

Investigation of Class 2b Trucks (Vehicles of 8,500 to 10,000 lbs GVWR)

March 2002

**Stacy C. Davis
Lorena F. Truett**

DOCUMENT AVAILABILITY

Reports produced after January 1, 1996, are generally available free via the U.S. Department of Energy (DOE) Information Bridge:

Web site: <http://www.osti.gov/bridge>

Reports produced before January 1, 1996, may be purchased by members of the public from the following source:

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
Telephone: 703-605-6000 (1-800-553-6847)
TDD: 703-487-4639
Fax: 703-605-6900
E-mail: info@ntis.fedworld.gov
Web site: <http://www.ntis.gov/support/ordernowabout.htm>

Reports are available to DOE employees, DOE contractors, Energy Technology Data Exchange (ETDE) representatives, and International Nuclear Information System (INIS) representatives from the following source:

Office of Scientific and Technical Information
P.O. Box 62
Oak Ridge, TN 37831
Telephone: 865-576-8401
Fax: 865-576-5728
E-mail: reports@adonis.osti.gov
Web site: <http://www.osti.gov/contact.html>

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

**INVESTIGATION OF CLASS 2B TRUCKS
(VEHICLES OF 8,500 TO 10,000 LBS GVWR)**

Stacy C. Davis

Lorena F. Truett

March 2002

Prepared for the
Office of Transportation Technologies
U.S. Department of Energy

Prepared by the
OAK RIDGE NATIONAL LABORATORY
Oak Ridge, Tennessee 37831-6073
managed by
UT-BATTELLE, LLC
for the
U.S. DEPARTMENT OF ENERGY
under Contract No. DE-AC05-00OR22725

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES	v
ABSTRACT.....	vii
EXECUTIVE SUMMARY	ix
ACRONYMS AND ABBREVIATIONS	xi
1. INTRODUCTION	1
2. IDENTIFICATION OF VEHICLES IN THE CLASS 2B CATEGORY	3
2.1 Methodologies for Estimation of Sales of Class 2b Trucks	4
2.1.1 Method 1: Combination of CY and MY Data	4
2.1.2 Method 2: Model Year New Vehicle Registration Counts	4
2.1.3 Method 3: Model Year Sales	7
2.1.4 Method 4: Calendar Year Sales	9
2.2 A Comparison of the Four Methodologies	10
2.3 Analysis of the Methodologies	11
3. CHARACTERISTICS AND IMPACTS	15
3.1 Vehicle Characteristics	15
3.1.1 Pickup Trucks	15
3.1.2 Multipurpose Vehicles	19
3.2 Market Shares by Vehicle Type and Fuel Type.....	21
3.3 Current Population.....	24
3.4 Average Age	25
3.5 Annual Miles.....	26
3.6 Fuel Economies.....	27
3.7 Fuel Usage.....	28
3.8 Emissions	29
3.8.1 New Vehicle Emission Standards	29
3.8.2 Emission Estimates.....	31
4. SUMMARY AND CONCLUSIONS	33
REFERENCES	35
APPENDIX A.....	37

LIST OF TABLES AND FIGURES

TABLES

1.	Sales of Vehicles Less Than 10,000 lbs by Class (thousands), 1989-1999	13
2.	U.S. 2000-2001 Model Class 2b Light-Duty Truck Specifications	16
3.	Price Ranges for Class 2b Pickups, 2000 Models	18
4.	Price Ranges for Class 2b SUVs, 2000 Models	20
5.	Price Ranges for Class 2b Vans/Wagons, 2000 Models	20
6.	Shares of Class 2a and Class 2b Truck Sales by Vehicle Type, MY 1989-2000	22
7.	Shares of Class 2a and Class 2b Truck Sales by Fuel Type, MY 1989-2000.....	23
8.	Shares of Class 2b Truck Sales by Vehicle Type and Fuel Type, 1989-2000.....	23
9.	Number of 2500/250/20 Series Models under 8,500 lbs	24
10.	Population of Trucks 10,000 lbs GVWR and Under by Weight Class, 2000.....	25
11.	Shares of the Population of Class 2a and Class 2b Trucks by Vehicle Type and Fuel Type, 2000	25
12.	Average Age (in years) of Vehicles with a GVWR Under 10,000 lbs in the 2000 Total Population of Registered Vehicles	26
13.	Number of Trucks and Average Annual Miles per Truck for Class 1 and Class 2 Trucks, 1997 VIUS	26
14.	Heaviest Vehicles for which Fuel Economy Data are Available, MY 2000	28
15.	EPA Emission Scores for MY 2001 Tested Class 2b Vehicles	32
16.	Summary Statistics on Light Trucks by Class	33
A.1.	Dealer Responses Regarding Percentage of Heavy-Duty Sales of ¾-Ton Trucks	38

FIGURES

1.	Method 1: Sales for Classes 1 plus 2a Combined and 2b, 1989-1999.....	5
2.	Method 2: New Truck Registrations for Classes 1, 2a, and 2b, MY 1989-1999.....	7
3.	Method 3: Truck Sales for Classes 1, 2a, and 2b, MY 1989-2000	9
4.	Method 4: Truck Sales for Classes 1, 2a, and 2b, CY 1989-1999	10
5.	A Comparison of the Sales of Class 2b Vehicles for Each of the Four Methodologies	11
6.	Market Shares of Sales of Class 2b Vehicles in Comparison with Sales of Other Light Vehicles, 1989-2000, Model Year Sales.....	21
7.	Market Shares of Sales of Class 2b Vehicles in Comparison with Sales of Other Light Vehicles, 1989-1999, Calendar Year Sales.....	22

ABSTRACT

The popularity of trucks in the class 2 category – that is, those with a 6,000 to 10,000 pounds (lbs) gross vehicle weight rating (GVWR) – has increased since the late 1970s/early 1980s. The purpose of this research is to identify and examine vehicles in the upper portion of the class 2 weight range (designated as vehicle class 2b) and to assess their impact.

Vehicles in class 2b (8,500 –10,000 lbs GVWR) include pickup trucks, sport utility vehicles (SUVs), and large vans (i.e., not minivans). Oak Ridge National Laboratory researched each individual truck model to determine which models were class 2b trucks and arrived at four methodologies to derive sales volumes. Two methods – one for calendar year and one for model year sales – were recommended for producing believable and reliable results.

The study indicates that 521,000 class 2b trucks were sold in calendar year 1999 – 6.4% of sales of all trucks under 10,000 lbs. Eighty-two percent of class 2b trucks sold in 1999 were pickups; one third of class 2b trucks sold in 1999 were diesel. There were 5.8 million class 2b trucks on the road in 2000, which amounts to 7.8% of all trucks under 10,000 lbs. Twenty-four percent of the class 2b truck population is diesel. Estimates show that class 2b trucks account for 8% of annual miles traveled by trucks under 10,000 lbs and 9% of fuel use.

Data on class 2b trucks are scarce. As the Tier 2 standards, which apply to passenger vehicles in the 8,500-10,000 lb GVWR category, become effective, additional data on class 2b trucks may become available – not only emissions data, but data in all areas. At the moment, distinguishing class 2b trucks from class 2 trucks in general is a substantial task requiring data on an individual model level.

EXECUTIVE SUMMARY

During the 1990s, passenger vehicles got larger, even as drivers traveled more miles. The popularity of trucks in the class 2 category – that is, those with a 6,000 to 10,000 pounds (lbs) gross vehicle weight rating (GVWR) – has increased since the late 1970s/early 1980s. The purpose of this research is to identify and examine vehicles in the upper portion of the class 2 weight range (designated as vehicle class 2b) and to assess their impact on vehicle miles traveled, fuel use, and emissions in the United States.

Vehicles in class 2b include pickup trucks, sport utility vehicles (SUVs), and large vans (i.e., not minivans). The vehicles in this class vary widely in their usage: they can be strictly recreational vehicles, vehicles that double for both work and family use, or vehicles that are used totally for commercial purposes.

To analyze the impact of class 2b vehicles (8,500 –10,000 lbs GVWR), we look at them over the past ten years and compare their sales and registration numbers with sales and registrations of vehicles in class 1 (6,000 lbs GVWR and under) and class 2a (6,001-8,500 lbs GVWR).

None of the existing data sources included weight data which identified the class 2b trucks separately from class 2a trucks. In an effort to find a simple method of identification of class 2b vehicles, ORNL considered various possibilities: engine size, physical dimensions such as wheelbase or overall length, specifications such as four-wheel drive or horsepower, and various combinations of these factors. None of these approaches, however, provided a “fool-proof” scheme of identification. For example, although engine size would seem to be a logical choice, there were no clear boundaries. Engine sizes for class 2b vehicles *generally* range from 5.4 to 7.4 liters. Some trucks with an engine size of 5.4 liters, however, have GVWRs under 8,500 lbs, and some trucks with 5.2-liter engines have GVWRs over 8,500 lbs. At the other end of the class 2b weight range (10,000 lbs), similar inconsistencies occur. No combinations of physical dimensions and/or other factors seemed to work consistently across model years. Thus, ORNL researched each individual truck model to determine which models were class 2b trucks and arrived at four methodologies to derive sales of class 2b trucks. These methodologies were applied to sales data for 1989-1999. Two methods – one

for calendar year and one for model year sales – were recommended for producing believable and reliable results.

Once the appropriate models were identified, we looked at the characteristics of the class 2b trucks by investigating body styles, fuel types, exterior dimensions, engine sizes and prices; characteristics of the population of class 2b trucks were also explored. The major findings on sales include:

- 521,000 class 2b trucks were sold in calendar year 1999 – 6.4% of sales of all trucks under 10,000 lbs.
- Eighty-two percent of class 2b trucks sold in 1999 were pickups.
- One-third of class 2b trucks sold in 1999 were diesel.
- The class 2b trucks designed for passenger use are subject to Tier 2 emission standards, while the class 2b trucks designed for a legitimate work function are still subject to heavy-duty vehicle standards.

The major findings on the class 2b truck population include:

- There were 5.8 million class 2b trucks on the road in 2000, which amounts to 7.8% of all trucks under 10,000 lbs.
- Twenty-four percent of the class 2b truck population is diesel.
- The average age of the class 2b truck population is 8.6 years.
- Class 2b trucks account for at least 9% of fuel used by trucks under 10,000 lbs.
- Class 2b trucks account for approximately 8% of annual miles traveled by trucks under 10,000 lbs.

Data on class 2b trucks are scarce. As the Tier 2 standards, which apply to passenger vehicles in the 8,500-10,000 lb GVWR category, become effective, additional data on class 2b trucks may become available – not only emissions data, but data in all areas. At the moment, distinguishing class 2b trucks from class 2 trucks in general is a substantial task requiring data on an individual model level.

ACRONYMS AND ABBREVIATIONS

CAFE	Corporate Average Fuel Economy
CNG	compressed natural gas
CY	calendar year
DOE	Department of Energy
EPA	Environmental Protection Agency
GMC	General Motors Corporation
GVWR	gross vehicle weight rating
HD	heavy-duty
lbs	pounds
LDT	light-duty trucks
LEV	low-emission vehicle
LNG	liquefied natural gas
LPG	liquefied petroleum gas
MDPV	medium-duty passenger vehicle
MY	model year
mpg	miles per gallon
ORNL	Oak Ridge National Laboratory
NHTSA	National Highway Transportation Safety Administration
SRW	single real wheels
SUV	sport utility vehicle
ULEV	ultra-low-emission vehicle
VIUS	Vehicle Inventory and Use Survey
vmt	vehicle miles traveled

INVESTIGATION OF CLASS 2B TRUCKS (VEHICLES OF 8,500 TO 10,000 LBS GVWR)

During the 1990s, passenger vehicles got larger, even as drivers traveled more miles. The popularity of trucks in the class 2 category – that is, those with a 6,000 to 10,000 pounds (lbs) gross vehicle weight rating (GVWR) – has increased dramatically since the late 1970s/early 1980s. The purpose of this research is to examine vehicles in the upper portion of the class 2 weight range (designated as vehicle class 2b). To complete this objective required identification of the appropriate vehicle models. After identification, the vehicles were characterized and analyzed for their impact on energy consumption and emissions.

