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COMPILATION OF AIR POLLUTANT EMISSION FACTORS

Volume II: Mobile Sources

FOURTH EDITION

AP-42
Fourth Edition
September 1985

COMPILATION OF AIR POLLUTANT EMISSION FACTORS

Volume II: Mobile Sources

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Office of Air and Radiation
Office of Mobile Sources
Test and Evaluation Branch
Ann Arbor, MI 48105

U.S. Environmental Protection Agency

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Volume II

PREFACE TO THE FOURTH EDITION

VOLUME II: MOBILE SOURCES

Compilation of Air Pollutant Emission Factors, AP-42, reports data on emissions of atmospheric polutants for which sufficient information exists to establish realistic emission factors. The highway source data are based on MOBILE3, a computer program issued by the EPA in June 1984, which estimates fleet emission rates for hydrocarbons (HC), carbon monoxide (CO) and nitrous oxides (NOx) for any calendar year. One off-highway source has been updated from previous editions of AP-42. The off-highway source updated is diesel powered construction equipment.

For the Fourth Edition, stationary point and area sources have been collected as Volume I. Mobile sources, formerly Chapter 3.0, are now separated into Volume II. Comments and suggestions regarding this document are appreciated and should be addressed to the AP-42 Project, Test and Evaluation Branch, Environmental Protection Agency, 2565 Plymouth Road, Ann Arbor, MI 48105.

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Part I - HIGHWAY MOBILE SOURCES

INTRODUCTION

This document officially revises all previous factor (AP-42) documents for highway mobile sources. Also, this document will be periodically revised as the emissions and in-use vehicle operational characteristics vary from those presented.

A. PURPOSE

This document was generated to present more recent emission factor information for highway mobile sources. As such, the March 1981 Compilation of Air Pollutant Emission Factors: Highway Mobile Sources, EPA-460/3-81-005 document is outdated. Many of the emission rates contained in this document are found in EPA's mobile source emission model, MOBILE3.

B. MAJOR DIFFERENCES FROM 1981 COMPILATION DOCUMENT [1]

The differences between the emission factors presented in this document and the March, 1981, Compilation Document are listed below:

1. Calculation Methodologies

   a. CO emissions at cold temperatures are predicted in part from an additive rather than a multiplicative model.

   b. Tampering offsets in g/mi are estimated from a number of inputs and added to basic untampered emission rates for the gasoline vehicle classes. The types of tampering included are misfueling (other than filler neck disablement), fuel inlet disablement, catalyst removal, EGR tampering, evaporative canister and PCV tampering, and air pump tampering. National average tampering rates for the above items are incorporated into the fleet emission rates.

   c. The heavy duty diesel mileage vs. age distribution is allowed to change with calendar year to account for the effects of more diesel sales in the light 2b (8,500-10,000 lb. GVW) class.

   d. Nonmethane emissions are estimated from a subtractive rather than a multiplicative model.

2. Emission Data

   a. The evaporative emission rates are based on a representative volatility commercial fuel instead of Indolene, a low volatility test fuel.

   b. More data for basic exhaust emissions for every vehicle type are incorporated, usually for the latest model years and across wider mileage ranges. This is especially true for the 1981 and later light duty gasoline vehicles.

   c. More representative fleet characterization data (registration and VMT vs. age distributions) are used for each vehicle type.

   d. The heavy duty vehicle emissions are based in part on new estimates of the factors which are used to convert emissions in g/bhp-hr to g/mi. These estimates are allowed to change in the future due to improved fuel economy of new trucks and increased sales in the lower weight classes.

   e. More temperature correction factor data have been incorporated for light-duty gasoline vehicles and trucks.

   f. More speed correction factor data have been incorporated for light duty gasoline vehicles and trucks.

3. Regulations

   The emission rates for the 1981 and later model year vehicles reflect the emission standards and regulations that are projected at the time of this update (see Appendix A).

In summary, all of the changes have an impact on the calculated emission factors. To illustrate the differences, six figures are given. Each figure represents emissions at an average speed of 19.6 mph, a temperature of 75°F, and operating mode VMT percentages of 20.6% for cold start, 52.1% for stabilized, and 27.3% for hot start. The six figures are grouped into two sets: 1) low altitude, and 2) high altitude emissions for January 1 of calendar years 1970 through 2000. The figures represent the emission levels for all eight vehicle types combined. Each set of graphs is composed of the three pollutants: total HC, CO, and NOx. The emissions predicted by the 1981 Compilation methodology were generated by the MOBILE2 computer model. The emissions predicted by the 1984 AP-42 methodology were generated by the MOBILE3 computer model, as corrected on May 15, 1985. The update included corrections to temperature correction factors and the EGR tampering rate.

FIGURE 1

TOTAL HYDROCARBONS, ALL MOBILE SOURCES
1970 – 2000
Low Altitude

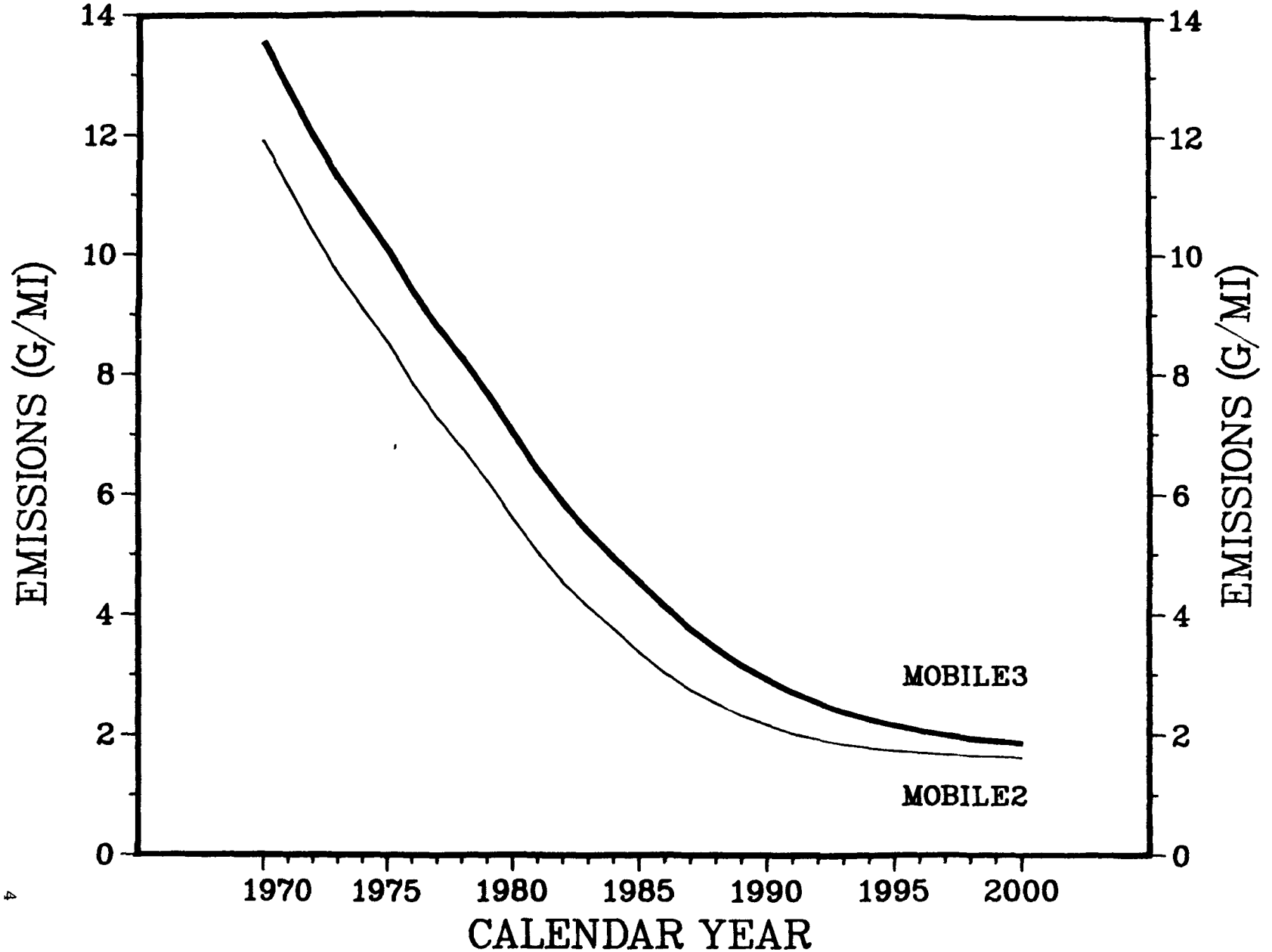


FIGURE 2

CARBON MONOXIDE, ALL MOBILE SOURCES
1970 – 2000
Low Altitude

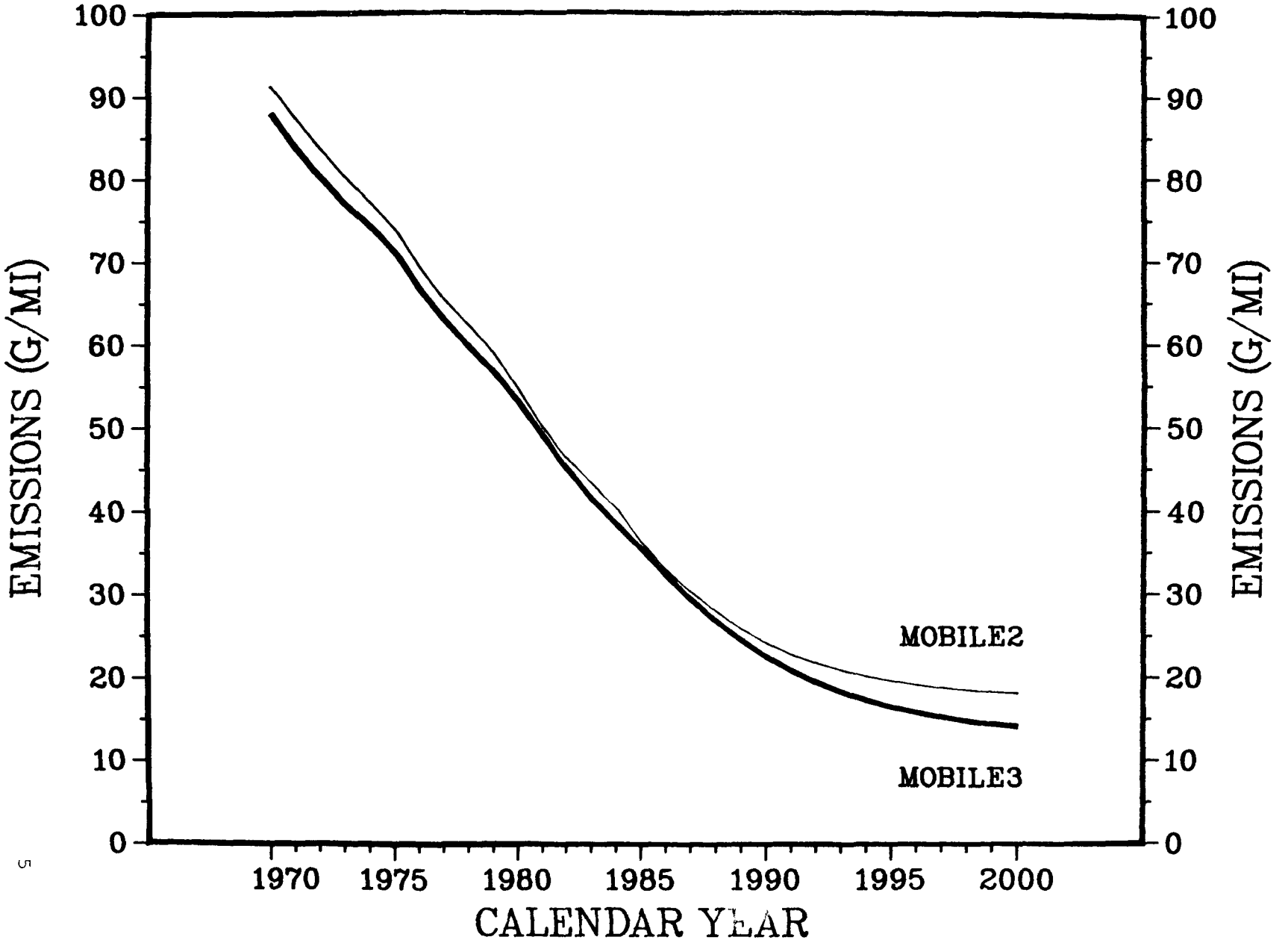


FIGURE 3

OXIDES OF NITROGEN, ALL MOBILE SOURCES
1970 – 2000
Low Altitude

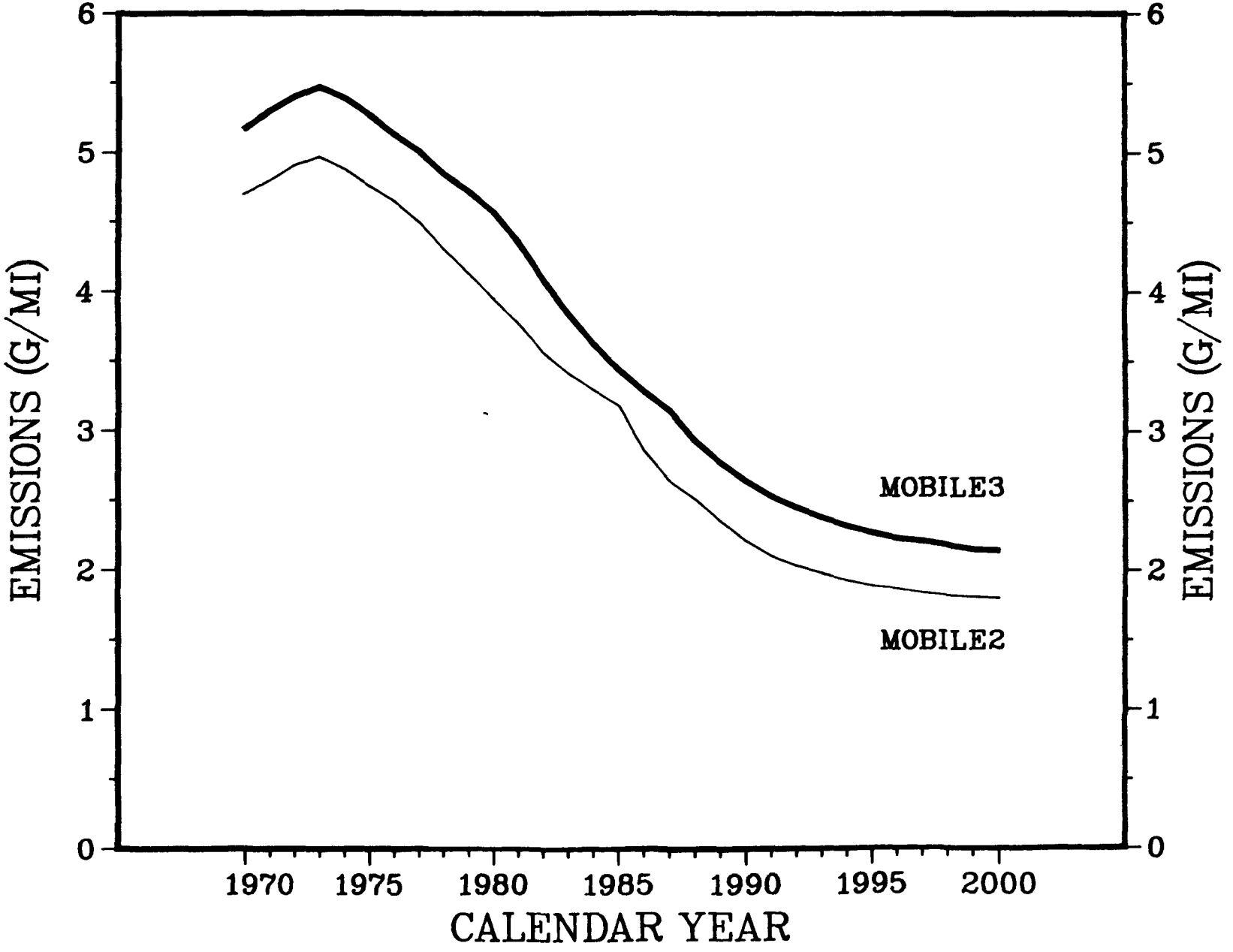


FIGURE 4

TOTAL HYDROCARBONS, ALL MOBILE SOURCES
1970 – 2000
High Altitude

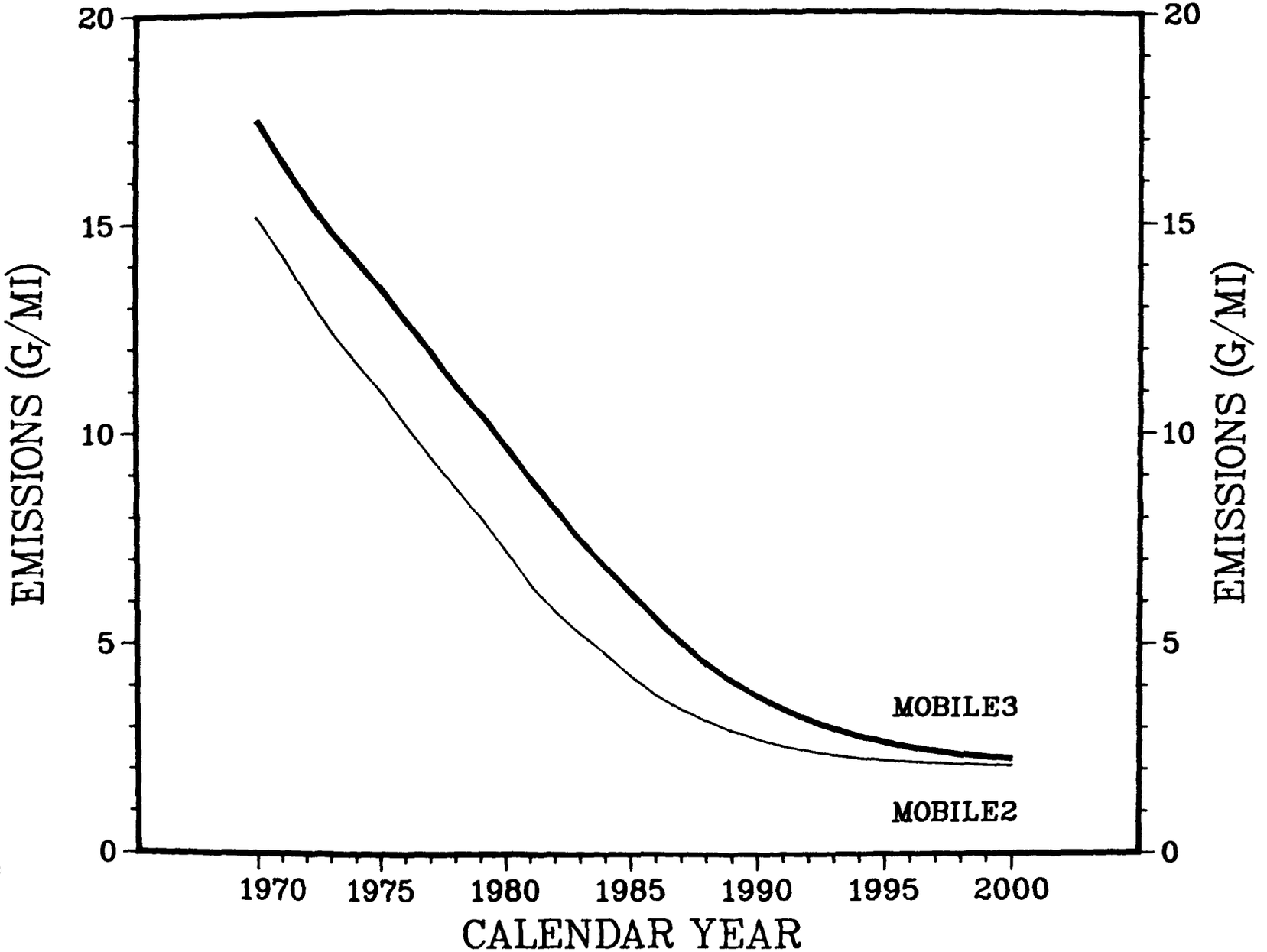
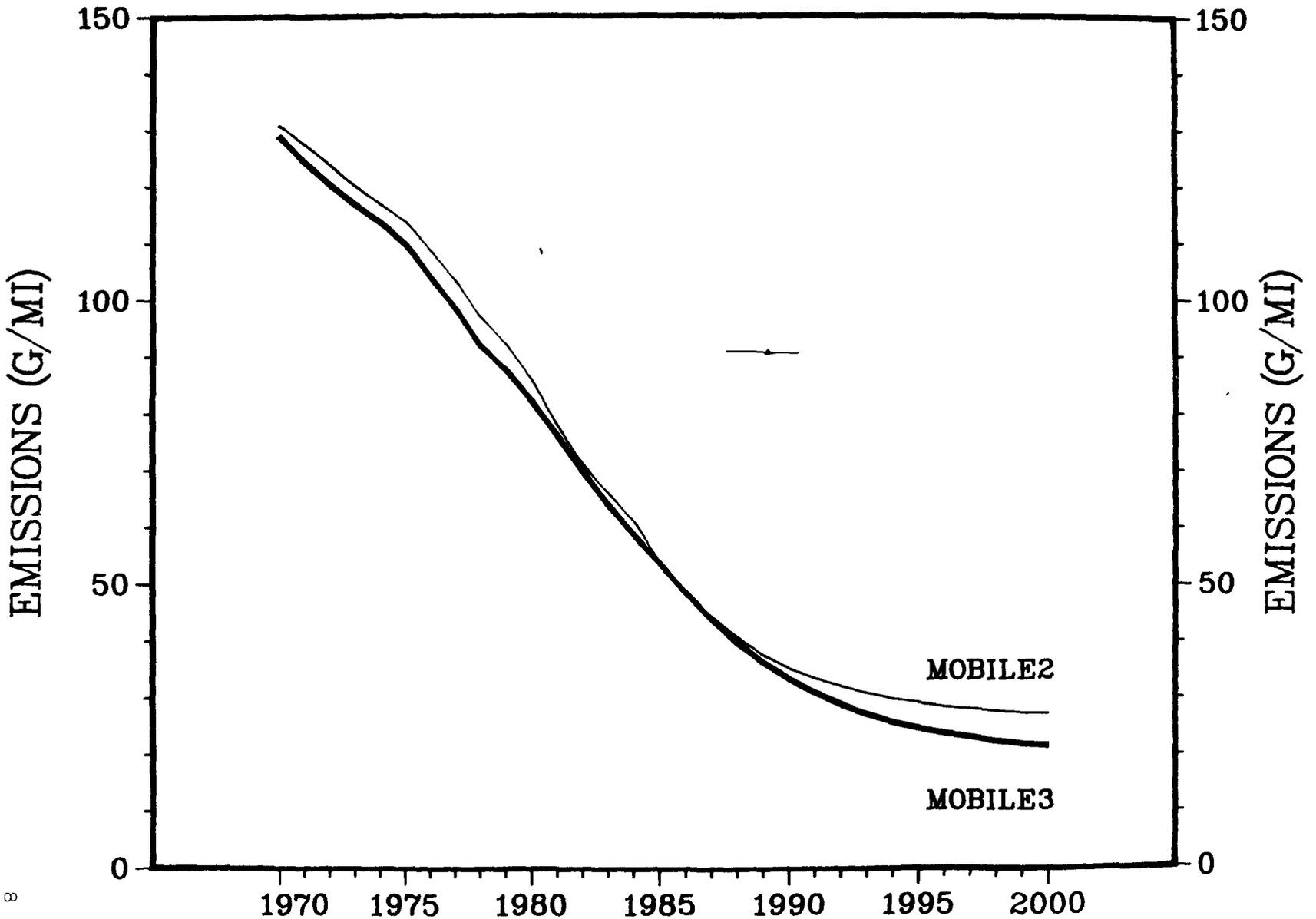
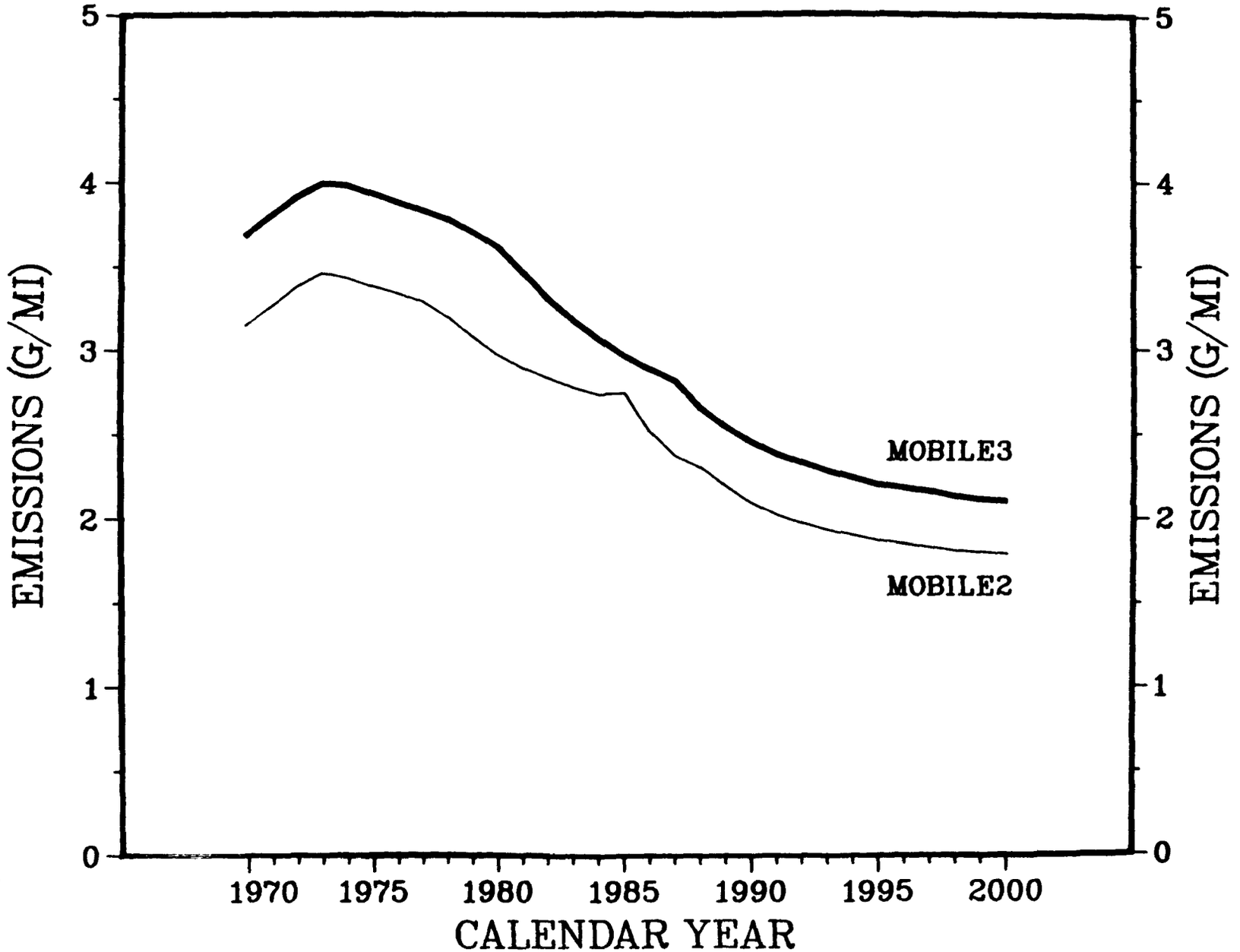


FIGURE 5

CARBON MONOXIDE, ALL MOBILE SOURCES
1970 – 2000
High Altitude



OXIDES OF NITROGEN, ALL MOBILE SOURCES
1970 – 2000
High Altitude



C. VEHICLE INSPECTION AND MAINTENANCE PROGRAMS

If a motor vehicle inspection and maintenance (I/M) program is in effect in the area for which emission factors are being calculated, emission reduction credits can be taken.

The emission reduction credits attributable to an annual I/M program vary according to the type of program in effect. The MOBILE3 credits of an I/M program depend upon the following six factors.

1. The estimated first year failure rate (stringency factor) for the pre-1981 low altitude LDGVs (or other vehicle types with similar emission control technologies). The pre-1975 vehicles are referred to as Technology I vehicles and 1975-1980 vehicles are referred to as Technology II vehicles.

2. The test type and short test cutpoints used for 1981 and later light duty gasoline vehicles.

3. The vehicle types affected by the I/M program: LDGV; LDGV & LDGT1; LDGV & LDGT2; or LDGV, LDGT1, & LDGT2.

4. The calendar year being analyzed and the calendar year the I/M program is implemented.

5. The presence or absence of an adequate mechanic's training program.

6. The model years involved in the I/M program.

These I/M reductions or credits are not tabulated in this document but can be applied through use of the MOBILE3 computer program.

D. VEHICLE ANTI-TAMPERING PROGRAMS

Emission reduction credits can also be taken if an anti-tampering program is in effect in the area for which emission factors are being calculated.

The emission reduction credits attributable to an anti-tampering program vary according to the program type. The types of programs and percent reductions attributable to them are discussed in the December 31, 1983 technical report entitled "Anti-Tampering and Anti-Misfueling Programs to Reduce In-Use Emissions From Motor Vehicles", EPA-AA-TSS-83-10. The MOBILE3 credits of an anti-tampering program depend on the following:

1. The extent of the inspection (i.e., types of components inspected) and frequency of the check (annual, biennial, random road side, etc.).

2. The vehicle types affected: LDGV's, LDGT1's, LDGT2's and HDGV's.

3. The calendar year being analyzed and the calendar year in which the program is implemented.

4. The model years involved in the anti-tampering program.

These anti-tampering program credits are not tabulated in this document, but can be used with the MOBILE3 computer program.

E. REACTIVE VERSUS NONREACTIVE HYDROCARBON EMISSIONS

Available scientific evidence indicates that methane and a few other nonreactive organic compounds do not contribute significantly to ozone formations. EPA's Volatile Organic Compound policy, published in the Federal Register on July 8, 1977, allows a limited number of compounds, including methane, to be excluded from control actions. States have been advised that they should exclude these compounds from baseline emission inventories that are to be used for control strategy development for ozone.

Although motor vehicles are regulated directly by the Clean Air Act on a total hydrocarbon basis (rather than on a "reactive" hydrocarbon basis), it is appropriate, when estimating ozone levels, to consider only those motor vehicle emissions which will react to form ozone. However, consideration must be given to the format of any associated stationary source emission inventory so that mobile source and stationary source emission inventories are consistent in their exclusions.

For MOBILE2 it was assumed that the methane percentage of total hydrocarbon emissions was constant over mileage. The analysis for MOBILE3, however, showed that there was practically no deterioration in methane like there was for total hydrocarbons. For MOBILE3, nonmethane emissions are estimated by subtracting methane offsets from the total hydrocarbon emissions. These offsets are constant. Estimates of the composite FTP methane offsets applicable to each vehicle category are given in the following table.

While the MOBILE3 computer program can calculate either total or nonmethane hydrocarbon emissions, all HC emission factors presented in this document are total hydrocarbons.

FTP COMPOSITE METHANE OFFSETS
FROM HIGHWAY MOBILE SOURCES

Vehicle Type	Low Altitude Model Years	Methane Offset (g/mi)	High Altitude Model Years	Methane Offset (g/mi)
LDGV	Pre-1975	0.310	Pre-1975	0.420
	1975-79	0.170	1975-76	0.320
	1981+	0.100	1977	0.150
			1978-79	0.330
			1980+	0.220
LDGT1	Pre-1975	0.310	Pre-1975	0.420
	1975-78	0.200	1975-78	0.390
	1979-83	0.180	1979-83	0.350
	1984+	0.120	1984+	0.260
LDGT2	Pre-1979	0.310	Pre-1974	0.420
	1979-83	0.180	1974-78	0.420
	1984+	0.120	1979-83	0.350
			1984+	0.260
HDGV	Pre-1979	0.670	Pre-1979	0.910
	1979-86	0.310	1979-86	0.600
	1987+	0.180	1987+	0.350
LDDV	Pre-1975	0.043	Pre-1975	0.099
	1975+	0.011	1975+	0.025
LDDT	Pre-1979	0.038	Pre-1979	0.079
	1979-82	0.034	1979-82	0.040
	1983+	0.024	1983+	0.022
HDDV	Pre-1981	0.145	Pre-1981	0.333
	1981-86	0.118	1981-86	0.271
	1987+	0.100	1987+	0.230
MC	Pre-1978	0.530	Pre-1978	0.680
	1978-79	0.270	1978-79	0.340
	1980+	0.240	1980+	0.370
Crank-case & Evap.	All	0.0	All	0.0

Chapter 1

LIGHT DUTY GASOLINE POWERED VEHICLES

1.A INTRODUCTION

Because of their widespread use, light duty gasoline powered vehicles (LDGV) are responsible for a large share of air pollutant emissions in many areas of the United States. A LDGV is defined to be any gasoline fueled automobiles designated primarily for transportation of persons and having a capacity of 12 persons or fewer. Substantial research effort has been expended to accurately characterize emission data from these vehicles. EPA's on-going program to collect in-use vehicle emissions data was instituted a number of years ago in order to estimate emission levels.

In addition to the methodologies presented for calculating the basic exhaust emission levels for HC, CO, and NOx, data are given in this chapter for crankcase and evaporative hydrocarbon emissions, and emissions in the idle mode. Information is also given regarding the emission correction factors and travel weighting fractions.

All tables referenced in Chapters 1-8 are found in Appendix H. The first half of Appendix H applies to low altitude, the latter half to high altitude.

1.A.1 Test Procedure

LDGV emissions testing is currently performed according to the procedures stipulated in the Federal Register (42 FR 32954, June 28, 1977) and the Code of Federal Regulations (40 CFR Part 86, Subpart B, July 1, 1984). The basic test conditions under which the LDGVs are tested are as follows:

1. Ambient temperature range is 68°F to 86°F.

2. Absolute humidity is adjusted to 75 grains of water per pound of dry air.

3. Average speed is 19.6 mph with 18% idle operation.

4. Average percent of vehicle-miles-traveled (VMT) in a cold start operation is 20.6%.

5. Average percent of VMT in a hot start operation is 27.3%.

6. Average percent of VMT in the stabilized operation is 52.1%.

7. Average trip length is 7.5 miles.

Additional elements regarding the test procedure that are reflected in the emission estimates are as follows:

1. Air conditioning not in use.

2. Car contains driver and passenger -- no additional passengers, luggage, etc.

3. Car is not pulling a trailer.

The test sequence for LDGVs is summarized below:

1. Determine the weight of the vehicle.

2. Determine the road-load (assuming level road, no curves, no wind) which is a function of weight and frontal area.

3. Precondition the vehicle (i.e., vehicle is briefly driven).

4. Place the vehicle in an ambient temperature environment between 68°F and 86°F with its engine off for at least 12 hours.

5. Push the vehicle onto a dynamometer.

6. Start the engine and begin collecting exhaust emissions.

7. Emissions for the first 505 seconds are collected for test segment #1. The mileage driven is 3.59 miles with an average speed of 26 mph. This is the cold start portion of the test.

8. Test segment #2 collects emissions for the next 870 seconds. The engine is not turned off between Steps 7 and 8. The mileage driven is 3.91 miles and the average speed is 16 mph. This is the stabilized portion of the test.

9. The engine is turned off.

10. The engine remains off for 10 minutes.

11. The car is restarted, the first 505 seconds are rerun, and emissions are collected for test segment #3. This is the hot start portion of the test.

12. The grams of each pollutant are determined for each test segment.

13. NOx emissions are adjusted for humidity.

14. The basic exhaust emission levels in grams per mile are computed.

1.A.2 General Emissions Calculation Equations

The following generalized equations are used to calculate the LDGV emission factors (subscripts dropped from equations for clarity):

a. HC: COMPEF = SUM[TF *(CCEVRT + SALHCF * BEF)]

where:

CCEVERT = [(HS+TAMEVP1)*TPD+(DI+TAMEVP2)]/MPD + (CC + TAMEVP3)

SALHCF = SCF * ACCF * XLCF * TWCF

BEF = OMTTAM - OFFMTH + OMTCF * BER

b. CO: COMPEF = SUM[TF * SALCHF * BEF]

SALHCF = SCF * ACCF * XLCF * TWCF

BEF = OMTTAM + OFFCO + OMTCF * BER

c. NOx: COMPEF = SUM [TF * SALHCF * BEF]

SALHCF = SCF * ACCF * XLCF * TWCF * HCF

BEF = OMTTAM + OMTCF * BER

And also where:

COMPEFpn = The basic exhaust emission factor for pollutant p in g/mile on January 1 of calendar year n.

SUMi = The summation over 20 model years of i=n -19 to i=n, where n is the calendar year.

TFin = The fraction of the total LDGV miles driven by model year i on January 1, of calendar year n.

CCEVRTin = The crankcase and evaporative HC emission factor for model year i in calendar year n.

SALHCFips = The composite speed, air conditioning, extra load and trailer towing correction factor for model year i, pollutant p and speed s.

BEFin = The basic exhaust emission rate for model year i in calendar year n.

HSi	=	The hot soak evaporative emission rate of model year i.
TAMEVP1in	=	The hot soak evaporative emission offset for model year i vehicles in calendar year n due to tampering.
TPD	=	The trips per day value for LDGV's.
DIi	=	The diurnal evaporative emission loss of model year i.
TAMEVP2in	=	The diurnal evaporative emission offset for model year i vehicles in calendar year n due to tampering.
MPD	=	Miles per day.
CCi	=	Crankcase emissions of model year i.
TAMEVP3in	=	The crankcase emission excess for model year i vehicles in calendar year n due to PCV tampering.
SCFips	=	The speed correction factor for model year i, pollutant p at speed s.
ACCFi	=	The air conditioning correction factor for model year i.
XLCFi	=	The extra load correction factor for model year i.
TWCFi	=	The trailer towing correction factor for model year i.
OMTTAMipn	=	The emissions offset for model year i pollutant p in calendar year n due to all types of tampering, corrected for temperature and operating mode.
OFFMTHi	=	The methane offset for model year i, used only if NMHC emissions are being estimated.
OMTCFi	=	The composite operating mode and temperature correction factor for model year i.
OFFCOt	=	The CO offset for Bag 1 at temperature t, corrected for operating mode.
HCF	=	The humidity correction factor for NO_x.

The general equations for estimating hot stabilized idle emissions are as follows:

IEFnp = SUMi[TFin*(IERinp-IDLMTHi)]

Where

IEFnp = The idle emission factor in g/minute for pollutant p in calendar year n.

IDLMTHi = The idle methane offset in g/minute for model year i, applicable only to HC emissions.

Tampering offsets are not added to idle emissions, furthermore, they are not corrected for temperature or operating mode.

1.B EMISSIONS

This section discusses the emission estimates for the LDGVs: Basic exhaust emission rates, tampering offsets, crankcase and evaporative HC emission levels, January 1 basic exhaust emission levels, and idle exhaust emission rates. The emission standards are given in Section A.1.1 of Appendix A. The emissions reflect vehicles which have received typical in-use maintenance. Further, the vehicles are not involved in an I/M or anti-tampering program.

1.B.1 Basic Exhaust Emission Rates

The basic exhaust emission rates for LDGVs were derived for the most part from data on in-use vehicles with no observed tampering. The basic assumption in the derivation of the emission rates is that emission levels change linearly as vehicles accumulate mileage. The rates are dependent upon two estimated variables: (1) zero mile emission levels and (2) the emission deterioration rates. The zero mile emission levels are the average grams of pollutants emitted by the vehicles at zero miles. The emission deterioration rates adjust the zero mile levels as vehicles accumulate mileage.

The basic exhaust emission levels are calculated from a linear function:

$$BERipn = ZMLip + DRip * Min$$

where the lower case letters are subscripts and

BERipn = The basic exhaust emission level relecting no tampering, in g/mile, for model year i and pollutant p, on January 1 of calendar year n.

ZMLip = The estimated zero mile emission level, in g/mile, for model year i and pollutant p.

DRip = The estimated emission deterioration rate, in g/mile/ 10,000 miles, for model year i and pollutant p.

Min = The model year i cumulative mileage, divided by 10,000 miles, on January 1 of calendar year n.

The basic exhaust emission rates reflecting zero tampering are presented in Table 1.1.1A for the different LDGV model year groups and pollutants.

1.B.2 Tampering Offsets and Emission Rates With Tampering

Tampering offsets in g/mi are added to the basic emission rates (which reflect no tampering) so that the overall fleet emissions reflect national average tampering. The exhaust emission rates including tampering are presented in Table 1.1.1B for the different LDGV model year groups and pollutants.

Tampering effects are first estimated for each type of tampering and operating mode (cold start, stabilized and hot start).

TAMPOFFipmn = TAMPipm * PEQUIPim * RATEimn

Where:

TAMPOFFipmn = The emission offset due to tampering in g/mi for model year i, pollutant p, and tampering type m in calendar year n.

TAMPipm = The emission offset in g/mi for model year i, pollutant p, tampering type m.

PEQUIPim = The percent of the model year i equipped with equipment type m.

RATEimn = The tampering rate of model year i, equipment m in year n (dependent on mileage).

After the offsets of each type of tampering are estimated, they are combined to form estimates of overall tampering for cold start, stabilized, and hot start modes. They are then corrected for temperature and combined in the following relationship:

OMTTAMipn = TAMPOFFipn1 * CS * TCF1 +
TAMPOFFipn2 * ST * TCF2 +
TAMPOFFipn3 * HS * TCF3

where:

OMTTAMipn = The composite tampering offset for model year i, pollutant p in calendar year n.

TAMPOFFipn1,2,3 = The tampering offsets for each operating mode (cold start, stabilized, hot start).

CS = Percent of VMT accumulated in cold start mode.

ST = Percent of VMT accumulated in stabilized mode.

HS = Percent of VMT accumulated in hot start mode.

TCF1, TCF2, CF3 = Temperature correction factors for each mode of operation.

1.B.3 Crankcase and Evaporative HC Emission Levels

In addition to the basic exhaust HC emission levels and tampering offsets, crankcase and evaporative HC emissions need to be included. Crankcase HC emissions result from the crankcase as the engine is running. The two major sources of evaporative HC emissions are hot soak and diurnal losses. Hot soak losses are generally produced as fuel evaporates from the carburetor system at the end of a trip. Changes in ambient temperature result in expansion of the air-fuel mixture in a partially filled fuel tank. As a result, diurnal HC emissions are expelled into the atmosphere. Crankcase and evaporative HC emission levels are calculated according to the equation in Section 1.A.2.

Crankcase and evaporative HC emission levels for untampered vehicles are summarized in Table 1.1.1C. The rates including tampering are presented in Table 1.1.1D.

1.B.4 January 1 Basic Exhaust Emission Levels

The basic exhaust emission levels for the latest 20 model years on January 1, 1980 through 2003, are given in Tables 1.1.2A through 1.1.2C for HC, CO, and NOx, respectively. The HC basic exhaust emission levels reflect total, rather than nonmethane HC emissions, and include crankcase and evaporative HC emission levels. Also, all emission rates include tampering.

1.B.5 Idle Exhaust Emission Rates (Hot Stabilized)

Estimates of emissions from the automotive fleet during a vehicle's idle operating mode have become more of a concern in transportation control plans, environmental impact statements, and state implementation plans. Examples of extended idle time are waits at shopping centers, airports, sport complexes, and drive-in window service businesses. The emission estimates presented in this section reflect engines operating in a hot stabilized condition.

The idle exhaust emission rates are expressed in units of grams per minute as opposed to the basic exhaust emission rate units of grams per mile. The LDGV idle exhaust emission levels are calculated from the estimated zero mile emission levels and emission deterioration rates given in Table 1.1.3. The idle emission level (in units of g/min) is calculated from a linear function similar to the basic exhaust emission level function given in Section 1.B.1. The idle emission function is IERipn = ZMLIDLip + DRIDLip * Min. The definition of the terms in this equation are almost identical to those in Section 1.B.1, except these are idle emissions and are expressed in grams/minute for the zero mile levels and grams/minute/10,000 miles for the idle emission deterioration rates.

1.C TRAVEL WEIGHTING FRACTIONS

The LDGV travel weighting fractions are the individual model year proportions of the total LDGV VMT. To generate the travel weighting fractions, three distributions are required: (1) the fleet annual mileage accumulation rate distribution, (2) the registration distribution, and (3) the estimated fleet sales fraction distribution (to account for the proportional increase of diesel powered vehicles).

The travel weighting fractions in this document reflect a January 1 evaluation date. For the LDGVs, the model year is assumed to begin sales on the October 1 preceding the corresponding calendar year. Further, it is assumed that the vehicles are sold and accumulate mileage according to a uniform distribution. These assumptions permit the estimation of the January 1 fleet mileage accumulation rate distribution and the January 1 registration distribution from July 1 information. An example of the travel weighting fraction calculation is given in Table 1.1.5.

1.C.1 Fleet Annual Mileage Accumulation Rate Distribution

A given vehicle is assumed to travel according to the annual mileage accumulation distribution given in Table 1.1.4. For example, the vehicle in its first year travels 12,818 miles at a uniform rate. In its second year, it travels 12,102 miles at a uniform rate. Finally in its 20th year, it travels 4,305 miles at a uniform rate.

The annual fleet mileage accumulation rate distribution is derived from the annual mileage accumulation rate distribution for individual vehicles. This derivation averages out the effects of purchase date. The derivation is described in Appendix D, and the resulting distribution is given in Table 1.1.4.

1.C.2 Model Year Registration Distribution

Table 1.1.4 also presents the estimated LDGV model year registration distribution fractions. These fractions are the individual model year proportions of the entire LDV fleet (both gasoline and diesel powered vehicles combined). The registration distribution is based on July 1 figures and is transformed to January 1 figures according to the procedure in Appendix D. The January 1 LDV fleet registration distribution is also presented in Table 1.1.4.

1.C.3 Fleet Sales Distribution

Assuming that diesel powered vehicles will become more prominent, the travel weighting fractions need to account for them. It is estimated that gasoline powered vehicles will account for proportionately fewer of the future light duty vehicle model year sales according to the distribution given in Table 1.1.5 (Column B). The distribution is anticipated to stabilize in 1991, with about 90 percent of the LDV sales being gasoline powered vehicles.

The fleet sales distribution is used in the travel weighting fractions to account for the influx of diesels. The travel weighting fractions change every January 1 in calendar years 1970 through 2010. Prior to 1975, diesels are considered to be an insignificant proportion of the LDV fleet. Further, even though the fleet sales distribution is predicted to stabilize in 1991, the travel weighting fractions require 20 years to stabilize. From that time on (2010+), the travel weighting fractions remain constant.

1.D EMISSION CORRECTION FACTORS

The LDGV basic exhaust emission levels are based on test results under the standardized conditions defined in Section 1.A.1. However, the basic exhaust emission levels are affected by ambient and vehicle usage conditions which differ from the prescribed test procedure. The conditions under which emissions are known to vary are the average speed, ambient temperature, fraction of VMT in cold and hot start operating modes, use of air conditioning, carrying of an extra load, trailer towing, and humidity. Emission correction factors are available to compensate for variations in these conditions.

1.D.1 Speed Correction Factor

The test procedure used for collecting the basic exhaust emissions is a driving cycle with an average speed of 19.6 mph. For those situations where the average speed of the vehicle deviates from this value, a speed correction factor is applied.

The coefficients for the speed correction factors are given in Table 1.1.6. The speed correction factor is symbolized as SCFipsxw where the lower case letters are subscripts and

SCFipsxw = The speed correction factor for model year i and pollutant p at the average speed of s. This is normalized to the speed associated with a cold start mode VMT fraction x and a hot start mode VMT fraction w.

The user is cautioned that this correction factor is only valid for speeds in the 5 through 55 mph range since the regression equations were based on speed data in that range. Extrapolations to speeds beyond this range should not be made.

1.D.2 Emission Temperature Correction Factor and Bag 1 CO Offset

The LDGV emission test procedure requires an ambient temperature of between 68°F and 86°F, and typically it runs at about 75°F. For temperatures other than 75°F, a correction factor is needed. There are two correction factor models. The first is a multiplicative model which is applicable to all pollutants and bag segments except Bag 1 CO. The second model is an additive or offset model for Bag 1 CO.

The multiplicative model uses a separate correction factor for each bag and pollutant. The equation is as follows:

$$TCFipbt = EXP(TCipbtt(T - TT))$$

where the lower case letters are subscripts and

TCFipbt = The emission temperature correction factor for model year i, pollutant p, test segment b, and ambient temperature t.

EXP = The exponential function.

TCipbtt = The temperature correction factor coefficient for model year i, pollutant p, test segment b, and reference temperature tt.

T = Ambient temperature (Fahrenheit).

TT = Reference temperature which equals 75.0°F.

The offset model for Bag 1 CO emissions uses the following equation:

$$Offset = (-1.3812)(T-75)$$

The offset model is in effect only for all 1980 and later LDGVs. The temperature correction factor coefficients are found in Table 1.1.7A.

1.D.3 Temperature/Operating-Mode Emission Correction Factor

For all conditions except where the CO offset model is in effect, a single emission correction factor called OMTCF adjusts for temperature and hot stabilized/cold start operating-mode conditions that differ from the basic test procedure. A vehicle will usually emit more emissions in a cold start mode than in a stabilized or a hot start mode. As such, vehicles will emit more pollution after an extended engine off period than vehicles that have not set long enough to be in the cold start mode. As a result, the operating mode is a necessary element of this correction factor.

