ENVIRONMENTAL IMPACT STATEMENT

EMISSION STANDARDS FOR NEW

LIGHT DUTY TRUCKS

PREPARED BY

OFFICE OF MOBILE SOURCE AIR POLLUTION CONTROL

APPROVED BY

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Date: 11/29/76

SUMMARY SHEETS

FOR

FINAL ENVIRONMENTAL IMPACT STATEMENT

PREPARED BY

OFFICE OF MOBILE SOURCE AIR POLLUTION CONTROL

ENVIRONMENTAL PROTECTION AGENCY

1. Title of Action: Emission Standards for New Light Duty Trucks. This is an administrative action.

2. Description of Action: The EPA has set more stringent emission standards for new light duty trucks, and has enlarged the current light duty truck class to include trucks up to 8500 pounds gross vehicle weight rating (GVWR). The emission standards which apply to trucks up to 8500 pounds GVWR are 1.7 grams/mile (g/m) hydrocarbons (HC), 18 g/m carbon monoxide (CO) and 2.3 g/m oxides of nitrogen (NOx). The EPA has set these standards for 1979 and later model year light duty trucks.

3. Environmental Impact: This action will affect the air quality of the nation as a whole, and in particular will improve air quality in those areas of the country projected to have problems in meeting air quality standards. About one-third of the U.S. population now lives in those areas. In those areas the action will, in 1990, result in a six percent oxidant air quality improvement, a five percent carbon monoxide air quality improvement and a three to four percent reduction in the expected air quality degradation for nitrogen dioxide.

There is the potential for an increase in sulfuric acid emissions from trucks in the new light duty truck class, although such increase at most would be slight. Sulfuric acid emissions from mobile sources have been extensively examined by EPA, and there is no indication at this time that current levels of mobile source sulfate emissions represent an immediate hazard to the public health or welfare. EPA's examination of the sulfuric acid emissions from mobile sources is continuing.

4. Economic Impact: The sticker price of new light duty trucks is expected to increase slightly for trucks currently regulated as light duty trucks (0 to 6000 pounds GVWR), and could increase as much as $219 for those heavier trucks being added to the new light duty truck class. Fuel economy of all light duty trucks should not be adversely affected.

5. Alternatives Considered:

A. Take no action.

B. Further control of emissions from stationary sources.

C. Further control of emissions from mobile sources other than light duty trucks.

D. Alternative means for control of light truck emissions:

I. Impose emission standards of 1.7 g/m HC, 18 g/m CO and 2.3 g/m NOx, but do not change the light duty truck class definition.

II. Impose emission standards of 1.7 g/m HC, 18 g/m CO and 2.3 g/m NOx, but limit the enlarging of the light duty truck class to 7000 pounds GVWR.

6. Availability: Copies of the final EIS were made available to the Council on Environmental Quality and the public _____. Single copies of the final EIS are available upon request from the Public Information Center (PM-215), U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460.

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Chapter I

INTRODUCTION

A. Background

Light duty trucks have been Federally regulated since 1968. From that time until model year 1975, light duty trucks were tested on the same test procedure and subjected to the same emission standards as light duty vehicles. Over those years, both the standards and test procedures for light duty vehicles and light duty trucks underwent several modifications. Current test procedures for light duty vehicles and light duty trucks involve operation of test vehicles on a simulated urban driving cycle, and measurement of exhaust emissions during that driving cycle. The current emission standards for both types of vehicles are based on testing of those vehicles on the urban driving cycle, and hence characterize the vehicles' expected urban emissions.

Since model year 1975 light duty trucks have been subjected to standards differing in stringency from light duty vehicles. As the result of a court decision 1/, EPA was required to base emission standards for light duty trucks on section 202(a) of the Clean Air Act which specifies that EPA should set emission standards for any class of vehicles (in this instance, light duty trucks) which causes or contributes to air pollution, or is likely to cause or contribute to air pollution which endangers the public health or welfare.

1/ International Harvester vs. Ruckelshaus, 478 F. 2d 615 (D.C. Cir. 1973).

Section 202(a) further specifies that EPA must consider both the cost of compliance with the regulation, and provide adequate time to comply with the regulation.

As a further result of that court decision, EPA established a class of vehicles differing from light duty vehicles for the purpose of setting emission standards. That class, the light duty truck class, was defined to include all trucks less than 6000 pounds gross vehicle weight rating (GVWR). In the same regulatory action which defined the light duty truck class 2/, EPA set emission standards for light duty trucks of 2.0 grams per mile (g/m) HC, 20 g/m CO and 3.1 g/m NOx. Since model year 1975, the light duty truck class definition and emission standards have not been changed.

In contrast, light duty vehicles are being subjected to increasingly more stringent emission standards. Beginning in model year 1975, light duty vehicles are required to meet emission standards of 1.5 g/m HC, 15 g/m CO and 3.1 g/m NOx. In model year 1977, as currently required by the Clean Air Act, the light duty vehicle NOx emission standard will be lowered to 2.0 g/m. Further development of vehicles to meet much lower emission standards scheduled to be imposed in the future is progressing in the light duty vehicle area.

2/ 38 FR 21362, August 7, 1973. Current emission regulations for light duty vehicles, light duty trucks and heavy duty engines are set forth at 40 FR 27593, June 30, 1975.

B. Description of this Action

EPA has both enlarged the current light duty truck class, and has imposed more stringent emission standards for all trucks in the resulting new light duty truck class.

The upper weight limit for the light duty truck class definition has been raised from 6000 to 8500 pounds GVWR. Addition of these higher capacity trucks to the light duty truck class will enlarge the class by approximately 80 percent.

Standards which have been promulgated for the new light duty truck class, 1.7 g/m HC, 18 g/m CO and 2.3 g/m NOx, will result in moderate emission reductions for those trucks currently regulated as light duty trucks (0 to 6000 pounds GVWR), and will achieve significant emission reductions for those trucks formerly tested under the heavy duty engine regulations (6000 to 8500 pounds GVWR).

Both these actions have been made effective beginning in the 1979 model year.

C. Light Duty Truck Class Structure

Truck design and usage characteristics have been examined to provide a basis for selecting a new light duty truck class definition which would result in similar trucks being regulated under standards and test procedures most appropriate for those trucks. Trucks with like design characteristics have been grouped together, so that emission standards can be imposed in a cost-effective manner. Trucks with like

usage patterns have also been included in the new light duty truck class, so that a test procedure which simulates urban light duty truck (and passenger car) usage can be applied to predict actual urban emissions from trucks in the new light duty truck class.

While the new light duty truck class is structured to minimize truck overlap (or one model line with trucks both above and below 8500 pounds GVWR), complete elimination of this overlap is not possible. To account for such overlap, EPA has included an optional category (up to 10,000 pounds GVWR) in which manufacturers may choose to certify trucks under the light duty truck procedure.

As a further limitation of the cross-over of body styles, and to exclude where possible trucks which are clearly used for commercial purposes from the light duty truck class, trucks with frontal areas greater than 46 square feet have been excluded from the new light duty truck class. This inclusion of high frontal area trucks in the heavy duty class will eliminate certain delivery vans and other large vehicles from the light duty truck class, on the basis that usage characteristics of these trucks do not warrant their inclusion in the light duty truck class.

D. Environmental Impact

This regulation will reduce urban emissions from trucks in the new light duty truck class in 1990 by 0.51 million tons per year of hydrocarbons, 3.0 million tons per year of carbon monoxide and 0.25 million tons per year of oxides of nitrogen. The projected reductions are those which can be expected to occur in areas having the most serious air quality problems in the near term and through the 1980's.

The urban emission reductions obtained from imposition of this regulation will result, in 1990, in a six percent improvement in oxidant (hydrocarbons) levels, a five percent improvement in carbon monoxide levels, and a three to four percent reduction in expected nitrogen dioxide air quality degredation. Similar improvements can be expected as a result of this regulation in regions other than those analyzed in this report.

There are no anticipated secondary environmental impacts in the areas of truck fuel consumption, noise pollution control, water or solid waste pollution. Fuel economy of trucks currently regulated as light duty trucks (0 to 6000 pounds GVWR) should not be affected by this regulation, as no design changes should be necessary to meet the standards. For the heavier trucks to be added to the new light duty truck class, imposition of these standards may result in slight fuel economy improvements. There is the potential that sulfuric acid emissions from the new light duty truck class could increase as a result of this regulation, but the increase is not considered major. This potential problem has been examined in connection with the ongoing work within EPA directed towards development of a sulfuric acid emission standard for application on light duty vehicles and light duty trucks. Such a standard is not at this time deemed necessary to protect the public health.

E. Economic Impact

Five domestic manufacturers dominate the light duty truck industry. Ford and General Motors account for 75 percent of all trucks in the enlarged light duty truck class which are sold domestically, with Chrysler, American Motors and International Harvester selling about 18 percent. Imports account for only about 7 percent of the total U.S. domestic sales of trucks in the enlarged light duty truck class.

Estimates of the cost of achieving the 1979 standards have been developed. Analysis done by EPA has led to the conclusion that a sticker price increase of $219 would be necessary to install a catalyst emission control system capable of meeting the final standards on those trucks being added to the class.

As most manufacturers have already elected to equip current light duty trucks with catalyst systems and the existing emission control systems will meet the new emission standards with slight modification, the real cost of this regulation is the cost of installing $219 worth of control equipment on those vehicles which were formerly classed as heavy duty vehicles (6000 to 8500 pounds GVWR) and which have become light duty trucks under the new class definition. These costs are estimated to represent between 3.8 and 6.0 percent of the sales price of typical 6000 to 8500 pound GVWR light duty trucks. The aggregate cost to install control equipment on all 1979 model year light duty trucks is estimated to be about $309.2 million, of which about $8.7 million is the expense of certifying the vehicles with EPA.

Consumer demand, employment and competition in the light duty truck industry are not expected to be permanently impacted, as the long run growth in production is expected to increase significantly and will help to decrease any short term market instability caused by this regulation.

F. Alternative Actions Considered

The principle alternative actions considered were (a) Take no action, (b) Set alternative light duty truck standards and (c) Control other sources of HC, CO and NOx. The alternative of taking no action was rejected because major population centers are projected not to meet

air quality standards through the 1980's and control of trucks in the new light duty truck class provides measurable improvements in air quality at reasonable cost. The second alternative was rejected because it did not provide as much emission control for light duty trucks as did the final approach selected.

The third alternative considered, control other sources of HC, CO and NOx, was rejected primarily due to the fact that even with implementation of all identified control strategies, many of the Nation's areas will be unable to meet the National Ambient Air Quality Standards.

G. Organization of the Report

This report presents an assessment of the environmental and a summary assessment of the economic impact of the light duty truck regulations EPA is promulgating. It provides a description of the information and analyses used to review all reasonable alternative actions and to make the final selection.

The report has been divided into six major sections plus this introduction. Chapter II presents a general description of the present in-use population of trucks, a description of the rationale for the selection of the new light duty truck class definition, a projection of growth in the sales of new light duty trucks, and a characterization of emissions from trucks in the new light duty truck class.

As assessment of the primary and secondary environmental impacts attributed to these regulations is given in Chapter III. The degree of control reflected by the standards is described and a projection of

air pollutant emissions for the national light duty truck population with and without the regulation through 1990 is presented. The impacts of these regulations on urban emissions and the expected air quality benefits are described. Secondary effects on other air pollutant emissions, water pollution, noise, and energy consumption are also discussed in this section.

Chapter IV presents an assessment of the economic impact of the regulations. Included is an assessment of the impact of these regulations on producer and consumer costs (operating and first cost), and the growth and structure of the light duty truck industry.

Chapter V discusses irreversible commitments of resources, and reviews the relationship of short term uses of the environment to long term productivity.

Chapter VI presents an evaluation of the environmental, social, and economic impacts of alternative actions including no further regulation of light duty truck emissions, alternative emission standards for light duty trucks and the additional reduction of emissions from other mobile sources and from stationary sources.

Chapter VII summarizes the comments EPA has received on the proposed regulation and on the Draft EIS. Also included in this chapter is EPA's disposition of the major comments.

Chapter II

LIGHT DUTY TRUCK CHARACTERIZATION

A. Introduction

In the area of mobile source air pollution control, EPA's primary concern in the near term is the reduction of urban emissions, since air quality problems are most acute in urban areas. Trucks of all types operate in urban areas, and hence contribute to urban air pollution. To effectively reduce the truck contribution to urban air pollution, these trucks must be subjected to regulations controlling emissions from each individual truck. However, unlike passenger cars, trucks differ widely in their design and use characteristics. This wide difference in truck design and use characteristics makes it impractical to subject all trucks to the same emission standards, and to require that all trucks be tested (for compliance with emission standards) using the same test procedure.

Because trucks do differ so widely, EPA has in the past divided trucks into light and heavy duty truck classes [1/]. The first class, light duty trucks, has been defined as all trucks less than 6000 pounds GVWR. These trucks have been subjected to emission standards similar to light duty vehicles (although slightly less stringent) and have been tested on the same test procedure as light duty vehicles. The second class, heavy duty trucks, has been defined as all trucks above 6000 pounds GVWR. Engines employed in these heavier trucks have been subjected to emission standards not nearly as stringent

1/ Current light duty truck and heavy duty engine emission control regulations are contained at 40 FR 27593, June 30, 1975.

as light duty vehicles, and have been tested on a test procedure which accounts for a wide variety of commercial use applications.

In order for a regulation for the reduction of truck emissions to be effective, two concerns must be satisfied by that regulation. First, the test procedure on which the emission standard is based should, to a reasonable degree, predict the actual emissions of the truck when the truck is operated in the environment where air quality problems are acute, in this instance in urban environments. Second, the emission standard imposed by the regulation should achieve reductions in emissions which are technically feasible for all trucks subject to the regulation, with due consideration of the cost-effectiveness of the control and the lead time necessary to develop and implement the control.

The first concern arises due to the fact that emission characteristics of vehicles differ depending on the operating patterns of the vehicles. For instance, a vehicle operated at a constant speed of 50 miles per hour would be expected to have different emission characteristics than a vehicle operated in stop and go traffic. The test procedure on which the emission standard is based would be meaningless if it did not accurately model the operating pattern of vehicles in the area of interest, in this case urban operation.

The second concern arises from the widely varying design of trucks. Trucks are produced with different design capacities, and even are produced in markedly different manners. Because of these vast differences in truck design all trucks cannot successfully achieve the same absolute levels of emission control.

To impose emission standards effectively, trucks must be grouped so that similar trucks may be subjected to similar standards. The imposition of emission standards can then be done in a cost-effective manner.

The current grouping of trucks (light duty trucks below 6000 pounds GVWR and heavy duty trucks above 6000 pounds GVWR) fails to adequately satisfy the two concerns discussed above. The 6000 pound GVWR division does not result in trucks being tested using the most appropriate test procedure, and does not allow the imposition of emission standards on similar trucks. For example, under the current division of trucks, two pickup trucks within the same model line, designed and produced in a similar manner and operated in urban areas in a similar manner, may be subjected to different emission control regulation (light and heavy duty truck) simply because one is less than 6000 pounds GVWR and one is more than 6000 pounds GVWR.

To make the light duty truck regulations more effective, EPA has grouped trucks with like operating characteristics in one class. This grouping will allow the emissions of trucks in urban areas to be accurately assessed, and will result in urban emission reductions being achieved by trucks in the new light duty truck class. For the purpose of choosing a group of trucks which are amenable to the same level of emission control, EPA has also grouped trucks with like design

characteristics in one class. This chapter examines truck design and usage characteristics, with a view toward outlining the considerations EPA has in grouping trucks into classes and imposing emission standards based on those considerations.

Following this examination of truck design and usage characteristics and the rationale for EPA's selection of light duty truck class definition, emission characteristics of trucks in the new light duty truck class are discussed, and growth of the new light duty truck class is projected. These further discussions concerning light duty truck emission characteristics and growth are presented to form the bases for the examination in the remainder of this statement of the environmental, economic and social impacts of EPA's final regulation.

B. Design Characteristics

The industry has traditionally grouped trucks into eight classes based on gross vehicle weight rating (GVWR). These classes are:

Class	Weight (lbs GVWR)	Class	Weight (lbs GVWR)
Class I	0 - 6000	Class V	16,001 - 19,500
Class II	6001 - 10,000	Class VI	19,501 - 26,000
Class III	10,001 - 14,000	Class VII	26,001 - 33,000
Class IV	14,001 - 16,000	Class VIII	over 33,000

Table II-1 shows data collected by the MVMA which details the levels of factory sales of trucks in these eight classes over the past several years. These data indicate clearly that of all trucks sold in the U.S. in recent years, the majority (over eighty percent) are less than 10,000 pounds GVWR. Few Class III vehicles are made though the volume did grow significantly between 1969 and 1973. Most trucks over 10,000 pounds GVWR are in Classes V through VIII, i.e. over 16,000 pounds GVWR.

Table II-2 offers a more detailed look at the composition of truck Classes I, II, and III. These data show that almost all trucks in these classes are less than 10,000 pounds GVWR with only two percent of factory sales falling in Class III. Ninety percent of the trucks in Class III are multistop trucks, primarily incomplete vehicles used for mobile homes. Multistop trucks less than 10,000 pounds GVWR are also produced but account for only two percent of factory sales in Classes I and II. Other types of incomplete vehicles [cab chassis, etc] make up four percent of sales in Classes I and II and ten percent in Class III.

Another observation is that almost all of the types of vehicles which make up the current light duty truck class [less than 6,000 pounds GVWR] are also manufacturered in larger versions up to 10,000 pounds GVWR. Approximately one half of all passenger vans, about one third of regular vans and pick up trucks, and one fifth of station wagons built on truck chassis are between 6,000 and 10,000 pounds GVWR. Also noteable is the fact that all of these truck types are less than 10,000 pounds GVWR. Thus only multistop vehicles and other incomplete trucks are produced in truck Class III as well as Classes I and II.

The main item that all trucks up to 14,000 pounds GVWR have in common is the engines. All domestic trucks in this GVWR range use essentially the same engines as current 0 to 6000 pound GVWR light duty trucks. In most cases, these engines are identical to those used in passenger cars or are close derivatives of passenger car engines. The engines differ in emission controls since some have been tested as light duty trucks and others as heavy duty vehicles. These differences amount to different carburetor and distributor settings and differences in the "add-on" emission control devices. For example most of the engines certified for heavy duty use do not have exhaust gas recirculation, air injection, evaporative emission controls, transmission controlled spark settings, or catalysts.

In summary the major conclusions that can be drawn concerning the present truck fleet are:

1) In terms of sales, the largest group of trucks is found in the range of 0 to 10,000 pounds GVWR, with the remaining majority of trucks concentrated above 16,000 pounds GVWR.

2) Most of the trucks sold in the current light duty truck class [pickup, vans, station wagons on truck chassis] are also produced between 6,000 and 10,000 pounds GVWR though none are greater than 10,000 pounds GVWR.

3) Few trucks are produced in Class III. Class III consists exclusively of multistop trucks and other incomplete vehicles that are used primarily for mobile homes.

4) Engines found in all domestic trucks up to 14,000 pounds GVWR are similar to the engines used in 0 to 6000 pound GVWR trucks, and in most cases are also similar to those used in passenger cars.

These conclusions imply that the breakpoint between heavy duty vehicles and light duty trucks, if based solely on truck design characteristics, should be no higher than 10,000 pounds GVWR.