1. INTRODUCTION

Vehicles in class 2b include pickup trucks, sport utility vehicles (SUVs), and large vans (i.e., not minivans). The vehicles in this class vary widely in their usage: they can be strictly recreational vehicles, vehicles that double for both work and family use (e.g., farm trucks), or vehicles that are used totally for commercial purposes (e.g., cargo vans). The interest in this class of vehicles is rising. It is possible that the popularity has some basis in greater recreational use. It is also possible that the “prestige” of driving a truck has an impact on purchasers. Finally, it is possible that purchasers believe that the larger size of the vehicle makes it safer.

To analyze the impact of class 2b vehicles, we look at them over the past ten years and compare their sales and registration numbers with sales and registrations of vehicles in class 1 (6,000 lbs GVWR and under) and class 2a (6,001-8,500 lbs GVWR). We also look at fuel economy and emissions. The terms “vehicles” and “trucks” in this report are both used to refer to pickup trucks, sport utility vehicles, and vans. Automobiles do not have a GVWR designation and are not included in any of the graphs or tables in this report.

2. IDENTIFICATION OF VEHICLES IN THE CLASS 2B CATEGORY

Class 2 vehicles are those with a GVWR between 6,000 and 10,000 lbs. Automotive databases such as Polks, Wards, and the Vehicle Inventory Use Survey (VIUS) list vehicles belonging to this classification. The class 2b vehicle is defined as having a GVWR of 8,500 to 10,000 pounds. No database actually separates class 2 vehicles into the 2a and 2b categories. In very broad terms, the ½-ton trucks are usually in class 2a, and the 1-ton trucks are generally in class 2b.

Although it would appear to be a simple matter to itemize the models in class 2, separate them into classes 2a or 2b, and collect sales data over time, the problem is more difficult than it seems. For example, over time, model names for vehicles in this size range change as new designs are introduced. In addition, vehicles with a particular nameplate may have different GVWRs from year to year. Finally, the GVWR of a particular model (e.g., the ¾-ton truck) can span the 8,500-lb range (e.g., GVWR = 8,400-8,600), placing it in either class 2a or 2b depending on some feature, such as heavy-duty springs.

One of the most significant problems for assigning a model to class 2a or 2b concerned those models that “straddle” the weight boundaries. For example, the 2001 Ford E-250 Econoline van which is configured for commercial use has a GVWR of 8,600 lbs; however, the Ford E-250 van which is configured for recreational use has a GVWR of less than 8,000 lbs. Another example is the Chevrolet Silverado 2500 pickup. In the 2000 models, the GVWR could drop under 8,500 lbs; however, in 2001, the “basic” 2500 pickup is not available, and all models of the Silverado 2500HD (heavy-duty) have a GVWR over 8,500 lbs. For vehicles at the other end of the weight range, the Ford F-350 with single rear wheels (SRW) is under 10,000 lbs; however, the F-350 dually (dual tires on rear axle) is slightly above the 2b upper limit of 10,000 lbs. In addition, the Ford F-350SRW could have precisely the same engine size as the F-350 dually.

In an effort to find a simple method of identification of class 2b vehicles, ORNL considered various possibilities: engine size, physical dimensions such as wheelbase or overall length, specifications such four-wheel drive or horsepower, and various combinations of these factors. None of these approaches, however, provided a “fool-proof” scheme of identification. For example, although engine size would seem to be a logical choice, there

were no clear boundaries. Engine sizes for class 2b vehicles *generally* range from 5.4 to 7.4 liters. Some trucks with an engine size of 5.4 liters, however, have GVWRs under 8,500 lbs, and some trucks with 5.2-liter engines have GVWRs over 8,500 lbs. At the upper end of the class 2b weight range (10,000 lbs), similar inconsistencies occur. No combinations of physical dimensions and/or other factors seemed to work consistently across model years.

Therefore, to obtain reasonable data for class 2b over time required manual searches for make and model names of class 2b vehicles for each year, a logic for determining a percentage of vehicles with GVWRs that might be either under or over 8,500 lbs that could safely be assumed to be class 2b, and cross-matching of different databases.

2.1 METHODOLOGIES FOR ESTIMATION OF SALES OF CLASS 2B TRUCKS

There are two ways to “count” the numbers of vehicles in a vehicle class – by calendar year (CY) or by model year (MY). These numbers can be very different. For example, a particular model may not be manufactured until near the end of the model year and then may be produced as the next year’s model. Although there would be CY sales data for that model, there would be no MY sales recorded in that year. We considered four methodologies for deriving sales of class 2b vehicles. In these methodologies, we sometimes used new vehicle registrations as a proxy for sales. These procedures are briefly explained in the following sections.

2.1.1 Method 1: Combination of CY and MY Data

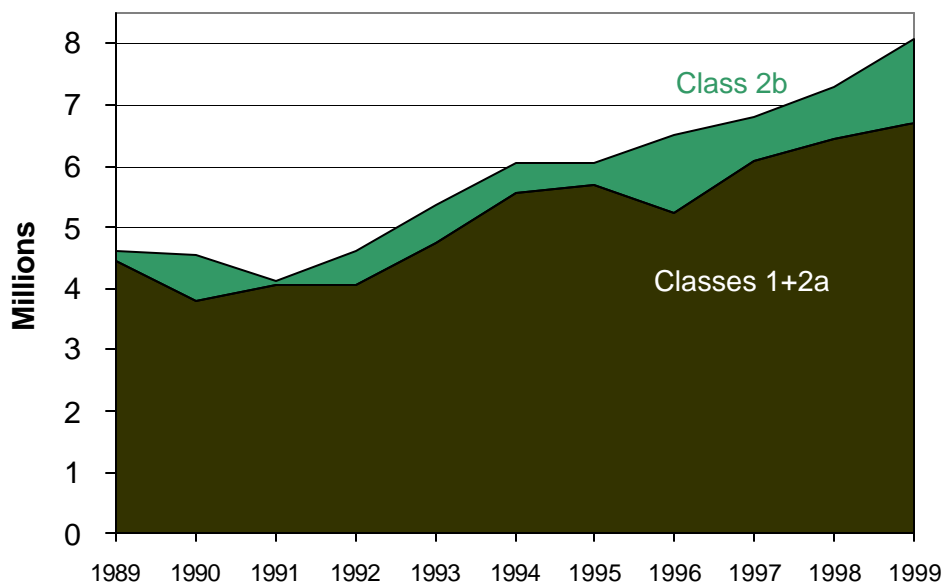
First, an extremely simple method was used to estimate sales of class 2b trucks. Calendar year sales for trucks 10,000 lbs and less are readily available from *Ward’s Facts and Figures*.¹ The National Highway Traffic Safety Administration (NHTSA) publishes light truck sales data each year in the report “Summary of Fuel Economy Performance.”² NHTSA’s data are on a model year basis and are for light trucks 8,500 lbs or less. NHTSA collects these data as part of the enforcement of the Corporate Average Fuel Economy (CAFE) standards, which apply only to light trucks 8,500 lbs or less GVWR. An estimate of class 2b sales can then be derived by the subtraction of the NHTSA 8,500 lbs and less data

¹ Ward’s Communications, *Ward’s Motor Vehicle Facts & Figures*, 2000, p. 24, and previous annual editions.

² U.S. Department of Transportation, National Highway Traffic Safety Administration, “Summary of Fuel Economy Performance,” March 2001, p. 3.

from the Ward's 10,000 lbs and less data. This methodology did not produce a consistent trend in class 2b sales (see Figure 1). However, this inconsistency may be due to the fact that this methodology compares two different time periods – calendar year and model year – which can be quite different depending on when each manufacturer begins selling the new model year vehicles.

Figure 1. Method 1: Sales for Classes 1 plus 2a Combined and 2b, 1989-1999



Source: Sales of light trucks 8,500 lbs and less: U.S. Department of Transportation, National Highway Traffic Safety Administration, "Summary of Fuel Economy Performance," Washington, DC, March 2001, p. 3.
 Sales of light trucks 10,000 lbs and less: Ward's Communications, *Ward's Motor Vehicle Facts & Figures 2000*, Southfield, MI, 2000, p.24, and previous editions of this series.

2.1.2 Method 2: Model Year New Vehicle Registration Counts

Using Polk National Vehicle Population Profile data files for each year from 1989 through 2000, registration information for each individual model in class 2 was derived.³ Because Polk registration data is gathered in the middle of the calendar year, registrations of vehicles sold during the final quarter of the most recent model year are not included in that

³ The Polk Company, National Vehicle Population Profile, MY 1989-2000, computer data files.

year's totals. Therefore, to obtain more complete registration counts, we used registration data for 1999 models from the 2000 file, 1998 models from the 1999 file, etc. In selecting the model codes, we did not count registrations for any models with "unknown" in the model name field. We also eliminated motor homes built on a truck chassis. We derived these counts for every year separately. It should be noted that occasional data anomalies occur in the Polk files. We did not attempt to adjust for these anomalies.

This methodology produced the numbers of trucks registered in the ½-ton, ¾-ton, and 1-ton category by nameplate by year. It did not, however, provide the number of vehicles in classes 2a and 2b, because the Polk file does not include a breakpoint at 8,500 lbs. Therefore, we needed a method for calculating the number of vehicles that were in class 2a and the number in class 2b.

Using annual volumes of the *Ward's Automotive Yearbook*, we determined whether specific makes and models belonged in class 2a or 2b based on GVWR listed in the table entitled "U.S. [year] Model Light-Duty Truck Specifications and Prices."⁴ Except for one or two cases, all vehicles in class 2b were manufactured by Chevrolet, Dodge, Ford, or GMC. Weight ratings for vans varied considerably across models and years. Some class 2 vehicles were *clearly* below and some were *clearly* above 8,500 lbs. Some vehicles, however, had GVWRs that spanned the 8,500-lb cutoff, being below or above that weight rating based on certain conditions. The trucks in this category, which will be referred to as the borderline category, were generally the ¾-ton variety.

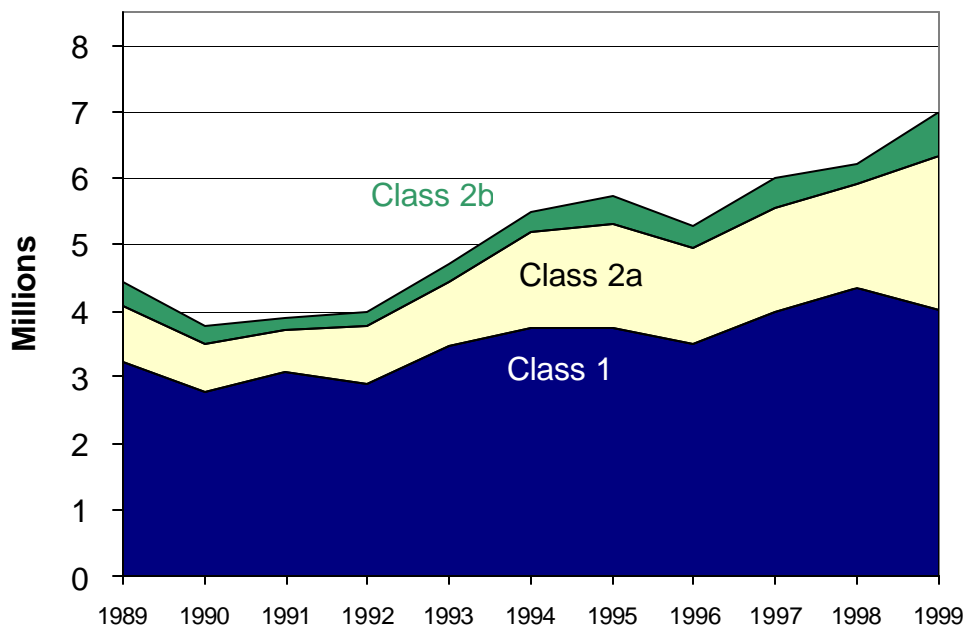
When a particular model's GVWR spanned the 8,500-lb cutoff, the most frequent determinant of whether its GVWR was under or over 8,500 lbs was whether it had heavy-duty springs, transmission, and suspension; manufacturers often designate the trucks as "heavy-duty" or "super-duty" based on these features (e.g., Chevrolet Silverado 2500 HD). Borderline vehicles that have heavy-duty features have a higher GVWR and therefore belong in the 2b category rather than the 2a. We called dealerships (see Appendix A) to try to determine the percentages of heavy-duty vehicles sold (e.g., the C/K-2500 is in the borderline category). However, dealer responses varied widely and did not seem consistent enough to generate a national average. In light of the fact that no other data were available, we decided

⁴ Ward's Communications, *Ward's Automotive Yearbook*, 2000, p. 307, and previous annual editions.

to assign 50% of the borderline vehicles to the 2a class and 50% to the 2b class. The share of trucks that were considered borderline varied among the model years; for many years the share was around 5%, but for others, such as MY 1989 and MY 1990, approximately 25% of class 2 truck sales were classified as borderline.