An integral part of the operating mode portion of OMTCF are the normalized bag fractions. The normalized bag fractions adjust OMTCF for emissions attributable to each operating mode. These fractions for LDGVs are given in Table 1.1.7B.

The OMTCF correction factor is defined as follows:

OMTCFiptwxn = ((TERM1 + TERM2 + TERM3)/DENOM)

where

OMTCFiptwxn = The temperature operating-mode emission correction factor for model year i, pollutant p, ambient temperature t, fraction of VMT in a cold start operating mode w, and fraction of VMT in a hot start operating mode x; on January 1 of calendar year n.

TERM1 = W * TCFip1t *(Bip1 + Dip1 * Min)

TERM2 = (1-W-X)*TCFip2t * (Bip2 + Dip2 * Min)

TERM3 = X * TCFip3t *(Bip3 + Dip3 * Min)

DENOM = Bip0 + Dip0 * Min

Bipb = The normalized bag fraction intercept coefficient for model year i, pollutant p, and test segment b (test segment 0 is the entire basic test procedure).

Dipb = The normalized bag fraction slope coefficient for model year i, pollutant p, and test segment b (test segment 0 is the entire basic test procedure).

Min = The fleet cumulative mileage for model year i on January 1 of calendar year n.

W = The fraction of VMT traveled in the cold start mode.

X = The fraction of VMT traveled in the hot start mode.

TCFipbt = The emission temperature correction factor for model year i, pollutant p, test segment b, and ambient temperature t.

When the temperature is less than 75°F and when the percent cold start is greater than zero TCFiplt is taken out of TERM1. Then OMTCF reflects the temperature and operating mode correction factors for the stabilized and hot start operating modes, but only the operating mode correction factor for the cold start mode. The emissions of the cold start mode are corrected for temperature with the CO offset discussed in 1.D.2. This offset is multiplied by the percent of VMT accumulated in the cold start (W) and added to the basic emission rate as presented in Section 1.A.2.

1.D.4 Air Conditioning Correction Factor

The LDGV emissions can be affected by the use of air conditioning. The air conditioning correction factor coefficients are based on data from vehicles tested at several different temperatures with the air conditioner on. These correction factors are given in Table 1.1.8A. The general correction factor equation is as follows:

ACCFipt = U*Vi ([Aip + Bip * (T - 75)] -1) +1

where the lower case letters are subscripts and

ACCFipt = The air conditioning correction factor for model year i, pollutant p, and ambient temperature t.

U = (DI - DILO)/(DIHI - DILO) = Of the vehicles equipped with an air conditioner, the estimated fraction that have it in use ($0 \leq U \leq 1$).

DI = (DB + WB) * .4 + 15 = Discomfort index.

DB = The dry bulb temperature in degrees Fahrenheit.

WB = The wet bulb temperature in degrees Fahrenheit.

DILO = The highest discomfort index where no air conditioners are in use (set to 70 in MOBILE3).

DIHI = The lowest discomfort index where all the air conditioners are in use (set to 80 in MOBILE3).

Vi = The fraction of model year i LDGVs equipped with an air conditioner. These fractions are given in Table 1.1.8B.

Aip = The air conditioning correction factor intercept coefficient for model year i and pollutant p.

Bip = The air conditioning correction factor slope coefficient for model year i and pollutant p.

T = Ambient temperature in degrees Fahrenheit.

75 = The normalizing ambient temperature for the ACCF linear function.

1.D.5 Extra Load Correction Factor

The basic exhaust emission rates are based on the "typical" vehicle weight with a driver and passenger, vehicle fuel, and other liquids. There are, however, situations in which vehicles have extra weight due to additional passengers, luggage, etc. In these events, emissions are known to change.

To apply the vehicle extra load correction factor found in Table 1.1.9 to a specific situation, it is necessary for a user to have an estimate of the percentage of LDGV VMT accumulated with an additional 500 pounds. The correction factor for extra load is computed according to the following equation:

$$ELCFip = (XLCip - 1) * U + 1$$

where the lower case letters are subscripts and

ELCFip = The extra load correction factor for model year i and pollutant p.

XLCip = The extra load correction factor coefficient for model year i and pollutant p.

U = The fraction of LDGV VMT accumulated with an extra load ($0 \leq U \leq 1$).

1.D.6 Trailer Towing Correction Factor

As with the extra load correction factor, the trailer towing correction factor will adjust LDGV emissions for usage conditions which differ from the basic test procedure. It has been determined that towing a trailer will affect a vehicle's emissions. As such, a correction factor is available to adjust LDGV emissions when a trailer is being towed. The correction factor coefficients given in Table 1.1.10 are valid for a trailer weight of 1000 pounds. This correction factor is computed by the following equation:

$$TTCFip = (TTCip - 1) * U + 1$$

where the lower case letters are subscripts and

TTCFip = The trailer towing correction factor for model year i and pollutant p.

TTCip = The trailer towing correction factor coefficient for model year i and pollutant p.

U = The fraction of LDGV VMT accumulated while towing a trailer ($0 \leq U \leq 1$).

1.D.7 NOx Humidity Correction Factor

The NOx emission factors are normalized to 75 grains of water per pound of dry air. In order to adjust NOx emissions to different humidity conditions, a multiplicative correction factor is available. The formula for the correction factor is given below, and is applicable for all model years:

$$HCF = 1.0 - .0038 * (H - 75)$$

where:

HCF = The NOx humidity correction factor.

H = Humidity level in grains of water per pound of dry air ($20 \leq H \leq 140$).

Chapter 2

LIGHT DUTY GASOLINE POWERED TRUCKS I

2.A INTRODUCTION

This chapter presents the emission factors for light duty gasoline powered trucks with a gross vehicle weight (GVW) rating of 6,000 pounds or less (LDGT1). Although LDGT1s have a load carrying capability that exceeds that of passenger cars, they are typically used for personal transportation and light hauling.

2.A.1 Test Procedure

The test procedure used for determining the LDGT1 basic exhaust emissions is almost identical to the LDGV test procedure. The difference between the two test procedures is primarily the road-load horsepower setting. The summary of the test procedure in Chapter 1 is correct for LDGT1s, therefore, refer to Chapter 1.

2.A.2 General Emissions Calculation Equations

The equations presented in Chapter 1 are also valid for the LDGT1s. Although the emissions, travel weighting fractions, and emission correction factors levels for LDGT1s are different from the LDGVs, the equations are identical.

2.B EMISSIONS

This section discusses the LDGT1 emission estimates: Basic exhaust emission rates, tampering offsets, crankcase and evaporative HC emission levels, January 1 basic exhaust emission levels, and idle exhaust emission rates. The emission standards are given in Section A.1.2 of Appendix A. The emissions reflect trucks which have received typical in-use maintenance. Further, the trucks are not involved in an I/M or anti-tampering program.

The discussions of the different emissions in Chapter 1 are also valid for the LDGT1s.

2.B.1 Basic Exhaust Emission Rates

The LDGT1 basic exhaust emission rates are given in Table 1.2.1A. This table presents the untampered LDGT1 zero mile emission levels and emission deterioration rates for every model year. The emissions are measured in grams per mile.

2.B.2 Tampering Offsets and Emission Rates With Tampering

Emission offsets in g/mi due to tampering are added to the basic emission rates (which reflect no tampering) so that the fleet emission rates reflect national average tampering. The exhaust emission rates including tampering are presented in Table 1.2.1B for the different LDGT1 model year groups and pollutants.

2.B.3 Crankcase and Evaporative HC Emission Levels

The LDGT1 crankcase and evaporative HC emission levels are presented in Table 1.2.1C. This table presents the emissions for every model year and crankcase and evaporative HC component: diurnal losses, hot soak losses, and crankcase losses. The evaporative and crankcase rates with tampering included are shown in Table 1.2.1D.

2.B.4 January 1 Basic Exhaust Emission Levels

January 1, 1980 through 2003, LDGT1 exhaust emission levels with tampering are given in Tables 1.2.2A through 1.2.2C for HC, CO, and NOx, respectively. The HC basic exhaust emission levels reflect total, rather than non-methane, HC emissions and include crankcase and evaporative HC levels.

2.B.5 Idle Exhaust Emission Rates (Hot Stabilized)

The LDGT1 hot stabilized idle exhaust emission rates are given in Table 1.2.3. These emission levels are measured in grams per minute and reflect engines operating in a hot stabilized condition.

2.C TRAVEL WEIGHTING FRACTIONS

The LDGT1 travel weighting fractions are the individual model year proportions of the total LDGT1 VMT. To generate the travel weighting fractions, three distributions are required: (1) the fleet annual mileage accumulation rate distribution, (2) the registration distribution, and (3) the estimated fleet sales fraction distribution (to account for the proportional increase of diesel powered trucks). The first and second distributions are given in Table 1.2.4, and the third distribution is given in Table 1.2.5. More detailed information is available in Chapter 1 on these distributions.

The travel weighting fractions in this document reflect a January 1 evaluation date. For the LDGT1s, the model year is assumed to begin sales on the October 1 preceding the corresponding calendar year. Further, it is assumed that the trucks are sold and accumulate mileage according to a uniform distribution. These assumptions permit the estimation of the January 1 fleet mileage accumulation rate distribution and the January 1 registration distribution from July 1 information. An example of the travel weighting fraction calculation is given in Table 1.2.5.

2.D EMISSION CORRECTION FACTORS

The LDGT1 basic exhaust emission levels are based on test results under the standardized conditions defined in Chapter 1. However, the basic exhaust emission levels are affected by ambient and truck usage conditions which differ from the prescribed test procedure. The conditions under which emissions are known to vary are the average speed, ambient temperature, fraction of VMT in cold and hot start operating modes, use of air conditioning, carrying of an extra load, trailer towing, and humidity level. Emission correction factors are available to compensate for these conditions.

The LDGT1s correction factors are based on the LDGV information. Therefore, the LDGT1 correction factors are those from the LDGV's, and the LDGV discussions in Chapter 1 are valid for the LDGT1s.

2.D.1 Speed Correction Factor

The test procedure used for collecting the basic exhaust emissions is a driving cycle with an average speed of 19.6 mph. For those situations where the average speed of the truck deviates from this value, a speed correction factor is applied. The LDGT1 speed correction factors are given in Table 1.2.6.

2.D.2 Emission Temperature Correction Factor

For those situations where the ambient temperature is not 75°F, an emission temperature correction factor is applied. Table 1.2.7A presents these correction factors for the LDGT1s. The CO offset model for Bag 1 is in effect for 1984 and later LDGT1s.

2.D.3 Temperature/Operating-Mode Emission Correction Factor

A single emission correction factor called OMTCF adjusts for temperature and operating-mode conditions that differ from the basic test procedure. As described in Chapter 1, OMTCF depends on normalized bag fractions. The LDGT1 normalized bag fractions are given in Table 1.2.7B.

2.D.4 Air Conditioning Correction Factor

The LDGT1 emissions can be significantly affected by the use of air conditioning. These correction factors are given in Table 1.2.8A. The fractions of LDGT1s equipped with an air conditioner, by model year, are given in Table 1.2.8B.

2.D.5 Extra Load Correction Factor

The basic exhaust emission rates are based on the "typical" truck weight with a driver and passenger, fuel, and other liquids. There are, however, situations in which trucks have extra weight due to additional passengers, luggage, load, etc. In these events, emissions are known to change.

To apply the truck extra load correction factor found in Table 1.2.9 to a specific situation, it is necessary for a user to have an estimate of the percentage of LDGT1 VMT accumulated with an additional 500 pounds.

2.D.6 Trailer Towing Correction Factor

As with the extra load correction factor, the trailer towing correction factor will adjust LDGT1 emissions for usage conditions which differ from the basic test procedure. The correction factor coefficients given in Table 1.2.10 are valid for a trailer weight of 1000 pounds.

2.D.7 NOx Humidity Correction Factor

The NOx humidity correction factor equation is the same as for LDGV's.

Chapter 3

LIGHT DUTY GASOLINE POWERED TRUCKS II

3.A INTRODUCTION

This chapter presents the emission factors for light duty gasoline powered trucks with a gross vehicle weight (GVW) rating between 6,001 and 8,500 pounds (LDGT2). This vehicle type is required since these trucks were classified as heavy duty vehicles through the 1978 model year. Beginning with the 1979 model year, these trucks have been considered light duty trucks.

In general, every LDGV section and subsection discussion in Chapter 1 is valid for this chapter.

3.A.1 Test Procedure

The test procedure used for determining the LDGT2 basic exhaust emissions is almost identical to the LDGV test procedure. The difference between the two test procedures is primarily the road-load horsepower setting. The LDGV test procedure summarized in Chapter 1 is valid for the LDGT2s.

3.A.2 General Emissions Calculation Equations

Chapter 1 also presents the equations that are valid for the LDGT2s. Although the emissions, travel weighting fractions, and emission correction factors for the LDGT2s are different from the LDGVs, the equations are identical.

3.B EMISSIONS

This section presents the LDGT2 emissions: Basic exhaust emission rates, tampering offsets, crankcase and evaporative HC emission levels, January 1 basic exhaust emission levels, and idle exhaust emission rates. The pre-1979 model year LDGT2 were considered heavy duty vehicles; their emission standards are given in Section A.1.3 of Appendix A. The 1979 and later LDGT2 emission standards are given in Section A.1.2 of Appendix A. The emissions reflect trucks which have received typical in-use maintenance. Further, the trucks are not involved in an I/M or anti-tampering program.

3.B.1 Basic Exhaust Emission Rates

The LDGT2 basic exhaust emission rates are given in Table 1.3.1A. This table presents the LDGT2 untampered zero mile emission levels and emission deterioration rates for every model year. The emissions are

measured in grams per mile.

3.B.2 Tampering Offsets and Emission Rates With Tampering

Emission offsets in g/mi due to tampering are added to basic emission rates (which reflect zero tampering) so that the fleet emission rates reflect national average tampering. The exhaust emission rates including tampering are presented in Table 1.3.1B for the different LDGT2 model year groups and pollutants.

3.B.3 Crankcase and Evaporative HC Emission Levels

The LDGT2 untampered crankcase and evaporative HC emission levels are given in Table 1.3.1C. This table presents the emissions for every model year and emission component: diurnal losses, hot soak losses, and crankcase losses. The emission rates with tampering included are shown in Table 1.3.1D.

3.B.4 January 1 Basic Exhaust Emission Levels

January 1, 1980 through 2003, LDGT2 exhaust emission levels with tampering are given in Tables 1.3.2A through 1.3.2C for HC, CO, and NOx, respectively. The HC basic exhaust emission levels reflect total, rather than nonmethane, HC emissions and include crankcase and evaporative HC levels.

3.B.5 Idle Exhaust Emission Rates (Hot Stabilized)

The LDGT2 hot stabilized idle exhaust emission rates are given in Table 1.3.3. These emissions are measured in grams per minute and reflect engines operating in a hot stabilized condition.

3.C TRAVEL WEIGHTING FRACTIONS

The LDGT2 travel weighting fractions are the individual model year proportions of the total LDGT2 VMT. To generate the travel weighting fractions, three distributions are required: (1) the fleet annual mileage accumulation rate distribution, (2) the registration distribution, and (3) the estimated fleet sales fraction distribution (to account for the proportional increase of diesel powered trucks). The first and second distributions are given in Table 1.3.4, and the third distribution is given in Table 1.3.5. More detailed information is available in Chapter 1 on these three distributions.

The travel weighting fractions in this document reflect a January 1 evaluation date. For the LDGT2s, the model year is assumed to begin sales on the October 1 preceding the corresponding calendar year. Further, it is assumed that the trucks are sold and accumulate mileage according to a uniform distribution. These assumptions permit the

estimation of the January 1 fleet mileage accumulation rate distribution and the January 1 registration distribution from July 1 information. An example of the travel weighting fraction calculation is given in Table 1.3.5.

3.D EMISSION CORRECTION FACTORS

The LDGT2 basic exhaust emission levels are based on test results under the standardized conditions defined in Chapter 1. However, the basic exhaust emission levels are affected by ambient and truck usage conditions which differ from the prescribed test procedure. The conditions under which emissions are known to vary are the average speed, ambient temperature, fraction of VMT in cold and hot start operating modes, use of air conditioning, carrying of an extra load, trailer towing, and humidity level. Emission correction factors are available to compensate for these conditions.

The LDGT2 emission correction factors are based on the LDGV information. Therefore, the LDGT2 correction factors are those from the LDGVs, and the discussions in Chapter 1 are valid for the LDGT2s.

3.D.1 Speed Correction Factor

The test procedure used for collecting the basic exhaust emissions is a driving cycle with an average speed of 19.6 mph. For those situations where the average speed of the truck deviates from this value, a speed correction factor is applied. The LDGT2 average cycle speed emission correction factors are given in Table 1.3.6.

3.D.2 Emission Temperature Correction Factor

For those situations where the ambient temperature is not 75°F, an emission temperature correction factor is applied. Table 1.3.7A presents these correction factor for the LDGT2s. The CO offset model for Bag 1 is in effect for 1984 and later LDGT2s.

3.D.3 Temperature/Operating-Mode Emission Correction Factor

A single emission correction factor called OMTCF adjusts for speed, temperature and operating-mode conditions that differ from the basic test procedure. As described in Chapter 1, OMTCF depends on normalized bag fractions. The LDGT2 normalized bag fractions are given in Table 1.3.7B.

3.D.4 Air Conditioning Correction Factor

The LDGT2 emissions can be significantly affected by the use of air conditioning. These correction factors are given in Table 1.3.8A. The fractions of LDGT2s equipped with an air conditioner, by model year, are given in Table 1.3.8B.

3.D.5 Extra Load Correction Factor

The basic exhaust emission rates are based on the "typical" truck weight with a driver and passenger, fuel, and other liquids. There are, however, situations in which trucks have extra weight due to additional passengers, luggage, load, etc. In these events, emissions are known to change.

To apply the truck extra load correction factor found in Table 1.3.9 to a specific situation, it is necessary for a user to have an estimate of the percentage of LDGT2 VMT accumulated with an additional 500 pounds.

3.D.6 Trailer Towing Correction Factor

As with the extra load correction factor, the trailer towing correction factor will adjust LDGT2 emissions for usage conditions which differ from the basic test procedure. The correction factor coefficients given in Table 1.3.10 are valid for a trailer weight of 1000 pounds.

3.D.7 NOx Humidity Correction Factor

The NOx humidity correction factor equation is the same as for LDGV's.

Chapter 4

HEAVY DUTY GASOLINE POWERED VEHICLES

4.A INTRODUCTION

This chapter presents the emission factors for the heavy duty gasoline powered vehicles (HDGV). A HDGV is defined to be any gasoline fueled motor vehicle designated primarily for the transportation of property and rated at more than 8,500 pounds gross vehicle weight (GVW), or designated primarily for transportation of persons and having a capacity of more than 12 persons.

4.A.1 Test Procedure

The HDGV basic exhaust emission rates are based on the engine dynamometer transient test procedure stipulated in the Federal Register (45 FR 4181, January 21, 1980) and the Code of Federal Regulations (40 CRF, Part 86, Subpart N, July 1, 1984). The basic test conditions under which the HDGVs are tested are as follows:

1. Ambient temperature range is 68°F through 86°F.

2. Absolute humidity is adjusted to 75 grains of water per pound of dry air.

3. Estimated cycle speed is 19.45 mph with 27% idle operation.

4. Average percent VMT in a cold start operation is 14.3%.

5. Average percent VMT in a hot start operation is 86.7%.

6. No average percent VMT in the stabilized operation.

7. Estimated trip length is 6.5 miles.

The test procedure for the HDGVs can be briefly described by the following:

1. Generate the maximum torque vs. speed curve of the engine.

2. Precondition the engine with practice cycle runs.

3. With the engine off, let it sit for at least 12 hours between 68°F and 86°F. An optional procedure is the forced cool-down procedure, whereby cool water is circulated (and/or air directed onto the engine) through the engine's water coolant system until the engine oil is between 68°F and 75°F.

4. Conduct the cold start test. The estimated mileage is 6.5 miles and cycle speed is 19.9 mph.

5. Turn off the engine.

6. Keep the engine off for 20 minutes.

7. Conduct the hot start test. The cycle is the same as the cold start cycle.

8. Calculate the grams of pollutant and total brake horsepower-hour for each test cycle.

9. Correct NOx to 75 grains of water per pound of dry air.

10. Calculate the basic exhaust emissions in grams per brake horsepower-hour.

4.A.2 General Emissions Calculation Equations

To calculate the HDGV emissions, the following generalized equations are used:

a. COMPEFpnst = SUMi[TFin * ((BERipn * TCFipt-OFFMTHi + OMTTAMipn) * SCFps + CCEVERTin)]

b. IEF = SUMi [TFi *(IERipn - IDLMTHi)]

where:

COMPEFpnst = The composite emission factor in g/mi of pollutant p in calendar year n at speed s and temperature t.

SCFps = The speed correction factor for HDGV's for pollutant p and speed s.

TCFipt = The temperature correction factor for model year i (not operating mode-dependent like light duty vehicles and trucks), pollutant p and temperature t.

All other variables have the same definitions as for LDGV's. OFFMTH, CCEVERT, and IDLMTH apply only to HC emissions.

4.B EMISSIONS

This section discusses the emission estimates for the HDGVs. The five subsections are (1) basic exhaust emission rates, (2) emission rates including tampering, (3) crankcase and evaporative HC emission levels, (4) January 1 basic exhaust

emission levels, and (5) idle exhaust emission rates. The emission standards are given in Section A.1.3 of Appendix A. The emissions reflect vehicles which have received typical in-use maintenance. Further, the vehicles are not involved in an I/M or anti-tampering program.

4.B.1 Basic Exhaust Emission Rates

The HDGV basic untampered exhaust emission rates are given in Table 1.4.1A. This table presents the untampered HDGV zero mile emission levels and emission deterioration rates for every model year.

The conversion factors which are used to convert the emissions in g/bhp-hr to emissions in g/mi were substantially updated from previous versions of mobile source emission factors. These conversion factors are dependent on projected sales in the different weight classes of the heavy duty gasoline vehicles and their respective fuel economies. A complete discussion of the development of these conversion factors is found in the EPA report "Heavy Duty Vehicle Emission Conversion Factors, 1962-1997", EPA-AA-SDSB-84-1.

4.B.2 Tampering Offsets and Emission Rates With Tampering

Tampering offsets in gm/mi are added to basic emission rates (which reflect zero tampering) so that the fleet emission rates reflect national average tampering. The exhaust emission rates including tampering are presented in Table 1.4.1B for the different HDGV model year groups and pollutants.

4.B.3 Crankcase and Evaporative HC Emission Levels

The HDGV untampered crankcase and evaporative HC emission levels are given in Table 1.4.1C. This table presents the emissions for every model year and emission component: diurnal losses, hot soak losses, and crankcase losses. The evaporative and crankcase emissions including tampering are shown in Table 1.4.1D.

4.B.4 January 1 Basic Exhaust Emission Levels

The January 1, 1980 through 2003, HDGV basic exhaust emission levels are given in Tables 1.4.2A through 1.4.2C for HC, CO, and NOx, respectively. The HC basic exhaust emission levels reflect total, rather than nonmethane, HC emissions and include crankcase and evaporative HC emission levels.

4.B.5 Idle Exhaust Emission Rates (Hot Stabilized)

The HDGV hot stabilized idle exhaust emission rates are given in Table 1.4.3. These emissions are measured in grams per minute and reflect engines operating in a hot stabilized condition.

4.C TRAVEL WEIGHTING FRACTIONS

The HDGV travel weighting fractions are the individual model year proportions of the total HDGV VMT. To generate the HDGV travel weighting fractions, two distributions are required: (1) the fleet annual mileage accumulation rate distribution and (2) the registration distribution. These two distributions are given in Table 1.4.4. More detailed information is available in Chapter 1 on these distributions.

The travel weighting fractions in this document reflect a January 1 evaluation date. For the HDGVs, the model years are assumed to begin sales on January 1. Further, it is assumed that the vehicles are sold and accumulate mileage according to a uniform distribution. These assumptions permit the estimation of the January 1 fleet mileage accumulation rate distribution and the January 1 registration distribution from July 1 information. The travel weighting fractions are given in Table 1.4.5.

4.D EMISSION CORRECTION FACTORS

The HDGV basic exhaust emission levels are based on test results under the standardized conditions defined in Section 4.A.1. However, the basic exhaust emission levels are affected by ambient and vehicle usage conditions which differ from the prescribed test procedure. The conditions under which HDGV emissions are known to vary are the average speed and ambient temperature. Emission correction factors are available to compensate for these conditions.

4.D.1 Speed Correction Factor

The test procedure used for collecting the basic exhaust emissions is a transient engine cycle with an estimated speed of 20.0 mph. For those situations where the average speed of the vehicle deviates from this value, a speed correction factor is applied. The HDGV speed correction factor equations are as follows:

a. $SCFips = EXP(Aip + Bip*s + Cip*s^2)$ for HC and CO, and

b. $SCFips = Aip + Bip*s + Cip*s^2$ for NOx

where

SCFips = The correction factor for model year i and pollutant p at the average speed of s.

EXP = The exponential function.

Aip = The speed correction factor intercept coefficient for model year i and pollutant p.

Bip = The speed correction factor first order coefficient for model year i and pollutant p.

Cip = The speed correction factor second order coefficient for model year i and pollutant p.

The coefficients for the speed correction factor equations are given in Table 1.4.6. The speed correction factors are only valid for speeds in the 5 through 55 mph range.

4.D.2 Emission Temperature Correction Factor

For situations where the ambient temperature is not 75°F, an emission temperature correction factor is applied. This temperature correction factor differs slightly in form from the temperature correction factor given in Chapter 1. The HDGV temperature correction factor is for the entire transient test as opposed to the LDGV temperature correction factors for the individual test segments. The HDGV temperature correction factor is given in Table 1.4.7 and the equation is as follows:

TCFipt = EXP(TCiptt(T - TT))

where the lower case letters are subscripts and

TCFipt = The emission temperature correction factor for model year i, pollutant p, and ambient temperature t.

EXP = The exponential function.

TCiptt = The temperature correction factor coefficient for model year i, pollutant p, and reference temperature tt.

T = Ambient temperature (Fahrenheit).

TT = Reference temperature which equals 75°F.

Chapter 5

LIGHT DUTY DIESEL POWERED VEHICLES

5.A INTRODUCTION

Diesel powered passenger cars may become more prominent in the light duty vehicle fleet. As a result, emission factors are required for these light duty diesel powered vehicles (LDDV). A LDDV is defined to be any diesel fueled automobile designated primarily for transportation of persons and having a capacity of 12 persons or fewer.

5.A.1 Test Procedure

The test procedure used for determining the LDDV basic exhaust emissions is identical to the LDGV test procedure. Therefore, refer to Chapter 1 for a brief overview.

5.A.2 General Emissions Calculation Equations

a. COMPEF = SUMi[(BERipn*OMTCF - OFFMTH) * TFin * SCF]

b. IEFnp = SUMi[TFin*(IERipn - IDLMTHi)]

c. OMTCF in the above equation does not include the temperature correction factors, and therefore is limited only to the operating mode correction factors.

5.B EMISSIONS

This section discusses the LDDV emission estimates: Basic exhaust emission rates, crankcase and evaporative HC emission levels, January 1 basic exhaust emission levels, and idle exhaust emission rates. The emission standards are given in Section A.1.1 of Appendix A. The emissions reflect vehicles which have received typical in-use maintenance. Further, the vehicles are not involved in an I/M program.

With the exception of the crankcase and evaporative HC emissions, the discussions of the different emissions in Chapter 1 are also valid for the LDDVs.

5.B.1 Basic Exhaust Emission Rates

The LDDV basic exhaust emission rates are given in Table 1.5.1. This table presents the LDDV zero mile emission levels and emission deterioration rates for every model year. The emissions are measured in grams per mile.

EPA believes that diesel vehicles are subjected to very little tampering, therefore, tampering offsets are not added to any diesel vehicles.

5.B.2 Crankcase and Evaporative HC Emission Levels

LDDVs are considered to have insignificant crankcase and evaporative HC emission levels. Therefore, no emission estimates are given.

5.B.3 January 1 Basic Exhaust Emission Levels

January 1, 1980 through 2003, LDDV basic exhaust emission levels are given in Tables 1.5.2A through 1.5.2C for HC, CO, and NOx, respectively. The HC basic exhaust emission levels reflect total, rather than nonmethane, HC emissions.

5.B.4 Idle Exhaust Emission Rates (Hot Stabilized)

The LDDV hot stabilized idle exhaust emission rates are given in Table 1.5.3. These emission levels are measured in grams per minute and reflect engines operating in a hot stabilized condition.

5.C TRAVEL WEIGHTING FRACTIONS

The LDDV travel weighting fractions are individual model year proportions of the total LDDV VMT. To generate the travel weighting fractions, three distributions are required: (1) the fleet annual mileage accumulation rate distribution, (2) the registration distribution, and (3) the estimated fleet sales fraction distribution (to account for the proportional increase of diesel powered vehicles). The first and second distributions are given in Table 1.5.4, and the third distribution is given in Table 1.5.5. More detailed information is available in Chapter 1 on these distributions.

The travel weighting fraction in this document reflect a January 1 evaluation date. For the LDDVs, the model year is assumed to begin sales on the October 1 preceding the corresponding calendar year. Further, it is assumed that the vehicles are sold and accumulate mileage according to a uniform distribution. These assumptions permit the estimation of the January 1 fleet mileage accumulation rate distribution and the January 1 registration distribution from July 1 information. An example of the travel weighting fraction calculation is given in Table 1.5.5.

5.D EMISSION CORRECTION FACTORS

The LDDV basic exhaust emission levels are based on test results under the standardized conditions defined in Chapter 1. However, the basic exhaust emission levels are affected by ambient and vehicle usage conditions which differ from the prescribed test procedure. The conditions under which LDDV emissions are known to vary are the average speed, and fraction of VMT in cold and hot start operating modes. Emission correction factors are available to compensate for these conditions. Use of air conditioning, carrying of an extra load, trailer

towing, and humidity levels may affect LDDV emissions, but no information is available to estimate the effects.

5.D.1 Speed Correction Factor

The test procedure used for collecting the basic exhaust emissions is a driving cycle with an average speed of 19.6 mph. For those situations where the average speed of the vehicle deviates from this value, a speed correction factor is applied.

The LDDV speed correction factor equation and coefficients are given in Table 1.5.6. The speed correction factor for LDDVs is normalized to 19.6 mph. The LDDV speed correction factor equation is as follows:

$$SCF = EXP[Ap(SPD-SADJ) + Bip(SPD^2-SADJ^2)]$$

where:

Aip = The speed first order term speed correction factor coefficient for pollutant p.

SPD = The speed for which the correction factor is being estimated.

SADJ = Speed, adjusted for cold start w and hot start x VMT fractions. 1/SADJ = ((W + X/26)+ ((1-W-X)/16).

Bp = The second order term correction factor coefficent for pollutant p.

The user is cautioned that the correction factor as given in Table 1.5.6 is only valid for speeds in the 5 through 55 mph range since the regression equations were based on speed data in that range. Extrapolations to speeds beyond this range should not be made.

5.D.2 Emission Temperature Correction Factor

The emissions of LDDV's may be somewhat dependent on temperature, but that dependence is thought to be much less for diesel vehicles than for gasoline vehicles. Also, EPA has no data on emissions from diesel vehicles at different temperatures. Therefore, the temperature coefficients for LDDV's are all zeros, and result in a conversion factor of unity at all temperatures.

5.D.3 Speed/ Operating-Mode Emission Correction Factor

A single emission correction factor called OMTCF adjusts for speed and operating-mode conditions that differ from the basic

test procedure. As described in Chapter 1, OMTCF depends on normalized bag fractions. The LDDV normalized bag fractions are given in Table 1.5.7.

Chapter 6

LIGHT DUTY DIESEL POWERED TRUCKS

6.A INTRODUCTION

The light duty diesel powered trucks (LDDT) are becoming more prominent in the light duty truck fleet. Therefore, the LDDT emission factors are required. A LDDT is defined to be any diesel fueled motor vehicle designed primarily for transportation of property and rated at 8,500 pounds gross vehicle weight or less.

6.A.1 Test Procedure

The test procedure used for determining the LDDT basic exhaust emissions is almost identical to the LDGV test procedure. The difference between the two test procedures is primarily the road-load horsepower setting. The summary of the test procedure in Chapter 1 is correct for LDDTs. Therefore, refer to Chapter 1 for a brief overview.

6.A.2 General Emissions Calculation Equations

The generalized calculating equations for the LDDTS are presented in Chapter 5. All of the equations are identical, although the emissions, travel weighting fractions, and emission correction factors levels for LDDTs are different from the LDDVs.

6.B EMISSIONS

This section discusses the LDDT emission estimates: Basic exhaust emission rates, crankcase and evaporative HC emission levels, January 1 basic exhaust emission levels, and idle exhaust emission rates. The emission standards are given in Section A.1.2 of Appendix A. Prior to the 1978 model year, the number of LDDTs are considered insignificant. As a result, no emissions are measured prior to January 1, 1978. The emissions also reflect trucks which have received typical in-use maintenance. Further, the trucks are not involved in an I/M program.

With the exception of the crankcase and evaporative HC emissions, the discussions of the different emissions in Chapter 1 are valid for the LDDTs.

6.B.1 Basic Exhaust Emission Rates

The LDDT basic exhaust emission rates are given in Table 1.6.1. This table presents the LDDT zero mile emission levels and emission deterioration rates for every model year. The emissions are measured in grams per mile.

EPA believes that diesel vehicles are subjected to very little tampering, therefore, tampering offsets are not added to all diesel vehicles.

6.B.2 Crankcase and Evaporative HC Emission Levels

LDDT are considered to have insignificant crankcase and evaporative HC emission levels. Therefore, no emission estimates are given.

6.B.3 January 1 Basic Exhaust Emission Levels

January 1, 1980 through 2003, LDDT basic exhaust emission levels are given in Tables 1.6.2A through 1.6.2C for HC, CO, and NOx, respectively. The HC basic exhaust emission levels reflect total, rather than nonmethane, HC emissions.

6.B.4 Idle Exhaust Emission Rates (Hot Stabilized)

The LDDT hot stabilized idle exhaust emission rates are given in Table 1.6.3. These emission levels are measured in grams per minute and reflect engines operating in a hot stabilized condition.

6.C TRAVEL WEIGHTING FRACTIONS

The LDDT travel weighting fractions are the individual model year proportion of the total LDDT VMT. To generate the travel weighting fractions, three distributions are required: (1) the fleet annual mileage accumulation rate distribution, (2) the registration distribution, and (3) the estimated fleet sales fraction distribution (to account for the proportional increase of diesel powered trucks). The first and second distributions are given in Table 1.6.4, and the third distribution is given in Table 1.6.5. More detailed information is available in Chapter 1 on these distributions.

The travel weighting fractions in this document reflect a January 1 evaluation date. For the LDDTs, the model year is assumed to begin sales on the October 1 preceding the corresponding calendar year. Further, it is assumed that the trucks are sold and accumulate mileage according to a uniform distribution. These assumptions permit the estimation of the January 1 fleet mileage accumulation rate distribution and the January 1 registration distribution from July 1 information. An example of the travel weighting fraction calculation is given in Table 1.6.5.

6.D EMISSION CORRECTION FACTORS

The LDDT basic exhaust emission levels are based on test results under the standardized conditions defined in Chapter 1. However, the basic exhaust emission levels are affected by ambient and truck usage conditions which differ from the prescribed test procedure. The conditions under which LDDT emissions are known to vary are the average speed, and fraction of VMT in cold and hot start operating modes. Emission correction factors are available to compensate for these conditions. Use of air conditioning, carrying of an extra load, trailer

towing, and humidity levels may affect LDDT emissions, but no information is available to estimate the effects.

6.D.1 Speed Correction Factor

The test procedure used for collecting the basic exhaust emissions is a driving cycle with an average speed of 19.6 mph. For those situations where the average speed of the truck deviates from this value, a speed correction factor is applied.

The LDDT emission cycle speed correction factor equation and coefficients are given in Table 1.6.6. The LDDT speed correction factor is normalized to 19.6 and is identical to the LDDV speed correction factor.

The user is cautioned that this correction factor is only valid for speeds in the 5 through 55 mph range since the regression equations were based on speed data in that range. Extrapolations to speeds beyond this range should not be made.

6.D.2 Emission Temperature Correction Factor

The emissions of LDDV's may be somewhat dependent on temperature, but that dependence is thought to be much less for diesel vehicles than for gasoline vehicles. Also, EPA has no data on emissions from diesel vehicles at different temperatures. Therefore, the temperature coefficients for LDDV's are all zeros, and result in a conversion factor of unity at all temperatures.

6.D.3 Temperature/Operating-Mode Emission Correction Factor

A single emission correction factor called OMTCF adjusts for speed, and operating-mode conditions that differ from the basic test procedure. As described in Chapter 1, OMTCF depends on normalized bag fractions. The LDDT normalized bag fractions are given in Table 1.6.7.

Chapter 7

HEAVY DUTY DIESEL POWERED VEHICLES

7.A INTRODUCTION

This chapter presents the emission factors for the heavy duty diesel powered vehicles (HDDV). A HDDV is defined to be any diesel fueled motor vehicle designated primarily for the transportation of property and rated at more than 8,500 pounds of gross vehicle weight (GVW). Supplementary emission factors for diesel transit buses are found in Appendix N.

7.A.1 Test Procedure

The test procedure used for determining the HDDV basic exhaust emissions is almost identical to the HDGV test procedure. The major difference between the two test procedures is the test cycle. The HDDV test procedure is similar to the one for HDGVs. Therefore, refer to Chapter 4 for a brief overview. The specific differences are as follows:

1. The HDDV test procedure estimated cycle speed is 19.45 mph with 36% idle operation.

2. The HDDV test procedure has the estimated trip length of 6.4 miles.

3. NOx is not corrected for humidity.

7.A.2 General Emissions Calculation Equations

To calculate the HDDV emissions, the following generalized equations are used:

a. COMPEF = SUMi[TFin * (BERipn - OFFMTHi) * SCFps]

b. IEFnp = SUMi[(IERipn - OFFMTH) * TFin]

where the lower case letters are subscripts, and:

COMPEF	=	The basic fleet exhaust emission factors in grams per mile on January 1 of calendar year n for pollutant p and average speed s.
SUMi[ ]	=	The summation over 20 model years from i=n-19 to i=n, where n is the calendar year.
BERipn	=	The basic exhaust emission level in grams/mile for model year i and pollutant p on January 1 of calendar year n.

OFFMTHi	=	The methane offset of total HC for model year i. This variable is only applied to HC emissions and is defined in Section E of the INTRODUCTION.
TFin	=	The model year i fraction of the total HDDV miles driven on January 1 of calendar year n.
SCFps	=	The speed correction factor for pollutant p at the average speed of s.
IEFnp	=	The idle exhaust emission factors in grams/minute on January 1 of calendar year n for pollutant p.
IERipn	=	The idle exhaust emission level in grams/minute for model year i and pollutant p on January 1 of calendar year n.

7.B EMISSIONS

This section discusses the emission estimates for the HDDVs. The four subsections are (1) basic exhaust emission rates, (2) crankcase and evaporative HC emission levels, (3) January 1 basic exhaust emission levels, and (4) idle exhaust emission rates. The emission standards are given in Section A.1.4 of Appendix A. The emissions reflect vehicles which have received typical in-use maintenance. Further, the vehicles are not involved in an I/M program.

The conversion factors which are used to convert the emissions in g/bhp-hr to emissions in g/mi were substantially updated from previous versions of mobile source emission factors. These conversion factors are dependent on projected sales in the different weight classes of the heavy duty gasoline vehicles and their respective fuel economies. A complete discussion of the development of these conversion factors is found in the EPA report "Heavy Duty Vehicle Emission Conversion Factors, 1962-1997", EPA-AA-SDSB-84-1 [3].

7.B.1 Basic Exhaust Emission Rates

The HDDV basic emission rates are given in Table 1.7.1. This table presents the HDDV zero mile emission levels and emission deterioration rates for every model year. From the HDDV test procedure, emissions are measured in grams per brake horsepower-hour. However, the emissions in this section are given in grams per mile for consistency.

7.B.2 Crankcase and Evaporative HC Emission Levels

HDDVs are considered to have insignificant crankcase and evaporative HC emission levels. Therefore, no emission estimates are given.

7.B.3 January 1 Basic Exhaust Emission Levels

The January 1, 1980 through 2003, HDDV basic exhaust emission levels are given in Tables 1.7.2A through 1.7.2C for HC, CO, and NOx, respectively. The basic exhaust emission levels reflect total, rather than nonmethane, HC emissions.

7.B.4 Idle Exhaust Emission Rates (Hot Stabilized)

The HDDV hot stabilized idle exhaust emission rates are given in Table 1.7.3. These emissions are measured in grams per minute and reflect engines operating in a hot stabilized condition.

7.C TRAVEL WEIGHTING FRACTIONS

The HDDV travel weighting fractions are the individual model year proportions of the total HDDV VMT. To generate the HDDV travel weighting fractions, two distributions are required: (1) the fleet annual mileage accumulation rate distribution and (2) the registration distribution. The registration distribution and the VMT distribution for 1978 are given in Table 1.7.4. More detailed information is available in Chapter 1 and Appendix F on these distributions.

The travel weighting fractions in this document reflect a January 1 evaluation date. For the HDDVs, the model years are assumed to begin sales on January 1. Further, it is assumed that the vehicles are sold and accumulate mileage according to a uniform distribution. These assumptions permit the estimation of the January 1 fleet mileage accumulation rate distribution and the January 1 registration distribution from July 1 information. The travel weighting fractions are given in Table 1.7.5.

7.D. EMISSION CORRECTION FACTORS

The HDDV basic exhaust emission levels are based on test results under the standardized conditions defined in Section 4.A.1 of Chapter 4 and Section 7.A.1. However, the basic exhaust emission levels are affected by ambient and vehicle usage conditions which differ from the prescribed test procedure. The conditions under which HDDV emissions are known to vary are the average speed and ambient temperature. Emission correction factors are available to compensate for these conditions.

7.D.1 Speed Correction Factor

The test procedure used for collecting the basic exhaust emissions is a transient engine cycle with an estimated speed of about 20.0 mph. For those situations where the average speed of the vehicle deviates from this value, a speed correction factor is applied. The HDDV speed

correction factor equation is as follows:

$$SCFips = EXP(Aip + Bip*s + Cip*s^2)$$

where

SCFips	=	The correction factor for model year i and pollutant p at the average speed of s.
EXP	=	The exponential function
Aip	=	The speed correction factor intercept coefficient for model year i and pollutant p.
Bip	=	The speed correction factor first order coefficient for model year i and pollutant p.
Cip	=	The speed correction factor second order coefficient for model year i and pollutant p.

The coefficients for the speed correction factor equations are given in Table 1.7.6. The speed correction factors are only valid for speeds in the 5 through 55 mph range. Further, the speed correction factors are normalized to 20.0 mph.

7.D.2 Emission Temperature Correction Factor

The emissions of HDDVs may be somewhat dependent on temperature, but that dependence is thought to be much less for diesel vehicles than for gasoline vehicles. Also, EPA has no data on emissions from diesel vehicles at different temperatures. Therefore, the temperature coefficients for HDDVs are all zeros, and result in a conversion factor of unity at all temperatures.

Chapter 8

MOTORCYCLES

8.A INTRODUCTION

A motorcycle is defined as any motor vehicle designed to travel with not more than three wheels in contact with the ground, and weighing less than 1,500 pounds.

The MC fleet is composed of six engine size-type combinations: small, medium, and large engine sizes, each size having two-stroke and four-stroke engine types. Small or Class I motorcycles have engine displacements in the 50 cubic centimeter (cc) through 169 cc range. Medium or Class II motorcycles have engine displacements in the 170 cc through 279 cc range. Large or Class III motorcycles have engine displacements in the 280 cc and over range.

8.A.1 Test Procedure

With the exception of the Class I motorcycles, the MC basic exhaust emission test procedure is similar to the LDGV test procedure. Therefore, with the one class exception, the summary of the test procedure in Chapter 1 is correct for the MCs. Given below is a list of Class I motorcycle test procedure summary statistics that differ from the LDGV test procedure.

1. Average speed is 17.8 mph.

2. Average percent VMT in cold start operation is 18.3%.

3. Average percent VMT in hot start operation is 24.2%.

4. Average percent VMT in the stabilized operation is 57.5%

5. Average trip length is 6.8 miles.

6. Test segment #1 (cold start) and #3 (cold start) each have an average trip length of 2.89 miles and speed of 20.6 mph.

7. Test segment #2 (stabilized) has the average trip length of 3.91 miles and speed of 16.2 mph.

8.A.2 General Emission Calculation Equations

The MC generalized equations are almost identical to the LDGV equations. The differences are three optional emission correction factors that are not applicable for MCs: air conditioning, extra load, and trailer towing. Also, the effects of tampering are not included for motorcycles. With these four exceptions, the MC emission factors

calculating equations are identical to the LDGV equations given in Chapter 1.

8.B EMISSIONS

This section discusses the MC emission estimates: Basic exhaust emission rates, crankcase and evaporative HC emission levels, January 1 basic exhaust emission levels, and idle exhaust emission rates. The emission standards are given in Section A.1.5 of Appendix A. The emissions reflect motorcycles which have received typical in-use maintenance. Further, the motorcycles are not involved in an I/M program.

With the exception of the six engine size-type combinations being sales weighted, the discussions of the different emissions in Chapter 1 are also valid for the MCs. Therefore, the discussions will not be reiterated. Refer to Chapter 1 for the discussions that correspond to the subsections below. Further, it is assumed that the MC emissions reflect exactly the standarized test conditions described in Chapter 1.

8.B.1 Basic Exhaust Emission Rates

The MC basic exhaust emission rates are given in Table 1.8.1A. This table presents the MC zero mile emission levels and emission deterioration rates for every model year. The emissions are measured in grams per mile.

8.B.2 Crankcase and Evaporative HC Emission Levels

The MC crankcase and evaporative HC emission levels are given in Table 1.8.1B. This table presents the emissions for every model year and emission component: diurnal losses, hot soak losses, and crankcase losses.

8.B.3 January 1 Basic Exhaust Emission Levels

January 1, 1980 through 2003, MC basic exhaust emisson levels are given in Table 1.8.2A through 1.8.2C for HC, CO, and NOx, respectively. The HC basic exhaust emission levels reflect total rather than nonmethane HC emissions and include crankcase and evaporative HC levels.

8.B.4 Idle Exhaust Emission Rates (Hot Stabilized)

The MC hot stabilized idle exhaust emission rates are given in Table 1.8.3. These emissions are measured in grams per minute and reflect engines operating in a hot stabilized condition.

8.C TRAVEL WEIGHTING FRACTIONS

The MC travel weighting fractions are the individual model year proportions of the total MC VMT. To generate the MC travel weighting fractions, two distributions are required: (1) the fleet annual mileage accumulation rate distribution and (2) the registration distribution.

These two distributions are given in Table 1.8.4. More detailed information is available in Chapter 1 on these distributions.

The travel weighting fractions in this document reflect a January 1 evaluation date. For the MCs, the model year is assumed to begin sales on January 1. Further, it is assumed that the motorcycles are sold and accumulate mileage according to a uniform distribution. These assumptions permit the estimation of the January 1 fleet mileage accumulation rate distribution and the January 1 registration distribution from July 1 information. The travel weighting fractions are given in Table 1.8.5.

8.D EMISSION CORRECTION FACTORS

The MC basic exhaust emission levels are typically based on test results under the standardized conditions defined in Chapter 1. However, the basic exhaust emission levels are affected by ambient and usage conditions which differ from the prescribed test procedure. The conditions under which emissions are known to vary are the average speed, ambient temperature, fraction of VMT in cold and hot start operating conditions, and humidity level. Emission correction factors are available to compensate for these varying conditions.

The MC emission correction factors are based on the LDGV information and the discussions in Chapter 1 are valid for MCs.

8.D.1 Speed Correction Factor

The test procedure used for collecting the basic exhaust emissions is typically a driving cycle with an average speed of 17.8 mph. For those situations where the average speed of the MC deviates from this value, a speed correction factor is applied. The MC speed emission correction factor is given in Table 1.8.6.

8.D.2 Emission Temperature Correction Factor

The established motorcycle emissions test procedure requires an ambient test temperature between 68°F and 86°F. For those situations where the ambient temperature is not 75°F, an emission temperature correction factor is applied. Table 1.8.7A presents this correction factor for the MCs.

8.D.3 Temperature/Operating-Mode Emission Correction Factor

A single emission correction factor called OMTCF adjusts for temperature, and operating-mode conditions that differ from the basic test procedure. As described in Chapter 1, OMTCF depends on normalized bag fractions. The MC normalized bag fractions are given in Table 1.8.7B.

8.D.4 NOx Humidity Correction Factor

The NOx humidity in correction factor equation is the same as for LDGVs.

References for Part 1

1. "Compilation of Air Pollutant Emission Factors: Highway Mobile Sources", EPA 460/3-81-005, Office of Mobile Sources, U.S. Environmental Protection Agency, Ann Arbor, MI 48105, March 1981.

2. "Evapaporative HC Emissions for MOBILE3", TEB-EF-85-01, Office of Mobile Sources, U.S. Environmental Protection Agency, Ann Arbor, MI 48105, August 1985.