Table II-1

FACTORY SALES OF TRUCKS

FACTORY SALES OF TRUCKS AND BUSES BY GROSS VEHICLE WEIGHT, POUNDS

	6,000 & Less	6,001-10,000	10,001-14,000	14,001-16,000	16,001-19,500	19,501-26,000	26,001-33,000	Over 33,000	TOTAL
TOTAL									
1975	982,511	962,987	14,342	1,129	10,582	174,218	27,310	99,081	2,272,160
1974	1,536,778	731,529	9,094	4,318	13,071	224,499	34,432	173,592	2,727,313
1973	1,735,645	761,481	44,724	7,477	18,941	203,300	42,200	165,920	2,979,688
1972	1,414,551	584,612	44,221	9,945	28,080	182,058	42,213	141,127	2,446,807
1971	1,196,544	486,388	17,928	14,871	58,042	132,197	36,441	110,735	2,053,146
1970	950,252	401,592	7,353	9,979	59,205	124,554	38,451	101,054	1,692,440
1969	1,121,222	405,108	7,161	13,491	78,105	147,405	33,304	117,383	1,923,179
1968	1,136,059	385,803	4,646	17,495	79,436	141,264	41,814	89,561	1,896,078
1967	899,986	289,835	5,207	16,499	88,213	123,934	37,960	77,828	1,539,462
1966	1,020,158	296,957	7,485	21,286	125,473	124,361	44,337	91,027	1,731,084
1965	1,058,211	294,178	5,020	25,751	144,449	109,625	39,968	74,603	1,751,805
1964	919,663	250,204	5,804	24,234	142,277	104,499	29,613	64,159	1,540,453
1963	836,129	246,650	5,679	28,450	145,298	109,570	32,186	58,746	1,462,708
1962	677,804	213,050	8,503	27,495	142,163	93,138	35,153	42,862	1,240,168
DOMESTIC									
1975	897,292	853,310	13,914	917	5,718	139,769	21,555	70,283	2,002,758
1974	1,409,586	660,312	8,911	3,220	10,271	197,450	29,091	150,785	2,469,626
1973	1,639,663	713,210	44,272	6,443	15,543	180,345	37,834	149,503	2,786,813
1972	1,339,226	549,523	43,898	8,661	24,826	163,266	37,727	127,244	2,294,371
1971	1,133,911	453,981	17,796	12,602	52,038	110,587	32,795	100,598	1,914,308
1970	895,238	373,595	6,510	8,357	52,466	103,318	34,751	91,434	1,565,669
1969	1,052,057	379,492	6,525	11,272	68,617	125,910	30,858	106,446	1,781,177
1968	1,069,422	365,785	4,338	14,690	67,381	123,059	37,882	82,534	1,765,091
1967	836,512	269,273	4,850	14,236	76,874	107,972	33,911	70,810	1,414,438
1966	957,227	278,099	5,805	18,711	109,696	110,528	41,158	85,302	1,606,526

Source: MVMA Motor Vehicle Facts and Figures '76

Table II-2

Domestic Factory Sales - 1973 Calender Year

	Under 6000# GVWR	6-10000#	10-14000#	Total Under 10,000# GVWR	Total Under 14,000# GVWR
Pickup	1,067,908 (68%)	467,307 (62%)	-----	1,535,215 (66%)	1,535,215 (65%)
Multistop	2,803 (0%)	34,282 (5%)	39,659 (90%)	37,685 (2%)	77,344 (3%)
Other: Bare Chassis, Chassis w/cab, Chassis w/cowl	6,253 (1%)	88,068 (11%)	4,613 (10%)	94,321 (4%)	98,934 (4%)
Van	204,348 (13%)	101,553 (13%)	-----	305,901 (13%)	305,901 (13%)
Passenger Van	49,501 (3%)	44,480 (6%)	-----	93,981 (4%)	93,981 (4%)
Station Wagon	80,842 (5%)	20,713 (3%)	-----	101,555 (4%)	101,555 (4%)
Panel	3,213 (0%)	-----	-----	3,213 (0%)	3,213 (0%)
General Utility	161,602 (10%)	-----	-----	161,602 (7%)	161,602 (7%)
1973 Sales Total	1,576,470	757,003	44,272	2,333,473	2,377,745

Source: MVMA Data Sheets FS 20 and FS 3

C. Usage Characteristics

Since the physical characteristics of trucks up to 10,000 pounds GVWR are basically similar, with truck design in transition from 10,000 to 16,000 pounds GVWR, an optimum division between light duty trucks and heavy duty trucks would be one which separates those trucks on the basis of usage characteristics. This would allow trucks to be tested using the most appropriate test procedure, or one which most accurately characterizes the expected usage patterns of trucks in actual urban operation.

Examination of Census data for the eight MVMA truck classes indicates that truck use varies according to weight. Trucks in classes I and II are primarily used for personal transportation and agriculture, those in classes IV, V and VI are used primarily in support of agriculture, manufacturing and construction, and class VII and VIII trucks are used in construction, wholesale and trade for hire. 2/

About 53 percent of trucks under 10,000 pounds are used for personal transportation and 21 percent for agricultural purposes. Use of trucks for personal transportation declines significantly for Classes III, IV and V for which only 11 percent of trucks in these categories are used in that manner. Agricultural uses increase to 32 percent, however, while commercial uses follow a similar pattern. Only 14.9 percent of trucks under 10,000 pounds GVWR are used in support of manufacturing, construction, the wholesale and retail trades, and "for hire." In classes III, IV and V 38.4 percent of trucks

2/ 1972 Census of Transportation - "Truck Inventory and Use Survey"

are used to support these enterprises, 48.6 in class VI and 76.5 in classes VII and VIII.

The data considered thus far lend additional support to the conclusion that a breakpoint between light duty trucks and heavy duty vehicles should be no higher than 10,000 pounds GVWR. EPA conducted additional analysis 3/, however, to examine the physical and usage characteristics of trucks below 10,000 pounds GVWR so as to identify a cut-off point for the new light duty truck definition that would minimize the inclusion of trucks used for commercial purposes in the new light duty truck class. One result of that analysis indicates that personal transportation is the dominant use for trucks up to 8000 pounds GVWR, percentage of personal transportation is in transition in the gross vehicle weight range 8000 to 16,000 pounds, and personal transportation accounts for only two percent of the usage in trucks 16,000 to 26,000 pounds GVWR. When considering this data alone, independent of other usage data, 8000 pounds GVWR appears to separate light duty trucks from heavy duty vehicles on the basis of personal use versus commercial use.

On further examination of usage characteristics of trucks less than 10,000 pounds GVWR by truck type (see Appendix A), it can be seen that pickups in that weight range are primarily personal usage trucks and that panels, cab chassis and multistop

3/ The EPA analysis, "Selection of a Breakpoint Between Light Duty Trucks and Heavy Duty Vehicles" is included as Appendix A to this report.

trucks are primarily commercial use vehicles. This would indicate that an appropriate divisor between light duty trucks and heavy duty vehicles would be one which maximizes inclusion of pickup trucks in the light duty truck class, and which minimizes inclusion of panels, cab chassis and multistop trucks.

D. Selection of a Light Duty Truck Class Definition

There is no one criterion that can be established to completely separate light duty trucks from heavy duty vehicles which will completely eliminate cross-over of vehicle body styles and vehicle usage. From the discussion of truck design and usage characteristics presented above, it is apparent that a optimum divisor between light and heavy duty trucks is one which satisfies the following concerns:

1) Design characteristics

So that trucks included in the new light truck class are amenable to the same absolute degree of emission control, and therefore can be subjected to emission standards which provide cost-effective urban emission reductions, trucks of similar design should be grouped in one class. Examination of truck design characteristics has led to the following conclusions:

a) The largest sales volume of trucks is found under 10,000 pounds GVWR, with the remaining majority of truck sales being concentrated above 16,000 pounds GVWR.

b) Most of the trucks sold less than 6000 pounds GVWR have counterparts which are also sold between 6000 and 10,000 pounds GVWR, although none of these truck types are sold above 10,000 pounds GVWR.

c) Engines are similar in all trucks up to 14,000 pounds GVWR and in most cases those engines are similar to passenger car engines.

2) Usage characteristics

To be able to adequately characterize actual emissions from trucks operated in urban areas, where urban vehicle operation is simulated by the cost procedure currently used on light duty vehicles and light duty trucks less than 6000 pounds GVWR, trucks of similar use should be grouped in one class. Truck use characteristics discussed earlier lead to the following conclusions:

1) *The light duty truck class should be structured to* maximize inclusion of pickup trucks, since in the weight ranges under consideration almost all pickup trucks are used primarily for personal transportation.

2) The light duty truck class should minimize inclusion of multistop trucks, panels, vans and cab chassis, since those types of trucks are used primarily for commercial purposes.

3) The weight limit division between light and heavy duty trucks should not be less than *8000 pounds GVWR*, since the percentage of trucks used for personal transportation up to 8000 pounds is consistently above 50 percent.

Considering all these concerns, and examining truck sales *distribution (see Appendix A, Figures 3 and 4)*, 8500 pounds GVWR appears the optimum minimum cutpoint between light and heavy duty trucks. In addition, trucks above 6000 pounds curb weight which are often built to carry permanently installed equipment used for commercial and recreational purposes have been excluded from the new class. As a further limitation of the cross-over of body styles, and to exclude where possible trucks which are clearly used for commercial purposes from the light duty truck class, trucks with frontal areas greater than 46 square feet have been excluded from the new light duty truck class. This inclusion of high frontal area trucks in the heavy duty class will eliminate certain delivery vans and other large vehicles from the light duty truck class, on the basis that usage *characteristics of these* trucks do not warrant their inclusion in the light duty truck class.

To further eliminate cross-over of body styles and vehicle usage (and to eliminate the current situation in which one type of truck may be required to be certified under both the light and heavy duty truck regulations) EPA has included an optional light duty truck category for trucks up to 10,000 pounds GVWR. Trucks in this class may, at the manufacturer's option, be certified as light or heavy duty trucks. This arrangement will allow vehicles in the 8,500 to 10,000 pound GVWR range to be certified under regulations which best reflect their design and usage characteristics and will minimize the number of vehicles which would be (and are currently) certified under two procedures.

E. Emission Characteristics of Trucks in the New Light Duty Truck Class

Trucks in the new light duty truck class, having been historically subjected to two separate regulatory requirements, currently have widely differing emission characteristics. Those trucks which have previously been regulated as light duty trucks (0 to 6000 pounds GVWR) have been subjected since 1975 to standards of 2.0 grams per mile (g/m) hydrocarbons, 20 g/m carbon monoxide and 3.1 g/m oxides of nitrogen (2.0 g/m in California). Actual emission levels of trucks subjected to those standards vary with vehicle age and the deterioration associated with the particular emission control system used on the individual truck. For a typical light duty truck which has been subjected to a 2.0 g/m hydrocarbon standard, actual performance emission levels would be expected to vary from 1.6 g/m during the truck's first year of operation to 7.6 g/m at the end of the truck's in-use life. Similar ranges would be expected for carbon monoxide and oxides of nitrogen under a 20 g/m and 3.1 g/m standard (respectively), with carbon monoxide performance levels ranging from 20 g/m to 99 g/m, and oxides of nitrogen performance levels ranging from 2.5 g/m to 3.9 g/m.

The remainder of the trucks in the new light duty truck class, those in the GVWR range 6000 to 8500 pounds, have been subjected since 1974 to heavy duty engine standards and have been tested using heavy duty engine test procedures. Initial (first year) emission performance levels for a typical 6000 to 8500 pound GVWR truck were established in an EPA testing program 5/ at 4.3

5/ EPA in-house testing, and "Technical Evaluation of Emission Control Approaches and Economics of Emission Reduction Requirements for Vehicles Between 6,000 and 14,000 Pounds Gross Weight", Calspan Corp. November 1973, EPA-460/3-73-005.

g/m hydrocarbons, 44 g/m carbon monoxide and 5.2 g/m oxides of nitrogen. Based on the similarity of these vehicles in terms of vehicle and engine design to light duty vehicles for which emission control deterioration rates have been determined 6/, the initial performance levels for a typical 6000 to 8500 pound GVWR light duty truck, regulated under current heavy duty standards, would be expected to deteriorate from 5.7 to 11.4 g/m hydrocarbons, 67.8 to 128.9 g/m carbon monoxide and remain at 5.4 g/m oxides of nitrogen at the end of the truck's in-use life.

Composite emission rates for trucks in the new light duty truck class have been developed by weighting the emission characteristics discussed above for both the 0 to 6000 and 6000 to 8500 pound GVWR light duty truck groupings. This weighting assumes that 55 percent of the new light duty truck class will be comprised of 0 to 6000 pound GVWR trucks, and that the remaining 45 percent will be 6000 to 8500 pound gross vehicle weight trucks. (The bases for this assumption are further discussed in Chapter IV of this statement.) Table II-3 examines the emission rates (obtained through this weighting process) for an average truck in the new light duty truck class. Table II-3 is provided as a base case, as it assumes that no further control is imposed on trucks in the new light duty truck class. Table II-4 presents similar emission rates for a typical truck in the new light duty class when controlled under this regulation. These emission rates form a basis for the examination in Chapter III of this statement of the air quality impacts of EPA's proposed action.

6/ See Appendix B.

Table II-3

EMISSION RATES FOR AN AVERAGE TRUCK IN THE

NEW LIGHT DUTY TRUCK CLASS - NO FURTHER CONTROL

Base Case 0-6000 GVWR 2.0/20/3.1
6000-8500 GVWR 4.3/44/5.2

Vehicle Age (years)	Emission Rates* HC	CO	(0-8500 GVWR) NOx
1	3.4	41.7	3.8
2	4.1	49.6	3.9
3	4.8	57.4	4.0
4	5.4	65.3	4.0
5	6.1	73.2	4.1
6	6.7	81.0	4.2
7	7.4	88.9	4.3
8	8.0	96.7	4.4
9	8.7	104.6	4.5
10	9.3	112.5	4.6
11	9.3	112.5	4.6
12	9.3	112.5	4.6
13+	9.3	112.5	4.6

*grams per vehicle mile

NOTE: Excessive emission levels during a vehicle's later years of operation indicate a lack of proper maintenance. This trend towards excessive emission levels can be slowed if proper maintenance practices are followed throughout the vehicle's life. Imposition of requirements concerning proper maintenance practices by vehicle users is the subject of another program under development within EPA, the Inspection and Maintenance program.

Table II-4

EMISSION RATES FOR AN AVERAGE TRUCK IN THE

NEW LIGHT DUTY TRUCK CLASS - FINAL STANDARDS

0-8500 GVWR 1.7/18/2.3

Vehicle Age (year	Emission Rates* HC	CO	NOx
1	1.4	18.3	1.9
2	1.9	26.1	2.0
3	2.5	33.9	2.1
4	3.0	41.7	2.2
5	3.6	49.5	2.3
6	4.2	57.4	2.4
7	4.7	65.2	2.5
8	5.3	73.0	2.7
9	5.9	80.8	2.8
10	6.4	88.6	2.9
11	6.4	88.6	2.9
12	6.4	88.6	2.9
13+	6.4	88.6	2.9

*grams per vehicle mile

NOTE: Excessive emission levels during a vehicle's later years of operation indicate a lack of proper maintenance. This trend towards excessive emission levels can be slowed if proper maintenance practices are followed throughout the vehicle's life. Imposition of requirements concerning proper maintenance practices by vehicle users is the subject of another program under development within EPA, the Inspection and Maintenance program.

F. Growth of the New Light Duty Truck Class

At the current time no known econometric models for estimating light duty truck sales are available for EPA use. Since limitations in time and availability of personnel do not permit internal development of such model, simple least square regression analysis 7/ was used to determine the pattern of light duty truck sales over a 15 year period (1960-1974). From this data an average yearly growth rate in sales was calculated. Estimated factory sales for light duty trucks for 1975 to 1990 were then made by applying the growth rate to production figures, using 1974 production as a base year.

Figure 2-1 shows the recent growth in the sales of light duty trucks. Between 1960 and 1974 light duty truck sales grew at an average rate of 4.1 percent per year. Over the same time period, automobile sales grew at the rate of only 3.8 percent per year. The current (1974) population of registered light duty trucks is approximately 17.4 million. 8/ Table II-5 projects annual new sales and total population of light duty trucks through 1990 assuming an annual growth rate of 4.1 percent.

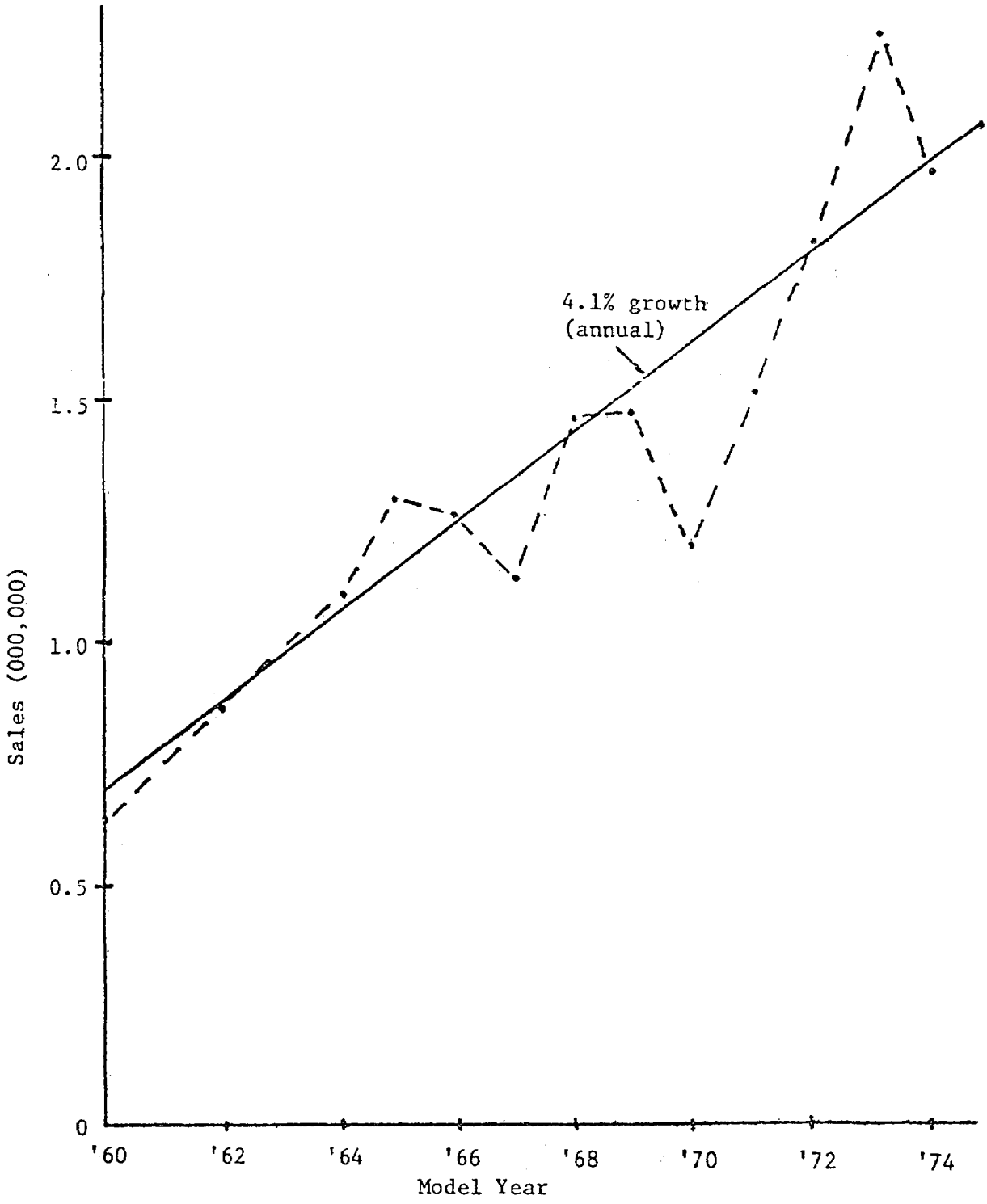
7/ The "least squares method" is a statistical technique for fitting a straight line through several data points.