The counts of trucks in class 1 were also obtained from the Polk files. Figure 2 shows the estimation of the numbers of new vehicles registered in classes 1, 2a, and 2b, for model years 1989-1999.

Figure 2. Method 2: New Truck Registrations for Classes 1, 2a, and 2b, MY 1989-1999



Source: The Polk Company, National Vehicle Population Profile, 1989-1999.

2.1.3 Method 3: Model Year (October 1 – September 30) Sales

In *Ward's Automotive Reports* the term model year is applied to any vehicle sold between October 1 of one year and September 30 of the next year. In this definition, the model year begins three months before the calendar year of the same name. For example, a truck sold in November 1998 would be counted as model year 1999, even if the truck manufacturer had designated the vehicle a 1998 model. This definition of model year is

different than the model year used in Method 2, where the manufacturers' model year designation is used.

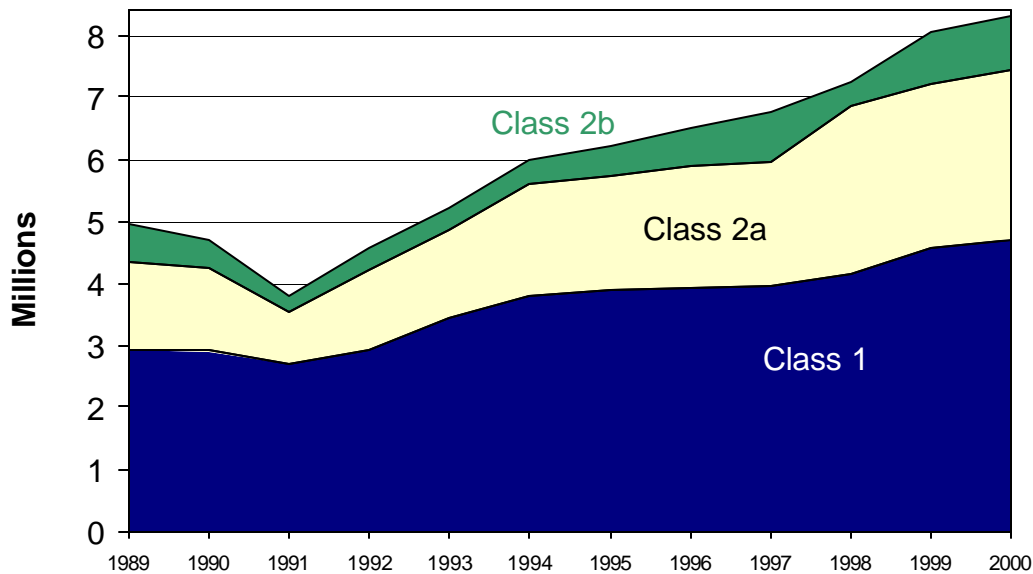
Using the table entitled "Ward's U.S. New Light Truck Sales by Line and Brand – September [year]," from the September issue of *Ward's Automotive Reports*, for each year from 1989 through 2000, we derived a table of retail model year sales totals by manufacturer and nameplate for trucks with a GVWR > 6,000 lbs.⁵ These sales numbers include both 2a and 2b vehicles. [Note: the list is an aggregation of total sales – e.g., Ford F series (including ½-, ¾-, and 1-ton trucks, some of which belong to class 2a and some to class 2b); we eliminated those in class 3 – over 10,000 lbs GVWR.]

Any aggregated sales data had to be split using percentages from the Polk data generated in method 2. For example, 1999 model year Ford F-Series sales were divided into F-150, F-250, and F-350 based on the 1999 model year registration data. Once categorized as class 2a, class 2b or borderline, the sales were totaled. The sales of borderline models were treated just as in method 2 – 50% into class 2a and 50% into class 2b.

The counts of vehicles in class 1 were also obtained from *Wards Automotive Reports*. Figure 3 shows the estimation of the numbers of vehicle sales by model year in classes 1, 2a, and 2b, for model years 1989-2000.

⁵ Ward's Communications, *Ward's Automotive Reports*, September 2000, and previous annual editions.

Figure 3. Method 3: Truck Sales for Classes 1, 2a, and 2b, MY 1989-2000



Source: Class 1 and Class 2 sales: Ward's Communications, *Ward's Automotive Reports*, Southfield, MI, 2000, and previous editions of this series.

Share of aggregated model sales: The Polk Company, *National Vehicle Population Profile*, 1990-2000.

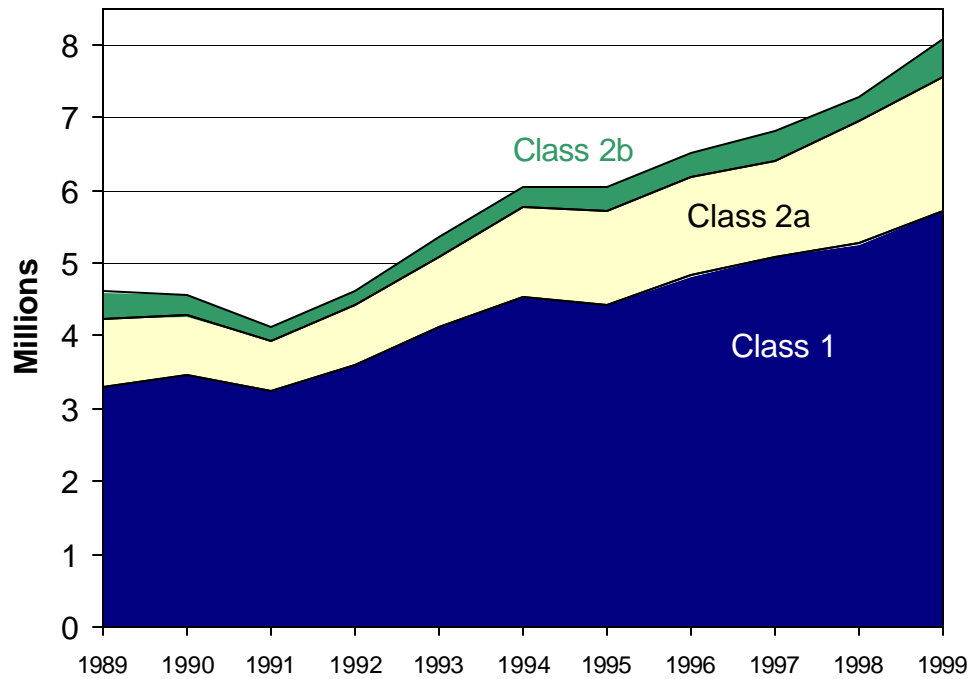
Note: Model Year (MY) is the sales period of October 1 of the preceding year to September 30 of the current year.

2.1.4 Method 4: Calendar Year Sales

Percentages of class 2 vehicles under and over the 8,500 lb breakpoint were generated using method 2. These percentages (new vehicle registrations by model year) were applied to total class 2 sales data (calendar year) from *Motor Vehicle Facts & Figures*. This procedure obtained a split of class 2 sales data into classes 2a and 2b. Class 1 sales were also obtained from the *Motor Vehicles Facts & Figures*.

Figure 4 shows the estimation of the numbers of vehicles sold in classes 1, 2a, and 2b, during calendar years 1989-1999.

Figure 4. Method 4: Truck Sales for Classes 1, 2a, and 2b, CY 1989-1999

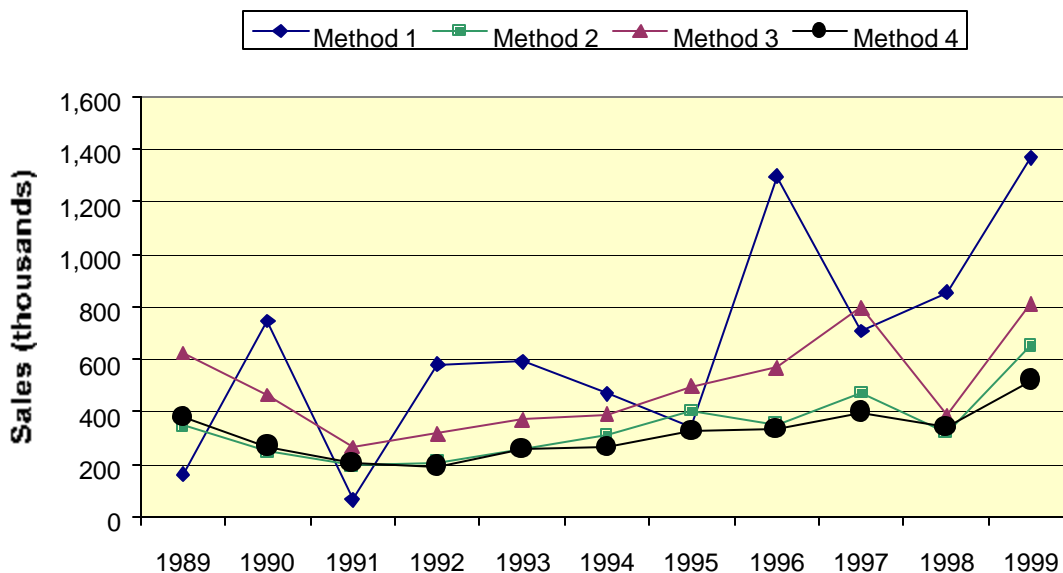


Source: Class 1 and Class 2 sales: Ward's Communications, *Ward's Motor Vehicle Facts & Figures 2000*, Southfield, MI, 2000, p.24, and previous editions of this series.
Share of Class 2b truck sales: The Polk Company, National Vehicle Population Profile, 1990-2000.

2.2 A COMPARISON OF THE FOUR METHODOLOGIES

A comparison of the class 2b sales based on each of these methodologies is shown in Figure 5.

Figure 5. A Comparison of the Sales of Class 2b Vehicles for Each of the Four Methodologies



Source: See Figures 1-4.

2.3 ANALYSIS OF THE METHODOLOGIES

Each of the four methodologies described above has some advantages and some disadvantages. These pros and cons must be carefully considered in the context of a particular situation.

Method 1 has the advantage of using data that are readily available. Both *Ward's Facts and Figures* CY sales and NHTSA MY fuel economy data are published annually, which implies that there is minimal cost to derive data. It becomes a simple subtraction exercise to obtain numbers of class 2b vehicles by subtracting the number of vehicles weighing less than 8,500 lbs (i.e., the sum of class 1 plus class 2a) from the total number of vehicles weighing less than 10,000 lbs (i.e., all class 1 and class 2 vehicles).

Method 1, unfortunately, does not produce believable results because of the large variability of the class 2b sales from year to year (see Figure 5). It is possible that this variability is caused by the combination of CY and MY data. It is also possible that the two data sets are simply incompatible.

Methods 2-4 appear to produce more reasonable results than method 1; that is, there are not such wide variations in the sales numbers from year to year (see Figure 5). Method 2

results contribute to methods 3 and 4 in the use of percentages of vehicles in the ½-ton, ¾-ton, and 1-ton categories. Because of the necessity of manual searches for information in Ward's and the programming involved in deriving data from the Polk files, methods 2-4 are time consuming and therefore much more costly than method 1. However, these methods also seem to produce more believable data in comparison to the dramatic irregularity of method 1 results.