3. "Heavy-Duty Vehicle Emission Conversion Factors 1962-1997", SDSB-84-01, Office of Mobile Sources, U.S. Environmental Protection Agency, Ann Arbor, MI 48105, August 1984.

4. "Fleet Characterization Data Used for MOBILE3", TEB-EF-84-02, Office of Mobile Sources, U.S. Environmental Protection Agency, Ann Arbor, MI 48105, August 1984

5. Users Guide to MOBILE3, EPA 460/3-84-002, Office of Mobile Sources, U.S. Environmental Protection Agency, Ann Arbor, MI 48105, June 1984.

6. "Anti-Tampering and Anti-Misfueling Programs to Reduce In-Use Emissions from Motor Vehicles", TSS-83-10, Office of Mobile Sources, U.S. Environmental Protection Agency, Ann Arbor, MI 48105, December 1983.

6. "Proposal for 1980 and Earlier Light-Duty Gas Vehicle Emission Factors for MOBILE3", Office of Mobile Sources, Test and Evaluation Branch, U.S. Environmental Protection Agency, Ann Arbor, MI 48105, December 1983.

Appendix A

NEW VEHICLE EMISSION STANDARDS

This appendix presents the emission standards assumed in this document. At the time of the MOBILE3 release, these standards represent current and projected standards. However, it is possible that some of the assumed standards are now different due to changes in regulations, waivers, etc.

A.1 LOW AND HIGH ALTITUDE NON-CALIFORNIA HIGHWAY VEHICLE EMISSION STANDARDS

This section presents the emission standards for the eight low and high altitude non-California vehicle types. The standards are presented in five subsections. The light duty vehicle and light duty truck fleets are comprised of both diesel and gasoline powered vehicle types. The pre-1979 model year LDGT2s are heavy duty vehicles while the 1979 and later model years are light duty trucks. Finally, the high altitude standards are included in this section since there are few emission standards specific to the high altitude vehicle types.

All hydrocarbon emission standards in this section are presented for total hydrocarbon emissions.

A.1.1 Light Duty Vehicles

The following standards, up through 1974, apply only to gasoline powered light duty vehicles. Standards for 1975 and later apply to both gasoline and diesel powered light duty vehicles[1].

Year	Test Procedure[2]	Hydro-carbons	Carbon Monoxide	Oxides of Nitrogen	Partic-ulates[3]	Evaporative Hydrocarbons[4]
Prior	7-mode	850 ppm	3.4%	1000 ppm	-	-
to	7-mode	11 gpm	80 gpm	4 gpm	-	-
controls	CVS-75	8.8 gpm	87.0 gpm	3.6 gpm	-	-
1968-69	7-mode					
	50-100 CID	410 ppm	2.3%	-	-	-
	101-140 CID	350 ppm	2.0%	-	-	-
	over 140 CID	275 ppm	1.5%	-	-	-
1970	7-mode	2.2 gpm	23 gpm	-	-	-
1971	7-mode	2.2 gpm	23 gpm	-	-	6.0 g/test[5]
1972	CVS-72	3.4 gpm	39 gpm	-	-	2.0 g/test
1973-74	CVS-72	3.4 gpm	39 gpm	3.0 gpm	-	2.0 g/test
1975-76	CVS-75	1.5 gpm	15 gpm	3.1 gpm	-	2.0 g/test
1977[6]	CVS-75	1.5 gpm	15 gpm	2.0 gpm	-	2.0 g/test
1978-79	CVS-75	1.5 gpm	15 gpm	2.0 gpm	-	6.0 g/test
1980	CVS-75	0.41 gpm	7.0 gpm	2.0 gpm	-	6.0 g/test
1981	CVS-75	0.41 gpm	3.4 gpm[7]	1.0 gpm[8,9]	-	2.0 g/test
1982[10]	CVS-75	0.41 gpm (0.57)	3.4 gpm[7] (7.8)	1.0 gpm[8,9] (1.0)[8]	0.6 gpm (-)	2.0 g/test (2.6)
1983[10]	CVS-75	0.41 gpm (0.57)	3.4 gpm (7.8)	1.0 gpm[8] (1.0)[8]	0.6 gpm (-)	2.0 g/test (2.6)
1984-86[11]	CVS-75	0.41 gpm (.41)	3.4 gpm (3.4)	1.0 gpm (1.0)	0.6 gpm (-)	2.0 g/test (2.0)
1987 & later[11]	CVS-75	0.41 gpm (.41)	3.4 gpm (3.4)	1.0 gpm (1.0)	0.2 gpm (-)	2.0 g/test (2.0)

LIGHT DUTY VEHICLES

1 Standards do not apply to vehicles with engines less than 50 CID from 1968 through 1974.

2 Different test procedures have been used since the early years of emission control which vary in stringency. The appearance that the standards were relaxed from 1971 to 1972 is incorrect. The 1972 standards are actually more stringent because of the 1972 test procedure.

3 Applies only to diesels.

4 Evaporative emissions determined by carbon trap method through 1977, SHED procedure beginning in 1978. Applies only to gasoline-fueled vehicles.

5 Evaporative standard does not apply to off-road utility vehicles for 1971.

6 Cars sold in specified high altitude counties are required to meet standards at high altitude.

7 Carbon monoxide standard can be waived to 7.0 gpm for 1981-82 by the EPA Administrator.

8 Oxides of nitrogen standard can be waived to 1.5 gpm for innovative technology or diesel.

9 Oxides of nitrogen standard can be waived to 2.0 gpm for American Motors Corporation.

10 Standards in parentheses apply to vehicles sold in specified high altitude counties. Vehicles eligible for a carbon monoxide waiver to 7.0 gpm at low altitude are eligible for a waiver to 11 gpm at high altitude.

11 Standards in parentheses apply to vehicles sold in specified high altitude counties.

gpm - grams per mile
CID - cubic inch displacement
CVS-72 - constant volume sample cold start test
CVS-75 - constant volume sample test which includes cold and hot starts
7-mode - 137 second driving cycle test
ppm - parts per million

A.1.2 Light Duty Trucks

The following standards, up through 1975, apply only to gasoline powered light duty trucks. Standards for 1976 and later apply to both gasoline and diesel powered light duty trucks[1].

Year	Test Procedure[2]	Hydro-carbons	Carbon Monoxide	Oxides of Nitrogen	Partic-ulates[3]	Evaporative[4] Hydrocarbons
Prior	7-mode	850 ppm	3.4%	1000 ppm	-	-
to	7-mode	11 gpm	80 gpm	4 gpm	-	-
controls	CVS-75	8.8 gpm	87.0 gpm	3.6 gpm	-	-
1968-69	7-mode					
	50-100 CID	410 ppm	2.3%	-	-	-
	101-140 CID	350 ppm	2.0%	-	-	-
	over 140 CID	275 ppm	1.5%	-	-	-
1970	7-mode	2.2 gpm	23 gpm	-	-	-
1971	7-mode	2.2 gpm	23 gpm	-	-	6.0 g/test[5]
1972	CVS-72	3.4 gpm	39 gpm	-	-	2.0 g/test
1973-74	CVS-72	3.4 gpm	39 gpm	3.0 gpm	-	2.0 g/test
1975-77[6]	CVS-75	2.0 gpm	20 gpm	3.1 gpm	-	2.0 g/test
1978	CVS-75	2.0 gpm	20 gpm	3.1 gpm	-	6.0 g/test
1979-80[7]	CVS-75	1.7 gpm	18 gpm	2.3 gpm	-	6.0 g/test
1981	CVS-75	1.7 gpm	18 gpm	2.3 gpm	-	2.0 g/test
1982-83[8]	CVS-75	1.7 gpm (2.0)	18 gpm (26)	2.3 gpm (2.3)	0.6 gpm (-)	2.0 g/test (2.6)
1984-86[9]	CVS-75	0.8 gpm (1.0)	10 gpm (14)	2.3 gpm (2.3)	0.6 gpm (-)	2.0 g/test (2.6)
1987 & later[9]	CVS-75	0.8 gpm (1.0)	10 gpm (14)	1.2 gpm (1.2)	0.26 gpm (-)	2.0 g/test (2.6)

LIGHT DUTY TRUCKS

1 Standards do not apply to trucks with engines less than 50 CID from 1968 through 1974.

2 Different test procedures have been used since the early years of emission control which vary in stringency. The appearance that the standards were relaxed from 1971 to 1972 is incorrect. The 1972 standards are actually more stringent because of the 1972 test procedure.

3 Applies only to diesels.

4 Evaporative emissions determined by carbon trap method through 1977, SHED procedure beginning in 1978. Applies only to gasoline fueled trucks.

5 Evaporative standard does not apply to off-road utility trucks for 1971.

6 Trucks sold in specified high altitude counties required to meet standards at high altitude (1977 only).

7 Effective in 1979, light duty truck classification was extended from 0-6,000 pounds GVWR to 0-8,500 pounds GVWR.

8 Standards in parentheses apply to trucks sold in specified high altitude counties.

9 Standards in parentheses apply to trucks sold in specified high altitude counties.

gpm - grams per mile
CID - cubic inch displacement
CVS-72 - constant volume sample cold start test
CVS-75 - constant volume sample test which includes cold and hot starts
7-mode - 137 second driving cycle test
ppm - parts per million
GVWR - gross vehicle weight rating

A.1.3 Heavy Duty Gasoline Powered Engines and Vehicles

The following is a summary of gasoline powered heavy duty engine and vehicle standards[1].

Year	Hydro-carbons	Carbon Monoxide	Oxides of Nitrogen	Hydrocarbons + Oxides of Nitrogen	Evaporative Hydrocarbons[2]
1970-73	275 ppm	1.5%	-	-	-
1974-78	-	40 g/bhp-hr	-	16 g/bhp-hr	-
1979[3,4,5]	1.5 g/bhp-hr	25 g/bhp-hr	-	10 g/bhp-hr	-
	1.0 g/bhp-hr	25 g/bhp-hr	-	9.5 g/bhp-hr	-
	-	25 g/bhp-hr	-	5 g/bhp-hr	-
1980-84[3]	1.5 g/bhp-hr	25 g/bhp-hr	-	10 g/bhp-hr	-
	-	25 g/bhp-hr	-	5 g/bhp-hr	-
1985-86	2.5 g/bhp-hr	40.0 g/bhp-hr	10.7 g/bhp-hr	-	3.0 g/test 4.0 g/test[6]
1987 & later[7]	1.3 g/bhp-hr	15.5 g/bhp-hr	6.0 g/bhp-hr		3.0 g/test
	2.5 g/bhp-hr	40.0 g/bhp-hr	6.0 b/bhp-hr		4.0 g/test

---

1 Test procedure for 1970-1983 standards is the 9-mode test procedure. Test procedure for 1985 and later is the transient test procedure although manufacturers may use the 9-mode test with an alternate set of standards (not shown).

2 Evaporative emissions determined by the SHED procedure.

3 Manufacturers may chose among the set of standards listed.

4 Standards of 1.0 HC, 25 CO, and 9.5 NOx are used if NDIR HC measurement method is used.

5 Effective in 1979, heavy duty vehicle classification was changed from 6,001 pounds and greater GVWR to 8,501 pounds and greater GVWR.

6 3.0 g standard applies to HDGV's less than 14,000 lbs. GVW, and 4.0 g standard applies to HDGV's over 14,000 lbs.

7 The 1.3/15.5/6.0/3.0 standards apply to HDGV's less than 14,000 lbs. GVW, the 2.5/40.0/6.0/4.0 standards apply to trucks over 14,000 lbs. GVW.

NOTE: g/bhp-hr = grams per brake horsepower-hour
ppm = parts per milion

A.1.4 Heavy Duty Diesel Powered Engines and Vehicles

The following is a summary of diesel powered heavy duty engine and vehicle standards[1].

Year	Hydro-carbons	Carbon Monoxide	Oxides of Nitrogen	Hydro-carbons + Oxides of Nitrogen	Partic-ulates	Smoke
1970-73	-	-	-	-	-	ACCEL 40% LUG 20% opacity
1974-78	-	40g/bhp-hr	-	16g/bhp-hr	-	ACCEL 20% LUG 15% PEAK 20% opacity
1979-84[2,3]	1.5g/bhp-hr 0.5g/bhp-hr	25g/bhp-hr 15.5g/bhp-hr	9.0g/bhp-hr	10g/bhp-hr -	-	ACCEL 20% LUG 15% PEAK 50% opacity
1985-86[3]	1.3g/bhp-hr	15.5g/bhp-hr		10.7g/bhp-hr	-	ACCEL20% LUG 15% PEAK 50% opacity
1987 & later	1.3g/bhp-hr	15.5g/bhp-hr	6.0g/bhp-hr	-	-	ACCEL 20% LUG 15% PEAK 50% opacity

1 Test procedure for 1970-1983 standards is the 13-mode test procedure. Test procedure for 1985 and later is the transient test procedure. Both test procedures measure in grams per brake horsepower-hour.

2 Effective in 1979 the heavy duty vehicle classification was changed from 6,001 pounds and greater GVWR to 8,501 pounds and greater GVWR.

3 Standards of 0.5 HC, 15.5 CO, and 9.0 NOx are optional standards for 1984 diesels tested on the 13-mode test procedure.

g/bhp-hr - grams per brake horsepower-hour
ppm - parts per million

A.1.5 Motorcycles

The following is a summary of motorcycle standards.

Year	Displacement[1]	Hydrocarbons	Carbon Monoxide
1978-79	50-169	5.0 g/km	17 g/km
	170-749	5.0 + 0.0155(D-170) g/km[2]	17 g/km
	750 & larger	14 g/km	17 g/km
1980 & later	All (50 & larger)	5.0 g/km	12 g/km

1 Displacement shown in cubic centimeters

2 Motorcycle Hydrocarbon Formula

D = engine displacement in cubic centimeters
e.g., 300 cc engine --
HC Standard = (300-170) X .0155 + 5.0 = 7.0 g/km

g/km - grams per kilometer

Appendix B

CALCULATION OF THE VMT MIX

The proportion of the total vehicle-miles-traveled (VMT) driven by a given vehicle type depends entirely on (a) the number of vehicles, (b) the model year registration distribution, and (c) the mileage accumulation rate distribution. Also, as light duty diesel powered vehicles and trucks become a larger proportion of their respective fleets, their VMT proportions will increase. As the diesel powered vehicle type VMT fractions increase, the corresponding gasoline powered vehicle type VMT fractions will decrease.

The MOBILE3 computer program calculates the VMT mix unless a user inputs locality specific information. The calculation procedure is based on the estimated number of vehicles and the average annual miles driven for each vehicle type. The product of these two variables estimates the total miles driven on January 1 of a calendar year for each vehicle type. By performing this calculation for each vehicle type and summing the results, the total miles driven on January 1 for the entire highway mobile source fleet are estimated. Finally, by normalizing the individual vehicle type total miles, the VMT fractions are estimated.

Specifically, the MOBILE3 computer program performs the calculations in subprogram TFCALX with the following equations:

```
MILES(IV)  = VCOUNT(IV)*GSFVCT(IV)*TFNORM(IV)
TOTVMT     = SUMiv[MILES(IV)]
VMTMIX(IV) = MILES(IV)/TOTVMT
```

where

TOTVMT = the total miles traveled by the entire highway mobile source fleet.

IV = the vehicle type index (1 = LDGV, 2 = LDGT1, 3 = LDGT2, 4 = HDGV, 5 = LDDV, 6 = LDDT, 7 = HDDV, and 8 = MC).

VMTMIX(IV) = the estimated VMT fraction for vehicle type IV.

VCOUNT(IV) = the estimated vehicle count for vehicle type IV based on 1981 registrations. To use the dieselization rates, VCOUNT(1) = VCOUNT(5) and VCOUNT(2) + VCOUNT(3) = VCOUNT(6). This implies that the LDDVs and LDGVs are combined

to become the light duty vehicle fleet. Similarly, the LDGT1s, LDGT2s and LDDTs are combined to become the light duty truck fleet. Both the light duty vehicle and truck fleets are adjusted by fleet sales fractions to separate the diesel from the gasoline powered vehicles/trucks.

GSFVCT(IV) = fraction of each total (gas + diesel) vehicle counts that are either gas or diesel. GSFVCT (1) = DAF (1)/(DAF(1) + DAF(5)), where DAF is the fleet sum of the product of the registration distribution and the diesel sales fractions by model year in a given calendar year. The DAF values change with calendar year. For an example of how the DAF values are estimated, refer to the .5 tables in Appendix H. For the gas/diesel sales fractions for each model year of LDVs and LDTs refer to Table B.1.

TFNORM(IV) = the registration weighted average of annual miles driven by each vehicle of vehicle type IV. The values are illustrated in each table .5 of Appendix H (denoted as TFNORM at the bottom of the C*D column).

MILES(IV) = the estimated miles driven by vehicle type IV.

SUMiv = the summation over the eight vehicle types.

An example of the VMT mix calculation follows. This example is based on information readily available. Using the example travel weighting factor calculation tables and the 1981 registration counts[1], the VMT mix example for January 1, 1988 is as follows:

VCOUNT(1) = 105,839,000
VCOUNT(2) = 18,072,000
VCOUNT(3) = 11,506,000

---

[1] EPA Report, "Fleet Characterization Data Used for MOBILE3", August,1984, EPA-AA-TEB-84-6

VCOUNT(4) = 4,650,000
VCOUNT(5) = 105,839,000
VCOUNT(6) = 29,578,000
VCOUNT(7) = 1,640,000
VCOUNT(8) = 5,600,000

GSFVCT(1) = 0.902/(.902 + .044) = .954
GSFVCT(2) = 0.876/(.876 + .080) = .916
GSFVCT(3) = 0.876/(.876 + .080) = .916
GSFVCT(4) = 1.000
GSFVCT(5) = 0.044/(.902 + .044) = .046
GSFVCT(6) = 0.080/(.876 + .080) = .083
GSFVCT(7) = 1.000
GSFVCT(8) = 1.000

TFNORM(1) = 9,518.0
TFNORM(2) = 10,909.0
TFNORM(3) = 11,245.4
TFNORM(4) = 13,015.0
TFNORM(5) = 10,871.3
TFNORM(6) = 14,765.6
TFNORM(7) = 45,860.0
TFNORM(8) = 1,924.0

MILES(1)= (105,839,000)*(.954)*(9,518.0) = 9.61 x 10^{11} miles
MILES(2)= (18,072,000)*(.916)*(10,909.0) = 1.81 x 10^{11} miles
MILES(3)= (11,506,000)*(.916)*(11,245.4) = 1.19 x 10^{11} miles
MILES(4)= (4,650,000)*(1.000)*(13,015.0) = 0.61 x 10^{11} miles
MILES(5)= (105,839,000)*(.046)*(10,871.3) = 0.53 x 10^{11} miles
MILES(6)= (29,578,000)*(.083)*(14,765.6) = 0.36 x 10^{11} miles
MILES(7)= (1,640,000)*(1.000)*(45,860.0) = 0.75 x 10^{11} miles
MILES(8)= (5,600,000)*(1.000)*(1,924.0) = 0.11 x 10^{11} miles

Total 14.97 x 10^{11} miles

VMTMIX(1) = 9.61/14.97 = .648
VMTMIX(2) = 1.81/14.97 = .122
VMTMIX(3) = 1.19/14.97 = .080
VMTMIX(4) = 0.61/14.97 = .041
VMTMIX(5) = 0.53/14.97 = .036
VMTMIX(6) = 0.36/14.97 = .021
VMTMIX(7) = 0.75/14.97 = .050
VMTMIX(8) = 0.11/14.83 = .008

Table B.1

Gasoline/Diesel Sales Fractions for LDVs and LDTs
(used in MOBILE3 also)

MODEL YEAR	LDGV	LDDV	LDGT (1&2)	LDDT
Pre-1974	1.000	0.000	1.000	0.000
1975	0.997	0.003	0.998	0.002
1976	0.997	0.003	0.997	0.003
1977	0.996	0.004	0.995	0.005
1978	0.991	0.009	0.991	0.009
1979	0.972	0.028	0.972	0.028
1980	0.966	0.034	0.966	0.034
1981	0.939	0.061	0.940	0.060
1982	0.954	0.046	0.920	0.080
1983	0.947	0.053	0.900	0.100
1984	0.940	0.060	0.870	0.130
1985	0.934	0.066	0.840	0.160
1986	0.927	0.073	0.820	0.180
1987	0.920	0.080	0.790	0.210
1988	0.910	0.090	0.760	0.240
1989	0.900	0.100	0.730	0.270
1990	0.887	0.113	0.706	0.294
1991	0.887	0.113	0.697	0.303
1992	0.886	0.114	0.688	0.312
1993	0.886	0.114	0.679	0.321
1994	0.885	0.115	0.670	0.330
1995+	0.885	0.115	0.661	0.339

Appendix C

CALCULATION PROCEDURE TO COMBINE THE EMISSION RESULTS OF THE TWO LIGHT DUTY GASOLINE POWERED TRUCK CLASSES

Frequently air quality analyses require the use of one light duty gasoline powered truck vehicle type as opposed to two. However, emission factors are presented for two truck types: LDGT1 and LDGT2. As a result, a procedure has been developed which will combine the two truck types. This appendix describes this procedure. The procedure simply combines the calculated emission factors of each truck type on the basis of VMT. To illustrate this, a hypothetical example is used.

Suppose that on January 1, 1988, the LDGT1 and LDGT2 calculated CO emission factors are 39.3 and 43.4 grams/mile; respectively. Further, assume that the LDGT1 and LDGT2 proportions of the total fleet VMT are 12.2 percent and 8.0 percent; respectively. Finally assume that the entire fleet travels 14.83×10^{11} miles.

From this example the combined truck types travel the following miles on January 1, 1988:

$$(14.83 \times 10^{11} \text{ miles})*(.122) + (14.83 \times 10^{11} \text{ miles})\ (.080)$$

Further, the total grams emitted by the combined truck types are as follows:

$$(1.81 \times 10^{11} \text{ miles})(39.3 \text{ g/mi})+(1.19 \times 10^{11} \text{miles})*(43.4\text{g/mi})$$

As a result, the calculated CO gram/mile emission factor estimate for the combined truck type is as follows (total grams/total miles):

$$\frac{(14.83\text{x}10^{11}\text{miles})(.122)(39.3\text{g/mi})+(14.83\text{x}10^{11}\text{miles})(.080)(43.\text{g/mi})}{(14.83 \times 10^{11} \text{ miles})\ (.122) + (14.83 \times 10^{11}\text{miles})\ (.080)}$$

or,

$$\frac{(.122)\ (39.3 \text{ g/mi}) + (.080)\ (43.4 \text{ g/mi})}{(.122) + (.080)} = 40.9 \text{ gm/mi}$$

After simplifying the equation it becomes obvious that the combined LDGT vehicle type is a function of the calculated emission factors and the VMT fractions. The more generalized formula is as follows:

$$\frac{\text{VMT(LDGT1)} \times \text{EF(LDGT1)} + \text{VMT(LDGT2)} \times \text{EF(LDGT2)}}{\text{VMT(LDGT1)} + \text{VMT(LDGT2)}}$$

Appendix D

METHODOLOGY FOR CALCULATING JANUARY 1 TRAVEL WEIGHTING INFORMATION AND FLEET AVERAGE MILEAGE ACCUMULATION

This appendix describes the derivation of January 1 registration distributions, the annual rate of mileage accrual for the fleets, and the fleet average mileage accumulation distributions. The January 1 registration and annual rate of mileage accrual distributions are used in the calculation of travel weighting fractions. The fleet average mileage accumulation distributions are used to estimate the January 1 emission levels by model year.

D.1 JANUARY 1 TRAVEL WEIGHTING INFORMATION

The travel weighting fractions for a given vehicle type are the individual model year proportions of the total VMT for the vehicle type. To generate the travel weighting fractions, typically three distributions are required: (1) the annual mileage accrual rate per vehicle by age distribution, (2) the registration distribution, and (3) the fleet sales fraction distribution (to account for the influx of diesels).

D.1.1 January 1 Registration Distribution Transformations

A portion of the January 1 travel fraction calculation procedure is to estimate the January 1 model year registration distribution for each vehicle type. The model year registration distribution, frequently referred to as the registration mix, begins with all model years combined for a given vehicle type and apportions them into their appropriate model year index (except for model year index 20 which represents all model years that were built 20 or more model years ago). At this phase of the registration mix development, the LDV and LDT model year registration distributions are composed of both the gasoline and diesel powered vehicle types.

For the EPA MOBILE3 computer program, the initial model year registration distributions are assumed to be based on July 1 data. This July 1 information is then transformed into January 1 model year registration distributions. For vehicle types where model year sales are assumed to begin on October 1 (light duty vehicles and trucks), the original July 1 model year registration distribution accounts for approximately 75 percent of the current model year fleet. Using the assumption of uniform sales throughout the year, approximately 25 percent would have been sold

by January 1 (or one-third of the July 1 registration). The older model year registration figures are six months older on July 1 than they are on January 1. However, no direct adjustment are made to these older model year registration figures. Although the difference between January 1 and July 1 for the older model vehicles is primarily scrappage, the older model year registration figures are adjusted later.

Denoting the July 1 registration fractions as R(1), R(2), R(3), . . ., R(20+), we can generalize the January 1 light duty adjustment equations as follows:

FIRST MODEL YEAR INDEX: 1/3*R(1)
SECOND AND LATER MODEL YEAR INDEX: R(i), i=2, 3, . . ., 20+

The second type of adjustment for the January 1 model year registration distributions is to account for the fleet sales fractions: The separation of the model year sales into diesel and gasoline powered vehicle types. The fleet sales fractions are given in Table B.1 of Appendix B. As a result, the January 1 model year registration distributions are adjusted according to the following formulation:

FIRST MODEL YEAR INDEX: 1/3*R(1)*F(my)
SECOND AND LATER INDEX: R(i)*F(my-i+1)

F(my) is the fraction of the model year sales which are gasoline powered, if calculating the LDGV or LDGT registration distributions. F(my) is the fraction of the model year sales which are diesel powered, if calculating the LDDV or LDDT registration distributions.

The last adjustment to estimate the January 1 model year registration distributions is to normalize the distribution such that the fractions sum to one. To accomplish this adjustment, the following procedure is used:

DAF = SUMi[P(i)*R(i)*F(my-i+1)]

where P(1) = 1/3
P(i) = 1 i = 2, 3, . . ., 20+
R(i) = July 1 registration figures
i = 1, 2, 3, . . ., 20+

F(my-i+1) = the fleet sales fraction for model year my-i+1

and SUMi = the summation over the 20 model years.

Then each January 1 registration P(i)*R(i)*F(my-i+1) figure is divided by DAF to estimate the January 1 registration mix.

For vehicles whose model year sales begins on January 1 (heavy duty vehicles and motorcycles), there are two changes to the above normalization procedure. P(1) should be set to zero and every F(my-i+1) term should be set to 1.

D.1.2 January 1 Annual Rate of Mileage Accrual for the Fleet

The last aspect of calculating the travel weighting fractions is determination of the January 1 annual rate of mileage accrual. The methodology for calculating the average mileage accumulation rate will be explained by the following example: Calculation of the average annual mileage accumulation rate for the 1985 model year (MY) vehicles on January 1 of 1985, 1986, 1987 and later years.

First the average annual mileage accumulation rate of the 1985 MY light duty vehicles on January 1, 1985, will be calculated (the calendar year when the vehicle model year index is one). It is assumed that mileage accrual is uniform throughout the year and that 1985 light duty model year sales begin on October 1, 1984.

Using these assumptions, it is obvious that by January 1, 1985, all 1985 MY vehicles are less than one year old and accumulate mileage at the first year rate. The annual rates of mileage accural are presented in table .4 of Appendix H for each vehicle type. For the light duty gasoline powered vehicles, the annual mileage accrual rate for vehicles during their first year is 12,818 miles.

By January 1, 1986, those vehicles that had been sold by January 1, 1985 have been on the road for an additional year and accumulate mileage at the second year annual rate of 12,102 miles.

In addition to the 1985 model year vehicles sold before January 1, 1985, those 1985 MY vehicles sold after January 1 and before October 1, 1985, must be considered. Again by assuming uniform sales, approximately 75 percent of the 1985 model year vehicles are sold after January 1, 1985. Further, on January 1, 1986 these vehicles are still in their first year of mileage accumulation and are accumulating mileage at a 12,818 mile annual rate.

Since the first group represents three months of sales and the second group represents nine months of sales, the average annual mileage accrual rate of 1985 MY vehicles on January 1, 1986 can be expressed as follows:

(.25)*(12,102) + (.75)*(12,818)

By extension, the formula for the average mileage accumulation rate of the 1985 MY vehicles on January 1, 1987 is as follows:

(.25)*(11,427) + (.75)*(12,102)

Denoting the average annual rate of mileage accrual during the first, second, and third year as M(1), M(2), and M(3); respectively, the generalized average annual mileage accumulation rate equations on January 1 are as follows:

FIRST MODEL YEAR INDEX: M(1)
SECOND MODEL YEAR INDEX: .25*M(2) + .75*M(1)
THIRD MODEL YEAR INDEX: .25*M(3) + .75*M(2)
Ith MODEL YEAR INDEX: .25*M(i) + .75*M(i-1)

For the vehicle types whose model year sales begin on January 1 (heavy duty vehicles and motorcycles) the generalized formulae are as follows:

FIRST MODEL YEAR INDEX: 0
Ith MODEL YEAR INDEX: M(i-1)

D.2 JANUARY 1 FLEET AVERAGE MILEAGE ACCUMULATION

To estimate the emission levels on January 1 for each model year (as in tables .2A through .2C for each vehicle type), the annual mileage accrual rate per vehicle by age distribution is used to derive the fleet average mileage accumulation distribution.

The methodology for calculating the average January 1 fleet cumulative mileages will be explained by example: Calculation of the average cumulative mileage for the 1985 model year (MY) vehicles on January 1 of 1985, 1986, 1987, and later years.

First, we calculate the average fleet cumulative mileage of the 1985 MY LDGVs on January 1, 1985 (the calendar year when the vehicle model year index is defined as one).

We assume vehicle sales are uniform throughout the year, the mileage accrual is uniform throughout the year, and the 1985 model year sales begin on October 1, 1984.

Using these assumptions, it is obvious that by January 1, 1985 (25 percent of the way through the sales year), approximately 25% of the 1985 model year vehicles will be sold. These vehicles range in age from 0 to 3 months. Assuming uniform sales, their average age is 1.5 months.

Therefore, the average mileage accrual for these 1985 MY vehicles which have been sold by January 1, 1985, is 1.5/12, or .125, times the annual

rate of mileage accrual for the first year. The annual rates of mileage accrual are presented in table .4 and .5 for each vehicle type. For LDGVs the annual mileage accrual rate for vehicles during their first year is 12,818 miles.

By January 1, 1986, those vehicles sold before January 1, 1985 have been on the road for an additional year. Therefore, those vehicles have accumulated mileage for 1+(1.5/12) years, or 1.125 years. Referring to table .4 for the annual rates of mileage accrual, we can calculate the average cumulative mileage of these vehicles as the sum of the first year's mileage (12,818 miles) plus .125 times the second year annual rate (12,102 miles).

In addition to the 1985 model year vehicles sold before January 1, 1985, we must consider those 1985 MY vehicles sold between January 1, 1985 and September 30, 1985. If we again assume uniform sales, then by January 1, 1986 these vehicles range in age from 3 months to 12 months, with an average age of 7.5 months. Since these vehicles are still in their first year of use on January 1, 1986, their average mileage accumulation on that date is 7.5/12, or .625, times 12,818 miles.

The average cumulative mileage of all 1985 MY vehicles on January 1, 1986 is the sales weighted average of the cumulative mileages for these two groups of vehicles (those sold before January 1 and those sold after January 1).

Since the first group represents three months of sales and the second group represents nine months of sales, the weighted average cumulative mileage of 1985 MY vehicles on January 1, 1986 can be expressed as follows:

$$.25*[12818 + .125*12102] + .75*[.625*12818]$$

By extension, the formula for the cumulative mileage of 1985 model year vehicles on January 1, 1987 is given by:

$$.25*[12818 + 12102 + .125*11427 + .75*[12818 + .625*12102].$$

Denoting the average rate of mileage accumulation during the first, second, and third years as M(1), M(2), and M(3), we can generalize the equations for cumulative mileage on January 1 as follows:

FIRST YEAR: $.125*M(1)$
SECOND YEAR: $.25*[M(1) + .125*M(2)] + .75*[.625*M(1)]$
THIRD YEAR: $M(1)+.25*[M(2)+.125*M(3)]+.75*[.625*M(2)]$
Ith YEAR: $M(1)+M(2)+...+M(i-2)+.25*[M(i-1)+.125*M(i)]+.75*[.625*M(i-1)]$

For vehicles whose sales year begins on January 1 (heavy duty vehicles and motorcycles) the formulae are modified as follows:

```
FIRST YEAR:  0
SECOND YEAR: .5*M(1)
THIRD YEAR:  M(1) + M(2) + ... + M(i-2) + .5*M(i-1)
```

Appendix E

METHOD FOR DETERMINING EXCESS EMISSIONS DUE TO TAMPERING AND MISFUELING

E.1 Background

Since 1978, EPA has conducted surveys of in-use vehicles, passenger cars and trucks in over seventeen states. During these surveys, EPA collected data regarding emission component disablements and misfueling from over 8,000 vehicles. One of these surveys, completed in 1982, collected data from nearly 3,000 cars in ten states. This 1982 survey was chosen as the data base with which to calculate current and future tampering rates for MOBILE3.

In order to estimate the excess emissions caused by tampering and misfueling on a future date, it is necessary to predict the tampering and misfueling rates when the average age of the vehicles will be older than that observed in the 1982 survey. Examination of the data from the 1982 survey shows a marked increase in misfueling rates, and in the tampering rates of some components, as the average mileage of the sample increases.

To examine this issue, a linear regression equation on mileage was fit to data from the 1982 EPA survey and this equation appears to reasonably explain the tampering and misfueling rates observed in the surveys. Each linear equation is defined by a zero mile rate and an increase in the rate for every 10,000 miles of fleet average mileage. Other non-linear equations did not seem to better explain the increase. It was decided, therefore, to use the linear equation to estimate the tampering and misfueling rates using standard EPA predictions of the average age in miles of each model year on that date.

Least squares regression was used to estimate a line of the form $Y = BX + A$, where Y is the proportion of tampered vehicles at mileage X. The data used to generate estimates of the regression coefficients, A and B, were the mileage and whether the vehicle was tampered (Y=1) or not (Y=0) for each vehicle in the 1982 tampering survey.

The regression coefficients for various types of tampering are shown in Table E-1. In Table E-1, some linear equations contain negative zero mile rates. Since these negative levels are small, no effort has been made to force the equation through zero. However, if a tampering or misfueling rate for a particular model year is calculated to be less than zero in the evaluation year, that rate is set to zero.

Also in Table E-1, overlap among tampering types is ignored, thus one car can contribute to several of the regression equations. The overall tampering rate at a given mileage is therefore less than the sum of these equations. However, when estimating the excess emissions due to tampering, it is necessary to explicitly account for vehicles with more

than one form of tampering, since tampering effects are not always additive. The following sections will describe how this was done for each case.

E.2 Discussion of Method

The approach used begins with a single model year's vehicles. The calculation described below is performed for each of the last 19 model years, resulting in a total emissions impact for each from all forms of tampering combined. These 19 model year-specific impacts are then added using age-based vehicle miles traveled (VMT) fractions as weighting factors to arrive at the impact on the composite emissions of, for example, passenger cars of all ages.

The description below is for passenger cars, but the same procedure can be used for light-duty trucks by substituting any truck-specific tampering rates, emission impacts, etc.

The calculation consists of the following steps for each model year:

A. Separate the model year into subgroups with distinct combinations of equipment, such that all cars in a subgroup are susceptible to the same types of tampering. Specifically, cars with air pumps and catalysts must be separated from cars with only air pumps and cars with only catalysts, since simultaneous air pump and catalyst tampering is possible for one subgroup but not the others. The sales fraction for each of these subgroups must be known; the necessary fractions are given in Tables E-2a and 2b. Because in a single model year all cars either have or do not have PCV and evaporative controls, and because the impacts of PCV and evaporative tampering are strictly additive to the impacts of misfueling, catalyst removal, and air pump disablement, there is no need to define subgroups based on PCV and evaporative equipment.

B. Identify all the unique combinations of tampering that can occur on cars in each subgroup. These are as follows:

Air Pump/Catalyst	Catalyst Only	Air Pump Only
1. Air Pump/Catalyst		
2. Air Pump/Misfueling(Inlet)		
3. Air Pump/Misfueling(Other)		
4. Air Pump/Catalyst/Misfueling(Inlet)		
5. Air Pump/Catalyst/Misfueling(Other)		
6. Catalyst/Misfueling(Inlet)	X	
7. Catalyst/Misfueling(Other)	X	
8. Air Pump Only		X
9. Catalyst Only	X	
10. Misfueling(Inlet) Only	X	
11. Misfueling(Other) Only	X	

In the above list, "Inlet" designates habitual misfueling accompanied by tampering of the inlet restrictor. "Other" designates habitual misfueling accomplished by other means, such as a small pump nozzle or a funnel. As before, PCV and evaporative tampering can be kept separate.

C. Find the percentage of vehicles with each of the above unique combinations of tampering on the evaluation date assuming no special program to reduce tampering and misfueling. Since the tampering rates derived in Table E-1 depend on mileage, the odometer of the model year on the evaluation date (always January 1) must be known. The mileage accumulation rate for LDGVs is given in Table 1.1.4 (Appendix H). Given an odometer value, the equations from Table E-1 can be used to calculate the overall air pump rate (AIR), catalyst removal rate (CAT), the rate of misfueling via inlet tampering (INLET), and the rate of misfueling via other means (OTHER). These overall tampering rates are the sum of the rates for two or more of the above unique combinations of tampering. To calculate the individual rate for each unique combination, additional assumptions are necessary. To fill this need, EPA has assumed that the rate for a given overlap combination is always proportional to the overall rate of one or the other of the forms of tampering that make up the overlap combination.

For example, EPA has had to assume that the rate of simultaneous air pump and catalyst tampering is 6.6% of the overall air pump tampering rate, regardless of any local variation in overall air pump tampering rate or overall catalyst tampering rate. (The figure of 6.6% was determined from the 1982 Tampering Survey data.) An exception is made if necessary to prevent a logical contradiction; in the example given, the rate of simultaneous air pump and catalyst tampering is never assumed to be larger than the overall rate of catalyst or air pump tampering. Similar assumptions are made for other overlap combinations. The full set of assumptions is as follows:

Rate (1) = .066 x AIR
Rate (2) = .111 x AIR
Rate (3) = .105 x AIR
Rate (4) = .238 x CAT
Rate (5) = .032 x CAT
Rate (6) = .441 x CAT
Rate (7) = .050 x CAT
Rate (8) = AIR - (1,2,3,4,5)
Rate (9) = CAT - (1,4,5,6,7)
Rate (10) = INLET - (2,4,6)
Rate (11) = OTHER - (3,5,7)

As mentioned, alterations are made as necessary to prevent logical contradictions that would otherwise result in one or more of the last four rates being negative. PCV and evaporative tampering rates come directly from the equations in Table E-1.

D. Assign each unique combination of tampering an emissions impact per vehicle. The impacts are taken from Table E-3a and E-3b, with the following further assumptions regarding cases of simultaneous tampering.

   The impact of simultaneous catalyst removal and of misfueling and/or air pump tampering is the same as stated in Table E-3a for catalyst removal alone.

   The impact of simultaneous misfueling and air pump tampering is the same as stated in Table 3a for misfueling alone.

E. Multiply tampering rate by tampering impact for each unique combination, and add the result for all combinations taking into account the sales split between the air pump only subgroup, the air pump/catalyst-equipped subgroup and the catalyst-only subgroup. Add to this the rate-times-impact result for PCV and evaporative tampering. The sum is the excess emissions due to the tampering and misfueling.

Composite excess emissions can be calculated by weighting each model year by its age based VMT fraction, also known as its travel fraction.

The method described above assumes that the user of the result of the calculation is interested in a situation in which vehicles are driven under standard conditions of temperature, speed, etc. All of the emission impacts shown in this document assume such a situation as well. It is possible to analyze other situations if correction factors for non-standard conditions are applied at an appropriate step in the calculation. MOBILE3 does this automatically.

E.3 Example Calculation

This example will calculate the excess emissions due to tampering and misfueling for the 1977 model year. We will assume that the vehicles are located in a non-I/M area, and we will use the national average tampering and misfueling rates described in Table E-1. We will evaluate all excess emissions for January 1, 1988.

On average, the 1977 model year is estimated to have accumulated 107,558 miles by January 1, 1988. Using this mileage and the rate equations from Table 1, the overall rates of tampering and misfueling can be estimated.

Table A

Example Calculation of Tampering and Misfueling Rates*

System	Rate Equations** Zero-Mi Level(A)	Increase/ 10K miles(B)	Rate at Eval.*** (107,558 mi (X))
Air Pump	-0.0271	0.02652	0.2581
Catalyst	-0.0195	0.01611	0.1538
Fuel Inlet	-0.0143	0.02022	0.2032
Other Misfueling	0.0165	0.00559	0.0766
Evaporative	-0.0048	0.00335	0.0312
PCV	-0.0002	0.00248	0.0265

* Non-I/M area LDGV
** From Table E-1
***Rate = A + B(X/10K)

These overall rates are then used to estimate the size of the 11 overlap categories. Category 12 represents untampered vehicles. These categories do not include PCV and evaporative canister tampering, which are addressed later in this section. For HC and CO excess emissions there are three technology types of interest; air pump only, catalyst only and air pump with catalyst.

Using the equations described in section (C), the 11 category sizes can be determined. These are presented in Table B. The category sizes for air pump only and catalyst only vehicles can be derived from the rates in Table E-1.

Table B

Example Calculation of Overlap Categories*

Overall Category	Category Description**	Equation***	Category Size at Evaluation
(1)	AIR/CAT	.066*AIR	.0170
(2)	AIR/INLET	.111*AIR	.0286
(3)	AIR/OTHER	.105*AIR	.0271
(4)	AIR/CAT/INLET	.238*CAT	.0366
(5)	AIR/CAT/OTHER	.032*CAT	.0049
(6)	CAT/INLET	.441*CAT	.0678
(7)	CAT/OTHER	.050*CAT	.0077
(8)	AIR	AIR-(1,2,3,4,5)	.1439
(9)	CAT	CAT-(1,4,5,6,7)	.0198
(10)	INLET	INLET-(2,4,6)	.0702
(11)	OTHER	OTHER-(3,5,7)	.0369

* Catalyst vehicles equipped with air pumps only
** AIR: Air Pump Disabled
CAT: Catalyst Removed
INLET: Misfueling by Enlarging Fuel Filler Inlet
OTHER: Other Misfueling
***Rates for AIR, CAT, INLET, and OTHER from Table A

The excess emissions from this model year (1977) can be estimated from the evaluation date estimates of tampering and misfueling rates from Table A. First, the emission impact of each of the categories must be determined. Since all of the 1977 model year vehicles use oxidation catalyst technology, the emission impact of air pump disablement, catalyst removal and misfueling can be taken directly from Table E-3a. For simplicity, only total HC emissions will be addressed in this example. It is assumed that the effect of catalyst removal supercedes all other tampering and misfueling effects, therefore the overlap categories 1, 4, 5, 6, 7, and 9 which all contain catalyst removal would experience the emission impact of air pump disablement. The overlap categories 2, 3, 10, and 11 which all contain misfueling but without catalyst removal would experience the emission impact of misfueling. Only category 8, which contains only air pump disablements, experiences the air pump disablement emission impact. These emission impact groups are summed in Table C.

The excess emissions due to tampering and misfueling are determined by multiplying the size of each emission impact group times the appropriate excess emission estimate. The three technology types are then weighted by their fleet fractions from Table E-2 and summed for the combined excess emissions from air pump, catalyst, and misfueling. This calculation is presented in Table C.

Table C

Example Calculation of Emission Impact

Technology Type	Emission Impact Groups	Overlap Categories	(A) Emission Impact Group Size	(B) Excess Total HC Emissions (gm/mi)	(C) Technology Fleet Fraction	Composite Emission Impact (A*B*C)
Air Pump With Catalyst	Air Pump Disabled	(8)	.1439	1.37	.20	.039
	Catalyst Removed	(1,4,5,6,7,9)	.1538	3.05	.20	.094
	Misfueled	(2,3,10,11)	.1628	2.47	.20	.080
Air Pump Only	Air Pump Disabled	(1-5,8)	.2581	1.37	.10	.035
Catalyst Only	Catalyst Removed	(1,4-7,9)	.1538	3.05	.65	.305
	Misfueled	(2,3,10,11)	.1628	2.47	.65	.261
			Total Emission Impact			0.814 gm/mi

PCV and evaporative canister tampering effects are assumed not to overlap with any of the other tampering and misfueling effects. As a result, the excess emissions due to these types of tampering can be determined by simply multiplying together the evaluation date rate estimated from Table A and the appropriate excess emissions and technology type fleet fraction from Tables E-2a, E-2b and E-3a. This calculation is presented below. This emission impact for PCV and evaporative canister tampering can be added directly to the emission impacts calculated for other forms of tampering and misfueling in Table C to give an overall impact from tampering and misfueling.

Table D

Example Calculation of Excess Emissions
from PCV and Evaporative Cannister Disablements

System	(A) Tampering Rate Fraction	(B) Excess Total HC Emissions (gm/mi)	(C) Tech. Fleet Size Factor	Composite Emission Impact (A)*(B)*(C)
PCV	.026	3.44	1.0	.089
Evap	.031	1.01	1.0	.031
				.12 gm/mi

F.4 Composite of All Model Years

Once an estimate of the excess emissions due to tampering and misfueling has been made for each of the last 19 model years, these estimates are weighted together by the vehicle mileage fraction contribution of each model year to the fleet mileage accumulation. The sum of the weighted excess estimates the composite vehicle excess emissions without an I/M program.

