.2)
- 5 Regions (as defined in Section 2.3 and Figure 2.3-1)
- 50 States

Appendix A provides more detailed tables on the regional and state distributions of the 4-axles or less truck fleet for 1992 and 1987.

3.2 Observations on the Size of the Total Truck Fleet

Before discussing the 4-axles or less truck fleet, a summary of the 1992 total truck fleet which includes the 5-axles or more vehicles is presented in this section. The distribution of the 1992 total truck fleet by configuration class and geographical region is provided in Table 3.2-1. Table 3.2-2 provides a summary of the 1992 state vehicle populations in rank order.

NATIONWIDE - 1992

- The 1992 total truck fleet contained 4.07 million trucks.

REGIONAL VARIATIONS - 1992

- One-third of the total fleet was registered in the North Central region.
- The other four regions, each contained about one-sixth of the total truck population.

STATE VARIATIONS - 1992 (see Table 3.2-2)

- California had the largest state truck population (392,572 trucks) which accounted for about one-tenth (9.6%) of the national truck fleet.

- The next five largest state truck populations were Illinois (6.7%), Texas (5.3%), Pennsylvania (5.1%), Ohio (4.5%), and New York (4.0%). These states accounted for one-quarter of the total fleet.

Table 3.2-1 1992 Total Truck Fleet Number of Vehicles by Truck Configuration and Region

Configuration Class	Regions					
	North Central	North East	South Atlantic	South Gulf	West	Total
Straight Truck						
2-axle	690,046	397,595	390,340	337,257	453,782	2,269,021
3-axle	167,723	63,637	60,103	59,890	78,636	429,989
4-axle	29,693	21,093	7,474	8,492	10,242	76,994
Subtotal	887,462	482,325	457,918	405,640	542,659	2,776,004
Truck + Trailer						
2+2	35,261	13,776	23,284	20,636	19,130	112,086
2+*3	4,488	2,753	3,711	2,744	1,565	15,261
3+2	9,600	3,487	2,586	8,008	19,640	43,321
3+*3	1,173	693	145	522	1,612	4,146
***4+2**	2,027	586	194	535	1,780	5,122
***4+*3**	1,307	36	36	116	451	1,946
Subtotal	53,856	21,330	29,956	32,561	44,179	181,881
Tractor + Semitrailer						
2-S1	17,672	5,804	9,749	10,903	21,863	65,990
2-S2	40,640	23,030	22,170	25,764	21,455	133,059
2-*S3	2,290	691	1,288	2,299	1,995	8,563
3-S1	1,765	815	1,089	2,083	2,683	8,434
3-S2	305,414	90,239	109,979	142,300	117,711	765,643
3-*S3	20,314	6,888	4,576	9,776	7,502	49,056
4-S1	121	0	8	67	22	217
4-S2	8,195	4,357	3,318	4,012	3,612	23,494
4-*S3	2,653	678	511	871	2,086	6,799
Subtotal	399,064	132,501	152,689	198,074	178,927	1,061,255
Tractor + Double						
2-S1-2	8,052	1,417	1,586	2,732	19,680	33,467
3-S1-2	1,225	144	450	230	1,910	3,958
2-S2-2	506	87	52	20	1,084	1,748
3-S2-2	536	602	96	29	3,716	4,979
Other @ 7-axle	58	0	0	0	758	815
3-S2-3	128	29	0	98	1,739	1,994
Other @ 8-axle	104	29	0	105	777	1,014
3-*S2-*4	1,959	58	0	162	1,054	3,233
Other @ 9-axle	30	0	13	0	107	149
Other @10-axle	481	0	0	0	191	673
Subtotal	13,079	2,365	2,196	3,375	31,015	52,031
Tractor + Triples						
2-S1-2-2	8	0	0	0	279	288
3-S1-2-2	71	0	0	0	262	333
Other	0	33	0	0	93	126
Subtotal	79	33	0	0	635	747
Total	1,353,541	638,554	642,759	639,650	797,415	4,071,918

* Note: Excludes pickups, mini-vans, utility sports, station wagons, trucks or truck-tractors with 4-tires, and trucks pulling 1-axle trailer or 1-axle utility trailer, as defined in Section 1.3.

Source: 1992 Truck Inventory and Use Survey

Table 3.2-2 1992 Total Truck Fleet Ranking of State from Highest Truck Population to Lowest

State	Region	Straight Truck	%	Truck + Trailer	%	Tractor + Semitrailer	%	Tractor+ Doubles	%	Tractor +Triples	%	Total Number	Total %
California	WE	266,700	9.61	18,906	10.39	86,414	8.14	20,436	39.28	115	15.45	*392,572*	***9.64***
Illinois	NC	139,077	5.01	11,167	6.14	114,611	10.80	6,957	13.37	0	0.00	*271,813*	***6.68***
Texas	SG	125,896	4.54	14,157	7.78	73,390	6.92	965	1.86	0	0.00	*214,409*	***5.27***
Pennsylvania	NE	150,493	5.42	5,158	2.84	51,520	4.85	684	1.32	0	0.00	*207,856*	***5.10***
Ohio	NC	126,501	4.56	6,456	3.55	49,018	4.62	557	1.07	0	0.00	*182,531*	***4.48***
New York	NE	130,319	4.69	6,815	3.75	26,498	2.50	800	1.54	0	0.00	*164,431*	***4.04***
Florida	SA	104,632	3.77	9,074	4.99	41,335	3.89	816	1.57	0	0.00	*155,857*	***3.83***
North Carolina	SA	80,903	2.91	5,098	2.80	37,935	3.57	826	1.59	0	0.00	*124,763*	***3.06***
Indiana	NC	75,412	2.72	3,775	2.08	42,415	4.00	471	0.90	0	0.00	*122,072*	***3.00***
Michigan	NC	74,281	2.68	7,539	4.14	34,884	3.29	3,027	5.82	0	0.00	*119,732*	***2.94***
Kansas	NC	89,105	3.21	3,029	1.67	21,503	2.03	556	1.07	0	0.00	*114,193*	***2.80***
Georgia	SA	72,548	2.61	3,004	1.65	32,506	3.06	173	0.33	0	0.00	*108,231*	***2.66***
Missouri	NC	70,568	2.54	5,263	2.89	28,107	2.65	291	0.56	0	0.00	*104,229*	***2.56***
Minnesota	NC	73,792	2.66	5,080	2.79	22,475	2.12	237	0.46	71	9.53	*101,655*	***2.50***
New Jersey	NE	68,088	2.45	3,199	1.76	27,435	2.59	375	0.72	0	0.00	*99,097*	***2.43***
Iowa	NC	63,825	2.30	2,875	1.58	29,149	2.75	296	0.57	0	0.00	*96,145*	***2.36***
Wisconsin	NC	62,313	2.24	4,442	2.44	26,729	2.52	94	0.18	0	0.00	*93,578*	***2.30***
Oklahoma	SG	61,902	2.23	2,699	1.48	26,148	2.46	233	0.45	0	0.00	*90,982*	***2.23***
Alabama	SG	49,672	1.79	4,646	2.55	32,381	3.05	331	0.64	0	0.00	*87,030*	***2.14***
Tennessee	SG	53,063	1.91	3,865	2.12	21,830	2.06	1,258	2.42	0	0.00	*80,015*	***1.97***
Virginia	SA	64,031	2.31	4,804	2.64	8,535	0.80	64	0.12	0	0.00	*77,433*	***1.90***
Kentucky	SG	57,212	2.06	2,109	1.16	15,009	1.41	141	0.27	0	0.00	*74,471*	***1.83***
Maryland	SA	60,290	2.17	3,039	1.67	10,263	0.97	0	0.00	0	0.00	*73,592*	***1.81***
Colorado	WE	46,124	1.66	3,605	1.98	12,581	1.19	309	0.59	81	10.87	*62,700*	***1.54***
Washington	WE	40,732	1.47	6,265	3.44	13,161	1.24	2,018	3.88	22	2.88	*62,197*	***1.53***
Nebraska	NC	40,749	1.47	1,840	1.01	17,075	1.61	94	0.18	0	0.00	*59,759*	***1.47***
Oregon	WE	35,512	1.28	3,926	2.16	17,086	1.61	2,658	5.11	301	40.28	*59,483*	***1.46***
South Carolina	SA	40,117	1.45	3,311	1.82	14,067	1.33	235	0.45	0	0.00	*57,731*	***1.42***
Louisiana	SG	38,440	1.38	2,640	1.45	15,934	1.50	240	0.46	0	0.00	*57,254*	***1.41***
North Dakota	NC	45,347	1.63	1,181	0.65	6,689	0.63	273	0.53	0	0.00	*53,491*	***1.31***
Massachusetts	NE	39,909	1.44	1,936	1.06	10,414	0.98	128	0.25	0	0.00	*52,387*	***1.29***
Connecticut	NE	35,070	1.26	1,042	0.57	4,158	0.39	290	0.56	7	0.92	*40,567*	***1.00***
Arizona	WE	29,164	1.05	2,957	1.63	7,599	0.72	691	1.33	0	0.00	*40,411*	***0.99***
Idaho	WE	29,205	1.05	2,329	1.28	7,015	0.66	1,203	2.31	20	2.63	*39,771*	***0.98***
South Dakota	NC	26,491	0.95	1,210	0.66	6,410	0.60	225	0.43	8	1.11	*34,344*	***0.84***
Utah	WE	17,667	0.64	1,069	0.59	10,872	1.02	1,418	2.73	20	2.66	*31,046*	***0.76***
Montana	WE	20,252	0.73	1,602	0.88	7,894	0.74	1,008	1.94	18	2.47	*30,775*	***0.76***
Maine	NE	22,799	0.82	1,007	0.55	5,487	0.52	18	0.04	0	0.00	*29,311*	***0.72***
West Virginia	SA	23,295	0.84	1,093	0.60	4,400	0.41	77	0.15	0	0.00	*28,865*	***0.71***
Mississippi	SG	14,736	0.53	1,811	1.00	8,478	0.80	186	0.36	0	0.00	*25,211*	***0.62***
New Hampshire	NE	19,058	0.69	1,124	0.62	3,547	0.33	52	0.10	26	3.51	*23,808*	***0.58***
Nevada	WE	16,052	0.58	814	0.45	5,215	0.49	605	1.16	33	4.36	*22,720*	***0.56***
New Mexico	WE	17,953	0.65	1,301	0.72	2,545	0.24	36	0.07	0	0.00	*21,836*	***0.54***
Delaware	SA	10,410	0.37	521	0.29	3,553	0.33	4	0.01	0	0.00	*14,488*	***0.36***
Hawaii	WE	8,986	0.32	443	0.24	2,460	0.23	27	0.05	0	0.00	*11,916*	***0.29***
Wyoming	WE	6,255	0.23	401	0.22	4,109	0.39	371	0.71	14	1.83	*11,150*	***0.27***
Alaska	WE	8,057	0.29	560	0.31	1,976	0.19	234	0.45	11	1.49	*10,838*	***0.27***
Vermont	NE	8,485	0.31	602	0.33	1,701	0.16	17	0.03	0	0.00	*10,806*	***0.27***
Rhode Island	NE	8,104	0.29	446	0.25	1,740	0.16	0	0.00	0	0.00	*10,291*	***0.25***
Arkansas	SG	4,718	0.17	635	0.35	4,905	0.46	20	0.04	0	0.00	*10,278*	***0.25***
District of Columbia	SA	1,692	0.06	11	0.01	96	0.01	0	0.00	0	0.00	*1,799*	***0.04***

* Note: Excludes pickups, mini-vans, utility sports, station wagons, trucks or truck-tractors with 4-tires, and trucks pulling 1-axle trailer or 1-axle utility trailer, as defined in Section 1.3.

Source: 1992 Truck Inventory and Use Survey

CHANGES BETWEEN 1987 AND 1992

- Nationwide, the total truck fleet increased in size by 4.2% between 1987 and 1992.

- Regionally, the West region experienced the most growth in their truck population (+19.3%). The North Central region (+5.3%) and North East region (+1.3%) experienced an increase, while the South Atlantic region (-1.1%) and the Gulf region (-4.9%) experienced a decrease.

- For the States,

  - California's share of the total truck fleet had increased from 7.8% in 1987 to 9.6% in 1992.

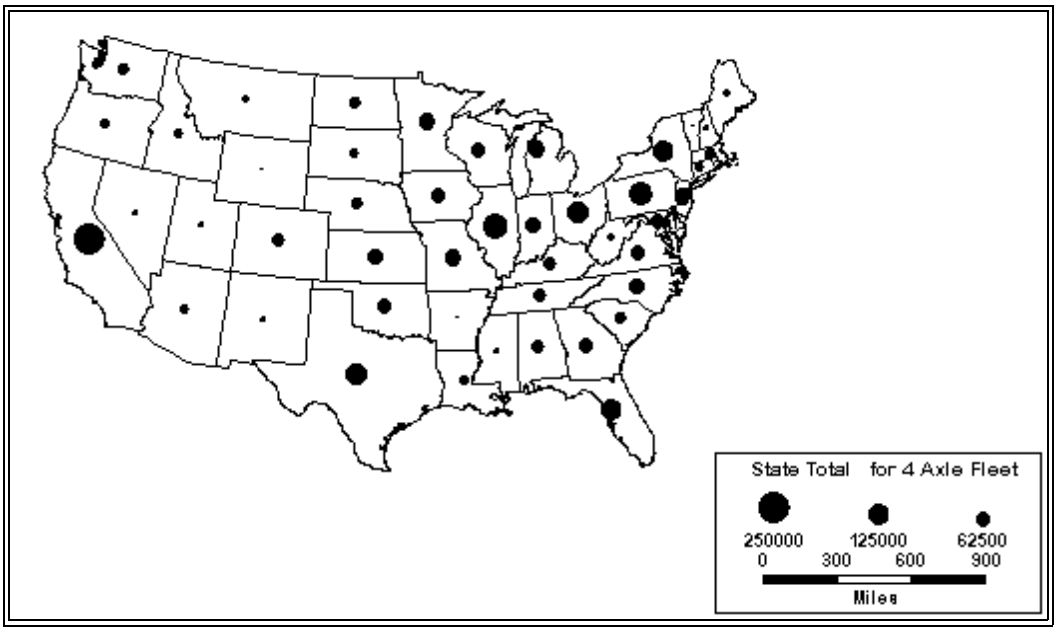
  - The combination of Illinois, Texas, Pennsylvania, Ohio and New York's share of the total fleet did not change from 1987 to 1992. However, Texas's share of the total fleet was less in 1992 (5.3%) than in 1987 (6.3%), while Pennsylvania's share was greater in 1992 (5.1%) than in 1987 (4.4%). The 1987 shares for Illinois (6.5%), Ohio (4.4%), and New York (4.1%) did not differ from 1992.

3.3 Size of the 4-Axles or Less Truck Fleet

The 4-axles or less truck fleet was obtained by removing truck/tractor combinations with 5-axles or more from the total truck fleet data sets. Also, any vehicle whose principal product was recorded as "passenger transportation", "personal transportation", or "not in use" was excluded, as well as any vehicles which were reported on survey Form 9501 for small trucks. This 4-axles or less truck fleet differs from the 4-axles or less truck fleet briefly discussed in the TS&W Report No. 2. In TS&W Report No. 2, the brief analysis of the 4-axles or less truck fleet did not exclude any vehicles based on their designated principal product. The 4-axles or less truck configurations in Table 3.2-1 do not exclude any vehicles based on their principal product.

The state distribution of the 4-axles or more fleet for 1992 is graphically presented in Figure 3.3-1. A regional comparison is provided in Figure 3.3-2. A summary of the distribution of the fleet by vehicle group and region is discussed below and highlighted in Tables 3.3-1 and 3.3-2.

Figure 3.3-1 1992 State Distribution of the 4-axles or Less Truck Fleet



NATIONWIDE - 1992

- In 1992, the 4-axles or less truck fleet was comprised of 2,773,072 vehicles, about 68% of the total truck fleet in 1992.

REGIONAL VARIATIONS - 1992

- The North Central region, which has the largest regional population, accounted for one-third (33.4%) of the 4-axles or less truck fleet.

- Each of the other regions accounted for approximately one-sixth of the fleet (the West region 18.5%, the North East 16.9%, the South Atlantic 16.5%, and the South Gulf region 14.8%).

STATE VARIATIONS - 1992 (see Table 3.3-3)

- California, Illinois, and Pennsylvania combined accounted for one-fifth of the 4-axles or less truck fleet (19.7%).

- Together California, Illinois, Pennsylvania, Texas, Ohio, New York, and Florida accounted for over one-third of the 4-axles or less truck fleet (38%). These seven states each had truck populations over 100,000 vehicles.

- 22 States and District of Columbia had populations of 40,000 or less, and combined accounted for only 15% of the fleet.

CHANGES BETWEEN 1987 AND 1992 (see Table 3.3-3 and Table 3.3-4)

- Nationwide, the 4-axles or less truck fleet did not change substantially.

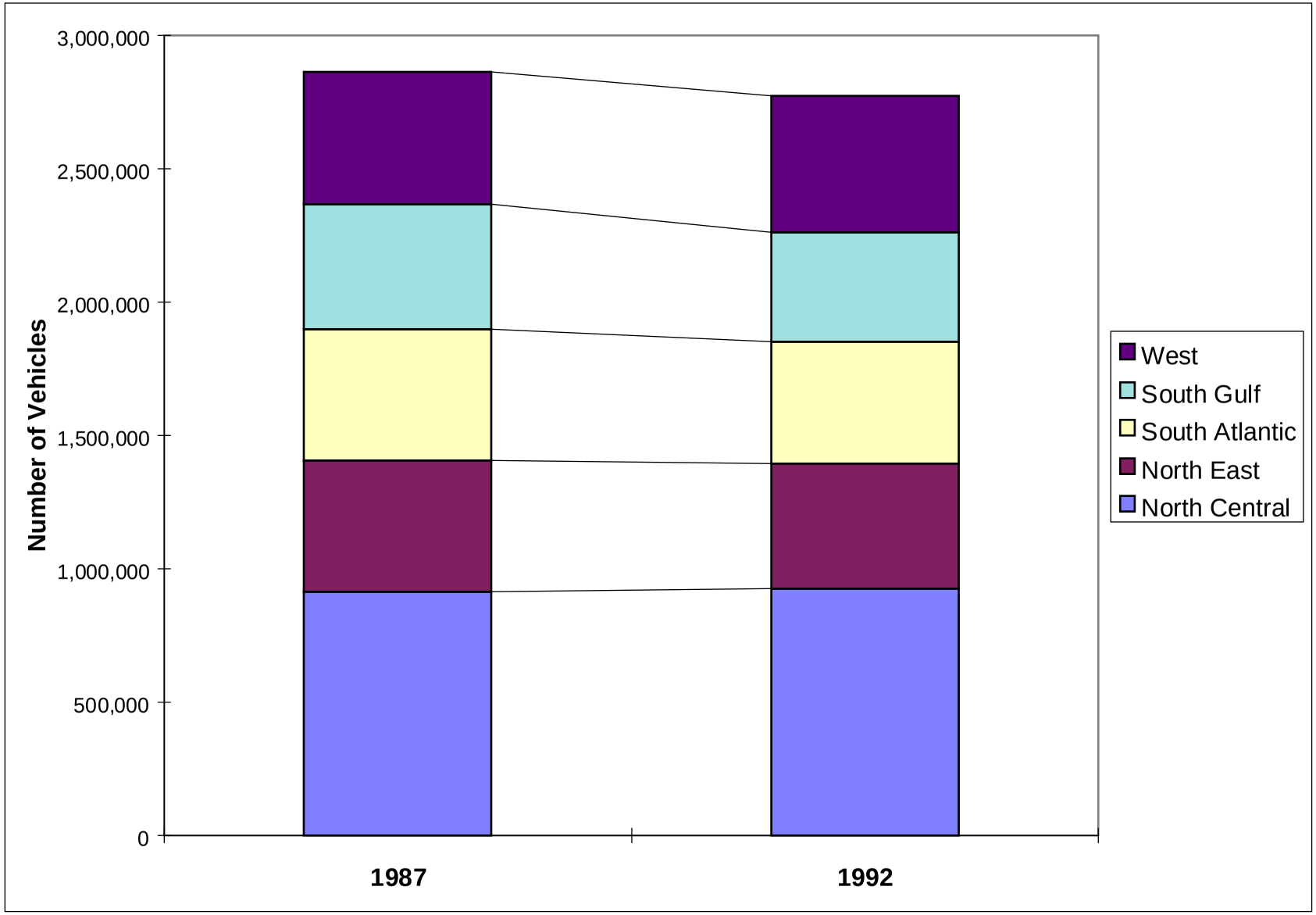
- The size and regional distribution of the 4-axles or less fleet remained the same.

- At the state level, the top six states remained the same, with different rankings between the years. In 1987, the top 6 states were California, Texas, Illinois, New York, Pennsylvania, and Ohio, and in 1992, California, Illinois, Pennsylvania, Texas, Ohio, and New York.

- The states with the highest growth rates were Arkansas (100.2%), Nevada (87.8%), Idaho (33.2%), Florida (21.5%), Pennsylvania (14.7%), and Alabama (14.6%). The states which experienced the largest decrease were Wyoming (-53.2%), Massachusetts (-27.4%), Texas (-25.2%), Georgia (-24.9%), Louisiana (-23.9%), North Carolina (-19.4%), Virginia (-18.4%), and New Jersey (-17.0%).

  Care needs to be taken when using state data because of the sample sizes used to generate state truck fleet totals.

Figure 3.3-2 Regional Distribution of the 4-axles or Less Fleet



Source: 1992 and 1987 Truck Inventory and Use Survey

Table 3.3-1 1992 Truck Fleet (@ 4-axles or less)
Number of Vehicles by Vehicle Configuration

Vehicle Group	North Central	North East	South Atlantic	South Gulf	West	Total
Straight Truck						
2-axle	637,843	345,131	337,904	288,883	368,703	1,978,463
3-axle	164,193	60,789	58,178	55,465	73,997	412,622
4-axle	29,145	20,506	7,376	8,432	10,155	75,616
Truck + Trailer						
2+2	34,527	12,938	21,051	19,833	15,222	103,570
Tractor+Semitrailer						
2-S1	17,525	5,193	9,664	10,884	21,592	64,858
2-S2	40,158	22,547	21,990	25,278	19,653	129,627
3-S1	1,765	784	1,034	2,083	2,650	8,316
Total	925,156	467,889	457,198	410,858	511,972	2,773,072

Exclusions:
- Pickups, mini-vans, utility sports, station wagons, trucks or truck-tractors with 4-tires, and trucks pulling 1-axle trailer or 1-axle utility trailer,
- Vehicles whose principal product was personal transportation, passenger transportation or not in use.
- Vehicles who were given TIUS Survey 9501 for small trucks.