Methods 3 and 4 look at sales data at different timepoints. Method 3 counts sales by MY, and method 4 looks at CY sales. Method 3 starts out with model year sales totals from a highly reliable source and applies the new registration percentages derived from Polk for aggregated model sales. Method 4 starts out with calendar year sales from a highly reliable source and applies the class 2b new registration percentages derived from Polk.

Method 3 has an extreme dip in class 2b sales in 1998. Upon investigation, it was discovered that Ford did not produce any F-series pickups over 8,500 lbs with MY 1998 designation. The 1997 MY class 2b trucks were available for a longer period of time and the 1999 MY class 2b trucks were introduced early. This would cause a decline in the MY sales for class 2b, but would not cause much of an anomaly in the CY data (method 4).

ORNL chooses method 3 as the preferred method for MY sales and method 4 as the preferred method for CY sales. Once the percentages for division into classes 2a and 2b have been derived from Polk, applying them to sales data is a fairly straightforward procedure. ORNL does not recommend method 1 because the results from year to year are too variable to be entirely believable. Though shares derived from method 2 are used as input to methods 3 and 4, the totals from method 2 are not actually sales, but a snapshot of new registrations as of July 1 of the year after the model year vehicles were sold.

Table 1 shows the data for classes 1, 2a, and 2b for the methodologies of choice. The sales decline from 1989 to 1990 reflects the rising fuel prices and economic recession of the early 1990's.⁶

⁶ Davis, Stacy C., *Transportation Energy Data Book: Edition 20*, October 2000, pp. 5-7, 7-4, 7-5.

Table 1. Sales of Vehicles Less Than 10,000 lbs by Class (thousands), 1989-1999

Year	Method 3 (MY)				Method 4 (CY)			
	Class 1	Class 2a	Class 2b	Total	Class 1	Class 2a	Class 2b	Total
1989	2,926	1,432	624	4,982	3,313	918	379	4,610
1990	2,910	1,350	463	4,723	3,451	829	268	4,548
1991	2,710	821	265	3,796	3,246	670	206	4,122
1992	2,937	1,301	315	4,553	3,608	827	194	4,629
1993	3,457	1,403	371	5,231	4,119	975	257	5,351
1994	3,799	1,805	390	5,994	4,527	1,241	265	6,033
1995	3,881	1,830	496	6,207	4,422	1,304	327	6,053
1996	3,912	2,002	568	6,482	4,829	1,356	334	6,519
1997	3,958	1,988	796	6,742	5,085	1,315	397	6,797
1998	4,150	2,694	385*	7,229	5,263	1,694	342	7,299
1999	4,585	2,640	812	8,037	5,707	1,845	521	8,073
% change 1989-1999	56.7%	84.4%	30.1%	61.3%	72.3%	101.0%	37.5%	75.1%

Source: See Methods 3 and 4.

*Ford did not sell any F-series trucks over 8,500 lbs GVWR which were designated as MY 1998.

Based on method 3 (i.e., sales by MY), sales of class 2b trucks have grown from slightly over 624 thousand units in 1989 to over 812 thousand units in 1999, an increase of about 30%. Based on method 4 (i.e., CY), sales went from 379 thousand to 521 thousand units (an increase of over 37%). During this same time period, sales of class 2a vehicles increased 84% (using method 3 – MY) or 101% (using method 4 – CY). Thus, although the sales of class 2b vehicles have grown, the growth of class 2a has been much greater.

3. CHARACTERISTICS AND IMPACTS

In this chapter, we describe the characteristics of vehicles in class 2b and examine, insofar as is possible, their fuel economies and emissions.

3.1 VEHICLE CHARACTERISTICS

Table 2 shows vehicles in class 2b for model years 2000 and 2001. Vehicle types include pickup trucks, large SUVs, and some larger vans and wagons. Fuels include gasoline, diesel, compressed natural gas (CNG), and liquid petroleum gas (LPG). There are no electric vehicles in this size class.

3.1.1 Pickup Trucks

The full-sized pickup truck is the epitome of U.S. wide-open spaces, self-confidence, independence, and strength. Descriptive terms used with large pickups include “heavy-duty” and “super cab.” In one brochure, the Dodge Ram is described as having “... that look, like biceps bulging underneath a well-worn T-shirt. It’s lean. It’s tough. It’s a statement.”⁷ Truck specifications include features not provided for automobiles – for example, payload weights and GVWR, axle ratios and tow ratings, and number of rear wheels.

The extended cab has progressed from two doors, to three, to four. For the full-size pickups, more than 80% have V8 engines and over 90% have automatic transmissions.⁸ The market is dominated by Chevrolet, GMC, Dodge, and Ford models. When Dodge introduced the Ram pickup in 1994, its aggressive styling struck a responsive chord in the eyes of the American truck-buying public, and sales of the Ram pickup increased from 80,000 units (counting all full-sized trucks, including those with a GVWR under 8,500 pounds) in calendar year 1992 to over 400,000 units in 1998.⁹

⁷ Chrysler Corporation, *1997 Ram Pickup: The New Dodge*, July 1996, p. 7.

⁸ AutoPacific, *The US Car and Light Truck Market*, 1999, pp. 147-148.

⁹ AutoPacific, *The US Car and Light Truck Market*, 1999, p. 148.

Table 2. U.S. 2000-2001 Model Class 2B Light-Duty Truck Specifications^{a,b}

(All vehicles are gasoline-fueled, unless otherwise noted)

NAMEPLATE	LITERS (range)	HORSE- POWER (range)	HEIGHT (in.)	LENGTH (in.)	WIDTH (in.)	WHEEL- BASE (in.)	GVWR ^c	FUEL TANK (gal)	BASE PRICE ^d (range)
Chevrolet Silverado 2500 PU and 2500 HD PU	5.3-6.0	285-300	73.7-74.5	222-246.7	78.5	133-157.5	8,600-9,300	26-34	\$21,575-27,059
Chevrolet Silverado 2500 PU (CNG-D and LPG)	6.0					133-157.5	8,500	20/34.8 GGE (CNG/LPG)	
Chevy Express G2500 van	5.7	200-255	81.1-82.5	218.7-238.7	79.2	135-155	8,600	31	21,625-27,635
Chevy Express G2500 van (DIESEL)	6.5	195	81.1-82.5	218.7-238.7	79.2	135-155	8,600	31	
Chevy Express G2500 van (BI-FUEL CNG)						135	8,600	31 conventional & 9.3 GGE	
Chevrolet C/K 2500 PU	5.7-7.4	255-290	71.2-76	213.1-237.4	76.8-77	131.5-155.5	8,600	25-34	20,187-24,471
Chevrolet C/K 2500 PU (DIESEL)	6.5	180-195	71.2-76	213.1-237.4	76.8-77	131.5-155.5	8,600	25-34	22,942-27,645
Chevrolet Suburban C/K 2500 SUV	6.0	300	74.2	219.3	78.8	130	8,600	39	28,330
Chevrolet C/K 3500 PU	5.7-7.4	255-290	73.2-74	213.1-250.9	77	131.5-168.5	9,000-10,000	34	20,685-25,495
Chevrolet C/K 3500 PU (DIESEL)	6.5	195	73.2-74	213.1-250.9	77	131.5-168.5	9,000-10,000	34	23,685-28,669
Chevy Express G3500 van	5.7-7.4	255-290	82.5-83.9	218.7-238.7	79.2-79.4	135-155	9,500	31	23,854-27,969
Chevy Express G3500 van (DIESEL)	6.5	195	82.5-83.9	218.7-238.7	79.2-79.4	135-155	9,500	31	
Chevy Express G3500 van (BI-FUEL CNG)						165	9,500	31 conventional & 9.3 GGE	
Dodge Ram 2500 PU	5.9-8.0	245-300	72.1	224.1	79.4	135	8,800	35	21,170-26,370
Dodge Ram 2500 PU (DIESEL)	5.9	230	72.1	224.1	79.4	135	8,800	35	
Dodge Ram 3500 Maxi Van/Wagon	5.2-5.9	225-250	79.9	231.2	79.8	127.6	8,700-9,200	35	22,930-28,940
Dodge Ram 3500 Van and Maxi Van/Wagon (CNG-D)	5.2		80.1-82.8	210.6-236.6	78.8	127.2	8,700	18.7 GGE	
Ford E-250 Econoline Van (COMMERCIAL ONLY)	5.4	200-255	83.4	211.9; 231.9	79.3	138	8,600	35	22,150-24,510
Ford E-250 Econoline Van (CNG-D)	5.4						8,600	16.2-18.6 GGE	
Ford Excursion SUV	5.4-6.8	255-310	76.7-79.7	226.7	80	137	8,600-9,200	44	34,380-41,470
Ford Excursion SUV (DIESEL)	7.3	235	76.7-79.7	226.7	80	137	8,600-9,200	44	
Ford F-250 PU Super Duty	5.4-6.8	260-310	76.6-77	227-257.6	79.9	141.8-172.4	8,800	29-38	21,040-32,495
Ford F-250 PU Super Duty (DIESEL)	7.3	235	76.6-77	227-257.6	79.9	141.8-172.4	8,800	29-38	
Ford E-350 Super Duty Econoline Van	5.4-6.8	255-305	84.1	211.9-231.9	79.3	138	9,400-9,500	35	24,595-29,630
Ford E-350 Super Duty Econoline Van (DIESEL)	7.3	215	84.1	211.9-231.9	79.3	138	9,400-9,500	35	
Ford E-350 Super Duty Econoline Van (CNG-D)	5.4	225						16.2-18.6 GGE	
Ford F-350 Super Duty PU, SRW ONLY	5.4-6.8	260-310	76.3-77.3	222.2-257.6	79.9	137-172	9,900	38	21,490-34,510
Ford F-350 Super Duty PU (DIESEL), SRW ONLY	7.3	235	76.3-77.3	222.2-257.6	79.9	137-172	9,900	38	
GMC Sierra 2500 PU	5.3-7.4	255-300	71.2-76	213.1-246.7	76.8-78.5	131.5-157.5	8,600	26-34	22,220-31,246
GMC Sierra 2500 PU (DIESEL) and 2500 HD PU (DIESEL)	6.5	195	71.2-76	213.1-246.7	76.8-78.5	131.5-157.5	9,200	26	

NAMEPLATE	LITERS (range)	HORSE- POWER (range)	HEIGHT (in.)	LENGTH (in.)	WIDTH (in.)	WHEEL- BASE (in.)	GVWR ^c	FUEL TANK (gal)	BASE PRICE ^d (range)
GMC Sierra 2500 PU (CNG-D and LPG)	6.0					133-157.5	8,500	20/34.8 GGE (CNG/LPG)	
GMC Savana G2500 van	5.7	255	81.1-82.5	218.8-238.8	79.4	135-155	8,600	31	21,689-27,699
GMC Savana G2500 van (DIESEL)	6.5	195	81.1-82.5	218.8-238.8	79.4	135-155	8,600	31	
GMC Savana G2500 van (BI-FUEL CNG)						135	8,600	31 conventional & 9.3 GGE	
GMC Yukon 2500 SUV	6.0	300	76.8	219.3	79.8	130	8,600	38.5	36,721-39,683
GMC Savana G3500 van	5.7-7.4	255-290	82.5-83.9	218.7-238.7	79.4	135-155	9,500	31	23,918-28,033
GMC Savana G3500 van (DIESEL)	6.5	195	82.5-83.9	218.7-238.7	79.4	135-155	9,500	31	
GMC Savana G3500 van (BI-FUEL CNG)						155	9,500	31 conventional & 9.3 GGE	
GMC Sierra 3500 PU	5.7-7.4	255-290	73.9-74	213.1-250.9	77	131.5-168.5	9,000-10,000	34	20,755-28,739
GMC Sierra 3500 PU (DIESEL)	6.5	195	73.9-74	213.1-250.9	77	131.5-168.5	9,000-10,000	34	

^aThe purpose of showing a combination of model year 2000 and 2001 data is to include as many nameplates as possible with gross vehicle weights in the 8,500-10,000 pound class. Therefore, some vehicles that are listed (e.g., the Chevrolet Silverado 2500 pickup, which existed in the 2000 model year, has been replaced by the 2500 HD pickup in 2001) may not be available in both years.