Table E-1

Assumed Tampering and Misfueling Rates*
Used in MOBILE3

Emission Control System	LDGV A (Zero Mile Rate)	LDGV B (Increase Per 10K Mile)	LDGT1, LDGT2 & HDGV A (Zero Mile Rate)	LDGT1, LDGT2 & HDGV B (Increase Per 10k Mile)
Non-I/M Areas				
Air Pump Disablements	-0.0271	0.02652	0.0489	0.02652
Catalyst Removal	-0.0195	0.01611	0.1353	0.01611
Fuel Inlet Tampering	-0.0143	0.02022	0.1101	0.02022
Other Misfueling	0.0165	0.00559	0.0696	0.00559
EGR System Disablements	-0.0006	0.02199	0.0502	0.02199
Evaporative Canister	-0.0048	0.00335	0.0377	0.00335
PCV System Disablements	-0.0002	0.00248	0.0308	0.00248
I/M Areas				
Air Pump Disablements	-0.0101	0.01111	-0.0100	0.01111
Catalyst Removal	-0.0011	0.00459	0.0332	0.00459
Fuel Inlet Tampering	-0.0077	0.01000	0.0470	0.01000
Other Misfueling	0.0382	-0.00211	0.0699	-0.00211
EGR System Disablements	-0.0006	0.02199	0.0502	0.02199
Evaporative Canister	-0.0048	0.00335	0.0377	0.00335
PCV System Disablements	-0.0002	0.00248	0.0308	0.00248

* All tampering and misfueling rates were estimated using the results of the FY82 EPA FOSD tampering survey. (EPA-330/1-83-001)

Tampering rate = A + BX, where X = mileage/10K

Table E-2a

Assumed Technology Distribution for
Estimating Number of Vehicles Affected by
Tampering and Misfueling in MOBILE3

Description	Model Years	Percent Equipped (%)			
		LDGV	LDGT1	LDGT2	HDGV
Air Pump	Pre-1968	0	0	0	0
	1968-1971	5	5	0	0
	1972	10	10	0	0
	1973-1974	30	30	0	0
	1975	45	40	0	0
	1976	40	40	0	0
	1977	30	30	0	0
	1978	30	30	0	0
	1979	30	50	50	0
	1980	65	50	50	0
	1981	85	50	50	0
	1982	70	50	50	0
	1983-1984	60	50	50	0
	1985-1986	40	50	50	0
	1987-2020	30	50	50	37
Oxidation Catalyst	Pre-1975	0	0	0	0
	1975	80	70	0	0
	1976	85	80	0	0
	1977	85	75	0	0
	1978	90	75	0	0
	1979	90	80	100	0
	1980	88	80	100	0
	1981	13	95	100	0
	1982	13	80	100	0
	1983	13	70	90	0
	1984-1986	0	60	60	0
	1987-2020	0	15	15	74
3-Way Catalyst	Pre-1980	0	0	0	0
	1980	7	0	0	0
	1981	87	5	0	0
	1982	87	0	0	0
	1983	87	30	10	0
	1984-1986	100	40	40	0
	1987-2020	100	85	85	0
EGR System	Pre-1973	0	0	0	0
	1973	80	80	30	0
	1974-1978	90	90	30	0
	1979	90	100	100	0
	1980	97	100	100	0
	1981-1983	90	100	100	0
	1984-1986	93	100	100	0
	1987-2020	90	100	100	100

Table E-2b

Assumed Technology Overlaps for
Estimating Number of Vehicles Affected by
Tampering and Misfueling in MOBILE3

		Percent Equipped (%)			
Description	Model Years	LDGV	LDGT1	LDGT2	HDGV
Air Pump with	Pre-1975	0	0	0	0
Oxidation or	1975-1976	30	30	0	0
3-Way Catalyst	1977	20	20	0	0
	1978	25	20	0	0
	1979	25	40	50	0
	1980	65	40	50	0
	1981	85	50	50	0
	1982	70	50	50	0
	1983-1984	60	50	50	0
	1985-1986	40	50	50	0
	1987-2020	30	50	50	37
EGR System with	Pre-1980	0	0	0	0
3-Way Catalyst	1980	7	0	0	0
	1981	85	5	0	0
	1982	85	20	0	0
	1983	85	30	10	0
	1984-1986	93	40	40	0
	1987-2020	90	85	85	0
Evaporative	Pre-1971	0	0	0	0
Canister	1971-1978	100	100	5	0
	1979-1984	100	100	100	0
	1985-2020	100	100	100	100
PCV System	Pre-1963	0	0	0	0
	1963-1967	0	0	0	0
	1968-2020	100	100	100	100

Table E-3a

Assumed Emission Impacts Due to
Tampering and Misfueling
Used in *MOBILE3*

(gm/mi) Description	Pollutant	Excess Emissions FTP	Bag 1	Bag 2	Bag 3
Air Pump	THC	1.37	1.80	1.37	1.04
Disablement	CO	30.61	34.67	33.90	21.28
(Oxidation Cat)					
Air Pump	THC	0.51	1.52	0.11	0.50
Disablement	CO	16.29	41.20	5.18	18.69
(3-Way Catalyst)					
Catalyst Removal	THC	3.05	2.31	3.40	2.95
(Oxidation Cat)	CO	28.01	41.40	28.97	16.06
Catalyst Removal	THC	1.68	1.48	1.89	1.44
(3-Way Catalyst)	CO	17.80	23.87	18.11	12.64
	NOx	2.16	1.66	2.27	2.34
Habitual	THC	2.47	2.30	2.57	2.40
Misfueling	CO	20.96	46.50	13.13	16.62
(Oxidation Cat)					
Habitual	THC	1.57	1.44	1.77	1.30
Misfueling	CO	11.30	14.49	11.32	8.86
(3-Way Catalyst)	NOx	0.76	0.76	0.66	0.95
EGR Disabled					
Pre-1975	NOx	1.21	1.40	0.96	1.54
3.1 Standard	NOx	3.31	3.82	2.63	4.21
2.0 Standard	NOx	3.48	4.11	2.68	4.53
1.0 Standard	NOx	1.23	1.36	1.19	1.21
EGR Disabled & 3-Way Catalyst Removed	NOx	3.39	3.02	3.46	3.55
EGR Disabled & 3-Way Catalyst Misfueled	NOx	1.99	2.12	1.85	2.16

Table E-3b

Assumed Emission Impacts Due to
Non-Exhaust Tampering
Used in MOBILE3

Description	Model Years	Excess Crankcase HC Emissions(g/mi) LDGV	LDGT1	LDGT2	HDGV
PCV System Disablements	Pre-1963	0.0	0.0	0.0	0.0
	1963-1967	3.80	3.80	0.0	0.0
	1968-1970	3.74	3.74	5.20	5.70
	1971-1974	3.51	3.51	4.88	5.70
	1975-1977	3.44	3.44	4.78	5.70
	1978-1979	3.29	3.29	4.57	5.70
	1980	2.83	2.83	3.93	5.70
	1981-1982	2.68	2.68	3.73	5.70
	1983-2020	2.49	2.49	3.46	5.70

Description	Model Years	Excess Hot Soak HC Emissions (grams) LDGV	LDGT1	LDGT2	HDGV
Evaporative Canister Disablements	Pre-1971	0.0	0.0	0.0	0.0
	1971	6.39	6.39	0.0	0.0
	1972-1977	18.77	18.77	0.0	0.0
	1978	10.85	10.85	0.0	0.0
	1979-1980	10.85	10.85	10.85	0.0
	1981	12.03	13.28	13.28	0.0
	1982	10.85	13.28	13.28	0.0
	1983	9.61	13.28	13.28	0.0
	1984	7.97	11.16	11.16	0.0
	1985	5.18	9.03	9.03	17.28
	1986	5.18	6.91	6.91	17.28
	1987	2.72	5.05	5.05	17.28
	1988-1989	2.72	2.72	2.72	17.28
	1990-2020	1.49	1.49	1.49	17.28

Description	Model Years	Excess Diurnal HC Emissions (grams) LDGV	LDGT1	LDGT2	HDGV
Evaporative Canister Disablements	Pre-1971	0.0	0.0	0.0	0.0
	1971	16.66	16.66	0.0	0.0
	1972-1977	11.92	11.92	0.0	0.0
	1978	16.04	16.04	0.0	0.0
	1979-1980	16.04	16.04	16.04	0.0
	1981-1984	10.79	10.79	10.79	0.0
	1985-2020	10.79	10.79	10.79	25.54

Appendix F

CALCULATION PROCEDURE FOR VMT VERSUS AGE DISTRIBUTION FOR HEAVY DUTY DIESEL TRUCKS

Four VMT vs. age distributions are used in MOBILE3 to estimate the VMT distribution for heavy duty diesel vehicles in any given calendar year. The four distributions are for four weight classes of diesel trucks: 2b, 3-5, 6, and 7-8. The distributions are shown in the first four columns of Table F-1.

The distributions are weighted together by the registration fractions for vehicles in each weight class to arrive at an overall heavy duty diesel mileage distribution for each calendar year. Table F-1 shows these registration fractions at the bottom of the column for calendar year 1982. The "weighted average" column shows the actual mileage distribution used for 1982. The estimated number of vehicles in each weight class for each calendar year are shown in Table F-2.

Table F-1

1982 Calendar Year VMT Example HDDV

Age	2B	3-5 (Light)	6 (Medium)	7-8 (Heavy)	Weighted* Average
	----------VMT Distributions----------				
1	18,352	45,544	53,370	82,288	78,209
2	16,946	39,671	46,901	78,984	71,134
3	15,648	34,558	41,190	68,328	64,701
4	14,449	30,092	36,206	62,263	58,857
5	13,342	26,213	31,812	56,737	53,543
6	12,320	22,834	27,948	51,700	48,711
7	11,376	19,898	24,556	47,111	44,318
8	10,504	17,332	21,575	42,930	40,325
9	9,700	15,098	18,956	39,119	36,692
10	8,956	13,152	16,655	35,647	33,389
11	8,270	11,456	14,632	32,483	30,385
12	7,637	9,979	12,856	29,599	27,652
13	7,052	8,693	11,296	26,972	25,167
14	6,511	7,572	9,925	24,578	22,906
15	6,012	6,596	8,719	22,396	20,849
16	5,552	5,746	7,661	20,408	18,978
17	5,126	5,005	6,728	18,597	17,275
18	4,734	4,360	5,913	16,946	15,726
19	4,371	3,798	5,196	15,442	14,316
20	4,036	3,308	4,565	14,071	13,033
% of Total HDDVs, 1982*	2.7%	0.5%	7.5%	89.3%	

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* The registration fractions for the four HDDV classes are calculated from the total registrations by class (Table F-2) divided by the overall HDDV registrations (last column of Table F-2).

Table F-2

Total HDDV Registrations by Class
for 1980 through 2000

Calendar Year	Total Registrations (in Millions)				
	Class 2B	3-5 (Light)	6 (Medium)	7-8 (Heavy)	Overall
1980	0.000	0.006	0.112	1.521	1.639
1981	0.000	0.006	0.124	1.581	1.711
1982	0.049	0.009	0.135	1.599	1.792
1983	0.104	0.013	0.141	1.592	1.850
1984	0.185	0.022	0.153	1.641	2.001
1985	0.274	0.037	0.166	1.719	2.196
1986	0.370	0.089	0.193	1.816	2.416
1987	0.475	0.071	0.185	1.927	2.658
1988	0.588	0.089	0.193	2.041	2.911
1989	0.707	0.106	0.201	2.151	3.165
1990	0.831	0.122	0.208	2.258	3.419
1991	0.960	0.137	0.215	2.362	3.674
1992	1.092	0.151	0.222	2.471	3.936
1993	1.225	0.165	0.229	2.581	4.200
1994	1.354	0.178	0.237	2.693	4.462
1995	1.480	0.190	0.245	2.807	4.772
1996	1.600	0.202	0.253	2.914	4.969
1997	1.712	0.212	0.261	3.015	5.200
1998	1.816	0.222	0.269	3.108	5.415
1999	1.912	0.230	0.276	3.194	5.612
2000	1.999	0.238	0.283	3.273	5.793

Appendix G

SAMPLE CALCULATION OF MOTOR VEHICLE EMISSIONS

This appendix presents the procedure for calculating emission factors in a step-by-step manner. Although most users of motor vehicle emission factors should rely on computerized calculations (such as MOBILE3), this sample calculation may prove useful to those becoming familiar with the methodologies presented in this document.

For this sample calculation, the light duty gasoline powered vehicle (LDGV) hydrocarbon emissions for January 1, 1988 are computed. An ambient temperature of 80°F is assumed. Although this HC calculation is only for the LDGVs, it is designed to give the user an understanding of the logical sequence of calculations. The emission factor calculation procedure of the other vehicle types follows the same logical sequence; however, the equations may differ.

An inventory of motor vehicle sources of hydrocarbon emissions should include emissions from the eight vehicle types. For each vehicle type the exhaust emission factors should be calculated with the equation presented in the corresponding chapter. The resultant exhaust emission factors multiplied by the fraction of vehicles-miles-traveled (VMT) for the respective vehicle types will sum to the average gram/mile exhaust emission levels from the entire highway mobile source fleet. For hydrocarbon emission estimates, the crankcase and evaporative HC emissions are calculated and added to the exhaust HC emissions estimates.

G.1 DATA REQUIREMENTS

Before determining what data are required, the user should review the conditions under which vehicles are tested in order to ascertain whether these conditions differ from the locality specific ambient temperature, average speeds, and vehicle operating modes (see Section .A.1 in each chapter).

The user should determine the following locality specific data:

1. Ambient temperature.

2. Fraction of January 1 travel, by model year, for each vehicle type (model year registration distributions and fleet annual mileage accumulation rates).

3. The VMT mix.

4. Percent of VMT in cold start and hot start operating modes for light duty vehicles, light duty trucks, and motorcycles.

5. The calendar year of study (January 1 of that year).

6. Any other data required to utilize additional (optional) correction factors.

G.2 DATA USED TO CALCULATE HC EMISSIONS

For this sample calculation, the following conditions are assumed:

1. Ambient temperature is 80°F.

2. National statistics on average fleet annual mileage accumulation rates and vehicle registration by model year are used.

3. The total hydrocarbon emissions (as opposed to nonmethane HC) are calculated for the speed of 30 mph.

4. The percentages of VMT in the cold start, stabilized, and hot start operating modes are assumed to be 40%, 30%, and 30% respectively, for light duty vehicles; both catalyst and non-catalyst.

5. The calendar year of study is 1988.

6. All other conditions are assumed to match the vehicle testing conditions.

G.3 CALCULATION OF EXHAUST EMISSION FACTORS

The equation to calculate the exhaust hydrocarbon emission factor for LDGVs is discussed in Chapter 1.

Since the air conditioning usage (ACCEipt), extra load (XLCFip), trailer towing (TWCFip), and humidity level for NOx (HCF) are assumed to match the basic test conditions, they are set equal to 1.0 (i.e., they have no effect on the calculations and may be disregarded).

G.3.1 Basic Exhaust Emission Levels (BER)

The basic exhaust emission levels for LDGVs are the emission levels per mile; assuming the basic test conditions. The HC emission levels on January 1, 1988 are listed in Table G-1 and will be used to calculate the exhaust HC emissions.

G.3.2 Operating-Mode/Temperature Correction Factor (OMTCF) and Speed Correction Factor (SALCHF)

Although the operating-mode/temperature correction factor can be calculated manually using the generalized equations in Chapter 1, MOBILE3

was used to generate the OMTCF values for a cold/stable/hot mix of 40%/30%/30%, and ambient temperature of 80°F. The appropriate OMTCF values are listed in Table G-1. Since the average speed in this example is 30 mph, speed factors are needed to correct emissions from 19.6 mph to 30 mph. These are shown in the column marked "SALHCF."

G.3.3 Tampering Offset (OMTTAM)

The effects of tampering on each model year's emission rate are estimated with OMTTAM. The tampering offset has already been corrected for temperature and operating mode, and then is added to the basic emission rate (BER) after BER has been corrected for operating mode and temperature (with OMTCF). The OMTTAM values in Table G-1 have already been corrected for operating mode and temperatures.

G.3.4 Travel Weighting Fractions (TF)

In order to calculate the fraction of annual travel by model year, the fraction of in-use vehicles by model year are weighted on the basis of annual rate of mileage accumulation. In many cases, locality specific data on automobile use and registration are readily available. Whenever possible, local data should be used. However, for purposes of this sample calculation, the national average fraction of annual travel (Appendix H) will be used. The TF values are also listed in Table G-1 and are used to weight the individual model year emission factors together to form a fleet number.

G.3.5 Calculated Exhaust Emission Factors

The final step in the calculation of the exhaust HC emission factor for LDGVs is to multiply the mean emission level by the operating mode/temperature correction factor, add the tampering offset, and then multiply by the speed correction factor and travel fraction. This procedure is shown in Table G-1. The emission factor is expressed in units of grams per vehicle mile traveled.

If the pollutant were CO or NOx, no further calculations would be needed to estimate the total exhaust emission factor. However, for HC emission estimates the additional calculations in Sections G.3.6 and G.3.7 need to be performed.

G.3.6 Crankcase and Evaporative HC Emission Levels (CCEVERT)

To calculate the crankcase and evaporative HC emission level, the model year hot soak (HS), diurnal (DI), and crankcase emissions (CC), plus the tampering offsets (TAMEVP 1,2,3) are required. Further, the fractions of annual travel by model year (TFin) are required (the same as in Section G.3.2).

The procedure for estimating evaporative and crankcase emissions is shown in Table G-2. The algorithm for estimating emissions for each model year is shown at the bottom of the table. The fleet emission factor is expressed in units of grams per vehicle mile traveled.

G.3.7 Total HC Emission Factors

Summing the emission factors from Sections G.3.5 and G.3.6 gives the total HC emission factor. For this example the total HC emission factor is 2.36 grams/mile (1.513 + 0.848).

Table G-1

CALCULATION OF EXHAUST HYDROCARBON EMISSION
FACTOR FOR LIGHT DUTY GASOLINE POWERED VEHICLES

Ambient Temperature 80°F, Avg. Route Speed 30 mph,
40% Cold Start/30% Hot Start,
January 1, 1988

Model Year(i)	BER	OMTCF	OMTTAM	SALHCF	TF	(BER*OMTCF+OMTTAM) *SALHCF*TF
1988	0.219	1.508	0.027	0.726	0.036	0.009
1987	0.315	1.429	0.042	0.726	0.137	0.049
1986	0.462	1.373	0.104	0.726	0.122	0.066
1985	0.602	1.346	0.165	0.726	0.109	0.077
1984	0.777	1.340	0.231	0.726	0.097	0.090
1983	0.867	1.341	0.314	0.726	0.085	0.092
1982	0.994	1.339	0.379	0.726	0.075	0.093
1981	1.135	1.344	0.449	0.726	0.064	0.091
1980	1.184	1.350	0.718	0.667	0.056	0.087
1979	3.518	1.150	0.726	0.680	0.048	0.156
1978	3.727	1.148	0.789	0.680	0.041	0.141
1977	3.925	1.147	0.815	0.717	0.034	0.129
1976	4.112	1.145	0.892	0.717	0.027	0.110
1975	4.288	1.144	0.918	0.717	0.021	0.089
1974	5.491	1.066	0.132	0.706	0.016	0.068
1973	5.590	1.065	0.139	0.706	0.011	0.048
1972	5.683	1.064	0.048	0.795	0.007	0.033
1971	8.249	1.063	0.025	0.798	0.005	0.033
1960	8.430	1.063	0.026	0.811	0.003	0.024
1969	8.215	1.058	0.0	0.781	0.004	0.028
				Exhaust HC =		1.513 g/mi

Table G-2

CALCULATION OF CRANKCASE AND EVAPORATIVE HYDROCARBON
EMISSION FACTOR FOR LIGHT DUTY GASOLINE POWERED VEHICLES

Calendar Year 1988

Model Year	HS	TAM1	DI	TAM2	CC	TAM3	TF	CCEVERT*TF
1988	2.050	0.0	9.310	0.0	0.0	0.001	0.036	0.018
1987	2.050	0.0	9.310	0.0	0.0	0.006	0.137	0.069
1986	2.500	0.013	9.310	0.027	0.0	0.014	0.122	0.068
1985	2.500	0.033	9.310	0.069	0.0	0.021	0.109	0.062
1984	3.010	0.080	9.310	0.109	0.0	0.028	0.097	0.061
1983	3.310	0.130	9.310	0.146	0.0	0.034	0.085	0.058
1982	3.540	0.182	9.310	0.181	0.0	0.043	0.075	0.053
1981	3.750	0.239	9.310	0.215	0.0	0.050	0.064	0.048
1980	3.980	0.248	9.310	0.366	0.0	0.058	0.056	0.044
1979	3.980	0.277	9.310	0.410	0.0	0.075	0.048	0.039
1978	3.980	0.306	9.310	0.452	0.0	0.081	0.041	0.033
1977	12.320	0.575	23.530	0.365	0.0	0.091	0.034	0.072
1976	12.320	0.618	23.530	0.393	0.0	0.097	0.027	0.058
1975	12.320	0.659	23.530	0.419	0.0	0.102	0.021	0.046
1974	12.320	0.698	23.530	0.443	0.0	0.110	0.016	0.035
1973	12.320	0.735	23.530	0.467	0.0	0.115	0.011	0.024
1972	12.320	0.769	23.530	0.489	0.0	0.120	0.007	0.015
1971	16.150	0.273	38.580	0.712	0.0	0.124	0.005	0.014
1960	22.450	0.0	47.990	0.0	0.0	0.137	0.003	0.013
1969	22.450	0.0	47.990	0.0	0.0	0.0	0.004	0.016
						Evaporative HC	=	0.848

CCEVERT=(((HS+TAM1)*TPD+(DI+TAM2))/MPD)+(CC+TAM3)
TPD=3.05 and MPD=31.1 for LDGVs

Appendix H

HIGHWAY MOBILE SOURCE EMISSION FACTOR TABLES

All of the emission factor tables for each region and vehicle type are given within this appendix. Each emission factor table has a three digit identification table number. The table numbers have the following format:

R.VT.#

where

R indicates the region code
- 1 = Low altitude non-California
- 2 = High altitude non-California

VT indicates the vehicle type
- 1 = LDGV
- 2 = LDGT1
- 3 = LDGT2
- 4 = HDGV
- 5 = LDDV
- 6 = LDDT
- 7 = HDDV
- 8 = MC

# indicates which of the 16 types of table are referenced.

In addition to this coding scheme for the table numbers, the table titles include the information so that no confusion can arise. Table H-1 gives a summary of every table and table number for each region. There is a total of 100 tables for each of the two regions presented in this appendix.

Table H-1

SUMMARY OF THE EMISSION FACTOR TABLE NUMBERS
FOR EACH REGION BY VEHICLE TYPE AND TABLE TYPE

	Vehicle Type Code "VT"							
	.1	.2	.3	.4	.5	.6	.7	.8
Table Code "#" Description	LDGV	LDGT1	LDGT2	HDGV	LDDV	LDDT	HDDV	MC
Untampered Basic Exhaust Emissions	R.1.1A	R.2.1A	R.3.1A	R.4.1A	R.5.1	R.6.1	R.7.1	R.8.1A
Actual Exhaust Emissions at Various Mileage Intervals	R.1.1B	R.2.1B	R.3.1B	R.4.1B	---	---	---	---
Untampered Crankcase & Evap. HC Emissions	R.1.1C	R.2.1C	R.3.1C	R.4.1C	--	--	--	R.8.1C
Total Crankcase & Evap HC at Various Mileage Intervals	R.1.1D	R.2.1D	R.3.1D	R.4.1D	---	---	---	---
Basic HC Emission Levels	R.1.2A	R.2.2A	R.3.2A	R.4.2A	R.5.2A	R.6.2A	R.7.2A	R.8.2A
Basic CO Emission Levels	R.1.2B	R.2.2B	R.3.2B	R.4.2B	R.5.2B	R.6.2B	R.7.2B	R.8.2B
Basic NOx Emission Levels	R.1.2C	R.2.2C	R.3.2C	R.4.2C	R.5.2C	R.6.2C	R.7.2C	R.8.2C
Idle Emissions	R.1.3	R.2.3	R.3.3	R.4.3	R.5.3	R.6.3	R.7.3	R.8.3
Registration & Mileage Information	R.1.4	R.2.4	R.3.4	R.4.4	R.5.4	R.6.4	R.7.4	R.8.4
Example Travel Weighting Fractions	R.1.5	R.2.5	R.3.5	R.4.5	R.5.5	R.6.5	R.7.5	R.8.5
Speed Correction Factor Coefficients	R.1.6	R.2.6	R.3.6	R.4.6	R.5.6	R.6.6	R.7.6	R.8.6
Temperature Correction Factor Coefficients	R.1.7A	R.2.7A	R.3.7A	R.4.7				R.8.7A
Normalized Bag Fractions	R.1.7B	R.2.7B	R.3.7B	--	R.5.7B	R.6.7B	--	R.8.7B
Air Conditioning Correction Factor Coefficients	R.1.8A	R.2.8A	R.3.8A	--	--	--	--	--
Air Conditioning Fleet Sizes	R.1.8B	R.2.8B	R.3.8B	--	--	--	--	--
Extra Load Correction Factors	R.1.9	R.2.9	R.3.9	--	--	--	--	--
Trailer Towing Correction Factors	R.1.10	R.2.10	R.3.10	--	--	--	--	--

Region Code "R": 1 = Low altitude non-California
2 = High altitude non-California

TABLE 1.1.1A

EXHAUST EMISSION RATES FOR
LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED VEHICLES
(RATES REFLECT ZERO TAMPERING)

* BER = ZML + (DR * M)

Pol	Model Years	Zero Mile Emission Level (Grams/Mile)	Deterioration Rate (Gm/Mi/10K Mi)	50,000 Mile Emission Level (Grams/Mile)
HC	Pre-1968	7.25	0.18	8.15
	1968-1969	4.43	0.25	5.68
	1970-1971	3.00	0.37	4.85
	1972-1974	3.36	0.17	4.21
	1975-1979	1.07	0.27	2.42
	1980	0.36	0 10	0.86
	1981	0.25	0.12	0.85
	1982	0.22	0.12	0.82
	1983	0.21	0.12	0.81
	1984	0.20	0.13	0.85
	1985-1989	0.20	0.12	0.80
	1990+	0.20	0.11	0.75
CO	Pre-1968	78.27	2.25	89.52
	1968-1969	56.34	2.55	69.09
	1970-1971	42.17	3.13	57.82
	1972-1974	40.78	2.44	52.98
	1975-1979	18.23	2.59	31.18
	1980	6.09	0.73	9.74
	1981	2.13	1.90	11.63
	1982	1.09	1.91	10.64
	1983	1.09	1.90	10.59
	1984	0.99	2.07	11.34
	1985-1986	1.04	1.96	10.84
	1987-1989	1.11	1.87	10.46
	1990+	1.14	1.82	10.24
NOx	Pre-1968	3.44	0.0	3.44
	1968-1972	4.35	0.0	4.35
	1973-1974	2.87	0.04	3.07
	1975-1976	2.44	0.03	2.59
	1977-1979	1.70	0.09	2.15
	1980	1.50	0.07	1.85
	1981	0.59	0.08	0.99
	1982	0.63	0 08	1.03
	1983	0.56	0.08	0.96
	1984	0.53	0 09	0.98
	1985-1986	0.53	0 09	0.98
	1987-1989	0.53	0.10	1 03
	1990+	0.53	0.10	1.03

* WHERE : BER = Basic emission rate (untampered)
ZML = Zero mile level
DR = Deterioration rate
M = Cumulative mileage / 10,000

DATE : MAY 25, 1985

TABLE 1.1.1B

EXHAUST EMISSION RATES FOR
LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED VEHICLES
AT VARIOUS MILEAGE INTERVALS
(RATES INCLUDE TAMPERING)

Pol	Model Years	Emission Rate (Grams/Mile) 0K	20K	40K	60K	80K	100K	120K	140K
HC	Pre-1968	7.25	7.61	7.97	8.33	8.69	9.05	9.40	9.76
	1968-1969	4.43	4.94	5.44	5.95	6.46	6.97	7.47	7.98
	1970-1971	3.00	3.74	4.48	5.22	5.96	6.70	7.44	8.18
	1972	3.36	3.70	4.05	4.39	4.74	5.09	5.43	5.78
	1973-1974	3.36	3.71	4.07	4.43	4.79	5.15	5.51	5.87
	1975	1.10	1.74	2.43	3.13	3.82	4.52	5.21	5.91
	1976	1.10	1.75	2.44	3.14	3.84	4.54	5.24	5.94
	1977	1.10	1.74	2.44	3.13	3.83	4.53	5.22	5.92
	1978-1979	1.11	1.75	2.45	3.15	3.86	4.56	5.26	5.96
	1980	0.40	0.71	1.09	1.47	1.84	2.22	2.60	2.98
	1981	0.28	0.60	0.96	1.32	1.68	2.04	2.40	2.76
	1982	0.25	0.56	0.92	1.28	1.64	2.00	2.36	2.72
	1983	0.24	0.55	0.91	1.27	1.62	1.98	2.34	2.69
	1984	0.23	0.56	0.92	1.29	1.65	2.02	2.38	2.75
	1985-1986	0.23	0.53	0.88	1.22	1.56	1.90	2.25	2.59
	1987-1989	0.23	0.53	0.87	1.22	1.56	1.90	2.24	2.58
	1990+	0.23	0.51	0.83	1.16	1.48	1.80	2.12	2.44
CO	Pre-1968	78.26	82.72	87.17	91.63	96.09	100.55	105.01	109.47
	1968-1969	56.34	61.42	66.55	71.68	76.80	81.93	87.06	92.19
	1970-1971	42.17	48.47	54.81	61.15	67.49	73.83	80.17	86.51
	1972	40.78	45.76	50.82	55.88	60.94	65.99	71.05	76.11
	1973-1974	40.78	45.92	51.30	56.69	62.07	67.45	72.84	78.22
	1975	18.51	24.70	31.57	38.44	45.31	52.18	59.05	65.92
	1976	18.53	24.72	31.58	38.45	45.31	52.17	59.03	65.90
	1977	18.53	24.67	31.45	38.22	44.99	51.76	58.54	65.31
	1978-1979	18.54	24.72	31.53	38.34	45.15	51.96	58.77	65.58
	1980	6.42	9.03	12.41	15.79	19.17	22.54	25.92	29.30
	1981	2.34	6.96	12.18	17.39	22.60	27.81	33.02	38.24
	1982	1.30	5.90	11.05	16.20	21.35	26.51	31.66	36.81
	1983	1.30	5.85	10.93	16.00	21.08	26.16	31.23	36.31
	1984	1.18	6.00	11.31	16.62	21.93	27.23	32.54	37.85
	1985-1986	1.23	5.78	10.78	15.77	20.76	25.75	30.74	35.73
	1987-1989	1.30	5.65	10.42	15.18	19.95	24.71	29.48	34.24
	1990+	1.33	5.58	10.24	14.91	19.57	24.23	28.90	33.56
NOx	Pre-1968	3.44	3.44	3.44	3.44	3.44	3.44	3.44	3.44
	1968-1972	4.35	4.35	4.35	4.34	4.34	4.34	4.34	4.34
	1973	2.87	2.99	3.11	3.24	3.36	3.48	3.60	3.73
	1974	2.87	3.00	3.13	3.25	3.38	3.51	3.64	3.76
	1975-1976	2.44	2.63	2.82	3.01	3.20	3.39	3.58	3.77
	1977-1979	1.70	2.02	2.34	2.66	2.97	3.29	3.61	3.93
	1980	1.50	1.79	2.07	2.36	2.65	2.94	3.23	3.52
	1981	0.60	0.85	1.13	1.41	1.69	1.97	2.25	2.53
	1982	0.64	0.89	1.17	1.45	1.73	2.01	2.29	2.57
	1983	0.57	0.82	1.10	1.38	1.66	1.94	2.22	2.50
	1984	0.54	0.82	1.14	1.46	1.78	2.10	2.42	2.74
	1985-1986	0.54	0.82	1.14	1.46	1.78	2.10	2.42	2.74
	1987-1989	0.54	0.84	1.18	1.52	1.86	2.20	2.53	2.87
	1990+	0.54	0.84	1.18	1.52	1.86	2.20	2.53	2.87

DATE : MAY 25, 1985

TABLE 1.1.1C

CRANKCASE AND EVAPORATIVE HYDROCARBON EMISSIONS
FOR LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED VEHICLES
(RATES REFLECT ZERO TAMPERING)

** CCEV = (HSK * TPD + DNL)/MPD + CC

Model Years	SHED Hot Soak Emissions (Gm/Trip)	Trips* Per Day	SHED Diurnal Emissions (Gm/Day)	Miles* Per Day	Crankcase Emissions (Gm/Mile)	Total Crankcase and Evap. Emissions (Gm/Mile)
Pre-1963	22.45	3.05	47.99	31.10	4.10	7.84
1963-1967	22.45	3.05	47.99	31.10	0.80	4.54
1968-1970	22.45	3.05	47.99	31.10	0.0	3.74
1971	16.15	3.05	38.58	31.10	0.0	2.82
1972-1977	12.32	3.05	23.53	31.10	0.0	1.96
1978-1980	3.98	3.05	9.31	31.10	0.0	0.69
1981	3.75	3.05	9.31	31.10	0.0	0.67
1982	3.54	3.05	9.31	31.10	0.0	0.65
1983	3.31	3.05	9.31	31.10	0.0	0.62
1984	3.01	3.05	9.31	31.10	0.0	0.59
1985-1986	2.50	3.05	9.31	31.10	0.0	0.54
1987-1989	2.05	3.05	9.31	31.10	0.0	0.50
1990+	1.82	3.05	9.31	31.10	0.0	0.48

* Default information that may be altered by the MOBILE3 user with information about the local area.

** WHERE :

CCEV = Total untampered crankcase & evaporative HC emissions (Gm/Mile)
HSK = Hot soak emissions (Gm/Trip)
TPD = Trips per day
DNL = Diurnal emissions (Gm/Day)
MPD = Miles per day
CC = Crankcase emissions (Gm/Mile)

DATE : MAY 25, 1985

TABLE 1.1.1D

TOTAL CRANKCASE AND EVAPORATIVE HC EMISSIONS
FOR LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED VEHICLES
AT VARIOUS MILEAGE INTERVALS
(RATES INCLUDE TAMPERING)

Model Years	Emission Rate (Grams/Mile) 0K	20K	40K	60K	80K	100K	120K	140K
Pre-1963	7.84	7.84	7.84	7.84	7.84	7.84	7.84	7.84
1963-1967	4.54	4.54	4.54	4.54	4.54	4.54	4.54	4.54
1968-1970	3.75	3.76	3.78	3.80	3.82	3.84	3.86	3.88
1971	2.83	2.84	2.87	2.90	2.92	2.95	2.97	3.00
1972-1974	1.97	1.99	2.02	2.05	2.08	2.12	2.15	2.18
1975-1977	1.97	1.99	2.02	2.05	2.08	2.11	2.15	2.18
1978-1979	0.69	0.71	0.74	0.76	0.79	0.82	0.84	0.87
1980	0.69	0.71	0.73	0.76	0.78	0.81	0.83	0.86
1981	0.67	0.68	0.71	0.73	0.75	0.78	0.80	0.82
1982	0.65	0.66	0.69	0.71	0.73	0.75	0.78	0.80
1983	0.62	0.64	0.66	0.68	0.70	0.72	0.74	0.77
1984	0.60	0.61	0.63	0.65	0.67	0.69	0.71	0.73
1985-1986	0.55	0.56	0.58	0.60	0.61	0.63	0.65	0.67
1987-1989	0.50	0.51	0.53	0.55	0.56	0.58	0.60	0.61
1990+	0.48	0.49	0.51	0.52	0.54	0.55	0.57	0.59

DATE : MAY 25, 1985

TABLE 1.1.2A

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED VEHICLES
TOTAL HC (INCLUDES EVAP & CRANKCASE)

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	17.9	1962	17.9	1963	14.6	1964	14.6	1965	14.6	1966	14.6	1967	14.6	1968	12.1	1969	12.1	1970	12.6	1971	11.6	1972	8.1
1962	17.8	1963	14.5	1964	14.5	1965	14.5	1966	14.5	1967	14.5	1968	12.0	1969	12.0	1970	12.4	1971	11.5	1972	8.1	1973	8.1
1963	14.4	1964	14.4	1965	14.4	1966	14.4	1967	14.4	1968	11.9	1969	11.9	1970	12.2	1971	11.3	1972	8.0	1973	8.0	1974	8.0
1964	14.3	1965	14.3	1966	14.3	1967	14.3	1968	11.8	1969	11.8	1970	12.0	1971	11.1	1972	7.9	1973	7.9	1974	7.9	1975	6.9
1965	14.2	1966	14.2	1967	14.2	1968	11.6	1969	11.6	1970	11.8	1971	10.9	1972	7.8	1973	7.8	1974	7.8	1975	6.8	1976	6.8
1966	14.1	1967	14.1	1968	11.5	1969	11.5	1970	11.6	1971	10.7	1972	7.7	1973	7.7	1974	7.7	1975	6.6	1976	6.6	1977	6.6
1967	14.0	1968	11.3	1969	11.3	1970	11.4	1971	10.4	1972	7.6	1973	7.6	1974	7.6	1975	6.5	1976	6.5	1977	6.5	1978	5.2
1968	11.2	1969	11.2	1970	11.1	1971	10.2	1972	7.5	1973	7.5	1974	7.5	1975	6.3	1976	6.3	1977	6.3	1978	5.0	1979	5.0
1969	11.0	1970	10.9	1971	9.9	1972	7.4	1973	7.4	1974	7.4	1975	6.1	1976	6.1	1977	6.1	1978	4.8	1979	4.8	1980	2.3
1970	10.6	1971	9.7	1972	7.2	1973	7.2	1974	7.2	1975	5.9	1976	5.9	1977	5.9	1978	4.6	1979	4.6	1980	2.2	1981	2.3
1971	9.4	1972	7.1	1973	7.1	1974	7.1	1975	5.7	1976	5.7	1977	5.7	1978	4.4	1979	4.4	1980	2.2	1981	2.2	1982	2.1
1972	7.0	1973	7.0	1974	7.0	1975	5.5	1976	5.5	1977	5.5	1978	4.2	1979	4.2	1980	2.1	1981	2.1	1982	2.0	1983	2.0
1973	6.8	1974	6.8	1975	5.2	1976	5.2	1977	5.2	1978	4.0	1979	4.0	1980	2.0	1981	2.0	1982	1.9	1983	1.9	1984	1.9
1974	6.6	1975	5.0	1976	5.0	1977	5.0	1978	3.7	1979	3.7	1980	1.9	1981	1.9	1982	1.8	1983	1.8	1984	1.8	1985	1.6
1975	4.7	1976	4.7	1977	4.7	1978	3.4	1979	3.4	1980	1.8	1981	1.8	1982	1.7	1983	1.7	1984	1.6	1985	1.5	1986	1.5
1976	4.4	1977	4.4	1978	3.2	1979	3.2	1980	1.7	1981	1.6	1982	1.6	1983	1.5	1984	1.5	1985	1.4	1986	1.4	1987	1.4
1977	4.1	1978	2.9	1979	2.9	1980	1.6	1981	1.5	1982	1.4	1983	1.4	1984	1.4	1985	1.3	1986	1.3	1987	1.2	1988	1.2
1978	2.6	1979	2.6	1980	1.5	1981	1.4	1982	1.3	1983	1.3	1984	1.2	1985	1.1	1986	1.1	1987	1.1	1988	1.1	1989	1.1
1979	2.2	1980	1.3	1981	1.2	1982	1.2	1983	1.1	1984	1.0	1985	1.0	1986	1.0	1987	0.9	1988	0.9	1989	0.9	1990	0.9
1980	1.3	1981	1.1	1982	1.1	1983	1.0	1984	0.9	1985	0.9	1986	0.9	1987	0.8	1988	0.8	1989	0.8	1990	0.8	1991	0.8

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	8.1	1974	8.1	1975	7.3	1976	7.3	1977	7.3	1978	6.1	1979	6.1	1980	2.8	1981	2.9	1982	2.9	1983	2.8	1984	2.9
1974	8.1	1975	7.2	1976	7.2	1977	7.2	1978	5.9	1979	5.9	1980	2.7	1981	2.9	1982	2.8	1983	2.8	1984	2.8	1985	2.6
1975	7.1	1976	7.1	1977	7.1	1978	5.8	1979	5.8	1980	2.7	1981	2.8	1982	2.7	1983	2.7	1984	2.8	1985	2.6	1986	2.6
1976	6.9	1977	6.9	1978	5.7	1979	5.7	1980	2.6	1981	2.7	1982	2.7	1983	2.6	1984	2.7	1985	2.5	1986	2.5	1987	2.5
1977	6.8	1978	5.5	1979	5.5	1980	2.6	1981	2.7	1982	2.6	1983	2.6	1984	2.6	1985	2.4	1986	2.4	1987	2.4	1988	2.4
1978	5.4	1979	5.4	1980	2.5	1981	2.6	1982	2.5	1983	2.5	1984	2.6	1985	2.4	1986	2.4	1987	2.3	1988	2.3	1989	2.3
1979	5.2	1980	2.4	1981	2.5	1982	2.5	1983	2.4	1984	2.5	1985	2.3	1986	2.3	1987	2.3	1988	2.3	1989	2.3	1990	2.1
1980	2.4	1981	2.5	1982	2.4	1983	2.4	1984	2.4	1985	2.2	1986	2.2	1987	2.2	1988	2.2	1989	2.2	1990	2.0	1991	2.0
1981	2.4	1982	2.3	1983	2.3	1984	2.3	1985	2.1	1986	2.1	1987	2.1	1988	2.1	1989	2.1	1990	1.9	1991	1.9	1992	1.9
1982	2.2	1983	2.2	1984	2.2	1985	2.0	1986	2.0	1987	2.0	1988	2.0	1989	2.0	1990	1.9	1991	1.9	1992	1.9	1993	1.9
1983	2.1	1984	2.1	1985	2.0	1986	2.0	1987	1.9	1988	1.9	1989	1.9	1990	1.8	1991	1.8	1992	1.8	1993	1.8	1994	1.8
1984	2.0	1985	1.9	1986	1.9	1987	1.8	1988	1.8	1989	1.8	1990	1.7	1991	1.7	1992	1.7	1993	1.7	1994	1.7	1995	1.7
1985	1.7	1986	1.7	1987	1.7	1988	1.7	1989	1.7	1990	1.6	1991	1.6	1992	1.6	1993	1.6	1994	1.6	1995	1.6	1996	1.6
1986	1.6	1987	1.6	1988	1.6	1989	1.6	1990	1.5	1991	1.5	1992	1.5	1993	1.5	1994	1.5	1995	1.5	1996	1.5	1997	1.5
1987	1.5	1988	1.5	1989	1.5	1990	1.4	1991	1.4	1992	1.4	1993	1.4	1994	1.4	1995	1.4	1996	1.4	1997	1.4	1998	1.4
1988	1.4	1989	1.4	1990	1.3	1991	1.3	1992	1.3	1993	1.3	1994	1.3	1995	1.3	1996	1.3	1997	1.3	1998	1.3	1999	1.3
1989	1.2	1990	1.1	1991	1.1	1992	1.1	1993	1.1	1994	1.1	1995	1.1	1996	1.1	1997	1.1	1998	1.1	1999	1.1	2000	1.1
1990	1.0	1991	1.0	1992	1.0	1993	1.0	1994	1.0	1995	1.0	1996	1.0	1997	1.0	1998	1.0	1999	1.0	2000	1.0	2001	1.0
1991	0.9	1992	0.9	1993	0.9	1994	0.9	1995	0.9	1996	0.9	1997	0.9	1998	0.9	1999	0.9	2000	0.9	2001	0.9	2002	0.9
1992	0.8	1993	0.8	1994	0.8	1995	0.8	1996	0.8	1997	0.8	1998	0.8	1999	0.8	2000	0.8	2001	0.8	2002	0.8	2003	0.8

*MY Indicates the model year

**E Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1.1.4.

TABLE 1.1.2B

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED VEHICLES
CO

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	111.8	1962	111.8	1963	111.8	1964	111.8	1965	111.8	1966	111.8	1967	111.8	1968	94.5	1969	94.5	1970	89.2	1971	89.2	1972	77.4
1962	110.8	1963	110.8	1964	110.8	1965	110.8	1966	110.8	1967	110.8	1968	93.4	1969	93.4	1970	87.7	1971	87.7	1972	76.3	1973	76.3
1963	109.7	1964	109.7	1965	109.7	1966	109 7	1967	109.7	1968	92.1	1969	92.1	1970	86.2	1971	86.2	1972	75.1	1973	75.1	1974	75 1
1964	108.5	1965	108.5	1966	108.5	1967	108.5	1968	90.8	1969	90.8	1970	84.6	1971	84.6	1972	73.8	1973	73.8	1974	73.8	1975	53.4
1965	107.3	1966	107.3	1967	107.3	1968	89 4	1969	89.4	1970	82.9	1971	82.9	1972	72.5	1973	72.5	1974	72.5	1975	52.0	1976	52.0
1966	106.0	1967	106.0	1968	87.9	1969	87.9	1970	81.1	1971	81.1	1972	71.1	1973	71.1	1974	71.1	1975	50.5	1976	50.5	1977	50.5
1967	104.6	1968	86.4	1969	86.4	1970	79 1	1971	79.1	1972	69 6	1973	69.6	1974	69.6	1975	48.9	1976	48.9	1977	48.9	1978	48.9
1968	84.7	1969	84.7	1970	77.1	1971	77.1	1972	68 0	1973	68.0	1974	68.0	1975	47.2	1976	47.2	1977	47.2	1978	47.2	1979	47.2
1969	82.9	1970	74.9	1971	74.9	1972	66.3	1973	66.3	1974	66 3	1975	45.4	1976	45.4	1977	45.4	1978	45.4	1979	45.4	1980	13.7
1970	72.7	1971	72.7	1972	64.5	1973	64.5	1974	64.5	1975	43.5	1976	43.5	1977	43.5	1978	43.5	1979	43.5	1980	13.2	1981	20.7
1971	70.2	1972	62.6	1973	62.6	1974	62.6	1975	41.5	1976	41.5	1977	41.5	1978	41.5	1979	41.5	1980	12.7	1981	19.3	1982	18.3
1972	60.6	1973	60.6	1974	60.6	1975	39.4	1976	39 4	1977	39.4	1978	39.4	1979	39 4	1980	12.1	1981	17.7	1982	16.8	1983	16.7
1973	58.5	1974	58.5	1975	37.2	1976	37.2	1977	37.2	1978	37.2	1979	37.2	1980	11.4	1981	16.1	1982	15.1	1983	15.0	1984	16 2
1974	56 3	1975	34.8	1976	34.8	1977	34.8	1978	34.8	1979	34.8	1980	10.8	1981	14.3	1982	13.4	1983	13.3	1984	14.3	1985	13 6
1975	32.3	1976	32.3	1977	32.3	1978	32.3	1979	32.3	1980	10 0	1981	12.5	1982	11.5	1983	11.4	1984	12.3	1985	11.7	1986	11.7
1976	29.6	1977	29.6	1978	29.6	1979	29.6	1980	9.3	1981	10.5	1982	9.5	1983	9.5	1984	10.1	1985	9.7	1986	9.7	1987	9.4
1977	26.8	1978	26.8	1979	26.8	1980	8.5	1981	8.5	1982	7.5	1983	7.4	1984	7.9	1985	7.6	1986	7.6	1987	7.3	1988	7.3
1978	23.8	1979	23.8	1980	7.7	1981	6.3	1982	5 2	1983	5 2	1984	5.5	1985	5.3	1986	5.3	1987	5.2	1988	5.2	1989	5.2
1979	20.6	1980	6.8	1981	3.9	1982	2.9	1983	2.9	1984	3.0	1985	2.9	1986	2.9	1987	2.9	1988	2.9	1989	2.9	1990	2.9
1980	6.2	1981	2.4	1982	1.4	1983	1 4	1984	1.3	1985	1.3	1986	1.3	1987	1.4	1988	1.4	1989	1.4	1990	1.4	1991	1.4

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	77.4	1974	77.4	1975	57 2	1976	57.2	1977	57 2	1978	57.2	1979	57.2	1980	17.1	1981	30.8	1982	29.9	1983	29.7	1984	32.2
1974	76.3	1975	56.0	1976	56.0	1977	56 0	1978	56 0	1979	56.0	1980	16.7	1981	29.9	1982	29.0	1983	28.8	1984	31.2	1985	29.7
1975	54.7	1976	54.7	1977	54.7	1978	54.7	1979	54.7	1980	16.4	1981	29.0	1982	28.1	1983	27.9	1984	30.2	1985	28.7	1986	28.7
1976	53.4	1977	53.4	1978	53.4	1979	53 4	1980	16.0	1981	28.0	1982	27.1	1983	26.9	1984	29.2	1985	27.7	1986	27.7	1987	26.6
1977	52.0	1978	52.0	1979	52.0	1980	15.6	1981	26.9	1982	26 0	1983	25.9	1984	28.0	1985	26.6	1986	26.6	1987	25.5	1988	25.5
1978	50.5	1979	50.5	1980	15.2	1981	25 8	1982	24 9	1983	24 8	1984	26.8	1985	25.5	1986	25.5	1987	24.4	1988	24.4	1989	24 4
1979	48.9	1980	14.7	1981	24.7	1982	23.8	1983	23.6	1984	25.6	1985	24.3	1986	24.3	1987	23.3	1988	23.3	1989	23.3	1990	22.7
1980	14.3	1981	23 4	1982	22.5	1983	22.4	1984	24.2	1985	23.0	1986	23.0	1987	22.1	1988	22.1	1989	22.1	1990	21.5	1991	21.5
1981	22.1	1982	21.2	1983	21.1	1984	22.8	1985	21 7	1986	21.7	1987	20.8	1988	20.8	1989	20.8	1990	20.3	1991	20.3	1992	20.3
1982	19.8	1983	19.7	1984	21.3	1985	20.2	1986	20.2	1987	19.4	1988	19.4	1989	19.4	1990	19.0	1991	19.0	1992	19.0	1993	19.0
1983	18.2	1984	19.7	1985	18.7	1986	18.7	1987	18.0	1988	18.0	1989	18.0	1990	17.6	1991	17.6	1992	17.6	1993	17.6	1994	17.6
1984	18.0	1985	17.1	1986	17.1	1987	16.5	1988	16.5	1989	16.5	1990	16.1	1991	16.1	1992	16.1	1993	16.1	1994	16.1	1995	16.1
1985	15.4	1986	15.4	1987	14.8	1988	14.8	1989	14.8	1990	14.5	1991	14.5	1992	14.5	1993	14.5	1994	14.5	1995	14.5	1996	14.5
1986	13.6	1987	13.1	1988	13.1	1989	13.1	1990	12.8	1991	12.8	1992	12.8	1993	12.8	1994	12.8	1995	12.8	1996	12.8	1997	12.8
1987	11.3	1988	11.3	1989	11.3	1990	11.1	1991	11.1	1992	11.1	1993	11.1	1994	11.1	1995	11.1	1996	11.1	1997	11.1	1998	11.1
1988	9.4	1989	9.4	1990	9.2	1991	9.2	1992	9.2	1993	9.2	1994	9.2	1995	9.2	1996	9.2	1997	9.2	1998	9.2	1999	9.2
1989	7.3	1990	7.2	1991	7.2	1992	7.2	1993	7 2	1994	7.2	1995	7.2	1996	7.2	1997	7.2	1998	7.2	1999	7.2	2000	7.2
1990	5.1	1991	5.1	1992	5.1	1993	5.1	1994	5.1	1995	5.1	1996	5.1	1997	5.1	1998	5.1	1999	5.1	2000	5.1	2001	5.1
1991	2.9	1992	2.9	1993	2.9	1994	2.9	1995	2.9	1996	2 9	1997	2.9	1998	2.9	1999	2.9	2000	2.9	2001	2.9	2002	2.9
1992	1.4	1993	1.4	1994	1.4	1995	1.4	1996	1.4	1997	1.4	1998	1.4	1999	1.4	2000	1.4	2001	1.4	2002	1.4	2003	1.4