8/ Commercial Car Journal estimate based on data from U.S. Census of Transportation, Bureau of Census.

Figure 2-1

ANNUAL TRUCK SALES FOR

THE NEW LIGHT DUTY TRUCK CLASS



Source: Motor Vehicle Manufacturers Association, 1974 Motor Truck Facts

TABLE II-5

PROJECTED SALES AND REGISTRATIONS OF TRUCKS

IN THE NEW LIGHT DUTY TRUCK CLASS THROUGH 1990

Year	Sales (millions of units)	Total Registrations 2/ (millions of units)
1974	1.97 1/	17.4
1975	2.05	18.3
1976	2.13	19.2
1977	2.22	20.2
1978	2.31	21.3
1979	2.40	22.3
1980	2.50	23.4
1981	2.61	24.8
1982	2.71	26.0
1983	2.82	27.0
1984	2.94	27.7
1985	3.06	28.8
1986	3.18	29.9
1987	3.2	31.1
1988	3.45	32.3
1989	3.59	33.6
1990	3.74	35.0

1/ Figure (1.97 million) represents actual factory sales of light duty trucks in the weight range 0-10,000 pounds GVWR, adjusted by 5 percent to account for vehicles estimated to be between 8,500-10,000 pound GVWR.

2/ Based on data from U.S. Census of Transportation, and assuming constant growth of the light duty truck class over the period of interest (1960 to 1990).

Chapter III

ENVIRONMENTAL IMPACT

A. Background

On March 5, 1975, EPA Administrator Russell Train announced the interim automotive emission standards for the 1977 model year and recommended the delay of statutory HC, CO and NOx automotive emission standards until 1980 in light of uncertanties regarding automotive sulfuric acid emission levels. Because of continuing difficulties in achieving the oxidant, carbon monoxide and nitrogen dioxide air quality standards in major urban areas and the fact that the more stringent automotive emission standards may be delayed, EPA is taking a new look at the potential for further reduction of other sources of emissions of hydrocarbons, carbon monoxide and oxides of nitrogen.

During the same March 5th press conference, Administrator Train announced several actions designed to provide additional reductions in emissions of hydrocarbons, carbon monoxide and oxides of nitrogen from other sources. The actions included:

1. More stringent emission standards will be proposed for heavy duty vehicles.

2. A new evaporative emission standard for automobiles will be proposed for the 1978 model year.

3. Motorcycle emission standards will be set for the 1978 model year.

4. Existing standards requiring a 90 percent reduction in hydrocarbon emissions during vehicle refueling must result in use of the most effective control devices which are available or can be developed.

5. EPA will re-examine current regulations providing for hydrocarbon control from paints, solvents, dry-cleaning liquids, and refineries with a view to tightening them.

All of these actions, including the reduction of emissions from light duty trucks, are a part of EPA's overall strategy for achieving ambient air quality standards. When examined individually, emission reductions from any one of the several actions may appear to be marginal. However, when examined in the aggregate, they provide for substantial reductions in mobile source emissions.

Hydrocarbon emissions from all mobile sources in 1972 totalled approximately 13 x 10^6 tons. As a result of the various control actions expected to be implemented by EPA in the near future and described in part above, hydrocarbon emissions in 1990 are projected to be reduced to below 6 x 10^6 tons. Similar reductions are expected to occur for carbon monoxide, with emissions of carbon monoxide falling from 87 x 10^6 tons per year in 1972 to under 50 x 10^6 tons per year in 1990. Emissions of oxides of nitrogen from mobile sources are expected to remain through 1990 at about 9 to 10 x 10^6 tons per year. 1/

The aggregate mobile source emissions are examined individually by class in Tables III-A, III-B and III-C. The major classes of mobile sources, light duty vehicles, light duty trucks and heavy duty vehicles are presented and emission projections are given for each class from 1972 to 1990. The class "other mobile sources" includes motorcycles, aircraft, and uncontrolled mobile sources such as tractors, vessels, locomotives, miscellaneous off-highway vehicles and lawnmowers and other utility engines.

1/ EPA staff analysis, September 1976.

The projections of total mobile source emissions by class of vehicle given in Tables III-A, III-B and III-C allow for a general overview of the contribution to air pollution that each class of vehicles makes through 1990, and of the distribution of the burden of control of emissions from all mobile sources. From these tables it can be seen that emissions from the class "other mobile sources," and to a lesser extent those from heavy duty vehicles, grow in proportion to emissions from light duty vehicles and light duty trucks. This apparent inequitable distribution of the burden for reducing mobile source emissions can be in part accounted for by the lack of authorizing legislation for the control of emissions from the bulk of the category "other mobile sources" (excluding motorcycles and aircraft), and due to the fact that for heavy duty vehicles, no emission reduction credit is given for the planned long term heavy duty vehicle emission regulation. 2/

This chapter examines the impact of one of the actions in EPA's overall strategy to reduce mobile source related emissions. The contribution of light duty trucks to total mobile source emissions is examined, and projections are given for the improvements in air quality which can be attributed to the light duty truck regulation in those areas which are not expected to meet ambient air quality standards.

2/ The planned long term heavy duty vehicle emission regulations include the development of an urban-based test procedure, and the imposition of stringent emission standards for heavy duty vehicles.

Table III - A

Nationwide HC Emissions

10^6 tons per year (percent of total regulated mobile source emissions)

Source	1972	1975	1980	1985	1990
LDV Exhaust	4.8 (41%)	4.9 (45%)	3.4 (41%)	1.7 (38%)	1.0 (31%)
Evap + Crank-case	3.1 (27%)	2.6 (24%)	1.8 (22%)	0.7 (16%)	0.3 (9%)
LDV Total	7.9 (68%)	7.5 (69%)	5.3 (65%)	2.4 (53%)	1.3 (44%)
LDT Exhaust	0.8 (7%)	0.8 (7%)	0.9 (11%)	0.8 (18%)	0.8 (25%)
Evap + Crank-case	0.6 (5%)	0.5 (5%)	0.4 (5%)	0.2 (4%)	0.1 (3%)
LDT Total	1.4 (12%)	1.4 (13%)	1.3 (16%)	1.0 (22%)	1.0 (31%)
HDV Exhaust	1.7 (15%)	1.4 (13%)	1.1 (13%)	0.7 (16%)	0.6 (19%)
Evap	0.6 (5%)	0.6 (6%)	0.4 (5%)	0.4 (9%)	0.3 (9%)
HDV Total	2.3 (20%)	2.0 (18%)	1.6 (20%)	1.1 (24%)	0.9 (28%)
Total Regulated Mobile Sources	11.6	10.9	8.2	4.5	3.2
Other Mobile Sources	1.3	1.4	1.7	2.0	2.3
Total Mobile Sources	12.9	12.3	9.9	6.5	5.5

Source: Revised Esmitates of Total Nationwide Emissions for Various Regulatory Alternatives, internal EPA memorandum, January, 1976, as amended October, 1976.

*NOTE: Totals may not add due to rounding errors.

Table III - B

Nationwide CO Emissions
10^6 tons per year (percent of total regulated mobile source emissions)

Source	1972	1975	1980	1985	1990
LDV	57.2 (73%)	58.5 (73%)	40.8 (65%)	19.5 (47%)	11.3 (32%)
LDT	9.4 (12%)	10.0 (12%)	10.0 (16%)	9.8 (24%)	10.6 (30%)
HDV	12.0 (15%)	12.0 (15%)	12.1 (19%)	12.3 (30%)	13.2 (38%)
Total Regulated Mobile Sources	78.6	80.5	62.9	41.6	35.1
Other Mobile Sources	8.3	9.1	10.6	12.3	14.4
Total Mobile Sources	86.9	89.6	73.5	53.9	49.5

Source: Revised Estimates of Total Nationwide Emissions for Various Regulatory Alternatives, internal EPA memorandum, January, 1976, as amended October, 1976.

Table III - C

Nationwide NOx Emissions
10^6 tons per year (percent of total regulated mobile source emissions)

Source	1972	1975	1980	1985	1990
LDV	5.0 (64%)	5.1 (61%)	3.5 (49%)	1.5 (26%)	0.9 (16%)
LDT	0.8 (10%)	0.9 (11%)	0.9 (13%)	0.8 (14%)	0.9 (16%)
HDV	2.0 (26%)	2.4 (29%)	2.8 (29%)	3.4 (60%)	3.9 (70%)
Total Regulated Mobile Sources	7.8	8.4	7.2	5.7	5.6
Other Mobile Sources	2.3	2.5	2.9	3.3	3.9
Total Mobile Sources	10.1	10.9	10.1	9.0	9.5

Source: Revised Estimates of Total Nationwide Emissions for Various Regulatory Alternatives, internal EPA memorandum, January, 1976, as amended Octover, 1976.

ASSUMPTIONS FOR TABLES III-A, III-B, and III-C

- Light duty vehicles will be controlled to statutory emission levels (.41 HC, 3.4 CO, .4 NOx) beginning in 1978 as required by the current language of the Clean Air Act.

- Light duty trucks will be controlled to levels comparable in stringency to the 1977 interim light duty vehicle standards (1.7 HC, 18 CO, 2.3 NOx) beginning in 1979.

- Both light duty vehicle and light duty truck evaporative emissions will be controlled to more stringent levels using a new test procedure beginning in 1978 as has been promulgated by EPA, 41 FR 35626, 8/23/76.

- Heavy duty vehicle exhaust emissions will be controlled to interim levels of 10 g/bhp-h HC + NOx and 25 g/bhp-h CO beginning in 1978 as has been proposed by EPA, 41 FR 21292, 5/24/76. More stringent standards are planned for 1983 but are as yet undefined and have not been considered in the above tables.

Also, a stringent evaporative emission standard for HDVs is planned for the 1983-1985 time frame but has not yet been defined and is not considered in the above tables.

The category "other mobile sources" is defined to include motorcycles, aircraft, tractors, vessels, locomotives, miscellaneous off-highway vehicles and lawnmowers and other utility engines.

B. Primary Impact

1. Emissions Reductions for Light Duty Trucks

As shown in Table III-D the exhaust emissions standards will decrease hydrocarbon, carbon monoxide and oxides of nitrogen emissions from light duty trucks sold in model year 1979 and subsequent model years by 38 percent, 29 percent and 42 percent respectively on a per truck basis. Evaporative emission standards for light duty trucks, part of the final regulations, currently apply to light duty trucks under 6000 pounds GVWR. The primary impact of the final evaporative emission standards occurs for those light duty trucks which have been added to the light duty truck class (6000 to 8500 pounds GVWR). These heavier rated trucks are currently controlled under the heavy duty engine regulations, and are not subject to an evaporative emission standard except in the state of California. For these trucks, imposition of the final evaporative emission standard results in a 28 percent decrease in evaporative emissions from each truck sold in model year 1979 and subsequent model years.

As new light duty trucks are put into use and older ones are scrapped, emissions of the "average" light duty truck on the road will decrease. Using sales projections, usage data, data on annual mileage 3/ and emission

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3/ Annual mileage data on light duty trucks is contained in the preliminary edition of Supplement No. 5 for compilation of Air Pollutant Emission Factors (AP-42), U.S. Environmental Protection Agency, April 1975.

factor data on light duty trucks contained in Appendix B to this report, urban emissions of HC, CO and NOx from the total in-use population of light duty trucks have been projected through 1990 with and without the regulations in effect (Table III-E). One can see that the control standards will be effective in reducing the absolute urban light duty truck emissions of HC, CO and NOx.

TABLE III-D

Estimated Incremental Degree of Control for

Final Emission Standards

Vehicle Weight Category	Less Than 6000 Pounds GVWR	6000 to 8500 Pounds GVWR	Overall[a] Incremental
Exhaust HC	15%	53%	38%
Exhaust CO	10%	44%	29%
Exhaust NOx	25%	55%	42%
Evaporative HC	NA[b]	28%	10%
Crankcase HC	NA[c]		

a. Weighted by vehicle miles traveled, and based on change in lifetime emissions of a typical truck resulting from the proposed standards.

b. Evaporative emission standards currently apply to light duty trucks in the weight range 0 to 6000 pounds GVWR therefore no further control is assumed.

c. Gasoline engines, under the current light and heavy duty vehicle regulations, have no crankcase emissions.

Table III-E

Comparison of Light Duty Truck Urban

Emissions With and Without the

Proposed Action

Strategy	1972	1975	1980	1985	1990
		Hydrocarbons (10^6 tons per year)			
No Action	.79	.79	.85	.95	1.08
Proposal	.79	.79	.76	.60	.57
		Carbon Monoxide (10^6 tons per year)			
No Action	6.05	6.58	7.40	8.84	10.30
Proposal	6.05	6.58	6.83	6.73	7.32
		Oxides of Nitrogen (10^6 tons per year)			
No Action	.35	.38	.44	.52	.61
Proposal	.35	.38	.39	.34	.37

2. Air Quality Impact of the Action

The reductions in urban emissions in 1990 discussed above, 0.51 million tons per year of hydrocarbons, 3.0 million tons per year of carbon monoxide and 0.25 million tons of oxides of nitrogen, will result in measurable air quality improvements. Table III-F presents those air quality improvements, and allows for a comparison with the alternative of taking no action. Table III-F is a summary of the results of an EPA analysis 4/ which examined the impact of this regulation on the expected air quality of thirty-six Air Quality Control Regions. The analysis was performed using emission factors presented in Appendix B to this report for light duty vehicles and light duty trucks, and in Supplement No. 5 for the compilation of Air Pollutant Emission Factors (AP-42), U.S. EPA, April 1975, and using a computer simulation model 5/ to predict the future air quality impact of various growth and control situations.

Oxidants, the most pervasive air quality problem, will be reduced six percent in 1990 as a direct result of this regulation. This reduction in ambient oxidant levels will occur in those 29 Air Quality Control Regions failing to meet the ambient air quality standard for oxidants which have been included in the analysis. Similar improvements in oxidant levels, although not quantified here, can be expected to occur in other areas of the country.

4/ Analysis of Alternative Standards for Light Duty Trucks, EPA, November 1976.

5/ N. deNevers and R. Morris, "Rollback Modeling - Basic and Modified," presented at the annual meeting of the Air Pollution Control Association, June 24-28, 1973. Chicago, Illinois, paper no. 73-139.

Data available to EPA 6/ show that about 60 urban areas currently fail to meet the ambient oxidant air quality standard. In addition, some rural regions in the midwest and throughout the East coast are experiencing widespread violations of the oxidant standard. It seems likely then, that additional violations of the oxidant standard will be discovered as the air quality monitoring network throughout the country is enlarged, and that this regulation will have a more broadly based impact on the oxidant problem than indicated by examining the 29 regions included in the analysis.

Twenty-six urban areas were analyzed for carbon monoxide. Carbon monoxide, unlike hydrocarbons (oxidant precursors) and oxides of nitrogen, is almost uniquely a motor vehicle problem. This is due to the fact that locations which experience violations of the carbon monoxide standard are most always those locations with high traffic densities. This regulation will, in 1990, reduce the carbon monoxide concentrations an average of five percent in those twenty-six urban areas.

For oxides of nitrogen, this regulation will slow the increase in ambient concentrations by three to four percent in 1990. Since the ambient nitrogen dioxide air quality problem appears to be one of containing growth in emissions of oxides of nitrogen rather than rolling back current levels, and since future growth of stationary source oxides of nitrogen emissions will be the major air quality problem, emission limitations for new stationary sources will form

6/ Air Quality Impact of Alternative Emission Standards for Light Duty Vehicles, Environmental Protection Agency, Office of Air and Waste Management, Revised March 12, 1975.

the bulk of the control of oxides of nitrogen necessary to maintain current ambient levels. EPA's action in promulgating revised light duty truck regulations contributes to this effort to maintain current ambient levels, in that it slows the increase in nitrogen dioxide ambient concentrations.

Table III - F
Urban Air Quality Impact of the Proposed Action

Average Percent Improvement in CO Air Quality Concentration From Base Year (1970) (CBD Growth)

	1980	1985	1990
No Action	25	50	58
Proposal	25	54	63

Average Precent Improvement in Oxidant Air Quality Concentration From Base Year (1970)

	1980	1985	1990
No Action			
CBD*	15	27	26
MET**	12	25	24
Proposal			
CBD	16	31	32
MET	12	28	30

Average Percent Degredation in NO_x Air Quality Concentration From Base Year (1972)

	1980	1985	1990
No Action			
CBD	7	7	12
MET	9	9	14
Proposal			
CBD	6	5	9
MET	9	6	10

*CBD = Central business district growth assumed for mobile sources.

*MET = Metropolitation area growth assumed for mobile sources.

C. Potential Secondary Environmental Impacts of This Regulation

1. Sulfuric Acid Emissions

Historically, stationary sources have been the major contributors to sulfate concentrations in urban environments, contributing 99 percent of the total sulfate air burden. 7/ With the introduction of the current catalyst/air pump technology applied to mobile sources, there exists the potential for a significant source of mobile related sulfate emissions in the form of sulfuric acid aerosol. While of negligible magnitude on a regional basis, mobile source sulfuric acid emissions could produce a significant localized urban sulfate concentration in urban street canyons or congested urban freeway situations. Moreover, mobile source sulfates differ from stationary source sulfates in that they are emitted near the ground and in the form of a fine sulfuric acid mist.

The increase sulfate emissions due to the use of oxidation catalyst/air pump combination has been of considerable concern to EPA. In pre-model year 1975 non-catalyst systems, most of the fuel sulfur leaves the vehicle after combustion as SO_2. In oxidation catalyst/air pump systems used on 1975 model year automobiles and light duty trucks, more of the sulfur leaves the combustion chamber as SO_3. The SO_3 combines with water in the exhaust to form sulfuric acid aerosol.

7/ Communication with M. Williams, OMSAPC, EPA, June 1975.

Extensive efforts have been made within government and industry to improve the information about mobile source sulfate emission factors, sulfate air quality modeling techniques and sulfate health effects as a function of exposure level. In addition technology assessment work is proceeding to identify how sulfates are formed in catalyst/air pump systems, and to develop other low sulfate producing catalytic control systems such as the 3-way catalyst. The work in these areas is directed toward development of a sulfuric acid emission standard for light duty vehicles and light duty trucks should such a standard become necessary. This effort is designed to insure that mobile source sulfate levels in real-life localized problem areas will not result in situations hazardous to human health.

Although work is progressing within EPA directed towards development of a sulfuric acid emission standard, current data indicate that such a standard will not be needed in the near term. EPA's decision not to propose a sulfuric acid emission standard was announced April 12, 1976, by Dr. Thomas Murphy 8/, at which time Dr. Murphy presented EPA's rationale and future plans in this area:

"...[O]ur decision not to propose a standard at this time does not mean that a standard may not be needed and promulgated in the future. Rather, it means that EPA is not today in a position to determine with

8/ Opening Remarks by Thomas A. Murphy, Deputy Assistant Administrator, Air, Land and Water Use, U.S. Environmental Protection Agency at the Symposium "The General Motors/Environmental Protection Agency Sulfate Dispersion Experiment," Research Triangle Park, North Carolina, April 12, 1976.

reasonable certainty whether, and if so at what level, establishment of a sulfuric acid emission standard for automobiles may be required or prudent to protect the public health. We are continuing vigorously to investigate the current areas of uncertainty, including health effects and exposure estimates, and will continue to monitor vehicle sulfuric acid emission rates and the development of sulfuric acid control techniques by industry. Moreover, we will monitor ambient sulfuric acid levels in the vicinity of roadways. These programs will provide us the capability to identify the potential hazard of sulfuric acid emissions to public health and allow us to take preventative action before a real danger could develop."