Source: 1992 and 1987 Truck Inventory and Use Survey

Table 3.3-2 1987 Truck Fleet (@ 4-axles or less)
Number of Vehicles by Vehicle Configuration

Vehicle Group	North Central	North East	South Atlantic	South Gulf	West	Total
Straight Truck						
2-axle	665,394	373,605	370,265	330,560	365,585	2,105,409
3-axle	140,704	57,651	60,148	64,470	64,171	387,144
4-axle	18,195	14,885	9,536	5,636	4,114	52,367
Truck + Trailer						
2+2	17,827	11,083	11,035	23,228	16,271	79,444
Tractor+Semitrailer						
2-S1	21,830	5,814	10,541	11,471	19,353	69,010
2-S2	43,487	26,060	27,240	25,364	20,278	142,429
3-S1	5,940	3,372	3,680	7,666	6,435	27,092
Total	913,376	492,470	492,445	468,396	496,208	2,862,895

Exclusions:
- Pickups, mini-vans, utility sports, station wagons, trucks or truck-tractors with 4-tires, and trucks pulling 1-axle trailer or 1-axle utility trailer,
- Vehicles whose principal product was personal transportation, passenger transportation or not in use.
- Vehicles who were given TIUS Survey 9501 for small trucks.

Table 3.3-3 1992 Truck Fleet (@ 4-axles or less)
Ranking of States from Highest Truck Population to Lowest

State	Region	2-axle	3-axle	4-axle	2+2	2-S1	2-S2	3-S1	Total Number	Total %
California	WE	183,849	20,305	5,857	5,503	13,855	12,046	1,425	242,840	8.76
Illinois	NC	105,907	25,084	1,640	8,371	4,453	9,510	438	155,403	5.60
Pennsylvania	NE	106,983	15,628	11,603	3,020	1,369	8,262	114	146,979	5.30
Texas	SG	91,276	19,775	1,094	8,051	4,024	10,038	520	134,778	4.86
Ohio	NC	95,104	19,335	3,546	5,391	2,173	6,462	196	132,207	4.77
New York	NE	93,388	18,463	2,580	4,289	1,551	4,647	283	125,200	4.51
Florida	SA	78,821	15,960	1,684	7,221	2,872	8,237	248	115,043	4.15
Kansas	NC	63,934	15,731	629	1,744	1,450	2,096	139	85,723	3.09
North Carolina	SA	62,388	8,433	2,088	3,044	2,356	4,277	216	82,801	2.99
Indiana	NC	57,667	8,826	3,026	2,930	1,536	6,794	156	80,936	2.92
Michigan	NC	53,411	8,216	5,799	3,129	2,880	3,784	138	77,356	2.79
Minnesota	NC	47,936	18,818	2,942	2,911	939	2,599	169	76,314	2.75
Missouri	NC	50,988	15,016	922	3,374	1,239	2,942	145	74,627	2.69
New Jersey	NE	50,998	8,123	1,494	2,059	1,007	4,716	173	68,569	2.47
Virginia	SA	49,828	8,797	1,138	4,177	1,048	1,535	90	66,612	2.40
Wisconsin	NC	42,852	10,122	7,508	2,948	848	1,745	118	66,140	2.39
Iowa	NC	42,958	15,295	970	1,440	1,130	2,061	89	63,943	2.31
Georgia	SA	46,879	7,635	76	1,867	1,543	4,165	260	62,424	2.25
Oklahoma	SG	44,452	7,995	510	1,948	1,166	2,587	893	59,551	2.15
Maryland	SA	45,682	7,881	317	1,911	693	921	98	57,503	2.07
Kentucky	SG	39,855	7,872	1,949	1,521	1,090	2,121	104	54,512	1.97
Tennessee	SG	38,422	6,103	3,066	2,978	858	2,309	210	53,945	1.95
Alabama	SG	35,121	5,497	1,163	2,853	1,454	4,464	142	50,695	1.83
Colorado	WE	33,482	10,116	219	1,790	1,218	1,075	244	48,144	1.74
North Dakota	NC	29,306	12,476	914	627	192	274	51	43,840	1.58
Nebraska	NC	29,077	9,833	741	951	411	1,513	76	42,600	1.54
Massachusetts	NE	31,187	5,700	817	1,351	614	2,487	23	42,179	1.52
Washington	WE	27,906	7,620	952	1,628	1,551	1,136	366	41,159	1.48
South Carolina	SA	30,406	3,980	760	2,020	881	1,955	78	40,078	1.45
Louisiana	SG	27,297	5,529	432	1,078	1,615	1,477	149	37,577	1.36
Oregon	WE	22,638	8,086	593	883	1,626	1,013	148	34,987	1.26
Connecticut	NE	23,899	2,741	2,174	556	366	781	48	30,566	1.10
Arizona	WE	20,932	3,493	610	1,778	1,141	900	48	28,901	1.04
South Dakota	NC	18,703	5,441	507	711	275	379	50	26,065	0.94
Idaho	WE	16,622	7,481	92	664	170	449	131	25,609	0.92
Maine	NE	15,176	4,754	903	405	118	517	18	21,892	0.79
West Virginia	SA	15,144	3,665	1,082	499	138	338	6	20,872	0.75
Montana	WE	14,283	3,779	209	586	140	493	0	19,489	0.70
Utah	WE	13,000	3,233	434	502	723	446	109	18,446	0.67
New Hampshire	NE	11,212	2,878	597	766	63	697	95	16,307	0.59
New Mexico	WE	11,900	1,885	153	839	269	662	10	15,718	0.57
Nevada	WE	10,218	2,474	590	515	629	543	57	15,027	0.54
Mississippi	SG	9,152	1,758	25	892	401	1,713	44	13,985	0.50
Delaware	SA	7,670	1,736	213	301	134	548	38	10,640	0.38
Hawaii	WE	6,127	1,856	183	112	34	347	60	8,718	0.31
Vermont	NE	6,264	1,439	176	172	20	152	0	8,222	0.30
Rhode Island	NE	6,023	1,064	163	320	85	289	30	7,974	0.29
Wyoming	WE	4,052	1,729	77	296	200	268	41	6,663	0.24
Alaska	WE	3,694	1,941	187	125	38	275	11	6,272	0.23
Arkansas	SG	3,307	938	193	512	275	569	20	5,814	0.21
District of Columbia	SA	1,086	93	19	11	0	14	0	1,224	0.04
Total		1,978,463	412,622	75,616	103,570	64,858	129,627	8,316	2,773,072	100

Exclusions:

- Pickups, mini-vans, utility sports, station wagons, trucks or truck-tractors with 4-tires, and trucks pulling 1-axle trailer or 1-axle utility trailer,
- Vehicles whose principal product was personal transportation, passenger transportation or not in use.
- Vehicles who were given TIUS Survey 9501 for small trucks.

Source: 1992 Truck Inventory and Use Survey

Table 3.3-4 1987 Truck Fleet (@ 4-axles or less)
Ranking of States from Highest Truck Population to Lowest

State	Region	2-axle	3-axle	4-axle	2+2	2-S1	2-S2	3-S1	Total Number	Total %
California	WE	163,247	20,663	1,970	7,571	13,579	12,834	4,270	224,134	7.83
Texas	SG	119,184	27,377	261	14,144	5,723	11,077	2,381	180,147	6.29
Illinois	NC	105,726	22,406	1,013	3,832	5,576	10,398	896	149,846	5.23
New York	NE	104,714	17,529	1,606	1,646	1,541	5,532	327	132,894	4.64
Pennsylvania	NE	95,498	11,746	8,144	3,297	1,103	7,530	813	128,130	4.48
Ohio	NC	87,189	16,336	2,530	3,187	2,672	7,664	1,308	120,885	4.22
North Carolina	SA	77,606	10,663	3,107	2,244	3,148	4,834	1,133	102,735	3.59
Florida	SA	67,389	11,826	1,786	1,040	2,597	9,494	519	94,650	3.31
Indiana	NC	64,732	9,160	1,985	1,957	1,988	3,974	678	84,475	2.95
Kansas	NC	66,915	11,273	262	1,153	1,449	2,254	440	83,746	2.93
Georgia	SA	61,785	9,518	819	3,660	1,943	4,763	674	83,163	2.90
New Jersey	NE	61,698	8,722	947	2,451	1,189	5,876	1,681	82,565	2.88
Michigan	NC	58,731	8,992	3,295	1,617	3,470	5,547	591	82,244	2.87
Virginia	SA	62,787	11,691	1,618	607	909	3,464	557	81,633	2.85
Missouri	NC	53,881	12,993	187	1,313	2,933	3,606	371	75,283	2.63
Minnesota	NC	49,014	16,149	1,623	862	1,354	1,941	237	71,181	2.49
Wisconsin	NC	43,432	8,652	5,060	2,066	959	2,615	548	63,331	2.21
Kentucky	SG	47,370	9,105	1,262	508	824	2,427	339	61,835	2.16
Oklahoma	SG	43,892	8,308	603	3,918	1,710	2,122	1,071	61,624	2.15
Iowa	NC	41,794	11,998	465	1,068	868	3,101	344	59,637	2.08
Massachusetts	NE	44,658	7,755	632	1,190	732	3,021	142	58,130	2.03
Maryland	SA	42,758	8,658	238	1,282	911	1,983	140	55,971	1.96
Tennessee	SG	39,908	4,984	1,583	1,272	1,103	3,620	1,150	53,621	1.87
Colorado	WE	39,948	10,188	69	1,476	214	332	55	52,282	1.83
Louisiana	SG	36,852	5,884	782	2,145	443	2,243	1,006	49,355	1.72
Nebraska	NC	37,538	8,533	826	548	351	1,192	268	49,256	1.72
North Dakota	NC	36,508	10,540	737	140	38	780	127	48,870	1.71
Alabama	SG	32,890	6,084	896	591	865	1,921	975	44,221	1.54
Washington	WE	30,945	6,003	531	1,234	820	1,183	212	40,928	1.43
South Carolina	SA	32,354	2,637	630	1,749	626	1,550	538	40,083	1.40
Oregon	WE	26,405	5,577	156	1,396	1,243	1,949	1,007	37,732	1.32
Connecticut	NE	24,846	2,418	2,159	1,041	557	1,371	109	32,501	1.14
Arizona	WE	21,000	3,273	309	969	1,509	925	219	28,204	0.99
South Dakota	NC	19,934	3,672	211	84	172	416	133	24,622	0.86
Montana	WE	17,680	3,281	117	646	217	515	75	22,532	0.79
West Virginia	SA	16,305	3,263	1,208	272	260	399	51	21,757	0.76
Maine	NE	14,960	3,681	930	585	244	935	101	21,436	0.75
Idaho	WE	13,758	3,885	113	756	177	454	88	19,230	0.67
New Hampshire	NE	12,112	3,329	283	466	164	948	102	17,404	0.61
Utah	WE	12,700	2,006	290	413	605	515	118	16,648	0.58
New Mexico	WE	13,481	1,401	93	744	146	617	33	16,516	0.58
Mississippi	SG	9,039	2,150	70	585	627	1,620	598	14,689	0.51
Wyoming	WE	9,874	3,274	101	479	133	295	72	14,227	0.50
Delaware	SA	7,778	1,693	115	182	146	727	65	10,706	0.37
Vermont	NE	7,603	1,585	138	226	38	286	43	9,919	0.35
Rhode Island	NE	7,516	886	47	181	246	562	55	9,491	0.33
Hawaii	WE	6,082	1,658	153	89	121	278	69	8,449	0.30
Nevada	WE	5,812	925	36	267	554	282	123	8,000	0.28
Alaska	WE	4,654	2,038	177	230	35	100	94	7,328	0.26
Arkansas	SG	1,425	578	179	66	176	335	146	2,904	0.10
District of Columbia	SA	1,504	199	16	0	2	25	3	1,747	0.06
Total		2,105,409	387,144	52,367	79,444	69,010	142,429	27,092	2,862,895	100

Exclusions:

- Pickups, mini-vans, utility sports, station wagons, trucks or truck-tractors with 4-tires, and trucks pulling 1-axle trailer or 1-axle utility trailer,
- Vehicles whose principal product was personal transportation, passenger transportation or not in use.
- Vehicles who were given TIUS Survey 9501 for small trucks.

Source: 1987 Truck Inventory and Use Survey

3.4 Make-up of the 4-Axles or Less Fleet

This section evaluates the make-up of the 4-axles or less fleet in terms of the 7 identified vehicle groups (as defined in Section 2.2). Figures 3.4-1 and 3.4-2 provide a pictorial comparison of the size of the vehicle groups in 1992 and 1987. The vehicle group population totals are summarized in Tables 3.3-1 and 3.3-2.

NATIONWIDE - 1992

- 89.0% of the 4-axles or less fleet was comprised of straight trucks. More specifically, the 2-axle straight trucks accounted for 71.3% of the 4-axles or less truck fleet.

- 3.7% of the 4-axles or less fleet were straight truck + trailer combinations.

- 7.3% of the fleet were tractor + semitrailer combinations.

REGIONAL VARIATIONS - 1992

- The composition (i.e., percent of straight trucks, truck + trailer, and tractor + semitrailer) of all the regional truck fleets was very similar.

STATE VARIATIONS - 1992

In Appendix A, GIS maps illustrate the state distributions for each of the 7 vehicle groups. Care needs to be taken when using state data because of the small sample sizes used to generate state truck fleet totals.

- California has the largest state population of 2-axle straight trucks (9.3% of all 2-axle trucks) and of tractor-semitrailers (13.5% of all tractor-semitrailers).

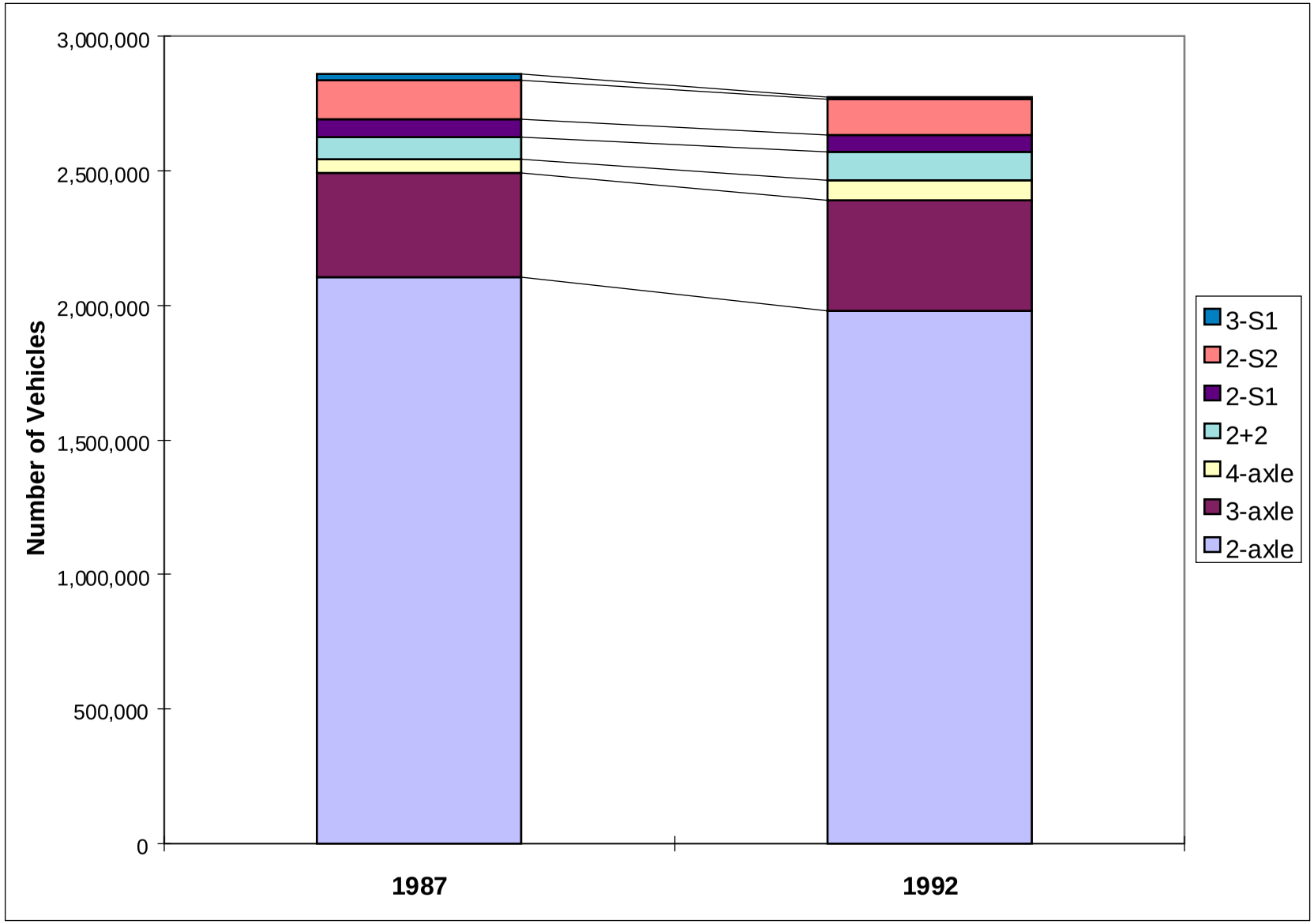
- Illinois has the largest state population of 2+2 truck+trailer combinations (8.1% of all truck+trailer combinations), and the largest 3-axle straight truck population (6.1% of all 3-axle trucks).

- Pennsylvania has the largest population of 4-axle straight trucks (15.3% of all 4-axle trucks).

CHANGES BETWEEN 1987 AND 1992

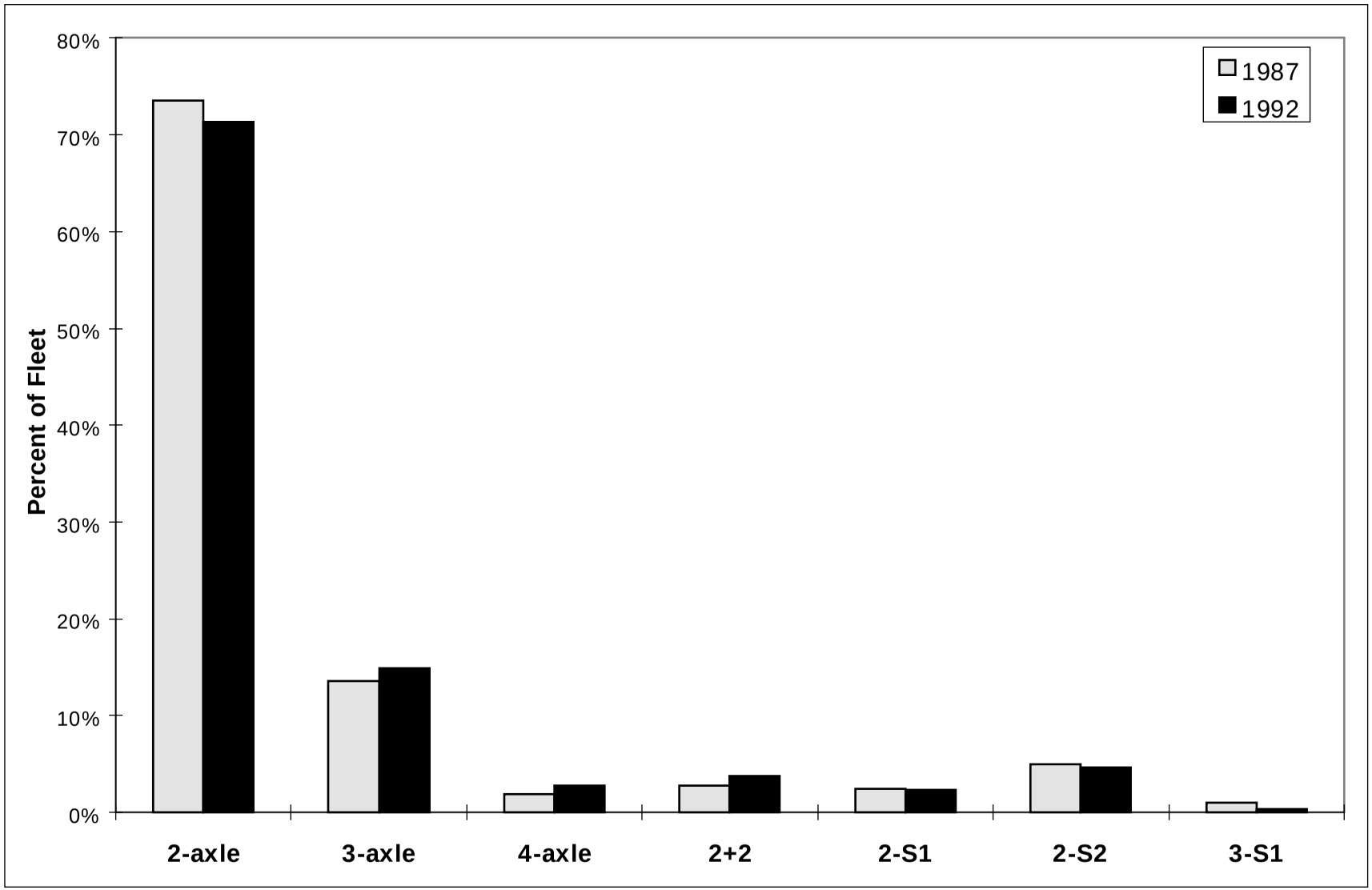
- Nationwide, the size and distribution by vehicle group of the 4-axles or less fleet remained the same.

Figure 3.4-1 The 4-Axles or Less Truck Fleet by Vehicle Configuration



Source: 1992 and 1987 Truck Inventory and Use Survey

Figure 3.4-2 Percentage of 4-Axles or Less Truck Fleet by Vehicle Groups



Source: 1992 and 1987 Truck Inventory and Use Survey

4.0 Analysis of the 4-Axles or Less Fleet by Body Type

For each truck in the 4-axles or less fleet, a body type was identified. This body type classification was an indicator of the body type of the vehicle or the trailer most often attached to it. This data was obtained from Question 8 on the 1987 Survey and Question 9 on the 1992 Survey, as shown in Appendix F.

4.1 Analysis Structure

This analysis focused on the composition of the 4-axles or less fleet in terms of the number of vehicles in the different body type categories. The distribution of body types was evaluated across the regions and across vehicle groups.