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1.1.4

TABLE 1.1.2C

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR LOW ALTITUDE LIGHT DUTY GASOLINE POWERED VEHICLES NOx

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	3.4	1962	3.4	1963	3.4	1964	3.4	1965	3.4	1966	3.4	1967	3.4	1968	4.3	1969	4.3	1970	4.3	1971	4.3	1972	4.3
1962	3.4	1963	3.4	1964	3.4	1965	3.4	1966	3.4	1967	3.4	1968	4.3	1969	4.3	1970	4.3	1971	4.3	1972	4.3	1973	3.4
1963	3.4	1964	3.4	1965	3.4	1966	3.4	1967	3.4	1968	4.3	1969	4.3	1970	4.3	1971	4.3	1972	4.3	1973	3.4	1974	3.4
1964	3.4	1965	3.4	1966	3.4	1967	3.4	1968	4.3	1969	4.3	1970	4.3	1971	4.3	1972	4.3	1973	3.4	1974	3.4	1975	2.8
1965	3.4	1966	3.4	1967	3.4	1968	4.3	1969	4.3	1970	4.3	1971	4.3	1972	4.3	1973	3.4	1974	3.4	1975	2.8	1976	2.8
1966	3.4	1967	3.4	1968	4.3	1969	4.3	1970	4.3	1971	4.3	1972	4.3	1973	3.4	1974	3.4	1975	2.8	1976	2.8	1977	2.8
1967	3.4	1968	4.3	1969	4.3	1970	4.3	1971	4.3	1972	4.3	1973	3.3	1974	3.3	1975	2.8	1976	2.8	1977	2.8	1978	2.8
1968	4.3	1969	4.3	1970	4.3	1971	4.3	1972	4.3	1973	3.3	1974	3.3	1975	2.8	1976	2.8	1977	2.7	1978	2.7	1979	2.7
1969	4.3	1970	4.3	1971	4.3	1972	4.3	1973	3.3	1974	3.3	1975	2.7	1976	2.7	1977	2.6	1978	2.6	1979	2.6	1980	2.2
1970	4.3	1971	4.3	1972	4.3	1973	3.3	1974	3.3	1975	2.7	1976	2.7	1977	2.6	1978	2.6	1979	2.6	1980	2.2	1981	1.4
1971	4.3	1972	4.3	1973	3.2	1974	3.2	1975	2.7	1976	2.7	1977	2.5	1978	2.5	1979	2.5	1980	2.1	1981	1.3	1982	1.4
1972	4.3	1973	3.2	1974	3.2	1975	2.7	1976	2.7	1977	2.4	1978	2.4	1979	2.4	1980	2.1	1981	1.2	1982	1.3	1983	1.2
1973	3.2	1974	3.2	1975	2.7	1976	2.7	1977	2.4	1978	2.4	1979	2.4	1980	2.0	1981	1.2	1982	1.2	1983	1.1	1984	1.2
1974	3.1	1975	2.6	1976	2.6	1977	2.3	1978	2.3	1979	2.3	1980	1.9	1981	1.1	1982	1.1	1983	1.1	1984	1.1	1985	1.1
1975	2.6	1976	2.6	1977	2.2	1978	2.2	1979	2.2	1980	1.9	1981	1.0	1982	1.1	1983	1.0	1984	1.0	1985	1.0	1986	1.0
1976	2.6	1977	2.1	1978	2.1	1979	2.1	1980	1.8	1981	0.9	1982	1.0	1983	0.9	1984	0.9	1985	0.9	1986	0.9	1987	1.0
1977	2.0	1978	2.0	1979	2.0	1980	1.7	1981	0.9	1982	0.9	1983	0.8	1984	0.8	1985	0.8	1986	0.8	1987	0.9	1988	0.9
1978	1.9	1979	1.9	1980	1.6	1981	0.8	1982	0.8	1983	0.7	1984	0.7	1985	0.7	1986	0.7	1987	0.7	1988	0.7	1989	0.7
1979	1.8	1980	1.6	1981	0.7	1982	0.7	1983	0.6	1984	0.6	1985	0.6	1986	0.6	1987	0.6	1988	0.6	1989	0.6	1990	0.6
1980	1.5	1981	0.6	1982	0.6	1983	0.6	1984	0.5	1985	0.5	1986	0.5	1987	0.5	1988	0.5	1989	0.5	1990	0.5	1991	0.5

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	3.5	1974	3.5	1975	2.9	1976	2.9	1977	3.1	1978	3.1	1979	3.1	1980	2.6	1981	1.8	1982	1.8	1983	1.8	1984	1.9
1974	3.4	1975	2.9	1976	2.9	1977	3.0	1978	3.0	1979	3.0	1980	2.5	1981	1.8	1982	1.8	1983	1.7	1984	1.8	1985	1.8
1975	2.9	1976	2.9	1977	3.0	1978	3.0	1979	3.0	1980	2.5	1981	1.7	1982	1.8	1983	1.7	1984	1.8	1985	1.8	1986	1.8
1976	2.8	1977	2.9	1978	2.9	1979	2.9	1980	2.4	1981	1.7	1982	1.7	1983	1.6	1984	1.8	1985	1.8	1986	1.8	1987	1.9
1977	2.9	1978	2.9	1979	2.9	1980	2.4	1981	1.6	1982	1.7	1983	1.6	1984	1.7	1985	1.7	1986	1.7	1987	1.8	1988	1.8
1978	2.8	1979	2.8	1980	2.4	1981	1.6	1982	1.6	1983	1.6	1984	1.7	1985	1.7	1986	1.7	1987	1.8	1988	1.8	1989	1.8
1979	2.8	1980	2.3	1981	1.5	1982	1.6	1983	1.5	1984	1.6	1985	1.6	1986	1.6	1987	1.7	1988	1.7	1989	1.7	1990	1.7
1980	2.3	1981	1.5	1982	1.5	1983	1.5	1984	1.5	1985	1.5	1986	1.5	1987	1.7	1988	1.7	1989	1.7	1990	1.7	1991	1.7
1981	1.4	1982	1.5	1983	1.4	1984	1.5	1985	1.5	1986	1.5	1987	1.6	1988	1.6	1989	1.6	1990	1.6	1991	1.6	1992	1.6
1982	1.4	1983	1.3	1984	1.4	1985	1.4	1986	1.4	1987	1.5	1988	1.5	1989	1.5	1990	1.5	1991	1.5	1992	1.5	1993	1.5
1983	1.3	1984	1.3	1985	1.3	1986	1.3	1987	1.4	1988	1.4	1989	1.4	1990	1.4	1991	1.4	1992	1.4	1993	1.4	1994	1.4
1984	1.3	1985	1.3	1986	1.3	1987	1.3	1988	1.3	1989	1.3	1990	1.3	1991	1.3	1992	1.3	1993	1.3	1994	1.3	1995	1.3
1985	1.2	1986	1.2	1987	1.3	1988	1.3	1989	1.3	1990	1.3	1991	1.3	1992	1.3	1993	1.3	1994	1.3	1995	1.3	1996	1.3
1986	1.1	1987	1.2	1988	1.2	1989	1.2	1990	1.2	1991	1.2	1992	1.2	1993	1.2	1994	1.2	1995	1.2	1996	1.2	1997	1.2
1987	1.1	1988	1.1	1989	1.1	1990	1.1	1991	1.1	1992	1.1	1993	1.1	1994	1.1	1995	1.1	1996	1.1	1997	1.1	1998	1.1
1988	1.0	1989	1.0	1990	1.0	1991	1.0	1992	1.0	1993	1.0	1994	1.0	1995	1.0	1996	1.0	1997	1.0	1998	1.0	1999	1.0
1989	0.9	1990	0.9	1991	0.9	1992	0.9	1993	0.9	1994	0.9	1995	0.9	1996	0.9	1997	0.9	1998	0.9	1999	0.9	2000	0.9
1990	0.7	1991	0.7	1992	0.7	1993	0.7	1994	0.7	1995	0.7	1996	0.7	1997	0.7	1998	0.7	1999	0.7	2000	0.7	2001	0.7
1991	0.6	1992	0.6	1993	0.6	1994	0.6	1995	0.6	1996	0.6	1997	0.6	1998	0.6	1999	0.6	2000	0.6	2001	0.6	2002	0.6
1992	0.5	1993	0.5	1994	0.5	1995	0.5	1996	0.5	1997	0.5	1998	0.5	1999	0.5	2000	0.5	2001	0.5	2002	0.5	2003	0.5

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1.1.4.

TABLE 1.1.3

IDLE EMISSION RATES FOR
LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED VEHICLES

* IER = ZML + (DR * M)

Pol	Model Years	Zero Mile Emission Level (Grams/Min.)	Deterioration Rate (Gm/Min/10K Mi)
HC	Pre-1968	1.32	0.03
	1968-1969	1.07	0.06
	1970-1971	0.54	0.07
	1972-1974	0.72	0.07
	1975-1979	0.30	0.07
	1980	0.07	0.04
	1981	0.09	0.04
	1982	0.09	0.04
	1983	0.09	0.04
	1984	0.09	0.04
	1985-1989	0.09	0.04
	1990+	0.09	0.04
CO	Pre-1968	13.76	0.40
	1968-1969	13.99	0.63
	1970-1971	11.84	0.88
	1972-1974	12.66	0.76
	1975-1979	6.00	0.85
	1980	1.83	0.85
	1981	1.63	0.82
	1982	1.55	0.81
	1983	1.48	0.82
	1984	1.48	0.82
	1985-1986	1.48	0.82
	1987-1989	1.48	0.82
	1990+	1.48	0.82
NOx	Pre-1968	0.09	0.0
	1968-1972	0.17	0.0
	1973-1974	0.14	0.0
	1975-1976	0.26	0.0
	1977-1979	0.18	0.01
	1980	0.17	0.01
	1981	0.08	0.01
	1982	0.08	0 01
	1983	0.08	0.01
	1984	0.08	0.01
	1985-1986	0.08	0.01
	1987-1989	0 08	0.01
	1990+	0.08	0.01

* WHERE : IER = Idle emission rate
ZML = Zero mile level
DR = Deterioration Rate
M = Cumulative Mileage / 10,000

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TABLE 1.1.4

REGISTRATION MIX AND
MILEAGE ACCUMULATION RATES FOR
LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED VEHICLES

Model Year Index**	July 1 Registration Mix*	Mileage Accumulation Rate per vehicle*	Jan 1 Registration Mix	Jan 1 Mileage Accumulation Rate (fleet)	Jan 1 Mileage Accumulation (fleet)
1	0.080	12818.	0.027	12818.	1602.
2	0.101	12102.	0.101	12639.	9591.
3	0.095	11427.	0.095	11933.	21873.
4	0.089	10789.	0.089	11267.	33470.
5	0.083	10187.	0.083	10638.	44420.
6	0.077	9619.	0.077	10045.	54758.
7	0.071	9082.	0.071	9485.	64520.
8	0.065	8575.	0.065	8955.	73738.
9	0.059	8096.	0.059	8455.	82440.
10	0.053	7645.	0.053	7983.	90657.
11	0.047	7218.	0.047	7538.	98415.
12	0.041	6815.	0.041	7117.	105740.
13	0.035	6435.	0.035	6720.	112657.
14	0.029	6076.	0.029	6345.	119187.
15	0.023	5737.	0.023	5991.	125354.
16	0.017	5416.	0.017	5657.	131176.
17	0.011	5114.	0.011	5340.	136673.
18	0.008	4829.	0.008	5043.	141863.
19	0.006	4559.	0.006	4761.	146763.
20+	0.008	4305.	0.008	4495.	151390.

* Default information that may be altered by the MOBILE3 user with information about the local area.

** The indices refer to the most recent model year vehicles in any given calendar year. Index 1 references the newest model year vehicles and index 20+ references the oldest model year vehicles.

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TABLE 1.1.5

EXAMPLE TRAVEL WEIGHTING FRACTION CALCULATION FOR
LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED VEHICLES
JANUARY 1, 1988

Model Years	(A) LDV Fleet Registration	(B) Sales Fraction	(A*B)	(C=A*B/DAF) LDGV Registration	(D) Annual Mileage Accrual Rate	(C*D)	(C*D/TFNORM) Travel Fractions
1988	0.027	0.910	0.024	0.027	12818.	345.4	0.036
1987	0.101	0.920	0.093	0.103	12639.	1304.3	0.137
1986	0.095	0.923	0.088	0.097	11933.	1162.1	0.122
1985	0.089	0.934	0.083	0.092	11267.	1040.2	0.109
1984	0.083	0.940	0.078	0.087	10638.	921.8	0.097
1983	0.077	0.947	0.073	0.081	10045.	813.5	0.085
1982	0.071	0.954	0.068	0.075	9485.	713.5	0.075
1981	0.065	0.939	0.061	0.068	8955.	607.0	0.064
1980	0.059	0.966	0.057	0.063	8455.	535.2	0.056
1979	0.053	0.972	0.052	0.057	7983.	456.7	0.048
1978	0.047	0.991	0.047	0.052	7538.	389.9	0.041
1977	0.041	0.996	0.041	0.045	7117.	322.8	0.034
1976	0.035	0.997	0.035	0.039	6720.	260.4	0.027
1975	0.029	0.997	0.029	0.032	6345.	203.7	0.021
1974	0.023	1.000	0.023	0.026	5991.	153.0	0.016
1973	0.017	1.000	0.017	0.019	5657.	106.8	0.011
1972	0.011	1.000	0.011	0.012	5340.	65.2	0.007
1971	0.008	1.000	0.008	0.009	5043.	44.8	0.005
1970	0.006	1.000	0.006	0.007	4761.	31.7	0.003
1969-	0.008	1.000	0.008	0.009	4495.	39.9	0.004
		DAF:	0.902		TFNORM:	9518.0	

WHERE :

A = January 1 registration mix from Table 1.1.4.
B = Fleet sales fractions
D = Sales weighted fleet mileage accumulation rate from Table 1.1.4, adjusted to January 1
D(1) = Annual Miles(1)
D(MY1) = .25*(Annual Miles(MY1)) + .75*(Annual Miles(MY1-1)), MY1=2,...,20+

NOTE : In general, the travel weighting fractions will change for every calendar year since the sales fraction (column B) changes for almost every model year.

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TABLE 1.1.6

SPEED CORRECTION FACTOR COEFFICIENTS FOR LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED VEHICLES

$$* \; SCF(s,sadj) = SF(s)/SF(sadj)$$

$$SF(s) = EXP(A + B*s + C*s^2 + D*S^3 + E*s^4 + F*s^5), \text{ HC \& CO}$$
$$= A + B*s + C*s^2 + D*s^3 + E*s^4 + F*s^5, \text{ NOx, Pre-1978}$$
$$= EXP(A + B*s + C*s^2 + D*s^3 + E*s^4 + F*s^5), \text{ NOx, 1978+}$$

Pollutant and Model Years	A	B	C	D	E	F
HC						
Pre-1968	0.231026E+01	-0.289572E+00	0.152990E-01	-0.446689E-03	0.648183E-05	-0.363456E-07
1968	0.239726E+01	-0.299985E+00	0.161351E-01	-0.487491E-03	0.729093E-05	-0.419769E-07
1969	0.240873E+01	-0.308187E+00	0.168168E-01	-0.506843E-03	0.753855E-05	-0.431596E-07
1970	0.223217E+01	-0.284985E+00	0.153833E-01	-0.456738E-03	0.673486E-05	-0.383798E-07
1971	0.225223E+01	-0.287778E+00	0.156820E-01	-0.473179E-03	0.707954E-05	-0.408456E-07
1972	0.234948E+01	-0.304959E+00	0.168416E-01	-0.509623E-03	0.759516E-05	-0.434963E-07
1973-1974	0.268382E+01	-0.344633E+00	0.195417E-01	-0.625720E-03	0.978442E-05	-0.583369E-07
1975-1977	0.239540E+01	-0.335781E+00	0.211609E-01	-0.731550E-03	0.120715E-04	-0.748566E-07
1978-1979	0.121545E+01	-0.707633E-01	0.446460E-03	0.0	0.0	0.0
1980	0.144386E+01	-0.880857E-01	0.735680E-03	0.0	0.0	0.0
1981+	0.984090E+00	-0.567319E-01	0.332820E-03	0.0	0.0	0.0
CO						
Pre-1968	0.233989E+01	-0.296978E+00	0.160071E-01	-0.477396E-03	0.706752E-05	-0.403978E-07
1968	0.246551E+01	-0.305023E+00	0.160497E-01	-0.473969E-03	0.699075E-05	-0.399758E-07
1969	0.277804E+01	-0.319130E+00	0.153183E-01	-0.422327E-03	0.584948E-05	-0.314969E-07
1970	0.278899E+01	-0.327107E+00	0.162943E-01	-0.467573E-03	0.671906E-05	-0.374401E-07
1971	0.270743E+01	-0.331038E+00	0.176179E-01	-0.538583E-03	0.817402E-05	-0.477803E-07
1972	0.268454E+01	-0.332817E+00	0.176277E-01	-0.524123E-03	0.772221E-05	-0.437025E-07
1973-1974	0.283929E+01	-0.368756E+00	0.210782E-01	-0.676438E-03	0.106267E-04	-0.636405E-07
1975-1977	0.248747E+01	-0.391562E+00	0.270721E-01	-0.976178E-03	0.165270E-04	-0.104317E-06
1978-1979	0.116177E+01	-0.592737E-01	0.0	0.0	0.0	0.0
1980	0.881952E+00	-0.449976E-01	0.0	0.0	0.0	0.0
1981+	0.858419E+00	-0.437969E-01	0.0	0.0	0.0	0.0
NOx						
Pre-1968	0.168635E+01	-0.118303E+00	0.654975E-02	-0.137139E-03	0.100849E-05	0.0
1968	0.122677E+01	-0.444978E-01	0.262476E-02	-0.567150E-04	0.434293E-06	0.0
1969	0.101743E+01	-0.118958E-01	0.914365E-03	-0.215740E-04	0.182300E-06	0.0
1970	0.987600E+00	-0.195674E-01	0.169645E-02	-0.404000E-04	0.328001E-06	0.0
1971	0.115917E+01	-0.444536E-01	0.296425E-02	-0.668990E-04	0.522365E-06	0.0
1972	0.128169E+01	-0.804874E-01	0.535735E-02	-0.118891E-03	0.901060E-06	0.0
1973-1974	0.783838E+00	0.328549E-03	0.106029E-02	-0.319350E-04	0.290389E-06	0.0
1975-1977	0.942131E+00	-0.423240E-01	0.386253E-02	-0.939853E-04	0.753883E-06	0.0
1978-1979	0.308282E+00	-0.230362E-01	0.372830E-03	0.0	0.0	0.0
1980	0.295046E+00	-0.236333E-01	0.437750E-03	0.0	0.0	0.0
1981+	0.386041E+00	-0.262961E-01	0.336740E-03	0.0	0.0	0.0

* WHERE : s = average speed (mph)
sadj = basic test procedure speed; adjusted for fraction of cold start operation x and fraction of hot start operation w, [1/sadj = (w+x)/26 + (1-w-x)/16]

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TABLE 1 1.7A

TEMPERATURE CORRECTION FACTOR COEFFICIENTS FOR
LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED VEHICLES

* TCF(b) = EXP(TC(b) * (T - 75.0))

Pol	Model Years	Test segment 1 TC Low	Test segment 1 TC High	Test segment 2 TC Low	Test segment 2 TC High	Test segment 3 TC Low	Test segment 3 TC High
HC	Pre-1968	-0 20623E-01	-0.14381E-01	-0.24032E-02	0.13219E-02	-0.10081E-02	0.34799E-02
	1968-1969	-0.24462E-01	-0.12552E-01	-0.32017E-02	0.42667E-02	-0.86884E-03	0.75843E-02
	1970-1971	-0.21255E-01	-0.10888E-01	-0 52755E-03	-0.47925E-03	0.93659E-03	0.76666E-02
	1972-1974	-0 21427E-01	-0.66107E-02	-0 39442E-03	0 26288E-02	0.49731E-02	0.12320E-01
	1975-1979	-0.23517E-01	-0.14095E-01	-0.88057E-02	0 26179E-01	-0.16222E-02	0.24297E-01
	1980	-0 27793E-01	-0.14095E-01	-0 10177E-01	0.26179E-01	-0.82680E-02	0.24297E-01
	1981+	-0.33883E-01	0.11959E-01	-0.10113E-01	-0.12627E-04	-0.80650E-02	0.78765E-02
CO	Pre-1968	-0.13487E-01	-0.14691E-01	0.15784E-02	0.37462E-02	0.11097E-02	0.11014E-01
	1968-1969	-0.21126E-01	-0.38767E-01	-0 15289E-02	0.84685E-02	0.15749E-02	0.25179E-01
	1970-1971	-0.20843E-01	-0.21165E-01	-0.59951E-02	0.23603E-01	0 18253E-02	0.28483E-01
	1972-1974	-0.19091E-01	-0.13146E-01	-0.42373E-03	0.24717E-01	0.57982E-02	0.25848E-01
	1975-1979	-0.24835E-01	-0.19612E-01	-0.88336E-02	0 48537E-01	-0.11553E-02	0.31439E-01
	1980	see NOTE 2	-0 19612E-01	-0.17783E-01	0.48537E-01	-0.10871E-01	0 31439E-01
	1981+	see NOTE 2	-0.12596E-01	-0 18813E-01	0.13861E-01	-0.11951E-01	0.96939E-02
NOx	Pre-1968	-0.16897E-03	0.38841E-02	-0 89245E-02	-0.87325E-02	-0.72580E-02	-0.10839E-01
	1968-1972	-0.25074E-03	-0.10389E-02	-0.59791E-02	-0 92466E-02	-0.62690E-02	-0.10108E-01
	1973-1974	0.38855E-02	-0.18301E-01	-0.24156E-02	-0.10925E-01	-0.21188E-02	-0.18042E-01
	1975-1976	-0.45504E-04	-0.71420E-02	-0.12575E-02	-0.87910E-02	-0.53153E-03	-0.75470E-02
	1977-1979	-0.76044E-02	-0 26153E-01	-0.68045E-02	-0.18603E-01	-0.54198E-02	-0.20878E-01
	1980	-0 30110E-02	-0 26153E-01	-0 67130E-02	-0.18603E-01	-0.45310E-02	-0.20878E-01
	1981+	-0.53710E-02	-0 34416E-01	-0.65050E-02	-0.35871E-01	-0.85650E-02	-0.28830E-01

* WHERE :

TCF(b) = Temperature correction factor for appropriate pollutant, ambient temperature, and model year; for test segment b
T = Ambient temperature (Fahrenheit)
TC(b) = Temperature correction factor coefficient for appropriate pollutant, reference temperature and model year; for test segment b
75.0 = Reference temperature

NOTE 1 : The temperature correction factor is used in conjunction with the Ripstwxn correction factor given in Table 1.1.7B.

NOTE 2 : Offset model used for Bag 1 CO. Offset = -1.3812*(T - 75.0).

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TABLE 1.1.7B

NORMALIZED BAG FRACTIONS FOR
LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED VEHICLES

Pol	Model Years	Normalized Fractions: Test Seg.#1 B1	Test Seg.#1 D1	Test Seg.#2 B2	Test Seg.#2 D2	Test Seg.#3 B3	Test Seg.#3 D3	Total Test B0	Total Test D0
HC	Pre-1968	1.282	0.025	0.973	0.028	0.839	0.019	1.000	0.025
	1968-1969	1.345	0.074	0.946	0.054	0.842	0.048	1.000	0.056
	1970-1971	1.345	0.178	0.919	0.118	0.894	0.093	1.000	0.124
	1972-1974	1.398	0.060	0.885	0.055	0.919	0.036	1.000	0 051
	1975-1979	1.856	0.345	0.765	0.233	0.802	0.196	1.000	0.246
	1980	2.200	0.714	0.571	0.171	0.914	0.143	1.000	0.274
	1981	2.654	0.960	0.383	0.375	0.929	0.310	1 000	0.478
	1982	2.609	1.101	0.387	0.435	0.957	0.365	1.000	0.553
	1983	2.613	1.097	0.384	0.443	0.958	0.367	1.000	0.557
	1984	2.603	1.285	0.372	0.529	0.989	0.417	1.000	0.654
	1985-1986	2.617	1.173	0.371	0.510	0.981	0.404	1.000	0.618
	1987-1989	2.634	1.104	0.368	0.499	0.973	0.391	1.000	0.594
	1990+	2.639	1.051	0.368	0.489	0.969	0.385	1.000	0.577
CO	Pre-1968	1.277	0.033	1.017	0.029	0.758	0.025	1.000	0.029
	1968-1969	1.442	0.071	0.996	0.042	0.674	0.033	1.000	0.046
	1970-1971	1.553	0.109	0.933	0.079	0.711	0.038	1.000	0.074
	1972-1974	1.573	0.054	0.902	0.079	0.755	0.029	1.000	0.060
	1975-1979	1.792	0.177	0.882	0.157	0.628	0.109	1.000	0.148
	1980	2.403	0.278	0.649	0.061	0.621	0.076	1.000	0.110
	1981	3.724	1.325	0.0	0.792	0.853	0.659	1.000	0.865
	1982	3.854	2.041	0.0	1.152	0.755	1.010	1.000	1.296
	1983	3.865	2.030	0.0	1.153	0.746	1.007	1.000	1.294
	1984	3.959	2.285	0.0	1.351	0.675	1.163	1.000	1.492
	1985-1986	3.946	2.124	0.0	1.254	0.686	1.081	1.000	1.386
	1987-1989	3.941	2.009	0.0	1 186	0.689	1.014	1.000	1.308
	1990+	3.935	1.940	0.0	1.144	0.694	0.979	1.000	1.263
NOx	Pre-1968	1.121	0.009	0.785	0.001	1.319	-0.009	1 000	0.0
	1968-1972	1.199	-0.004	0.793	-0.002	1 245	0.006	1.000	0.0
	1973-1974	1.262	0.022	0.770	0.004	1.242	0.027	1 000	0.014
	1975-1976	1.297	0.012	0.781	0.004	1.194	0.016	1.000	0.009
	1977-1979	1.371	0.040	0.766	0.046	1.166	0.063	1.000	0.049
	1980	1.313	0.047	0.810	0.034	1 125	0.054	1.000	0.042
	1981	1.752	0.129	0.737	0.123	0.935	0.173	1.000	0.138
	1982	1.652	0.121	0.768	0.115	0.951	0.162	1 000	0.129
	1983	1.725	0.137	0.728	0.129	0.973	0.183	1 000	0.145
	1984	1.817	0.167	0.707	0.148	0.942	0.219	1.000	0.172
	1985-1986	1.818	0.167	0.707	0.148	0.942	0.219	1 000	0.172
	1987-1989	1 830	0.169	0.703	0.149	0.939	0.222	1.000	0.173
	1990+	1 830	0.169	0.704	0 149	0 939	0.222	1.000	0.173

NOTE : The fractions given in this table are used in the calculation of the operating-mode/ temperature correction factor (OMTCF)

WHERE :

```
OMTCF   = ((TERM1 + TERM2 + TERM3)/DENOM)
TERM1   =    W   *TCF(1)*(B1+D1*M)
TERM2   = (1-W-X)*TCF(2)*(B2+D2*M)
TERM3   =    X   *TCF(3)*(B3+D3*M)
DENOM   = BO + DO*M
 W      = Fraction of VMT in the cold start mode
 X      = Fraction of VMT in the  hot start mode
TCF(b)  = Temperature correction factor for pollutant, model
          year; for test segment b
 M      = Cumulative mileage / 10,000
```

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TABLE 1.1.8A

AIR CONDITIONING CORRECTION FACTOR COEFFICIENTS FOR
LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED VEHICLES

* ACCF= U*V*(A + B*(T-75) -1) + 1

Model	HC		CO		NOx	
Years	A	B	A	B	A	B
Pre-1975	0.1023E+01	0.3344E-02	0.1202E+01	0.1808E-02	0.1299E+01	0.5643E-04
1975+	0.1000E+01	0.3512E-02	0.1130E+01	0.1528E-02	0.1221E+01	0.4262E-03

* WHERE :

ACCF = Air Conditioning Correction Factor
V = Fraction of vehicles which are equipped with AC given in Table 1.1.8B
U = Fraction of vehicles with AC that are using it = (DI-DILO)/(DIHI-DI), 0<=U<=1
DI = Discomfort index = (DB+WB)*.4+15
DILO = The highest discomfort index where no AC is used
DIHI = The lowest discomfort index where all vehicles with AC use it
DB = Dry bulb temperature (Fahrenheit)
WB = Wet bulb temperature (Fahrenheit)
T = Ambient temperature (Fahrenheit)

TABLE 1.1.8B

ESTIMATED FRACTION OF
LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED VEHICLES
EQUIPPED WITH AIR CONDITIONING

Model Years	Fraction Equipped With Air Conditioning
Pre-1962	0.07
1962-1964	0.14
1965-1966	0.24
1967-1968	0.37
1969-1971	0.51
1972-1976	0.61
1977+	0.72

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TABLE 1.1.9

EXTRA LOAD CORRECTION FACTOR COEFFICIENTS
FOR LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED VEHICLES

* XLCF = (XLC-1)*U + 1

Model Years	Coefficients (XLC) HC	CO	NOx
Pre-1968	1.0786	1.2765	0.9535
1968-1969	1.0495	1.1384	1.0313
1970-1971	1.0852	1.2478	1.0313
1972	1.0556	1.1347	1.0313
1973-1974	1.0556	1.1347	1.0753
1975+	1.0455	1.3058	1.0719

* WHERE :

XLCF = Extra load correction factor
U = Fraction of VMT with an extra load
XLC = Correction factor coefficient

TABLE 1.1.10

TRAILER TOWING CORRECTION FACTOR COEFFICIENTS
FOR LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED VEHICLES

* TTCF = (TTC-1)*U + 1

Model Years	Coefficients (TTC) HC	CO	NOx
Pre-1968	1.2614	1.9327	1.1184
1968-1969	1.2762	1.8940	1.1384
1970-1971	1.4598	2.4753	1.1384
1972	1.7288	2.1414	1.1384
1973-1974	1.7288	2.1414	1.2170
1975+	1.5909	3.9722	1.3875

* WHERE :

TTCF = Trailer towing correction factor
U = Fraction of VMT towing a trailer
TTC = Correction factor coefficient

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TABLE 1.2.1A

EXHAUST EMISSION RATES FOR
LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS I
(RATES REFLECT ZERO TAMPERING)

* BER = ZML + (DR * M)

Pol	Model Years	Zero Mile Emission Level (Grams/Mile)	Deterioration Rate (Gm/Mi/10K Mi)	50,000 Mile Emission Level (Grams/Mile)
HC	Pre-1968	7.25	0.18	8.15
	1968-1969	4.43	0.25	5.68
	1970-1971	3.00	0.37	4.85
	1972-1974	3.36	0.17	4.21
	1975-1978	1.80	0.27	3.15
	1979-1980	0.92	0.27	2.27
	1981-1983	0.92	0.19	1.87
	1984	0.58	0.13	1.23
	1985-1986	0.45	0.07	0.80
	1987+	0.51	0.06	0.81
CO	Pre-1968	78.27	2.25	89.52
	1968-1969	56.34	2.55	69.09
	1970-1971	42.17	3.13	57.82
	1972-1974	40.78	2.44	52.98
	1975-1978	24.55	2.59	37.50
	1979-1980	13.67	2.59	26.62
	1981	13.67	1.13	19.32
	1982-1983	13.67	1.13	19.32
	1984	7.41	0.98	12.31
	1985-1986	6.43	0.49	8.88
	1987+	5.60	0.93	10.25
NOx	Pre-1968	3.44	0.0	3.44
	1968-1972	4.35	0.0	4.35
	1973-1974	2.87	0.04	3.07
	1975-1978	2.70	0.03	2.85
	1979-1983	1.74	0.09	2.19
	1984	1.74	0.09	2.19
	1985-1986	1.74	0.04	1.94
	1987+	0.86	0.04	1.06

* WHERE : BER = Basic emission rate (untampered)
ZML = Zero mile level
DR = Deterioration rate
M = Cumulative mileage / 10,000

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TABLE 1.2.1B

EXHAUST EMISSION RATES FOR
LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS I
AT VARIOUS MILEAGE INTERVALS
(RATES INCLUDE TAMPERING)

Pol	Model Years	Emission Rate (Grams/Mile) 0K	20K	40K	60K	80K	100K	120K	140K
HC	Pre-1968	7.25	7.61	7.97	8.33	8.69	9.05	9.40	9.76
	1968-1969	4.43	4.94	5.45	5.96	6.46	6.97	7.48	7.99
	1970-1971	3.00	3.74	4.48	5.23	5.97	6.71	7.45	8.19
	1972	3.37	3.71	4.06	4.41	4.75	5.10	5.44	5.79
	1973-1974	3.38	3.74	4.10	4.46	4.82	5.18	5.54	5.91
	1975	2.23	2.92	3.60	4.28	4 97	5.65	6.33	7.02
	1976	2.29	2.99	3.69	4.39	5.09	5.79	6.49	7.19
	1977-1978	2.26	2.95	3.64	4.33	5.01	5.70	6.39	7.08
	1979-1980	1.41	2.11	2.81	3.52	4.22	4.92	5.63	6.33
	1981	1.51	2.08	2.64	3.21	3.78	4.35	4.91	5.48
	1982	1.47	2.03	2.58	3.14	3.69	4.25	4.80	5.36
	1983	1.45	1.99	2.54	3.09	3.63	4.18	4.73	5.27
	1984	1.08	1.48	1.88	2.29	2.69	3.09	3.50	3.90
	1985-1986	0.95	1.23	1.52	1.81	2.10	2.38	2.67	2.96
	1987+	0.90	1.13	1.37	1.61	1.84	2.08	2.32	2.55
CO	Pre-1968	78.26	82.72	87.17	91.63	96.09	100.55	105.01	109.47
	1968-1969	56.41	61.54	66.67	71.79	76.92	82.05	87.18	92.30
	1970-1971	42.25	48 59	54.93	61.27	67.61	73.95	80.29	86.63
	1972	40 93	45.99	51.05	56.11	61.17	66.23	71.29	76.34
	1973-1974	41.23	46.62	52.00	57.38	62.77	68.15	73.53	78.92
	1975	29 38	36 37	43.36	50.35	57.33	64 31	71.28	78.26
	1976	29.92	37.06	44.19	51.33	58.46	65 58	72.70	79.83
	1977-1978	29.65	36 63	43.60	50 57	57.54	64 50	71.46	78.42
	1979-1980	18.64	25.80	32.99	40.18	47.38	54 58	61.78	68.98
	1981	19 46	23 76	28.06	32.36	36.65	40 94	45.23	49.52
	1982	19.14	23.32	27.50	31.68	35.86	40.03	44.20	48.36
	1983	18.93	23.03	27.13	31.23	35.32	39.41	43.50	47.59
	1984	12.07	15.62	19.19	22.76	26.32	29.89	33.46	37.03
	1985-1986	11 07	13.63	16.21	18.80	21.38	23.96	26.54	29.13
	1987+	9.19	12.28	15.38	18.48	21.58	24.68	27.78	30.88
NOx	Pre-1968	3.44	3.44	3.44	3.44	3.44	3.44	3.44	3.44
	1968-1972	4.35	4.35	4.35	4.34	4.34	4.34	4 34	4.34
	1973	2 92	3.04	3.16	3.29	3.41	3.53	3.65	3.78
	1974	2.93	3.05	3.18	3.31	3.44	3.56	3.69	3.82
	1975-1978	2.86	3 03	3.20	3.38	3.55	3.73	3.90	4.08
	1979-1980	1.92	2.24	2.57	2.90	3.23	3.55	3.88	4.21
	1981	1.92	2.24	2 57	2.90	3.22	3.55	3.88	4.21
	1982	1.92	2.25	2.58	2.91	3.24	3.56	3.89	4.22
	1983	1.93	2.26	2.59	2.93	3.26	3.59	3.92	4.25
	1984	1.95	2.28	2.62	2.95	3.29	3 62	3.95	4.29
	1985-1986	1.95	2 18	2.42	2.65	2.89	3.12	3.36	3.60
	1987+	1.19	1.39	1.59	1.80	2.00	2.20	2.41	2.61

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TABLE 1.2.1C

CRANKCASE AND EVAPORATIVE HYDROCARBON EMISSIONS
FOR LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS I
(RATES REFLECT ZERO TAMPERING)

** CCEV = (HSK * TPD + DNL)/MPD + CC

Model Years	SHED Hot Soak Emissions (Gm/Trip)	Trips* Per Day	SHED Diurnal Emissions (Gm/Day)	Miles* Per Day	Crankcase Emissions (Gm/Mile)	Total Crankcase and Evap. Emissions (Gm/Mile)
Pre-1963	22.45	3.05	47.99	26.30	4.10	8.53
1963-1967	22.45	3.05	47.99	26.30	0.80	5.23
1968-1970	22.45	3.05	47.99	26.30	0.0	4.43
1971	16.15	3.05	38.58	26.30	0.0	3.34
1972-1977	12.32	3.05	23.53	26.30	0.0	2.32
1978-1983	3.98	3.05	9.31	26.30	0.0	0.82
1984	3.59	3.05	9.31	26.30	0.0	0.77
1985	3.20	3.05	9.31	26.30	0.0	0.73
1986	2.81	3.05	9.31	26.30	0.0	0.68
1987	2.47	3.05	9.31	26.30	0.0	0.64
1988-1989	2.05	3.05	9.31	26.30	0.0	0.59
1990+	1.82	3.05	9.31	26.30	0.0	0.57

* Default information that may be altered by the MOBILE3 user with information about the local area.

** WHERE :

CCEV = Total untampered crankcase & evaporative HC emissions (Gm/Mile)
HSK = Hot soak emissions (Gm/Trip)
TPD = Trips per day
DNL = Diurnal emissions (Gm/Day)
MPD = Miles per day
CC = Crankcase emissions (Gm/Mile)

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TABLE 1.2.1D

TOTAL CRANKCASE AND EVAPORATIVE HC EMISSIONS
FOR LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS I
AT VARIOUS MILEAGE INTERVALS
(RATES INCLUDE TAMPERING)

Model Years	Emission Rate (Grams/Mile) 0K	20K	40K	60K	80K	100K	120K	140K
Pre-1963	8.53	8.53	8.53	8.53	8.53	8.53	8.53	8.53
1963-1967	5.23	5.23	5.23	5.23	5.23	5.23	5.23	5.23
1968-1970	4.54	4.56	4.58	4.60	4.62	4.64	4.65	4.67
1971	3.50	3.53	3.55	3.58	3.61	3.63	3.66	3.69
1972-1974	2.53	2.57	2.60	2.64	2.67	2.71	2.74	2.78
1975-1977	2.53	2.56	2.60	2.63	2.67	2.70	2.74	2.77
1978-1979	0.99	1.02	1.04	1.07	1.10	1.13	1.16	1.19
1980	0.97	1.00	1.03	1.05	1.08	1.11	1.13	1.16
1981-1982	0.97	1.00	1.02	1.05	1.08	1.10	1.13	1.16
1983	0.97	0.99	1.02	1.04	1.07	1.09	1.12	1.14
1984	0.91	0.94	0.96	0.98	1.01	1.03	1.05	1.08
1985	0.86	0.88	0.90	0.92	0.95	0.97	0.99	1.01
1986	0.80	0.82	0.84	0.86	0.88	0.90	0.93	0.95
1987	0.75	0.77	0.79	0.81	0.83	0.85	0.87	0.89
1988-1989	0.70	0.71	0.73	0.75	0.76	0.78	0.80	0.82
1990+	0.66	0.68	0.70	0.71	0.73	0.75	0.76	0.78

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TABLE 1.2.2A

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS I
TOTAL HC (INCLUDES EVAP & CRANKCASE)

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	19.1	1962	19.1	1963	15.8	1964	15.8	1965	15.8	1966	15.8	1967	15.8	1968	13.7	1969	13.7	1970	14.6	1971	13.5	1972	9.3
1962	19.0	1963	15.7	1964	15.7	1965	15 7	1966	15 7	1967	15.7	1968	13.6	1969	13.6	1970	14.4	1971	13.3	1972	9.2	1973	9.2
1963	15.6	1964	15.6	1965	15.6	1966	15.6	1967	15 6	1968	13.5	1969	13.5	1970	14.2	1971	13.1	1972	9.1	1973	9.1	1974	9.1
1964	15.5	1965	15.5	1966	15.5	1967	15.5	1968	13.3	1969	13.3	1970	14.0	1971	12.9	1972	9.0	1973	9.0	1974	9.0	1975	9.1
1965	15.4	1966	15.4	1967	15.4	1968	13.2	1969	13.2	1970	13.8	1971	12.7	1972	8.9	1973	8.9	1974	8.9	1975	9.0	1976	9.0
1966	15.3	1967	15.3	1968	13.0	1969	13.0	1970	13.6	1971	12.5	1972	8.8	1973	8.8	1974	8.8	1975	8.8	1976	8.8	1977	8.8
1967	15.2	1968	12.9	1969	12.9	1970	13.3	1971	12.2	1972	8.7	1973	8.7	1974	8.7	1975	8.6	1976	8.6	1977	8.6	1978	7.1
1968	12.7	1969	12.7	1970	13.1	1971	12.0	1972	8.6	1973	8.6	1974	8.6	1975	8.4	1976	8.4	1977	8.4	1978	6.9	1979	6.0
1969	12.5	1970	12.8	1971	11.7	1972	8.5	1973	8.5	1974	8.5	1975	8.2	1976	8.2	1977	8.2	1978	6.7	1979	5.8	1980	5.8
1970	12.5	1971	11.4	1972	8.3	1973	8.3	1974	8.3	1975	8.0	1976	8.0	1977	8.0	1978	6.5	1979	5.6	1980	5.6	1981	4.6
1971	11.0	1972	8.2	1973	8.2	1974	8.2	1975	7.8	1976	7 8	1977	7.8	1978	6.2	1979	5.4	1980	5.4	1981	4.4	1982	4.4
1972	8.0	1973	8 0	1974	8.0	1975	7.5	1976	7.5	1977	7.5	1978	6.0	1979	5.1	1980	5.1	1981	4.2	1982	4.2	1983	4.2
1973	7.8	1974	7.8	1975	7.2	1976	7.2	1977	7.2	1978	5.7	1979	4.8	1980	4.8	1981	4.0	1982	4.0	1983	4.0	1984	3.0
1974	7.6	1975	6.9	1976	6.9	1977	6.9	1978	5.4	1979	4.5	1980	4.5	1981	3.8	1982	3.8	1983	3.8	1984	2.9	1985	2.2
1975	6.6	1976	6.6	1977	6.6	1978	5.1	1979	4.2	1980	4.2	1981	3.6	1982	3.6	1983	3.6	1984	2.7	1985	2.1	1986	2.1
1976	6.2	1977	6.2	1978	4.7	1979	3.8	1980	3.8	1981	3.3	1982	3.3	1983	3.3	1984	2.6	1985	2.0	1986	2.0	1987	1.9
1977	5.8	1978	4.3	1979	3.4	1980	3.4	1981	3.1	1982	3.1	1983	3.1	1984	2.4	1985	1.9	1986	1.9	1987	1.8	1988	1.7
1978	3.9	1979	3.0	1980	3.0	1981	2.8	1982	2.8	1983	2.8	1984	2.2	1985	1.8	1986	1.8	1987	1.7	1988	1.6	1989	1.6
1979	2.6	1980	2.6	1981	2.4	1982	2.4	1983	2.4	1984	2.0	1985	1.7	1986	1.7	1987	1.6	1988	1.5	1989	1.5	1990	1.5
1980	2.3	1981	2.2	1982	2.2	1983	2.2	1984	1.8	1985	1.6	1986	1.6	1987	1.5	1988	1.5	1989	1.5	1990	1.4	1991	1.4

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	9 3	1974	9.3	1975	9.5	1976	9.5	1977	9.5	1978	8.0	1979	7.1	1980	7.1	1981	5.7	1982	5.7	1983	5.7	1984	4.2
1974	9.2	1975	9.4	1976	9.4	1977	9.4	1978	7.9	1979	7.0	1980	7.0	1981	5.6	1982	5.6	1983	5.6	1984	4.1	1985	2.9
1975	9.3	1976	9.3	1977	9 3	1978	7.8	1979	6.9	1980	6.9	1981	5.5	1982	5.5	1983	5.5	1984	4.0	1985	2.8	1986	2.8
1976	9.1	1977	9.1	1978	7.6	1979	6 7	1980	6 7	1981	5 4	1982	5.4	1983	5.4	1984	4.0	1985	2.8	1986	2.7	1987	2.5
1977	9.0	1978	7 5	1979	6.6	1980	6.6	1981	5.3	1982	5.3	1983	5.3	1984	3.9	1985	2.7	1986	2.7	1987	2.5	1988	2.4
1978	7.3	1979	6.4	1980	6.4	1981	5.2	1982	5.2	1983	5 2	1984	3.8	1985	2.7	1986	2.7	1987	2.4	1988	2.4	1989	2.4
1979	6.2	1980	6 2	1981	5 0	1982	5.0	1983	5.0	1984	3 7	1985	2.7	1986	2.6	1987	2.4	1988	2.3	1989	2.3	1990	2.3
1980	6.0	1981	4.9	1982	4.9	1983	4 9	1984	3.6	1985	2.6	1986	2.6	1987	2.4	1988	2.3	1989	2.3	1990	2.3	1991	2.3
1981	4.7	1982	4.7	1983	4.7	1984	3.5	1985	2.5	1986	2.5	1987	2.3	1988	2.3	1989	2.3	1990	2.2	1991	2.2	1992	2.2
1982	4.6	1983	4.6	1984	3.4	1985	2.5	1986	2.4	1987	2.3	1988	2.2	1989	2.2	1990	2.2	1991	2.2	1992	2.2	1993	2.2
1983	4.4	1984	3.3	1985	2.4	1986	2.4	1987	2.2	1988	2.2	1989	2.2	1990	2.1	1991	2.1	1992	2.1	1993	2.1	1994	2.1
1984	3.2	1985	2.4	1986	2 3	1987	2.1	1988	2.1	1989	2.1	1990	2.1	1991	2.1	1992	2.1	1993	2.1	1994	2.1	1995	2.1
1985	2.3	1986	2.2	1987	2.1	1988	2.0	1989	2.0	1990	2.0	1991	2.0	1992	2.0	1993	2.0	1994	2.0	1995	2.0	1996	2.0
1986	2.2	1987	2.0	1988	2.0	1989	2.0	1990	1.9	1991	1.9	1992	1.9	1993	1.9	1994	1.9	1995	1.9	1996	1.9	1997	1.9
1987	1.9	1988	1.9	1989	1.9	1990	1.9	1991	1.9	1992	1.9	1993	1.9	1994	1.9	1995	1.9	1996	1.9	1997	1.9	1998	1.9
1988	1.8	1989	1.8	1990	1.8	1991	1.8	1992	1.8	1993	1.8	1994	1.8	1995	1.8	1996	1.8	1997	1.8	1998	1.8	1999	1.8
1989	1.7	1990	1.7	1991	1.7	1992	1.7	1993	1.7	1994	1.7	1995	1.7	1996	1.7	1997	1.7	1998	1.7	1999	1.7	2000	1.7
1990	1.6	1991	1.6	1992	1.6	1993	1.6	1994	1.6	1995	1.6	1996	1.6	1997	1.6	1998	1.6	1999	1.6	2000	1.6	2001	1.6
1991	1.5	1992	1.5	1993	1.5	1994	1.5	1995	1.5	1996	1.5	1997	1.5	1998	1.5	1999	1.5	2000	1.5	2001	1.5	2002	1.5
1992	1.4	1993	1.4	1994	1.4	1995	1.4	1996	1.4	1997	1.4	1998	1.4	1999	1.4	2000	1.4	2001	1.4	2002	1.4	2003	1.4

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1.2.4.