These light duty truck emission standards are not expected to increase present mobile source sulfate emissions significantly or to present a future problem. Current data indicate that there is no substantial difference in the sulfuric acid emission levels of catalyst/non-air pump and non-catalyst vehicles. 9/ In contrast, sulfuric acid emissions of catalyst/air pump vehicles do appear to be at levels generally higher than those for either catalyst/non-air pump or non-catalyst vehicles. Estimates of 1975 light duty truck sales show that the light duty truck manufacturers may be expected to equip about 60 percent of their production units with catalysts (approximately 830,000 vehicles).

9/ Test Report, Automotive Sulfuric Acid Baseline Program, Environmental Protection Agency, Emission Control Technology Division, January 1976.

By 1978 this figure is expected to increase significantly. Of those trucks manufactured in 1975, about twenty percent were equipped with a catalyst in combination with an air pump (approximately 280,000 vehicles). This compares with 1975 light duty vehicle sales figures for catalyst/air pump vehicles of 2.5 to 3.0 million units.

The final light duty truck emission standards were set at levels which do not require the application of catalyst technology, and in no case should the standards require the application of catalyst/air pump technology. Even though these standards do not require the use of catalyst/air pump technology, some manufacturers may choose to employ such technology on some trucks to increase fuel economy and driveability. In worst case 10/, the incremental increase in catalyst/air pump vehicles in 1979 as a result of the proposed regulation would be 760,000 vehicles per year. This worst case situation would represent a annual increase in all catalyst/air pump vehicles of less than seven percent.

10/ Internal EPA projections based on trends in 1975-1977 catalyst usage.

2. Water Pollution, Noise Control and Energy Consumption

Control of light duty truck emissions is expected to have negligible impact either on water pollution, or on the ability of manufacturers to meet present and future noise emission standards for light duty trucks.

Fuel economy of light duty trucks is not expected to be adversely impacted by this regulation. At the emission levels promulgated, most light duty truck manufacturers are expected to equip light duty trucks with catalyst emission control systems, resulting in no fuel economy change for those vehicles currently regulated as light duty trucks (0 to 6000 pounds GVWR). For those vehicles added to the light duty truck class (6000 to 8500 pounds GVWR) which are currently experiencing a zero to five percent fuel economy penalty compared to uncontrolled vehicles 11/, application of catalyst technology is expected to result in fuel economy comparable to that of uncontrolled vehicles.

Even though the emission standards promulgated for light duty trucks, 1.7 g/m HC, 18 g/m CO and 2.3 g/m NOx, require a reduction in NOx emissions from the current 3.1 g/m NOx emission standard for light duty trucks, fuel economy of trucks in the new light duty truck class is not expected to be adversely affected. Analysis of the 1977 model year light duty vehicle fuel economy results obtained in EPA's certification program 12/ has shown that 1977 model year light duty vehicles are 2.8 percent better in fuel economy than comparable 1976 model year vehicles. In 1976, the light

11/ An Examination of Interim Emission Control Strategies for Heavy Duty Vehicles, OMSAPC, EPA October 3, 1975.

12/ *Fuel economy of the 1974-1977 Models, Draft SAE paper September 1976.*

duty vehicle emission standards were 1.5 g/m HC, 15 g/m CO and 3.1 NOx. In 1977, the light duty vehicle emission standards remained the same for HC and CO, and changed to 2.0 g/m for NOx. Because EPA projects that light duty vehicle emission control technology will be employed on light duty trucks subject to this regulation, and because the final light duty truck emission standards have been adjusted to account for differences in weight between cars and trucks, it is concluded that light duty trucks which employ emission control technology similar to that employed on 1977 light duty vehicles will not experience a fuel penalty due to more stringent emission control. As indicated by the improvement accomplished by the light duty vehicle industry in model year 1977, there appears to exist the potential for improvements in light duty truck fuel economy in the 1979 model year. It should be noted that the fuel economy improvements for light duty vehicles in the 1977 model year are a result of engineering improvements in emission control systems, and are not due to reduced vehicle weight. The referenced analysis estimates that an overall improvement in fuel economy (which includes the benefits due to reduced vehicle weight) of 6 percent occurred in the 1977 model year.

Chapter IV

ECONOMIC IMPACT 1/

A. Economic Background

1. Description of Trucks in the New Light Duty Truck Class

The new light duty truck class consists of many different styles of trucks intended for various types of operation. Included in the class are pickup trucks, van trucks, panel trucks, station wagons built on pickup truck chassis, multistop trucks (e.g., bakery and milk trucks), and off-road and utility vehicles (e.g., four wheel drive vehicles). Some trucks in the new light duty truck class are sold as cab chassis combinations to special body builders who complete the construction of the vehicle (e.g., some mobile homes).

Most of these trucks are equipped with V-8 engines essentially the same as those used in light duty vehicles. The major differences are in the carburetor and distributor settings with minor differences in basic engine specifications like valve diameters and bearing load ratings. The similarities between light duty vehicle and light duty truck engines should allow adaptation of light duty vehicle emission control systems for use on trucks in the new light duty truck class.

Factory sales of light duty trucks less than 6000 pounds GVWR was about 977,000 vehicles in 1975. Approximately 874,000 trucks between 6000 and 8500 pounds GVWR were produced in 1975. These 874,000 vehicles, which were certified as heavy duty vehicles in 1975, will be

1/ This chapter consists of data and conclusions extracted from a more detailed analysis entitled "Economic Assessment of the Revised Light Duty Truck Regulations for 1979 and Later Model Year Light Duty Trucks," prepared by the Office of Mobile Source Air Pollution Control. Information in this chapter not specifically referenced may be found in that document.

classified as light duty trucks under these regulations. Factory sales over the past ten years grew at a 4.1 percent annual rate, though in 1974 and 1975 sales fell nearly 12 and 20 percent respectively from 1973 levels. 1976 sales have again picked up and, if sales for the first six months are repeated, will exceed 1973 sales by 230,000 units.

2. Description of the Manufacturers

Under the redefinition of the light duty truck class there will be five primary domestic manufacturers of light duty trucks. Ford and General Motors (Chevrolet and GMC) currently dominate the market, producing over 70 percent of all trucks in the new light duty truck class which are sold domestically. They are followed by Chrysler (Dodge) with 12 percent, American Motors/Jeep with 4 percent, and International Harvester with 2 percent. Part of the U.S. production is exported for sale in foreign markets. Imports only account for about 7 percent of total U.S. domestic sales. 2/

The wholesale value of all trucks and buses produced in the U.S. in 1974 was approximately $10.1 billion. Total domestic factory sales of trucks and buses in that year was 2.46 million vehicles of which approximately 1.9 million would have been classified as light duty trucks under the 1979 light duty truck regulations. 3/

None of the five domestic producers derives much of its total revenue from the sale of trucks in the new light duty truck class. Except for International Harvester, all produce passenger vehicles. International Harvester produces heavy duty trucks as do Ford and GM. Most have wholly owned subsidiaries, or divisions which manufacture

2/ Motor Vehicle Manufacturers Association.

3/ Automotive News Almanac, April 1975.

many of the parts needed to construct the vehicle and to supply the replacement parts market. All have diversified into some non-transportation related enterprises such as electronics, appliances or plastics, though non derive more than around five percent of total revenue from these lines of businesses.

B. Cost of Implementing the LDT Regulations

Analysis done by EPA has indicated that it would cost about $211 to install in LDTs a catalyst emission control system capable of meeting the emission standards. This is based on the assumption that the same equipment which can be used on light duty vehicles to meet the current 1977 light duty vehicle Federal emission standards also could be used to meet the 1979 light duty truck standards. The cost of the equipment is given in Table IV-A. During the public comment manufacturers provided their estimates of the costs of the control equipment necessary to meet the new standards. This data is summarized in Table IV-B.

In addition to equipping trucks with pollution control equipment manufacturers will have to expend financial resources to develop control systems and calibrations and to certify with EPA that their trucks are capable of meeting the standards. EPA estimates that the industry will spend about $17 million for development during model years 1979 to 1983. This is about $6 per truck sold during that period. Certification costs will be higher during the 1979 and 1980 models than during the period 1981 to 1983 assuming that the standards do not change. That is because manufacturers will be able to "carry over" results of certification tests from one year to the next if no changes are made

Table IV-A

Cost of Catalyst Control System

A. System Required to Meet 1974 LDV Federal Standards (3.1, 39, 3.1) 1/	Cost (1975 dollars)
Evap. Control	$ 15
Transmission Control Spark	3
Anti-Dieseling Solenoid	3
Intake Air Heater	5
Port Exhaust Gas Recirculation (EGR)	20
Modulation Valves	5
Miscellaneous Modifications	20
Air Pump	15
Total Cost: 1974 Fed. System	$ 86

B. System Required to Meet 1977 LDV Federal Standards (1.5, 15, 2.0)	
1974 Federal System	86
Oxidation Catalyst	100
Improved Exhaust System	25
Total Cost:	$ 211

1) Standard using 1972 FTP. Using 1975 FTP Standards will be (3.0, 28, 3.1)

Source: Automobile Emission Control - The Technical Status and Development Trends as of March 1976. A Report to the Administrator prepared by the Emission Control Technology Division, Mobile Source Pollution Control Program. April 1976.

TABLE IV-B

Manufacturers' Estimates of Costs
(Per Vehicle)
for Control Equipment

Manufacturer	Truck Category (GVWR) 0-6,000 lb	6,001--8,500 lb
GM a/	minimal	$165 - $210
Ford b/	-	$402
Chrysler (Dodge) c/	$12	$260
IHC d/	n.a.	$400
AMC/Jeep e/	$7.60 - $122	$140 - $175
Toyota f/	$100 - $150	n.a.
Volkswagon	3% of sales price	n.a.
SALES WEIGHTED AVERAGE g/	$8.64 - $16.67	$243.70 - $264.63

a. Minimum system would be catalyst, EGR, and evaporative controls (EVAP).

b. Costs are for a catalyst system. A few 0 - 6,000 pound trucks may require the installation of this system. Costs also include $37 for engineering, test facility construction, and changes in operating costs.

c. Some current LDTs may require EGR timer, air pump, catalyst, and heat shields. 6,000 to 8,500 pound trucks will need equipment such as catalyst heated air, exhaust system improvements, air pump, proportional EGR. Cost includes amortized development, certification, retooling and expansion expenses.

d. Cost includes cost for catalyst, air injection, EVAP, and carburetor and EGR revisions. Cost also includes $127 for exhaust system changes.

e. CJ 5/7 will require catalysts, transmission controlled spark (TCS), and improved exhaust systems. The high cost estimate is for a system that includes catalyst, TCS, and air injection for Cherokee Wagoneers and truck models.

f. Costs for either a thermal reactor or catalyst which may be required on some models to meet standards.

g. Assumes that costs for all importers will be the same as those for Toyota.

to vehicles which could impact emissions. EPA estimates that the total certification costs in 1979 will be $8.7 million. In subsequent years this total will decline substantially as carry over applies. EPA estimates per vehicle certification costs over the period 1979 to 1983 to be about $2.

An advantage of using a catalyst system is that it does not impose a fuel economy penalty on the vehicle. This occurs because the operation of the catalyst is basically independent of the operation of the engine. Use of catalyst technology permits manufacturers more freedom to adjust the engine for fuel economy while maintaining a continued high level of emission control. A non-catalyst control system, though its initial cost may be $30 less than a catalyst system, is often accompanied by a 10 to 15 percent fuel economy penalty. 4/

Maintenance costs are not expected to change as a result of these regulations although if any maintenance costs change, those requirements should decrease. Unleaded fuels which must be used on catalyst equipped vehicles cause less damage to exhaust systems and spark plugs, increasing the amount of time between replacement of these parts. Since emissions can be controlled by and large in the catalyst, frequent tuneups may be less crucial to emissions control. Decreases in maintenance requirements should offset the slightly higher cost of unleaded fuel.

The incremental cost of implementing these regulations may be calculated by estimating the number of trucks which must meet the standard and

4/ Trade-Offs Associated with Possible Auto Emissions Standards, Emission Control Technology Division, OMSAPC, February 1975.

applying a cost of control factor to that estimate. Combining sticker price increases and changes in operating costs (if any) the following incremental costs (per vehicle) of meeting the emission standards were derived:

		Trucks Previously Certified as Heavy Duty Vehicles	Trucks in Current Light Duty Truck Class
Sticker Price:	Equipment	$211	$0
	Development	6	6
	Certification	2	2
Operating Costs:	Maintenance	0	0
	Fuel	0	0
	Total	$219	$8

Many manufacturers are planning to use catalyst emission control systems on light duty trucks less than 6000 pounds GVWR prior to the 1979 model year. For the purposes of calculating the aggregate incremental cost of this regulation EPA assumed that all trucks currently defined as light duty trucks were so equipped. Trucks between 6000 and 8500 pounds GVWR are considered to have essentially no emission control devices and so the full $219 expense would be required. The aggregate incremental costs are given in Table IV-C.

For the years 1979-1983 the total cost of implementing this regulation will be $1.67 billion. The calculations made in preparing Table IV-C assume that light duty truck sales will continue to expand at 4.1 percent per year. It was also assumed that the sales split between 0-6000 pound trucks and 6,000-8,500 pound trucks will be the same during the 1979-1983 period as it was in 1975 and 1976. In these years, the first where light trucks were considered a class of

Table IV-C

Incremental Cost of Implementing
the 1979 Light Truck Regulations

U.S. Truck Sales

	0 - 6000	6000 - 8500	Incremental Cost of Control
1974	1,616,319	639,689	0
1975	1,204,259	895,758	0
1976 e	1,255,000 a/	1,287,000 a/	0
1977 e	1,306,000	1,340,000	0
1978 e	1,360,000	1,394,000	0
	0 - 8500		
1979 e	2,724,000		309,174,000 b/
1980 e	2,836,000		321,886,000
1981 e	2,952,000		335,052,000
1982 e	3,073,000		348,785,000
1983 e	3,199,999		363,086,000

a/ Estimate made on the basis of actual six month production being repeated in last six months of 1976.

b/ Cost estimates are based on 1 to 1 split between 0 - 6,000 and 6,001 to 8,500 pound trucks with $8 and $219 costs for each category respectively.

e = estimated

vehicle separate from passenger cars with separate standards, the ratio between these two categories of trucks approached 1 to 1. Just one year before, in 1974, trucks with GVWR's less than 6,000 pounds out numbered trucks with GVWRs between 6001 and 8500 pounds two to one. This two to one ratio is one that had been relatively stable for many years. Since 1975 sales of the heavier trucks have increased (doubled between 1974 and 1976) while sales of the lighter trucks have decreased. 1975 saw a dramatic increase in the sales of van trucks which mostly have GVWRs of greater than 6,000 pounds. 1975 also saw the advent of the 6,050 pound GVWR truck which several manufacturers introduced to replace models which previously had GVWRs of less than 6,000 pounds. What ever the reason for this shift, the result is to significantly increase the costs of this action over what it would have been had the historical 2 to 1 split persisted. For example the first year (1979) costs would have been $211.2 million and total five year costs $1.15 billion had this historical split continued.

As a result of implementing new light duty truck regulations government expenditures will increase. Two additional man years for laboratory and data technicians will be required at a cost of $45,000. Costs for testing vehicles at EPA is expected to increase since the number of durability and emission data vehicles will go up by 11 and 55 vehicles respectively. Total costs to the government for increased testing and two additional positions will be $160,000 for the 1979 model year.

C. Economic Impact

If manufacturers elect to pass the entire $219 cost of this regulation on to the consumer this would increase typical 1975 list prices of light duty trucks with GVWRs between 6000 and 8500 pounds by approximately 3.8 to 6.0 percent. Assuming that the relationship between changes in price and the resultant changes in demand for the light duty truck market is the same as that in the light duty vehicle market, the implementation of the proposed regulations could cause as much as a 3.8 to 6.0 percent decrease in unit sales for these heavier trucks. A six percent decrease in sales of 6,000 to 8,500 pounds is equivalent to a 3.0% decrease demand for all trucks in the new light duty truck class. Manufacturers would be expected to experience similar losses in sales revenue and profits.

This impact should be considered a worst case situation. In performing this analysis EPA has attempted to provide a very conservative estimate of the impact of these regulations on light truck demand by assuming that the price elasticity of LDTs was -1.0. If this is true, then a one percent increase in sales price would yield a one percent decrease in sales. However, there is no economic data to support a conclusion that a -1.0 price elasticity is realistic for LDTs. Industry and academic studies done on passenger car price elasticities have yielded values between -0.3 and -1.0. Thus on the low side a $219 price increase in 6000 to 8500 pound GVWR LDTs may result in only a 1% to 1.8% decrease in sales of those trucks.

Since no econometric studies to determine LDT price elasticities have been conducted EPA must be satisfied by concluding that sales decreases resulting from the light duty truck regulations may lie anywhere within a 0.5 to 3 percent range. Exactly where within that range the potential decrease in sales will fall is impossible to say with any certainty. Some consumers may react to the $219 price increase for the heavier trucks by electing to purchase a lighter truck. This would increase the demand for these vehicles and mitigate the effects of the lower demand for heavier trucks. In addition, any significant improvements in general economic conditions resulting in increases in disposable income or improvement in credit availability would increase the demand for light trucks and probably overshadow the small negative effects of the price increase.

It is not anticipated that this regulation will so adversely affect consumer demand that any of the approximately 22 LDT production facilities will be closed down. There may be temporary production slow downs at some plants as consumers re-evaluate their needs for specific light duty trucks and demand patterns shift between the competing types, sizes, and styles of trucks. But long run consumer demand for light duty trucks is expected to continue to grow and so no permanent unemployment of the industry's 36,036 5/ employees is anticipated. Changes in

5/ Data obtained from U.S. Department of Commerce, County Business Patterns 1973.

the product mix of light duty trucks sold may cause decreases in demand, and therefore employment, at some plants which may be made up by increased output at other plants.

Competition in the light duty truck industry is unlikely to be significantly affected by this regulation. Table IV-D shows the percentage of the light duty truck market, total truck market, and passenger car market held by each firm. The numbers have historically been quite consistent with GM and Ford being the dominant market forces.

The low volume producers may be more hard pressed, however, to bear the costs of certification and any costs to develop a control system for use on light duty trucks. Dodge, AMC/Jeep and International Harvester may be placed at a disadvantage because they have smaller production runs over which to spread costs of developing and testing control systems they will eventually use in production trucks. Further, at least IHC will experience some disadvantage because it has certified only heavy duty engines since 1975 and therefore has very limited facilities and experience for developing LDV type control systems for their products that will be LDTs after 1979.

The smaller volume manufacturers may be subject to intensified price competition in some markets after the 1979 regulations are promulgated. Larger manufacturers who can spread cost increases out over several markets, may increase prices in selected markets or of selected trucks by less than the actual costs. Smaller

Table IV-D

Market Sales: Trucks in the New Light Duty Truck Class 1/

	% of Light Truck Market 2/	Light Truck Sales as a % of total Truck Sales by Co.	% of Motor Truck Market	% of Passenger Car Market
Chevrolet	36.7	90	34	21.2 3/
GMC	6.7	84	7.1	-
Ford	31.5	84	31.2	23.0
Chrysler (Dodge)	12.1	84	11.9	11.7
AMC/Jeep	4.0	100.0	3.5	3.7
IHC	2.1	37	4.6	-
Other Truck Manufactures	0.0	0.0	1.9	-
Other Manufacturers of Passenger Cars	-	-	-	22.2
Imports	6.9	-	5.8	18.2
	100.0	-	100.0	100.0

1/ Light Truck defined as 0-8,500 GVWR.

2/ Based on U.S. Truck Sales (1975) as contained in Automotive News 1976 Market Data Book.