- 27 body types (as defined in the 1992 TIUS Survey Question 9 on Form 2)

  - van
  - multi-stop or step van (including hi-cube or cutaway)
  - platform with devices permanently mounted on bed of truck
  - low boy (gooseneck)—platform with depressed center
  - basic platform—including flatbed, stake, etc.
  - livestock truck (including livestock drop frame)
  - insulated, non-refrigerated van
  - insulated, refrigerated van
  - drop frame van (including furniture van, etc.)
  - open top van (including fruit)
  - basic enclosed van (dry cargo)
  - beverage truck
  - utility truck—used in public utility operations
  - winch or crane truck—lifting equipment (including roll-on, roll-off)
  - wrecker—for motor vehicle towing or lifting
  - pole, logging, pulpwood or pipe truck
  - automobile transport
  - service truck or craftsman's vehicle
  - yard tractor—cab and chassis only used to spot trailers
  - oil field truck—service equipment permanently mounted on vehicle
  - grain bodies (including low-side grain and hoppers, etc.)
  - garbage truck
  - dump truck (including belly or bottom dump)
  - tank truck for liquids or gases
  - tank truck for dry bulk
  - concrete mixer
  - other (trucks whose body type was not one of the previous types)

- 7 vehicle groups (see Section 2.2)

- 5 traffic regions (see Section 2.3)

Appendix B gives the detailed results of the distribution of the 4-axles or less fleet, by body type, by vehicle group, by region for 1992 and 1987.

4.2 Observations on Body Types in the 4-Axles or Less Fleet

The distribution of the fleet by body type by geographical region for 1992 and 1987 is summarized in Tables 4.2-1 and 4.2-2. The distribution of the fleet by body type by vehicle group for 1992 and 1987 is provided in Tables 4.2-3 and 4.2-4. The following observations on body type were made about the 1992 fleet. Selected comparisons with 1987 were made and noted.

NATIONWIDE - 1992

- Platforms (i.e., Platform with Devices, Basic Platform, and Low Boy) accounted for about a third of the fleet (29.5%) with the Basic Platforms being the most prevalent type (21.1% of the 4-axle or less truck fleet).

- The van body type (i.e., Van, Multi-Stop Van, Insulated Non-Refrigerated, Insulated Refrigerated, Drop Frame, Open Top, and Basic Enclosed Van) accounted for the second largest portion of the fleet (24.7%) with Basic Enclosed Vans being the most common (12.7% of the 4-axle or less truck fleet).

- Dump trucks accounted for 13.6% of the fleet.

- Grain Bodies accounted for 7.8% of the fleet.

- Each of the remaining body types accounted for less than 5% of the total fleet.

REGIONAL VARIATIONS - 1992

- Industry-specific body types tended to be concentrated in certain geographical regions:

    - Over half (59%) of the tanker trucks for hauling dry bulk were in the North Central region.

    - Over two-thirds (71%) of the Grain Bodies were in the North Central region.

    - Close to one-half (43%) of the oilfield trucks were in the South Gulf region.

CHANGES BETWEEN 1987 AND 1992

- Nationwide, vans and platforms together accounted for over half (54.2%) of the population. The proportion of vans in the fleet remained constant, while the proportion of platforms in the fleet decreased from 33.1% to 29.5%.

- A few 2-axle conventional vans were reported in the 1992 4-axle or less fleet; however, none were reported in the 1987 fleet.

- Regionally, there were no significant changes or differences in the distribution of body types.

Table 4.2-1 1992 Truck Fleet (@ 4-axles or less)
Number of Vehicles by Body Type and Region

Body Type	North Central	North East	South Atlantic	South Gulf	West	Total
Van	540	419	572	629	0	2,160
Multi-Stop or Step Van	56,794	39,995	37,077	23,979	53,041	210,887
Platform with Devices	83,233	30,123	30,499	26,537	42,043	212,434
Low Boy Platform	6,351	2,255	3,518	4,795	3,491	20,411
Basic Platform	168,157	70,312	98,703	100,248	146,953	584,372
Livestock Truck	10,021	1,432	2,727	3,301	4,687	22,169
Insulated Non-Refrigerated Van	2,156	2,358	1,183	1,155	1,268	8,119
Insulated Refrigerated Van	18,747	15,903	14,736	11,044	12,593	73,023
Drop Frame Van	8,131	4,306	6,776	4,774	7,312	31,298
Open Top Van	1,695	1,207	904	660	2,334	6,801
Basic Enclosed Van	108,547	67,931	66,235	53,477	55,935	352,126
Beverage Truck	16,303	10,357	10,494	12,121	9,892	59,167
Utility Truck	26,578	19,439	18,928	12,763	12,911	90,618
Winch/Crane Truck	13,312	7,602	4,913	9,712	8,863	44,403
Wrecker	18,032	12,124	15,589	9,808	9,767	65,320
Pole, Logging Truck	4,266	4,016	4,057	4,274	772	17,385
Auto Transport	1,830	1,993	853	400	423	5,498
Service Truck	21,472	12,648	17,019	15,282	16,901	83,322
Yard Tractor	1,139	498	413	1,171	552	3,772
Oilfield Truck	2,394	1,468	2,157	6,308	3,583	15,910
Grain Bodies	157,734	7,037	10,977	24,087	17,627	217,462
Garbage Truck	18,964	13,495	9,614	6,946	12,692	61,710
Dump Truck	108,428	105,759	67,343	47,069	47,153	375,753
Tank Truck for Liquids or Gases	41,615	26,294	19,778	18,209	24,569	130,466
Tank Truck for Dry Bulk	7,905	785	964	1,320	831	11,806
Concrete Mixer	18,425	7,320	9,458	8,724	13,091	57,017
Other	2,386	812	1,710	2,065	2,692	9,665
Total	925,156	467,889	457,197	410,858	511,974	2,773,073

Source: 1992 Truck Inventory and Use Survey

Table 4.2-2 1987 Truck Fleet (@ 4-axles or less)
Number of Vehicles by Body Type and Region

Body Type	North Central	North East	South Atlantic	South Gulf	West	Total
Van	0	0	0	0	0	0
Multi-Stop or Step Van	43,783	45,303	40,824	29,789	36,928	196,627
Platform with Devices	70,361	30,394	25,222	32,067	32,422	190,467
Low Boy Platform	8,946	3,075	5,060	5,343	3,819	26,243
Basic Platform	244,109	87,099	120,550	127,559	151,585	730,902
Livestock Truck	14,838	2,749	6,827	5,951	6,067	36,433
Insulated Non-Refrigerated Van	2,736	2,330	2,223	2,063	2,071	11,422
Insulated Refrigerated Van	13,288	13,875	11,982	15,040	14,987	69,171
Drop Frame Van	8,239	7,740	7,991	6,059	8,676	38,706
Open Top Van	2,766	1,627	816	609	2,284	8,101
Basic Enclosed Van	91,558	76,917	71,401	54,527	58,611	353,015
Beverage Truck	16,388	9,170	10,182	10,039	10,041	55,820
Utility Truck	20,656	17,242	12,586	12,131	11,433	74,047
Winch/Crane Truck	8,448	6,772	7,130	8,703	7,300	38,354
Wrecker	21,091	13,420	16,986	13,712	13,821	79,030
Pole, Logging Truck	2,270	4,808	6,984	6,939	1,686	22,687
Auto Transport	3,271	501	1,530	1,343	363	7,008
Service Truck	15,894	9,485	9,494	10,643	17,910	63,425
Yard Tractor	1,254	582	463	598	683	3,580
Oilfield Truck	3,685	1,374	969	8,157	4,743	18,928
Grain Bodies	148,575	4,241	10,466	27,097	18,954	209,333
Garbage Truck	13,101	10,502	7,522	3,857	9,653	44,635
Dump Truck	94,549	106,490	82,218	50,834	52,046	386,137
Tank Truck for Liquids or Gases	39,231	26,727	20,381	21,479	18,586	126,403
Tank Truck for Dry Bulk	7,182	826	790	1,967	1,349	12,114
Concrete Mixer	15,487	7,839	9,512	9,656	8,869	51,363
Other	1,668	1,380	2,337	2,234	1,321	8,940
Total	913,375	492,469	492,444	468,395	496,208	2,862,890

Source: 1987 Truck Inventory and Use Survey

Table 4.2-3 1992 Truck Fleet (@ 4-axles or less)
Number of Vehicles by Body Type and Vehicle Group

Body Type	2-axle	3-axle	4-axle	2+2	2-S1	2-S2	3-S1	Total
Van	2,160	0	0	0	0	0	0	2,160
Multi-Stop or Step Van	209,534	144	0	951	0	258	0	210,887
Platform with Devices	162,663	37,276	3,197	7,127	559	1,441	171	212,434
Low Boy Platform	2,203	305	97	5,241	2,915	9,019	630	20,411
Basic Platform	486,145	39,203	1,059	37,095	3,906	15,707	1,259	584,372
Livestock Truck	16,656	992	14	2,345	212	1,865	85	22,169
Insulated Non-Refrigerated Van	5,885	419	6	81	518	1,178	31	8,119
Insulated Refrigerated Van	52,174	7,195	127	345	6,745	5,954	482	73,023
Drop Frame Van	18,926	27	29	678	3,178	8,146	315	31,298
Open Top Van	3,386	2,633	97	94	19	541	31	6,801
Basic Enclosed Van	243,471	9,542	87	5,505	29,211	61,335	2,975	352,126
Beverage Truck	38,162	593	0	812	14,469	4,605	527	59,167
Utility Truck	75,793	4,550	215	10,028	24	0	10	90,618
Winch/Crane Truck	25,256	15,130	2,591	762	211	97	358	44,403
Wrecker	60,693	4,364	37	87	0	139	0	65,320
Pole, Logging Truck	7,395	4,823	3,079	444	142	1,369	132	17,385
Auto Transport	3,768	297	0	51	58	1,306	19	5,498
Service Truck	78,984	1,378	31	2,900	0	29	0	83,322
Yard Tractor	234	114	0	0	366	2,943	115	3,772
Oilfield Truck	9,945	5,017	196	409	47	297	0	15,910
Grain Bodies	145,769	63,975	2,439	1,324	1,489	2,093	373	217,462
Garbage Truck	20,778	34,839	6,093	0	0	0	0	61,710
Dump Truck	202,114	108,947	33,376	25,540	111	5,538	127	375,753
Tank Truck for Liquids or Gases	93,445	28,178	2,821	1,525	515	3,434	547	130,466
Tank Truck for Dry Bulk	5,992	4,988	519	0	0	200	107	11,806
Concrete Mixer	1,009	36,324	19,489	79	0	115	0	57,017
Other	5,928	1,365	18	149	164	2,019	22	9,665
Total	1,978,467	412,619	75,616	103,570	64,858	129,627	8,316	2,773,073

Source: 1992 Truck Inventory and Use Survey

Table 4.2-4 1987 Truck Fleet (@ 4-axles or less)
Number of Vehicles by Body Type and Vehicle Group

Body Type	2-axle	3-axle	4-axle	2+2	2-S1	2-S2	3-S1	Total
Van	0	0	0	0	0	0	0	0
Multi-Stop or Step Van	191,039	2,437	6	2,092	300	557	197	196,627
Platform with Devices	148,870	31,319	3,784	4,145	724	1,416	209	190,467
Low Boy Platform	2,368	763	109	4,692	3,029	12,735	2,548	26,243
Basic Platform	604,767	53,927	2,883	36,125	5,670	22,424	5,107	730,902
Livestock Truck	27,651	1,924	130	3,783	780	1,965	200	36,433
Insulated Non-Refrigerated Van	8,191	887	0	17	452	1,613	262	11,422
Insulated Refrigerated Van	51,376	6,547	251	46	4,384	5,461	1,105	69,171
Drop Frame Van	20,812	468	74	236	5,007	11,320	788	38,706
Open Top Van	5,074	2,010	19	48	172	562	215	8,101
Basic Enclosed Van	239,115	8,718	7	1,351	33,109	61,453	9,262	353,015
Beverage Truck	42,362	365	596	169	9,418	2,333	576	55,820
Utility Truck	64,926	3,306	189	4,892	529	84	122	74,047
Winch/Crane Truck	23,528	12,615	815	901	44	296	155	38,354
Wrecker	72,418	4,867	226	1,108	62	156	194	79,030
Pole, Logging Truck	11,104	6,444	1,146	418	716	1,392	1,467	22,687
Auto Transport	4,039	81	0	90	277	2,150	371	7,008
Service Truck	60,182	1,896	209	1,078	36	25	0	63,425
Yard Tractor	287	49	29	113	578	2,370	154	3,580
Oilfield Truck	11,612	5,267	398	883	259	260	250	18,928
Grain Bodies	160,269	42,749	2,222	483	879	2,436	296	209,333
Garbage Truck	17,665	25,650	1,042	0	261	18	0	44,635
Dump Truck	224,286	114,254	24,870	15,013	837	4,928	1,948	386,137
Tank Truck for Liquids or Gases	100,440	18,959	944	572	984	3,189	1,315	126,403
Tank Truck for Dry Bulk	7,641	3,362	412	137	30	238	293	12,114
Concrete Mixer	1,444	37,920	11,998	0	0	0	0	51,363
Other	3,939	360	9	1,053	472	3,049	58	8,940
Total	2,105,405	387,144	52,367	79,444	69,010	142,428	27,092	2,862,890

Source: 1987 Truck Inventory and Use Survey

5.0 Analysis of the 4-Axles or Less Truck Fleet by Major Business Use

The major business use of a vehicle provides a general description of the typical business usage of the vehicle. In the 5-axles or more fleet, the major business that most of those vehicles were involved in was "For-Hire" operations. However, with the 4-axles or less fleet, there is more variety in the type of business operations that these vehicles were used in.

On the TIUS survey, respondents selected one of 14 categories that best described the major business use of their vehicle (1992 TIUS Survey Question 27, 1987 TIUS Survey Question 29). This section discusses the major business uses of the 4-axles or less truck fleet.

5.1 Analysis Structure

This analysis focuses on the distribution of the fleet by major business use. Differences in vehicle usage between 1987 and 1992 were evaluated. For 1992, vehicle usage was analyzed across the traffic regions and vehicle groups.

- Major Use Categories

  - Agricultural Services (including fisheries)
  - Forestry or Lumbering Activities
  - Construction Work (buildings, homes, roads, structures, etc.)
  - Contractor Activities or Special Trades (plumbing, painting, electrical work, masonry, carpentry, etc.)
  - Manufacturing, Refining, or Processing Activities
  - Wholesale Trade
  - Retail Trade
  - Business and Personal Services - used to assist in such services as lodging operations, landscaping, repair (except plumbing, electrical work, etc.), laundry, advertising, entertainment, etc.
  - Utilities - used to assist in operation or service of public utilities (telephone, gas, electric, cable television, etc.)
  - Mining or Quarrying Activities (includes well-drilling) - used to assist in the extraction of natural resources or in hauling to processors
  - One Way Rental
  - Daily Rental - rented out, without a driver, to someone else on a daily or short-term basis
  - For-Hire Transportation
  - Other

5.2 Observations on Major Use of the 4-Axles or Less Fleet

A comparison between 1992 and 1987 of the percent of vehicles in each of the major use categories is illustrated in Figure 5.2-1. For 1992, Table 5.2-1 summarizes the distribution of the fleet by major use and by the 5 regions, while Table 5.2-2 describes the distribution of the fleet by major use and by the 7 vehicle groups. From these tables, the following observations on major use were made about the 1992 fleet with selected comparisons to the 1987 fleet.

NATIONWIDE - 1992

- The major business usage of vehicles in the 4-axles or less truck fleet was in Agricultural Activities (22.4% of the fleet).
- The second major usage was in Construction (15.6%).
- In third place, Wholesale Trade (9.8%), Retail Trade (10.2%), Business/Personal Services (10.2%), and Contractor (9.8%) business areas were evenly distributed among the fleet.

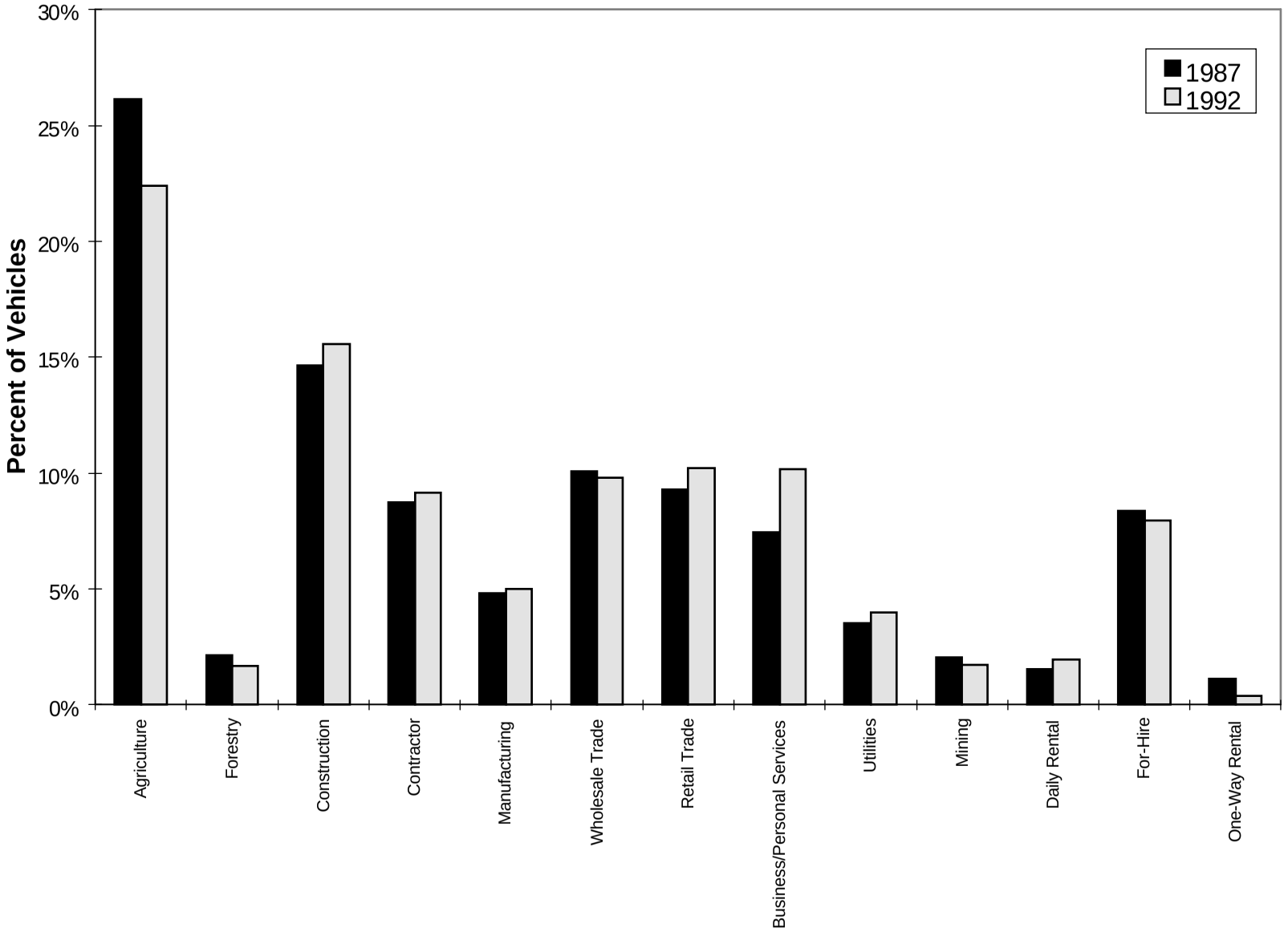
REGIONAL - 1992

- Agricultural Activities accounted for the most usage in the North Central, South Gulf, and West regions.
- In the North East and South Atlantic, Construction was the most prevalent business use.

CHANGES BETWEEN 1987 AND 1992

- The usage of vehicles for Agricultural Activities declined from 26.2% of the fleet in 1987 to 22.4% in 1992.
- Business/Personal Services rose from 7.4% of the fleet in 1987 to 10.2% in 1992.

Figure 5.2-1 Percent of Vehicles by Major Use for the 4-axles or Less Fleet



Source: 1992 and 1987 Truck Inventory and Use Survey

Table 5.2-1 1992 Truck Fleet (@ 4-axles or less)
Number of Vehicles by Major Use and Vehicle Group

Major Use	2-axle	3-axle	4-axle	2+2	2-S1	2-S2	3-S1	National Total
Agriculture	463,670	114,240	5,614	21,851	3,804	11,055	1,344	621,577
Forestry	28,817	10,252	3,382	2,237	150	1,906	134	46,878
Construction	245,395	119,139	34,570	23,050	1,554	7,873	515	432,096
Contractor	217,839	16,903	1,866	13,456	565	3,072	48	253,749
Manufacturing	86,237	22,773	5,679	2,288	3,410	17,362	870	138,620
Wholesale Trade	212,844	16,859	1,471	2,444	21,372	14,741	1,621	271,352
Retail Trade	241,888	18,095	1,953	5,860	4,963	9,382	583	282,723
Business and Personal Services	212,350	43,912	6,453	10,644	1,816	6,123	535	281,832
Utilities	85,635	7,163	438	16,019	98	1,238	83	110,674
Mining	23,797	18,617	2,568	1,931	96	1,206	121	48,336
Daily Rental	43,283	2,595	265	1,455	1,261	4,663	601	54,123
For-Hire	105,825	22,072	11,357	2,308	25,449	50,932	1,862	219,804
One-Way Rental	10,688	0	0	28	319	74	0	11,110
Personal Transport	195	0	0	0	0	0	0	195
Total	1,978,463	412,620	75,616	103,570	64,859	129,626	8,316	2,773,070

Source: 1992 Truck Inventory and Use Survey

Table 5.2-2 1992 Truck Fleet (@ 4-axles or less)
Number of Vehicles by Major Use and by Region

Major Use	North Central	North East	South Atlantic	South Gulf	West	National Total
Agriculture	320,884	45,110	67,581	92,725	95,278	621,578
Forestry	11,122	9,432	9,224	8,494	8,606	46,878
Construction	122,449	83,218	76,285	60,426	89,718	432,096
Contractor	69,018	51,551	45,144	37,443	50,594	253,750
Manufacturing	46,586	24,895	24,709	21,499	20,931	138,620
Wholesale Trade	72,191	51,586	49,260	43,930	54,385	271,352
Retail Trade	77,327	63,467	47,915	41,233	52,782	282,724
Business/Personal Services	71,927	62,205	53,966	31,723	62,010	281,831
Utilities	33,218	19,750	25,898	15,080	16,729	110,675
Mining	11,875	5,565	7,334	16,008	7,554	48,337
Daily Rental	18,622	7,660	9,038	9,963	8,840	54,123
For-Hire	67,895	43,039	39,436	25,262	44,173	219,805
One-Way Rental	1,937	411	1,366	7,053	344	11,110
Personal Transport	107	0	41	19	28	195
Total	925,158	467,889	457,197	410,857	511,972	2,773,073

Source: 1992 Truck Inventory and Use Survey

6.0 Analysis of the 4-Axles or Less Truck Fleet by Principal Product Carried

On the TIUS survey, each owner identified the percent of annual truck mileage associated with hauling the 29 listed commodities or carrying no load (1992 TIUS Survey Question 28, 1987 TIUS Survey Question 30). Based on the respondent's reply to this commodity question and how the vehicle's VMT was distributed over the various commodities, the Bureau of the Census created a new variable, Principal Product, which would indicate the commodity hauled most often by the given truck. In using the principal product information, one should be aware that the remaining products carried by a truck were ignored in the analysis. In Chapter 7, all commodities carried by a vehicle were analyzed.