TABLE 1.2.2B

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS I
CO

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	118.5	1962	118.5	1963	118.5	1964	118.5	1965	118.5	1966	118.5	1967	118.5	1968	102.1	1969	102.1	1970	98.4	1971	98.4	1972	84.6
1962	117.5	1963	117.5	1964	117.5	1965	117.5	1966	117.5	1967	117.5	1968	100.9	1969	100.9	1970	97.0	1971	97.0	1972	83.5	1973	83.5
1963	116.4	1964	116.4	1965	116.4	1966	116.4	1967	116.4	1968	99.7	1969	99.7	1970	95.5	1971	95.5	1972	82.3	1973	82.3	1974	82.3
1964	115.2	1965	115.2	1966	115.2	1967	115.2	1968	98.3	1969	98.3	1970	93.8	1971	93.8	1972	81.0	1973	81.0	1974	81.0	1975	67.3
1965	113.9	1966	113.9	1967	113.9	1968	96.9	1969	96.9	1970	92.0	1971	92.0	1972	79.6	1973	79.6	1974	79.6	1975	65.9	1976	65.9
1966	112.5	1967	112.5	1968	95.3	1969	95.3	1970	90.1	1971	90.1	1972	78.1	1973	78.1	1974	78.1	1975	64.3	1976	64.3	1977	64.3
1967	111.0	1968	93 6	1969	93.6	1970	88.0	1971	88.0	1972	76.5	1973	76.5	1974	76.5	1975	62.6	1976	62.6	1977	62.6	1978	62.6
1968	91.8	1969	91.8	1970	85.8	1971	85.8	1972	74.8	1973	74 8	1974	74.8	1975	60.7	1976	60.7	1977	60.7	1978	60.7	1979	49.9
1969	89.8	1970	83.4	1971	83.4	1972	72.9	1973	72.9	1974	72.9	1975	58.7	1976	58.7	1977	58.7	1978	58.7	1979	47.9	1980	47.9
1970	80.8	1971	80.8	1972	70.8	1973	70.8	1974	70.8	1975	56.6	1976	56.6	1977	56.6	1978	56.6	1979	45.7	1980	45.7	1981	27.6
1971	78.0	1972	68.7	1973	68.7	1974	68.7	1975	54.2	1976	54.2	1977	54.2	1978	54.2	1979	43.4	1980	43.4	1981	26.6	1982	26.6
1972	66.3	1973	66.3	1974	66.3	1975	51.7	1976	51.7	1977	51.7	1978	51.7	1979	40.9	1980	40.9	1981	25.5	1982	25.5	1983	25.5
1973	63.8	1974	63 8	1975	49.0	1976	49.0	1977	49.0	1978	49 0	1979	38.2	1980	38.2	1981	24.3	1982	24.3	1983	24.3	1984	16.7
1974	61.0	1975	46.1	1976	46.1	1977	46.1	1978	46.1	1979	35.3	1980	35.3	1981	23.1	1982	23.1	1983	23.1	1984	15.6	1985	10.5
1975	43.0	1976	43 0	1977	43.0	1978	43.0	1979	32.2	1980	32.2	1981	21.7	1982	21.7	1983	21.7	1984	14.4	1985	9.9	1986	9.9
1976	39.6	1977	39.6	1978	39.6	1979	28.8	1980	28.8	1981	20.2	1982	20.2	1983	20.2	1984	13.1	1985	9.3	1986	9.3	1987	11.0
1977	36.0	1978	36.0	1979	25.1	1980	25.1	1981	18.6	1982	18.6	1983	18.6	1984	11.7	1985	8.6	1986	8.6	1987	9.7	1988	9.7
1978	32.0	1979	21.2	1980	21.2	1981	16.9	1982	16.9	1983	16.9	1984	10.2	1985	7.8	1986	7.8	1987	8.3	1988	8.3	1989	8.3
1979	17.0	1980	17 0	1981	15.1	1982	15.1	1983	15.1	1984	8.6	1985	7 0	1986	7.0	1987	6.8	1988	6.8	1989	6.8	1990	6.8
1980	14.2	1981	13.8	1982	13.8	1983	13 8	1984	7.6	1985	6.5	1986	6.5	1987	5.8	1988	5.8	1989	5.8	1990	5.8	1991	5.8

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	84.6	1974	84.6	1975	71.2	1976	71.2	1977	71.2	1978	71.2	1979	60.3	1980	60.3	1981	34.0	1982	34.0	1983	34.0	1984	25.1
1974	83.5	1975	70.0	1976	70.0	1977	70.0	1978	70.0	1979	59.2	1980	59.2	1981	33.5	1982	33.5	1983	33.5	1984	24.6	1985	15.0
1975	68.7	1976	68.7	1977	68.7	1978	68.7	1979	57.9	1980	57.9	1981	32.9	1982	32.9	1983	32.9	1984	24.1	1985	14.8	1986	14.8
1976	67.3	1977	67.3	1978	67.3	1979	56 5	1980	56.5	1981	32.3	1982	32.3	1983	32.3	1984	23.6	1985	14.5	1986	14.5	1987	21.0
1977	65.9	1978	65.9	1979	55.0	1980	55.0	1981	31.7	1982	31.7	1983	31.7	1984	23 1	1985	14.2	1986	14.2	1987	20.5	1988	20.5
1978	64.3	1979	53.4	1980	53.4	1981	31.0	1982	31.0	1983	31.0	1984	22.4	1985	13.9	1986	13.9	1987	19.9	1988	19.9	1989	19.9
1979	51.7	1980	51.7	1981	30.2	1982	30.2	1983	30.2	1984	21.8	1985	13.6	1986	13.6	1987	19.3	1988	19.3	1989	19.3	1990	19.3
1980	49.9	1981	29.4	1982	29.4	1983	29.4	1984	21.1	1985	13.3	1986	13.3	1987	18.6	1988	18.6	1989	18.6	1990	18.6	1991	18.6
1981	28.6	1982	28.6	1983	28.6	1984	20.3	1985	12.9	1986	12.9	1987	17.9	1988	17.9	1989	17.9	1990	17.9	1991	17.9	1992	17.9
1982	27.6	1983	27.6	1984	19.5	1985	12.5	1986	12.5	1987	17.1	1988	17.1	1989	17.1	1990	17.1	1991	17.1	1992	17.1	1993	17.1
1983	26.6	1984	18.7	1985	12.0	1986	12.0	1987	16.3	1988	16.3	1989	16.3	1990	16.3	1991	16.3	1992	16.3	1993	16.3	1994	16.3
1984	17.7	1985	11.6	1986	11.6	1987	15 4	1988	15.4	1989	15.4	1990	15.4	1991	15.4	1992	15.4	1993	15.4	1994	15.4	1995	15.4
1985	11.1	1986	11.1	1987	14.4	1988	14.4	1989	14.4	1990	14.4	1991	14.4	1992	14.4	1993	14.4	1994	14.4	1995	14.4	1996	14.4
1986	10.5	1987	13.4	1988	13.4	1989	13.4	1990	13.4	1991	13.4	1992	13.4	1993	13.4	1994	13.4	1995	13.4	1996	13.4	1997	13.4
1987	12.2	1988	12.2	1989	12.2	1990	12.2	1991	12.2	1992	12.2	1993	12.2	1994	12.2	1995	12.2	1996	12.2	1997	12.2	1998	12.2
1988	11.0	1989	11.0	1990	11 0	1991	11.0	1992	11.0	1993	11.0	1994	11.0	1995	11.0	1996	11.0	1997	11.0	1998	11.0	1999	11.0
1989	9.7	1990	9.7	1991	9.7	1992	9.7	1993	9.7	1994	9.7	1995	9.7	1996	9.7	1997	9.7	1998	9.7	1999	9.7	2000	9.7
1990	8.3	1991	8.3	1992	8.3	1993	8.3	1994	8.3	1995	8.3	1996	8.3	1997	8.3	1998	8.3	1999	8.3	2000	8.3	2001	8.3
1991	6.8	1992	6.8	1993	6.8	1994	6.8	1995	6.8	1996	6.8	1997	6.8	1998	6.8	1999	6.8	2000	6.8	2001	6.8	2002	6.8
1992	5.8	1993	5.8	1994	5.8	1995	5.8	1996	5.8	1997	5.8	1998	5.8	1999	5.8	2000	5.8	2001	5.8	2002	5.8	2003	5.8

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1.2.4.

TABLE 1.2.2C

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS I
NOx

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	3.4	1962	3.4	1963	3.4	1964	3.4	1965	3.4	1966	3.4	1967	3.4	1968	4.3	1969	4.3	1970	4.3	1971	4.3	1972	4.3
1962	3.4	1963	3.4	1964	3.4	1965	3.4	1966	3.4	1967	3.4	1968	4.3	1969	4.3	1970	4.3	1971	4.3	1972	4.3	1973	3.6
1963	3 4	1964	3.4	1965	3.4	1966	3.4	1967	3 4	1968	4.3	1969	4.3	1970	4.3	1971	4.3	1972	4.3	1973	3.5	1974	3.5
1964	3.4	1965	3.4	1966	3.4	1967	3.4	1968	4.3	1969	4.3	1970	4.3	1971	4.3	1972	4.3	1973	3.5	1974	3.5	1975	3.2
1965	3.4	1966	3.4	1967	3.4	1968	4.3	1969	4.3	1970	4.3	1971	4.3	1972	4.3	1973	3.5	1974	3.5	1975	3.2	1976	3.2
1966	3.4	1967	3.4	1968	4.3	1969	4.3	1970	4.3	1971	4.3	1972	4.3	1973	3.5	1974	3.5	1975	3.2	1976	3.2	1977	3.2
1967	3.4	1968	4.3	1969	4.3	1970	4 3	1971	4.3	1972	4.3	1973	3.4	1974	3.4	1975	3.1	1976	3.1	1977	3.1	1978	3.1
1968	4.3	1969	4.3	1970	4.3	1971	4.3	1972	4.3	1973	3.4	1974	3.4	1975	3.1	1976	3.1	1977	3.1	1978	3.1	1979	3.0
1969	4.3	1970	4.3	1971	4.3	1972	4.3	1973	3.4	1974	3.4	1975	3.1	1976	3.1	1977	3.1	1978	3.1	1979	2.9	1980	2.9
1970	4.3	1971	4.3	1972	4.3	1973	3.4	1974	3.4	1975	3.1	1976	3.1	1977	3.1	1978	3.1	1979	2.8	1980	2.8	1981	2.8
1971	4.3	1972	4.3	1973	3.3	1974	3.3	1975	3.0	1976	3.0	1977	3.0	1978	3.0	1979	2.8	1980	2.8	1981	2.8	1982	2.8
1972	4.3	1973	3.3	1974	3.3	1975	3 0	1976	3.0	1977	3 0	1978	3.0	1979	2.7	1980	2.7	1981	2.7	1982	2.7	1983	2.7
1973	3.2	1974	3.2	1975	3.0	1976	3.0	1977	3.0	1978	3.0	1979	2.6	1980	2.6	1981	2.6	1982	2.6	1983	2.6	1984	2.6
1974	3.2	1975	2.9	1976	2.9	1977	2.9	1978	2.9	1979	2.5	1980	2.5	1981	2.5	1982	2.5	1983	2.5	1984	2.5	1985	2.1
1975	2.9	1976	2.9	1977	2.9	1978	2.9	1979	2.4	1980	2.4	1981	2.4	1982	2.4	1983	2.4	1984	2.4	1985	2.0	1986	2.0
1976	2.9	1977	2.9	1978	2.9	1979	2.3	1980	2.3	1981	2.3	1982	2.3	1983	2.3	1984	2.3	1985	2.0	1986	2.0	1987	1.1
1977	2.8	1978	2.8	1979	2.1	1980	2.1	1981	2.1	1982	2.1	1983	2.1	1984	2.1	1985	1.9	1986	1.9	1987	1.0	1988	1.0
1978	2.8	1979	2.0	1980	2.0	1981	2.0	1982	2.0	1983	2.0	1984	2.0	1985	1.9	1986	1.9	1987	1.0	1988	1.0	1989	1.0
1979	1.8	1980	1.8	1981	1.8	1982	1.8	1983	1.8	1984	1.8	1985	1.8	1986	1.8	1987	0.9	1988	0.9	1989	0.9	1990	0.9
1980	1.8	1981	1.8	1982	1.8	1983	1.8	1984	1.8	1985	1.7	1986	1.7	1987	0.9	1988	0.9	1989	0.9	1990	0.9	1991	0.9

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	3.6	1974	3.6	1975	3.2	1976	3.2	1977	3.2	1978	3.2	1979	3.4	1980	3.4	1981	3.4	1982	3.4	1983	3.4	1984	3.4
1974	3.6	1975	3.2	1976	3.2	1977	3.2	1978	3.2	1979	3.3	1980	3.3	1981	3.3	1982	3.3	1983	3.3	1984	3.3	1985	2.4
1975	3.2	1976	3.2	1977	3.2	1978	3.2	1979	3.3	1980	3.3	1981	3.3	1982	3.3	1983	3.3	1984	3.3	1985	2.4	1986	2.4
1976	3.2	1977	3.2	1978	3.2	1979	3.2	1980	3.2	1981	3.2	1982	3.2	1983	3.2	1984	3.2	1985	2.4	1986	2.4	1987	1.5
1977	3.2	1978	3.2	1979	3.2	1980	3.2	1981	3.2	1982	3.2	1983	3.2	1984	3.2	1985	2.4	1986	2.4	1987	1.5	1988	1.5
1978	3.2	1979	3.1	1980	3.1	1981	3.1	1982	3.1	1983	3 1	1984	3.1	1985	2.3	1986	2.3	1987	1.5	1988	1.5	1989	1.5
1979	3.1	1980	3 1	1981	3.1	1982	3 1	1983	3.1	1984	3 1	1985	2.3	1986	2.3	1987	1.4	1988	1.4	1989	1.4	1990	1.4
1980	3.0	1981	3.0	1982	3.0	1983	3.0	1984	3.0	1985	2.3	1986	2.3	1987	1.4	1988	1.4	1989	1.4	1990	1.4	1991	1.4
1981	2.9	1982	2.9	1983	2.9	1984	2.9	1985	2.3	1986	2.3	1987	1.4	1988	1.4	1989	1.4	1990	1.4	1991	1.4	1992	1.4
1982	2.8	1983	2.8	1984	2.8	1985	2.2	1986	2.2	1987	1.4	1988	1.4	1989	1.4	1990	1.4	1991	1.4	1992	1.4	1993	1.4
1983	2.8	1984	2.8	1985	2.2	1986	2.2	1987	1.3	1988	1.3	1989	1.3	1990	1.3	1991	1.3	1992	1.3	1993	1.3	1994	1.3
1984	2.7	1985	2.2	1986	2.2	1987	1.3	1988	1.3	1989	1.3	1990	1.3	1991	1.3	1992	1.3	1993	1.3	1994	1.3	1995	1.3
1985	2.1	1986	2.1	1987	1.2	1988	1.2	1989	1.2	1990	1.2	1991	1.2	1992	1.2	1993	1.2	1994	1.2	1995	1.2	1996	1.2
1986	2.1	1987	1.2	1988	1.2	1989	1.2	1990	1.2	1991	1.2	1992	1.2	1993	1.2	1994	1.2	1995	1.2	1996	1.2	1997	1.2
1987	1.1	1988	1.1	1989	1.1	1990	1.1	1991	1.1	1992	1.1	1993	1.1	1994	1.1	1995	1.1	1996	1.1	1997	1.1	1998	1.1
1988	1.1	1989	1.1	1990	1.1	1991	1.1	1992	1.1	1993	1 1	1994	1.1	1995	1.1	1996	1.1	1997	1.1	1998	1.1	1999	1.1
1989	1.0	1990	1.0	1991	1.0	1992	1.0	1993	1.0	1994	1.0	1995	1.0	1996	1.0	1997	1.0	1998	1.0	1999	1.0	2000	1.0
1990	1.0	1991	1.0	1992	1.0	1993	1.0	1994	1.0	1995	1.0	1996	1.0	1997	1.0	1998	1.0	1999	1.0	2000	1.0	2001	1.0
1991	0.9	1992	0.9	1993	0.9	1994	0.9	1995	0.9	1996	0.9	1997	0.9	1998	0.9	1999	0.9	2000	0.9	2001	0.9	2002	0.9
1992	0.9	1993	0.9	1994	0.9	1995	0.9	1996	0.9	1997	0.9	1998	0.9	1999	0.9	2000	0.9	2001	0.9	2002	0.9	2003	0.9

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1.2.4.

TABLE 1.2.3

IDLE EMISSION RATES FOR
LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS I

* IER = ZML + (DR * M)

Pol	Model Years	Zero Mile Emission Level (Grams/Min.)	Deterioration Rate (Gm/Min/10K Mi)
HC	Pre-1968	1.32	0.03
	1968-1969	1.07	0.06
	1970-1971	0.54	0.07
	1972-1974	0.72	0.04
	1975-1978	0.37	0.06
	1979-1980	0.07	0.02
	1981-1983	0.06	0.02
	1984	0.04	0.02
	1985-1986	0.03	0.01
	1987+	0.03	0.01
CO	Pre-1968	13.76	0.40
	1968-1969	13.99	0.63
	1970-1971	11.84	0.88
	1972-1974	12.66	0.76
	1975-1978	6.27	0.72
	1979-1980	1.57	0.32
	1981	1.31	0.27
	1982-1983	1.19	0.24
	1984	0.69	0.14
	1985-1986	0.34	0.18
	1987+	0.34	0.18
NOx	Pre-1968	0.09	0.0
	1968-1972	0.17	0.0
	1973-1974	0.14	0 0
	1975-1978	0.06	0.0
	1979-1983	0.06	0.0
	1984	0.05	0.0
	1985-1986	0.02	0.0
	1987+	0.02	0.0

* WHERE : IER = Idle emission rate
ZML = Zero mile level
DR = Deterioration Rate
M = Cumulative Mileage / 10,000

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TABLE 1.2.4

REGISTRATION MIX AND
MILEAGE ACCUMULATION RATES FOR
LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS I

Model Year Index**	July 1 Registration Mix*	Mileage Accumulation Rate per truck *	Jan 1 Registration Mix	Jan 1 Mileage Accumulation Rate (fleet)	Jan 1 Mileage Accumulation (fleet)
1	0.067	17394.	0.022	17394.	2174.
2	0.085	16132.	0.085	17078.	13006.
3	0.081	14961.	0.081	15839.	29456.
4	0.077	13876.	0.077	14690.	44713.
5	0.073	12869.	0.073	13624.	58862.
6	0.069	11935.	0.069	12635.	71986.
7	0.065	11069.	0.065	11718.	84156.
8	0.061	10266.	0.061	10868.	95444.
9	0.057	9521.	0.057	10080.	105912.
10	0.053	8830.	0.053	9348.	115621.
11	0.048	8189.	0.048	8670.	124625.
12	0.044	7595.	0.044	8040.	132976.
13	0.040	7044.	0.040	7457.	140720.
14	0.036	6533.	0.036	6916.	147903.
15	0.032	6059.	0.032	6414.	154565.
16	0.028	5619.	0.028	5949.	160744.
17	0.024	5211.	0.024	5517.	166474.
18	0.020	4833.	0.020	5116.	171787.
19	0.016	4483.	0.016	4745.	176716.
20+	0.024	4157.	0.024	4401.	181287.

* Default information that may be altered by the MOBILE3 user with information about the local area.

** The indices refer to the most recent model year vehicles in any given calendar year. Index 1 references the newest model year vehicles and index 20+ references the oldest model year vehicles.

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TABLE 1.2.5

EXAMPLE TRAVEL WEIGHTING FRACTION CALCULATION FOR
LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS I
JANUARY 1, 1988

Model Years	(A) LDT1 Fleet Registration	(B) Sales Fraction	(A*B)	(C=A*B/DAF) LDGT1 Registration	(D) Annual Mileage Accrual Rate	(C*D)	(C*D/TFNORM) Travel Fractions
1988	0.022	0.760	0.017	0.019	17394.	337.1	0.031
1987	0.085	0.790	0.067	0.077	17078.	1309.6	0.120
1986	0.081	0.820	0.066	0.076	15839.	1201.4	0.110
1985	0.077	0.840	0.065	0.074	14690.	1085.0	0.099
1984	0.073	0.870	0.064	0.073	13624.	988.1	0.091
1983	0.069	0.900	0.062	0.071	12635.	896.0	0.082
1982	0.065	0.920	0.060	0.068	11718.	800.2	0.073
1981	0.061	0.940	0.057	0.065	10868.	711.6	0.065
1980	0.057	0.966	0.055	0.063	10080.	633.8	0.058
1979	0.053	0.972	0.052	0.059	9348.	549.9	0.050
1978	0.048	0.991	0.048	0.054	8670.	470.9	0.043
1977	0.044	0.995	0.044	0.050	8040.	402.0	0.037
1976	0.040	0.997	0.040	0.046	7457.	339.6	0.031
1975	0.036	0.998	0.036	0.041	6916.	283.8	0.026
1974	0.032	1.000	0.032	0.037	6414.	234.4	0.021
1973	0.028	1.000	0.028	0.032	5949.	190.2	0.017
1972	0.024	1.000	0.024	0.027	5517.	151.2	0.014
1971	0.020	1.000	0.020	0.023	5116.	116.9	0.011
1970	0.016	1.000	0.016	0.018	4745.	86.7	0.008
1969-	0.024	1.000	0.024	0.027	4401.	120.6	0.011
		DAF:	0.876		TFNORM:	10909.0	

WHERE :

A = January 1 registration mix from Table 1.2.4.
B = Fleet sales fractions
D = Sales weighted fleet mileage accumulation rate from Table 1.2.4, adjusted to January 1
D(1) = Annual Miles(1)
D(MYI)= .25*(Annual Miles(MYI)) + .75*(Annual Miles(MYI-1)), MYI=2,...,20+

NOTE : In general, the travel weighting fractions will change for every calendar year since the sales fraction (column B) changes for almost every model year.

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TABLE 1.2.6

SPEED CORRECTION FACTOR COEFFICIENTS FOR LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS I

$$* \; SCF(s,sadj) = SF(s)/SF(sadj)$$

$$SF(s) = EXP(A + B*s + C*s^2 + D*S^3 + E*s^4 + F*s^5), \text{ HC \& CO}$$
$$= A + B*s + C*s^2 + D*s^3 + E*s^4 + F*s^5, \text{ NOx, Pre-1979}$$
$$= EXP(A + B*s + C*s^2 + D*s^3 + E*s^4 + F*s^5), \text{ NOx, 1979+}$$

Pollutant and Model Years	A	B	C	D	E	F
HC						
Pre-1968	0.231026E+01	-0.289572E+00	0.152990E-01	-0.446689E-03	0.648183E-05	-0.363456E-07
1968	0.239726E+01	-0.299985E+00	0.161351E-01	-0.487491E-03	0.729093E-05	-0.419769E-07
1969	0.240873E+01	-0.308187E+00	0.168168E-01	-0.506843E-03	0.753855E-05	-0.431596E-07
1970	0.223217E+01	-0.284985E+00	0.153833E-01	-0.456738E-03	0.673486E-05	-0.383798E-07
1971	0.225223E+01	-0.287778E+00	0.156820E-01	-0.473179E-03	0.707954E-05	-0.408456E-07
1972	0.234948E+01	-0 304959E+00	0.168416E-01	-0.509623E-03	0.759516E-05	-0.434963E-07
1973-1974	0.268382E+01	-0.344633E+00	0.195417E-01	-0.625720E-03	0.978442E-05	-0.583369E-07
1975-1978	0.239540E+01	-0.335781E+00	0.211609E-01	-0.731550E-03	0.120715E-04	-0 748566E-07
1979-1983	0.121545E+01	-0.707633E-01	0.446460E-03	0.0	0.0	0.0
1984-1986	0.144386E+01	-0.880857E-01	0.735680E-03	0.0	0.0	0.0
1987+	0.984090E+00	-0.567319E-01	0.332820E-03	0.0	0.0	0.0
CO						
Pre-1968	0.233989E+01	-0.296978E+00	0.160071E-01	-0.477396E-03	0.706752E-05	-0.403978E-07
1968	0.246551E+01	-0.305023E+00	0.160497E-01	-0.473969E-03	0.699075E-05	-0.399758E-07
1969	0.277804E+01	-0.319130E+00	0.153183E-01	-0.422327E-03	0.584948E-05	-0.314969E-07
1970	0.278899E+01	-0.327107E+00	0.162943E-01	-0.467573E-03	0.671906E-05	-0.374401E-07
1971	0.270743E+01	-0.331038E+00	0.176179E-01	-0.538583E-03	0.817402E-05	-0.477803E-07
1972	0.268454E+01	-0.332817E+00	0 176277E-01	-0.524123E-03	0.772221E-05	-0.437025E-07
1973-1974	0.283929E+01	-0.368756E+00	0.210782E-01	-0.676438E-03	0.106267E-04	-0.636405E-07
1975-1978	0.248747E+01	-0.391562E+00	0.270721E-01	-0.976178E-03	0.165270E-04	-0.104317E-06
1979-1983	0.116177E+01	-0 592737E-01	0.0	0.0	0.0	0.0
1984-1986	0.881952E+00	-0.449976E-01	0.0	0.0	0.0	0.0
1987+	0.858419E+00	-0.437969E-01	0.0	0.0	0.0	0.0
NOx						
Pre-1968	0.168635E+01	-0.118303E+00	0.654975E-02	-0.137139E-03	0.100849E-05	0.0
1968	0.122677E+01	-0 444978E-01	0.262476E-02	-0.567150E-04	0.434293E-06	0.0
1969	0.101743E+01	-0.118958E-01	0.914365E-03	-0.215740E-04	0.182300E-06	0.0
1970	0.987600E+00	-0.195674E-01	0.169645E-02	-0.404000E-04	0.328001E-06	0.0
1971	0.115917E+01	-0.444536E-01	0.296425E-02	-0.668990E-04	0.522365E-06	0.0
1972	0.128169E+01	-0.804874E-01	0.535735E-02	-0.118891E-03	0.901060E-06	0.0
1973-1974	0.783838E+00	0.328549E-03	0.106029E-02	-0.319350E-04	0.290389E-06	0.0
1975-1978	0.942131E+00	-0.423240E-01	0.386253E-02	-0.939853E-04	0.753883E-06	0.0
1979-1983	0.308282E+00	-0.230362E-01	0.372830E-03	0.0	0.0	0.0
1984-1986	0.295046E+00	-0.236333E-01	0.437750E-03	0.0	0.0	0.0
1987+	0.386041E+00	-0.262961E-01	0.336740E-03	0.0	0.0	0.0

* WHERE : s = average speed (mph)
sadj = basic test procedure speed; adjusted for fraction of cold start operation x and fraction of hot start operation w, [1/sadj = (w+x)/26 + (1-w-x)/16]

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TABLE 1.2.7A

TEMPERATURE CORRECTION FACTOR COEFFICIENTS FOR
LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS I

* TCF(b) = EXP(TC(b) * (T - 75.0))

Pol	Model Years	Test segment 1 TC Low	Test segment 1 TC High	Test segment 2 TC Low	Test segment 2 TC High	Test segment 3 TC Low	Test segment 3 TC High
HC	Pre-1968	-0.20623E-01	-0.14381E-01	-0.24032E-02	0.13219E-02	-0.10081E-02	0.34799E-02
	1968-1969	-0.24462E-01	-0.12552E-01	-0 32017E-02	0.42667E-02	-0.86884E-03	0.75843E-02
	1970-1971	-0.21255E-01	-0.10888E-01	-0.52755E-03	-0 47925E-03	0.93659E-03	0.76666E-02
	1972-1974	-0.21427E-01	-0.66107E-02	-0.39442E-03	0.26288E-02	0.49731E-02	0.12320E-01
	1975-1983	-0.23517E-01	-0.14095E-01	-0.88057E-02	0.26179E-01	-0.16222E-02	0.24297E-01
	1984-1986	-0.27793E-01	-0.14095E-01	-0.10177E-01	0.26179E-01	-0.82680E-02	0.24297E-01
	1987+	-0.33883E-01	0.11959E-01	-0.10113E-01	-0.12627E-04	-0.80650E-02	0.78765E-02
CO	Pre-1968	-0.13487E-01	-0.14691E-01	0.15784E-02	0.37462E-02	0.11097E-02	0.11014E-01
	1968-1969	-0.21126E-01	-0.38767E-01	-0.15289E-02	0.84685E-02	0.15749E-02	0.25179E-01
	1970-1971	-0.20843E-01	-0.21165E-01	-0.59951E-02	0.23603E-01	0.18253E-02	0.28483E-01
	1972-1974	-0.19091E-01	-0.13146E-01	-0.42373E-03	0.24717E-01	0.57982E-02	0.25848E-01
	1975-1983	-0.24835E-01	-0.19612E-01	-0.88336E-02	0.48537E-01	-0.11553E-02	0.31439E-01
	1984-1986	see NOTE 2	-0.19612E-01	-0.17783E-01	0.48537E-01	-0.10871E-01	0 31439E-01
	1987+	see NOTE 2	-0.12596E-01	-0.18813E-01	0.13861E-01	-0.11951E-01	0.96939E-02
NOx	Pre-1968	-0.16897E-03	0.38841E-02	-0.89245E-02	-0.87325E-02	-0.72580E-02	-0.10839E-01
	1968-1972	-0.25074E-03	-0.10389E-02	-0.59791E-02	-0.92466E-02	-0.62690E-02	-0.10108E-01
	1973-1974	0.38855E-02	-0.18301E-01	-0.24156E-02	-0.10925E-01	-0.21188E-02	-0.18042E-01
	1975-1978	-0.45504E-04	-0.71420E-02	-0 12575E-02	-0.87910E-02	-0.53153E-03	-0.75470E-02
	1979-1986	-0.76044E-02	-0.26153E-01	-0.68045E-02	-0.18603E-01	-0.54198E-02	-0.20878E-01
	1987+	-0.53710E-02	-0.34416E-01	-0.65050E-02	-0.35871E-01	-0.85650E-02	-0.28830E-01

* WHERE :

TCF(b) = Temperature correction factor for appropriate pollutant, ambient temperature, and model year; for test segment b
T = Ambient temperature (Fahrenheit)
TC(b) = Temperature correction factor coefficient for appropriate pollutant, reference temperature and model year; for test segment b
75.0 = Reference temperature

NOTE 1 : The temperature correction factor is used in conjunction with the Ripstwxn correction factor given in Table 1.2.7B.

NOTE 2 : Offset model used for Bag 1 CO. Offset = -1.3812*(T - 75.0).

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TABLE 1.2.7B

NORMALIZED BAG FRACTIONS FOR
LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS I

		Normalized Fractions							
	Model	Test Seg.#1		Test Seg.#2		Test Seg.#3		Total Test	
Pol	Years	B1	D1	B2	D2	B3	D3	B0	D0
HC	Pre-1968	1.282	0.025	0.973	0.028	0.839	0.019	1.000	0.025
	1968-1969	1.345	0.074	0.946	0.054	0.842	0.048	1.000	0.056
	1970-1971	1.345	0.178	0.919	0.118	0.894	0.093	1.000	0.124
	1972-1974	1.398	0.060	0.885	0.055	0.919	0.036	1.000	0.051
	1975-1983	1.860	0.345	0.766	0.234	0.804	0.196	1.000	0.243
	1984-1986	2.200	0.714	0.571	0.171	0.914	0.143	1.000	0.286
	1987+	2.634	1.104	0.368	0.499	0.973	0.391	1.000	0.594
CO	Pre-1968	1.277	0.033	1.017	0.029	0.758	0.025	1.000	0.029
	1968-1969	1.442	0.071	0.996	0.042	0.674	0.033	1.000	0.046
	1970-1971	1.553	0.109	0.933	0.079	0.711	0.038	1.000	0.074
	1972-1974	1.573	0.054	0.902	0.079	0.755	0.029	1.000	0.060
	1975-1983	1.972	0.176	0.881	0.157	0.628	0.109	1.000	0.139
	1984-1986	2.438	0.282	0.658	0.062	0.621	0.077	1.000	0.111
	1987+	3.941	2.009	0.0	1.186	0.689	1.014	1.000	1.308
NOx	Pre-1968	1.121	0.009	0.785	0.001	1.319	-0.009	1.000	0.0
	1968-1972	1.199	-0.004	0.793	-0.002	1.245	0.006	1.000	0.0
	1973-1974	1.262	0.022	0.770	0.004	1.242	0.027	1.000	0.014
	1975-1978	1.299	0.012	0.783	0.004	1.197	0.016	1.000	0.012
	1979-1986	1.372	0.040	0.766	0.046	1.167	0.063	1.000	0.051
	1987+	1.830	0.169	0.703	0.149	0.939	0.222	1.000	0.173

NOTE : The fractions given in this table are used in the calculation of the operating-mode/ temperature correction factor (OMTCF).

WHERE :

```
OMTCF  = ((TERM1 + TERM2 + TERM3)/DENOM)
TERM1  =    W    *TCF(1)*(B1+D1*M)
TERM2  = (1-W-X)*TCF(2)*(B2+D2*M)
TERM3  =    X    *TCF(3)*(B3+D3*M)
DENOM  = B0 + D0*M
 W     = Fraction of VMT in the cold start mode
 X     = Fraction of VMT in the  hot start mode
TCF(b) = Temperature correction factor for pollutant, model
         year; for test segment b
 M     = Cumulative mileage / 10,000
```

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TABLE 1.2.8A

AIR CONDITIONING CORRECTION FACTOR COEFFICIENTS FOR
LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS I

* ACCF= U*V*(A + B*(T-75) -1) + 1

Model	HC		CO		NOx	
Years	A	B	A	B	A	B
Pre-1975	0.1023E+01	0.3344E-02	0.1202E+01	0.1808E-02	0.1299E+01	0.5643E-04
1975+	0.1000E+01	0.3512E-02	0.1130E+01	0.1528E-02	0.1221E+01	0.4262E-03

* WHERE :

ACCF = Air Conditioning Correction Factor
V = Fraction of vehicles which are equipped with AC given in Table 1.2.8B
U = Fraction of vehicles with AC that are using it = (DI-DILO)/(DIHI-DI), 0<=U<=1
DI = Discomfort index = (DB+WB)*.4+15
DILO = The highest discomfort index where no AC is used
DIHI = The lowest discomfort index where all vehicles with AC use it
DB = Dry bulb temperature (Fahrenheit)
WB = Wet bulb temperature (Fahrenheit)
T = Ambient temperature (Fahrenheit)

TABLE 1.2.8B

ESTIMATED FRACTION OF
LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS I
EQUIPPED WITH AIR CONDITIONING

Model Years	Fraction Equipped With Air Conditioning
Pre-1977	0.32
1977	0.52
1978+	0.39

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TABLE 1.2.9

EXTRA LOAD CORRECTION FACTOR COEFFICIENTS
FOR LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS I

* XLCF = (XLC-1)*U + 1

Model Years	Coefficients (XLC) HC	CO	NOx
Pre-1968	1.0786	1.2765	0.9535
1968-1969	1.0495	1.1384	1.0313
1970-1971	1.0852	1.2478	1.0313
1972	1.0556	1.1347	1.0313
1973-1974	1.0556	1.1347	1.0753
1975+	1.0455	1.3058	1.0719

* WHERE :

XLCF = Extra load correction factor
U = Fraction of VMT with an extra load
XLC = Correction factor coefficient

TABLE 1.2.10

TRAILER TOWING CORRECTION FACTOR COEFFICIENTS
FOR LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS I

* TTCF = (TTC-1)*U + 1

Model Years	Coefficients (TTC) HC	CO	NOx
Pre-1968	1.2614	1.9327	1.1184
1968-1969	1.2762	1.8940	1.1384
1970-1971	1.4598	2.4753	1.1384
1972	1.7288	2.1414	1.1384
1973-1974	1.7288	2.1414	1.2170
1975+	1.5909	3.9722	1.3875

* WHERE :

TTCF = Trailer towing correction factor
U = Fraction of VMT towing a trailer
TTC = Correction factor coefficient

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TABLE 1.3.1A

EXHAUST EMISSION RATES FOR
LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS II
(RATES REFLECT ZERO TAMPERING)

* BER = ZML + (DR * M)

Pol	Model Years	Zero Mile Emission Level (Grams/Mile)	Deterioration Rate (Gm/Mi/10K Mi)	50,000 Mile Emission Level (Grams/Mile)
HC	Pre-1970	9.57	0.18	10.47
	1970-1973	6.28	0.25	7.53
	1974-1978	6.28	0.17	7.13
	1979-1980	0.92	0.27	2.27
	1981-1983	0.92	0.19	1.87
	1984	0.58	0.13	1.23
	1985-1986	0.45	0.07	0.80
	1987+	0.51	0.06	0.81
CO	Pre-1970	93.98	2.25	105.23
	1970-1973	60.08	2.55	72.83
	1974-1978	60.08	2.44	72.28
	1979-1980	13.67	2.59	26.62
	1981	13.67	1.13	19.32
	1982-1983	13.67	1.13	19.32
	1984	7.41	0.98	12.31
	1985-1986	6.43	0.49	8.88
	1987+	5.60	0.91	10.15
NOx	Pre-1970	5.44	0.0	5.44
	1970-1973	6.45	0.0	6.45
	1974-1978	4.61	0.04	4.81
	1979-1983	1.74	0.09	2.19
	1984	1.74	0.09	2.19
	1985-1986	1.74	0.04	1.94
	1987+	0.86	0.04	1.06

* WHERE : BER = Basic emission rate (untampered)
ZML = Zero mile level
DR = Deterioration rate
M = Cumulative mileage / 10,000

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TABLE 1.3.1B

EXHAUST EMISSION RATES FOR
LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS II
AT VARIOUS MILEAGE INTERVALS
(RATES INCLUDE TAMPERING)

Pol	Model Years	Emission Rate (Grams/Mile) 0K	20K	40K	60K	80K	100K	120K	140K
HC	Pre-1970	9.57	9.93	10.29	10.65	11.01	11.36	11.72	12.08
	1970-1973	6.28	6.78	7.29	7.80	8.30	8.81	9.31	9.82
	1974-1978	6.28	6.62	6.96	7.29	7.63	7.97	8.31	8.65
	1979-1980	1.52	2.26	2.99	3.72	4.45	5.19	5.92	6.65
	1981-1982	1.52	2.09	2.67	3.24	3.81	4.38	4.95	5.52
	1983	1.50	2.06	2.62	3.19	3.75	4.31	4.88	5.44
	1984	1.08	1.48	1.88	2.29	2.69	3.09	3.50	3.90
	1985-1986	0.95	1.23	1.52	1.81	2.10	2.38	2.67	2.96
	1987+	0.90	1.13	1.37	1.61	1.84	2.08	2.32	2.55
CO	Pre-1970	93.97	98.42	102.87	107.32	111.77	116.22	120.68	125.13
	1970-1973	60.08	65.12	70.16	75.21	80.25	85.30	90.34	95.38
	1974-1978	60.09	64.99	69.89	74.79	79.69	84.59	89.49	94.39
	1979-1980	19.57	26.95	34.36	41.77	49.19	56.61	64.03	71.46
	1981-1982	19.57	23.90	28.25	32.58	36.92	41.25	45.58	49.91
	1983	19.36	23.61	27.88	32.13	36.39	40.64	44.89	49.14
	1984	12.07	15.62	19.19	22.76	26.32	29.89	33.46	37.03
	1985-1986	11.07	13.63	16.21	18.80	21.38	23.96	26.54	29.13
	1987+	9.19	12.24	15.30	18.36	21.42	24.48	27.54	30.60
NOx	Pre-1970	5.44	5.44	5.44	5.44	5.44	5.44	5.43	5.43
	1970-1972	6.45	6.45	6.44	6.44	6.44	6.44	6.43	6.43
	1973	6.47	6.48	6.49	6.51	6.52	6.53	6.55	6.56
	1974-1978	4.63	4.72	4.82	4.92	5.01	5.11	5.20	5.30
	1979-1982	1.92	2.24	2.57	2.90	3.23	3.55	3.88	4.21
	1983	1.92	2.24	2.57	2.90	3.23	3.55	3.88	4.21
	1984	1.95	2.28	2.62	2.95	3.29	3.62	3.95	4.29
	1985-1986	1.95	2.18	2.42	2.65	2.89	3.12	3.36	3.60
	1987+	1.19	1.39	1.59	1.80	2.00	2.20	2.41	2.61

DATE : MAY 25, 1985

TABLE 1.3.1C

CRANKCASE AND EVAPORATIVE HYDROCARBON EMISSIONS
FOR LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS II
(RATES REFLECT ZERO TAMPERING)

** CCEV = (HSK * TPD + DNL)/MPD + CC

Model Years	SHED Hot Soak Emissions (Gm/Trip)	Trips* Per Day	SHED Diurnal Emissions (Gm/Day)	Miles* Per Day	Crankcase Emissions (Gm/Mile)	Total Crankcase and Evap. Emissions (Gm/Mile)
Pre-1968	27.66	3.05	77.89	33.70	5.70	10.51
1968-1978	27.66	3.05	77.89	33.70	0.0	4.81
1979-1983	3.98	3.05	9.31	33.70	0.0	0.64
1984	3.59	3.05	9.31	33.70	0.0	0.60
1985	3.20	3.05	9.31	33.70	0.0	0.57
1986	2.81	3.05	9.31	33.70	0.0	0.53
1987	2.47	3.05	9.31	33.70	0.0	0.50
1988-1989	2.05	3.05	9.31	33.70	0.0	0.46
1990+	1.82	3.05	9.31	33.70	0.0	0.44

* Default information that may be altered by the MOBILE3 user with information about the local area.

** WHERE :

CCEV = Total untampered crankcase & evaporative HC emissions (Gm/Mile)
HSK = Hot soak emissions (Gm/Trip)
TPD = Trips per day
DNL = Diurnal emissions (Gm/Day)
MPD = Miles per day
CC = Crankcase emissions (Gm/Mile)

DATE : MAY 25, 1985

TABLE 1.3.1D

TOTAL CRANKCASE AND EVAPORATIVE HC EMISSIONS
FOR LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS II
AT VARIOUS MILEAGE INTERVALS
(RATES INCLUDE TAMPERING)

Model Years	Emission Rate (Grams/Mile) 0K	20K	40K	60K	80K	100K	120K	140K
Pre-1968	10.51	10.51	10.51	10.51	10.51	10.51	10.51	10.51
1968-1970	4.97	5.00	5.03	5.05	5.08	5.10	5.13	5.16
1971-1974	4.96	4.99	5.01	5.04	5.06	5.09	5.11	5.13
1975-1977	4.96	4.99	5.01	5.03	5.06	5.08	5.10	5.13
1978	4.96	4.98	5.00	5.02	5.05	5.07	5.09	5.11
1979	0.83	0.86	0.90	0.93	0.96	0.99	1.03	1.06
1980	0.81	0.84	0.87	0.90	0.93	0.96	0.99	1.02
1981-1982	0.81	0.84	0.87	0.89	0.92	0.95	0.98	1.01
1983	0.80	0.83	0.86	0.88	0.91	0.94	0.96	0.99
1984	0.76	0.78	0.81	0.84	0.86	0.89	0.91	0.94
1985	0.72	0.74	0.76	0.79	0.81	0.84	0.86	0.89
1986	0.67	0.70	0.72	0.74	0.77	0.79	0.81	0.84
1987	0.64	0.66	0.68	0.70	0.73	0.75	0.77	0.79
1988-1989	0.59	0.61	0.63	0.65	0.67	0.69	0.72	0.74
1990+	0.56	0.58	0.61	0.63	0.65	0.67	0.69	0.71

DATE : MAY 25, 1985

TABLE 1.3.2A

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS II
TOTAL HC (INCLUDES EVAP & CRANKCASE)

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	23.4	1962	23.4	1963	23.4	1964	23.4	1965	23.4	1966	23 4	1967	23.4	1968	17.7	1969	17.7	1970	16.1	1971	16.1	1972	16.1
1962	23.3	1963	23.3	1964	23.3	1965	23.3	1966	23.3	1967	23.3	1968	17.6	1969	17.6	1970	16.0	1971	16.0	1972	16.0	1973	16.0
1963	23.2	1964	23.2	1965	23.2	1966	23.2	1967	23.2	1968	17.5	1969	17.5	1970	15.9	1971	15.9	1972	15.9	1973	15.9	1974	14.4
1964	23.2	1965	23.2	1966	23.2	1967	23.2	1968	17.5	1969	17.5	1970	15 8	1971	15.8	1972	15.8	1973	15.8	1974	14.4	1975	14.4
1965	23.1	1966	23.1	1967	23.1	1968	17.4	1969	17.4	1970	15.6	1971	15.6	1972	15.6	1973	15.6	1974	14.3	1975	14.3	1976	14.3
1966	22.9	1967	22.9	1968	17.2	1969	17.2	1970	15.5	1971	15.5	1972	15.5	1973	15.5	1974	14.2	1975	14.2	1976	14.2	1977	14.2
1967	22.8	1968	17.1	1969	17.1	1970	15.3	1971	15.3	1972	15 3	1973	15.3	1974	14.0	1975	14.0	1976	14.0	1977	14.0	1978	14.0
1968	17.0	1969	17.0	1970	15.1	1971	15.1	1972	15.1	1973	15.1	1974	13.9	1975	13.9	1976	13.9	1977	13.9	1978	13.9	1979	5.8
1969	16.9	1970	14.9	1971	14.9	1972	14.9	1973	14.9	1974	13 8	1975	13.8	1976	13.8	1977	13.8	1978	13.8	1979	5.6	1980	5.6
1970	14.7	1971	14.7	1972	14.7	1973	14.7	1974	13 6	1975	13 6	1976	13.6	1977	13.6	1978	13.6	1979	5.4	1980	5.4	1981	4.4
1971	14 5	1972	14.5	1973	14.5	1974	13.5	1975	13.5	1976	13.5	1977	13.5	1978	13.5	1979	5.2	1980	5.2	1981	4.2	1982	4.2
1972	14.2	1973	14 2	1974	13 3	1975	13.3	1976	13.3	1977	13 3	1978	13.3	1979	4.9	1980	4.9	1981	4.0	1982	4.0	1983	4.0
1973	14.0	1974	13.1	1975	13 1	1976	13.1	1977	13.1	1978	13 1	1979	4.6	1980	4.6	1981	3.8	1982	3.8	1983	3 8	1984	2.8
1974	12.9	1975	12.9	1976	12.9	1977	12.9	1978	12.9	1979	4.3	1980	4.3	1981	3.6	1982	3.6	1983	3.6	1984	2.7	1985	2.0
1975	12 7	1976	12 7	1977	12.7	1978	12.7	1979	3.9	1980	3 9	1981	3.3	1982	3.3	1983	3.3	1984	2.5	1985	1.9	1986	1.8
1976	12.5	1977	12.5	1978	12.5	1979	3.6	1980	3.6	1981	3.1	1982	3.1	1983	3.1	1984	2.3	1985	1.8	1986	1.7	1987	1.7
1977	12.3	1978	12.3	1979	3.2	1980	3.2	1981	2.8	1982	2.8	1983	2.8	1984	2.1	1985	1.7	1986	1.6	1987	1.6	1988	1.6
1978	12.0	1979	2.7	1980	2.7	1981	2 5	1982	2.5	1983	2.5	1984	1.9	1985	1.6	1986	1.5	1987	1.5	1988	1.5	1989	1.5
1979	2.3	1980	2.3	1981	2.2	1982	2.2	1983	2.2	1984	1 7	1985	1.4	1986	1.4	1987	1.4	1988	1.4	1989	1.4	1990	1.4
1980	2.0	1981	1.9	1982	1.9	1983	1.9	1984	1.6	1985	1 4	1986	1.3	1987	1.3	1988	1.3	1989	1.3	1990	1.3	1991	1.3

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	16.1	1974	14.6	1975	14.6	1976	14.6	1977	14 6	1978	14.6	1979	6.9	1980	6.9	1981	5.4	1982	5.4	1983	5.4	1984	3.9
1974	14.5	1975	14.5	1976	14.5	1977	14.5	1978	14.5	1979	6.8	1980	6.8	1981	5.3	1982	5.3	1983	5.3	1984	3.9	1985	2.6
1975	14.4	1976	14.4	1977	14.4	1978	14.4	1979	6.7	1980	6.7	1981	5.3	1982	5.3	1983	5.3	1984	3.8	1985	2.6	1986	2.5
1976	14.4	1977	14.4	1978	14.4	1979	6.5	1980	6.5	1981	5.2	1982	5.2	1983	5.2	1984	3.7	1985	2.5	1986	2.5	1987	2.4
1977	14.3	1978	14.3	1979	6.4	1980	6.4	1981	5.0	1982	5.0	1983	5.0	1984	3.7	1985	2.5	1986	2.5	1987	2.3	1988	2.3
1978	14.2	1979	6.2	1980	6.2	1981	4.9	1982	4 9	1983	4 9	1984	3.6	1985	2.5	1986	2.4	1987	2.3	1988	2.2	1989	2.2
1979	6 0	1980	6.0	1981	4.8	1982	4.8	1983	4.8	1984	3 5	1985	2.4	1986	2.4	1987	2.2	1988	2.2	1989	2.2	1990	2.2
1980	5.8	1981	4.7	1982	4 7	1983	4.7	1984	3.4	1985	2 4	1986	2.3	1987	2.2	1988	2.2	1989	2.2	1990	2.1	1991	2.1
1981	4.5	1982	4.5	1983	4.5	1984	3.3	1985	2.3	1986	2.3	1987	2.2	1988	2.1	1989	2.1	1990	2.1	1991	2.1	1992	2.1
1982	4.4	1983	4.4	1984	3.2	1985	2.2	1986	2.2	1987	2.1	1988	2.1	1989	2.1	1990	2.0	1991	2.0	1992	2.0	1993	2.0
1983	4.2	1984	3.1	1985	2 2	1986	2 1	1987	2.0	1988	2.0	1989	2.0	1990	2.0	1991	2.0	1992	2.0	1993	2.0	1994	2.0
1984	3.0	1985	2.1	1986	2.1	1987	2.0	1988	2.0	1989	2.0	1990	1.9	1991	1.9	1992	1.9	1993	1.9	1994	1.9	1995	1.9
1985	2.0	1986	2.0	1987	1.9	1988	1.9	1989	1.9	1990	1.9	1991	1.9	1992	1.9	1993	1.9	1994	1.9	1995	1.9	1996	1.9
1986	1.9	1987	1.9	1988	1.8	1989	1.8	1990	1.8	1991	1.8	1992	1.8	1993	1.8	1994	1.8	1995	1.8	1996	1.8	1997	1.8
1987	1.8	1988	1.7	1989	1.7	1990	1.7	1991	1.7	1992	1.7	1993	1.7	1994	1.7	1995	1.7	1996	1.7	1997	1.7	1998	1.7
1988	1.7	1989	1.7	1990	1.6	1991	1.6	1992	1.6	1993	1.6	1994	1.6	1995	1.6	1996	1.6	1997	1.6	1998	1.6	1999	1.6
1989	1.6	1990	1.6	1991	1.6	1992	1.6	1993	1 6	1994	1.6	1995	1.6	1996	1.6	1997	1.6	1998	1.6	1999	1.6	2000	1.6
1990	1.5	1991	1.5	1992	1.5	1993	1.5	1994	1.5	1995	1.5	1996	1.5	1997	1.5	1998	1.5	1999	1.5	2000	1.5	2001	1.5
1991	1.4	1992	1.4	1993	1.4	1994	1.4	1995	1.4	1996	1.4	1997	1.4	1998	1.4	1999	1.4	2000	1.4	2001	1.4	2002	1.4
1992	1.3	1993	1.3	1994	1.3	1995	1.3	1996	1.3	1997	1.3	1998	1.3	1999	1.3	2000	1.3	2001	1.3	2002	1.3	2003	1.3

*MY -- Indicates the model year

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27 3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1.3.4.