^bIn this table, "n/a" means not available; PU = pickup; SUV = sport utility vehicle; SRW = single rear wheel; HD = heavy duty; CNG-D = compressed natural gas – dedicated; and GGE = gasoline gallon equivalent.

^cThe Gross Vehicle Weight Rating (GVWR) is from the Automotive News source listed below, except as follows:

**According to Automotive News, the GVWR for the Chevy Silverado 2500 PU is listed at 7,200-8,600; however, at the Chevrolet web site (<http://www.chevrolet.com/silverado/index.htm>) for all model year 2001 models, the Silverado 2500 is listed at 8,600 GVWR and the 2500HD is listed at 9,300 GVWR.*

**Although Automotive News listed the GVWR for the Chevy Express G2500 van as between 7,300 and 8,600 GVWR the 2001 models (which incidentally do not include a diesel model) are all listed at 8,600 lbs.*

**According to Michael Webb at Neill Sandler Ford, Maryville, Tennessee, the Ford E-250 standard commercial Econoline Van has a weight of 8,600 GVWR; when converted to a traveler/recreational package, the weight is under 8,000 GVWR.*

**Although Automotive News lists the GMC Sierra 2500 PU with 7,200-8,600 GVWR, the GMC specifications at <http://www.gmc.com/sierra/models.html> for the Sierra listed all weights as above 8,500 GVWR.*

**The Ford F-350 PU with single rear wheels has a GVWR under 10,000 lbs; however, the F-350 with dual rear wheels does not belong to the class 2b category because its weight is over 10,000 lbs. In addition, there is an F-350 Super Duty pickup which is a bi-fuel (propane) alternative fueled vehicle; however, its weight exceeds 10,000 lbs.*

^dDifferences in base price are caused by factors such as 2WD vs. 4WD; regular, extended, or crew cab; number of wheels; number of doors; and wheelbase. In addition, diesel prices are not always provided with the adjustment to allow for the optional diesel engine.

Sources: Base prices from *Automotive News, 2000 Market Data Book*, May 2000, pp. 75-88, Model Year 2000. Vehicle specifications are from the same source, pp. 68-74, except for Gross Vehicle Weight (see footnote c).

The “full-sized pickup” category generally includes ½-ton, ¾-ton, and 1-ton trucks. Of these, the ½-ton vehicles (e.g., the C/K-1500, Ram-1500, and F-150) have a GVWR under 8,500 pounds. About one-half of all Ford F series pickups are the F-150.¹⁰ The ¾-ton vehicle may be over or under a GVWR of 8,500 pounds depending on its springs, suspension, and transmission. A ¾-ton “heavy duty” (or super duty) vehicle can be assumed to fall in the class 2b range. In the 1-ton trucks, the “modern” Dodge Ram 3500 has a GVWR of over 10,000 pounds and is therefore excluded from the class 2b trucks. The GVWR of the Ford F-350 is below 10,000 pounds if the vehicle has single rear wheels; it is slightly over if it has double rear wheels. The Chevy and GMC C/K 3500 series vehicles fall in the class 2b range.

Prices vary widely on vehicles in the 2b class. Table 3 provides some comparison of the price ranges for 2000 models.

Table 3. Price Ranges for Class 2b Pickups, 2000 Models

Nameplate	Approximate price range
Chevrolet C/K 2500 pickup	\$20,200 – 27,600
Chevrolet C/K 3500 pickup	\$20,700 – 28,700
Dodge Ram 2500 pickup	\$21,200 – 29,400
Ford F-250 super duty pickup	\$21,000 – 32,500
Ford F-350 super duty pickup (SRW)	\$21,500 – 34,500
GMC Sierra 2500 pickup	\$22,200 – 31,200
GMC Sierra 3500 pickup	\$20,800 – 28,800

Source: Crain Communications, *Automotive News Market Data Book*, May 2000, p. 71.

Although the class 2b truck is traditionally considered a commercial-size vehicle, many personal-use buyers have moved to these pickups, attracted by the “comfort” features as well as by the towing and hauling functionality. In 1998, for example, Dodge enhanced the extended cab configuration with the “Quad Cab” which added both driver- and passenger-side

¹⁰ AutoPacific, *The US Car and Light Truck Market*, 1999, p. 158.

quarter doors¹¹ (a feature that makes loading groceries into the vehicle much easier). Ford Super-Duty pickups are available with luxury features such as leather seats and automatic temperature control.

Production of Chevrolet and GMC trucks was hindered in 1998 by the labor union strike. While earlier Chevy and GMC trucks were similar in design, in 1999, design differences between the Silverado and the Sierra became more distinctive.¹²

3.1.2 Multipurpose Vehicles

Multipurpose vehicles include sport utility vehicles (SUVs) and large vans and wagons. SUVs

SUVs may be described as “large, sturdy, high-priced, appropriate for hauling/towing, safe (to the SUV occupants), and ‘trendy.’”¹³ Although SUVs are assumed to be used for more rugged purposes than automobiles, Bradsher noted that few drivers actually use their SUVs for off-road purposes.¹⁴

Most SUV models have GVWRs under 8,500 lbs. SUVs that fall in the class 2b category are those with an engine similar to that of the trucks listed in Table 2 – at least ¾-ton. The Chevrolet Suburban has been on the market for several years, and the Ford Excursion made its debut in 1999. In 2000, the GMC Yukon XL was produced in a ¾-ton version with a GVWR of slightly over 8,600 lbs. SUVs are enormously popular, currently showing the greatest growth in sales of any single vehicle style.

The average SUV customer is a married, 45-year-old male with an annual household income of almost \$95,000.¹⁵ Senior citizens (over age 65) are the least-likely age group to purchase an SUV.¹⁶ Table 4 shows a price comparison of class 2b SUVs for 2000 models.

¹¹ AutoPacific, *The US Car and Light Truck Market*, 1999, p. 158.

¹² AutoPacific, *The US Car and Light Truck Market*, 1999, p. 155.

¹³ Davis, Stacy C., and Lorena F. Truett, *An Analysis of the Impact of Sport Utility Vehicles in the United States*, August 2000, p. 11.

¹⁴ Bradsher, Keith, “Deadly Crashes Increase Between Cars, Light Trucks,” *The New York Times*, September 24, 1997.

¹⁵ AutoPacific, *The US Car and Light Truck Market*, 1999, pp. 143-144.

¹⁶ Office of Transportation Technologies, <http://www.ott.doe.gov/facts/archives/fotw92.html>, “Fact of the Week,” Fact #92, June 8, 1999. (Original source: AutoPacific Group.)

Table 4. Price Ranges for Class 2b SUVs, 2000 Models

Nameplate	Approximate price range
Chevrolet Suburban (¾-ton)	\$22,900 – 27,600
Ford Excursion	\$34,400 – 41,500
GMC Yukon (¾-ton)	\$36,700 – 39,700

Source: Crain Communications, *Automotive News Market Data Book*, May 2000, p. 71.

Larger Vans and Wagons

Full-size vans that fall in class 2b are not “minivans.” This subclass includes commercial cargo and passenger vans as well as larger non-commercial vehicles. Table 5 provides a list of class 2b vans and wagons for 2000 models. Generally speaking, a “van” is used for cargo, and a “wagon” is considered a passenger vehicle. However, vans may also be used for passengers or may be converted for special uses.

Table 5. Price Ranges for Class 2b Vans/Wagons, 2000 Models

Nameplate	Approximate price range
Chevrolet Express Van (¾-ton and 1-ton)	\$21,600 – 28,000
Dodge Ram Van/Wagon (1-ton)	\$22,900 – 29,000
Ford Econoline Van/Wagon (¾-ton and 1-ton)	\$22,150 – 29,600
GMC Savana Van (¾-ton and 1-ton)	\$21,700 – 27,700

Source: Crain Communications, *Automotive News Market Data Book*, May 2000, p. 71.

The Ford Econoline has led the full-size van and wagon market in sales for several years. The line includes commercial cargo vans, conversion vans, club wagons, and cutaways. The vans make up about 61% of Econoline sales, the club wagon about 17%, and the cutaway about 22%. The club wagon can be configured with seating designs for 7 to 15 passengers. The vehicle mix in sales among the E-150, E-250, and E-350 models is usually expected to be about 39%, 19%, and 42% respectively. The customer base is about 60% commercial (18% people carriers; 42% cargo carriers) and about 40% personal (large families 6%; travelers/entertainers 34%).¹⁷

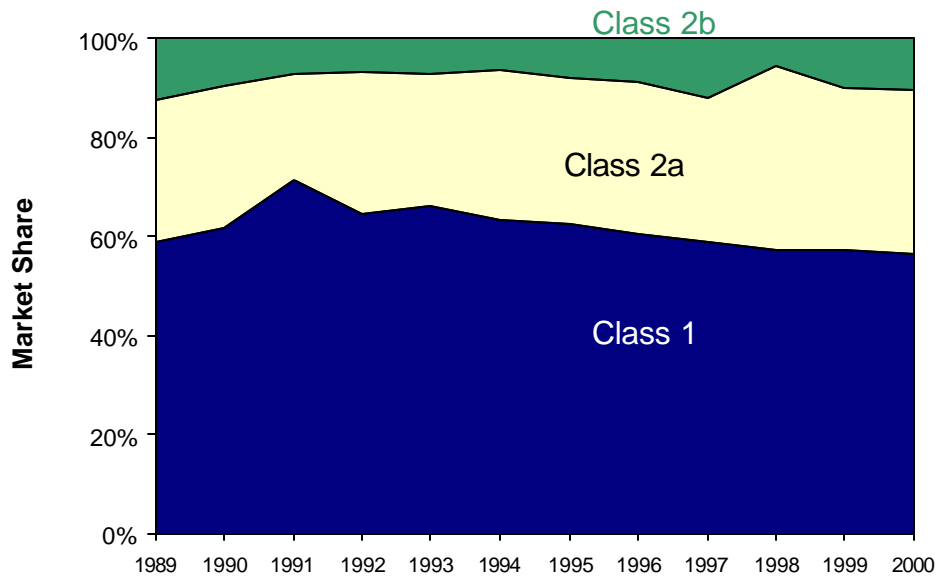
¹⁷ Ford Motor Company, *Econoline 97 Club Wagon Product and Marketing Guide*, August 1996.

The other vans and wagons noted in Table 5 have similar features to those of the Econoline. All full-size vans have tow packages. All are available in diesel as well as gasoline engines.

3.2 MARKET SHARES BY VEHICLE AND FUEL TYPE

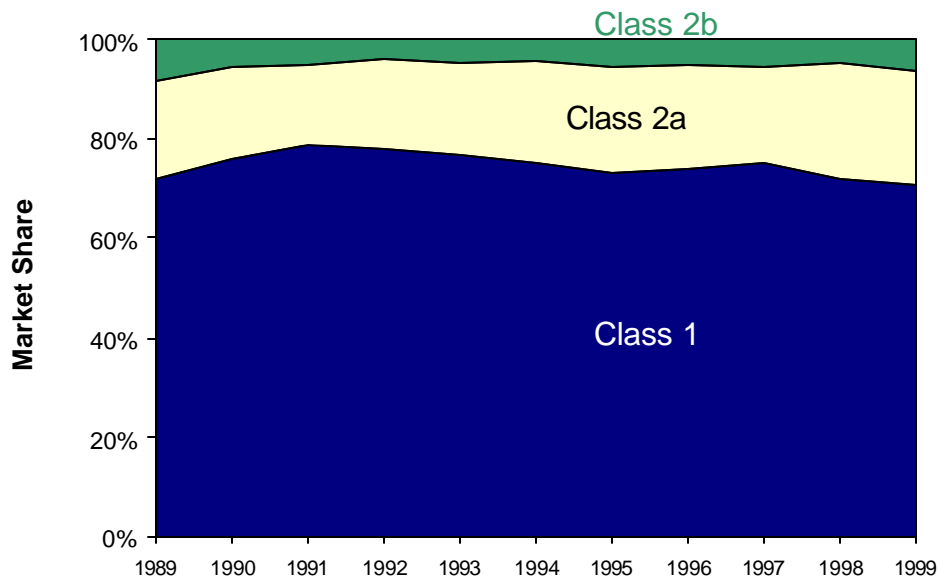
Since the early 1990's, class 2 vehicles have presented a more visible presence in the market place. Figure 6 shows the market share of class 2b vehicles (on a MY basis) in comparison with classes 1 and 2a vehicles. Figure 7 shows the market share on a CY basis.