6.1 Analysis Structure

This section focuses on the principal product hauled by various vehicles in the national fleet. The analysis evaluated the distribution of the truck fleet by principal product across vehicle groups and regions. In Chapter 7.0, the distribution of VMT hauling the various commodities is discussed, and those data were used to make general comparisons to the principal products data.

- 30 principal products (Derived by the Bureau of the Census from the commodity data)

  - **no load** — vehicle empty
  - **live animals**
  - fresh **farm products**
  - **processed foods** and tobacco products
  - **animal feed**
  - **mining products**
  - **building materials** (gravel, sand, concrete, flat glass, etc.—except cut lumber)
  - **logs and** other **forest products**
  - **lumber and fabricated wood products**—except furniture
  - **paper and paper products**
  - **chemicals** and/or drugs (including fertilizers, pesticides, cosmetics, paints, etc.)
  - **petroleum and petroleum products** (including paving and roofing materials)
  - **plastics** and/or and **rubbe**r products
  - **primary metal** products—pipes, ingots, billets, sheets, etc.
  - **fabricated metal** products—except machinery or transportation equipment
  - **machinery**—electrical or non-electrical and electronic
  - **transportation equipment** (including complete vehicles) and parts
  - **furniture** (wood and non-wood) and/or hardware—not involved in household moving
  - **glass products**
  - **textiles and apparels**—fibers, leather goods, carpets, clothing, etc.
  - **miscellaneous products** of manufacturing
  - moving of **household** and office furniture
  - **craftsman's equipment** - miscellaneous tools and/or parts for specialized use

- **mixed cargo** (including the delivery of small packages)
- **scrap** (not for recycling), garbage, trash, septic tank waste
- **industrial** "waste" **water**
- **hazardous waste (EPA** manifest)
- **hazardous waste (non-EPA** manifest)
- **recyclable products**
- **other**

- 7 vehicle groups (see Section 2.2)

- 5 traffic regions (see Section 2.3)

6.2 Observations on the Principal Products Carried by 4-Axles or Less Trucks

Because of differences in the surveys for the two years, principal product was only analyzed for 1992. Table 6.2-1 presents the distribution of the 4-axles or less truck fleet by principal product carried and by vehicle group. Table 6.2-2 summarizes the distribution of the fleet by principal product carried at the regional level for 1992. The following observations were based from these tables.

NATIONWIDE - 1992

- Over two-thirds (69.7%) of the vehicles in the 4-axles or less truck fleet hauled primarily the following 10 commodities:
  - building materials (16.0% of total 4-axles or less fleet)
  - farm products (14.7% of total 4-axles or less fleet)
  - processed foods (8.2% of total 4-axles or less fleet)
  - craftsman's equipment and tools (7.2% of total 4-axles or less fleet)
  - mixed cargo (4.7% of total 4-axles or less fleet)
  - refuse (4.2% of total 4-axles or less fleet)
  - petroleum and petroleum products (3.9% of total 4-axles or less fleet)
  - machinery (3.9% of total 4-axles or less fleet)
  - transportation equipment (3.8% of total 4-axles or less fleet)
  - live animals (3.2% of total 4-axles or less fleet)

- The distribution of principal products by 2-axle straight trucks was similar to the national distribution of the 4-axles or less truck fleet.

- Half (55.0%) of the 3-axle straight trucks most often hauled either farm products or building materials, and approximately 10.7% of the 3-axle trucks hauled refuse.

- About two-thirds (62.7%) of the 4-axle straight trucks most often hauled building materials.

Table 6.2-1 1992 Truck Fleet (@ 4-axles or Less)
Principal Product Hauled by Vehicle Group

Principal Product	2-axle	3-axle	4-axle	2+2	2-S1	2-S2	3-S1	Total
Farm Products	288,107	90,489	4,886	9,512	3,308	9,518	866	406,685
Live Animals	67,430	8,712	509	8,565	658	2,753	154	88,781
Animal Feed	49,184	8,558	852	1,424	370	417	75	60,879
Processed Foods	173,036	8,799	227	2,431	24,144	16,078	1,567	226,282
Mining	7,465	4,857	3,516	210	174	361	13	16,596
Building	228,611	136,711	47,435	20,974	454	7,630	454	442,270
Logs	28,402	7,330	3,261	2,660	125	2,317	161	44,255
Lumber	60,657	6,058	240	1,984	604	4,662	137	74,342
Paper	27,032	1,305	144	202	3,637	6,243	209	38,772
Chemicals	60,106	12,191	261	954	649	2,954	302	77,416
Petroleum	84,473	17,104	2,750	1,896	751	1,944	183	109,101
Plastics	18,435	177	0	615	913	3,440	118	23,699
Primary Metal	29,191	2,652	149	2,106	236	3,196	437	37,967
Fabricated Metal	49,249	3,046	496	3,343	540	4,577	182	61,431
Machinery	73,337	8,295	350	15,507	2,211	7,498	336	107,534
Transportation Equipment	83,622	6,679	43	6,694	1,840	6,708	386	105,972
Furniture	46,365	486	0	636	1,308	6,530	265	55,589
Textile	33,788	176	0	197	2,763	4,757	160	41,840
Household Goods	25,855	360	0	498	2,154	5,624	150	34,642
Craftsman's Equipment	177,800	3,739	220	16,000	359	1,794	37	199,949
Mixed Cargo	89,807	1,032	43	1,944	15,084	22,467	937	131,313
Refuse	61,775	44,082	7,510	2,120	5	330	38	115,860
Glass Products	4,115	12	0	0	235	688	23	5,074
Miscellaneous	33,512	1,375	8	834	822	3,342	490	40,384
Industrial Water	3,052	1,935	23	0	0	150	10	5,170
Hazardous Waste (EPA)	1,097	454	15	105	24	99	22	1,816
Hazardous Waste (Non-EPA)	1,202	168	0	105	0	174	0	1,649
Recyclables	15,879	5,992	360	462	1,170	932	101	24,897
Other	26,706	10,964	511	1,245	174	1,244	454	41,297
No Load	129,175	18,884	1,808	346	147	1,198	51	151,608
Total	1,978,466	412,621	75,616	103,569	64,858	129,627	8,316	2,773,073

Source: 1992 Truck Inventory and Use Survey

Table 6.2-2 1992 Truck Fleet (@ 4-axles or Less)
Principal Product Hauled by Region

Principal Product	North Central	North East	South Atlantic	South Gulf	West	Total
Farm Products	233,549	34,013	42,100	45,280	51,743	406,685
Live Animals	36,746	6,071	11,274	17,681	17,010	88,782
Animal Feed	25,743	5,632	7,888	11,677	9,939	60,879
Processed Foods	62,049	44,671	39,448	37,719	42,396	226,283
Mining	2,566	7,015	2,989	2,517	1,508	16,596
Building	127,675	98,342	77,405	55,794	83,055	442,271
Logs	9,357	10,032	11,273	8,388	5,205	44,255
Lumber	23,001	14,517	13,469	9,837	13,519	74,343
Paper	10,565	8,327	6,317	4,276	9,288	38,772
Chemicals	27,689	10,908	10,883	12,841	15,096	77,417
Petroleum	33,659	21,636	20,608	18,075	15,123	109,101
Plastics	5,123	6,157	3,992	2,902	5,526	23,699
Primary Metal	9,287	7,442	6,552	6,848	7,838	37,967
Fabricated Metal	22,355	10,254	6,236	9,147	13,439	61,430
Machinery	30,698	15,797	20,798	16,313	23,928	107,534
Transportation Equipment	29,200	19,344	21,555	17,463	18,410	105,972
Furniture	12,123	7,311	12,803	12,210	11,142	55,589
Textile	8,452	6,342	9,927	5,835	11,284	41,840
Household Goods	9,090	4,909	8,470	4,683	7,489	34,642
Craftsman's Equipment	58,677	36,070	39,177	24,623	41,402	199,949
Mixed Cargo	44,979	23,874	18,497	19,859	24,104	131,313
Refuse	29,843	22,409	20,739	16,583	26,286	115,860
Glass Products	1,219	1,137	1,284	485	948	5,074
Miscellaneous	9,035	9,270	9,098	4,880	8,100	40,384
Industrial Water	2,174	992	953	491	561	5,171
Hazardous Waste (EPA)	233	419	661	14	489	1,816
Hazardous Waste (Non-EPA)	66	235	729	38	582	1,649
Recyclables	8,300	6,417	4,374	2,387	3,420	24,897
Other	10,451	3,940	5,830	6,113	14,964	41,298
No Load	41,254	24,408	21,869	35,899	28,178	151,608
Total	925,158	467,889	457,198	410,856	511,973	2,773,074

Source: 1992 Truck Inventory and Use Survey

- Half (50.7%) of the 2+2 vehicles most often hauled building materials, machinery, or craftsman's equipment, and 17.4% most often hauled either farm products or live animals.

- Over half (60.5%) of the 2-S1 most often hauled either processed foods or mixed cargo.

- About a third (37.1%) of the 2-S2 most often hauled either processed foods, mixed cargo, or farm products.

- Over a third (40.5%) of the 3-S1 most often hauled either farm products, processed foods, or mixed cargo.

REGIONAL VARIATIONS - 1992 (see Tables 6.2-2 and 6.2-3)

- Over one-third of the fleet (38.8%) most often hauled one of these three principal products: building materials (16.0%), farm products (14.7%), or processed foods (8.2%). Most of the regional fleets also claimed these as their top three products. In addition, these three products were the major commodities most often hauled by a significant proportion of the vehicles in the regional fleets (North Central region—45.8%, North East region—37.8%, South Atlantic region—34.8%, South Gulf region—33.8%, West region—34.6%).

Table 6.2-3 Ranking of Principal Products by Regions in 1992

Products	National	North Central	North East	South Atlantic	South Gulf	West
Building Materials	1	2	1	1	1	1
Farm Products	2	1	4	2	2	2
Processed Foods	3	3	2	3	3	3
Craftsman's Equipment	4	4	3	4	4	4
Mixed Cargo	5	5	5	✓	5	6
Refuse	6	✓	6	7	✓	5
Petroleum	7	7	7	✓	6	✓

Note: ✓ indicates 8th or lower ranking.
Information for ranking all 29 commodities can be obtained from Table 6.2-2.

7.0 Analysis of the 4-Axles or Less Truck Fleet by Percent of VMT Hauling a Commodity

The previous section focused on the principal commodity hauled most often by the individual vehicles in the fleet. That analysis provides a general indication of the number of vehicles that haul a given commodity; however, vehicles in the fleet may haul more than one commodity during the year. This section analyzes the variety of commodities that each vehicle hauled, not just the commodity hauled most often. In particular, the focus is on the distribution of fleet vehicle miles of travel (VMT) across the commodity groups, whereas the previous chapter focused on the distribution of vehicles.

On the TIUS survey, owners identified the percent of their annual truck mileage that was used to haul the 29 listed commodities or carrying no load (TIUS Survey, Question 28 for 1992 and Question 30 for 1987, Appendix F). For each truck, the percent of VMT hauling the various 29 commodities and the percent of VMT hauling no load totaled to 100%. To perform an analysis of these data, the percent of VMT that a truck hauled a commodity had to first be converted into actual mileage, then VMT totals were obtained for the different commodity groups by the 7 vehicle groups. From the VMT totals, the percent of VMT was calculated several ways. Some percentages were based on the total fleet VMT, others were based on a vehicle group's total VMT, and others on a commodity group's total VMT.

7.1 Analysis Structure

This analysis estimates the percent of VMT that a particular commodity is hauled. To perform an analysis on this commodity data, the percent of VMT units had to be converted into actual VMT for each vehicle because annual VMT differs across vehicles. VMT totals were calculated and then converted to percent of VMT units. In the analysis, commodities were evaluated across the different vehicle groups and the different regions. No comparison was done with the 1987 data because of differences in the formatting and wording of the survey questionnaire, in particular because "no load" was not included with the list of commodities in the 1987 survey. A comparison between Chapter 6 and this chapter's observations on the rank ordering of the commodities is provided in order to show differences in the conclusions from these sections.

- 30 commodities

  - **no load** — vehicle empty
  - **live animals**
  - fresh **farm products**
  - **processed foods** and tobacco products
  - **animal feed**
  - **mining products**
  - **building materials** (gravel, sand, concrete, flat glass, etc.—except cut lumber)
  - **logs and** other **forest products**
  - **lumber and fabricated wood products**—except furniture

- **paper and paper products**
- **chemicals** and/or drugs (including fertilizers, pesticides, cosmetics, paints, etc.)
- **petroleum and petroleum products** (including paving and roofing materials)
- **plastics** and/or and **rubbe**r products
- **primary metal** products—pipes, ingots, billets, sheets, etc.
- **fabricated metal** products—except machinery or transportation equipment
- **machinery**—electrical or non-electrical and electronic
- **transportation equipment** (including complete vehicles) and parts
- **furniture** (wood and non-wood) and/or hardware—not involved in household moving
- **glass products**
- **textiles and apparels**—fibers, leather goods, carpets, clothing, etc.
- **miscellaneous products** of manufacturing
- moving of **household** and office furniture
- **craftsman's equipment** - miscellaneous tools and/or parts for specialized use
- **mixed cargo** (including the delivery of small packages)
- **scrap** (not for recycling), garbage, trash, septic tank waste
- **industrial** "waste" **water**
- **hazardous waste (EPA** manifest)
- **hazardous waste (non-EPA** manifest)
- **recyclable products**
- **other**

■ 7 vehicle groups (see Section 2.2)

■ 5 traffic regions (see Section 2.3).

7.2 Observations on the Percent of VMT Hauling a Commodity

NATIONWIDE - 1992 (see Table 7.2-1)

■ Over half (50.1%) of the 4-axles or less truck fleet's VMT was used to haul 7 commodities.

- building materials (12.2% of the total fleet VMT)
- processed foods (10.8% of the total fleet VMT)
- mixed cargo (7.8% of the total fleet VMT)
- farm products (5.1% of the total fleet VMT)
- transportation equipment (4.1% of the total fleet VMT)
- craftsman's equipment and tools (5.6% of the total fleet VMT)
- refuse (4.2% of the total fleet VMT)

■ Vehicles carried no loads (empty) for about 14.3% of their VMT.

Table 7.2-1 1992 Truck Fleet (@ 4-axles or Less)
Distribution of Percent of VMT Hauling a Commodity by Vehicle Group
Based on Total Fleet* VMT

Commodity	2-axle	3-axle	4-axle	2+2	2-S1	2-S2	3-S1	Percent of National Total
No Load	8.67	2.63	0.78	0.39	0.51	1.25	0.05	14.29
Live Animal	0.90	0.17	0.00	0.19	0.04	0.22	0.01	1.53
Farm Products	2.74	1.05	0.27	0.21	0.13	0.65	0.05	5.10
Processed Food	7.14	0.43	0.03	0.09	1.27	1.64	0.17	10.76
Animal Feed	0.89	0.26	0.08	0.03	0.01	0.06	0.01	1.35
Mining	0.09	0.22	0.30	0.02	0.02	0.05	0.00	0.70
Building	4.30	4.49	2.21	0.40	0.03	0.77	0.02	12.22
Logging	0.36	0.19	0.13	0.06	0.00	0.20	0.01	0.96
Lumber	1.67	0.25	0.01	0.06	0.06	0.32	0.01	2.37
Paper	1.25	0.08	0.00	0.04	0.18	0.76	0.02	2.32
Chemicals	1.70	0.30	0.02	0.04	0.07	0.39	0.02	2.53
Petroleum	2.44	0.70	0.18	0.08	0.05	0.21	0.01	3.69
Plastic	0.78	0.03	0.00	0.03	0.09	0.41	0.01	1.35
Primary Metal	0.84	0.09	0.01	0.05	0.04	0.38	0.03	1.44
Fabricated Metal	1.60	0.11	0.02	0.11	0.07	0.39	0.02	2.32
Machinery	2.06	0.19	0.01	0.38	0.08	0.30	0.03	3.04
Transport Equipment	3.12	0.17	0.00	0.12	0.06	0.59	0.02	4.08
Furniture	1.79	0.02	0.00	0.05	0.15	0.86	0.04	2.92
Glass	0.36	0.00	0.00	0.00	0.04	0.12	0.00	0.53
Textile	1.43	0.01	0.00	0.01	0.23	0.50	0.02	2.20
Miscellaneous Mfg.	1.34	0.06	0.00	0.03	0.07	0.35	0.03	1.88
Moving	1.16	0.07	0.00	0.03	0.09	0.39	0.02	1.75
Tools	5.23	0.10	0.02	0.45	0.02	0.12	0.00	5.95
Mix Cargo	4.03	0.04	0.00	0.08	0.90	2.61	0.13	7.79
Refuse	1.40	2.21	0.50	0.05	0.00	0.05	0.00	4.21
Industrial Water	0.11	0.06	0.00	0.00	0.00	0.02	0.00	0.19
Hazardous EPA	0.04	0.01	0.00	0.00	0.00	0.02	0.00	0.09
Hazardous Non-EPA	0.07	0.01	0.00	0.00	0.00	0.03	0.00	0.12
Recyclables	0.42	0.31	0.05	0.01	0.04	0.10	0.01	0.93
Other	0.97	0.21	0.02	0.03	0.01	0.13	0.02	1.39
Percent of National Total	58.91	14.48	4.65	3.03	4.26	13.90	0.77	100.00

***** Total fleet VMT is in reference to the 4-axles or less fleet's total VMT.

Source: 1992 Truck Inventory and Use Survey

VEHICLE GROUPS - 1992 (see Tables 7.2-2 and 7.2-3)

- 28.3% of the 2-axle straight trucks' VMT was used to haul either Processed Foods, Building Materials, or Craftsman's Tools.

- Around half of the 3-axle trucks' VMT (46.3%) was used to haul either Building Materials or Refuse, while over half of the 4-axle trucks' VMT (58.2%) was used to haul either Building Materials or Refuse.

- Over a third of the 2+2s' VMT (40.1%) was used in hauling either Building Materials, Machinery, or Craftsman's Tools.

- Processed Foods and Mixed Cargo accounted for 50.9% of the 2-S1s' VMT, 30.6% of the 2-S2s' VMT, and 38.8% of the 3-S1s' VMT.

REGIONAL VARIATIONS - 1992 (see Tables 7.2-4 and 7.2-5)

- 29.4% of the 4-axles or less fleet's VMT was driven by vehicles registered in the North Central region. For over half of the commodities, the North Central trucks accounted for the largest proportion of the VMT hauling those particular products. Some exceptions were Mining products which were hauled largely by North East vehicles (41.8% of the Mining VMT), Textiles which were hauled by Western vehicles (24.2%), Hazardous EPA (32%) and Hazardous Non-EPA (29.3%) materials which were hauled by South Atlantic vehicles, and Recyclables which were hauled by North East vehicles (27.7%).

COMPARISON OF COMMODITY DATA AND PRINCIPAL PRODUCT

- Table 7.2-6 is a ranking based on the VMT that each of the commodities accounted for in 1992. Table 6.2-3 is a ranking based on the number of trucks that hauled a given principal product. A comparison of Tables 6.2-3 and 7.2-6 shows a difference in the ranking of commodities. This difference results because annual VMT varies across the vehicles.

- One major difference between Tables 7.2-6 and 6.2-3 is the placement of Farm Products. The principal commodity, Farm Products, is hauled by 14.7% of the vehicles in the fleet which ranks it in second place; however, the movements of Farm Products in terms of percent of VMT accounts for 5.1% of the total VMT which ranks it in fifth place.

Table 7.2-6 Ranking of the Major Commodities (based on VMT) by Regions in 1992

Products	National	North Central	North East	South Atlantic	South Gulf	West
Building Materials	1	1	1	1	1	1
Processed Foods	2	2	3	4	3	4
Mixed Cargo	3	5	2	3	2	2
Craftsman's Equipment	4	4	4	2	4	3
Farm Products	5	3	5	✓	7	✓
Refuse	6	6	6	✓	6	✓
Transport Equipment	7	✓	7	✓	✓	7

Note: ✓ indicates 8th or lower ranking.
Information for ranking all 29 commodities can be obtained from Table 7.2-4.

Table 7.2-2 1992 Truck Fleet (@ 4-axles or Less) Distribution of Percent of VMT Across Commodities For a Given Vehicle Group

Commodity	2-axle	3-axle	4-axle	2+2	2-S1	2-S2	3-S1
No Load	14.72	18.17	16.84	12.85	11.99	8.96	6.92
Live Animal	1.52	1.20	0.09	6.18	0.89	1.59	0.99
Farm Products	4.65	7.24	5.90	6.96	3.11	4.65	6.65
Processed Food	12.12	2.95	0.54	3.00	29.77	11.80	22.27
Animal Feed	1.52	1.81	1.63	1.02	0.34	0.40	1.83
Mining	0.16	1.53	6.44	0.61	0.38	0.37	0.37
Building	7.29	31.00	47.51	13.21	0.74	5.51	2.88
Logging	0.61	1.33	2.85	2.00	0.07	1.46	1.47
Lumber	2.84	1.71	0.15	1.91	1.38	2.31	0.81
Paper	2.12	0.52	0.07	1.22	4.11	5.48	2.90
Chemicals	2.88	2.10	0.52	1.18	1.59	2.81	2.03
Petroleum	4.14	4.85	3.95	2.67	1.25	1.54	1.51
Plastic	1.33	0.20	0.02	0.95	2.09	2.95	1.78
Primary Metal	1.43	0.60	0.17	1.78	0.99	2.75	3.31
Fabricated Metal	2.72	0.76	0.46	3.47	1.65	2.82	2.81
Machinery	3.49	1.33	0.16	12.39	1.79	2.17	3.82
Transport Equipment	5.30	1.18	0.04	3.84	1.33	4.25	2.90
Furniture	3.03	0.16	0.04	1.73	3.54	6.22	5.31
Glass	0.61	0.03	0.00	0.02	0.89	0.89	0.56
Textile	2.43	0.05	0.00	0.36	5.50	3.57	2.02
Miscellaneous Mfg.	2.28	0.42	0.00	1.04	1.58	2.54	3.67
Moving	1.96	0.49	0.00	1.15	2.10	2.77	2.23
Tools	8.88	0.70	0.33	14.81	0.49	0.89	0.41
Mix Cargo	6.85	0.30	0.09	2.54	21.14	18.78	16.54
Refuse	2.38	15.26	10.67	1.56	0.06	0.36	0.25
Industrial Water	0.18	0.38	0.02	0.00	0.02	0.17	0.00
Hazardous EPA	0.07	0.07	0.07	0.02	0.05	0.18	0.11
Hazardous Non-EPA	0.13	0.05	0.07	0.06	0.08	0.19	0.00
Recyclables	0.71	2.14	1.04	0.37	0.83	0.68	1.47
Other	1.65	1.48	0.33	1.09	0.25	0.96	2.16
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Note: Cells represent % of vehicle group's VMT.