TABLE 1.3.2B

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS II
CO

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	135.3	1962	135.3	1963	135.3	1964	135.3	1965	135.3	1966	135.3	1967	135.3	1968	135.3	1969	135.3	1970	107.1	1971	107.1	1972	107.1
1962	134.3	1963	134.3	1964	134.3	1965	134.3	1966	134.3	1967	134.3	1968	134.3	1969	134.3	1970	106.0	1971	106.0	1972	106.0	1973	106.0
1963	133.2	1964	133.2	1965	133.2	1966	133.2	1967	133.2	1968	133.2	1969	133.2	1970	104.7	1971	104.7	1972	104.7	1973	104.7	1974	102.8
1964	132.1	1965	132.1	1966	132.1	1967	132.1	1968	132 1	1969	132.1	1970	103.4	1971	103.4	1972	103.4	1973	103.4	1974	101.5	1975	101.5
1965	130.8	1966	130.8	1967	130.8	1968	130 8	1969	130.8	1970	102.0	1971	102.0	1972	102.0	1973	102.0	1974	100.1	1975	100.1	1976	100.1
1966	129.4	1967	129.4	1968	129.4	1969	129 4	1970	100.4	1971	100.4	1972	100.4	1973	100.4	1974	98.6	1975	98.6	1976	98.6	1977	98.6
1967	127.9	1968	127.9	1969	127.9	1970	98.7	1971	98.7	1972	98.7	1973	98.7	1974	97.0	1975	97.0	1976	97.0	1977	97.0	1978	97.0
1968	126.3	1969	126.3	1970	96.9	1971	96.9	1972	96.9	1973	96.9	1974	95.3	1975	95.3	1976	95.3	1977	95.3	1978	95.3	1979	51.2
1969	124.6	1970	94.9	1971	94.9	1972	94.9	1973	94.9	1974	93.4	1975	93.4	1976	93.4	1977	93.4	1978	93.4	1979	49.2	1980	49.2
1970	92.7	1971	92.7	1972	92.7	1973	92.7	1974	91 3	1975	91.3	1976	91.3	1977	91.3	1978	91.3	1979	47.0	1980	47.0	1981	28.2
1971	90.4	1972	90.4	1973	90.4	1974	89.1	1975	89.1	1976	89.1	1977	89.1	1978	89.1	1979	44.6	1980	44.6	1981	27.2	1982	27.2
1972	87.9	1973	87.9	1974	86.7	1975	86.7	1976	86.7	1977	86.7	1978	86.7	1979	42.1	1980	42.1	1981	26.0	1982	26.0	1983	26.0
1973	85.2	1974	84.1	1975	84.1	1976	84.1	1977	84.1	1978	84.1	1979	39.3	1980	39.3	1981	24.8	1982	24.8	1983	24.8	1984	17.1
1974	81.3	1975	81.3	1976	81.3	1977	81.3	1978	81.3	1979	36.3	1980	36.3	1981	23.5	1982	23.5	1983	23.5	1984	16.0	1985	10.7
1975	78.2	1976	78.2	1977	78.2	1978	78.2	1979	33.1	1980	33.1	1981	22.1	1982	22.1	1983	22.1	1984	14.7	1985	10.1	1986	10.1
1976	74.9	1977	74.9	1978	74.9	1979	29.6	1980	29.6	1981	20.6	1982	20.6	1983	20.6	1984	13.4	1985	9.4	1986	9.4	1987	11.2
1977	71.3	1978	71.3	1979	25.8	1980	25.8	1981	18.9	1982	18.9	1983	18.9	1984	12.0	1985	8.7	1986	8.7	1987	9.8	1988	9.8
1978	67.4	1979	21.6	1980	21.6	1981	17.1	1982	17.1	1983	17.1	1984	10.4	1985	7.9	1986	7.9	1987	8.4	1988	8.4	1989	8.4
1979	17.2	1980	17.2	1981	15.2	1982	15.2	1983	15.2	1984	8.7	1985	7.1	1986	7.1	1987	6.8	1988	6.8	1989	6.8	1990	6.8
1980	14.2	1981	13.9	1982	13.9	1983	13.9	1984	7.6	1985	6.5	1986	6.5	1987	5.8	1988	5.8	1989	5.8	1990	5.8	1991	5.8

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	107.1	1974	105.1	1975	105.1	1976	105.1	1977	105.1	1978	105.1	1979	61.6	1980	61.6	1981	34.5	1982	34.5	1983	34.5	1984	25.5
1974	104.0	1975	104.0	1976	104.0	1977	104.0	1978	104.0	1979	60.4	1980	60.4	1981	34.0	1982	34.0	1983	34.0	1984	25.1	1985	15.3
1975	102.8	1976	102.8	1977	102.8	1978	102.8	1979	59.2	1980	59.2	1981	33.5	1982	33.5	1983	33.5	1984	24.6	1985	15.0	1986	15.0
1976	101.5	1977	101.5	1978	101.5	1979	57.8	1980	57.8	1981	32.9	1982	32.9	1983	32.9	1984	24.1	1985	14.8	1986	14.8	1987	21.1
1977	100.1	1978	100.1	1979	56.4	1980	56.4	1981	32.3	1982	32.3	1983	32.3	1984	23.6	1985	14.5	1986	14.5	1987	20.6	1988	20.6
1978	98.6	1979	54.8	1980	54.8	1981	31.6	1982	31 6	1983	31 6	1984	23.0	1985	14.2	1986	14.2	1987	20.0	1988	20.0	1989	20.0
1979	53.1	1980	53.1	1981	30.8	1982	30.8	1983	30.8	1984	22 3	1985	13.9	1986	13.9	1987	19.4	1988	19.4	1989	19.4	1990	19.4
1980	51.2	1981	30.0	1982	30.0	1983	30.0	1984	21.6	1985	13.5	1986	13.5	1987	18.8	1988	18.8	1989	18.8	1990	18.8	1991	18.8
1981	29.1	1982	29.1	1983	29.1	1984	20.8	1985	13.1	1986	13.1	1987	18.1	1988	18.1	1989	18.1	1990	18.1	1991	18.1	1992	18.1
1982	28.2	1983	28.2	1984	20.0	1985	12.7	1986	12.7	1987	17 3	1988	17.3	1989	17.3	1990	17.3	1991	17.3	1992	17.3	1993	17.3
1983	27.2	1984	19.1	1985	12.3	1986	12.3	1987	16.5	1988	16.5	1989	16.5	1990	16.5	1991	16.5	1992	16.5	1993	16.5	1994	16.5
1984	18.2	1985	11.8	1986	11.8	1987	15.6	1988	15.6	1989	15.6	1990	15.6	1991	15.6	1992	15.6	1993	15.6	1994	15.6	1995	15.6
1985	11.3	1986	11.3	1987	14.6	1988	14.6	1989	14.6	1990	14.6	1991	14.6	1992	14.6	1993	14.6	1994	14.6	1995	14.6	1996	14.6
1986	10.7	1987	13.6	1988	13.6	1989	13.6	1990	13.6	1991	13.6	1992	13.6	1993	13.6	1994	13.6	1995	13.6	1996	13.6	1997	13.6
1987	12.4	1988	12.4	1989	12.4	1990	12.4	1991	12.4	1992	12.4	1993	12.4	1994	12.4	1995	12.4	1996	12.4	1997	12.4	1998	12.4
1988	11.2	1989	11.2	1990	11.2	1991	11.2	1992	11.2	1993	11.2	1994	11.2	1995	11.2	1996	11.2	1997	11.2	1998	11.2	1999	11.2
1989	9.8	1990	9.8	1991	9.8	1992	9.8	1993	9.8	1994	9.8	1995	9.8	1996	9.8	1997	9.8	1998	9.8	1999	9.8	2000	9.8
1990	8.4	1991	8.4	1992	8.4	1993	8.4	1994	8.4	1995	8.4	1996	8.4	1997	8.4	1998	8.4	1999	8.4	2000	8.4	2001	8.4
1991	6.8	1992	6.8	1993	6.8	1994	6.8	1995	6.8	1996	6.8	1997	6.8	1998	6.8	1999	6.8	2000	6.8	2001	6.8	2002	6.8
1992	5.8	1993	5.8	1994	5.8	1995	5.8	1996	5.8	1997	5.8	1998	5.8	1999	5.8	2000	5.8	2001	5.8	2002	5.8	2003	5.8

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1.3.4.

TABLE 1.3.2C

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS II
NOx

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	5.4	1962	5.4	1963	5.4	1964	5.4	1965	5.4	1966	5.4	1967	5.4	1968	5.4	1969	5.4	1970	6.4	1971	6.4	1972	6.4
1962	5.4	1963	5.4	1964	5.4	1965	5.4	1966	5.4	1967	5.4	1968	5.4	1969	5.4	1970	6.4	1971	6.4	1972	6.4	1973	6.4
1963	5.4	1964	5.4	1965	5.4	1966	5.4	1967	5.4	1968	5.4	1969	5.4	1970	6.4	1971	6.4	1972	6.4	1973	6.4	1974	5.3
1964	5.4	1965	5.4	1966	5.4	1967	5.4	1968	5.4	1969	5.4	1970	6.4	1971	6.4	1972	6.4	1973	6.4	1974	5.3	1975	5.3
1965	5.4	1966	5.4	1967	5.4	1968	5.4	1969	5.4	1970	6.4	1971	6.4	1972	6.4	1973	6.4	1974	5.3	1975	5.3	1976	5.3
1966	5.4	1967	5.4	1968	5.4	1969	5.4	1970	6.4	1971	6.4	1972	6.4	1973	6.4	1974	5.2	1975	5.2	1976	5.2	1977	5.2
1967	5.4	1968	5.4	1969	5.4	1970	6.4	1971	6.4	1972	6.4	1973	6.4	1974	5.2	1975	5.2	1976	5.2	1977	5.2	1978	5.2
1968	5.4	1969	5.4	1970	6.4	1971	6.4	1972	6.4	1973	6.4	1974	5.2	1975	5.2	1976	5.2	1977	5.2	1978	5.2	1979	3.0
1969	5.4	1970	6.4	1971	6.4	1972	6.4	1973	6.4	1974	5.2	1975	5.2	1976	5.2	1977	5.2	1978	5.2	1979	3.0	1980	3.0
1970	6.4	1971	6.4	1972	6.4	1973	6.4	1974	5.1	1975	5.1	1976	5.1	1977	5.1	1978	5.1	1979	2.9	1980	2.9	1981	2.9
1971	6.4	1972	6.4	1973	6.4	1974	5.1	1975	5.1	1976	5.1	1977	5.1	1978	5.1	1979	2.8	1980	2.8	1981	2.8	1982	2.8
1972	6.4	1973	6.4	1974	5.0	1975	5.0	1976	5.0	1977	5.0	1978	5.0	1979	2.7	1980	2.7	1981	2.7	1982	2.7	1983	2.7
1973	6.4	1974	5.0	1975	5.0	1976	5.0	1977	5.0	1978	5.0	1979	2.6	1980	2.6	1981	2.6	1982	2.6	1983	2.6	1984	2.6
1974	5.0	1975	5.0	1976	5.0	1977	5.0	1978	5.0	1979	2.5	1980	2.5	1981	2.5	1982	2.5	1983	2.5	1984	2.5	1985	2.1
1975	4.9	1976	4.9	1977	4.9	1978	4.9	1979	2.4	1980	2.4	1981	2.4	1982	2.4	1983	2.4	1984	2.4	1985	2.0	1986	2.0
1976	4.8	1977	4.8	1978	4.8	1979	2.3	1980	2.3	1981	2.3	1982	2.3	1983	2.3	1984	2.3	1985	2.0	1986	2.0	1987	1.1
1977	4.8	1978	4.8	1979	2.2	1980	2.2	1981	2.2	1982	2.2	1983	2.2	1984	2.2	1985	1.9	1986	1.9	1987	1.0	1988	1.0
1978	4.7	1979	2.0	1980	2.0	1981	2.0	1982	2.0	1983	2.0	1984	2.0	1985	1.9	1986	1.9	1987	1.0	1988	1.0	1989	1.0
1979	1.9	1980	1.9	1981	1.9	1982	1.9	1983	1.9	1984	1.9	1985	1.8	1986	1.8	1987	0.9	1988	0.9	1989	0.9	1990	0.9
1980	1.8	1981	1.8	1982	1.8	1983	1.8	1984	1.8	1985	1.7	1986	1.7	1987	0.9	1988	0.9	1989	0.9	1990	0.9	1991	0.9

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	6.4	1974	5.3	1975	5.3	1976	5.3	1977	5.3	1978	5.3	1979	3.4	1980	3.4	1981	3.4	1982	3.4	1983	3.4	1984	3.4
1974	5.3	1975	5.3	1976	5.3	1977	5.3	1978	5.3	1979	3.4	1980	3.4	1981	3.4	1982	3.4	1983	3.4	1984	3.4	1985	2.5
1975	5.3	1976	5.3	1977	5.3	1978	5.3	1979	3.3	1980	3.3	1981	3.3	1982	3.3	1983	3.3	1984	3.3	1985	2.4	1986	2.4
1976	5.3	1977	5.3	1978	5.3	1979	3.3	1980	3.3	1981	3.3	1982	3.3	1983	3.3	1984	3.3	1985	2.4	1986	2.4	1987	1.5
1977	5.3	1978	5.3	1979	3.2	1980	3.2	1981	3.2	1982	3.2	1983	3.2	1984	3.2	1985	2.4	1986	2.4	1987	1.5	1988	1.5
1978	5.2	1979	3.2	1980	3.2	1981	3.2	1982	3.2	1983	3.2	1984	3.2	1985	2.4	1986	2.4	1987	1.5	1988	1.5	1989	1.5
1979	3.1	1980	3.1	1981	3.1	1982	3.1	1983	3.1	1984	3.1	1985	2.3	1986	2.3	1987	1.5	1988	1.5	1989	1.5	1990	1.5
1980	3.0	1981	3.0	1982	3.0	1983	3.0	1984	3.0	1985	2.3	1986	2.3	1987	1.4	1988	1.4	1989	1.4	1990	1.4	1991	1.4
1981	3.0	1982	3.0	1983	3.0	1984	3.0	1985	2.3	1986	2.3	1987	1.4	1988	1.4	1989	1.4	1990	1.4	1991	1.4	1992	1.4
1982	2.9	1983	2.9	1984	2.9	1985	2.3	1986	2.3	1987	1.4	1988	1.4	1989	1.4	1990	1.4	1991	1.4	1992	1.4	1993	1.4
1983	2.8	1984	2.8	1985	2.2	1986	2.2	1987	1.3	1988	1.3	1989	1.3	1990	1.3	1991	1.3	1992	1.3	1993	1.3	1994	1.3
1984	2.7	1985	2.2	1986	2.2	1987	1.3	1988	1.3	1989	1.3	1990	1.3	1991	1.3	1992	1.3	1993	1.3	1994	1.3	1995	1.3
1985	2.1	1986	2.1	1987	1.3	1988	1.3	1989	1.3	1990	1.3	1991	1.3	1992	1.3	1993	1.3	1994	1.3	1995	1.3	1996	1.3
1986	2.1	1987	1.2	1988	1.2	1989	1.2	1990	1.2	1991	1.2	1992	1.2	1993	1.2	1994	1.2	1995	1.2	1996	1.2	1997	1.2
1987	1.2	1988	1.2	1989	1.2	1990	1.2	1991	1.2	1992	1.2	1993	1.2	1994	1.2	1995	1.2	1996	1.2	1997	1.2	1998	1.2
1988	1.1	1989	1.1	1990	1.1	1991	1.1	1992	1.1	1993	1.1	1994	1.1	1995	1.1	1996	1.1	1997	1.1	1998	1.1	1999	1.1
1989	1.0	1990	1.0	1991	1.0	1992	1.0	1993	1.0	1994	1.0	1995	1.0	1996	1.0	1997	1.0	1998	1.0	1999	1.0	2000	1.0
1990	1.0	1991	1.0	1992	1.0	1993	1.0	1994	1.0	1995	1.0	1996	1.0	1997	1.0	1998	1.0	1999	1.0	2000	1.0	2001	1.0
1991	0.9	1992	0.9	1993	0.9	1994	0.9	1995	0.9	1996	0.9	1997	0.9	1998	0.9	1999	0.9	2000	0.9	2001	0.9	2002	0.9
1992	0.9	1993	0.9	1994	0.9	1995	0.9	1996	0.9	1997	0.9	1998	0.9	1999	0.9	2000	0.9	2001	0.9	2002	0.9	2003	0.9

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1.3.4.

TABLE 1.3.3

IDLE EMISSION RATES FOR
LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS II

* IER = ZML + (DR * M)

Pol	Model Years	Zero Mile Emission Level (Grams/Min.)	Deterioration Rate (Gm/Min/10K Mi)
HC	Pre-1970	1.67	0.03
	1970-1973	1.06	0.04
	1974-1978	1.06	0.03
	1979-1980	0.07	0.02
	1981-1983	0.06	0.02
	1984	0.04	0.01
	1985-1986	0.03	0.01
	1987+	0.03	0.01
CO	Pre-1970	18.98	0.45
	1970-1973	11.53	0.52
	1974-1978	11.53	0.49
	1979-1980	1.57	0.32
	1981	1.31	0.27
	1982-1983	1.19	0.24
	1984	0.69	0.14
	1985-1986	0.34	0.18
	1987+	0.34	0.18
NOx	Pre-1970	0.08	0.0
	1970-1973	0.10	0.0
	1974-1978	0.07	0.0
	1979-1983	0.06	0.0
	1984	0.05	0.0
	1985-1986	0.02	0.0
	1987+	0.02	0.0

* WHERE : IER = Idle emission rate
ZML = Zero mile level
DR = Deterioration Rate
M = Cumulative Mileage / 10,000

DATE : MAY 25, 1985

TABLE 1.3.4

REGISTRATION MIX AND
MILEAGE ACCUMULATION RATES FOR
LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS II

Model Year Index**	July 1 Registration Mix*	Mileage Accumulation Rate per truck *	Jan 1 Registration Mix	Jan 1 Mileage Accumulation Rate (fleet)	Jan 1 Mileage Accumulation (fleet)
1	0.067	18352.	0.022	18352.	2294.
2	0.085	16946.	0.085	18000.	13720.
3	0.081	15648.	0.081	16621.	31021.
4	0.077	14449.	0.077	15348.	46997.
5	0.073	13342.	0.073	14172.	61748.
6	0.069	12320.	0.069	13086.	75370.
7	0.065	11376.	0.065	12084.	87947.
8	0.061	10504.	0.061	11158.	99562.
9	0.057	9700.	0.057	10303.	110286.
10	0.053	8956.	0.053	9514.	120188.
11	0.048	8270.	0.048	8784.	129332.
12	0.044	7637.	0.044	8112.	137775.
13	0.040	7052.	0.040	7491.	145572.
14	0.036	6511.	0.036	6917.	152771.
15	0.032	6012.	0.032	6386.	159419.
16	0.028	5552.	0.028	5897.	165557.
17	0.024	5126.	0.024	5445.	171225.
18	0.020	4734.	0.020	5028.	176458.
19	0.016	4371.	0.016	4643.	181291.
20+	0.024	4036.	0.024	4287.	185753.

* Default information that may be altered by the MOBILE3 user with information about the local area.

** The indices refer to the most recent model year vehicles in any given calendar year. Index 1 references the newest model year vehicles and index 20+ references the oldest model year vehicles.

DATE : MAY 25, 1985

TABLE 1.3.5

EXAMPLE TRAVEL WEIGHTING FRACTION CALCULATION FOR
LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS II
JANUARY 1, 1988

Model Years	(A) LDT2 Fleet Registration	(B) Sales Fraction	(A*B)	(C=A*B/DAF) LDGT2 Registration	(D) Annual Mileage Accrual Rate	(C*D)	(C*D/TFNORM) Travel Fractions
1988	0.022	0.760	0.017	0.019	18352.	355.7	0.032
1987	0.085	0.790	0.067	0.077	18000.	1380.3	0.123
1986	0.081	0.820	0.066	0.076	16621.	1260.7	0.112
1985	0.077	0.840	0.065	0.074	15348.	1133.6	0.101
1984	0.073	0.870	0.064	0.073	14172.	1027.8	0.091
1983	0.069	0.900	0.062	0.071	13086.	928.0	0.083
1982	0.065	0.920	0.060	0.068	12084.	825.2	0.073
1981	0.061	0.940	0.057	0.065	11158.	730.6	0.065
1980	0.057	0.966	0.055	0.063	10303.	647.8	0.058
1979	0.053	0.972	0.052	0.059	9514.	559.7	0.050
1978	0.048	0.991	0.048	0.054	8784.	477.2	0.042
1977	0.044	0.995	0.044	0.050	8112.	405.5	0.036
1976	0.040	0.997	0.040	0.046	7491.	341.1	0.030
1975	0.036	0.998	0.036	0.041	6917.	283.8	0.025
1974	0.032	1.000	0.032	0.037	6386.	233.4	0.021
1973	0.028	1.000	0.028	0.032	5897.	188.6	0.017
1972	0.024	1.000	0.024	0.027	5445.	149.2	0.013
1971	0.020	1.000	0.020	0.023	5028.	114.8	0.010
1970	0.016	1.000	0.016	0.018	4643.	84.8	0.008
1969-	0.024	1.000	0.024	0.027	4287.	117.5	0.010
		DAF:	0.876		TFNORM:	11245.4	

WHERE :

A = January 1 registration mix from Table 1.3.4.
B = Fleet sales fractions
D = Sales weighted fleet mileage accumulation rate from Table 1.3.4, adjusted to January 1
D(1) = Annual Miles(1)
D(MYI)= .25*(Annual Miles(MYI)) + .75*(Annual Miles(MYI-1)), MYI=2,...,20+

NOTE : In general, the travel weighting fractions will change for every calendar year since the sales fraction (column B) changes for almost every model year.

DATE : MAY 25, 1985

TABLE 1.3.6

SPEED CORRECTION FACTOR COEFFICIENTS FOR LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS II

* SCF(s,sadj) = SF(s)/SF(sadj)

$$SF(s) = EXP(A + B*s + C*s^2 + D*S^3 + E*s^4 + F*s^5),\ HC\ \&\ CO$$
$$= A + B*s + C*s^2 + D*s^3 + E*s^4 + F*s^5,\ NOx, Pre\text{-}1979$$
$$= EXP(A + B*s + C*s^2 + D*s^3 + E*s^4 + F*s^5),\ NOx, 1979+$$

Pollutant and Model Years	A	B	C	D	E	F
HC						
Pre-1970	0.231026E+01	-0.289572E+00	0.152990E-01	-0.446689E-03	0.648183E-05	-0.363456E-07
1970-1973	0.240873E+01	-0 308187E+00	0 168168E-01	-0.506843E-03	0.753855E-05	-0 431596E-07
1974-1978	0.268382E+01	-0.344633E+00	0.195417E-01	-0.625720E-03	0.978442E-05	-0.583369E-07
1979-1983	0.121545E+01	-0.707633E-01	0.446460E-03	0.0	0.0	0.0
1984-1986	0.144386E+01	-0.880857E-01	0.735680E-03	0.0	0.0	0.0
1987+	0.984090E+00	-0.567319E-01	0.332820E-03	0.0	0.0	0.0
CO						
Pre-1970	0.233989E+01	-0.296978E+00	0.160071E-01	-0.477396E-03	0.706752E-05	-0.403978E-07
1970-1973	0.277804E+01	-0.319130E+00	0.153183E-01	-0.422327E-03	0.584948E-05	-0.314969E-07
1974-1978	0.283929E+01	-0.368756E+00	0.210782E-01	-0.676438E-03	0.106267E-04	-0.636405E-07
1979-1983	0.116177E+01	-0.592737E-01	0 0	0 0	0 0	0.0
1984-1986	0.881952E+00	-0.449976E-01	0.0	0.0	0.0	0.0
1987+	0 858419E+00	-0.437969E-01	0.0	0.0	0.0	0.0
NOx						
Pre-1970	0.168635E+01	-0.118303E+00	0.654975E-02	-0.137139E-03	0.100849E-05	0.0
1970-1973	0.101743E+01	-0.118958E-01	0.914365E-03	-0.215740E-04	0.182300E-06	0.0
1974-1978	0.783838E+00	0.328549E-03	0.106029E-02	-0.319350E-04	0.290389E-06	0.0
1979-1983	0.308282E+00	-0.230362E-01	0.372830E-03	0.0	0.0	0.0
1984-1986	0.295046E+00	-0.236333E-01	0.437750E-03	0.0	0.0	0.0
1987+	0.386041E+00	-0.262961E-01	0.336740E-03	0.0	0.0	0.0

* WHERE : s = average speed (mph)
sadj = basic test procedure speed; adjusted for fraction of cold start operation x and fraction of hot start operation w, [1/sadj = (w+x)/26 + (1-w-x)/16]

DATE : MAY 25, 1985

TABLE 1.3.7A

TEMPERATURE CORRECTION FACTOR COEFFICIENTS FOR
LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS II

* TCF(b) = EXP(TC(b) * (T - 75.0))

Pol	Model Years	Test segment 1 TC Low	Test segment 1 TC High	Test segment 2 TC Low	Test segment 2 TC High	Test segment 3 TC Low	Test segment 3 TC High
HC	Pre-1970	-0.20623E-01	-0.14381E-01	-0.24032E-02	0.13219E-02	-0.10081E-02	0.34799E-02
	1970-1973	-0.24462E-01	-0.12552E-01	-0.32017E-02	0.42667E-02	-0.86884E-03	0.75843E-02
	1974-1978	-0.21255E-01	-0.10888E-01	-0.52755E-03	-0.47925E-03	0.93659E-03	0.76666E-02
	1979-1983	-0.23517E-01	-0.14095E-01	-0.88057E-02	0.26179E-01	-0.16222E-02	0.24297E-01
	1984-1987	-0.27793E-01	-0.14095E-01	-0.10177E-01	0.26179E-01	-0.82680E-02	0.24297E-01
	1988+	-0.33883E-01	0.11959E-01	-0.10113E-01	-0.12627E-04	-0.80650E-02	0.78765E-02
CO	Pre-1970	-0.13487E-01	-0.14691E-01	0.15784E-02	0.37462E-02	0.11097E-02	0.11014E-01
	1970-1973	-0.21126E-01	-0.38767E-01	-0.15289E-02	0.84685E-02	0.15749E-02	0.25179E-01
	1974-1978	-0.20843E-01	-0.21165E-01	-0.59951E-02	0.23603E-01	0.18253E-02	0.28483E-01
	1979-1983	-0 24835E-01	-0.19612E-01	-0.88336E-02	0.48537E-01	-0.11553E-02	0.31439E-01
	1984-1987	see NOTE 2	-0.19612E-01	-0.17783E-01	0.48537E-01	-0.10871E-01	0.31439E-01
	1988+	see NOTE 2	-0.12596E-01	-0.18813E-01	0.13861E-01	-0.11951E-01	0.96939E-02
NOx	Pre-1970	-0.16897E-03	0.38841E-02	-0.89245E-02	-0.87325E-02	-0.72580E-02	-0.10839E-01
	1970-1973	-0.25074E-03	-0.10389E-02	-0.59791E-02	-0.92466E-02	-0.62690E-02	-0.10108E-01
	1974-1978	0.38855E-02	-0.18301E-01	-0.24156E-02	-0.10925E-01	-0.21188E-02	-0.18042E-01
	1979-1987	-0.76044E-02	-0.26153E-01	-0.68045E-02	-0.18603E-01	-0.54198E-02	-0.20878E-01
	1988+	-0.53710E-02	-0.34416E-01	-0.65050E-02	-0.35871E-01	-0.85650E-02	-0.28830E-01

* WHERE :

TCF(b) = Temperature correction factor for appropriate pollutant, ambient temperature, and model year; for test segment b
T = Ambient temperature (Fahrenheit)
TC(b) = Temperature correction factor coefficient for appropriate pollutant, reference temperature and model year; for test segment b
75.0 = Reference temperature

NOTE 1 : The temperature correction factor is used in conjunction with the Ripstwxn correction factor given in Table 1.3.7B.

NOTE 2 : Offset model used for Bag 1 CO. Offset = -1.3812*(T - 75.0).

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TABLE 1.3.7B

NORMALIZED BAG FRACTIONS FOR
LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS II

		Normalized Fractions							
Pol	Model Years	Test Seg.#1 B1	Test Seg.#1 D1	Test Seg.#2 B2	Test Seg.#2 D2	Test Seg.#3 B3	Test Seg.#3 D3	Total Test B0	Total Test D0
HC	Pre-1970	1.282	0.025	0.973	0.028	0.839	0.019	1.000	0.025
	1970-1973	1.345	0.074	0.946	0.054	0.842	0.048	1.000	0.056
	1974-1978	1.398	0.060	0.885	0.055	0.919	0.036	1.000	0.051
	1979-1983	1.860	0.345	0.766	0.234	0.804	0.196	1.000	0.243
	1984-1986	2.200	0.714	0.571	0.171	0.914	0.143	1.000	0.286
	1987+	2.634	1.104	0.368	0.499	0.973	0.391	1.000	0.594
CO	Pre-1970	1.277	0.033	1.017	0.029	0.758	0.025	1.000	0.029
	1970-1973	1.442	0.071	0.996	0.042	0.674	0.033	1.000	0.046
	1974-1978	1.573	0.054	0.902	0.079	0.755	0.029	1.000	0.060
	1979-1983	1.972	0.176	0.881	0.157	0.628	0.109	1.000	0.139
	1984-1986	2.438	0.282	0.658	0.062	0.621	0.077	1.000	0.111
	1987+	3.941	2.009	0.0	1.186	0.689	1.014	1.000	1.308
NOx	Pre-1970	1.121	0.009	0.785	0.001	1.319	-0.009	1.000	0.0
	1970-1973	1.199	-0.004	0.793	-0.002	1.245	0.006	1.000	0.0
	1974-1978	1.262	0.022	0.770	0.004	1.242	0.027	1.000	0.014
	1979-1986	1.372	0.040	0.766	0.046	1.167	0.063	1.000	0.051
	1987+	1.830	0.169	0.703	0.149	0.939	0.222	1.000	0.173

NOTE : The fractions given in this table are used in the calculation of the operating-mode/ temperature correction factor (OMTCF).

WHERE :

```
OMTCF   = ((TERM1 + TERM2 + TERM3)/DENOM)
TERM1   =    W    *TCF(1)*(B1+D1*M)
TERM2   = (1-W-X)*TCF(2)*(B2+D2*M)
TERM3   =    X    *TCF(3)*(B3+D3*M)
DENOM   = B0 + D0*M
 W      = Fraction of VMT in the cold start mode
 X      = Fraction of VMT in the  hot start mode
TCF(b)  = Temperature correction factor for pollutant, model
          year; for test segment b
 M      = Cumulative mileage / 10,000
```

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TABLE 1.3.8A

AIR CONDITIONING CORRECTION FACTOR COEFFICIENTS FOR
LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS II

* ACCF= U*V*(A + B*(T-75) -1) + 1

Model	HC		CO		NOx	
Years	A	B	A	B	A	B
Pre-1979	0.1023E+01	0.3344E-02	0.1202E+01	0.1808E-02	0.1299E+01	0.5643E-04
1979+	0.1000E+01	0.3512E-02	0.1130E+01	0.1528E-02	0.1221E+01	0.4262E-03

* WHERE :

ACCF = Air Conditioning Correction Factor
V = Fraction of vehicles which are equipped with AC given in Table 1.3.8B
U = Fraction of vehicles with AC that are using it = (DI-DILO)/(DIHI-DI), 0<=U<=1
DI = Discomfort index = (DB+WB)*.4+15
DILO = The highest discomfort index where no AC is used
DIHI = The lowest discomfort index where all vehicles with AC use it
DB = Dry bulb temperature (Fahrenheit)
WB = Wet bulb temperature (Fahrenheit)
T = Ambient temperature (Fahrenheit)

TABLE 1.3.8B

ESTIMATED FRACTION OF
LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS II
EQUIPPED WITH AIR CONDITIONING

Model Years	Fraction Equipped With Air Conditioning
Pre-1977	0.32
1977	0.52
1978+	0.39

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TABLE 1.3.9

EXTRA LOAD CORRECTION FACTOR COEFFICIENTS
FOR LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS II

* XLCF = (XLC-1)*U + 1

Model Years	Coefficients (XLC) HC	CO	NOx
Pre-1970	1.0786	1.2765	0.9535
1970-1973	1.0495	1.1384	1.0313
1974-1978	1.0556	1.1347	1.0753
1979+	1.0455	1.3058	1.0719

* WHERE :

XLCF = Extra load correction factor
U = Fraction of VMT with an extra load
XLC = Correction factor coefficient

TABLE 1.3.10

TRAILER TOWING CORRECTION FACTOR COEFFICIENTS
FOR LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS II

* TTCF = (TTC-1)*U + 1

Model Years	Coefficients (TTC) HC	CO	NOx
Pre-1970	1.2614	1.9327	1.1184
1970-1973	1.2762	1.8940	1.1384
1974-1978	1.7288	2.1414	1.2170
1979+	1.5909	3.9722	1.3875

* WHERE :

TTCF = Trailer towing correction factor
U = Fraction of VMT towing a trailer
TTC = Correction factor coefficient

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TABLE 1.4.1A

EXHAUST EMISSION RATES FOR
LOW ALTITUDE
HEAVY DUTY GASOLINE POWERED VEHICLES
(RATES REFLECT ZERO TAMPERING)

* BER = ZML + (DR * M)

Pol	Model Years	Zero Mile Emission Level (Grams/Mile)	Deterioration Rate (Gm/Mi/10K Mi)	50,000 Mile Emission Level (Grams/Mile)
HC	Pre-1963	16.49	0.31	18.04
	1963-1969	17.08	0.32	18.68
	1970-1973	9.21	0.37	11.06
	1974-1977	8.28	0.22	9.38
	1978	7.31	0.19	8.26
	1979-1980	3.07	0.19	4.02
	1981-1982	2.86	0.17	3.71
	1983	2.83	0.17	3.68
	1984	2.84	0.17	3.69
	1985	2.45	0.06	2.75
	1986	2.16	0.06	2.46
	1987-1990	0.97	0.09	1.42
	1991-1993	0.95	0.08	1.35
	1994-1996	0.93	0.08	1.33
	1997+	0.91	0.08	1.31
CO	Pre-1963	200.80	4.81	224.85
	1963-1969	208.10	4.99	233.05
	1970-1973	157.48	6.68	190.88
	1974-1977	141.48	5.74	170.18
	1978	124.90	5.07	150.25
	1979-1980	104.78	4.83	128.93
	1981-1982	97.71	4.50	120.21
	1983	96.53	4 45	118 78
	1984	97.15	4.47	119 50
	1985	38.30	0.92	42.90
	1986	30.45	0.93	35.10
	1987-1990	13 26	0.58	16.16
	1991-1993	12 98	0.57	15 83
	1994-1996	12.63	0.55	15 38
	1997+	12.39	0.54	15.09
NOx	Pre-1963	7.87	0.0	7.87
	1963-1969	8.15	0.0	8.15
	1970-1973	9.35	0.0	9.35
	1974-1977	6.12	0.07	6.47
	1978	5.41	0.06	5.71
	1979-1980	5.14	0.06	5.44
	1981-1982	4.80	0 06	5 10
	1983	4.74	0.06	5.04
	1984	4.77	0.06	5.07
	1985	4.79	0.03	4 94
	1986	4.82	0.03	4.97
	1987-1990	4 60	0.10	5.10
	1991-1993	4.50	0.09	4.95
	1994-1996	4.38	0.09	4.83
	1997+	4.30	0.09	4 75

* WHERE : BER = Basic emission rate (untampered)
ZML = Zero mile level
DR = Deterioration rate
M = Cumulative mileage / 10,000

DATE : MAY 25, 1985

TABLE 1.4.1B

EXHAUST EMISSION RATES FOR
LOW ALTITUDE
HEAVY DUTY GASOLINE POWERED VEHICLES
AT VARIOUS MILEAGE INTERVALS
(RATES INCLUDE TAMPERING)

Pol	Model Years	Emission Rate (Grams/Mile) 0K	20K	40K	60K	80K	100K	120K	140K
HC	Pre-1963	16.49	17.11	17.73	18.35	18.97	19.59	20.21	20.83
	1963-1969	17.08	17.72	18.36	19.00	19.64	20.28	20.92	21.56
	1970-1973	9.21	9.95	10.69	11.43	12.17	12.91	13.65	14.39
	1974-1977	8.28	8.72	9.16	9.60	10.04	10.48	10.92	11.36
	1978	7.31	7.69	8.07	8.45	8.83	9.21	9.59	9.97
	1979-1980	3.07	3.45	3.83	4.21	4.59	4.97	5.35	5.73
	1981-1982	2.86	3.20	3.54	3.88	4.22	4.56	4.90	5.24
	1983	2.83	3.17	3.51	3.85	4.19	4.53	4.87	5.21
	1984	2.84	3 18	3.52	3.86	4.20	4.54	4.88	5.22
	1985	2.45	2 57	2.69	2.81	2.93	3.05	3.17	3.29
	1986	2.16	2.28	2.40	2.52	2.64	2.76	2.88	3.00
	1987-1990	1.42	1.73	2.05	2.37	2.68	3.00	3.32	3.64
	1991-1993	1.40	1.69	1.99	2.29	2.58	2.88	3.18	3.48
	1994-1996	1.38	1.67	1.97	2.27	2.56	2.86	3.16	3.46
	1997+	1.36	1.65	1.95	2.25	2.54	2.84	3.14	3.44
CO	Pre-1963	200.80	210.42	220.04	229.66	239.28	248.90	258.52	268.14
	1963-1969	208.10	218.08	228.06	238.04	248.02	258.00	267.98	277.96
	1970-1973	157.48	170.84	184.20	197.56	210.92	224.28	237.64	251.00
	1974-1977	141.48	152.96	164 44	175.92	187.40	198.88	210.36	221.84
	1978	124.90	135.04	145.18	155.32	165.46	175.60	185.74	195.88
	1979-1980	104.78	114.44	124.10	133.76	143.42	153.08	162.74	172.40
	1981-1982	97 71	106.71	115.71	124.71	133.71	142.71	151.71	160.71
	1983	96.53	105.43	114.33	123.23	132.13	141.03	149.93	158.83
	1984	97.15	106 09	115.03	123.97	132.91	141.85	150.79	159.73
	1985	38.30	40.14	41.98	43.82	45.66	47.50	49.34	51.18
	1986	30.45	32 31	34.17	36.03	37.89	39.75	41.61	43.47
	1987-1990	17.25	19.82	22.40	24.98	27.56	30.14	32.72	35.30
	1991-1993	16.97	19.52	22.08	24.64	27.20	29.76	32.32	34.88
	1994-1996	16.62	19.13	21.65	24.17	26.69	29.21	31.73	34.25
	1997+	16.38	18.87	21.37	23.87	26.37	28.87	31.37	33.87
NOx	Pre-1963	7.87	7 87	7.87	7.87	7.87	7.87	7.87	7.87
	1963-1969	8.15	8.15	8.15	8.15	8.15	8.15	8.15	8.15
	1970-1973	9.35	9 35	9.35	9.35	9.35	9.35	9.35	9.35
	1974-1977	6.12	6.26	6.40	6.54	6.68	6.82	6.96	7.10
	1978	5.41	5.53	5.65	5.77	5.89	6.01	6.13	6.25
	1979-1980	5.14	5.26	5.38	5.50	5.62	5.74	5.86	5.98
	1981-1982	4.80	4.92	5.04	5.16	5.28	5.40	5.52	5.64
	1983	4.74	4.86	4.98	5.10	5.22	5.34	5.46	5.58
	1984	4.77	4.89	5.01	5.13	5.25	5.37	5.49	5.61
	1985	4.79	4.85	4.91	4.97	5.03	5.09	5.15	5.21
	1986	4.82	4.88	4.94	5.00	5.06	5.12	5.18	5.24
	1987-1990	4.77	5.11	5.46	5.80	6.15	6.49	6.84	7.18
	1991-1993	4.67	4.99	5.32	5.64	5.97	6.29	6.62	6.94
	1994-1996	4.55	4.87	5.20	5.52	5.85	6.17	6.50	6.82
	1997+	4.47	4.79	5.12	5.44	5.77	6.09	6.42	6.74

DATE : MAY 25, 1985

TABLE 1.4.1C

CRANKCASE AND EVAPORATIVE HYDROCARBON EMISSIONS
FOR LOW ALTITUDE
HEAVY DUTY GASOLINE POWERED VEHICLES
(RATES REFLECT ZERO TAMPERING)

** CCEV = (HSK * TPD + DNL)/MPD + CC

Model Years	SHED Hot Soak Emissions (Gm/Trip)	Trips* Per Day	SHED Diurnal Emissions (Gm/Day)	Miles* Per Day	Crankcase Emissions (Gm/Mile)	Total Crankcase and Evap. Emissions (Gm/Mile)
Pre-1968	27.66	6.88	77.89	36.70	5.70	13.01
1968-1984	27.66	6.88	77.89	36.70	0.0	7.31
1985+	6.34	6.88	14.83	36.70	0.0	1.59

* Default information that may be altered by the MOBILE3 user with information about the local area.

** WHERE :

CCEV = Total untampered crankcase & evaporative HC emissions (Gm/Mile)
HSK = Hot soak emissions (Gm/Trip)
TPD = Trips per day
DNL = Diurnal emissions (Gm/Day)
MPD = Miles per day
CC = Crankcase emissions (Gm/Mile)

DATE : MAY 25, 1985

TABLE 1.4.1D

TOTAL CRANKCASE AND EVAPORATIVE HC EMISSIONS
FOR LOW ALTITUDE
HEAVY DUTY GASOLINE POWERED VEHICLES
AT VARIOUS MILEAGE INTERVALS
(RATES INCLUDE TAMPERING)

Model Years	Emission Rate (Grams/Mile) 0K	20K	40K	60K	80K	100K	120K	140K
Pre-1968	13.01	13.01	13.01	13.01	13.01	13.01	13.01	13.01
1968-1984	7.48	7.51	7.54	7.57	7.60	7.62	7.65	7.68
1985+	1.92	1.97	2.03	2.08	2.14	2.19	2.24	2.30

DATE : MAY 25, 1985

TABLE 1.4.2A

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
HEAVY DUTY GASOLINE POWERED VEHICLES
TOTAL HC (INCLUDES EVAP & CRANKCASE)

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	35.0	1962	35.0	1963	36.2	1964	36.2	1965	36.2	1966	36.2	1967	36.2	1968	30.5	1969	30.5	1970	23.5	1971	23.5	1972	23.5
1962	34.9	1963	36 1	1964	36.1	1965	36.1	1966	36 1	1967	36.1	1968	30.4	1969	30.4	1970	23.4	1971	23.4	1972	23.4	1973	23.4
1963	35.9	1964	35.9	1965	35.9	1966	35.9	1967	35.9	1968	30.2	1969	30.2	1970	23.2	1971	23.2	1972	23.2	1973	23.2	1974	19.7
1964	35.8	1965	35.8	1966	35.8	1967	35.8	1968	30.1	1969	30.1	1970	23.1	1971	23.1	1972	23.1	1973	23.1	1974	19.6	1975	19.6
1965	35.7	1966	35.7	1967	35.7	1968	30.0	1969	30.0	1970	22.9	1971	22.9	1972	22.9	1973	22.9	1974	19.5	1975	19.5	1976	19.5
1966	35.5	1967	35.5	1968	29.8	1969	29.8	1970	22.7	1971	22.7	1972	22.7	1973	22.7	1974	19.4	1975	19.4	1976	19.4	1977	19.4
1967	35.3	1968	29.6	1969	29.6	1970	22.5	1971	22.5	1972	22.5	1973	22.5	1974	19.3	1975	19.3	1976	19.3	1977	19.3	1978	17.9
1968	29.4	1969	29.4	1970	22.2	1971	22.2	1972	22.2	1973	22.2	1974	19.2	1975	19.2	1976	19.2	1977	19.2	1978	17.7	1979	13.5
1969	29.2	1970	22.0	1971	22.0	1972	22.0	1973	22.0	1974	19.0	1975	19.0	1976	19.0	1977	19.0	1978	17.6	1979	13.4	1980	13.4
1970	21.7	1971	21.7	1972	21.7	1973	21.7	1974	18.8	1975	18.8	1976	18.8	1977	18.8	1978	17.5	1979	13.2	1980	13.2	1981	12.7
1971	21.4	1972	21.4	1973	21.4	1974	18.6	1975	18.6	1976	18.6	1977	18.6	1978	17.3	1979	13.1	1980	13.1	1981	12.6	1982	12.6
1972	21.0	1973	21.0	1974	18.4	1975	18.4	1976	18.4	1977	18.4	1978	17.1	1979	12.9	1980	12.9	1981	12.4	1982	12.4	1983	12.4
1973	20.6	1974	18.2	1975	18.2	1976	18.2	1977	18.2	1978	16.9	1979	12.7	1980	12.7	1981	12.3	1982	12.3	1983	12.2	1984	12.2
1974	17.9	1975	17.9	1976	17.9	1977	17.9	1978	16.7	1979	12.5	1980	12.5	1981	12.1	1982	12.1	1983	12.0	1984	12.0	1985	4.9
1975	17.7	1976	17.7	1977	17.7	1978	16.5	1979	12.2	1980	12.2	1981	11.8	1982	11.8	1983	11.8	1984	11.8	1985	4.9	1986	4.6
1976	17.4	1977	17.4	1978	16.2	1979	11.9	1980	11.9	1981	11.6	1982	11.6	1983	11.6	1984	11.6	1985	4.8	1986	4.5	1987	3.5
1977	17.0	1978	15.9	1979	11.7	1980	11.7	1981	11.3	1982	11.3	1983	11.3	1984	11.3	1985	4.7	1986	4.4	1987	3.3	1988	3.3
1978	15.6	1979	11.3	1980	11.3	1981	11.0	1982	11.0	1983	11.0	1984	11.0	1985	4.6	1986	4.3	1987	3.2	1988	3.2	1989	3.2
1979	11.0	1980	11.0	1981	10.7	1982	10.7	1983	10.7	1984	10.7	1985	4.5	1986	4.2	1987	3.0	1988	3.0	1989	3.0	1990	3.0
1980	10.8	1981	10.6	1982	10.6	1983	10.5	1984	10.5	1985	4.4	1986	4.1	1987	2.9	1988	2.9	1989	2.9	1990	2.9	1991	2.9

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	23.5	1974	19.9	1975	19.9	1976	19.9	1977	19.9	1978	18.4	1979	14.1	1980	14.1	1981	13.6	1982	13.6	1983	13.5	1984	13.5
1974	19.8	1975	19.8	1976	19.8	1977	19.8	1978	18.3	1979	14.1	1980	14.1	1981	13.5	1982	13.5	1983	13.5	1984	13.5	1985	5.4
1975	19.7	1976	19.7	1977	19 7	1978	18.3	1979	14.0	1980	14.0	1981	13.4	1982	13.4	1983	13.4	1984	13.4	1985	5.4	1986	5.1
1976	19.6	1977	19.6	1978	18.2	1979	13 9	1980	13.9	1981	13.4	1982	13.4	1983	13.3	1984	13.3	1985	5.4	1986	5.1	1987	4.4
1977	19 5	1978	18.1	1979	13.8	1980	13.8	1981	13.3	1982	13.3	1983	13.3	1984	13.3	1985	5.4	1986	5.1	1987	4.3	1988	4.3
1978	18.0	1979	13.7	1980	13.7	1981	13.2	1982	13.2	1983	13 2	1984	13.2	1985	5.3	1986	5.0	1987	4.3	1988	4.3	1989	4.3
1979	13.6	1980	13 6	1981	13.1	1982	13.1	1983	13.1	1984	13 1	1985	5.3	1986	5.0	1987	4.2	1988	4.2	1989	4.2	1990	4.2
1980	13.5	1981	13.0	1982	13.0	1983	13.0	1984	13.0	1985	5.3	1986	5.0	1987	4.2	1988	4.2	1989	4.2	1990	4.2	1991	4.0
1981	12.9	1982	12.9	1983	12.8	1984	12.8	1985	5.2	1986	4.9	1987	4.1	1988	4.1	1989	4.1	1990	4.1	1991	4.0	1992	4.0
1982	12.7	1983	12.7	1984	12.7	1985	5 2	1986	4.9	1987	4.1	1988	4.1	1989	4.1	1990	4.1	1991	3.9	1992	3.9	1993	3.9
1983	12.6	1984	12.6	1985	5.1	1986	4.8	1987	4.0	1988	4.0	1989	4.0	1990	4.0	1991	3.8	1992	3.8	1993	3.8	1994	3.8
1984	12.4	1985	5.1	1986	4 8	1987	3.9	1988	3.9	1989	3.9	1990	3.9	1991	3.7	1992	3.7	1993	3.7	1994	3.7	1995	3.7
1985	5.0	1986	4.7	1987	3.8	1988	3.8	1989	3.8	1990	3.8	1991	3.7	1992	3.7	1993	3.7	1994	3.6	1995	3.6	1996	3.6
1986	4 6	1987	3.7	1988	3.7	1989	3.7	1990	3.7	1991	3.6	1992	3.6	1993	3.6	1994	3.5	1995	3.5	1996	3.5	1997	3.5
1987	3.6	1988	3.6	1989	3.6	1990	3.6	1991	3.5	1992	3.5	1993	3.5	1994	3.4	1995	3.4	1996	3.4	1997	3.4	1998	3.4
1988	3.5	1989	3.5	1990	3.5	1991	3.4	1992	3.4	1993	3.4	1994	3.3	1995	3.3	1996	3.3	1997	3.3	1998	3.3	1999	3.3
1989	3.3	1990	3.3	1991	3.2	1992	3.2	1993	3.2	1994	3.2	1995	3.2	1996	3.2	1997	3.2	1998	3.2	1999	3.2	2000	3.2
1990	3.2	1991	3.1	1992	3.1	1993	3.1	1994	3.1	1995	3.1	1996	3.1	1997	3.0	1998	3.0	1999	3.0	2000	3.0	2001	3.0
1991	2.9	1992	2.9	1993	2.9	1994	2.9	1995	2.9	1996	2.9	1997	2.9	1998	2.9	1999	2.9	2000	2.9	2001	2.9	2002	2.9
1992	2.9	1993	2.9	1994	2.8	1995	2.8	1996	2.8	1997	2.8	1998	2.8	1999	2.8	2000	2.8	2001	2.8	2002	2.8	2003	2.8

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F. Emissions are based on the January 1 mileage accumulation figures given in Table 1.4.4.