3/ GM's total market share for passenger cars was 43.4%.

manufacturers who cannot spread out costs and recoup losses by increasing prices in other markets may get caught in a cost-price squeeze. The most susceptable to this type of predicament would be IHC since it concentrates in the utility truck market and has estimated its costs to comply at $400 per vehicle, well above the industry average of about $250. Dodge, though it does compete in several LDT markets may also have difficulty in recouping all its estimated $260 in costs. AMC/Jeep, though a small producer, has estimated a cost increase of only $140 to $175 and thus should be able to remain competitive in terms of price.

Whether or not a particular manufacturer will be priced out of a particular market is impossible to tell since it will depend upon how the low cost manufacturers decide to price their products. This is a corporate decision which must take into consideration many factors of which one is the possibility of legal action being taken against certain firms if there is evidence of predatory pricing. To date there is little evidence to support the conclusion that the price leaders of the light truck industry have priced, or will price, their products so as to intentionally drive competion out of business.

D. Cost Effectiveness

Cost effectiveness is a statistic which measures the economic efficiency of undertaking some action to achieve a certain goal. In the context of controlling the emissions from mobile sources cost effectiveness is measured in terms of cost per ton of pollutant controlled. To calculate this number the costs of controlling each pollutant must be determined. The allocation of control costs to each pollutant is somewhat arbitrary. EPA has attempted to allocate control costs in Table IV-E, based on the effect each component may have on emissions. The cost effectiveness of the 1979 light duty truck regulations for 6000 to 8500 pound GVWR vehicles is also shown in Table IV-E.

One alternative to the new 1979 light duty truck regulations was to reduce the standards but leave the definition of a light truck unchanged. For those vehicles in the class (0 - 6,000 pounds GVWR) the cost would be $8 for development and certification while the incremental amount of control would be 0.3g/mi - HC, 2.0g/mi - CO, and 0.8g/mi - NO_x. The resulting cost effectiveness numbers are, for the respective pollutants, $81/ton - HC, $12/ton - CO, and $30/ton - NO_x.

In combination with this a cost effectiveness for leaving 6,000-8,500 pound GVWR trucks in the heavy duty vehicle class should be determined. The cost effectiveness numbers calculated for the heavy duty engine Notice of Proposed Rule Making (See Draft Environmental and Inflationary Impact Statement - Interim Heavy Duty Engine Regulations for 1979 and Later Model Years, dated 4/21/76) are not appropriate

TABLE IV-E
Cost Effectiveness - 1979
LDT Exhaust Emissions Regulations
6000 to 8500 Pound GVWR Trucks

	Cost Allocation ($) HC	CO	NOx
Transmission Controlled Spark	-	-	3
Anti Diesel Solenoid	3	-	-
Intake Air Heater	2	3	-
Proportional EGR	-	-	20
Modulation Valves	2	-	3
Miscellaneous Mods	7	7	6
Air Pump	8	7	-
Oxidation Catalyst	50	50	-
Improved Exhaust Material	12	13	-
Development and Certification	2	3	3
	86	83	35 = 204 a/
Base line Emissions (g/mi)	4.3	44	5.2
LDT 1979 Standard (g/mi)	- 1.7	18	2.3
Reduction (g/mi)	2.6	26	2.9
Lifetime Reductions (tons/100,000 miles)	.29	2.86	.32
Cost Effectiveness	$297	$29	$109

a/ Cost of evaporative controls, $15, is not included in these calculations since these controls are not used for the control of exhaust emissions.

as a comparison because they were based on equations developed for an "average" heavy duty vehicle which was considered to have a GVWR of 26,000 pounds. Emissions factors for such a vehicle are much different than a typical 6,000 to 8,500 pound GVWR truck. EPA does not have data which indicate in grams per mile how a lighter truck would perform under the 1979 heavy duty truck regulations (the results of which are expressed in grams per brake-horsepower hour) and it is impossible to accurately extrapolate the relationship from the data based on an average truck of 26,000 pounds GVWR.

To provide a rough estimate of the cost effectiveness of leaving 6,000 to 8,500 pound trucks in the HDV class it is necessary to assume that emissions of these trucks will be equal to the gram-per-mile equivalent to the proposed 1979 heavy duty engine standards. (1.6g/mi - HC, 69g/mi - CO, and 6.3 g/mi - NOx). The resulting analysis shown in Table IV-F shows that only control of HC would be gained. Emissions of CO and NOx might well get worse. The costs associated with this increase in pollution have not been factored into the $227/ton cost effectiveness number for HC which is obtained. It should be remembered, however, that this analysis is based on the assumption that gram-per-mile equivalents of a 26,000 pound GVWR truck can be extrapolated to obtain a value for 6,000 to 8,500 pound GVWR trucks, an assumption which is highly tenuous and may potentially lead to a highly inaccurate number.

The cost effectiveness of the 1979 light duty truck regulations can be seen in comparison with other mobile source cost effectiveness numbers in Table IV-G. A review of this data indicates that except for the

Table IV-F

Cost Effectiveness of 6000 - 8500 Pound GVWR Trucks to Meet HDE Regulations

	HC	CO	NOx
Air Pump	15	-	-
Miscellaneous Modifications	20	-	-
Modulation Valves	5	-	-
Heated Air	5	-	-
EGR	20	-	-
Certification	3	-	-
	$68	-	-
Baseline Emissions (g/mi)	4.3	44	5.2
Proposed 1979 HDE Regulations	1.6	69	6.3
Reduction (g/mi)	2.7	(-25)	(-.9)
Lifetime Reduction (tons/ 100,000 miles)	.3	-	-
Cost Effectiveness	$227/ton	-	-

proposed 1979 heavy duty vehicle interim standards, the 1979 light duty truck regulations are the most cost effective in controlling HC, CO and NOx emissions. Further control of light duty vehicles becomes increasingly costly as standards get more stringent than existing standards. However, additional control of light duty truck emissions is possible without having to spend as much per ton of pollutant controlled.

Table IV-8

Cost Effectiveness of Selected Proposed Federal Emissions Contol Programs

Control Program	Base Line Emissions Program Emission Level 1/		Emissions After Control Program Initiated	Cost of Control ($/ton) HC	CO	NOx
Option 1 LDT Interim Standard	1974 LDT Standard	2.0/20/3.1				
	HDV Current Levels	4.3/44/5.2	1.7/18/2.3	200	21	73 4/
LDV 1975 California Standards	1975 Fed. LDV Standards	1.5/15/3.1	.9/9.0/2.0	303	30	165
LDV Fed. Statutory Stds.	1975 Fed. LDV Standards	1.5/15/3.1	.41/3.4/0.4	470	41	2300
HDV Fed. Interim Standard		- 2/	- 2/	29	9	17
LDV/LDT IM 3/		-	-	61-414	4-29	-

1/ All emissions factors in grams per mile HC/CO/NOx except for HDV.

2/ Heavy Duty Vehicle (HDV) emissions levels based on 1974 vs. proposed 1978 HDV emissions standards.

1974 Standards: 16 grams/bhp-hr (HC+NOx), 40 grams/bhp-hr (CO).
1978 Proposed Standards: 1.5 grams/bhp-hr (HC), 25.0 grams/bhp-hr (CO), 10.0 grams/bhp/hr NOx).

3/ IM Cost Effectiveness calculations assume a 30% failure rate.

4/ Obtained by weighting 0-6000# GVWR and 6000-8500# GVWR cost-effectiveness values.

CHAPTER V

Other General Considerations

A. Irreversible and Irretrievable Commitment of Resources

The major commitment of natural resources associated with this regulation relates to the approach taken by the manufacturer to achieve the standards. Although this cannot be accurately determined at this time, analogies to automotive control and current light duty truck control will provide some evidence of potential commitment of resources. In general, any resource commitment is expected to be negligible.

If catalytic converters are used exclusively to meet the 1979 standards, an additional commitment of platinum, palladium and steel would be required over and above that needed for light duty vehicles and current light duty trucks which already employ catalysts. The total light duty truck demand for platinum and palladium might be as high as 18 percent of the automotive demand in 1990, or somewhat less than 180,000 troy ounces per year if all light duty trucks were to employ catalysts. Should trends established for catalyst usage in 1975 on light duty trucks 1/ continue through 1990, and should all heavier trucks added to the light duty truck class employ catalyst, the incremental demand in 1990 (the amount which can be attributed to this regulation) would be approximately 60,000 troy ounces per year. An increase of this size would not strain world production capabilities.

1/ 62 percent of the 0 to 6000 pound gross vehicle weight light duty trucks used catalysts in 1975 and no 6000-8500 pound gross vehicle weight trucks used catalysts.

Commitments of other resources such as steel, aluminum, etc., are so small as to be over-shadowed by normal market fluctuations.

There is the potential that the 1979 standards could result in an increase in gasoline consumption in comparison to uncontrolled light duty trucks. However, fuel economy relative to an uncontrolled light duty truck is not expected to decrease if manufacturers employ catalyst technology as is expected. As such, no increase in gasoline consumption is forecast.

B. Relationship of Short-Term Uses of the Environment and Maintenance and Enhancement of Long-term Productivity

Regulation of light duty truck emissions results in a substantial decrease in hydrocarbon, carbon monoxide and oxides of nitrogen emissions from this source. This reduction will be beneficial and aid in the long-term attainment and maintenance of acceptable air quality levels.

Chapter VI

ALTERNATIVE ACTIONS

A. Identification of the Alternative Actions

EPA's procedures for the voluntary preparation of Environmental Impact Statements state that EPA will "...[d]escribe and objectively weigh reasonable alternatives to the proposed action, to the extent such alternatives are permitted by law." 1/ In determining which alternatives are reasonable, EPA has traditionally examined such factors as magnitude of emission reductions, economic considerations, expected adverse impacts and irreversible commitment of resources. Only when all these factors have been balanced can an effective, non-disruptive strategy for the control of emissions be selected.

The final regulations for the control of emissions from light duty trucks achieves this balance, in that it will result in a nationwide reduction in HC, CO and NOx emissions at reasonable cost and with negligible adverse impacts. A wide range of possible alternative actions exist to achieve similar reductions in emissions, with varying costs and varying adverse impacts. This wide range of possible alternatives includes emission control strategies for the many different types of stationary sources (i.e., power plants and industrial sources), emission control strategies for other mobile sources, limitations on growth or use of emission sources, and of course different strategies for the control of light duty trucks.

1/ 39 FR 37419, October 21, 1974, section 3(c)(2).

The two categories of man-made sources of HC, CO and NOx pollution are stationary sources and mobile sources. In 1972, the stationary source contribution to nationwide emissions of HC and NOx was roughly equal to the mobile source contribution (see Chapter III, Tables III-A, III-B and III-C), but mobile sources accounted for almost all the CO emissions in areas encountering violations of the National Ambient Air Quality Standards (NAAQS). Thus it could be concluded that HC and NOx emission control strategies, on balance, should be apportioned equally among stationary and mobile sources, and that CO emission control should be borne almost exclusively by mobile sources. In practice however, and due to the statutory framework of the Clean Air Act, emission reductions for significant mobile sources have been accomplished much more quickly than those for stationary sources.

In comparing any mobile or stationary source emission control strategy as a reasonable alternative to this regulation, consideration must be given to the purpose for the control of emissions from both mobile and stationary sources. The Clean Air Act as amended June 1974 requires that NAAQS be met in all regions of the nation by 1977. This goal, while unlikely to be achieved by a number of urban areas of the country in 1977 2/, requires large reductions in the emissions of HC, CO and NOx. To be able to substitute one emission control strategy for another implies that the goal of meeting the NAAQS can be achieved by

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2/ Announcement of the Administrator of the EPA, May 30, 1975.

the majority of the nation by implementing a few of the available strategies. For example, if a goal is to move people from one city to another, i.e., commuters from Washington to Baltimore, and there exist three possible means of meeting that goal, then the three means are reasonable alternatives. If however, the three means fails to meet the goal, either individually or in combination, the three cannot be considered as alternatives. Consider the following:

Alternative A can move 22% of the required people.

Alternative B can move 36% of the required people.

Alternative C can move 18% of the required people.

Implementing all three "alternatives" results in moving only 76% of the required amount of people between Washington and Baltimore. Thus the three "alternatives" are not in actuality alternatives since even if all three were implemented the goal would not be attained.

Much the same situation exists for the case of reducing nationwide emissions of HC, CO and NOx in order to meet the NAAQS. Calculations performed for a long-range Federal government planning effort 3/ indicate the need for substantial emissions reductions in large areas of the nation. The following chart, based on measured air quality data for 1971 through 1973, represents the emission reductions needed to meet NAAQS from sources which existed during the 1971-1973 time period. When growth is considered, the needed degree of control is increased (i.e., more control than is indicated by the chart is needed today simply due to growth in the number of both mobile and stationary sources).

3/ Panel Report on Air Quality, Noise and Health, Interagency Task Force on Mobile Vehicle Goals Beyond 1980, March 1976.

Pollutant	Number of AQCRS Where Required Control Exceeds 50 Percent	Maximum Control Required
CO	20	82%
Ox	22	88%
NO_2	00	32%

The same long-range planning study examined all available mobile and stationary source emission control strategies, both as to their cost and emission reduction potential. Tables VI-A and VI-B (from that study) are presented and allow an examination of all currently available emission reduction strategies with a view towards selecting the most cost-effective approach to achieve any total amount of emission reduction. Because CO is almost entirely a mobile source-related pollutant, stationary source controls were considered as alternatives only for the control of NOx and HC (which is a precursor to oxidant formation).

It can be seen from Table VI-A that there is an extensive range of sources and control strategies for HC emissions. Recalling, however, that reductions totaling more than 88% are needed if all areas in the nation are to achieve the NAAQS, and that there are 22 AQCRs where the degree of hydrocarbon control required exceeds 50%, it can be seen from Table VI-A that emissions reductions totaling only 54% are currently identified as being available. Thus there will continue to be areas of the nation which are unable to meet the NAAQS for oxidants in the future, even with all stationary and mobile source controls implemented. To forego one emission control strategy in favor of implementing another would therefore be a dereliction of EPA's statutory mandate to assure that NAAQS are met.

A different situation exists for controlling NOx. The first four and perhaps the fifth emission control strategy presented in Table VI-B could be implemented to assure that all areas of the nation met the NAAQS for NO_2. Unlike the case for HC, there appear to be adequate means for meeting the NO_2 standard and thus what becomes important is to examine the merits of individual NOx emission control strategies to assure that the NAAQS for NO_2 is met in the most efficient manner. Table VI-B also presents cost-effectiveness data for the various mobile and stationary source emission control strategies. Recalling from Chapter IV that the cost-effectiveness for NOx emission control for this regulation is $73 per ton of NOx, it can be seen that this regulation ranks with the most cost-effective emission control strategies (both mobile and stationary source) identified as available by the Agency.

Thus the Agency finds no reason to further examine alternative mobile or stationary source emission control strategies in its examination of reasonable alternatives to this regulation. For HC emission control strategies, there do not appear to be an adequate number of individual alternative control strategies sufficient to achieve the NAAQS for oxidants in substantial portions of the country. For this reason all reasonable HC emission control strategies are planned to be implemented. For CO, which is almost entirely a mobile source-related pollutant, comparison of the relative merits of several mobile source emission control strategies made in Chapter IV shows that this regulation is cost-effective in relation to other available mobile source CO

emission reduction strategies. Finally, there has been no further consideration of alternative NOx emission reduction strategies, since this regulation is as cost-effective as a wide range of mobile and stationary source NOx emission reduction strategies.

In addition to considering control of other mobile and stationary sources of HC, CO and NOx emissions, two alternative strategies in addition to the one selected were considered. These alternatives are:

- Take no action to reduce light duty truck emissions.
- Implement alternative emission standards for light duty trucks.

Table VI-A
AVAILABLE HC EMISSION CONTROL STRATEGIES

Control Strategy (%control before strategy-% control after strategy)	HC Removed (millions of tons)	Percentage of Baseline	Cumulative % of Baseline	Cost-Effectiveness ($/ton)	Annual Cost (million of $)	Cumulative (millions of $)
Degreasing 0-40	0.30	1.1	1.1	-210	-61	-61
Gravure 0-98	0.22	0.8	1.9	-50	-11	-72
Gas Terminal 0-67	0.91	3.4	5.2	0	0	-72
Acrylonitrile 0-35	0.10	.5	5.5	0	0	-72
Polyethylene 0-95	0.19	.7	6.2	0	0	-72
Charocoal 0-99	0.34	1.2	7.4	0	0	-72
Miscellaneous Chemicals 0-35	0.60	2.2	9.6	0	0	-72
Dry Cleaning 0-80	0.48	1.7	1.3	10	5	-67
Industrial Finishing 0-75	1.82	6.3	7.8	10	18	-49
Carbon Black 0-95	0.14	.5	8.3	10	1	-48
Formaldehyde 0-95	0.06	.2	8.5	10	1	-47
Refining 0-67	1.53	5.7	4.0	13	20	-27
Arch. Coatings 0-100	1.00	3.7	7.6	15	15	-12
GHDV Evap. 5.8 - 0.5 gm/mi	0.58	2.1	9.7	18	10	- 2
Open Burning 0-25	0.30	1.1	0.8	20	6	4
Ethylene Oxide 0-95	0.44	1.6	2.4	20	9	13
Acrylonitrile 36-99	0.17	0.6	3.0	37	6	19
Ethylene Dichloride 0-95	0.16	0.6	3.6	40	6	25
Paint & Varnish 0-70	0.09	0.3	3.9	50	5	30
Degreasing 41-90	0.36	1.3	5.2	85	31	61
Industrial Finishing 76-97	0.55	2.0	7.2	100	55	116
Gasoline Handling 16-50	0.57	2.0	9.2	100	57	173
Cyclohexanone 0-95	0.19	0.7	9.9	120	23	196
Metal Decorating 0-90	0.14	0.5	0.4	150	20	216
**** Proposed Action 0-38	0.94	3.5	***	200	188	***
Miscellaneous Chemicals 35-53	0.30	1.1	1.5	200	60	276
Gasoline Distribution 67-99	0.43	1.5	3.0	270	115	391
Coke Ovens 0-80	0.24	.9	3.9	435	105	496
LDV Exhaust 0.9 - 0.41 gm/mi	0.93	3.5	7.2	470	440	936
LDT & GHDV Exhaust 2.9 - 0.8 gm/mi	0.84	3.1	0.2	470	395	1330
Foundries 0-60	0.15	0.5	0.7	500	75	1410
Letterpress & Lithography 0-90	0.27	1.0	1.7	700	190	1600
Gas Handling 51-91	0.68	2.5	4.1	700	475	2080

SOURCE: Air Quality, Noise and Health, Interagency Task Force on Motor Vehicle Goals Beyond 1980, March 1976.

**** Not in original, added for illustrative purposes.

Table VI-B
AVAILABLE NOx EMISSION CONTROL STRATEGIES

Control Strategy (% control before strategy-% control control after strategy)	NOx Removed (million of tons)	Percentage of Baseline	Cumulative % of Baseline	Cost-Effectiveness ($/ton)	Annual Cost (billion $)	Cumulative (billion $)
**** Proposed Action From 0% to 41% Control	0.58	2	***	73	0.042	***
New Utility Boilers From 25% to 50% Control	3.52	11	11	100	0.35	0.35
Industrial Boilers From 25% to 65% Control	2.46	7	18	150	0.37	0.72
Exist. Util. Boilers From 25% to 50% Control	0.62	2	20	225	0.14	0.86
Sta. IC Engines From 25% to 75% Control	2.87	9	29	340	0.98	1.84
Other Mobile From 10 gm/mile to 80% Control	2.9	9	38	450	1.3	3.14
LDV From 2.0 to 1.0 gm/mile	1.91	6	44	450	0.86	4.0
Util. Boilers From 50% to 90% Control	6.62	20	64	1200	7.94	11.94
Sta. IC Engines From 75% to 90% Control*	0.86	3	67	1700	1.46	3.43
LDV to 0.4 gm/mile	1.15	3	70	2300	2.65	16.08

* STA IC ENG Control Does Not Include Small Engines

SOURCE: Air Quality, Noise and Health, Interagency Task Force on Motor Vehicle Goals Beyond 1980, March 1976.