Source: 1992 Truck Inventory and Use Survey

Table 7.2-3 1992 Truck Fleet (@ 4-axles or Less)
Distribution of Percent of VMT Across Vehicle Groups
By Commodity

Commodity	2-axle	3-axle	4-axle	2+2	2-S1	2-S2	3-S1	Total
No Load	60.71	18.42	5.48	2.73	3.57	8.72	0.37	100
Live Animal	58.63	11.36	0.28	12.27	2.48	14.48	0.50	100
Farm Products	53.70	20.54	5.37	4.14	2.59	12.65	1.00	100
Processed Food	66.34	3.97	0.23	0.85	11.78	15.24	1.59	100
Animal Feed	66.35	19.43	5.63	2.31	1.09	4.15	1.04	100
Mining	13.13	31.65	42.63	2.65	2.28	7.25	0.40	100
Building	35.17	36.76	18.09	3.28	0.26	6.26	0.18	100
Logging	37.28	20.03	13.76	6.31	0.30	21.14	1.17	100
Lumber	70.55	10.43	0.30	2.44	2.48	13.53	0.26	100
Paper	53.79	3.23	0.15	1.59	7.53	32.75	0.96	100
Chemicals	66.95	11.99	0.96	1.41	2.67	15.41	0.61	100
Petroleum	66.20	19.07	4.98	2.19	1.44	5.80	0.31	100
Plastic	57.78	2.19	0.05	2.13	6.58	30.27	1.01	100
Primary Metal	58.48	5.99	0.53	3.75	2.94	26.54	1.77	100
Fabricated Metal	68.97	4.72	0.92	4.54	3.04	16.89	0.93	100
Machinery	67.66	6.32	0.25	12.36	2.51	9.93	0.97	100
Transport Equipment	76.49	4.19	0.04	2.86	1.39	14.48	0.55	100
Furniture	61.18	0.78	0.07	1.80	5.16	29.62	1.40	100
Glass	67.84	0.75	0.01	0.14	7.12	23.33	0.81	100
Textile	65.22	0.33	0.00	0.50	10.67	22.58	0.71	100
Miscellaneous Mfg.	71.22	3.25	0.01	1.67	3.58	18.77	1.50	100
Moving	65.90	4.06	0.01	1.99	5.09	21.97	0.98	100
Tools	88.01	1.70	0.26	7.56	0.35	2.07	0.05	100
Mix Cargo	51.73	0.55	0.06	0.99	11.55	33.49	1.63	100
Refuse	33.29	52.51	11.78	1.12	0.06	1.18	0.05	100
Industrial Water	57.00	29.46	0.50	0.00	0.43	12.61	0.00	100
Hazardous EPA	51.04	12.03	3.78	0.76	2.44	28.93	1.02	100
Hazardous Non-EPA	63.95	6.50	2.66	1.61	2.85	22.43	0.00	100
Recyclables	44.87	33.44	5.19	1.21	3.81	10.26	1.22	100
Other	69.63	15.39	1.09	2.38	0.78	9.53	1.19	100

Note: Cells represent % of commodity group's VMT.

Source: 1992 Truck Inventory and Use Survey

Table 7.2-4 1992 Truck Fleet (@ 4-axles or Less) Distribution of Percent of VMT Hauling a Commodity by Region

Commodity	North Central	North East	South Atlantic	South Gulf	West	Percent of National Total
No Load	3.97	2.38	2.46	2.88	2.59	14.29
Live Animal	0.62	0.11	0.24	0.36	0.20	1.53
Farm Products	2.22	0.49	0.87	0.62	0.90	5.10
Processed Food	3.06	2.00	1.88	2.09	1.74	10.76
Animal Feed	0.55	0.11	0.31	0.21	0.17	1.35
Mining	0.12	0.29	0.13	0.13	0.03	0.70
Building	3.21	2.13	2.97	1.82	2.08	12.22
Logging	0.16	0.23	0.24	0.24	0.09	0.96
Lumber	0.70	0.43	0.49	0.34	0.41	2.37
Paper	0.59	0.62	0.33	0.31	0.47	2.32
Chemicals	0.70	0.37	0.42	0.59	0.46	2.53
Petroleum	1.05	0.72	0.74	0.74	0.44	3.69
Plastic	0.32	0.35	0.22	0.20	0.26	1.35
Primary Metal	0.48	0.25	0.18	0.22	0.31	1.44
Fabricated Metal	0.78	0.31	0.27	0.42	0.54	2.32
Machinery	0.91	0.46	0.48	0.58	0.60	3.04
Transport Equipment	1.20	0.64	0.87	0.61	0.76	4.08
Furniture	0.70	0.30	0.62	0.77	0.52	2.92
Glass	0.16	0.17	0.05	0.04	0.11	0.53
Textile	0.41	0.40	0.43	0.43	0.53	2.20
Miscellaneous Mfg.	0.52	0.44	0.40	0.25	0.28	1.88
Moving	0.42	0.26	0.45	0.24	0.37	1.75
Tools	1.60	1.15	1.23	0.88	1.09	5.95
Mix Cargo	3.20	1.30	1.09	0.94	1.27	7.79
Refuse	1.04	0.73	0.78	0.67	1.00	4.21
Industrial Water	0.06	0.05	0.02	0.03	0.02	0.19
Hazardous EPA	0.02	0.02	0.03	0.01	0.01	0.09
Hazardous Non-EPA	0.02	0.03	0.03	0.00	0.03	0.12
Recyclables	0.20	0.26	0.14	0.11	0.22	0.93
Other	0.37	0.19	0.28	0.18	0.38	1.39
Percent of National Total	29.38	17.18	18.64	16.90	17.90	100.00

Note: Cells represent % of national VMT.

Source: 1992 Truck Inventory and Use Survey

Table 7.2-5 1992 Truck Fleet (@ 4-axles or Less) Distribution of Percent of VMT Across Regions Hauling a Given Commodity

Note: Cells represent % of region's VMT.

Commodity	North Central	North East	South Atlantic	South Gulf	West	National Total
No Load	27.82	16.64	17.25	20.16	18.12	100.00
Live Animal	40.65	7.33	15.51	23.45	13.07	100.00
Farm Products	43.59	9.65	17.00	12.15	17.61	100.00
Processed Food	28.40	18.60	17.43	19.40	16.18	100.00
Animal Feed	40.74	8.00	22.88	15.67	12.71	100.00
Mining	16.67	41.81	18.67	17.87	4.98	100.00
Building	26.32	17.41	24.33	14.90	17.04	100.00
Logging	16.16	23.77	25.28	25.39	9.40	100.00
Lumber	29.72	18.25	20.46	14.14	17.42	100.00
Paper	25.35	26.51	14.33	13.54	20.27	100.00
Chemicals	27.43	14.68	16.58	23.35	17.97	100.00
Petroleum	28.57	19.58	19.99	19.99	11.87	100.00
Plastic	23.54	26.10	16.47	14.46	19.42	100.00
Primary Metal	33.13	17.35	12.61	15.58	21.32	100.00
Fabricated Metal	33.59	13.32	11.66	18.04	23.39	100.00
Machinery	30.08	15.11	15.81	19.11	19.89	100.00
Transport Equipment	29.39	15.69	21.28	14.99	18.64	100.00
Furniture	24.03	10.34	21.36	26.43	17.85	100.00
Glass	30.77	32.00	9.43	7.28	20.52	100.00
Textile	18.78	18.18	19.46	19.39	24.20	100.00
Miscellaneous Mfg.	27.41	23.49	21.16	13.23	14.72	100.00
Moving	24.19	15.05	25.64	13.78	21.35	100.00
Tools	26.97	19.26	20.62	14.77	18.38	100.00
Mix Cargo	41.08	16.64	13.96	12.08	16.23	100.00
Refuse	24.71	17.27	18.54	15.81	23.66	100.00
Industrial Water	32.90	29.22	10.14	16.17	11.58	100.00
Hazardous EPA	19.04	17.98	32.01	14.13	16.84	100.00
Hazardous Non-EPA	21.13	24.99	29.31	1.68	22.89	100.00
Recyclables	21.75	27.70	14.78	12.00	23.77	100.00
Other	26.66	13.30	19.92	12.62	27.49	100.00

Source: 1992 Truck Inventory and Use Survey

8.0 Analysis of Weights, Dimensions and Operating Characteristics for the 4-Axles or Less Fleet

In this section, specific truck configuration/body types which were prevalent in the truck fleet were identified and a closer examination of these configuration/body type groups was conducted. The analysis of the configuration/body types focused on the operating characteristics which are most important to the TS&W Study (i.e., vehicle weight, width, length, and hauling range).

8.1 Analysis Structure

Various combinations of vehicle configurations and body types (e.g., the 2-S2 refrigerated van) were chosen for analysis based on their occurrence in the truck fleet. The most prevalent configuration/body types in the truck fleet were analyzed in terms of their national operational characteristics for 1992 and 1987. The selected combinations of configuration/body type analyzed in this section accounted for approximately 83% of the vehicles in the 1992 4-axles or less fleet. The following 5 truck configurations and the 14 body types were most prevalent in the fleet:

FIVE SPECIFIC CONFIGURATIONS

- the 2-axle straight truck
- the 3-axle straight truck
- the 4-axle straight truck
- the 2-S1 tractor-trailer
- the 2-S2 tractor-trailer

FOURTEEN SPECIFIC BODY TYPES

- low boy
- basic platform
- platform with devices
- multi-stop or step van
- insulated refrigerated van
- drop frame van
- basic enclosed van
- beverage truck
- grain bodies
- garbage truck
- dump truck
- tank truck for liquids or gases
- tank truck for dry bulk
- concrete mixer

Appendix C gives the detailed results of the analysis of weights, dimensions, and operating characteristics for the 1992 and the 1987 4-axles or less fleets.

OPERATIONAL CHARACTERISTICS

In this analysis of the specific truck configuration/body types, eight vehicle characteristics were of interest:

- empty (tare) weight = vehicle weight
- payload weight = cargo weight
- average loaded weight = empty weight + average payload weight
- maximum loaded weight = empty weight + maximum payload weight
- external width of trailer (no width data available on single unit trucks)
- overall length
- annual vehicle miles of travel (VMT)
- base of operation = % of vehicles driven intrastate versus interstate
- range of operation = % of VMT used for different lengths of haul

In addition to the deletions discussed in Section 1.3, some data were excluded from the analyses based on the following criteria:

- if the empty (tare) weight, average loaded weight, or maximum loaded weight for a straight truck was reported to be 5,000 lbs. or less;

- if the empty (tare) weight for a straight truck was reported to be greater than 40,000 lbs;

- if the average loaded weight or maximum loaded weight for a straight truck was reported to be greater than 90,000 lbs;

- if the empty (tare) weight, average loaded weight, or maximum loaded weight for a tractor-trailer was reported to be 10,000 lbs. or less;

- if the empty (tare) weight for a tractor-trailer was reported to be greater than 45,000 lbs;

- if the average loaded weight or maximum loaded weight for a tractor-trailer was reported to be greater than 100,000 lbs;

- where no value of a given attribute was reported.

OPERATIONAL CHARACTERISTICS GRAPHS

Each page in Appendix C represents one cell in the matrix of 5 configuration types by 14 body types. On each page are 8 graphs, one for each of the 8 operational characteristics. In all of the graphs, the X-axis represents the different levels of the operational characteristic, while the Y-axis represents the percent of trucks or the cumulative percent of trucks at the different levels of X. However, the range of operation graph differs from the others because the Y-axis is in terms

of percent of total VMT for that configuration/body type. In other words, the Y-axis represents the percent of VMT expended on the various lengths of haul.

Further analysis was conducted on the distribution of average and maximum payload weights for each configuration/body type (see Appendix D). Because a vehicle's payload weight was not addressed on the TIUS survey, an estimate of a vehicle's payload was derived by subtracting the reported empty (tare) weight from the reported average loaded weight or maximum loaded weight. For these analyses, an exclusion was made where the empty (tare) weight was reported to be greater than the average loaded weight or maximum loaded weight.

8.2 Observations on Specific Truck Configurations and Body Types

The following rating scales are used in Section 8.3. The scales provide a means of generalization and comparison between the configuration/body type groups.

- Key words and their vehicle percentage indication
  - *most* (mostly) means more than 80% of the vehicles
  - *many* (mainly) means 61 to 80%
  - *half* means 41 to 60%
  - *some* means 20 to 40%
  - *few* (infrequently) means less than 20%

- Sample size
  - *very small*— less than 100
  - *small*—100 to 250
  - *good*—251 to 500
  - *large*—501 to 1000
  - *very large*—greater than 1000

- Weigh-out on average means operation at a loaded weight at or above the axle weight limit as shown on the average weight cumulative percentage chart.
  - 2-axle 6-tire truck axle weight limit was set at 32,000 pounds
  - 3-axle truck/tractor-trailer axle weight limit set at 46,000 pounds
  - 4-axle truck/tractor-trailer axle weight limit set at 68,000 pounds

- Never Weigh-out on maximum means operation of a vehicle at a loaded weight below the axle weight limit as shown on the maximum weight cumulative percentage chart.
  - 2-axle 6-tire truck axle weight limit was set at 32,000 pounds
  - 3-axle truck/tractor-trailer axle weight limit set at 46,000 pounds
  - 4-axle truck/tractor-trailer axle weight limit set at 68,000 pounds

- Base of Operation - uses the percentage definitions above and applies them to the percent of vehicles that have the following travel characteristics:

  - *mostly intra-state* travel; means 20% or less of the annual VMT is out-of-state
  - *mainly out-of-state* travel; means 60% to 80% of the annual VMT is out-of-state

- *mostly out-of-state* travel; means more than 80% of the annual VMT is out-of-state.

- Range of Operation - Percent of VMT used in different lengths of haul
  - *short haul* lengths mean 100 miles or less
  - *very long haul* lengths mean greater than 500 miles

- Width of Trailer (where applicable)
  - *narrow* means 96 inches
  - *wide* means 102 inches

- Annual VMT
  - *very small*—1 to 20,000 miles
  - *small*— 20,001 to 40,000 miles
  - *small medium*—40,001 to 60,000 miles
  - *high medium*—60,001 to 80,000 miles
  - *high*—greater than 80,000 miles

8.3 Review of Selected Truck Configurations/Body Types

The following section provides a summary of the operational demands and typical equipment use for selected truck configuration/body type combinations in the 1992 4-axles or less truck fleet as described in Section 8.1. As highlighted above, the summary for each combination is organized as follows:

- Sample size
- Weigh-Out on average
- Never Weigh-Out on maximum
- Base of Operation: intra-state or inter-state
- Range of operation: defined by VMT used in specific haul lengths
- Trailer width
- Annual VMT

8.3.1 Review of 2-Axle Straight Trucks - 1992

- (2-axle) Basic Platform [population = 486,145 or 17.5% of the 4-axles or less fleet]
  - very large (>1,000) sample
  - few (<20%) weigh-out on average
  - most (80-100%) never weigh-out on maximum
  - most (80-100%) operate mostly (80-100%) intra-state
  - most (80-100%) of VMT is used for short haul lengths (<100 miles)
  - Annual VMT — most (80-100%) have a very small annual VMT (<20,000 miles)

- (2-axle) Platform with Devices [pop = 162,663 or 5.9% of the 4-axles or less fleet]
  - very large (>1,000) sample
  - few (<20%) weigh-out on average
  - most (80-100%) never weigh-out on maximum
  - most (80-100%) operate mostly (80-100%) intra-state
  - most (80-100%) of VMT is used for short haul lengths (<100 miles)
  - Annual VMT — most (80-100%) have a very small annual VMT (<20,000 miles)

- (2-axle) Multi-Stop or Step Van [pop = 209,534 or 7.6% of the 4-axles or less fleet]
  - very large (>1,000) sample
  - few (<20%) weigh-out on average
  - most (80-100%) never weigh-out on maximum
  - most (80-100%) operate mostly (80-100%) intra-state
  - most (80-100%) of VMT is used for short haul lengths (<100 miles)
  - Annual VMT — many (60-80%) have a very small annual VMT (<20,000 miles)

- (2-axle) Insulated Refrigerated Van [pop = 52,174 or 1.9% of the 4-axles or less fleet]
  - large (501-1,000) sample
  - few (<20%) weigh-out on average
  - most (80-100%) never weigh-out on maximum
  - most (80-100%) operate mostly (80-100%) intra-state
  - most (80-100%) of VMT is used for short haul lengths (<100 miles)
  - Annual VMT — half (40-60%) have a very small annual VMT (<20,000 miles)

- (2-axle) Drop Frame Van [pop = 18,926 or 0.7% of the 4-axles or less fleet]
  - small (100-250) sample
  - few (<20%) weigh-out on average
  - most (80-100%) never weigh-out on maximum
  - most (80-100%) operate mostly (80-100%) intra-state
  - most (80-100%) of VMT is used for short haul lengths (<100 miles)
  - Annual VMT — many (60-80%) have a very small annual VMT (<20,000 miles)

- (2-axle) Basic Enclosed Van [pop = 243,471 or 8.8% of the 4-axles or less fleet]
  - very large (>1,000) sample
  - few (<20%) weigh-out on average
  - most (80-100%) never weigh-out on maximum
  - most (80-100%) operate mostly (80-100%) intra-state
  - many (60-80%) of VMT is used for short haul lengths (<100 miles)
  - Annual VMT — half (40-60%) have a very small annual VMT (<20,000 miles)

- (2-axle) Beverage Truck [pop = 38,162 or 1.4% of the 4-axles or less fleet]
  - good (251-550) sample
  - few (<20%) weigh-out on average
  - many (60-80%) never weigh-out on maximum
  - most (80-100%) operate mostly (80-100%) intra-state
  - most (80-100%) of VMT is used for short haul lengths (<100 miles)
  - Annual VMT — most (80-100%) have a very small annual VMT (<20,000 miles)

- (2-axle) Grain Bodies [pop = 145,769 or 5.3% of the 4-axles or less fleet]
  - very large (>1,000) sample
  - few (<20%) weigh-out on average
  - most (80-100%) never weigh-out on maximum
  - most (80-100%) operate mostly (80-100%) intra-state
  - most (80-100%) of VMT is used for short haul lengths (<100 miles)
  - Annual VMT — most (80-100%) have a very small annual VMT (<20,000 miles)

- (2-axle) Garbage Truck [pop = 20,778 or 0.7% of the 4-axles or less fleet]
  - good (251-550) sample
  - some (20-40%) weigh-out on average
  - many (60-80%) never weigh-out on maximum
  - most (80-100%) operate mostly (80-100%) intra-state
  - most (80-100%) of VMT is used for short haul lengths (<100 miles)
  - Annual VMT — many (60-80%) have a very small annual VMT (<20,000 miles)

- (2-axle) Dump Truck [pop = 202,114 or 7.3% of the 4-axles or less fleet]
  - very large (>1,000) sample
  - few (<20%) weigh-out on average
  - most (80-100%) never weigh-out on maximum
  - most (80-100%) operate mostly (80-100%) intra-state
  - most (80-100%) of VMT is used for short haul lengths (<100 miles)
  - Annual VMT — most (80-100%) have a very small annual VMT (<20,000 miles)

- (2-axle) Tank Truck for Liquids or Gases [pop = 93,445 or 3.4% of the 4-axles or less fleet]
  - very large (>1,000) sample
  - few (<20%) weigh-out on average
  - most (80-100%) never weigh-out on maximum
  - most (80-100%) operate mostly (80-100%) intra-state
  - most (80-100%) of VMT is used for short haul lengths (<100 miles)
  - Annual VMT — many (60-80%) have a very small annual VMT (<20,000 miles)

- (2-axle) Tank Truck for Dry Bulk [pop = 5,992 or 0.2% of the 4-axles or less fleet]
  - very small (<100) sample
  - few (<20%) weigh-out on average
  - many (60-80%) never weigh-out on maximum
  - most (80-100%) operate mostly (80-100%) intra-state
  - most (80-100%) of VMT is used for short haul lengths (<100 miles)
  - Annual VMT — many (60-80%) have a very small annual VMT (<20,000 miles)

8.3.2 Review of 3-Axle Straight Trucks - 1992

- (3-axle) Basic Platform [pop = 39,203 or 1.4% of the 4-axles or less fleet]
  - large (501-1,000) sample
  - few (<20%) weigh-out on average
  - half (40-60%) never weigh-out on maximum
  - most (80-100%) operate mostly (80-100%) intra-state
  - most (80-100%) of VMT is used for short haul lengths (<100 miles)
  - Annual VMT — many (60-80%) have a very small annual VMT (<20,000 miles)

- (3-axle) Platform with Devices [pop = 37,276 or 1.3% of the 4-axles or less fleet]
  - large (501-1,000) sample
  - some (20-40%) weigh-out on average
  - many (60-80%) never weigh-out on maximum
  - most (80-100%) operate mostly (80-100%) intra-state
  - most (80-100%) of VMT is used for short haul lengths (<100 miles)
  - Annual VMT — many (60-80%) have a very small annual VMT (<20,000 miles)

- (3-axle) Insulated Refrigerated Van [pop = 7,195 or 0.3% of the 4-axles or less fleet]
  - small (100-250) sample
  - few (<20%) weigh-out on average
  - many (60-80%) never weigh-out on maximum
  - many (60-80%) operate mostly (80-100%) intra-state
  - half (40-60%) of VMT is used for short haul lengths (<100 miles)
  - Annual VMT — half (40-60%) have a very small annual VMT (<20,000 miles)

- (3-axle) Basic Enclosed Van [pop = 9,542 or 0.3% of the 4-axles or less fleet]
  - small (100-250) sample
  - few (<20%) weigh-out on average
  - most (80-100%) never weigh-out on maximum
  - many (60-80%) operate mostly (80-100%) intra-state
  - many (60-80%) of VMT is used for short haul lengths (<100 miles)
  - Annual VMT — half (40-60%) have a very small annual VMT (<20,000 miles)