Figure 6. Market Shares of Sales of Class 2b Vehicles in Comparison with Sales of Other Light Vehicles, 1989-2000, Model Year Sales



Source: See Method 3.

Figure 7. Market Shares of Sales of Class 2b Vehicles in Comparison with Sales of Other Light Vehicles, 1989-1999, Calendar Year Sales



Source: See Method 4.

Pickup trucks are definitely the vehicle of choice in class 2 – 2a and 2b. Pickups account for over half of class 2a sales, and over 70% of class 2b sales since MY 1993. Table 6 shows the share of class 2a and class 2b sales by vehicle type for MY 1989-2000.

Table 6. Shares of Class 2a and Class 2b Truck Sales by Vehicle Type, MY 1989-2000

	Class 2a			Class 2b		
	Pickups	Vans/SUVs	Total	Pickups	Vans/SUVs	Total
1989	58.4%	41.6%	100.0%	69.6%	30.4%	100.0%
1990	60.4%	39.6%	100.0%	72.2%	27.8%	100.0%
1991	67.6%	32.4%	100.0%	64.8%	35.2%	100.0%
1992	76.9%	23.1%	100.0%	70.0%	30.0%	100.0%
1993	76.9%	23.1%	100.0%	77.1%	22.9%	100.0%
1994	80.5%	19.5%	100.0%	76.5%	23.5%	100.0%
1995	76.6%	23.4%	100.0%	70.9%	29.1%	100.0%
1996	77.4%	22.6%	100.0%	73.5%	26.5%	100.0%
1997	65.7%	34.3%	100.0%	74.1%	25.9%	100.0%
1998	55.4%	44.6%	100.0%	73.2%	26.8%	100.0%
1999	55.2%	44.8%	100.0%	82.1%	17.9%	100.0%

Source: The Polk Company, National Vehicle Population Profile, 1990-2000 files.

Table 7 shows the shares of class 2a and 2b sales by fuel type for MY 1989-2000. In MY 1999, one-third of all class 2b trucks sold were powered by diesel, while only 1% of the class 2a trucks were diesel. Diesel trucks have gained market share over the last ten years in the class 2b sales, but have lost market share in the class 2a sales.

Table 7. Shares of Class 2a and Class 2b Truck Sales by Fuel Type, MY 1989-2000

	Class 2a				Class 2b			
	Diesel	Gas	Other ^a	Total	Diesel	Gas	Other ^a	Total
1989	3.1%	96.9%	0.0%	100.0%	15.6%	84.4%	0.0%	100.0%
1990	4.0%	96.0%	0.0%	100.0%	19.8%	80.2%	0.0%	100.0%
1991	6.6%	93.4%	0.0%	100.0%	23.0%	77.0%	0.0%	100.0%
1992	5.3%	94.7%	0.0%	100.0%	27.4%	72.6%	0.1%	100.0%
1993	2.8%	97.2%	0.0%	100.0%	39.6%	60.4%	0.0%	100.0%
1994	2.6%	97.4%	0.0%	100.0%	33.9%	66.0%	0.1%	100.0%
1995	2.4%	97.6%	0.0%	100.0%	31.9%	68.0%	0.0%	100.0%
1996	2.1%	97.8%	0.1%	100.0%	36.9%	63.0%	0.0%	100.0%
1997	2.4%	97.5%	0.0%	100.0%	36.5%	63.4%	0.1%	100.0%
1998	0.1%	99.8%	0.1%	100.0%	22.0%	77.8%	0.2%	100.0%
1999	1.0%	99.0%	0.1%	100.0%	33.1%	66.6%	0.2%	100.0%

Source: The Polk Company, National Vehicle Population Profile, 1990-2000 files.

^aOther fuel types include compressed natural gas, liquefied natural gas, liquefied petroleum gas, alcohol fuels, and electricity.

The pickups are definitely where the diesel market is. As shown in Table 8, vans/SUVs have more of an alternative fuel market than pickups in recent years.

Table 8. Shares of Class 2b Truck Sales by Vehicle Type and Fuel Type, 1989-2000

	Pickup				Van/SUV			
	Diesel	Gas	Other	Total	Diesel	Gas	Other	Total
1989	18.3%	81.7%	0.0%	100.0%	9.3%	90.7%	0.0%	100.0%
1990	22.4%	77.6%	0.0%	100.0%	12.9%	87.1%	0.0%	100.0%
1991	28.3%	71.7%	0.0%	100.0%	13.2%	86.8%	0.0%	100.0%
1992	33.7%	66.3%	0.0%	100.0%	12.5%	87.2%	0.3%	100.0%
1993	47.0%	53.0%	0.0%	100.0%	14.5%	85.4%	0.1%	100.0%
1994	40.2%	59.8%	0.0%	100.0%	13.1%	86.5%	0.4%	100.0%
1995	40.1%	59.9%	0.0%	100.0%	12.1%	87.8%	0.1%	100.0%
1996	47.1%	52.9%	0.0%	100.0%	8.7%	91.2%	0.1%	100.0%
1997	46.3%	53.7%	0.0%	100.0%	8.6%	91.1%	0.3%	100.0%
1998	24.8%	75.2%	0.0%	100.0%	14.6%	84.8%	0.6%	100.0%
1999	38.0%	61.9%	0.1%	100.0%	11.0%	88.4%	0.6%	100.0%

Source: The Polk Company, National Vehicle Population Profile, 1990-2000 files.

3.3 CURRENT POPULATION

As noted in Section 2, the hardest part about classifying the vehicles that belong in class 2b is the subset of vehicles that we termed “borderline.” These are the vehicles with a GVWR range that spans the 8,500-lb mark. When describing the current population of vehicles based on The Polk Company’s 2000 file of all registered vehicles, we identified and classified these borderline vehicles as described in Section 2, Method 2, assuming that 50% of these vehicles would be 2a and 50% would be 2b vehicles. For all vehicles in the 2000 file with $GVWR \leq 10,000$ lbs, only 13.2% were in the borderline category; 70.1% were definitely under 8,500 lbs; 16.7% were definitely over.

The borderline vehicles are usually the 2500 series trucks and vans (250 series for Ford; 200 for some vans). This series of vehicles have been getting heavier in the last few model years so that many of the 2500/250/20 series vehicles are over 8,500 lbs. Table 9 shows that the number of models in this series which were under 8,500 lbs has gone from 24 in MY 1996 to 9 in MY 2001.

Table 9. Number of 2500/250/20 Series Models under 8,500 lbs

Model year	Number of 2500/250/20 series models that are under 8,500 lbs	Total number of 2500/250/20 series models	Share of models under 8,500 lbs
1996	24	47	51.1%
1997	24	63	38.1%
1998	29	57	50.9%
1999	34	146	23.3%
2000	17	112	15.2%
2001	9	114	7.9%

Source: Wards Communications, *Ward’s Automotive Yearbook*, 1996-2001.

Note: Every model listed as a separate line in the source table was counted. For example, the Sierra C2500 SL and Sierra C2500 SLE were counted as different models; 2WD and 4WD versions of the same name were counted as different models; Extended cab and regular cab versions of the same name were counted as different models.

Table 10 shows that while class 2b trucks make up 23% of the population of trucks between 6,000 and 10,000 lbs, they account for only 8% of the population of trucks 10,000 lbs and under.

Table 10. Population of Trucks 10,000 lbs GVWR and Under by Weight Class, 2000

	All trucks 10,000 lbs GVWR and under		Trucks between 6,000 lbs and 10,000 lbs GVWR	
	Number of trucks	Share of trucks	Number of trucks	Share of trucks
Class 1	49,687,820	66.5%		
Class 2a	19,151,133	25.7%	19,151,133	76.7%
Class 2b	5,828,918	7.8%	5,828,918	23.3%
Total	74,667,871	100.0%	24,980,051	100.0%

Source: The Polk Company, National Vehicle Population Profile, 2000 file.

Almost one-quarter of the class 2b vehicles on the road in 2000 were diesel-powered, while class 2a trucks were predominantly gasoline-powered. As shown in Table 11, pickup trucks definitely have a greater presence than do vans/SUVs.

Table 11. Shares of the Population of Class 2a and Class 2b Trucks by Vehicle Type and Fuel Type, 2000

Fuel Type	Class 2a			Class 2b		
	Pickup	Van/SUV	Total	Pickup	Van/SUV	Total
Diesel	3.4%	0.8%	2.5%	29.3%	9.2%	24.0%
Gas	96.5%	99.2%	97.4%	70.7%	90.7%	76.0%
Other	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
By Vehicle Type	66.3%	33.7%	100.0%	73.7%	26.3%	100.0%

Source: The Polk Company, National Vehicle Population Profile, 2000 file.

3.4 AVERAGE AGE

The average age of vehicles with a GVWR under 10,000 pounds is shown in Table 12. The data indicate that class 2a and class 1 vehicles have very similar average ages, while class 2 vehicles have a much higher average age. It might be assumed that, because the larger vehicles cost more initially than smaller vehicles, they would be kept for a longer period of time (i.e., it would be more cost-effective to repair the larger vehicle than to replace it). The average age of class 2a vans/SUVs is 0.4 years lower than the average age of pickups in that same weight class. This is likely due to the recent surge of large SUV sales for household use.

New large SUV models, such as the Ford Expedition, fall into the class 2a category and their sales have likely lowered the average age of class 2a vans/SUVs.

Table 12. Average Age (in years) of Vehicles with a GVWR Under 10,000 lbs in the 2000 Total Population of Registered Vehicles

Vehicle type	Class 1	Class 2a	Class 2b	Class 2a & Class 2b
Pickups	-	7.6	8.6	7.8
Van/SUV	-	7.2	8.8	7.5
Total	7.3	7.4	8.6	7.7

Source: The Polk Company, National Vehicle Population Profile, 2000 file.
 Note: Class 1 data by vehicle type are not available.

3.5 ANNUAL MILES

The Census Bureau's *1997 Vehicle Inventory and Use Survey* (VIUS) was investigated in hopes of obtaining an estimate of annual miles of class 2b trucks. However, the VIUS questionnaire that was sent to owners of pickups, vans, and SUVs had check-boxes for weight categories – less than 6,001 lbs and 6,001-10,000 lbs. The only other possibility of selecting class 2b trucks from VIUS is the size of the engine. As stated in Section 2, the vehicle's GVWR does not correspond to certain engine sizes.

Since there was no way to single out class 2b trucks from the VIUS, Table 13 shows the average annual miles per truck for Class 1 and Class 2 vehicles by the vehicle's major use – personal or commercial.

Table 13. Number of Trucks and Average Annual Miles per Truck for Class 1 and Class 2 Trucks, 1997 VIUS

Major use	Number of trucks (millions)		Average annual miles per truck	
	Class 1	Class 2	Class 1	Class 2
Commercial	7.9	8.0	17,016	16,093
Personal	36.7	14.0	12,776	11,496
All	44.6	22.0	13,525	13,161

Source: U.S. Bureau of the Census, 1997 Vehicle Inventory and Use Survey, microdata file on CD, 2000.