**** Not in original, added for illustrative purposes.

B. Analysis of Impacts of the Alternatives to this Regulation

Economic impacts of the alternatives to this regulation are summarized in this chapter, and are more fully described in "Economic Assessment of the 1979 Light Duty Truck Emission Standards," Office of Mobile Source Air Pollution Control, EPA.

1. Take No Further Action to Reduce Light Duty Truck Emissions

Total light duty truck emissions, if no further control is imposed, are expected to increase between now and 1990 to the extent that they comprise over 14 percent of the total mobile source emissions. Between now and 1990 emissions of other sources will be significantly curtailed as attainment of acceptable air quality is pursued, and the importance of light duty truck emissions in finally achieving the air quality standards will be increasingly evident. A large number of the regions presently exceeding the air quality standards for oxidants, carbon monoxide and nitrogen dioxide will continue to have difficulties in achieving or maintaining these standards in the 1980's. Emissions from light duty trucks will add to this burden.

Under the alternative of taking no action, costs to the industry and the consumer would appear to be less than those incurred under this regulation. As indicated in Chapter IV, the aggregate costs to the consumer and to the industry are expected to reach 830 million dollars for the five year period 1979 to 1983. These costs would not be incurred by the public directly should no further action be taken to reduce light duty truck emissions. Since additional reductions in emissions from mobile sources are necessary to meet and maintain ambient air quality standards in many regions 4/, costs

4/ See Chapter III, Section A.

would be incurred by the public for those additional reductions in emissions when obtained from emission sources other than light duty trucks. As shown in Table IV-4, the costs per pound of pollutant removed from the ambient air for several selected mobile sources are all higher than those costs for light duty trucks (with the exception of the planned 1979 Federal interim heavy duty vehicle emission standards). This indicates that obtaining equal reductions in emissions from other sources would be more costly to the consumer than obtaining those reductions from light duty trucks.

2. Implement Alternative Emission Standards for Light Duty Trucks

Several alternative emission levels were considered by EPA in the context of selecting the emission levels that were proposed 5/. These alternative emission levels included emission standards of equivalent stringency to the 1975 California interim light duty vehicle standards (0.9 g/m HC, 9.0 g/m CO, 2.0 g/m NOx), and emission levels based on a sliding scale according to vehicle weight. Alternatives for the light duty class boundary (e.g., up to 8500 pounds GVWR) were not examined as to their environmental, economic and social impacts, but were rejected on technical bases. Discussion of these alternatives considered by EPA in its selection of the proposed action can be obtained by consulting the Draft Environmental Impact Statement for this regulation, dated February 12, 1976.

Although the analysis of the alternative emission levels for light duty trucks presented in the Draft EIS will not be reprinted here, two different alternative regulatory approaches that have been suggested during the public comment period on the proposed regulation

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5/ 41 FR 6279, February 12, 1976.

will be examined. Those alternatives, suggested by Chrysler Corporation, Ford Motor Company and the Council on Wage and Price Stability are described in Table VI-C and are examined below.

a. Alternative I - Impose More Stringent Standards, But Do Not Change the Light Duty Truck Class Definition

b. Alternative II - Impose More Stringent Standards, and Change the Definition to Include Trucks up to 7000 Pounds GVWR

EPA has proposed to implement in model year 1979 more stringent emission standards for heavy duty engines 6/, which are currently used in trucks greater than 6000 pounds GVWR. It has been argued that including the 6000 to 8500 pound GVWR trucks in the light duty truck class is unnecessary, since in model year 1979 these trucks will be subjected to EPA's more stringent heavy duty engine emission standards. Commenters further claimed that since the cost-effectiveness of the proposed heavy duty engine emission control strategy is greater than for this regulation (i.e., fewer dollars per ton of pollution controlled), it would appear to be a more cost-effective strategy overall to leave the 6000 to 8500 pound GVWR trucks in the heavy duty engine class and to impose more stringent heavy duty engine emission standards on those trucks 7/.

Alternative II has been suggested by Ford and Chrysler as a means of minimizing the adverse impacts perceived by those compaines due to enlarging the light duty truck class to 8500 pounds GVWR. Ford and Chrysler contend that the number of individual truck configurations 8/,

6/ 41 FR 21292, May 24, 1976.

7/ See, e.g., Council on Wage and Price Stability, April 12, 1976, page 20.

8/ A vehicle configuration is a specific combination of vehicle weight, engine transmission, axle ratio and tire size.

each requiring a different emission control system calibration, increase dramatically for trucks above 7000 pounds GVWR. This proliferation of truck configurations in the weight range 7000 to 8500 pounds GVWR occurs because more trucks in this range are special order trucks, built at the request of the truck buyer to satisfy his individual needs.

Ford and Chrysler also contend that above 7000 pounds GVWR, trucks begin to take on truly heavy duty characteristics, such as components of greater weight and durability than passenger car components, rougher ride and slower acceleration capabilities.

Cost-effectiveness data for the proposed heavy duty engine emission control regulation were developed by considering the amount of emission control achieved by, and the cost for such control, for a "typical" heavy duty truck. "Typical" in this instance is a heavy duty vehicle with the following characteristics 9/:

Gasoline-Fueled	Diesel
24,000 pounds GVWR	55,000 pounds GVWR
16,000 miles per year	43,600 miles per year
10 year life	10 year life
4.6 mpg	4.6 mpg

It is not appropriate to conclude that costs for control of 6000 to 8500 pound GVWR trucks under the 1979 heavy duty engine emission standards would be the same as the costs to control a "typical" heavy duty truck as described above. Further, the predicted emission reductions for a "typical" heavy duty truck when subjected to the 1979 heavy duty engine emission control regulations can be expected

9/ Draft Environmental and Inflationary Impact Statement, Interim Heavy Duty Engine Regulations for 1979 and Later Model Years, EPA, April 21, 1976.

to be different than those which would be predicted for a 6000 to 8500 pound GVWR truck subjected to the same control strategy. This is the most important distinction to be made when examining the merits of continuing to classify 6000 to 8500 pound GVWR trucks as heavy duty vehicles.

The heavy duty engine emission test cycle is a steady-state cycle which exercises an engine over a range of speeds and engine loads. These different speed and load conditions (e.g., 2000 rpm and 75 percent of rated power) were selected to be representative of the type of operation that heavy duty vehicles encounter in-use. Emission results obtained from each of the steady-state modes of operation on the test cycle (13 for gasoline-fueled engines and 9 for Diesel engines) are weighted proportionately to approximate the amount of time each of the engine types experience in that steady-state condition in-use. The results of these heavy duty engine testing cycles and the subsequent weighting of the test values to obtain one emission level allow EPA to predict the actual in-use emission rates for heavy duty vehicles. This technique of predicting in-use vehicle emission rates based on the results of an engine test cycle is a valid technique for heavy duty vehicles since the engine test cycle has been designed to model the types of operation that the vehicle typically experiences in actual use on the road. Further changes to the heavy duty vehicle emission measurement procedures are being investigated by EPA in connection with its long term heavy duty vehicle program.

Because the usage pattern that a vehicle experiences influences its actual on-the-road emissions, the vehicle must be tested on a

cycle that adequately represents those usage patterns. EPA has determined (see Chapter II of this statement) that the actual usage patterns of light duty trucks up to 8500 pounds GVWR, when operated in urban environments, closely approximate those of passenger cars. This characteristic of light duty truck operation, personal transportation, is highly transient in nature. Personal usage in urban areas is characterized by stop and go operation, or by the type of operation experienced by the typical commuter. Steady state testing, as is performed in EPA's heavy duty engine test procedure, is incapable of accurately modeling this transient operation. Analysis performed 10/ of data obtained for EPA indicates that transient operation cannot be adequately simulated by the heavy duty engine steady-state test procedure, or by any modification of that steady-state procedure for the purpose of assessing the emissions from vehicles. Thus, to accurately assess the in-use emission performance of vehicles that are typically operated on transient cycles, the heavy duty engine test procedure cannot be used.

The light duty vehicle and truck test cycle, however, does adequately assess the in-use vehicle emission performance of cars and light duty trucks, since that test cycle is a simulation of an urban commuter-type trip. The light duty cycle contains transient operation, which exercises the vehicle over a range of accelerations and decelerations. Since light duty trucks up to 8500 pounds GVWR are operated a substantial portion of the time as personal use transportation vehicles, use of the light duty test cycle is appropriate for these vehicles.

10/ Transient vs. Steady-State Test Procedures for Measuring Emissions of Heavy Duty Diesel Trucks, Internal EPA Memorandum, September 28, 1976, and Prediction of Heavy Duty Gasoline Trucks' Transient Emissions from Steady-State or Sinusoidal Test Procedures, Internal EPA Memorandum, October 13, 1976.

A further consideration in examining whether 6000 to 8500 pound GVWR trucks should be regulated by EPA as light duty trucks or as heavy duty trucks involves the cost of each regulatory approach. Regulating those trucks as heavy duty vehicles involves less cost, since the heavy duty procedure is an engine test procedure. This means that one engine can be designed and tested to demonstrate conformity with Federal emission standards, and then be used by the truck industry in a wide variety of trucks. To require that these 6000 to 8500 pound GVWR trucks be regulated as light duty trucks would mean that each truck configuration (as opposed to each engine) would have to be designed to meet emission standards. There are substantially more truck configurations than engines.

Although a more costly approach, EPA has rejected the alternative of leaving the 6000 to 8500 pound GVWR trucks in the heavy duty class. The approach taken by EPA, that of requiring that 6000 to 8500 pound GVWR trucks be included in the light duty truck class, was selected because of the increased emission reductions available from this class of vehicles when tested under the light duty test cycle. Even though this approach is more costly than either of the alternatives discussed above, the Agency has determined that the emission reductions to be realized by this regulation are both necessary and cost-effective in comparison with a wide range of other mobile and stationary source emission control strategies.

Table VI-C

ALTERNATIVE LIGHT DUTY TRUCK

EMISSION REGULATIONS

Base Case	- No further control is imposed; the light duty truck class continues to be subject to the current standards of 2.0 g/m HC, 20 g/m CO and 3.1 g/m NOx. The light duty truck class definition is unchanged at 0 to 6000 pounds GVWR, and the 6000 to 8500 pound GVWR vehicles continue to be regulated as heavy duty vehicles.
Final Regulations	- Light duty trucks are controlled beginning in model year 1979 to emission levels of 1.7 g/m HC, 18 g/m CO and 2.3 g/m NOx. The light duty truck class is enlarged to include all trucks up to 8500 pounds GVWR and 6000 pounds curb weight.
Alternative I	- Light duty trucks are controlled beginning in model year 1979 to emission levels of 1.7 g/m HC, 18 g/m CO and 2.3 g/m NOx. The light duty truck class definition is unchanged at 0 to 6000 pounds GVWR. Trucks 6000 to 8500

Table VI-c (cont'd) ....2.

	pounds GVWR are regulated as heavy duty vehicles, and are subjected in model year 1979 to emission standards of 1.5 g/BHP-hr HC, 25 g/BHP-hr CO and 10 g/BHP-hr HC + NOx.*
Alternative II	- Light Duty trucks are controlled beginning in model year 1979 to emission levels of 1.7 g/m HC, 18 g/m CO and 2.3 g/m NOx. The light duty truck class is enlarged to include all trucks up to 7000 pounds GVWR and 6000 pounds curb weight.

* As has been proposed for trucks greater than 8500 pounds GVWR, 41 FR 21292, May 24, 1976.

Chapter VII

PROBLEMS AND OBJECTIONS RAISED BY FEDERAL, STATE AND LOCAL AGENCIES, AND BY THE PUBLIC

A. Introduction

This chapter summarizes the comments received in response to the Notice of Proposed Rulemaking and the Draft Environmental Impact Statement. The summarized comments, and EPA's disposition of those comments are grouped according to the basic issues raised by the commenters.

A complete summary and analysis of comments is not included with this final EIS due to the volume of comments received. Single copies of that document, "Summary and Analysis of Comments to the NPRM," are available in the Public Information Center, PM-215, U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460.

B. List of Commenters

1. American Farm Bureau Federation
2. American Motors Corporation
3. Kenneth A. Burkholder
4. Chrysler Corporation
5. The Council on Wage and Price Stability
6. Department of Defense
7. Department of Transportation
8. Energy Research and Development Administration
9. Ford Motor Company
10. General Motors Corporation
11. International Harvester Company

12. Motor Vehicle Manufacturers Association

13. Perkins Engines

14. State of New York, Department of Environmental Conservation

15. Volkswagen of America, Inc.

C. Summary

1. Lead Time - The vehicle manufacturers have indicated that they cannot achieve compliance with the proposed regulations in 1978. EPA's analysis supports this argument and results in a recommendation to delay implementation until the 1979 model year.

2. Fuel Economy - Most manufacturers have claimed that a fuel economy penalty will be incurred as a result of the proposed action. EPA's subsequent analysis of the additional data presented by the commenters reaffirms that there need not be a fuel penalty as a result of the proposed regulations.

3. Cost - A wide range of cost data inputs were received from the manufacturers. Analysis of these data has lead to minor revisions in EPA's original estimate. The estimated cost for 0 to 6000 pound GVWR vehicles is now $8 per vehicle and the estimated cost for 6000 to 8500 pound GVWR vehicles has been increased slightly to $219 per vehicle (including $15 for evaporative emission control equipment).

4. Stingency of Standards - Some manufacturers claimed that the standards were more stringent than the 1977 LDV standards because of the added payload and higher road load proposals. The higher payload requirements were reassessed and it has been recommended that they be

deleted (see issue #7). In addition, the analysis of the latest road load horsepower data has lead to a reduced road load horsepower requirement (see issue #9). The net effect of these revisions has been to assure that the proposed standards are not more stringent than the 1977 LDV standards. No change in the proposed standards has been recommended.

5. Class Definition - Comments were divided over the issue of an appropriate class definition with some support for the EPA proposal and some alternative suggestions ranging from no change to the current LDT (6000 pounds GVWR) class definition to enlarging the LDV class to include vehicles up to 10,000 pounds GVWR. Some manufacturers argued that vehicle design parameters should be the basis for distinguishing light duty trucks from heavy duty vehicles. The EPA position has been that the primary use of vehicles should govern their classification for emission testing purposes, and the majority of trucks under 8500 pounds GVWR are used primarily for personal transportation. Only those design features which would largely preclude personal transportation have been selected as criteria for allowing heavy duty certification. To this end EPA has accepted the contention that delivery vans which can carry only property, and are characterized by much larger frontal areas than pickup trucks and conventional vans, are properly regulated as heavy duty.

The recommendation is to exclude vehicles with frontal areas of greater than 46 square feet. The other aspects of the class definition, i.e., 6000 pound curb weight and 8500 pound GVWR (optional to 10,000 pound GVWR) should remain unchanged from the NPRM. The 10,000 pound GVWR

option remains to allow for common certification of a manufacturers product line which may extend beyond the 8500 pound GVWR limit.

6. Incomplete Vehicles - Several manufacturers have argued that incomplete vehicles are generally finished as commercial or recreational use vehicles whose final configurations would meet the criteria for inclusion in the heavy duty vehicle class. They have further argued that the proposed procedure for certifying incomplete vehicles is overly restrictive. EPA has partially concurred with these arguments.

The recommendation is to allow the primary manufacturer to classify incomplete trucks either as LDTs or as HDVs based on their intended completed vehicle configuration. The maximum curb weight and frontal area which the manufacturer intends to allow as a certified configuration would be attached to the vehicle in the form of a label for all LDTs. Incomplete HDVs under 8500 pounds GVWR would be labeled with a minimum curb weight of 6000 lbs. or a minimum frontal area of 46 square feet. Subsequent manufacturers completing these vehicles would be responsible for purchasing and completing vehicles in a certified configuration.

7. Payload - The NPRM proposed that a 500 pound simulated payload be substituted for the 300 pound payload in the existing regulation. Comments received were largely negative and indicated that the use of the higher payload was inconsistent with the personal use concept which is the basis for the revised class definition. EPA concurs, and therefore it is recommended that the 300 pound payload be retained.

8. Baseline Emissions of Trucks in the 6000 to 8500 Pound GVWR Range - American Motors and General Motors have claimed lower current baseline emissions than reported by EPA, and thus, argue that EPA has overstated the benefits of the proposed action. On the other hand, Chrysler has reported a baseline higher than EPA's. Further analysis of the original baseline data by EPA has lead to a reduction in the calculated baseline emissions, but not to the extent suggested by AMC and GM. The baseline has been decreased from 5.5 grams per mile for HC, 58 grams per mile for CO, and 6.3 grams per mile for NOx to 4.3 grams per mile, 44 grams per mile, and 5.2 grams per mile HC, CO and NOx, respectively. This revised baseline has been used in computing new cost and environmental impact data.

9. Road Load Horsepower - The NPRM proposed values of road load horsepower substantially higher than the existing requirements. Manufacturers submitted data indicating these values were too high and EPA collected additional data confirming that contention. A new table of road load power requirements has been developed. These power settings, although lower than those proposed, are higher than the current regulation requires and will result in a more accurate measurementof emissions and fuel economy from LDTs.

10. Cost Effectiveness - The Council on Wage and Price Stability (CWPS) has requested expansion of the cost effectiveness analysis in the regulatory support documentation so as to evaluate separately the actions of expanding the LDT class and then reducing the standards. Both CWPS and General Motors have argued that an evaluation of the alternative of leaving

the 6000 to 8500 pound GVWR vehicles in the HDV class under the proposed interim 1979 HDV standards is necessary. The cost effectiveness analysis has been revised to respond to these comments.

11. Optional Equipment Listing - This list of equipment would have provided data on options affecting frontal area of the vehicle which in turn can influence the road load and subsequently emissions and fuel economy. However, the requirement as stated in the NPRM was too general and would have required manufacturers to report a myriad of options that would not affect the road load power. Therefore the recommendation has been made to delete the proposed optional equipment listing requirement, and to replace it with a requirement to calculate vehicle frontal area by including the frontal area of optional equipment that is sold on more than 33% of a given model line.

12. Disadvantages of Catalysts - Three basic disadvantages of catalysts were claimed by several commenters. These were: (1) fire danger; (2) unavailability of unleaded fuel in rural areas; and (3) sulfate emissions. EPA has concluded on the basis of recent studies that the fire danger from catalyst-equipped vehicles is no greater than that from existing non-catalyst vehicles already in widespread use in rural areas. EPA has also concluded that adequate amounts of unleaded fuel will be available in all areas of the country by 1979 as a result of increasing numbers of light duty vehicles requiring its use. Finally, the Administrator has decided not to propose standards for sulfate emissions control at this time. If in the future it is determinedthat sulfate emissions from catalyst vehicles represent a significant hazard then an independent action will be taken.

13. Engine Calibrations - It has been argued that the expanded class definition will greatly expand the number of engine calibrations required for those vehicles previously certified as HDV. EPA has agreed that numbers of calibrations will increase and has recognized this as an additional cost of the action.

14. Four Wheel Drive - In response to comments from American Motors, the recommendation is made to include specific procedures for the certification testing of four wheel drive vehicles.

15. Consistency of California Regulations - Differences now exist between California and EPA proposed regulations in regard to aspects of class definition and test procedure. It is recommended that such differences be resolved as part of the California waiver proceedings.