- (3-axle) Grain Bodies [pop = 63,975 or 2.3% of the 4-axles or less fleet]
  - very large (>1,000) sample
  - some (20-40%) weigh-out on average
  - half (40-60%) never weigh-out on maximum
  - most (80-100%) operate mostly (80-100%) intra-state
  - most (80-100%) of VMT is used for short haul lengths (<100 miles)
  - Annual VMT — most (80-100%) have a very small annual VMT (<20,000 miles)

- (3-axle) Garbage Truck [pop = 34,839 or 1.3% of the 4-axles or less fleet]
  - large (501-1,000) sample
  - many (60-80%) weigh-out on average
  - few (<20%) never weigh-out on maximum
  - most (80-100%) operate mostly (80-100%) intra-state
  - most (80-100%) of VMT is used for short haul lengths (<100 miles)
  - Annual VMT — most (80-100%) have a very small annual VMT (<20,000 miles)

- (3-axle) Dump Truck [pop = 108,947 or 3.9% of the 4-axles or less fleet]
  - very large (>1,000) sample
  - many (60-80%) weigh-out on average
  - some (20-40%) never weigh-out on maximum
  - most (80-100%) operate mostly (80-100%) intra-state
  - most (80-100%) of VMT is used for short haul lengths (<100 miles)
  - Annual VMT — many (60-80%) have a very small annual VMT (<20,000 miles)

- (3-axle) Tank Truck for Liquids or Gases [pop = 28,178 or 1.0% of the 4-axles or less fleet]
  - large (501-1,000) sample
  - some (40-60%) weigh-out on average
  - half (40-60%) never weigh-out on maximum
  - most (80-100%) operate mostly (80-100%) intra-state
  - most (80-100%) of VMT is used for short haul lengths (<100 miles)
  - Annual VMT — many (60-80%) have a very small annual VMT (<20,000 miles)

- (3-axle) Tank Truck for Dry Bulk [pop = 4,988 or 0.2% of the 4-axles or less fleet]
  - very small (<100) sample
  - few (<20%) weigh-out on average
  - half (40-60%) never weigh-out on maximum
  - most (80-100%) operate mostly (80-100%) intra-state
  - most (80-100%) of VMT is used for short haul lengths (<100 miles)
  - Annual VMT — many (60-80%) have a very small annual VMT (<20,000 miles)

- (3-axle) Concrete Mixer [pop = 36,324 or 0.2% of the 4-axles or less fleet]
  - large (501-1,000) sample
  - many (60-80%) weigh-out on average
  - few (<20%) never weigh-out on maximum
  - most (80-100%) operate mostly (80-100%) intra-state
  - most (80-100%) of VMT is used for short haul lengths (<100 miles)
  - Annual VMT — many (60-80%) have a very small annual VMT (<20,000 miles)

8.3.3 Review of 4-Axle Straight Trucks - 1992

- (4-axle) Basic Platform [pop = 1,059 or 0.04% of the 4-axles or less fleet]
  - very very small (<50) sample
  - few (<20%) weigh-out on average
  - most (80-100%) never weigh-out on maximum
  - most (80-100%) operate mostly (80-100%) intra-state
  - most (80-100%) of VMT is used for short haul lengths (<100 miles)
  - Annual VMT — most (80-100%) have a very small annual VMT (<20,000 miles)

- (4-axle) Platform with Devices [pop = 3,197 or 0.1% of the 4-axles or less fleet]
  - very small (<100) sample
  - few (<20%) weigh-out on average
  - many (60-80%) never weigh-out on maximum
  - many (60-80%) operate mostly (80-100%) intra-state
  - most (80-100%) of VMT is used for short haul lengths (<100 miles)
  - Annual VMT — half (40-60%) have a very small annual VMT (<20,000 miles)

- (4-axle) Grain Bodies [pop = 2,439 or 0.1% of the 4-axles or less fleet]
  - very small (<100) sample
  - few (<20%) weigh-out on average
  - most (80-100%) never weigh-out on maximum
  - most (80-100%) operate mostly (80-100%) intra-state
  - most (80-100%) of VMT is used for short haul lengths (<100 miles)
  - Annual VMT — most (80-100%) have a very small annual VMT (<20,000 miles)

- (4-axle) Garbage Truck [pop = 6,093 or 0.2% of the 4-axles or less fleet]
  - very small (<100) sample
  - some (20-40%) weigh-out on average
  - many (60-80%) never weigh-out on maximum
  - most (80-100%) operate mostly (80-100%) intra-state
  - most (80-100%) of VMT is used for short haul lengths (<100 miles)
  - Annual VMT — few (20%<) have a very small annual VMT (<20,000 miles), many (60-80%) have a small annual VMT (20,000 - 40,000 miles)

- (4-axle) Dump Truck [pop = 33,376 or 1.2% of the 4-axles or less fleet]
  - large (501-1,000) sample
  - some (20-40%) weigh-out on average
  - half (40-60%) never weigh-out on maximum
  - most (80-100%) operate mostly (80-100%) intra-state
  - most (80-100%) of VMT is used for short haul lengths (<100 miles)
  - Annual VMT —some (20-40%) have a very small annual VMT (<20,000 miles), some (20-40%) have a small annual VMT (20,000 - 40,000 miles)

- (4-axle) Concrete Mixer [pop = 19,489 or 0.7% of the 4-axles or less fleet]
  - good (251-550) sample
  - few (<20%) weigh-out on average
  - many (60-80%) never weigh-out on maximum
  - most (80-100%) operate mostly (80-100%) intra-state
  - most (80-100%) of VMT is used for short haul lengths (<100 miles)
  - Annual VMT — many (60-80%) have a very small annual VMT (<20,000 miles)

8.3.4 Review of 2-S1 Tractor-Trailers - 1992

- (2-S1) Low Boy Platform [pop = 2,915 or 0.1% of the 4-axles or less fleet]
  - very small (<100) sample
  - few (<20%) weigh-out on average
  - most (80-100%) never weigh-out on maximum
  - most (80-100%) operate mostly (80-100%) intra-state
  - half (40-60%) of VMT is used for short haul lengths (<100 miles), VMT is used infrequently (<20%) for very long haul lengths (>500 miles)
  - most (80-100%) are narrow (96 inches)
  - Annual VMT — most (80-100%) have a very small annual VMT (<20,000 miles)

- (2-S1) Basic Platform [pop = 3,906 or 0.1% of the 4-axles or less fleet]
  - small (100-250) sample
  - some (20-40%) weigh-out on average
  - many (60-80%) never weigh-out on maximum
  - most (80-100%) operate mostly (80-100%) intra-state
  - many (60-80%) of VMT is used for short haul lengths (<100 miles)
  - many (60-80%) are narrow (96 inches)
  - Annual VMT — half (40-60%) have a very small annual VMT (<20,000 miles), half (40-60%) have a small medium annual VMT (20,000 - 60,000 miles)

- (2-S1) Insulated Refrigerated Van [pop = 6,745 or 0.2% of the 4-axles or less fleet]
  - good (251-550) sample
  - some (20-40%) weigh-out on average
  - some (20-40%) never weigh-out on maximum
  - most (80-100%) operate mostly (80-100%) intra-state
  - many (60-80%) of VMT is used for short haul lengths (<100 miles)
  - many (60-80%) are narrow (96 inches)
  - Annual VMT — few (20%<) have a very small annual VMT (<20,000 miles), some (20-40%) have a small annual VMT (20,000 - 40,000 miles)

- (2-S1) Drop Frame Van [pop = 3,178 or 0.1% of the 4-axles or less fleet]
  - very small (<100) sample
  - few (<20%) weigh-out on average
  - half (40-60%) never weigh-out on maximum
  - most (80-100%) operate mostly (80-100%) intra-state
  - half (40-60%) of VMT is used for short haul lengths (<100 miles), VMT is used infrequently (<20%) for very long haul lengths (>500 miles)
  - many (60-80%) are narrow (96 inches)
  - Annual VMT — half (40-60%) have a very small annual VMT (<20,000 miles)

- (2-S1) Basic Enclosed Van [pop = 29,211 or 1.1% of the 4-axles or less fleet]
  - large (501-1,000) sample
  - few (<20%) weigh-out on average
  - many (60-80%) never weigh-out on maximum
  - most (80-100%) operate mostly (80-100%) intra-state
  - many (60-80%) of VMT is used for short haul lengths (<100 miles)
  - many (60-80%) are wide (102 inches)
  - Annual VMT — some (20-40%) have a very small annual VMT (<20,000 miles)

- (2-S1) Beverage Truck [pop = 14,469 or 0.5% of the 4-axles or less fleet]
  - good (251-550) sample
  - few (<20%) weigh-out on average
  - half (40-60%) never weigh-out on maximum
  - most (80-100%) operate mostly (80-100%) intra-state
  - most (80-100%) of VMT is used for short haul lengths (<100 miles)
  - most (80-100%) are narrow (96 inches)
  - Annual VMT — many (60-80%) have a very small annual VMT (<20,000 miles)

8.3.5 Review of 2-S2 Tractor-Trailers - 1992

- (2-S2) Low Boy Platform [pop = 9,019 or 0.3% of the 4-axles or less fleet]
  - good (251-550) sample
  - few (<20%) weigh-out on average
  - most (80-100%) never weigh-out on maximum
  - most (80-100%) operate mostly (80-100%) intra-state
  - half (40-60%) of VMT is used for short haul lengths (<100 miles), VMT is used some (20-40%) for very long haul lengths (>500 miles)
  - most (80-100%) are narrow (96 inches)
  - Annual VMT — many (60-80%) have a very small annual VMT (<20,000 miles)

- (2-S2) Basic Platform [pop = 15,707 or 0.6% of the 4-axles or less fleet]
  - good (251-550) sample
  - some (20-40%) weigh-out on average
  - many (60-80%) never weigh-out on maximum
  - many (60-80%) operate mostly (80-100%) intra-state
  - half (40-60%) of VMT is used for short haul lengths (<100 miles), VMT is used infrequently (<20%) for very long haul lengths (>500 miles)
  - most (80-100%) are narrow (96 inches)
  - Annual VMT — some (20-40%) have a very small annual VMT (<20,000 miles)

- (2-S2) Insulated Refrigerated Van [pop = 5,954 or 0.2% of the 4-axles or less fleet]
  - small (100-250) sample
  - some (20-40%) weigh-out on average
  - half (40-60%) never weigh-out on maximum
  - half (40-60%) operate mostly (80-100%) intra-state
  - some (20-40%) of VMT is used for short haul lengths (<100 miles), VMT is used some (20-40%) for very long haul lengths (>500 miles)
  - many (60-80%) are narrow (96 inches)
  - Annual VMT — few (20%<) have a very small annual VMT (<20,000 miles), some (20-40%) have a high annual VMT (>80,000 miles)

- (2-S2) Drop Frame Van [pop = 8,146 or 0.3% of the 4-axles or less fleet]
  - good (251-550) sample
  - few (<20%) weigh-out on average
  - most (80-100%) never weigh-out on maximum
  - half (40-60%) operate mostly (80-100%) intra-state
  - infrequently (<20%) of VMT is used for short haul lengths (<100 miles), VMT is used half (40-60%) for very long haul lengths (>500 miles)
  - many (60-80%) are narrow (96 inches)
  - Annual VMT — some (20-40%) have a very small annual VMT (<20,000 miles), some (20-40%) have a high annual VMT (>80,000 miles)

- (2-S2) Basic Enclosed Van [pop = 61,335 or 2.2% of the 4-axles or less fleet]
  - very large (>1,000) sample
  - few (<20%) weigh-out on average
  - most (80-100%) never weigh-out on maximum
  - many (60-80%) operate mostly (80-100%) intra-state
  - half (40-60%) of VMT is used for short haul lengths (<100 miles), VMT is used infrequently (<20%) for very long haul lengths (>500 miles)
  - half (40-60%) are narrow (96 inches), half (40-60%) are wide (102 inches)
  - Annual VMT — some (20-40%) have a very small annual VMT (<20,000 miles), few (<20%) have a high annual VMT (>80,000 miles)

- (2-S2) Beverage Truck [pop = 4,605 or 0.2% of the 4-axles or less fleet]
  - very small (<100) sample
  - few (<20%) weigh-out on average
  - most (80-100%) never weigh-out on maximum
  - most (80-100%) operate mostly (80-100%) intra-state
  - most (80-100%) of VMT is used for short haul lengths (<100 miles)
  - most (80-100%) are narrow (96 inches)
  - Annual VMT — many (60-80%) have a very small annual VMT (<20,000 miles)

- (2-S2) Dump Truck [pop = 5,538 or 0.2% of the 4-axles or less fleet]
  - small (100-250) sample
  - many (60-80%) weigh-out on average
  - some (20-40%) never weigh-out on maximum
  - most (80-100%) operate mostly (80-100%) intra-state
  - many (60-80%) of VMT is used for short haul lengths (<100 miles)
  - most (80-100%) are narrow (96 inches)
  - Annual VMT — some (20-40%) have a very small annual VMT (<20,000 miles), few (<20%) have a high annual VMT (>80,000 miles)

- (2-S2) Tank Truck for Liquids or Gases [pop = 3,434 or 0.1% of the 4-axles or less fleet]
  - small (100-250) sample
  - half (40-60%) weigh-out on average
  - some (20-40%) never weigh-out on maximum
  - many (60-80%) operate mostly (80-100%) intra-state
  - half (40-60%) of VMT is used for short haul lengths (<100 miles), VMT is used infrequently (<20%) for very long haul lengths (>500 miles)
  - most (80-100%) are narrow (96 inches)
  - Annual VMT — some (20-40%) have a very small annual VMT (<20,000 miles)

8.4 Summary of the Weight, Dimension and Operating Characteristics by Truck Configuration/Body Type

For the 1992 4-axles or less fleet, a brief synopsis of the operating characteristics for the various configuration/body type combinations previously described is provided in this and the following subsections. Tables 8.4-1 and 8.4-2 summarize the degree of heavy loaded operations. In general, most vehicles were not heavily loaded in terms of average weight and maximum weight. Only certain vehicle configuration/body types appeared to have a number of vehicles operating at the federal weight limits (e.g., 2-S2 Dump Truck, 3-axle Garbage Truck).

From the Base of Operation distribution data in Appendix C, Table 8.4-3 was generated to illustrate the degree of intra-state travel in the 1992 fleet by the configuration/body type combinations described in Section 8.3. Most of the configuration/body type combinations were used intra-state. Other observations include: the basic enclosed van was one of the few body types driven interstate for a small percent of the group's VMT; and the 2-S2 configuration/body types tended to do more interstate traveling than the other configurations.

Table 8.4-4 shows a summary of the percent of VMT driven on short hauls of 100 miles or less. Most of the VMT for the various configuration/body types was driven on short hauls. Some exceptions were several 2-S2 body types which traveled occasionally on long hauls of 500 miles or more.

Table 8.4-1 Thematic Matrix for Percent of Fleet that Weigh-Out Maximum Loaded Weight in 1992

Body Type	Vehicle Configuration				
	2-axle	3-axle	4-axle	2-S1	2-S2
Multi-Stop Van		*	*	*	*
Platform with Devices				*	*
Low Boy	*	*	*		
Basic Platform					
Insulated Refrigerated			*		
Drop Frame Van		*	*		
Basic Enclosed Van			*		
Beverage Truck		*	*		
Grain Body				*	*
Garbage Truck				*	*
Dump Truck				*	
Tank Truck, Liquids or Gas			*	*	
Tank Truck, Dry Bulk			*	*	*
Concrete Mixer	*			*	*

* Indicates very small sample size for the cell.

Table 8.4-2 Thematic Matrix for Percent of Fleet that Weigh-Out Average Loaded Weight in 1992

Body Type	Vehicle Configuration				
	2-axle	3-axle	4-axle	2-S1	2-S2
Multi-Stop Van		*	*	*	*
Platform with Devices				*	*
Low Boy	*	*	*		
Basic Platform					
Insulated Refrigerated			*		
Drop Frame Van		*	*		
Basic Enclosed Van			*		
Beverage Truck		*	*		
Grain Body				*	*
Garbage Truck				*	*
Dump Truck				*	
Tank Truck, Liquids or Gas			*	*	
Tank Truck, Dry Bulk			*	*	*
Concrete Mixer	*			*	*

* Indicates very small sample size for the cell.

Table 8.4-3 Thematic Matrix for Percent of Fleet that Mostly Travel Intra-State in 1992

Body Type	Vehicle Configuration				
	2-axle	3-axle	4-axle	2-S1	2-S2
Multi-Stop Van	●	*	*	*	*
Platform with Devices	●	●	◕	*	*
Low Boy	*	*	*	●	●
Basic Platform	●	●	●	●	◕
Insulated Refrigerated	●	◕	*	●	◔
Drop Frame Van	●	*	*	●	◔
Basic Enclosed Van	●	◕	*	◕	◕
Beverage Truck	●	*	*	●	●
Grain Bodies	●	●	●	*	*
Garbage Truck	●	●	●	*	*
Dump Truck	●	●	●	*	●
Tank Truck, Liquids or Gas	●	●	*	*	◕
Tank Truck, Dry Bulk	●	●	*	*	*
Concrete Mixer	*	●	●	*	*

* Indicates very small sample size for the cell.

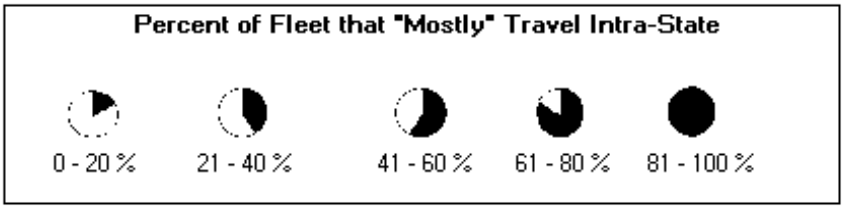
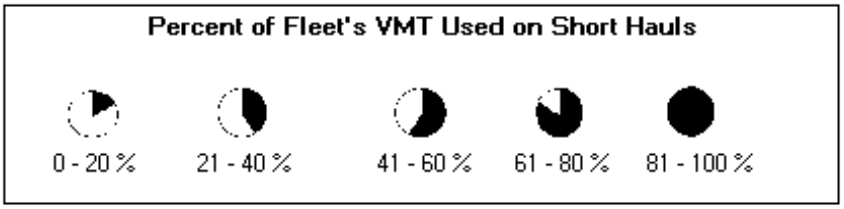


Table 8.4-4 Thematic Matrix for Percent of Fleet's VMT Driven on Short Hauls of 100 miles or less in 1992

Body Type	Vehicle Configuration				
	2-axle	3-axle	4-axle	2-S1	2-S2
Multi-Stop Van	●	*	*	*	*
Platform with Devices	●	●	●	*	*
Low Boy	*	*	*	◑	◑
Basic Platform	●	●	●	◕	◑
Insulated Refrigerated	●	◑	*	◕	◔
Drop Frame Van	●	*	*	◑	◔
Basic Enclosed Van	◕	◕	*	◕	◑
Beverage Truck	●	*	*	●	●
Grain Body	●	●	●	*	*
Garbage Truck	●	●	●	*	*
Dump Truck	●	●	●	*	◕
Tank Truck, Liquids or Gas	●	●	*	*	◔
Tank Truck, Dry Bulk	●	●	*	*	*
Concrete Mixer	*	●	●	*	*

* Indicates very small sample size for the cell.



8.5 Observations on Changes between 1987 and 1992 for Particular Truck Configurations and Body Types

8.5.1 Changes in Trailer Widths

Since the TIUS only provides information on the width of the trailer attached to the vehicle, width data only existed for the 2-S1 and 2-S2 configurations. For these two vehicle groups, a summary of the percent of vehicles with a reported width of 96" and 102" is provided in Table 8.5.1-1 with percentages rounded to the nearest 5%. Caution should be taken in comparing these data on 1992 and 1987, because the format of the width question varied on the two years' surveys. On the 1992 TIUS, the respondent selected one of four width categories, while on 1987 TIUS the respondent had to enter in the width of their vehicle. Atypical widths, such as 94" and 99", appeared in the 1987 database. For this analysis, the 1987 widths were placed into the four categories offered on the 1992 survey, and only exact entries of 96" and 102" were placed into the 96" and 102" categories, respectively.

8.5.2 Changes in Truck Weights

The following section provides a comparison between the mean truck weights for the two years. When interpreting whether the differences in weight between the two years is significant, the size of the sample analyzed and the distribution of vehicle weights need to be considered. This information is available from the graphs in Appendix C.

- MEAN TARE (EMPTY) WEIGHT

Table 8.5.2-1 provides a summary of the mean tare weights for 1992 and 1987. No significant changes were observed.

- MEAN "AVERAGE" LOADED WEIGHT (TARE + AVERAGE PAYLOAD)

Table 8.5.2-2 provides a summary of the mean average loaded weights for 1987 and 1992. Average loaded weight is the empty weight of the vehicle plus its average payload. The data show that the average weights of some 2-S1 body types were less in 1992 than in 1987.

- MEAN MAXIMUM LOADED WEIGHT (TARE + MAXIMUM PAYLOAD)

Table 8.5.2-3 provides a summary of the mean maximum loaded weights for 1987 and 1992. The data show that the maximum weight of some 2-S1s body types were lower in 1992 than in 1987.

- MEAN "AVERAGE" PAYLOAD WEIGHT

Table 8.5.2-4 summarizes the estimated mean average payload for the two years. The average payloads weighed less in 1992 than in 1987.

- MEAN “MAXIMUM” PAYLOAD WEIGHT

Table 8.5.2-5 summarizes the estimated mean maximum payload for the two years. The maximum payloads weighed less in 1992 than in 1987.

Table 8.5.1-1 Comparison of the Percentage of Truck Fleet with Trailer Widths of 96" and 102" for 1992 and 1987

Body Type	Vehicle Configuration			
	2-S1		2-S2	
	1992	1987	1992	1987
Multi-Stop Van	*	*	*	*
Platform with Devices	*	*	*	*
Low Boy	96" 90% 102" 5%	96" 65% 102" 5%	96" 90% 102" 10%	96" 75% 102" 5%
Basic Platform	96" 60% 102" 40%	96" 85% 102% 0%	96" 80% 102" 15%	96" 80% 102" 5%
Insulated Refrigerated	96" 90% 102" 10%	96" 90% 102" 5%	96" 70% 102" 30%	96" 80% 102" 15%
Drop Frame Van	96" 80% 102" 20%	96" 80% 102" 5%	96" 70% 102" 30%	96" 75% 102" 15%
Basic Enclosed Van	96" 40% 102" 60%	96" 55% 102" 35%	96" 55% 102" 45%	96" 70% 102" 25%
Beverage Truck	96" 90% 102" 5%	96" 70% 102" 0%	96" 95% 102" 5%	96" 65% 102" 0%
Grain Bodies	*	*	*	*
Garbage Truck	*	*	*	*
Dump Truck	*	*	96" 90% 102" 5%	96" 80% 102" 0%
Tank Truck, Liquids or Gas	*	*	96" 90% 102" 10%	96" 65% 102" 10%
Tank Truck, Dry Bulk	*	*	*	*
Concrete Mixer	*	*	*	*

* Indicates very small sample size for the cell.