As shown in Table 13, more than one-third of all class 2 trucks are used commercially, while only 18% of class 1 trucks are used commercially. Thus, we can derive an estimate of total class 2b miles by this equation: $[C2b*(36%)*16,093 \text{ miles}] + [C2b*(64%)*11,496 \text{ miles}]$, where C2b is the population of class 2b trucks in 2000 (Table 10). Using this methodology the vehicle miles traveled (vmt) for class 2b trucks is 76.7 billion vehicle miles. This will only be a rough estimate of class 2b truck miles due to the fact that the mileage data are from 1997 (latest VIUS data available) and the mileage data are for the entire class 2, not just class 2b. It is suspected that class 2b would have a greater share of commercial trucks than class 2a, but there are no available data sources to confirm that. Using this same methodology, the vmt for class 2a trucks would be 252 billion vehicle miles and class 1 trucks, 673 billion vehicle miles.

3.6 FUEL ECONOMIES

The city and highway fuel economies of trucks less than 8,500 lbs (class 1 and class 2a) are readily available from the *Fuel Economy Guide* and are posted on the window of all new vehicles sold.¹⁸ Trucks over 8,500 lbs, however, are not subject to the CAFE standards, and the manufacturers are not required to report the fuel economy for these vehicles. The Environmental Protection Agency (EPA) tests vehicles over 8,500 lbs to ensure they meet the proper emissions standards, but the fuel economy data collected during these tests are not made available outside the agency. The EPA explained that the test data would not be representative of the truck model because they are testing the “worst case scenario.”¹⁹ The manufacturers, who also test their own vehicles, have not made fuel economy information available for class 2b trucks in the last five years. The *1995 Ward’s Automotive Yearbook* contained information on many makes and models which had GVWR above 8,500 lbs, but the later versions (and most of the earlier versions) of the yearbook did not contain the fuel economy data for class 2b trucks.

¹⁸ U.S. Department of Energy and U.S. Environmental Protection Agency, *Model Year 2001 Fuel Economy Guide*, DOE/EE-0236, 2001.

¹⁹ Personal communication with David Goode, U.S. Environmental Protection Agency, National Vehicle and Fuel Emissions Laboratory, June 20, 2001.

In the absence of any source for recent class 2b fuel economy, we looked at the fuel economies of the heaviest vehicles in class 2a (Table 14). In model year 2000, fuel economies were available for seven van/wagon models and two ¾-ton pickup models.

The fuel economies from the heaviest vehicles in class 2a are similar to the fuel economies of vehicles in class 2b, according to the *1995 Ward's Automotive Yearbook*. As expected, the heaviest vehicles in class 2b would have slightly lower fuel economies than the class 2a vehicles. Also, whether the vehicle is diesel or gasoline will make a difference in fuel economy. Diesel vehicles generally get more miles to the gallon, because diesel engines are more efficient and diesel fuel has a higher energy content than gasoline.

Table 14. Heaviest Vehicles for which Fuel Economy Data Are Available, MY 2000

Manufacturer	Vehicle type	Engine size (liters)	City fuel economy (mpg)	Highway fuel economy (mpg)	Combined fuel economy (mpg)
Vans/wagons					
Chevrolet	Express Cargo Van G2500	5.7	14	18	16
Dodge	Ram Van 2500	5.9	12	18	15
	Ram Van 2500 Maxi	5.9	12	18	15
	Ram Wagon 2500	5.9	12	17	14
Ford	E250	5.4	13	18	15
	E250 Super Van	5.4	13	18	15
GMC	Savanna Cargo Van G2500	5.7	14	18	16
Pickups					
Chevrolet	Silverado C2500	6	12	16	14
GMC	Sierra C2500	6	12	16	14

Source: U.S. Environmental Protection Agency, adjusted fuel economy.

The VIUS indicates that the average fuel economy of the class 1 truck population is 17.9 miles per gallon (mpg), while the class 2 truck population averages 14.1 mpg. Thus, the fuel economy of the class 2b population would be expected to be no more than the class 2 average of 14 mpg.

3.7 FUEL USAGE

Given that we now have approximations for how many miles Class 2b trucks travel and how fuel efficient the vehicles are, we can estimate the fuel usage for this class of trucks. Again, this will be a low estimate for the fuel use, given the sparse data available on this

category of trucks. Using class 2b vehicle-miles (Section 3.5) divided by an estimated fuel economy of 14 mpg (Section 3.6) puts the fuel use of class 2b trucks at 5.5 billion gallons, or 929 gallons per truck [vmt/mpg=gallons of fuel used]. Using this same methodology, class 2a trucks use 18 billion gallons of fuel and class 1 trucks use 37 billion gallons of fuel.

3.8 EMISSIONS

Each year, passenger cars and light trucks contribute significant amounts of pollutants, thereby degrading air quality in the United States. Based on laboratory emissions tests, the EPA uses fuel efficiency ratings and air pollutant measurements to assign “green” scores to light vehicles. In the past, this ranking applied only to vehicles under 8,500 lbs GVWR. In recent years, however, many of the vehicles in the 8,500-lb to 10,000-lb GVWR category (i.e., class 2b vehicles) are being used as personal vehicles, not commercial vehicles; thus, regulations are changing.

3.8.1 New Vehicle Emission Standards

In early 2000, the EPA published the Final Rule on the new Tier 2 motor vehicle emissions standards.²⁰ This set of standards was designed to apply to larger passenger vehicles (i.e., pickup trucks, vans, and SUVs) as well as passenger cars, minivans, and light trucks. The ruling treats vehicles and fuels as a system and requires cleaner fuel as well as reducing emissions based on vehicle designs. The purpose of the ruling was to establish a “single set of emission standards that apply regardless of the fuel used and whether the vehicle is a car, a light truck, or a larger passenger vehicle.”²¹

Using a phased approach, the Tier 2 standards will eventually apply the same set of control criteria to passenger cars, light-duty trucks (LDT1-LDT4), and a new category of vehicles, labeled “medium-duty passenger vehicles” (MDPVs). The LDT3 and LDT4 vehicles belong to class 2a. The MDPV designation includes all class 2b personal-use vehicles. This classification is defined as follows:

²⁰ U.S. Environmental Protection Agency, “Control of Air Pollution from New Motor Vehicles: Tier 2 Motor Vehicle Emissions Standards and Gasoline Sulfur Control Requirements.” *Federal Register*, 40 CFR Parts 80, 85, and 86, Vol. 65, No. 28, February 10, 2000.

²¹ *Federal Register*, Vol. 65, No. 28, p. 6701.

any complete heavy-duty vehicle less than 10,000 pounds GVWR designed primarily for the transportation of persons ... not including any vehicle that (1) has a capacity of more than 12 persons total or (2) that is designed to accommodate more than 9 persons in seating rearward of the driver's seat or (3) has a cargo box (e.g., a pick-up box or bed) of six feet or more in interior length.²²

The MDPV category excludes vehicles that are *designed* for a legitimate work function as the primary use, including passenger service vehicles such as courtesy vans and jitneys. These vehicles would continue to be subject to applicable heavy-duty standards rather than the new Tier 2 standards.

The MDPV and heavy LDT categories will be subject to Tier 2 standards beginning in 2004. They must meet the final standards by 2009. EPA emission tests on a Ford Excursion (class 2b SUV) indicated that emission levels were higher than for a Ford Expedition (class 2a SUV) but were within the Tier 2 interim bin standards.

The Tier 2 standards are “fuel neutral” and apply to diesel as well as gasoline engines. The flexible phase-in timing allows manufacturers to delay meeting final Tier 2 standards for both gasoline and diesel engines until 2007 for smaller vehicles and until 2009 for heavy vehicles.

The Tier 2 standards require “cleaner” fuels for the “greener” vehicles. Sulfur levels in gasoline will be reduced during a phased-in approach comparable to the same time frame as that for Tier 2 vehicles. The interim and final Tier 2 exhaust emission standards (including MDPVs, which belong to class 2b), sulfur standards for gasoline, and impacts of the new standards (costs and benefits) are all provided in the *Federal Register* notice of February 10, 2000.

Guidelines for class 2b gasoline and diesel heavy-duty engines and vehicles which are not classified as MDPVs were published by EPA in early 2001.²³ These standards consider both the vehicle and the fuel as a total system as do the Tier 2 standards. This ruling also applies a phased approach to meeting the requirements. These standards include diesel fuel sulfur controls; the Tier 2 standards contain gasoline sulfur controls.

²² *Federal Register*, Vol. 65, No. 28, p. 6750.

²³ U.S. Environmental Protection Agency, “Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements.” *Federal Register*, 40 CFR Parts 69, 80, and 86, Vol. 66, No. 12, January 18, 2001.

3.8.2 Emission Estimates

Since historically the class 2b vehicle emissions have not been Federally-regulated, data in this area are scarce. The EPA mainly presents data on vehicles under 8,500 lbs GVWR, but does include some emissions data on gasoline-powered trucks over 8,500 lbs – mainly those certified to the stricter California emission standards. California adopted vehicle emission standards which were more stringent than the Federal standards; three other states (Massachusetts, New York, and Vermont) have joined California in adopting these standards. All new vehicles sold in those states must be certified to categories such as ultra-low-emission vehicle (ULEV), low-emission vehicle (LEV), and Tier 1 (a vehicle meeting the Federal Tier 1 emission standard). Effective with the 2001 model year, all vehicles of a given class offered by a manufacturer to be Federal Test Procedure certified for sale anywhere in the U.S. must collectively meet the fleet average emission limits of the National Low Emission Vehicle Program for that class.²⁴

The EPA has developed an “emission score” for MY 2001 vehicles which gives an indication of the number of pounds of smog-forming pollution that a vehicle emits for every 15,000 miles it is driven. The smog-forming pollution that the emission score is based upon includes nitrogen oxides, hydrocarbons, particulate matter and carbon monoxide. Table 15 lists the class 2b vehicles for which an emission score is available and gives information about their emissions.

²⁴ Personal communication with Chris Saricks, Transportation Technology R&D Center, Argonne National Laboratory, February 2002.

Table 15. EPA Emission Scores for MY 2001 Tested Class 2b Vehicles

Make and model (gasoline-fueled)	Primary sales area	Certification standard	Emissions score (0-10, 10 is best)	Pounds of smog- forming pollution per 15,000 miles
Chevrolet 2500 Silverado	CA, MA, NY, VT	LEV	2	39.0-40.6
Chevrolet 2500 Suburban	CA, MA, NY, VT	LEV	2	39.0-40.6
Chevrolet 3500 Express	CA, MA, NY, VT	Tier 1	0	63.8-121.1
	CA, MA, NY, VT	LEV	2	39.0-40.6
Chevrolet 3500 Silverado	CA, MA, NY, VT	LEV	1,2	39.0-58.8
Chevrolet 3500 Van	CA, MA, NY, VT	Tier 1	0	63.8-121.1
	CA, MA, NY, VT	LEV	2	39.0-40.6
Dodge RAM 2500 Pickup	Nationwide	Tier 1	0	63.8-121.1
	CA, MA, NY, VT	LEV	2	39.0-40.6
	CA, MA, NY, VT	ULEV	3	27.4-36.3
Dodge RAM 3500 Pickup	CA, MA, NY, VT	Tier 1	0	63.8-121.1
	CA, MA, NY, VT	LEV	1,2	39.0-58.8
	CA, MA, NY, VT	ULEV	2,3	27.4-40.6
Dodge RAM Van 3500	Nationwide	Tier 1	0	63.8-121.1
	CA, MA, NY, VT	ULEV	3	27.4-36.3
Dodge RAM Wagon 3500	Nationwide	Tier 1	0	63.8-121.1
	CA, MA, NY, VT	ULEV	3	27.4-36.3
Ford E350 Van	CA, MA, NY, VT	LEV	2	39.0-40.6
Ford Excursion	CA, MA, NY, VT	LEV	2	39.0-40.6
Ford F250	CA, MA, NY, VT	LEV	2	39.0-40.6
Ford F350	CA, MA, NY, VT	LEV	2	39.0-40.6
GMC 2500 Sierra	CA, MA, NY, VT	LEV	2	39.0-40.6
GMC 3500 Savana Passenger	CA, MA, NY, VT	Tier 1	0	63.8-121.1
	CA, MA, NY, VT	LEV	2	39.0-40.6
GMC 3500 Savana Cargo Van	CA, MA, NY, VT	Tier 1	0	63.8-121.1
	CA, MA, NY, VT	LEV	2	39.0-40.6
GMC 3500 Sierra	CA, MA, NY, VT	LEV	1,2	39.0-58.8

Source: U.S. EPA, Green Vehicle Guide website, www.epa.gov/autoemissions.
Includes nitrogen oxides, hydrocarbons, particulate matter and carbon monoxide.