Appendix A

Selection of a Breakpoint Between LDTs and HDVs

A. Design Characteristics:

Examination of the physical characteristics of all trucks in the HDV class leads to the observation that the vehicles between 6000 and 10,000 pounds GVWR more closely resemble LDTs than HDVs. MVMA sales data (See Chapter II) show that about 60% of all HDVs lie within the 6000 to 10,000 pound GVWR range. Based on 1973 sales, this represents 761,000 vehicles. (For purposes of comparison, roughly 1.7 million LDTs were sold in 1973.) Nearly 85% of the 6000 to 10,000 pound GVWR vehicles are pickup trucks, vans, and station wagons built on a truck chassis. These vehicles differ from their LDT counterparts only in having slightly higher capacity chassis components, including tires, suspension systems, frames and brakes. All of the vehicles in the 6000 to 10,000 pound GVWR range use the same engines as LDTs, differing only in emission control measures such as carburetor and distributor calibrations, and in some cases, lack of "add-on" emission controls (EGR, air pumps, evaporative emission controls). 1/

The 10,000 to 16,000 pound GVWR range represents a transition range where significant changes in vehicle design occur. Less than 2% of all vehicles in thecurrent HDV class fall within this range. Approximately 90 to 95% of the vehicles in the 10,000 to 14,000 pound GVWR range are motor homes built by over 100 manufacturers on bare chassis sold by the four major light truck manufacturers. The vast majority of these are built on Dodge chassis. According to 1973 MVMA sales data, over 39,999 of the 44,000 vehicles sold within the 10,000 to 14,000 pound GVWR range were motor homes on Dodge chassis. Some of the vehicles in the 14,000 to 16,000 pound GVWR range are also motor homes, but in general, the vehicles in this range (6300 in 1973 according to MVMA) appear to be working type vehicles with engines and chassis more like heavier vehicles than LDTs.

B. Usage Characteristics:

Since the physical characteristics of trucks are basically similar up to about 10,000 pounds GVWR, a decision on a breakpoint is largely dependent upon usage data. The most appropriate GVWR cutpoint would be one which maximally separates those truck types which are basically used for personal transportation from those truck types which basically have commercial applications. The 1972 Department of Commerce Truck and Bus Survey data 2/ and the 1973 Department of Transportation Weigh Station Survey data 3/ were used to investigate the usage characteristics of vehicle models by GVWR. The histogram in Figure 1 summarizes the responses of truck owners who were asked to specify the primary usage application for their vehicle. The histogram shows the percent of

vehicles used primarily for personal usage as a function of GVW. In determining trends of personal usage with GVWR, special attention should be given to the 5000, 6000, 8000, 10,000 and 16,000-26,000 pound GVWR points since most of the truck sample is concentrated at these points. (The sample was selected to represent the distribution of trucks in the field.) With this in mind, the percent of personal usage vehicles tends to remain stable at about 50% through 8000 pounds GVWR, remain stable at about 2% for 16,000-26,000 pound vehicles, and be in transition between 8000 and 16,000 pounds GVWR. These data support a lower GVWR limit of 8000 pounds.

Figure 2 expands the lower GVW range of Figure 1 examining the percent of vehicles used primarily for personal transportation by vehicle type: pickups, panels and vans, multistops. Within each of these body styles, the percentage of personal usage is fairly constant with GVWR although it should be noted that the percent of 10,000 pound GVWR pickups used primarily for personal usage is significantly less than the percent of under 10,000 pound GVWR pickups used primarily for personal usage. Averaged over all GVWR ranges, these data indicate that 53.8 percent of pickup trucks are used primarily for personal usage, 23.6 percent of panels and vans are used for personal usage, and only 6.3 percent of multistop vehicles are used for personal usage. Usage data on cab chassis are not available, but it can be reasonably assumed that these vehicles are basically non-personal usage vehicles, since incomplete vehicles are typically finished with cargo carrying bodies or permanent motor home equipment. Therefore an analysis of Figure 2 indicates that not only do pickups account for the largest percentage of trucks under 14,000 pounds GVWR, but they are the vehicles which are used, to a very large extent, for personal transportation.

C. Sales Distribution:

A selection of the specific cutpoint requires an examination of the sales distribution of vehicles by body type and GVWR. Figures 3 and 4 present 1973 sales data from Ford and Chevrolet respectively. (Chrysler has informally indicated that their vehicles are distributed similary to their competitors.) Examination of the Ford data indicates that a cutpoint at 8500 pounds GVWR maximizes the overall percentage of pickups included in the LDT class. A cutpoint below 8500 pounds GVWR would omit a significant number of pickups. The range between 8500 and 9500 pounds GVWR is not heavily populated. Within this range, the Chevrolet and Ford data indicate that the number of cab chassis and multistop vehicles are about equal to the number of pickups.

D. Cutpoint Selection

All trucks up to about 10,000 pounds GVWR have similar design characteristics. Functional usage data indicate that the majority of trucks below a lower limit of 8000 pounds GVWR are used primarily for personal transportation. In terms of body styles, pickups dominate the GVWR range up to 10,000 pounds GVWR and are consistently used primarily

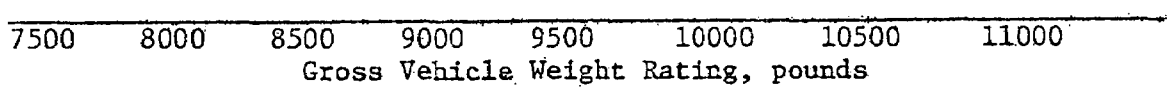
for personal transportation, while multistop vehicles are used to a much lesser extent for personal transportation. Therefore, the cutpoint desired is the one which maximizes the number of pickup trucks, minimizes the number of multistop trucks and cab chassis, does not exceed 9500 pounds GVWR, and if possible, is greater than 8000 pounds GVWR. Considering sales distribution to achieve this objective, 8500 pounds appears as the optimum minimum cutpoint. Selection of an 8500 pound GVWR cutpoint would expand the present LDT class from approximately 1.8 million vehicles per model year to approximately 2.5 million vehicles per model year (based on 1973 MVMA sales figures).

There is no one breakpoint that can be established to separate LDTs from HDVs which will completely eliminate cross-over or potential cross-over of vehicle body styles and vehicle usage. Cases where some models straddle the 8500 pound cutpoint will still exist. Therefore, it is proposed that the cutpoint be defined as shown in Figure 6. All vehicles with GVWR at or below 8500 pounds must be certified with the LDT test procedure. All vehicles at or above 10,000 pounds GVWR must be certified with the HDV test procedure. Manufacturers of vehicles between 8500 and 10,000 pounds GVWR can submit a request with their Part 1 certification applications stating which certification procedure they wish to apply. This arrangement will allow vehicles in this "usage overlap" GVWR range to be certified with the regulations which best reflect their usage characteristics and will minimize the number of vehicles which would be certified under two test procedures.

Figure 6

LDT Cutpoints

LDT or HDV



Two incentives would exist for manufacturers to certify these vehicles in the optional range by the HDV test procedure rather than the LDV test procedure. The current HDV test procedure is an engine test procedure and involves a smaller sample of engines than is the case under LDT certification, since the range of chassis options does not increase the sample size. In addition, the current HDV standards are not of equivalent stringency to the LDT standards for an equivalent vehicle.

The relative thoroughness of the two test procedures and the relative stringency of the two standards will be subject to modification: (1) if interim HDV regulations are promulgated and/or (2) when the "final" HDV test procedures and standards are promulgated. Therefore, since these incentives are more than likely short term, it would probably not be cost effective for a manufacturer to redesign large groups of vehicles.

In addition, 95% of the under 10,000 pound GVWR trucks are currently at or below 8500 pounds GVWR. Therefore, a relatively small percentage of trucks fall into the optional category. There is little indication that the percentage of trucks in this optional GVWR range will increase in order to avoid LDT certification. Unless an entire model-line can be pushed over the 8500 pound cutpoint, the result would be a two procedure certification situation wich is not cost effective for a manufacturer, especially considering the low model-line sales volumes in this GVWR range. Major design changes would be required to move entire model lines over the 8500 pound cutpoint. It is doubtful whether consumers who are using LDTs primarily for personal transportation would be willing to pay the additional costs which would occur as the result of added weight. Therefore, it is more likely that when a model extends from the LDT range into the optional range, the manufacturer will choose to certify the entire model with the LDT procedure to avoid the costs of dual certification. This viewpoint has been supported in informal discussions with several manufacturers. On the other hand, efforts to move the commercially used multistop or cab chassis vehicles over the 8500 pound cutpoint (where the majority of them are currently located) would essentially support the contention that those vehicles should in fact be regulated as HDVs. This is also likely to happen based on informal discussions with manufacturers.

E. Alternative Cutpoints:

Previous attempts to define a cutpoint between LDTs and HDVs have considered the following options:

1. The cutpoint defined at 14,000 pounds GVWR. The 14,000 pound limit represents the point of minimum cross-over for currently produced vehicles and also represents the point of minimum cross-over in the future if manufacturers choose to "beef-up" some vehicles to get them out of a LDT class. However, a 14,000 pound cutpoint includes a large porportion of all multistop vehicles and incomplete motor home chassis as well as a large number of incomplete cab chassis. These vehicles tend to be used strictly for commerical or recreational purposes and are not expected to drive like the current LDTs within the urban environment.

2. The cutpoint defined at 10,000 pounds GVWR. The 10,000 pound limit is used by the Department of Transportation to define light trucks, and it currently includes all standard pickups, vans, and station wagons. However, this cutpoint splits the multistop vehicles and motor homes and cab chassis production which increases markedly around 10,000 pounds GVWR. Thus, these non-personal usage vehicles would have to be certified under both the light duty and heavy duty certification programs. This results in increased cost to the manufacturer and the EPA. The 10,000 pound cutpoint would result in a class which is mostly composed of personal usage trucks with similar payload characteristics; however, a small fraction of the class would have substantially different usage and payload characteristics.

3. The cutpoint defined in terms of body styles. A body style definition would define a LDT class to include all pickups, vans and station wagons. Other vehicles such as motor homes, multistop vehicles, stake trucks, box vans, and tow trucks would be excluded. This approach is, however, virtually unworkable since it is not possible to clearly define some of the applicable body styles. For example, a motor home is often difficult to distinguish from a van. Even if these body styles could be adequately defined based on current vehicle design, it is not possible to predict future design developments. As a result of this problem, a body style definition has not been determined reasonable in this analysis nor has it been received well by the manufacturers.

Footnotes

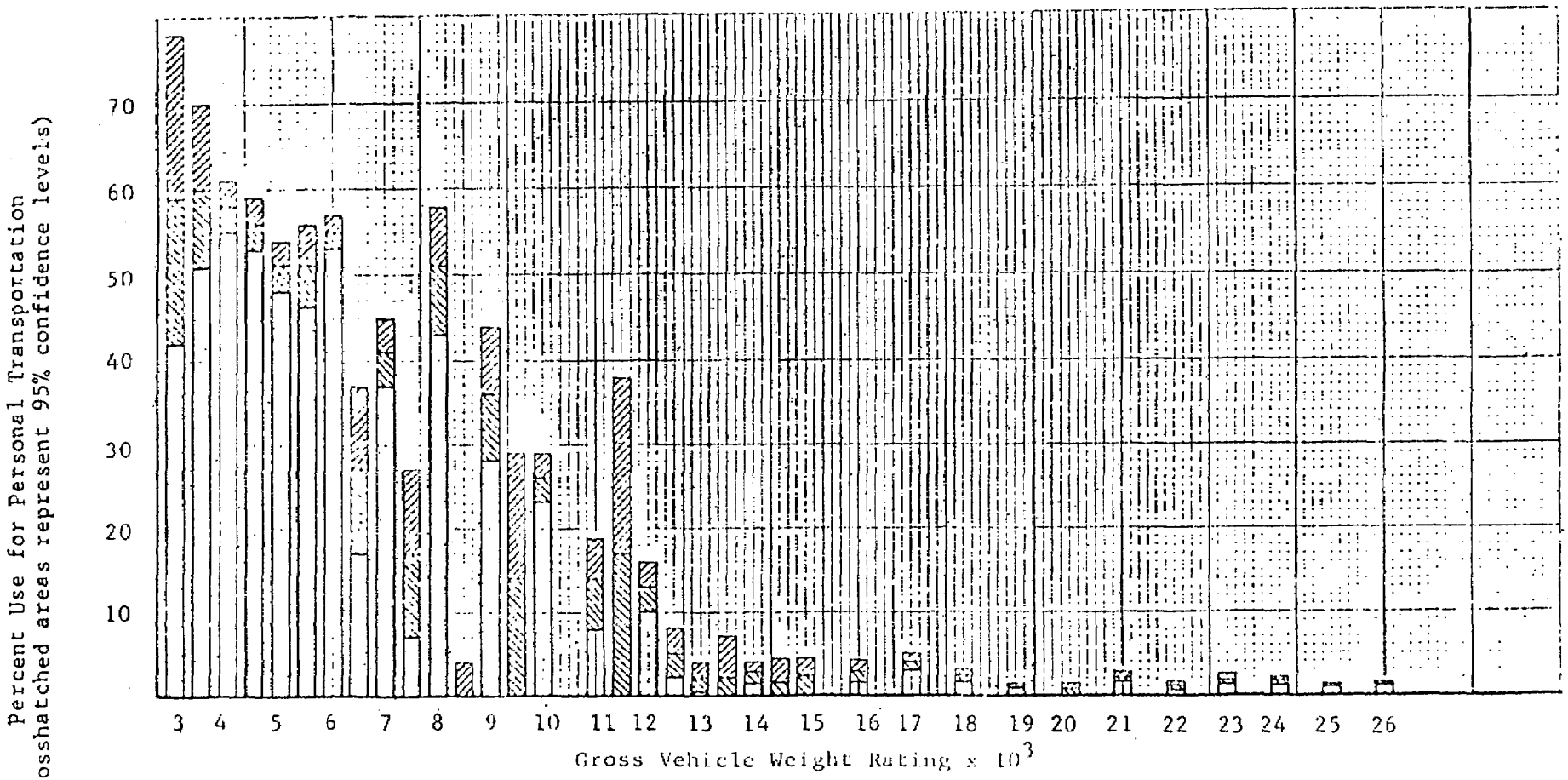
1/ Technical Evaluation of Emission Control Approaches and Economics of Emission Reduction Requirements for Vehicles Between 6,000 and 14,000 pounds GVW, by Bogdan, Burke and Reif, Calspan Corp., Nov. 1973, EPA-460/3-73-005.

2/ "Truck Inventory and Use Survey," 1972 Census of Transportation, U.S. Department of Commerce, October, 1973.

3/ 1973 Truck Weigh Station Survey Data, U.S. Department of Transportation, Federal Highway Administration.

FIGURE 1

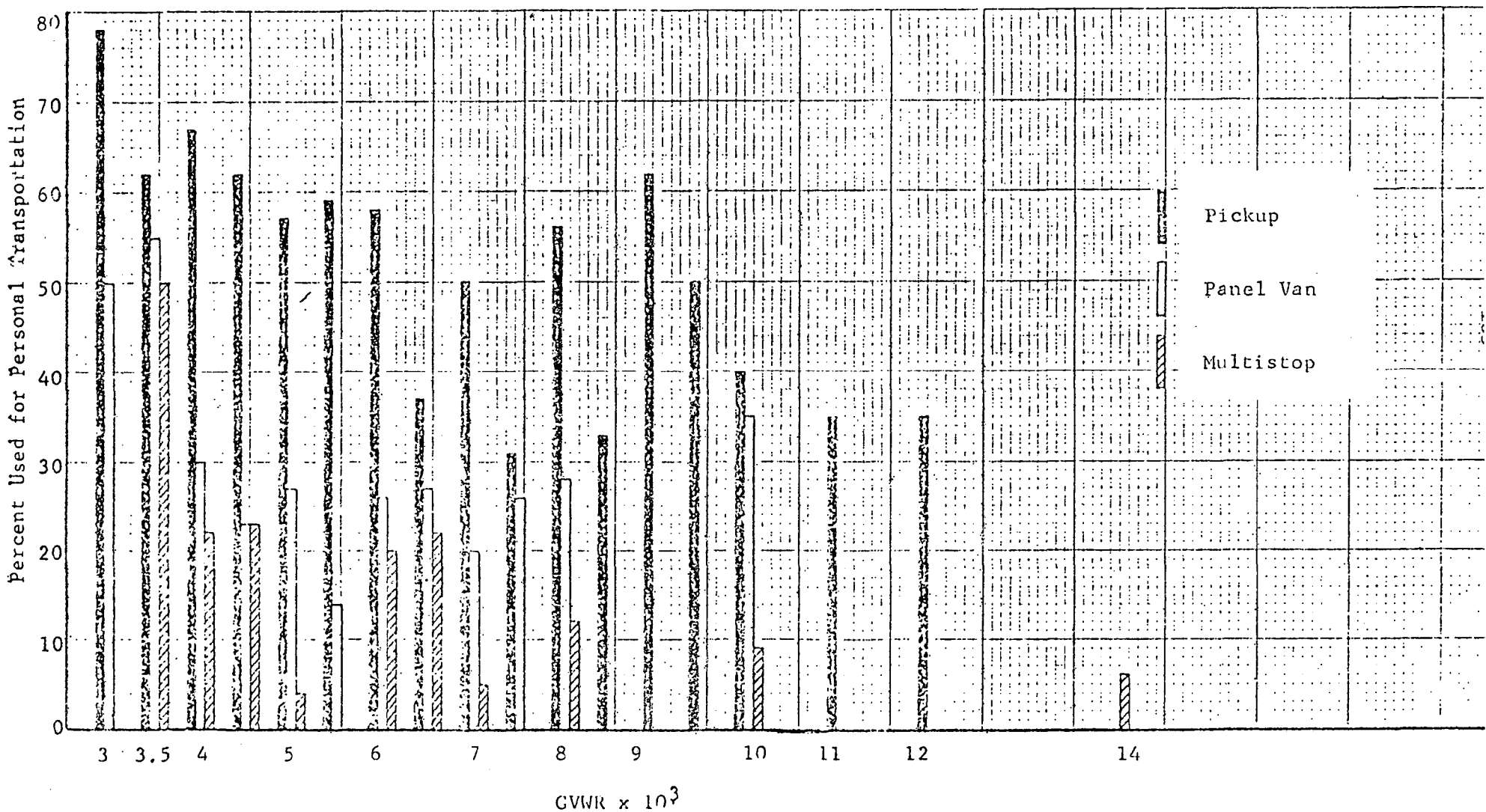
PERCENT OF TRUCKS USED FOR PERSONAL TRANSPORTATION AS A FUNCTION OF GROSS VEHICLE WEIGHT RATING



Source: 1972 Census of Transportation

Figure 2

Percent of all Pickup, Panel Van, Multistop Trucks Used for Personal Transportation as a Function of Registered Gross Vehicle Weight