Note: Values rounded to the nearest 5%. Total percentage for a year may not add to 100% because there were two additional categories in the survey question, > 102" or Other

Source: 1992 and 1987 Truck Inventory and Use Survey

Table 8.5.2-1 Comparison of Mean Empty Weights (in 1000s of pounds) for 1992 and 1987

Body Type	Vehicle Configuration									
	2-axle		3-axle		4-axle		2-S1		2-S2	
	1992	1987	1992	1987	1992	1987	1992	1987	1992	1987
Multi-Stop Van	7.76 -0.02	7.78	*	*	*	*	*	*	*	*
Platform with Devices	11.65 0.99	10.66	20.65 1.75	18.90	23.35 -1.13	24.48	*	*	*	*
Low Boy	*	*	*	*	*	*	18.73 0.13	18.60	21.37 1.11	20.26
Basic Platform	9.51 0.21	9.30	16.73 1.22	15.51	23.01 2.36	20.65	19.44 -0.24	19.68	21.51 -0.71	22.22
Insulated Refrigerated	13.56 0.40	13.16	19.94 0.67	19.27	*	*	21.36 -0.21	21.57	25.64 3.83	21.81
Drop Frame Van	11.35 -0.10	11.45	*	*	*	*	20.61 -1.03	21.64	24.98 0.18	24.80
Basic Enclosed Van	11.27 0.02	11.25	16.85 -0.73	17.58	*	*	18.49 0.11	18.38	22.77 1.25	21.52
Beverage Truck	13.86 0.53	13.33	*	*	*	*	19.33 -0.74	20.07	22.73 2.32	20.41
Grain Bodies	9.76 0.30	9.46	16.01 0.89	15.12	22.30 0.05	22.25	*	*	*	*
Garbage Truck	18.74 1.81	16.93	29.91 1.32	28.59	31.30 3.76	27.54	*	*	*	*
Dump Truck	10.98 0.74	10.24	20.99 0.71	20.28	25.29 0.80	24.49	*	*	26.33 2.92	23.41
Tank Truck, Liquids or Gas	13.60 1.23	12.37	21.05 1.21	19.84	*	*	*	*	25.23 1.00	24.23
Tank Truck, Dry Bulk	12.73 1.97	10.76	19.07 -1.20	20.27	*	*	*	*	*	*
Concrete Mixer	*	*	25.67 1.47	24.20	28.60 0.89	27.71	*	*	*	*

Note: The change in weight from 1987 to 1992 is listed below each 1992 entry.
* Indicates very small sample size for the cell.

Source: 1992 and 1987 Truck Inventory and Use Survey

Table 8.5.2-2 Comparison of Mean Average Loaded Weight (in 1000s of pounds) for 1992 and 1987

Body Type	Vehicle Configuration									
	2-axle		3-axle		4-axle		2-S1		2-S2	
	1992	1987	1992	1987	1992	1987	1992	1987	1992	1987
Multi-Stop Van	10.06 -0.35	10.41	*	*	*	*	*	*	*	*
Platform with Devices	18.08 -0.20	18.28	39.70 0.61	39.09	50.39 -2.78	53.17	*	*	*	*
Low Boy	*	*	*	*	*	*	34.92 -4.97	39.89	43.09 -0.92	44.01
Basic Platform	14.73 -1.01	15.74	34.69 -1.24	35.93	51.15 -3.16	54.31	39.58 -4.54	44.12	47.61 -3.20	50.81
Insulated Refrigerated	20.47 -0.92	21.39	35.17 0.60	34.57	*	*	41.53 -0.37	41.90	56.61 0.25	56.36
Drop Frame Van	17.25 -0.80	18.05	*	*	*	*	39.94 1.93	38.01	44.01 -1.01	45.02
Basic Enclosed Van	16.68 -0.42	17.10	29.79 -4.33	34.12	*	*	34.17 -5.23	39.40	47.07 -0.56	47.63
Beverage Truck	24.59 -0.47	25.06	*	*	*	*	38.33 -1.29	39.62	43.66 0.86	42.80
Grain Bodies	22.77 0.77	22.00	40.67 2.42	38.25	52.31 -4.87	57.18	*	*	*	*
Garbage Truck	27.59 1.04	26.55	47.75 -0.13	47.88	55.45 6.00	49.45	*	*	*	*
Dump Truck	19.59 0.06	19.53	47.81 0.39	47.42	60.53 -2.45	62.98	*	*	64.49 -0.16	64.65
Tank Truck, Liquids or Gas	23.94 1.32	22.62	40.75 -1.25	42.00	*	*	*	*	62.45 -0.74	63.19
Tank Truck, Dry Bulk	26.47 3.71	22.76	37.44 -1.65	39.09	*	*	*	*	*	*
Concrete Mixer	*	*	52.89 1.33	51.56	59.85 -2.39	62.24	*	*	*	*

Note: The change in weight from 1987 to 1992 is listed below each 1992 entry.
* Indicates very small sample size for the cell.

Source: 1992 and 1987 Truck Inventory and Use Survey

Table 8.5.2-3 Comparison of Mean Maximum Loaded Weight (in 1000s of pounds) for 1992 and 1987

Body Type	Vehicle Configuration									
	2-axle		3-axle		4-axle		2-S1		2-S2	
	1992	1987	1992	1987	1992	1987	1992	1987	1992	1987
Multi-Stop Van	11.50 -0.60	12.10	*	*	*	*	*	*	*	*
Platform with Devices	20.63 -0.27	20.90	45.32 1.47	43.85	54.75 -8.98	63.73	*	*	*	*
Low Boy	*	*	*	*	*	*	37.10 -8.25	45.35	49.26 -0.05	49.31
Basic Platform	17.29 -1.30	18.59	41.43 0.16	41.27	57.59 -0.61	58.20	43.37 -8.14	51.51	55.60 -4.11	59.71
Insulated Refrigerated	23.95 -0.32	24.27	41.94 1.79	40.15	*	*	50.41 3.84	46.57	64.54 1.10	63.44
Drop Frame Van	19.64 -0.93	20.57	*	*	*	*	44.87 -0.18	45.05	52.29 -0.82	53.11
Basic Enclosed Van	19.79 -0.86	20.65	35.78 -3.82	39.60	*	*	44.49 -5.16	49.65	56.18 -2.06	58.24
Beverage Truck	28.53 0.31	28.22	*	*	*	*	45.34 -0.38	45.72	48.60 -0.31	48.91
Grain Bodies	24.70 0.11	24.59	44.73 2.05	42.68	57.97 -1.21	59.18	*	*	*	*
Garbage Truck	29.68 0.65	29.03	53.45 0.46	52.99	60.09 -1.78	61.87	*	*	*	*
Dump Truck	22.26 0.03	22.23	52.36 0.19	52.17	66.90 0.22	66.68	*	*	70.99 3.96	67.03
Tank Truck, Liquids or Gas	27.40 2.38	25.02	47.39 0.07	47.32	*	*	*	*	69.79 0.58	69.21
Tank Truck, Dry Bulk	28.67 2.33	26.34	45.29 -1.14	46.43	*	*	*	*	*	*
Concrete Mixer	*	*	58.75 1.25	57.50	66.28 -0.47	66.75	*	*	*	*

Note: The change in weight from 1987 to 1992 is listed below each 1992 entry.

* Indicates very small sample size for the cell.

Source: 1992 and 1987 Truck Inventory and Use Survey

Table 8.5.2-4 Comparison of Mean Average Payload Weight (in 1000s of pounds) for 1992 and 1987

Body Type	Vehicle Configuration									
	2-axle		3-axle		4-axle		2-S1		2-S2	
	1992	1987	1992	1987	1992	1987	1992	1987	1992	1987
Multi-Stop Van	2.74 -0.55	3.29	*	*	*	*	*	*	*	*
Platform with Devices	7.54 -1.13	8.67	19.12 -1.51	20.63	26.04 -5.33	31.37	*	*	*	*
Low Boy	*	*	*	*	*	*	18.06 -4.42	22.48	21.90 -2.65	24.55
Basic Platform	6.08 -1.98	8.06	18.65 -2.45	21.10	30.74 -2.06	32.80	20.67 -6.44	27.11	26.39 -3.68	30.07
Insulated Refrigerated	7.29 -1.48	8.77	15.51 -0.16	15.67	*	*	19.88 -0.05	19.93	30.22 -5.18	35.40
Drop Frame Van	5.52 -1.43	6.95	*	*	*	*	19.52 3.93	15.59	19.31 -1.70	21.01
Basic Enclosed Van	6.01 -1.18	7.19	14.20 -2.91	17.11	*	*	15.92 -5.15	21.07	24.09 -2.79	26.88
Beverage Truck	10.89 -1.17	12.06	*	*	*	*	19.29 -0.05	19.34	24.49 2.51	21.98
Grain Bodies	13.29 0.04	13.25	24.78 -0.38	25.16	30.02 -4.91	34.93	*	*	*	*
Garbage Truck	8.66 -1.54	10.20	17.58 -1.53	19.11	22.32 -3.47	25.79	*	*	*	*
Dump Truck	9.09 -1.21	10.30	27.10 -0.98	28.08	35.99 -3.49	39.48	*	*	38.89 -3.90	42.79
Tank Truck, Liquids or Gas	10.59 -0.40	10.99	20.40 -1.95	22.35	*	*	*	*	37.11 -1.99	39.10
Tank Truck, Dry Bulk	13.24 1.70	11.54	17.92 -2.03	19.95	*	*	*	*	*	*
Concrete Mixer	*	*	26.84 -0.72	27.56	31.25 -3.15	34.40	*	*	*	*

Note: The change in weight from 1987 to 1992 is listed below each 1992 entry.

* Indicates very small sample size for the cell.

Source: 1992 and 1987 Truck Inventory and Use Survey

Table 8.5.2-5 Comparison of Mean Maximum Payload Weight (in 1000s of pounds) for 1992 and 1987

Body Type	Vehicle Configuration									
	2-axle		3-axle		4-axle		2-S1		2-S2	
	1992	1987	1992	1987	1992	1987	1992	1987	1992	1987
Multi-Stop Van	4.29 -0.71	5.00	*	*	*	*	*	*	*	*
Platform with Devices	10.03 -1.13	11.16	24.60 -0.58	25.18	30.80 -8.15	38.95	*	*	*	*
Low Boy	*	*	*	*	*	*	19.98 -7.38	27.36	28.45 -2.12	30.57
Basic Platform	8.80 -2.13	10.93	24.81 -1.11	25.92	35.23 -2.13	37.36	24.26 -11.87	36.13	34.17 -4.84	39.01
Insulated Refrigerated	11.02 -0.65	11.67	22.38 1.00	21.38	*	*	28.88 3.76	25.12	39.13 -2.18	41.31
Drop Frame Van	8.67 -1.44	10.11	*	*	*	*	21.37 -2.95	24.32	27.91 -0.96	28.87
Basic Enclosed Van	9.23 -1.26	10.49	19.67 -2.68	22.35	*	*	26.52 -4.83	31.35	33.78 -3.55	37.33
Beverage Truck	14.85 -0.56	15.41	*	*	*	*	26.61 0.85	25.76	30.20 1.65	28.55
Grain Bodies	15.21 -0.18	15.39	28.67 0.76	27.91	35.14 -1.79	36.93	*	*	*	*
Garbage Truck	10.92 -1.58	12.50	23.25 -0.73	23.98	26.71 -4.11	30.82	*	*	*	*
Dump Truck	11.87 -1.10	12.97	31.29 -0.64	31.93	41.91 -0.91	42.82	*	*	44.87 -0.01	44.88
Tank Truck, Liquids or Gas	13.83 0.47	13.36	26.33 -1.14	27.47	*	*	*	*	44.70 -0.65	45.35
Tank Truck, Dry Bulk	15.95 0.44	15.51	26.03 -0.12	26.15	*	*	*	*	*	*
Concrete Mixer	*	*	33.14 -0.18	33.32	37.68 -1.22	38.90	*	*	*	*

Note: The change in weight from 1987 to 1992 is listed below each 1992 entry.

* Indicates very small sample size for the cell.

Source: 1992 and 1987 Truck Inventory and Use Survey

9.0 Analysis of Vehicle Miles of Travel of the 4-Axles or Less Truck Fleet

On the TIUS, respondents provided the annual vehicle miles of travel (VMT) for their truck (1992 TIUS Survey Question 15, 1987 TIUS Survey Question 15). This section provides a comparison of the mean VMT for 4-axles or less trucks. Total VMT is not discussed, but an estimate of total VMT can be derived by multiplying the mean VMT by the number of vehicles.

9.1 Analysis Structure

The VMT analysis evaluated the differences in mean annual VMT between the vehicle groups and the various body types, and between the years.

- 7 vehicle groups (See Section 2.2)
- 26 body type groups (See Section 4.0)

9.2 Mean Annual VMT by Truck Configuration

A comparison in the 1992 and 1987 mean annual VMTs for each of the 7 vehicle groups is graphically presented in Figure 9.2-1. More detailed information on the mean VMTs for the 7 vehicle groups, the 26 body types, and various vehicle group/body type combinations is summarized for 1992 in Table 9.2-1 and for 1987 in Table 9.2-3. Caution should be used in interpreting these data because of the small samples analyzed for given cases. Tables 9.2-2 and 9.2-4 summarize the number of sample records used to generate the different cell means in Tables 9.2-1 and 9.2-3.

NATIONWIDE - 1992

- The mean annual VMT for a vehicle in the 4-axles or less fleet was 14,300 miles per truck.
- In the 1992 fleet, the vehicle groups with the largest mean annual VMT were 2-S2s (42,500 miles/truck) and 3-S1s (36,600 miles/truck).
- Vehicles with the smallest mean annual VMT were 2-axle straight trucks and 2-axle truck pulling 2-axle trailer which had mean annual VMTs less than 12,000 miles/truck.
- 3-axle straight trucks had a mean annual VMT of 14,000 miles.
- The mean annual VMT for the 4-axle straight trucks was 24,400 miles, and the mean annual VMT for the 2-S1 was 26,000 miles.

CHANGES BETWEEN 1987 AND 1992

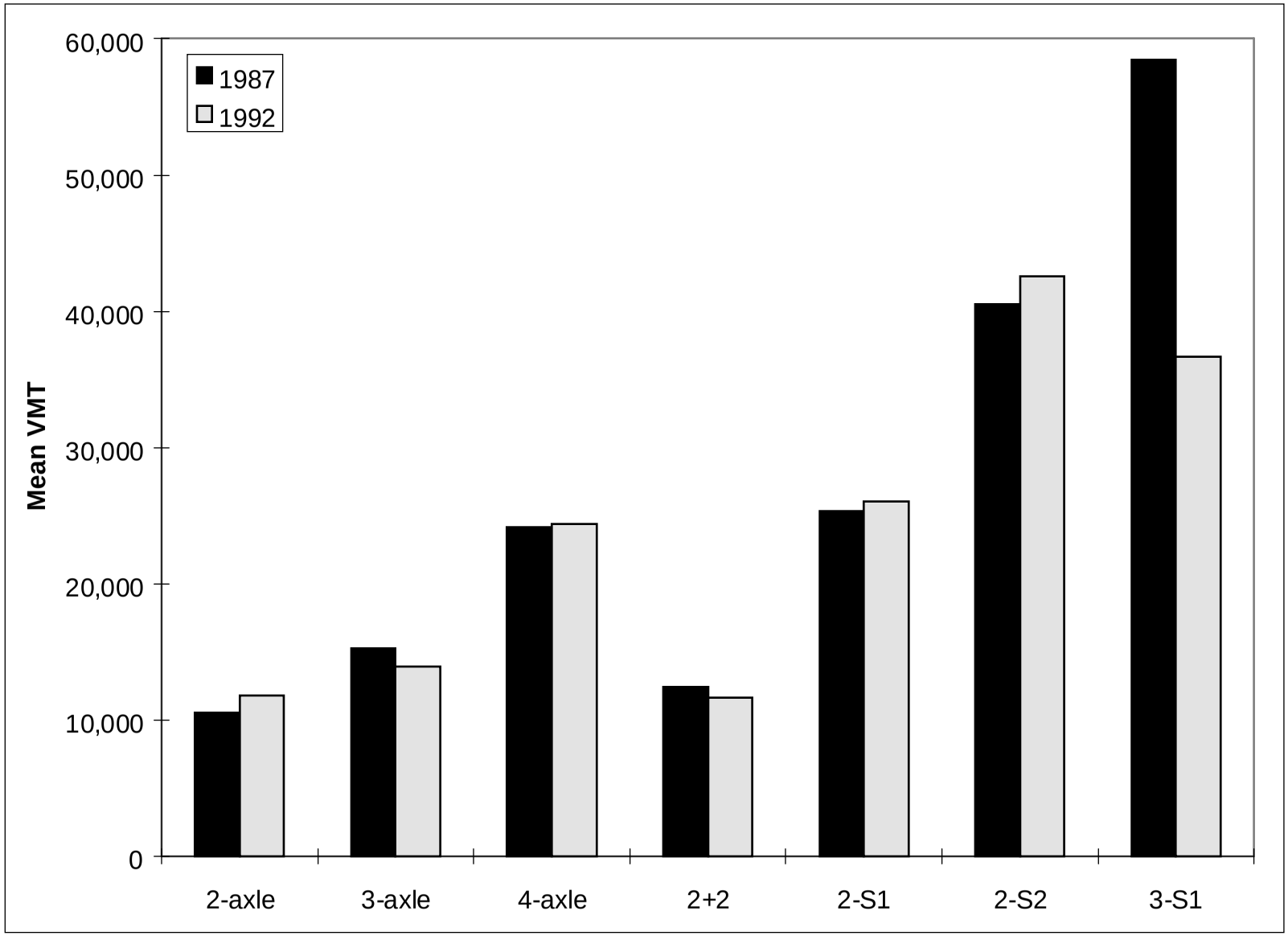
- The mean annual VMT for the fleet remained relatively constant across the years. The mean annual VMT for 2-S2 increased, while the mean annual VMT for 3-S1 decreased.

9.3 Annual VMT by Truck Configuration by Body Type

NATIONWIDE - 1992

- The insulated non-refrigerated vans and insulated refrigerated vans for the 2-axle, 3-axle, 2-S1, and 2-S2 vehicle groups had high mean annual VMTs in comparison to their vehicle group annual VMT mean.

Figure 9.2-1 Comparison of Mean Annual VMT



Source: 1992 and 1987 Truck Inventory and Use Survey

Table 9.2-1 Mean Annual VMT for Body Type, by Vehicle Group for 1992

Body Type	2-axle	3-axle	4-axle	2+2	2-S1	2-S2	3-S1	Total Mean
Van	18,625	-	-	-	-	-	-	18,625
Multi-Stop or Step Van	16,018	20,052	-	21,124	-	122,637	-	16,174
Platform with Devices	8,810	12,608	21,352	11,088	32,604	33,345	20,513	9,980
Low Boy Platform	9,938	21,519	61,666	10,926	12,816	19,964	15,011	15,608
Basic Platform	9,329	11,072	10,677	12,244	23,887	36,716	27,463	10,506
Livestock Truck	7,467	17,913	12,388	13,074	25,489	36,919	34,661	11,285
Insulated Non-Refrigerated Van	21,496	76,803	12,000	15,000	49,659	59,064	4,420	31,463
Insulated Refrigerated Van	23,546	30,413	39,103	45,601	41,714	65,851	43,355	29,612
Drop Frame Van	15,950	38,439	50,000	31,896	26,296	54,113	47,854	27,650
Open Top Van	11,470	6,173	7,313	38,474	6,040	51,617	15,984	12,934
Basic Enclosed Van	19,898	23,194	27,246	17,307	29,487	47,870	55,572	25,918
Beverage Truck	13,584	22,829	-	18,086	17,086	15,401	19,473	14,788
Utility Truck	10,023	5,541	17,630	9,953	14,400	-	33,743	9,812
Winch/Crane Truck	8,035	15,173	15,280	4,141	18,723	13,834	15,396	10,946
Wrecker	16,588	10,996	13,716	10,997	-	5,851	-	16,182
Pole, Logging Truck	8,597	9,326	20,758	14,681	17,791	40,715	24,767	13,836
Auto Transport	30,805	29,107	-	24,332	26,682	39,636	80,106	32,877
Service Truck	13,892	10,667	18,208	12,546	-	1,000	-	13,789
Yard Tractor	2,822	3,065	-	-	4,888	5,153	12,500	5,145
Oilfield Truck	15,593	11,828	2,692	16,534	2,248	20,762	-	14,329
Grain Bodies	2,711	4,673	11,119	9,448	4,101	25,828	31,997	3,706
Garbage Truck	13,217	23,338	28,795	-	-	-	-	20,469
Dump Truck	6,684	16,385	30,028	8,361	52,956	45,281	25,504	12,273
Tank Truck for Liquids or Gases	12,025	15,352	45,701	13,637	23,161	45,257	13,626	14,416
Tank Truck for Dry Bulk	16,991	11,567	30,481	-	-	81,213	66,649	16,829
Concrete Mixer	7,169	13,167	14,926	51,548	-	50,000	-	13,790
Other	24,137	11,102	7,847	29,591	9,112	28,793	9,484	23,035
Total	11,811	13,926	24,396	11,621	26,046	42,538	36,640	14,306

Note: Empty cells indicate that there were no vehicles in TIUS with that body type/configuration.