4. SUMMARY AND CONCLUSIONS

This study analyzed information on trucks in the upper portion of the class 2 weight range. The investigation of class 2b trucks began with identification of the trucks that are between 8,500 and 10,000 lbs GVWR. Data sources which were explored included data from NHTSA, The Polk Company, Ward's Communications, and the Census Bureau. None of the existing data sources included weight data which identified the class 2b trucks separately from class 2a trucks. Thus, ORNL researched each individual truck model to determine which models were class 2b trucks and arrived at four methodologies to derive sales of class 2b trucks over the last ten years. Method 3, using MY sales data from *Ward's Automotive Reports* and Polk data to subdivide some truck model data, is the preferred method for MY sales. Method 4, using CY sales data from *Ward's Facts & Figures* and Polk data to find the share of class 2b trucks, provides the smoothest curve and is the preferred method for CY sales.

Next, we looked at the characteristics of the class 2b trucks by investigating body styles, fuel types, exterior dimensions, engine sizes and prices. Eighty-two percent of class 2b trucks sold in 1999 were pickups. Though gasoline was the predominant fuel type for class 2b trucks sold in 1999, one-third were diesel-fueled. Wheelbases for MY 2000 class 2b trucks ranged from 127.2 to 168.5 inches; engine sizes generally ranged from 5.4 to 7.4 liters; prices ranged from \$20,000 to \$41,000.

After analyzing class 2b sales, characteristics of the population of class 2b trucks were explored. There were about 5.8 million class 2b trucks on the road in 2000 (Table 16), which accounts for about 8% of total trucks under 10,000 lbs (74.7 million). Twenty-four percent of all class 2b's are diesel, while only 2.5% of class 2a and 0.3% of class 1 trucks are diesel. Class 2b trucks are kept in service longer than class 1 and class 2a trucks, evidenced by the higher average age for class 2b trucks. Though no available data source includes information on annual miles or fuel use of class 2b trucks, ORNL derived "low-end" estimates of these based on the average annual miles of commercial class 2 trucks and the fuel economy of class 2 trucks (Table 16).

Table 16. Summary Statistics on Light Trucks by Class

	CY 1999 Truck Sales (millions)	2000 Truck Population (millions)	Percent Diesel Trucks in Population	Average Age (years)	Estimated Annual Miles (billions)	Estimated Fuel Use (billion gallons)
Class 1	5.7	49.7	0.3%	7.3	672.7	37.4
Class 2a	1.8	19.2	2.5%	7.4	251.9	18.0
Class 2b	0.5	5.8	24.0%	8.6	76.7	5.5
Source:	Table 1	Table 10	Table 11*	Table 12	Section 3.5	Section 3.7

* Class 1 data were not displayed in Table 11, but were generated from the same source.

Finally, we looked at class 2b emission standards and emission estimates. The EPA's Tier 2 motor vehicle emissions standards, which begin in 2004, were designed to apply to the larger passenger vehicles in addition to the smaller vehicles which have been regulated historically. The class 2b trucks designed for passenger use fall into the Tier 2 MDPV category. The class 2b trucks designed for a legitimate work function are subject to applicable heavy-duty vehicle standards instead of Tier 2. Data on class 2b vehicle emissions are scarce because they have not been subject to regulation in the past. However, data are available from the EPA for selected class 2b vehicles. These data show that some class 2b trucks emit as much as 121 lbs of smog-forming pollution, while others emit as low as 27 lbs (Table 15) for every 15,000 miles of operation.

As the Tier 2 standards, which apply to passenger vehicles in the 8,500-10,000 lb GVWR category, become effective, additional data on class 2b trucks may become available – not only emissions data, but data in all areas. At the moment, distinguishing class 2b trucks from class 2 trucks in general is a substantial task requiring data on an individual model level.

REFERENCES

- Autopacific. *The US Car and Light Truck Market*. FT Automotive, Financial Times Business Ltd., London. 1999.
- Bradsher, Keith. "Deadly Crashes Increase Between Cars, Light Trucks." *The New York Times*. September 24, 1997.
- Chrysler Corporation. *1997 Ram Pickup: The New Dodge*. July 1996.
- Crain Communications. *Automotive News: 2000 Market Data Book*. Detroit MI. May 2000.
- Davis, Stacy C. *Transportation Energy Data Book*. Ed. 20. ORNL-6959. Oak Ridge National Laboratory. Oak Ridge, TN. October 2000.
- Davis, Stacy C., and Lorena F. Truett. *An Analysis of the Impact of Sport Utility Vehicles in the United States*. ORNL/TM-2000/147. Oak Ridge National Laboratory, Oak Ridge, TN. August 2000. <http://www-cta.ornl.gov/Publications/Final%20SUV%20report.pdf>.
- DeCicco, John, and Martin Thomas. *Green Guide to Cars & Trucks, Model Year 2000*. American Council for an Energy-Efficient Economy. Washington, DC. 2000.
- Ford Motor Company. *Econoline 97 Club Wagon Product and Marketing Guide*. August 1996.
- Federal Register*. 40 CFR Parts 80, 85, and 86. Vol. 65. No. 28. February 10, 2000.
- Federal Register*. 40 CFR Parts 69, 80, and 86. Vol. 66. No. 12. January 18, 2001.
- Oak Ridge National Laboratory. Light Vehicle MPG and Market Shares System. Oak Ridge, TN. 2001.
- Office of Transportation Technologies. <http://www.ott.doe.gov/facts/archives/fotw92.html>, "Fact of the Week," Fact #92. Washington, DC. June 8, 1999.
- The Polk Company. National Vehicle Population Profile, Model Years 1989-2000, computer data files.
- U.S. Department of Commerce, Bureau of the Census. *1997 Census of Transportation, Vehicle Inventory and Use Survey Form TC-9501*.
- U.S. Department of Energy and U.S. Environmental Protection Agency. *Model Year 2001 Fuel Economy Guide*. DOE/EE-0236. Washington, DC. 2000. <http://www.fueleconomy.gov/feg/FEG2001.pdf>.
- U.S. Department of Transportation, National Highway Traffic Safety Administration, "Summary of Fuel Economy Performance," Washington, DC. March 2001.

U.S. Environmental Protection Agency. Green Vehicle Guide website.2001.
<http://www.epa.gov/autoemissions>.

Ward's Communications. *Ward's Automotive Reports*. Southfield, MI. 1998-2001.

Ward's Communications. *Ward's Automotive Yearbook*. Southfield, MI. 51st -63rd Editions.
1989-2001.

Ward's Communications. *Ward's Motor Vehicle Facts & Figures*. Southfield, MI. 1999-2000.
Also previous annual editions 1989-1998 published by the American Automobile
Manufacturers Association.

APPENDIX A

CONTACTS WITH DEALERSHIPS REGARDING “BORDERLINE” MODELS

Some truck models with the same specifications (e.g., engine size, wheelbase, number of tires) have a weight range that spans the class 2a-2b breakpoint. This situation makes it impossible to assign the model to one class or the other. The problem generally occurs only on the $\frac{3}{4}$ -ton trucks, because $\frac{1}{2}$ -ton trucks are always under 8,500 lbs gross vehicle weight rating (GVWR) and 1-ton trucks are usually over 8,500 lbs. In addition to the issue of a specific model spanning the weight range in any given year, some models would be listed with a GVWR under 8,500 lbs some years and over 8,500 lbs other years. These “borderline” vehicles were noted more frequently in Chevrolet and GMC models than in Dodge or Ford trucks.

We were able to determine that a $\frac{3}{4}$ -ton vehicle with heavy-duty springs and suspension was almost always over 8,500 lbs GVWR. The heavy-duty features were not, however, always obvious from the model name/number in the databases we used. Therefore, we called Chevrolet and GMC dealerships across the United States to see if we could determine a percentage of $\frac{3}{4}$ -ton trucks with heavy-duty features sold.

We chose Chevrolet and GMC dealerships from each of the four Census regions. All of the dealers had been in business at least ten years. Table A.1 shows their responses.

As can be seen in Table A.1, there was no consistent response. Therefore, we could draw no conclusions from this data inquiry regarding the percentage of $\frac{3}{4}$ -ton trucks sold that were heavy-duty.

Table A.1. Dealer Responses Regarding Percentage of Heavy-Duty^a Sales of ¾-ton Trucks

Dealer location	For MYs 2000/2001, considering sales of only ¾-ton trucks, what percent was HD?^b	Over the past ten years, considering sales of only ¾-ton trucks, what percent was HD?	Notes
Arlington/ Boston, MA	Chev: almost 100% GMC: 30%	Chev: 70% GMC: 40%	<u>Chev:</u> sell a lot of commercial vehicles; people can't get by with overloaded vehicles anymore because of CMV enforcement; also, owners have lower overall maintenance (tires, brakes) when they buy the appropriate frame for the load
Dover-Foxcroft, ME	Chev: 10% GMC: 10-15%	Chev: 5% GMC: 5%	<u>Chev:</u> sales are primarily class 1 and 2a trucks <u>GMC:</u> ¾ ton is hard to get – can't keep up with demand for HD axles; folks need the HD for towing
Indian-apolis, IN	Chev: 70% GMC: 80%	Chev: 7% GMC: 80%	<u>Chev:</u> customers are requesting HD feature – towing bigger boats
Blooming-ton, IL	Chev: 2-3% GMC: 66%	Chev: 2-3% GMC: 10%, gradually increasing yearly	<u>GMC:</u> In the past, consumer considered it a commercial vehicle. Engineering has improved it to be more comfortable and more user friendly. There is a lot of agricultural activity in the area; the ¾-ton truck can be used for ag purposes thru the week but then look nice enough to drive to church on Sunday
Portland, OR	Chev: 70% GMC: 5%	Chev: 70% GMC: doesn't know	<u>Chev:</u> towing – if they don't need the power, they'll go with the 1500 <u>GMC:</u> not into commercial sales
Cheyenne, WY	Chev: 15-18% GMC: 10%	Chev: 15-18% GMC: 20%	<u>GMC:</u> can't get the HD trucks; you can't sell them if you can't get them
El Paso, TX	Chev: <3% GMC: 35%	Chev: <3% GMC: doesn't know	<u>Chev:</u> availability is the problem
Pensacola, FL	Chev: 15-20% GMC: 90%	Chev: 5% GMC: 90%	<u>Chev:</u> percentage of HD is increasing – new market style; it's a lot more truck than before <u>GMC:</u> people who buy this size truck may own a business or have a trailer; they want heavy trailering and towing capability; it's not aesthetics, and the price of fuel doesn't matter; the purchase is based on a need

^a Manufacturers often designate light trucks as “heavy-duty” or “super-duty” based on whether it had heavy-duty springs, transmission, and suspension. Borderline vehicles that have these heavy-duty features have a higher GVWR and therefore belong in the 2b category rather than the 2a.

^b MY = model year; HD = heavy duty; CMV=commercial motor vehicle.

INTERNAL DISTRIBUTION

1. K. L. Campbell
2. S. C. Davis
3. E. C. Fox
4. D. L. Greene
5. P.S. Hu
6. L. F. Truett
7. Central Research Library
8. ORNL Laboratory Records–RC
9. ORNL Laboratory Records–OSTI
- 10–47. Center for Transportation Analysis

EXTERNAL DISTRIBUTION

48. Philip D. Patterson, U.S. Department of Energy, EE-30, Room 5F-034, 1000 Independence Avenue, SW, Washington, DC, 20585.
49. Chris Saricks, Argonne National Laboratory, ES-362, 9700 S. Cass Avenue, Argonne, IL 60439.
50. Anant Vyas, Argonne National Laboratory, ES-362, 9700 S. Cass Avenue, Argonne, IL 60439.