Source: 1972 Census of Transportation

Ford 1973 Truck Sales

Vehicle Sales by GVWR

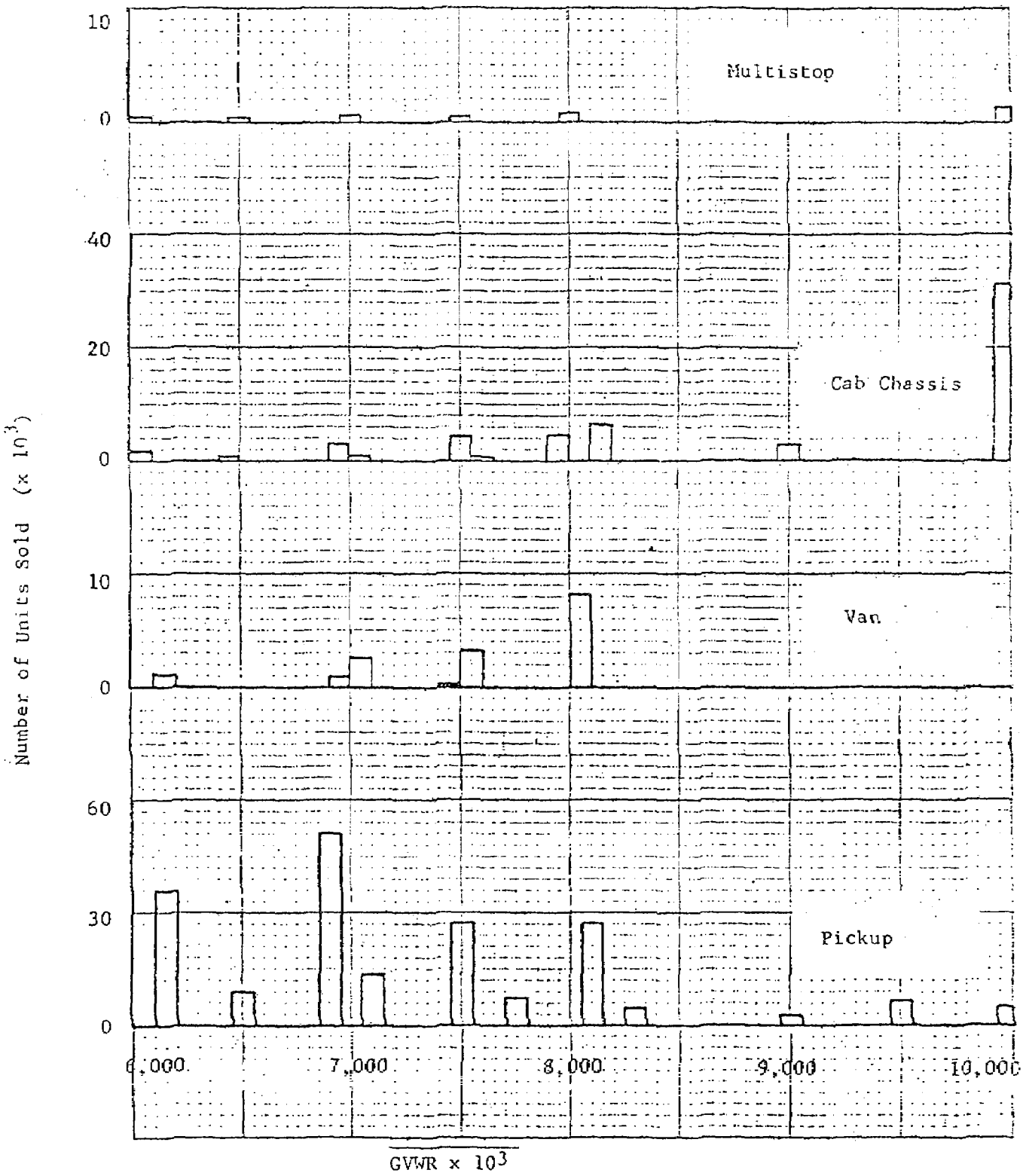
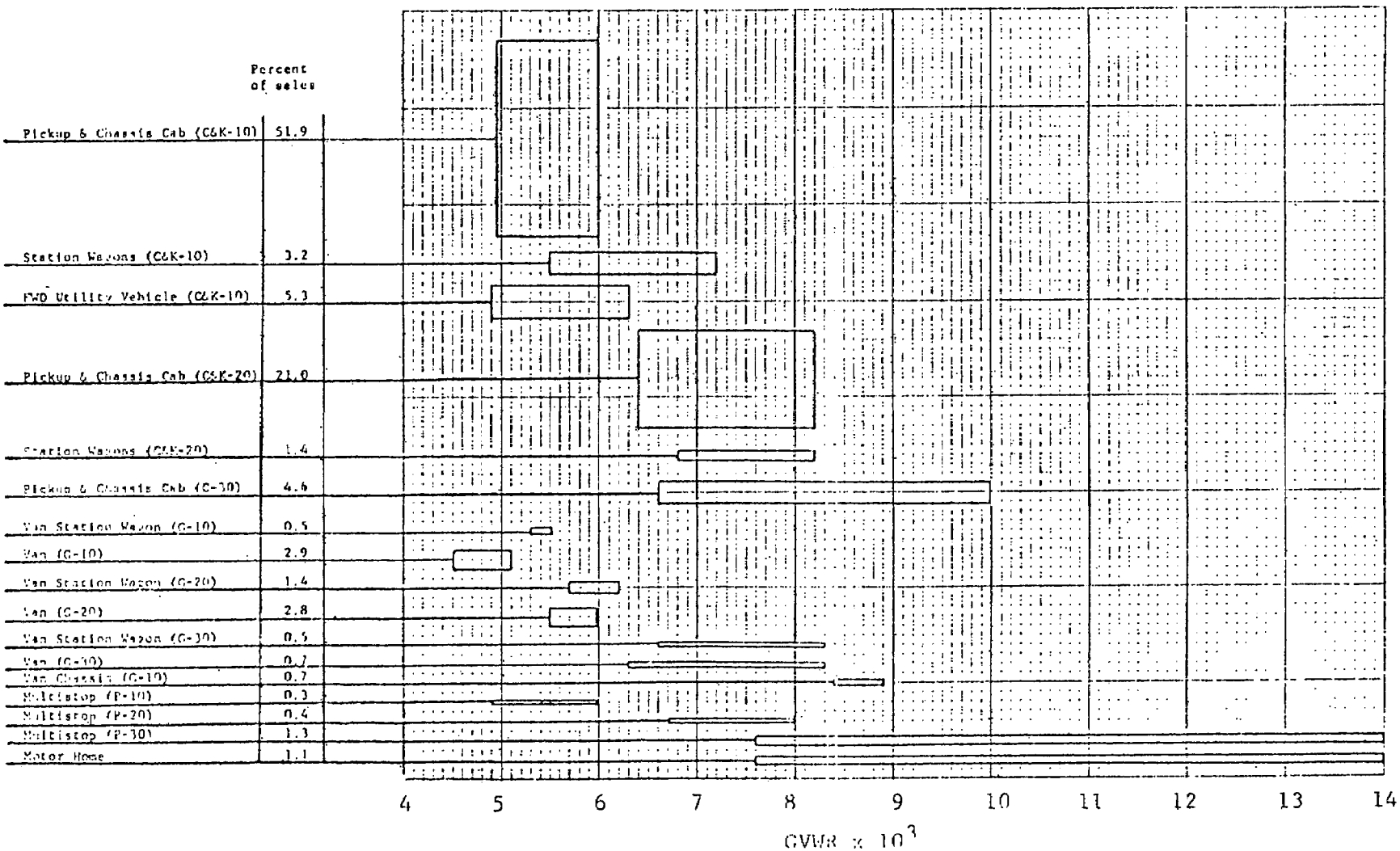


Figure 4

Chevrolet 1973 Truck Sales
(10, 20, 30 series)

Percent of Sales by GVWR

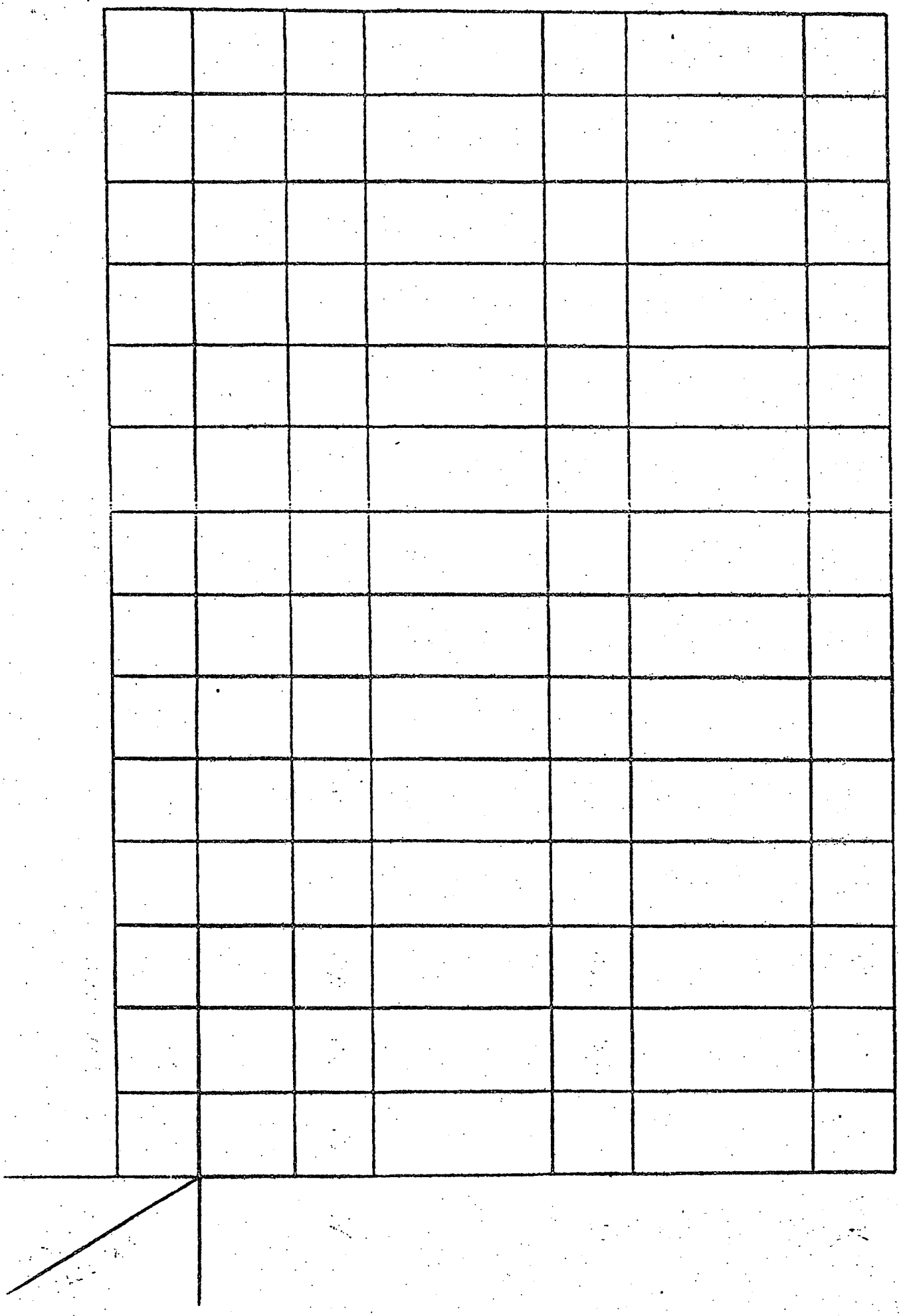


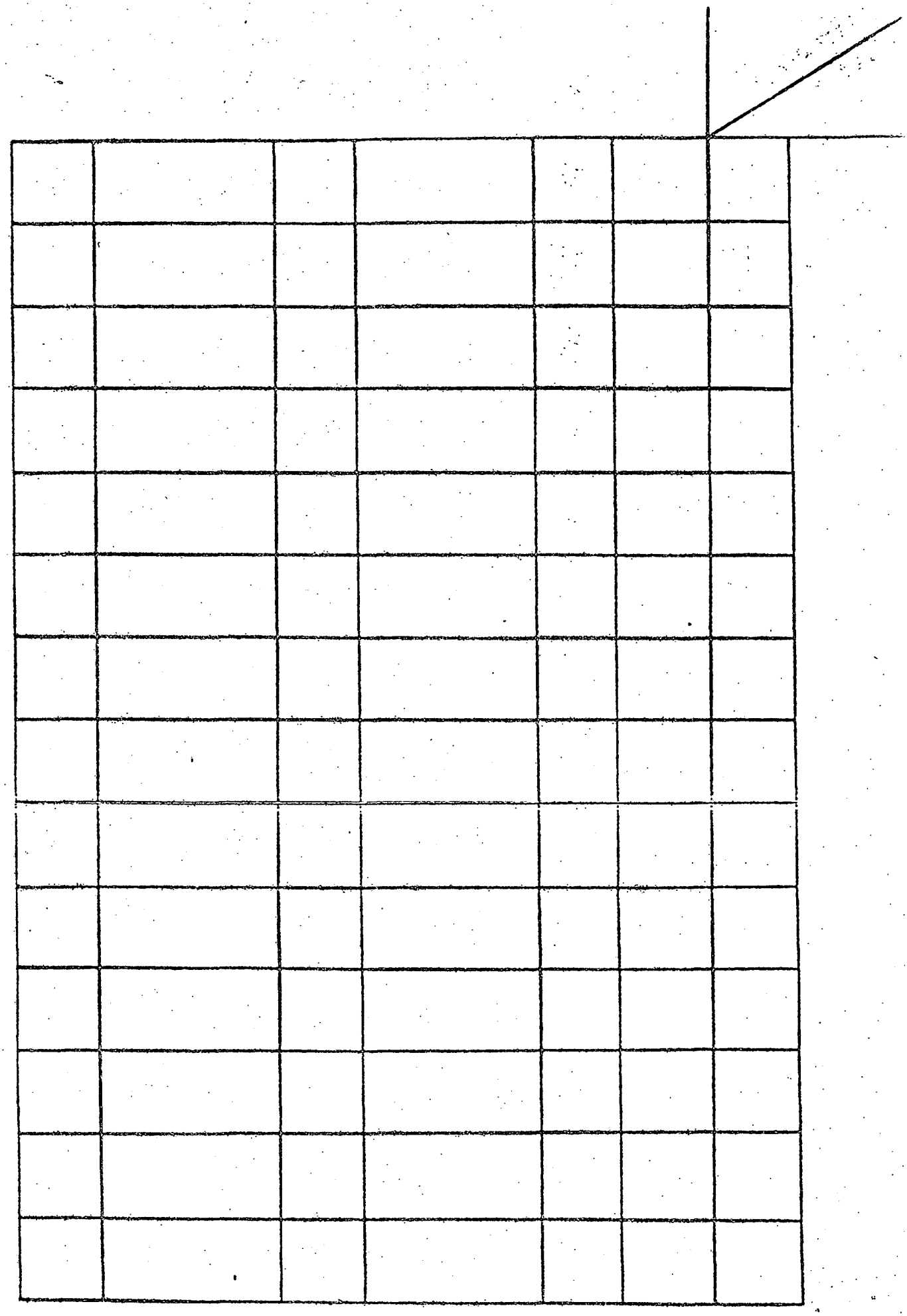
Appendix B - Light Duty Vehicle and Light Duty Truck Emission Factors

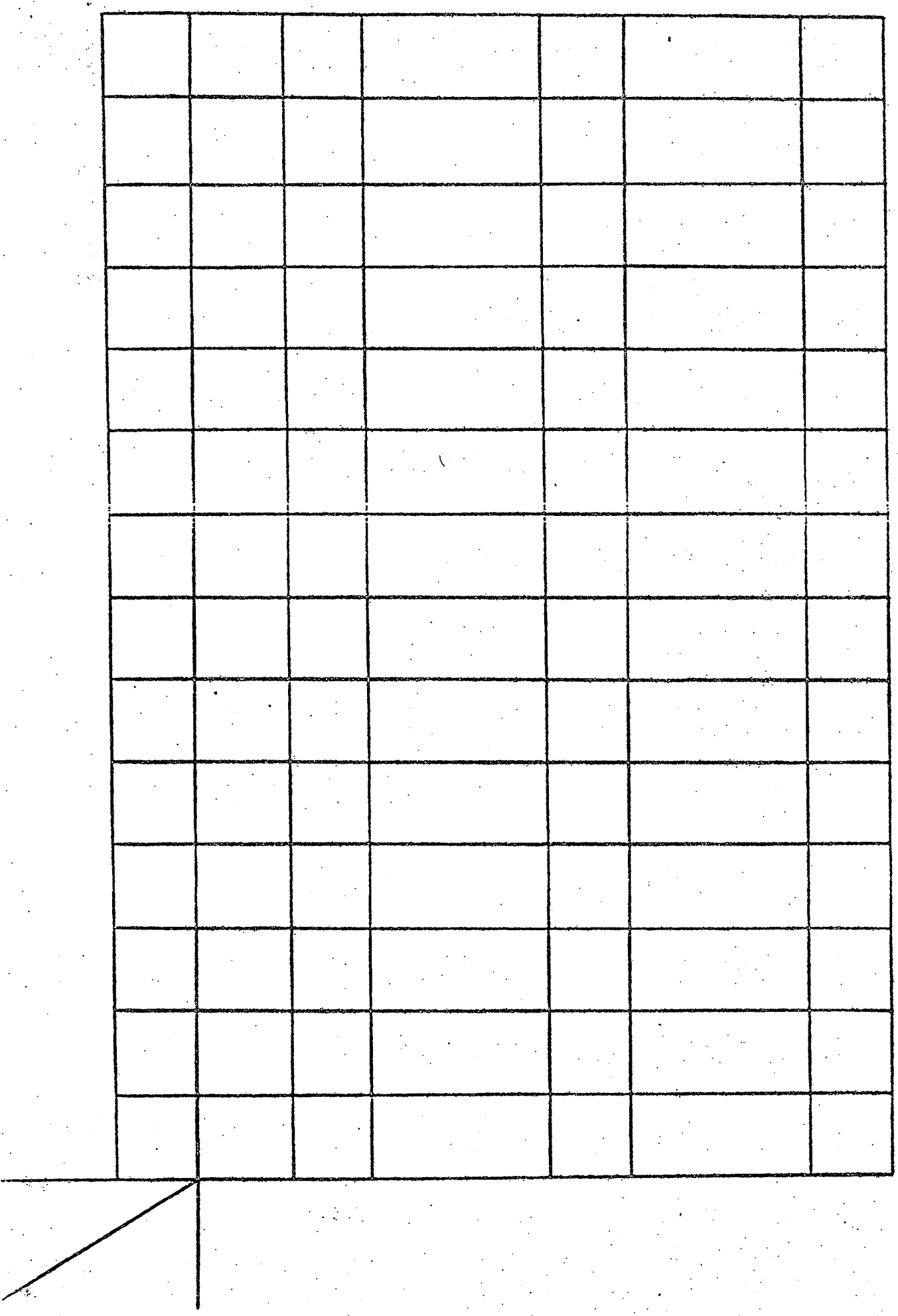
Section I of this appendix presents light duty vehicle emission factors in a format similar to that used in the "Compilation of Air Pollutant Emission Factors," (AP-42). The emission factors are preliminary factors derived from EPA's annual program to examine the acutal in-use emission rates of light duty vehicles and light duty trucks. These factors have been compiled based on the latest test results from that program and are currently being further screened within the Agency for inclusion in a future edition of AP-42. The factors assume that the emission standards for light duty vehicles which are currently mandated by the Clean Air Act will be in effect (i.e., 1978 model year standards of .41 grams per mile (g/m) HC, 3.4 g/m CO and .4 g/m NOx).

Section II of this appendix contains light duty truck emission factors, both for the case of taking no further action, and for the case of imposing emission standards associated with this regulation (i.e., 1979 model year standards of 1.7 g/m HC, 18 g/m CO and 2.3 g/m NOx). These emission factors are also preliminary factors based on data from EPA's latest emission factors testing program, and are currently undergoing additional review within the Agency for inclusion in AP-42.

Section I - Light Duty Vehicle Emission Factors







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Section II - Light Duty Truck Emission Factors

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CO	18.3	41.	57.4											
NOx	1.1	3.1	4.0											

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