Source: 1992 and 1987 Truck Inventory and Use Survey

Table 9.2-2 Sample Sizes for Body Type by Vehicle Group for 1992

Body Type	2-axle	3-axle	4-axle	2+2	2-S1	2-S2	3-S1	Total
Van	11	-	-	-	-	-	-	11
Multi-Stop or Step Van	1398	5	-	5		3	-	1,411
Platform with Devices	1512	923	78	65	23	32	5	2,638
Low Boy Platform	21	10	1	71	79	261	29	472
Basic Platform	3964	865	47	361	108	472	47	5,864
Livestock Truck	167	31	2	21	13	58	4	296
Insulated Non-Refrigerated Van	79	20	1	1	16	22	2	141
Insulated Refrigerated Van	513	143	2	9	284	220	20	1,191
Drop Frame Van	187	2	1	6	65	309	13	583
Open Top Van	41	93	4	4	1	20	2	165
Basic Enclosed Van	2245	181	5	76	756	1873	108	5,244
Beverage Truck	338	24	-	12	440	98	23	935
Utility Truck	645	110	2	76	1	-	1	834
Winch/Crane Truck	246	397	63	12	2	7	4	731
Wrecker	684	172	2	3	-	2	-	863
Pole, Logging Truck	83	121	110	12	8	57	6	397
Auto Transport	32	4	-	2	3	15	1	57
Service Truck	616	52	1	22	-	1	-	692
Yard Tractor	4	2	-	-	12	94	1	113
Oilfield Truck	120	186	2	9	2	11	-	330
Grain Bodies	1357	1131	76	20	42	82	17	2,725
Garbage Truck	274	704	79	-	-	-	-	1,057
Dump Truck	2255	3397	779	265	6	156	9	6,867
Tank Truck for Liquids or Gases	1138	879	56	19	15	158	20	2,285
Tank Truck for Dry Bulk	55	95	13	-	-	7	5	175
Concrete Mixer	27	850	434	2	-	1	-	1,314
Other	63	52	2	5	5	52	1	180
Total	18,075	10,449	1,760	1,078	1,881	4,011	318	37,571

Source: 1992 and 1987 Truck Inventory and Use Survey

Table 9.2-3 Mean Annual VMT for Body Type, by Vehicle Group for 1987

Body Type	2-axle	3-axle	4-axle	2+2	2-S1	2-S2	3-S1	Total Mean
Multi-Stop or Step Van	16,229	15,534	25,000	17,375	76,617	62,991	50,833	16,492
Platform with Devices	7,840	12,423	26,287	9,507	14,588	22,541	11,153	9,135
Low Boy Platform	12,744	18,656	35,093	14,364	6,919	13,739	29,614	14,746
Basic Platform	8,051	10,358	21,354	12,182	26,658	34,722	42,876	9,683
Livestock Truck	6,314	7,709	33,000	8,684	8,085	31,694	75,343	8,514
Insulated Non-Refrigerated Van	19,922	20,499	-	8,000	37,301	42,776	60,714	24,798
Insulated Refrigerated Van	21,219	32,657	18,386	20,423	34,549	51,805	76,283	26,431
Drop Frame Van	16,171	17,990	10,052	27,808	39,179	46,047	51,527	28,687
Open Top Van	5,637	7,756	50,000	120	17,814	28,059	71,982	9,812
Basic Enclosed Van	19,291	25,246	21,000	30,338	33,652	48,959	86,425	27,753
Beverage Truck	12,021	18,371	6,579	10,736	17,181	23,318	24,977	13,477
Utility Truck	9,250	5,050	29,369	6,937	11,570	30,460	2,913	8,992
Winch/Crane Truck	9,095	18,687	9,601	18,585	11,031	7,112	3,539	12,448
Wrecker	12,522	11,404	8,459	16,916	12,507	8,681	14,864	12,501
Pole, Logging Truck	7,008	11,905	26,053	19,203	31,462	45,280	49,211	15,435
Auto Transport	13,819	6,709	-	56,607	28,492	54,149	43,344	28,803
Service Truck	13,615	10,362	22,423	21,693	5,000	8,000	-	13,677
Yard Tractor	9,350	500	100	2,936	5,941	4,154	2,076	4,648
Oilfield Truck	9,418	13,058	20,454	10,724	4,128	18,263	4,825	10,712
Grain Bodies	2,546	5,116	13,340	11,460	6,818	24,413	28,574	3,515
Garbage Truck	13,881	24,325	32,130	-	22,632	20,226	-	20,363
Dump Truck	6,297	18,725	29,338	9,561	56,368	40,710	46,258	12,334
Tank Truck for Liquids or Gases	11,135	17,945	53,300	59,861	21,150	45,704	68,740	14,241
Tank Truck for Dry Bulk	8,166	18,480	28,568	3,758	11,049	41,981	25,424	12,761
Concrete Mixer	8,883	13,878	14,244	-	-	-	-	13,823
Other	23,133	16,535	4,500	17,924	20,082	38,435	15,759	21,232
Total	10,553	15,208	24,126	12,398	25,281	40,501	58,463	13,965

Source: 1992 and 1987 Truck Inventory and Use Survey

Table 9.2-4 Sample Sizes for Body Type by Vehicle Group for 1987

Body Type	2-axle	3-axle	4-axle	2+2	2-S1	2-S2	3-S1	Total
Multi-Stop or Step Van	1261	17	1	11	11	10	6	1,317
Platform with Devices	1596	675	68	48	19	36	10	2,452
Low Boy Platform	31	17	4	72	84	284	76	568
Basic Platform	5706	1066	66	293	132	591	152	8,006
Livestock Truck	308	36	1	26	17	49	10	447
Insulated Non-Refrigerated Van	122	16	-	1	16	29	9	193
Insulated Refrigerated Van	581	119	5	3	93	135	35	971
Drop Frame Van	208	6	1	3	140	299	16	673
Open Top Van	65	82	1	1	5	21	6	181
Basic Enclosed Van	2284	147	1	26	752	1505	216	4,931
Beverage Truck	512	8	4	4	234	42	16	820
Utility Truck	587	48	2	51	3	2	2	693
Winch/Crane Truck	284	241	24	11	2	6	4	572
Wrecker	576	121	4	7	2	5	2	717
Pole, Logging Truck	106	140	58	13	12	53	49	431
Auto Transport	36	3	-	2	5	26	6	78
Service Truck	448	45	2	9	1	1	-	506
Yard Tractor	11	1	1	4	11	64	5	97
Oilfield Truck	121	129	11	6	3	8	5	283
Grain Bodies	1563	795	51	7	18	63	16	2,513
Garbage Truck	311	436	12	2		2		763
Dump Truck	2448	2708	500	177	20	118	50	6,021
Tank Truck for Liquids or Gases	1354	547	27	11	32	87	47	2,105
Tank Truck for Dry Bulk	67	78	8	1	2	10	8	174
Concrete Mixer	32	703	206	-	-	-	-	941
Other	48	17	1	11	12	59	2	150
Total	20,666	8,201	1,059	800	1,626	3,505	748	36,603

Source: 1992 and 1987 Truck Inventory and Use Survey

Appendix A

Regional Distributions of the 4-Axles or Less Truck Fleet

Appendix B

Body Type Analysis
By the 5 Regions for
the 4-Axles or Less Truck Fleet

Appendix C

Weights, Dimensions, and Operating Characteristics Plots and Means for the 4-Axles or Less Truck Fleet

Appendix D

Average Payload Weights and Maximum Payload Weights for the 4-Axles or Less Truck Fleet

Appendix E

Data Analysis Methodology

Creating External Subset Databases

Because the original TIUS data sets contained vehicles that were not of interest to this study, new databases containing a subset of the original TIUS data sets were created for analysis. For each year, two databases were created: one, which contained the *total fleet* of large commercial trucks as defined in the report, and another which contained only the *4-axles or less truck fleet*.

Total Fleet Database

The total fleet database was a subset of the original TIUS data set; however, it excluded vehicles with 2-axles and 4-tires (i.e., TIUS variable NAXLE=1), or vehicles with the following body types: pickup (BODTYP=1), sport utility (BODTYP=24), station wagon (BODTYP=25), and mini-van (BODTYP=26). Straight trucks pulling a 1-axle utility trailer or 1-axle trailer were excluded (AXLRE=8 or 11 in 1992 TIUS).

In distributing the total truck fleet into various configuration classes, the TIUS axle recode variable, AXLRE, was used to determine the configuration class a vehicle should be assigned to (see Table E.1). The AXLRE variable was a variable created by the Bureau of the Census, based on survey data, to identify the configuration in which a vehicle travels most often in.

Table E.1. Configuration Classes and their Associated AXLRE Levels

Configuration	AXLRE Code 1992	AXLRE Code 1987
Truck		
2-axle	02	01
3-axle	03	02
4-axle	04	03
Truck + Trailer		
2+2	09, 20	4, 47, 53
2+*3	10, 21	5, 8, 48, 54
3+2	12, 23	6, 50, 56
3+*3	13, 24, 25	7, 9, 51, 57
***4+2**	15, 26	10, 59
***4+*3**	16, 27, 28	11, 12, 60
Tractor - Semitrailer		
2-S1	32	13
2-S2	33	14
2-*S3	34	18
3-S1	35	15
3-S2	36	16
3-*S3	37	19
4-S1	38	17
4-S2	39	20
4-*S3	40	21
Tractor - Doubles		
2-S1-2	45	22
3-S1-2	49	24
2-S2-2	46	23

Configuration	AXLRE Code 1992	AXLRE Code 1987
3-S2-2	50	27
Other @ *7-axle	47, 53	25, 26, 30
3-2S-3	51	28
Other @ *8-axle	48, 54	26, 28, 31
3-S2-4	52	29
Other @ *9-axle	55	32
Other @ *10-axle	56	33
Tractor - Triples		
2-S1-2-2	61	34
3-S1-2-2	65	38
Other	62-64, 66-72	35-37, 39-45

Notes: Configuration names: The first number indicates the number of axles on the straight truck or tractor truck. The second number indicates the number of axles on first trailer, while the third and fourth numbers represent number of axles on second and third trailers respectively.

The * next to a number indicates that the number of axles is equal to or greater than this number (e.g., *4+2 is the group for 4-axles or more straight trucks pulling one trailer with 2 axles.)

4-Axles or Less Fleet Database

The 4-axles or less fleet database was a subset of the total fleet data set; however, it excluded vehicles whose total number of axles were greater than four. Also, any vehicle whose principal product was recorded to be “passenger transportation”, “personal transportation”, or “not in use” was excluded, as well as, any vehicles which were reported on survey Form 9501 for small trucks. While creating this database, a new variable, VEHGRP, was added to the variable list. VEHGRP defines the vehicle group that a registered vehicle belongs in. Seven vehicle groups were defined: (1) 2-axle straight truck, (2) 3-axle straight truck, (3) 4-axle straight truck, (4) 2-axle straight truck pulling a 2-axle trailer (i.e. 2+2), (5) 2-S1 tractor-semitrailer, (6) 2-S2 tractor-semitrailer, and (7) 3-S1 tractor-semitrailer.

Table. Vehicle Groups and their Associated AXLRE

Vehicle Groups	AXLRE Code 1992	AXLRE Code 1987
2-Axle Straight Truck	2	1
3-Axle Straight Truck	3	2
4-Axle Straight Truck	4	3
2+2	9, 20	4, 47, 53
2-S1	32	13
2-S2	33	14
3-S1	35	15

TIUS Variables of Interest

Vehicle Body Type

Each surveyed truck identified the body type that they traveled *most often* in. This is question 9 on the 1992 TIUS survey Form 9502 and question 8 on the 1987 TIUS survey Form 9502. There were 27 body types to choose from.

Code #		Body Type Description
02	-	van other than mini-van
03	-	multi-stop or step van (including hi-cube or cutaway)
04	-	platform with devices permanently mounted on bed of truck
05	-	low boy (goose neck)—platform with depressed center
06	-	basic platform—including flatbed, stake, etc.
07	-	livestock truck (including livestock drop frame)
08	-	insulated, non-refrigerated van
09	-	insulated, refrigerated van
10	-	drop frame van (including furniture van, etc.)
11	-	open top van (including fruit)
12	-	basic enclosed van (dry cargo)
13	-	beverage truck
14	-	utility truck—used in public utility operations
15	-	winch or crane truck—lifting equipment (including roll-on, roll-off)
16	-	wrecker—for motor vehicle towing or lifting
17	-	pole, logging, pulpwood or pipe truck
18	-	automobile transport
22	-	service truck or craftsman's vehicle
23	-	yard tractor—cab and chassis only used to spot trailers
27	-	oilfield truck—service equipment permanently mounted on vehicle
29	-	grain bodies (including low-side grain and hoppers, etc.)
30	-	garbage truck
40	-	dump truck (including belly or bottom dump)
50	-	tank truck for liquids or gases
60	-	tank truck for dry bulk
70	-	concrete mixer
80	-	other (trucks whose body type was not one of the previous types)

Traffic Regions and Their Associated FIPST States

Because the number of records for the various configuration classes at the state level tends to be very small for most vehicle configuration, our report focused primarily on the regional level. The TIUS database did not contain a region variable, so in our analysis we had to create this variable based on the registration state (TIUS variable FIPST) given on the survey.

North Central		North East		South Atlantic		South Gulf		West	
STATE	FIPST								
Illinois	17	Connecticut	09	Delaware	10	Alabama	01	Alaska	02
Indiana	18	Maine	23	Dist. of Columbia	11	Arkansas	05	Arizona	04
Iowa	19	Massachusetts	25	Florida	12	Kentucky	21	California	06
Kansas	20	New Hampshire	33	Georgia	13	Louisiana	22	Hawaii	15
Michigan	26	Rhode Island	44	Maryland	24	Mississippi	28	Montana	30
Minnesota	27	Vermont	50	North Carolina	37	Oklahoma	40	Nevada	32
Missouri	29	New Jersey	34	South Carolina	45	Tennessee	47	Utah	49
Nebraska	31	New York	36	Virginia	51	Texas	48	Washington	53
North Dakota	38	Pennsylvania	42	West Virginia	54			Wyoming	56
Ohio	39							Idaho	16
South Dakota	46							New Mexico	35
Wisconsin	55							Oregon	41
								Colorado	08

Annual Vehicle Miles Traveled (VMT)

Each surveyed truck estimated their annual vehicle miles traveled (i.e., VMT) for the year. This is question 15 on the 1992 TIUS survey Form 9502 and question 15 on the 1987 TIUS survey Form 9502. Its variable name in the TIUS database was ANNMIL for both 1992 and 1987.

Trailer Width

Each combination vehicle was asked to report the width of the trailer most often attached to it. This is question 12c on the 1992 TIUS survey Form 9502 and question 11b on the 1987 TIUS survey Form 9502. For 1992, the respondents had 4 width categories to choose from. The 1992 WIDTH variable levels were (1) 96 inches, (2) 102 inches, (3) More than 102 inches, or (4) Other. For 1987, the respondents were asked to estimate in inches the width of their trailer. The 1987 width variable was called WTHTRL.

Some problems were noticed with the 1987 width data because estimates were given and because error correction was not performed on this variable by the Bureau of the Census. The first issue was that a number of combination vehicles reported a width of 0 inches. In our analysis, we omitted these widths; however, we footnote their absences. Another issue was that many respondents gave non- standard widths, for example 43, 95, or 97 inches. Based on our observations of the data, it appeared that a number of respondents who gave non-standard responses tended to be within two inches of a standard width (96 inches or 102 inches).

To compare the 1987 data with the 1992 data, the 1987 widths had to be categorized into the four groups. It was decided to only place values of 96 inches into the 96 inch group, of 102 inches into the 102 inch group, of more than 102 inches into the more than 102 inch group, and any other values, except zero values which was excluded from the analysis, into an other category.

Vehicle Length

Each vehicle was asked to report the overall length of their vehicle as it was most often operated. This is question 12a on the 1992 TIUS survey Form 9502 and question 11a on the 1987 TIUS survey Form 9502. For 1992, the respondents had 14 length categories from which to choose. This variable is called TOTLEN in the 1992 database. For 1987, respondents gave estimates in feet of the overall length of their vehicle. The variable was called LENGTH in the 1987 database. To compare the 1987 data with the 1992 data, the 1987 length values were grouped under the same categories headings that were presented on the 1992 survey. Unlike the width variable, we did not see many problems with categorizing the length data because the length category groupings specified a range of values not a specific length value.

% of VMT Outside Home Base State

Each vehicle was asked to report the percent of the year's mileage that was driven outside of the home base state where home base state refers to the state where the vehicle was usually parked when it was not on the road. (Note: Home base state and state of registration are not always the same.) This is question 18 on the 1992 TIUS survey Form 9502 and question 19 on the 1987 TIUS survey Form 9502. In the database, this variable was called POBAST for both 1992 and 1987.

In our analysis, we were primarily interested in the number of vehicles who reported that all of their VMT was driven inside the home base state. Therefore, the home base graphs referred to in section 8 of this report and presented in Appendix C are counts of the number of vehicles at different levels of % of VMT outside of home base state. The most important information on these plots is the number of vehicles who report all their VMT is driven within their home base state. This is obtained by looking at the value plotted at 0% of VMT outside of home base state.

Range of Operation

Each vehicle was asked to report the percent of the year's mileage that was driven on various lengths of trips. This is question 19 on the 1992 TIUS survey Form 9502, and question 20 on the 1987 TIUS survey Form 9502. In 1992, there were 6 length of haul ranges identified; however, in 1987 only 4 ranges were identified. The following table gives the ranges, and the TIUS variable associated with each range.

Range	Off Road	0-50 Miles	50-100 Miles	100-200 Miles	200-500 Miles	> 500 Miles
1987	POFFRD	PLOCAL	PSHORT		PLONG	
1992	POFFRD	PLOCAL	PSHORT	PSMED	PLMED	PLONG

Before analyzing the data, a quality check was performed to insure that the total percent of VMT distributed across the various range levels totaled to 100% for each record. Data that totaled to 0 were ignored in the analysis. No corrections were necessary for the 1992 data. For 1987, records that did not total to 100% were corrected before conducting any analysis. For a 1987 record, the correction method first involved summing the percent of VMT traveled across all 4 trip range groups. (Note: In SAS, we set a blank entry value to 0 before performing the summation.) If this sum did not equal 100, then each of the 4 range group values were divided

by the total sum of all the trips in order to get a proportion of the VMT that each trip accounted for. To convert proportion to percentage, we multiplied these proportion by 100.

In the analysis of the distribution of a vehicle group's VMT across the various trip range levels, the units for the trip range variables was first converted from percent of VMT to VMT for each record. This conversion process involved dividing the percent of VMT for trip range by 100 to get the proportion of the VMT accounted for by this type of trip, then multiplying this value by annual miles traveled (e.g., for a given record, the VMT spent on a local trip would be calculated by the following formula: VMT(local)=PLOCAL*ANNMIL/100).

Vehicle Weight

In deriving the mean empty weight, average weight and maximum weight of the various vehicle groups, some weight data was excluded from the analysis because it was felt to be invalid data based on our knowledge of general operational characteristics of the commercial vehicles. The restrictions are mentioned below.

TIUS Weight Variables. This is question 13 on the 1992 TIUS survey Form 9502 and question 12, 13, and 14 on the 1987 TIUS survey Form 9502.

Weight Variable	Variable Name 1992	Variable Name 1987
Empty (tare) Weight	EMPWT	EMPWGT
Average Weight	AVGWT	AVGWGT
Maximum Weight	MAXWT	MAXWGT

Restrictions on Weight Variables:

Weight Variable	Configuration	Lower limit	Upper limit
Empty (tare) Weight	Straight Truck	5,000	40,000
	Tractor-Trailer	10,000	45,000
Average Weight	Straight Truck	5,000	90,000
	Tractor-Trailer	10,000	100,000
Maximum Weight	Straight Truck	5,000	90,000
	Tractor-Trailer	10,000	100,000

Payload Weight

In addition to the evaluation of the overall weight of a vehicle, we were interested in the weight of the payload carried by a vehicle configuration. Since there was no question on the survey that directly addressed this issue, an estimate was derived of the average payload weight. This was calculated by subtracting the empty weight of the vehicle from its average weight. In addition, maximum payload weight was derived by subtracting the empty weight of the vehicle from its maximum weight. The previously mentioned restrictions on the weight variables applied in this analysis with an added condition that the reported empty weight had to be less than or equal to the reported average or maximum weight.

Commodities Hauled

Each respondent on the survey indicated the percent of their VMT that a particular commodity was hauled or that no commodities were hauled. This is question 28 on the 1992 TIUS survey Form 9502. The sum of the commodities should total to 100%. To evaluate the commodity data, the analysis has to be based on the actual VMT because % of VMT is not a valid unit of measure for analysis (i.e., 1% of VMT is not a common unit because each vehicle has a different annual VMT. For example, one vehicle's annual VMT may be 100,000 miles which means 1% of their VMT is 1,000 miles, while another vehicle's annual VMT is 30,000 miles which means 1% of their VMT is 300 miles).

In this report, only the commodity information from 1992 was evaluated. No comparison was done with the 1987 data because of differences in the formatting and wording of the question. The most noticeable difference was that no load was not included with the list of commodities.

Commodity Description	**Variable 1992**
No load — vehicle empty	PNOLOD
Live animals	LVANML
Fresh **farm products**	FARMPD
Processed foods and tobacco products	PRFOOD
Animal feed	ANFEED
Mining products	MINPRO
Building materials (gravel, sand, concrete, flat glass, etc.—except cut lumber)	BLDGMA
Logs and other **forest products**	LOGPRO
Lumber and fabricated wood products—except furniture	LUMBER
Paper and paper products	PAPER
Chemicals and/or drugs (including fertilizers, pesticides, cosmetics, paints, etc.)	CHEM
Petroleum and petroleum products (including paving and roofing materials)	PETROL
Plastics and/or and **rubbe**r products	PLASTK
Primary metal products—pipes, ingots, billets, sheets, etc.	PRIMTL
Fabricated metal products	FABMTL
Machinery—electrical or non-electrical and electronic	MACHNE
Transportation equipment (including complete vehicles) and parts	TEQUIP
Furniture (wood and non-wood) and/or hardware—not involved in household moving	FURN
Glass products	GLASS
Textiles and apparels—fibers, leather goods, carpets, clothing, etc.	TEXTIL
Miscellaneous products of manufacturing	MSCMFG
Moving of **household** and office furniture	MOVING
Craftsman's equipment - miscellaneous tools and/or parts for specialized use	TOOLS
Mixed cargo (including the delivery of small packages)	MXDCAR
Scrap (not for recycling), garbage, trash, septic tank waste	REFUSE

Industrial "waste" **water**	INDWTR
Hazardous waste (EPA manifest)	HAZEPA
Hazardous waste (non-EPA manifest)	HAXNEPA
Recyclable products	RECYCLE
Other	OTHPROD

Principal Product Hauled

Since no question on the survey directly asked the respondent what their principal product was that they hauled, the Bureau of the Census derived a truck's principal product (TIUS variable PRNPRO) from the commodities data. For each surveyed truck, they identified the commodity that was hauled the most in comparison to the other commodities, then they defined this commodity as the truck's principal product.

When using the principal product variable, there are some issues that one should be aware of. One can not assume that the identified principal product accounts for a majority (over 50%) of the vehicle's VMT. If a truck hauls a number of commodities, the principal product identified with it may be hauled for only 30% of the vehicle's VMT. Another issue has to do with the decision rule that the Bureau decided on to determine the principal product when a tie existed between a number of commodities. For example, if there was a tie between Processed Foods and Mixed Cargo, their rule may state that Processed Foods will be listed as the principal product. Depending on how these ties were decided upon, you can get very different results in your final analyses. For this reason, it is discouraged to use this variable except for possibly a preliminary examination of the commodity data.

Appendix F

1987 and 1992 TIUS Surveys