TABLE 1.4.2B

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
HEAVY DUTY GASOLINE POWERED VEHICLES
CO

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	286.1	1962	286.1	1963	296.6	1964	296.6	1965	296.6	1966	296.6	1967	296.6	1968	296.6	1969	296.6	1970	276.0	1971	276.0	1972	276.0
1962	284.4	1963	294.8	1964	294.8	1965	294.8	1966	294.8	1967	294.8	1968	294.8	1969	294.8	1970	273.6	1971	273.6	1972	273.6	1973	273.6
1963	292.9	1964	292.9	1965	292.9	1966	292.9	1967	292.9	1968	292.9	1969	292.9	1970	271.0	1971	271.0	1972	271.0	1973	271.0	1974	239.0
1964	290.8	1965	290.8	1966	290.8	1967	290.8	1968	290.8	1969	290.8	1970	268.2	1971	268.2	1972	268.2	1973	268.2	1974	236.6	1975	236.6
1965	288.4	1966	288.4	1967	288.4	1968	288.4	1969	288.4	1970	265.0	1971	265.0	1972	265.0	1973	265.0	1974	233.9	1975	233.9	1976	233.9
1966	285.8	1967	285.8	1968	285.8	1969	285.8	1970	261.5	1971	261.5	1972	261.5	1973	261.5	1974	230.9	1975	230.9	1976	230.9	1977	230.9
1967	282.9	1968	282.9	1969	282.9	1970	257.7	1971	257.7	1972	257.7	1973	257.7	1974	227.6	1975	227.6	1976	227.6	1977	227.6	1978	200.9
1968	279.8	1969	279.8	1970	253.4	1971	253.4	1972	253.4	1973	253.4	1974	223.9	1975	223.9	1976	223.9	1977	223.9	1978	197.7	1979	174.1
1969	276.3	1970	248.7	1971	248.7	1972	248.7	1973	248.7	1974	219.9	1975	219.9	1976	219.9	1977	219.9	1978	194.1	1979	170.7	1980	170.7
1970	243.5	1971	243.5	1972	243.5	1973	243.5	1974	215.4	1975	215.4	1976	215.4	1977	215.4	1978	190.2	1979	167.0	1980	167.0	1981	155.7
1971	237.8	1972	237.8	1973	237.8	1974	210.5	1975	210.5	1976	210.5	1977	210.5	1978	185.9	1979	162.9	1980	162.9	1981	151.8	1982	151.8
1972	231.5	1973	231.5	1974	205.0	1975	205.0	1976	205.0	1977	205.0	1978	181.0	1979	158.3	1980	158.3	1981	147.5	1982	147.5	1983	145.8
1973	224.5	1974	199.0	1975	199.0	1976	199.0	1977	199.0	1978	175.7	1979	153.2	1980	153.2	1981	142.8	1982	142.8	1983	141.2	1984	142.0
1974	192.4	1975	192.4	1976	192.4	1977	192.4	1978	169.9	1979	147.6	1980	147.6	1981	137.6	1982	137.6	1983	136.0	1984	136.8	1985	46.5
1975	185.1	1976	185.1	1977	185.1	1978	163.4	1979	141.5	1980	141.5	1981	131.9	1982	131.9	1983	130.3	1984	131.1	1985	45.3	1986	37.5
1976	177.0	1977	177.0	1978	156.2	1979	134.6	1980	134.6	1981	125.5	1982	125.5	1983	124.0	1984	124.8	1985	44.0	1986	36.2	1987	16.8
1977	168.0	1978	148.3	1979	127.1	1980	127.1	1981	118.5	1982	118.5	1983	117.1	1984	117.8	1985	42.6	1986	34.7	1987	15.9	1988	15.9
1978	139.6	1979	118.8	1980	118.8	1981	110.8	1982	110.8	1983	109.4	1984	110.1	1985	41.0	1986	33.1	1987	14.9	1988	14.9	1989	14.9
1979	109.6	1980	109.6	1981	102.2	1982	102.2	1983	101.0	1984	101.6	1985	39.2	1986	31.4	1987	13.8	1988	13.8	1989	13.8	1990	13.8
1980	104.8	1981	97.7	1982	97.7	1983	96.5	1984	97.1	1985	38.3	1986	30.4	1987	13.3	1988	13.3	1989	13.3	1990	13.3	1991	13.0

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	276.0	1974	243.3	1975	243.3	1976	243.3	1977	243.3	1978	214.8	1979	190.4	1980	190.4	1981	177.5	1982	177.5	1983	175.5	1984	176.4
1974	241.3	1975	241.3	1976	241.3	1977	241.3	1978	213.0	1979	188.7	1980	188.7	1981	175.9	1982	175.9	1983	173.9	1984	174.9	1985	54.3
1975	239.0	1976	239.0	1977	239.0	1978	211.1	1979	186.9	1980	186.9	1981	174.2	1982	174.2	1983	172.2	1984	173.1	1985	53.9	1986	46.3
1976	236.6	1977	236.6	1978	208.9	1979	184.8	1980	184.8	1981	172.3	1982	172.3	1983	170.3	1984	171.2	1985	53.5	1986	45.9	1987	22.9
1977	233.9	1978	206.5	1979	182.5	1980	182.5	1981	170.1	1982	170.1	1983	168.2	1984	169.1	1985	53.1	1986	45.4	1987	22.6	1988	22.6
1978	203.9	1979	180.0	1980	180.0	1981	167.8	1982	167.8	1983	165.8	1984	166.8	1985	52.6	1986	44.9	1987	22.3	1988	22.3	1989	22.3
1979	177.2	1980	177.2	1981	165.2	1982	165.2	1983	163.3	1984	164.2	1985	52.1	1986	44.4	1987	22.0	1988	22.0	1989	22.0	1990	22.0
1980	174.1	1981	162.3	1982	162.3	1983	160.4	1984	161.3	1985	51.5	1986	43.8	1987	21.6	1988	21.6	1989	21.6	1990	21.6	1991	21.2
1981	159.2	1982	159.2	1983	157.3	1984	158.2	1985	50.9	1986	43.2	1987	21.2	1988	21.2	1989	21.2	1990	21.2	1991	20.8	1992	20.8
1982	155.7	1983	153.9	1984	154.7	1985	50.2	1986	42.4	1987	20.7	1988	20.7	1989	20.7	1990	20.7	1991	20.3	1992	20.3	1993	20.3
1983	150.0	1984	150.9	1985	49.4	1986	41.6	1987	20.2	1988	20.2	1989	20.2	1990	20.2	1991	19.8	1992	19.8	1993	19.8	1994	19.2
1984	146.7	1985	48.5	1986	40.7	1987	19.7	1988	19.7	1989	19.7	1990	19.7	1991	19.3	1992	19.3	1993	19.3	1994	18.7	1995	18.7
1985	47.5	1986	39.8	1987	19.1	1988	19.1	1989	19.1	1990	19.1	1991	18.7	1992	18.7	1993	18.7	1994	18.1	1995	18.1	1996	18.1
1986	38.7	1987	18.4	1988	18.4	1989	18.4	1990	18.4	1991	18.0	1992	18.0	1993	18.0	1994	17.5	1995	17.5	1996	17.5	1997	17.2
1987	17.7	1988	17.7	1989	17.7	1990	17.7	1991	17.3	1992	17.3	1993	17.3	1994	16.8	1995	16.8	1996	16.8	1997	16.5	1998	16.5
1988	16.8	1989	16.8	1990	16.8	1991	16.5	1992	16.5	1993	16.5	1994	16.0	1995	16.0	1996	16.0	1997	15.7	1998	15.7	1999	15.7
1989	15.9	1990	15.9	1991	15.6	1992	15.6	1993	15.6	1994	15.2	1995	15.2	1996	15.2	1997	14.9	1998	14.9	1999	14.9	2000	14.9
1990	14.9	1991	14.6	1992	14.6	1993	14.6	1994	14.2	1995	14.2	1996	14.2	1997	14.0	1998	14.0	1999	14.0	2000	14.0	2001	14.0
1991	13.5	1992	13.5	1993	13.5	1994	13.2	1995	13.2	1996	13.2	1997	12.9	1998	12.9	1999	12.9	2000	12.9	2001	12.9	2002	12.9
1992	13.0	1993	13.0	1994	12.6	1995	12.6	1996	12.6	1997	12.4	1998	12.4	1999	12.4	2000	12.4	2001	12.4	2002	12.4	2003	12.4

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F. Emissions are based on the January 1 mileage accumulation figures given in Table 1.4.4.

TABLE 1.4.2C

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
HEAVY DUTY GASOLINE POWERED VEHICLES
NOx

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	7.9	1962	7.9	1963	8.1	1964	8.1	1965	8.1	1966	8.1	1967	8.1	1968	8.1	1969	8.1	1970	9.3	1971	9.3	1972	9.3
1962	7.9	1963	8.1	1964	8.1	1965	8.1	1966	8.1	1967	8.1	1968	8.1	1969	8.1	1970	9.3	1971	9.3	1972	9.3	1973	9.3
1963	8.1	1964	8.1	1965	8.1	1966	8.1	1967	8.1	1968	8.1	1969	8.1	1970	9.3	1971	9.3	1972	9.3	1973	9.3	1974	7.3
1964	8.1	1965	8.1	1966	8.1	1967	8.1	1968	8.1	1969	8.1	1970	9.3	1971	9.3	1972	9.3	1973	9.3	1974	7.3	1975	7.3
1965	8.1	1966	8.1	1967	8.1	1968	8.1	1969	8.1	1970	9.3	1971	9.3	1972	9.3	1973	9.3	1974	7.2	1975	7.2	1976	7.2
1966	8.1	1967	8.1	1968	8.1	1969	8.1	1970	9.3	1971	9.3	1972	9.3	1973	9.3	1974	7.2	1975	7.2	1976	7.2	1977	7.2
1967	8.1	1968	8.1	1969	8.1	1970	9.3	1971	9.3	1972	9.3	1973	9.3	1974	7.2	1975	7.2	1976	7.2	1977	7.2	1978	6.3
1968	8.1	1969	8.1	1970	9.3	1971	9.3	1972	9.3	1973	9.3	1974	7.1	1975	7.1	1976	7.1	1977	7.1	1978	6.3	1979	6.0
1969	8.1	1970	9.3	1971	9.3	1972	9.3	1973	9.3	1974	7.1	1975	7.1	1976	7.1	1977	7.1	1978	6.2	1979	6.0	1980	6.0
1970	9.3	1971	9.3	1972	9.3	1973	9.3	1974	7.0	1975	7.0	1976	7.0	1977	7.0	1978	6.2	1979	5.9	1980	5.9	1981	5.6
1971	9.3	1972	9.3	1973	9.3	1974	7.0	1975	7.0	1976	7.0	1977	7.0	1978	6.1	1979	5.9	1980	5.9	1981	5.5	1982	5.5
1972	9.3	1973	9.3	1974	6.9	1975	6.9	1976	6.9	1977	6.9	1978	6.1	1979	5.8	1980	5.8	1981	5.5	1982	5.5	1983	5.4
1973	9.3	1974	6.8	1975	6.8	1976	6.8	1977	6.8	1978	6.0	1979	5.7	1980	5.7	1981	5.4	1982	5.4	1983	5.3	1984	5.4
1974	6.7	1975	6.7	1976	6.7	1977	6.7	1978	5.9	1979	5.7	1980	5.7	1981	5.3	1982	5.3	1983	5.3	1984	5.3	1985	5.1
1975	6.7	1976	6.7	1977	6.7	1978	5.9	1979	5.6	1980	5.6	1981	5.3	1982	5.3	1983	5.2	1984	5.2	1985	5.0	1986	5.0
1976	6.6	1977	6.6	1978	5.8	1979	5.5	1980	5.5	1981	5.2	1982	5.2	1983	5.1	1984	5.1	1985	5.0	1986	5.0	1987	5.2
1977	6.4	1978	5.7	1979	5.4	1980	5.4	1981	5.1	1982	5.1	1983	5.0	1984	5.0	1985	4.9	1986	5.0	1987	5.1	1988	5.1
1978	5.6	1979	5.3	1980	5.3	1981	5.0	1982	5.0	1983	4.9	1984	4.9	1985	4.9	1986	4.9	1987	4.9	1988	4.9	1989	4.9
1979	5.2	1980	5.2	1981	4.9	1982	4.9	1983	4.8	1984	4.8	1985	4.8	1986	4.8	1987	4.7	1988	4.7	1989	4.7	1990	4.7
1980	5.1	1981	4.8	1982	4.8	1983	4.7	1984	4.8	1985	4.8	1986	4.8	1987	4.6	1988	4.6	1989	4.6	1990	4.6	1991	4.5

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	9.3	1974	7.4	1975	7.4	1976	7.4	1977	7.4	1978	6.5	1979	6.2	1980	6.2	1981	5.9	1982	5.9	1983	5.8	1984	5.8
1974	7.3	1975	7.3	1976	7.3	1977	7.3	1978	6.5	1979	6.2	1980	6.2	1981	5.8	1982	5.8	1983	5.8	1984	5.8	1985	5.3
1975	7.3	1976	7.3	1977	7.3	1978	6.4	1979	6.2	1980	6.2	1981	5.8	1982	5.8	1983	5.8	1984	5.8	1985	5.3	1986	5.3
1976	7.3	1977	7.3	1978	6.4	1979	6.1	1980	6.1	1981	5.8	1982	5.8	1983	5.7	1984	5.8	1985	5.3	1986	5.3	1987	6.3
1977	7.2	1978	6.4	1979	6.1	1980	6.1	1981	5.8	1982	5.8	1983	5.7	1984	5.7	1985	5.3	1986	5.3	1987	6.2	1988	6.2
1978	6.3	1979	6.1	1980	6.1	1981	5.7	1982	5.7	1983	5.7	1984	5.7	1985	5.3	1986	5.3	1987	6.2	1988	6.2	1989	6.2
1979	6.0	1980	6.0	1981	5.7	1982	5.7	1983	5.6	1984	5.7	1985	5.2	1986	5.3	1987	6.1	1988	6.1	1989	6.1	1990	6.1
1980	6.0	1981	5.7	1982	5.7	1983	5.6	1984	5.6	1985	5.2	1986	5.3	1987	6.0	1988	6.0	1989	6.0	1990	6.0	1991	5.8
1981	5.6	1982	5.6	1983	5.6	1984	5.6	1985	5.2	1986	5.2	1987	6.0	1988	6.0	1989	6.0	1990	6.0	1991	5.7	1992	5.7
1982	5.6	1983	5.5	1984	5.5	1985	5.2	1986	5.2	1987	5.9	1988	5.9	1989	5.9	1990	5.9	1991	5.7	1992	5.7	1993	5.7
1983	5.5	1984	5.5	1985	5.2	1986	5.2	1987	5.8	1988	5.8	1989	5.8	1990	5.8	1991	5.6	1992	5.6	1993	5.6	1994	5.5
1984	5.4	1985	5.1	1986	5.2	1987	5.7	1988	5.7	1989	5.7	1990	5.7	1991	5.5	1992	5.5	1993	5.5	1994	5.4	1995	5.4
1985	5.1	1986	5.1	1987	5.6	1988	5.6	1989	5.6	1990	5.6	1991	5.4	1992	5.4	1993	5.4	1994	5.3	1995	5.3	1996	5.3
1986	5.1	1987	5.5	1988	5.5	1989	5.5	1990	5.5	1991	5.3	1992	5.3	1993	5.3	1994	5.2	1995	5.2	1996	5.2	1997	5.1
1987	5.4	1988	5.4	1989	5.4	1990	5.4	1991	5.2	1992	5.2	1993	5.2	1994	5.1	1995	5.1	1996	5.1	1997	5.0	1998	5.0
1988	5.2	1989	5.2	1990	5.2	1991	5.1	1992	5.1	1993	5.1	1994	4.9	1995	4.9	1996	4.9	1997	4.9	1998	4.9	1999	4.9
1989	5.1	1990	5.1	1991	4.9	1992	4.9	1993	4.9	1994	4.8	1995	4.8	1996	4.8	1997	4.7	1998	4.7	1999	4.7	2000	4.7
1990	4.9	1991	4.8	1992	4.8	1993	4.8	1994	4.6	1995	4.6	1996	4.6	1997	4.6	1998	4.6	1999	4.6	2000	4.6	2001	4.6
1991	4.6	1992	4.6	1993	4.6	1994	4.5	1995	4.5	1996	4.5	1997	4.4	1998	4.4	1999	4.4	2000	4.4	2001	4.4	2002	4.4
1992	4.5	1993	4.5	1994	4.4	1995	4.4	1996	4.4	1997	4.3	1998	4.3	1999	4.3	2000	4.3	2001	4.3	2002	4.3	2003	4.3

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F. Emissions are based on the January 1 mileage accumulation figures given in Table 1.4.4.

TABLE 1.4.3

IDLE EMISSION RATES FOR
LOW ALTITUDE
HEAVY DUTY GASOLINE POWERED VEHICLES

* IER = ZML + (DR * M)

Pol	Model Years	Zero Mile Emission Level (Grams/Min.)	Deterioration Rate (Gm/Min/10K Mi)
HC	Pre-1963	2.29	0.04
	1963-1969	2.29	0.04
	1970-1973	0.85	0.04
	1974-1977	0.85	0.02
	1978	0.85	0.02
	1979-1980	0.14	0.01
	1981-1982	0.43	0.02
	1983	0.43	0.03
	1984	0.43	0.03
	1985	0.10	0.03
	1986	0.10	0.03
	1987-1990	0.10	0.03
	1991-1993	0.10	0.03
	1994-1996	0.10	0.03
	1997+	0.10	0.03
CO	Pre-1963	22.18	0.53
	1963-1969	22.18	0.53
	1970-1973	6.15	0.28
	1974-1977	6.15	0.27
	1978	6.15	0.27
	1979-1980	6.42	0.28
	1981-1982	6.42	0.28
	1983	6.42	0.28
	1984	0.70	0.14
	1985	0 34	0.18
	1986	0.34	0.18
	1987-1990	0.34	0.18
	1991-1993	0.34	0.18
	1994-1996	0.34	0.18
	1997+	0.34	0.18
NOx	Pre-1963	0.04	0.0
	1963-1969	0.04	0.0
	1970-1973	0.05	0.0
	1974-1977	0.06	0.0
	1978	0.06	0.0
	1979-1980	0.06	0.0
	1981-1982	0.06	0.0
	1983	0.06	0.0
	1984	0.07	0.0
	1985	0.01	0.0
	1986	0.01	0.0
	1987-1990	0.01	0.0
	1991-1993	0.01	0.0
	1994-1996	0.01	0.0
	1997+	0.01	0.0

* WHERE : IER = Idle emission rate
ZML = Zero mile level
DR = Deterioration Rate
M = Cumulative Mileage / 10,000

DATE : MAY 25, 1985

TABLE 1.4.4

REGISTRATION MIX AND
MILEAGE ACCUMULATION RATES FOR
LOW ALTITUDE
HEAVY DUTY GASOLINE POWERED VEHICLES

Model Year Index**	July 1 Registration Mix*	Mileage Accumulation Rate per vehicle*	Jan 1 Registration Mix	Jan 1 Mileage Accumulation Rate (fleet)	Jan 1 Mileage Accumulation (fleet)
1	0.079	19967.	0.0	0.	0.
2	0.136	18077.	0.136	19967.	9983.
3	0.116	16365.	0.116	18077.	29005.
4	0.099	14815.	0.099	16365.	46226.
5	0.085	13413.	0.085	14815.	61816.
6	0.072	12143.	0.072	13413.	75930.
7	0.062	10993.	0.062	12143.	88708.
8	0.053	9952.	0.053	10993.	100276.
9	0.045	9010.	0.045	9952.	110749.
10	0.038	8156.	0.038	9010.	120230.
11	0.033	7384.	0.033	8156.	128813.
12	0.028	6685.	0.028	7384.	136583.
13	0.024	6052.	0.024	6685.	143617.
14	0.020	5479.	0.020	6052.	149985.
15	0.018	4960.	0.018	5479.	155751.
16	0.015	4490.	0.015	4960.	160970.
17	0.013	4065.	0.013	4490.	165695.
18	0.011	3680.	0.011	4065.	169973.
19	0.009	3332.	0.009	3680.	173845.
20+	0.045	3016.	0.045	3332.	177351.

* Default information that may be altered by the MOBILE3 user with information about the local area.

** The indices refer to the most recent model year vehicles in any given calendar year. Index 1 references the newest model year vehicles and index 20+ references the oldest model year vehicles.

DATE : MAY 25, 1985

TABLE 1.4.5

EXAMPLE TRAVEL WEIGHTING FRACTION CALCULATION FOR
LOW ALTITUDE
HEAVY DUTY GASOLINE POWERED VEHICLES
JANUARY 1, 1988

Model Years	(A) HDGV Fleet Registration	(B) Sales Fraction	(A*B)	(C=A*B/DAF) HDGV Registration	(D) Annual Mileage Accrual Rate	(C*D)	(C*D/TFNORM) Travel Fractions
1988	0.0	1.000	0.0	0.0	0.	0.0	0.0
1987	0.136	1.000	0.136	0.148	19967.	2945.2	0.226
1986	0.116	1.000	0.116	0.126	18077.	2274.3	0.175
1985	0.099	1.000	0.099	0.107	16365.	1757.2	0.135
1984	0.085	1.000	0.085	0.092	14815.	1365.8	0.105
1983	0.072	1.000	0.072	0.078	13413.	1047.4	0.080
1982	0.062	1.000	0.062	0.067	12143.	816.6	0.063
1981	0.053	1.000	0.053	0.057	10993.	631.9	0.049
1980	0.045	1.000	0.045	0.049	9952.	485.7	0.037
1979	0.038	1.000	0.038	0.041	9010.	371.3	0.029
1978	0.033	1.000	0.033	0.036	8156.	291.9	0.022
1977	0.028	1.000	0.028	0.030	7384.	224.2	0.017
1976	0.024	1.000	0.024	0.026	6685.	174.0	0.013
1975	0.020	1.000	0.020	0.022	6052.	131.3	0.010
1974	0.018	1.000	0.018	0.020	5479.	107.0	0.008
1973	0.015	1.000	0.015	0.016	4960.	80.7	0.006
1972	0.013	1.000	0.013	0.014	4490.	63.3	0.005
1971	0.011	1.000	0.011	0.012	4065.	48.5	0.004
1970	0.009	1.000	0.009	0.010	3680.	35.9	0.003
1969-	0.045	1.000	0.045	0.049	3332.	162.6	0.012
		DAF:	0.921		TFNORM:	13015.0	

WHERE :

A = January 1 registration mix from Table 1.4.4.
B = Fleet sales fractions
D = Sales weighted fleet mileage accumulation rate from Table 1.4.4, adjusted to January 1
D(1) = Annual Miles(1)
D(MYI) = .25*(Annual Miles(MYI)) + .75*(Annual Miles(MYI-1)), MYI=2,...,20+

DATE : MAY 25, 1985

TABLE 1.4.6

SPEED CORRECTION FACTOR COEFFICIENTS FOR
LOW ALTITUDE
HEAVY DUTY GASOLINE POWERED VEHICLES

$$* \; SCF(s) = EXP(A + B*s + C*s^2) \;, \; HC \; \& \; CO$$
$$= A + B*s + C*s^2 \;, \; NOx$$

Pol	Model Years	Coefficients A	B	C
HC	All	1.60800	-0.09700	0.00083
CO	All	1.52000	-0.09800	0.00110
NOx	All	0.82400	0.00880	0.0

* WHERE: s = average speed (mph)

DATE : MAY 25, 1985

TABLE 1.4.7

TEMPERATURE CORRECTION FACTOR COEFFICIENTS FOR
LOW ALTITUDE
HEAVY DUTY GASOLINE POWERED VEHICLES

* TCF = EXP(TC * (T - 75.0))

Pol	Model Years	TC Low	TC High
HC	Pre-1970	-0.58903E-02	0.13458E-02
	1970-1973	-0.73870E-02	0.52317E-02
	1974-1978	-0.49759E-02	0.54651E-02
	1979-1983	-0.28549E-02	0.10082E-01
	1984	-0.74107E-02	0.20546E-01
	1985+	-0.92859E-02	0.84842E-02
CO	Pre-1970	-0.20576E-02	0.81720E-02
	1970-1973	-0.45541E-02	0.20268E-01
	1974-1978	-0.42899E-02	0.24127E-01
	1979-1983	-0.13085E-02	0.22061E-01
	1984	-0.77117E-02	0.27019E-01
	1985+	-0.60195E-02	0.71457E-02
NOx	Pre-1970	-0.64315E-02	-0.83986E-02
	1970-1973	-0.55456E-02	-0.86880E-02
	1974-1978	-0.13969E-02	-0.18079E-01
	1979-1983	-0.46352E-03	-0.74889E-02
	1984	-0.57524E-02	-0.21593E-01
	1985+	-0.19733E-02	-0.29584E-01

* WHERE :

TCF = Temperature correction factor for appropriate pollutant, ambient temperature, and model year
T = Ambient temperature (Fahrenheit)
TC = Temperature correction factor coefficient for appropriate pollutant, reference temperature, and model year
75.0 = Reference temperature

DATE : MAY 25, 1985

TABLE 1.5.1

EXHAUST EMISSION RATES FOR
LOW ALTITUDE
LIGHT DUTY DIESEL POWERED VEHICLES
(RATES REFLECT ZERO TAMPERING)

* BER = ZML + (DR * M)

Pol	Model Years	Zero Mile Emission Level (Grams/Mile)	Deterioration Rate (Gm/Mi/10K Mi)	50,000 Mile Emission Level (Grams/Mile)
HC	Pre-1975	1.31	0.08	1.71
	1975-1976	0.42	0.07	0.77
	1977	0.42	0.07	0.77
	1978	0.42	0.07	0.77
	1979	0.42	0.07	0.77
	1980+	0.29	0.03	0.44
CO	Pre-1975	2.71	0.13	3.36
	1975-1976	1.17	0.09	1.62
	1977	1.17	0.09	1.62
	1978	1.17	0.09	1.62
	1979	1.17	0.09	1.62
	1980+	1.15	0.04	1.35
NOx	Pre-1975	1.46	0.04	1.66
	1975-1976	1.40	0.04	1.60
	1977	1.40	0.04	1.60
	1978	1.40	0.04	1.60
	1979	1.40	0.04	1.60
	1980	1.40	0.04	1.60
	1981-1984	1.31	0.03	1.46
	1985+	0.87	0.03	1.02

* WHERE : BER = Basic emission rate (untampered)
ZML = Zero mile level
DR = Deterioration rate
M = Cumulative mileage / 10,000

DATE : MAY 25, 1985

TABLE 1.5.2A

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
LIGHT DUTY DIESEL POWERED VEHICLES
TOTAL HC

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	2.5	1962	2.5	1963	2.5	1964	2.5	1965	2.5	1966	2.5	1967	2.5	1968	2.5	1969	2.5	1970	2.5	1971	2.5	1972	2.5
1962	2.5	1963	2.5	1964	2.5	1965	2.5	1966	2.5	1967	2.5	1968	2.5	1969	2.5	1970	2.5	1971	2.5	1972	2.5	1973	2.5
1963	2.5	1964	2.5	1965	2.5	1966	2.5	1967	2.5	1968	2.5	1969	2.5	1970	2.5	1971	2.5	1972	2.5	1973	2.5	1974	2.5
1964	2.4	1965	2.4	1966	2.4	1967	2.4	1968	2.4	1969	2.4	1970	2.4	1971	2.4	1972	2.4	1973	2.4	1974	2.4	1975	1.4
1965	2.4	1966	2.4	1967	2.4	1968	2.4	1969	2.4	1970	2.4	1971	2.4	1972	2.4	1973	2.4	1974	2.4	1975	1.3	1976	1.3
1966	2.3	1967	2.3	1968	2.3	1969	2.3	1970	2.3	1971	2.3	1972	2.3	1973	2.3	1974	2.3	1975	1.3	1976	1.3	1977	1.3
1967	2.3	1968	2.3	1969	2.3	1970	2.3	1971	2.3	1972	2.3	1973	2.3	1974	2.3	1975	1.3	1976	1.3	1977	1.3	1978	1.3
1968	2.2	1969	2.2	1970	2.2	1971	2.2	1972	2.2	1973	2.2	1974	2.2	1975	1.2	1976	1.2	1977	1.2	1978	1.2	1979	1.2
1969	2.2	1970	2.2	1971	2.2	1972	2.2	1973	2.2	1974	2.2	1975	1.2	1976	1.2	1977	1.2	1978	1.2	1979	1.2	1980	0.6
1970	2.1	1971	2.1	1972	2.1	1973	2.1	1974	2.1	1975	1.1	1976	1.1	1977	1.1	1978	1.1	1979	1.1	1980	0.6	1981	0.6
1971	2.0	1972	2.0	1973	2.0	1974	2.0	1975	1.1	1976	1.1	1977	1.1	1978	1.1	1979	1.1	1980	0.6	1981	0.6	1982	0.6
1972	2.0	1973	2.0	1974	2.0	1975	1.0	1976	1.0	1977	1.0	1978	1.0	1979	1.0	1980	0.5	1981	0.5	1982	0.5	1983	0.5
1973	1.9	1974	1.9	1975	0.9	1976	0.9	1977	0.9	1978	0.9	1979	0.9	1980	0.5	1981	0.5	1982	0.5	1983	0.5	1984	0.5
1974	1.8	1975	0.9	1976	0.9	1977	0.9	1978	0.9	1979	0.9	1980	0.5	1981	0.5	1982	0.5	1983	0.5	1984	0.5	1985	0.5
1975	0.8	1976	0.8	1977	0.8	1978	0.8	1979	0.8	1980	0.5	1981	0.5	1982	0.5	1983	0.5	1984	0.5	1985	0.5	1986	0.5
1976	0.7	1977	0.7	1978	0.7	1979	0.7	1980	0.4	1981	0.4	1982	0.4	1983	0.4	1984	0.4	1985	0.4	1986	0.4	1987	0.4
1977	0.7	1978	0.7	1979	0.7	1980	0.4	1981	0.4	1982	0.4	1983	0.4	1984	0.4	1985	0.4	1986	0.4	1987	0.4	1988	0.4
1978	0.6	1979	0.6	1980	0.4	1981	0.4	1982	0.4	1983	0.4	1984	0.4	1985	0.4	1986	0.4	1987	0.4	1988	0.4	1989	0.4
1979	0.5	1980	0.3	1981	0.3	1982	0.3	1983	0.3	1984	0.3	1985	0.3	1986	0.3	1987	0.3	1988	0.3	1989	0.3	1990	0.3
1980	0.3	1981	0.3	1982	0.3	1983	0.3	1984	0.3	1985	0.3	1986	0.3	1987	0.3	1988	0.3	1989	0.3	1990	0.3	1991	0.3

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	2.5	1974	2.5	1975	1.5	1976	1.5	1977	1.5	1978	1.5	1979	1.5	1980	0.7	1981	0.7	1982	0.7	1983	0.7	1984	0.7
1974	2.5	1975	1.5	1976	1.5	1977	1.5	1978	1.5	1979	1.5	1980	0.7	1981	0.7	1982	0.7	1983	0.7	1984	0.7	1985	0.7
1975	1.4	1976	1.4	1977	1.4	1978	1.4	1979	1.4	1980	0.7	1981	0.7	1982	0.7	1983	0.7	1984	0.7	1985	0.7	1986	0.7
1976	1.4	1977	1.4	1978	1.4	1979	1.4	1980	0.7	1981	0.7	1982	0.7	1983	0.7	1984	0.7	1985	0.7	1986	0.7	1987	0.7
1977	1.3	1978	1.3	1979	1.3	1980	0.7	1981	0.7	1982	0.7	1983	0.7	1984	0.7	1985	0.7	1986	0.7	1987	0.7	1988	0.7
1978	1.3	1979	1.3	1980	0.7	1981	0.7	1982	0.7	1983	0.7	1984	0.7	1985	0.7	1986	0.7	1987	0.7	1988	0.7	1989	0.7
1979	1.3	1980	0.6	1981	0.6	1982	0.6	1983	0.6	1984	0.6	1985	0.6	1986	0.6	1987	0.6	1988	0.6	1989	0.6	1990	0.6
1980	0.6	1981	0.6	1982	0.6	1983	0.6	1984	0.6	1985	0.6	1986	0.6	1987	0.6	1988	0.6	1989	0.6	1990	0.6	1991	0.6
1981	0.6	1982	0.6	1983	0.6	1984	0.6	1985	0.6	1986	0.6	1987	0.6	1988	0.6	1989	0.6	1990	0.6	1991	0.6	1992	0.6
1982	0.6	1983	0.6	1984	0.6	1985	0.6	1986	0.6	1987	0.6	1988	0.6	1989	0.6	1990	0.6	1991	0.6	1992	0.6	1993	0.6
1983	0.6	1984	0.6	1985	0.6	1986	0.6	1987	0.6	1988	0.6	1989	0.6	1990	0.6	1991	0.6	1992	0.6	1993	0.6	1994	0.6
1984	0.5	1985	0.5	1986	0.5	1987	0.5	1988	0.5	1989	0.5	1990	0.5	1991	0.5	1992	0.5	1993	0.5	1994	0.5	1995	0.5
1985	0.5	1986	0.5	1987	0.5	1988	0.5	1989	0.5	1990	0.5	1991	0.5	1992	0.5	1993	0.5	1994	0.5	1995	0.5	1996	0.5
1986	0.5	1987	0.5	1988	0.5	1989	0.5	1990	0.5	1991	0.5	1992	0.5	1993	0.5	1994	0.5	1995	0.5	1996	0.5	1997	0.5
1987	0.5	1988	0.5	1989	0.5	1990	0.5	1991	0.5	1992	0.5	1993	0.5	1994	0.5	1995	0.5	1996	0.5	1997	0.5	1998	0.5
1988	0.4	1989	0.4	1990	0.4	1991	0.4	1992	0.4	1993	0.4	1994	0.4	1995	0.4	1996	0.4	1997	0.4	1998	0.4	1999	0.4
1989	0.4	1990	0.4	1991	0.4	1992	0.4	1993	0.4	1994	0.4	1995	0.4	1996	0.4	1997	0.4	1998	0.4	1999	0.4	2000	0.4
1990	0.4	1991	0.4	1992	0.4	1993	0.4	1994	0.4	1995	0.4	1996	0.4	1997	0.4	1998	0.4	1999	0.4	2000	0.4	2001	0.4
1991	0.3	1992	0.3	1993	0.3	1994	0.3	1995	0.3	1996	0.3	1997	0.3	1998	0.3	1999	0.3	2000	0.3	2001	0.3	2002	0.3
1992	0.3	1993	0.3	1994	0.3	1995	0.3	1996	0.3	1997	0.3	1998	0.3	1999	0.3	2000	0.3	2001	0.3	2002	0.3	2003	0.3

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1.5.4.

TABLE 1.5.2B

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
LIGHT DUTY DIESEL POWERED VEHICLES
CO

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	4.7	1962	4.7	1963	4.7	1964	4.7	1965	4.7	1966	4.7	1967	4.7	1968	4.7	1969	4.7	1970	4.7	1971	4.7	1972	4.7
1962	4.6	1963	4.6	1964	4.6	1965	4.6	1966	4.6	1967	4.6	1968	4.6	1969	4.6	1970	4.6	1971	4.6	1972	4.6	1973	4.6
1963	4.6	1964	4.6	1965	4.6	1966	4.6	1967	4.6	1968	4.6	1969	4.6	1970	4.6	1971	4.6	1972	4.6	1973	4.6	1974	4.6
1964	4.5	1965	4.5	1966	4.5	1967	4.5	1968	4.5	1969	4.5	1970	4.5	1971	4.5	1972	4.5	1973	4.5	1974	4.5	1975	2.4
1965	4.4	1966	4.4	1967	4.4	1968	4.4	1969	4.4	1970	4.4	1971	4.4	1972	4.4	1973	4.4	1974	4.4	1975	2.4	1976	2.4
1966	4.3	1967	4.3	1968	4.3	1969	4.3	1970	4.3	1971	4.3	1972	4.3	1973	4.3	1974	4.3	1975	2.3	1976	2.3	1977	2.3
1967	4.3	1968	4.3	1969	4.3	1970	4.3	1971	4.3	1972	4.3	1973	4.3	1974	4.3	1975	2.2	1976	2.2	1977	2.2	1978	2.2
1968	4.2	1969	4.2	1970	4.2	1971	4.2	1972	4.2	1973	4.2	1974	4.2	1975	2.2	1976	2.2	1977	2.2	1978	2.2	1979	2.2
1969	4.1	1970	4.1	1971	4.1	1972	4.1	1973	4.1	1974	4.1	1975	2.1	1976	2.1	1977	2.1	1978	2.1	1979	2.1	1980	1.6
1970	4.0	1971	4.0	1972	4.0	1973	4.0	1974	4.0	1975	2.1	1976	2.1	1977	2.1	1978	2.1	1979	2.1	1980	1.5	1981	1.5
1971	3.9	1972	3.9	1973	3.9	1974	3.9	1975	2.0	1976	2.0	1977	2.0	1978	2.0	1979	2.0	1980	1.5	1981	1.5	1982	1.5
1972	3.8	1973	3.8	1974	3.8	1975	1.9	1976	1.9	1977	1.9	1978	1.9	1979	1.9	1980	1.5	1981	1.5	1982	1.5	1983	1.5
1973	3.7	1974	3.7	1975	1.8	1976	1.8	1977	1.8	1978	1.8	1979	1.8	1980	1.4	1981	1.4	1982	1.4	1983	1.4	1984	1.4
1974	3.6	1975	1.8	1976	1.8	1977	1.8	1978	1.8	1979	1.8	1980	1.4	1981	1.4	1982	1.4	1983	1.4	1984	1.4	1985	1.4
1975	1.7	1976	1.7	1977	1.7	1978	1.7	1979	1.7	1980	1.4	1981	1.4	1982	1.4	1983	1.4	1984	1.4	1985	1.4	1986	1.4
1976	1.6	1977	1.6	1978	1.6	1979	1.6	1980	1.3	1981	1.3	1982	1.3	1983	1.3	1984	1.3	1985	1.3	1986	1.3	1987	1.3
1977	1.5	1978	1.5	1979	1.5	1980	1.3	1981	1.3	1982	1.3	1983	1.3	1984	1.3	1985	1.3	1986	1.3	1987	1.3	1988	1.3
1978	1.4	1979	1.4	1980	1.2	1981	1.2	1982	1.2	1983	1.2	1984	1.2	1985	1.2	1986	1.2	1987	1.2	1988	1.2	1989	1.2
1979	1.3	1980	1.2	1981	1.2	1982	1.2	1983	1.2	1984	1.2	1985	1.2	1986	1.2	1987	1.2	1988	1.2	1989	1.2	1990	1.2
1980	1.2	1981	1.2	1982	1.2	1983	1.2	1984	1.2	1985	1.2	1986	1.2	1987	1.2	1988	1.2	1989	1.2	1990	1.2	1991	1.2

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	4.7	1974	4.7	1975	2.5	1976	2.5	1977	2.5	1978	2.5	1979	2.5	1980	1.8	1981	1.8	1982	1.8	1983	1.8	1984	1.8
1974	4.6	1975	2.5	1976	2.5	1977	2.5	1978	2.5	1979	2.5	1980	1.7	1981	1.7	1982	1.7	1983	1.7	1984	1.7	1985	1.7
1975	2.5	1976	2.5	1977	2.5	1978	2.5	1979	2.5	1980	1.7	1981	1.7	1982	1.7	1983	1.7	1984	1.7	1985	1.7	1986	1.7
1976	2.4	1977	2.4	1978	2.4	1979	2.4	1980	1.7	1981	1.7	1982	1.7	1983	1.7	1984	1.7	1985	1.7	1986	1.7	1987	1.7
1977	2.4	1978	2.4	1979	2.4	1980	1.7	1981	1.7	1982	1.7	1983	1.7	1984	1.7	1985	1.7	1986	1.7	1987	1.7	1988	1.7
1978	2.3	1979	2.3	1980	1.7	1981	1.7	1982	1.7	1983	1.7	1984	1.7	1985	1.7	1986	1.7	1987	1.7	1988	1.7	1989	1.7
1979	2.2	1980	1.6	1981	1.6	1982	1.6	1983	1.6	1984	1.6	1985	1.6	1986	1.6	1987	1.6	1988	1.6	1989	1.6	1990	1.6
1980	1.6	1981	1.6	1982	1.6	1983	1.6	1984	1.6	1985	1.6	1986	1.6	1987	1.6	1988	1.6	1989	1.6	1990	1.6	1991	1.6
1981	1.6	1982	1.6	1983	1.6	1984	1.6	1985	1.6	1986	1.6	1987	1.6	1988	1.6	1989	1.6	1990	1.6	1991	1.6	1992	1.6
1982	1.5	1983	1.5	1984	1.5	1985	1.5	1986	1.5	1987	1.5	1988	1.5	1989	1.5	1990	1.5	1991	1.5	1992	1.5	1993	1.5
1983	1.5	1984	1.5	1985	1.5	1986	1.5	1987	1.5	1988	1.5	1989	1.5	1990	1.5	1991	1.5	1992	1.5	1993	1.5	1994	1.5
1984	1.5	1985	1.5	1986	1.5	1987	1.5	1988	1.5	1989	1.5	1990	1.5	1991	1.5	1992	1.5	1993	1.5	1994	1.5	1995	1.5
1985	1.4	1986	1.4	1987	1.4	1988	1.4	1989	1.4	1990	1.4	1991	1.4	1992	1.4	1993	1.4	1994	1.4	1995	1.4	1996	1.4
1986	1.4	1987	1.4	1988	1.4	1989	1.4	1990	1.4	1991	1.4	1992	1.4	1993	1.4	1994	1.4	1995	1.4	1996	1.4	1997	1.4
1987	1.4	1988	1.4	1989	1.4	1990	1.4	1991	1.4	1992	1.4	1993	1.4	1994	1.4	1995	1.4	1996	1.4	1997	1.4	1998	1.4
1988	1.3	1989	1.3	1990	1.3	1991	1.3	1992	1.3	1993	1.3	1994	1.3	1995	1.3	1996	1.3	1997	1.3	1998	1.3	1999	1.3
1989	1.3	1990	1.3	1991	1.3	1992	1.3	1993	1.3	1994	1.3	1995	1.3	1996	1.3	1997	1.3	1998	1.3	1999	1.3	2000	1.3
1990	1.2	1991	1.2	1992	1.2	1993	1.2	1994	1.2	1995	1.2	1996	1.2	1997	1.2	1998	1.2	1999	1.2	2000	1.2	2001	1.2
1991	1.2	1992	1.2	1993	1.2	1994	1.2	1995	1.2	1996	1.2	1997	1.2	1998	1.2	1999	1.2	2000	1.2	2001	1.2	2002	1.2
1992	1.2	1993	1.2	1994	1.2	1995	1.2	1996	1.2	1997	1.2	1998	1.2	1999	1.2	2000	1.2	2001	1.2	2002	1.2	2003	1.2

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1.5.4.

TABLE 1.5.2C

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
LIGHT DUTY DIESEL POWERED VEHICLES
NOx

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	2.1	1962	2.1	1963	2.1	1964	2.1	1965	2.1	1966	2.1	1967	2.1	1968	2.1	1969	2.1	1970	2.1	1971	2.1	1972	2.1
1962	2.0	1963	2.0	1964	2.0	1965	2.0	1966	2.0	1967	2.0	1968	2.0	1969	2.0	1970	2.0	1971	2.0	1972	2.0	1973	2.0
1963	2.0	1964	2.0	1965	2.0	1966	2.0	1967	2.0	1968	2.0	1969	2.0	1970	2.0	1971	2.0	1972	2.0	1973	2.0	1974	2.0
1964	2.0	1965	2.0	1966	2.0	1967	2.0	1968	2.0	1969	2.0	1970	2.0	1971	2.0	1972	2.0	1973	2.0	1974	2.0	1975	1.9
1965	2.0	1966	2.0	1967	2.0	1968	2.0	1969	2.0	1970	2.0	1971	2.0	1972	2.0	1973	2.0	1974	2.0	1975	1.9	1976	1.9
1966	2.0	1967	2.0	1968	2.0	1969	2.0	1970	2.0	1971	2.0	1972	2.0	1973	2.0	1974	2.0	1975	1.9	1976	1.9	1977	1.9
1967	1.9	1968	1.9	1969	1.9	1970	1.9	1971	1.9	1972	1.9	1973	1.9	1974	1.9	1975	1.9	1976	1.9	1977	1.9	1978	1.9
1968	1.9	1969	1.9	1970	1.9	1971	1.9	1972	1.9	1973	1.9	1974	1.9	1975	1.8	1976	1.8	1977	1.8	1978	1.8	1979	1.8
1969	1.9	1970	1.9	1971	1.9	1972	1.9	1973	1.9	1974	1.9	1975	1.8	1976	1.8	1977	1.8	1978	1.8	1979	1.8	1980	1.8
1970	1.8	1971	1.8	1972	1.8	1973	1.8	1974	1.8	1975	1.8	1976	1.8	1977	1.8	1978	1.8	1979	1.8	1980	1.8	1981	1.6
1971	1.8	1972	1.8	1973	1.8	1974	1.8	1975	1.8	1976	1.8	1977	1.8	1978	1.8	1979	1.8	1980	1.8	1981	1.6	1982	1.6
1972	1.8	1973	1.8	1974	1.8	1975	1.7	1976	1.7	1977	1.7	1978	1.7	1979	1.7	1980	1.7	1981	1.6	1982	1.6	1983	1.6
1973	1.7	1974	1.7	1975	1.7	1976	1.7	1977	1.7	1978	1.7	1979	1.7	1980	1.7	1981	1.5	1982	1.5	1983	1.5	1984	1.5
1974	1.7	1975	1.7	1976	1.7	1977	1.7	1978	1.7	1979	1.7	1980	1.7	1981	1.5	1982	1.5	1983	1.5	1984	1.5	1985	1.1
1975	1.6	1976	1.6	1977	1.6	1978	1.6	1979	1.6	1980	1.6	1981	1.5	1982	1.5	1983	1.5	1984	1.5	1985	1.0	1986	1.0
1976	1.6	1977	1.6	1978	1.6	1979	1.6	1980	1.6	1981	1.4	1982	1.4	1983	1.4	1984	1.4	1985	1.0	1986	1.0	1987	1.0
1977	1.5	1978	1.5	1979	1.5	1980	1.5	1981	1.4	1982	1.4	1983	1.4	1984	1.4	1985	1.0	1986	1.0	1987	1.0	1988	1.0
1978	1.5	1979	1.5	1980	1.5	1981	1.4	1982	1.4	1983	1.4	1984	1.4	1985	0.9	1986	0.9	1987	0.9	1988	0.9	1989	0.9
1979	1.4	1980	1.4	1981	1.3	1982	1.3	1983	1.3	1984	1.3	1985	0.9	1986	0.9	1987	0.9	1988	0.9	1989	0.9	1990	0.9
1980	1.4	1981	1.3	1982	1.3	1983	1.3	1984	1.3	1985	0.9	1986	0.9	1987	0.9	1988	0.9	1989	0.9	1990	0.9	1991	0.9

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	2.1	1974	2.1	1975	2.0	1976	2.0	1977	2.0	1978	2.0	1979	2.0	1980	2.0	1981	1.8	1982	1.8	1983	1.8	1984	1.8
1974	2.0	1975	2.0	1976	2.0	1977	2.0	1978	2.0	1979	2.0	1980	2.0	1981	1.7	1982	1.7	1983	1.7	1984	1.7	1985	1.3
1975	2.0	1976	2.0	1977	2.0	1978	2.0	1979	2.0	1980	2.0	1981	1.7	1982	1.7	1983	1.7	1984	1.7	1985	1.3	1986	1.3
1976	1.9	1977	1.9	1978	1.9	1979	1.9	1980	1.9	1981	1.7	1982	1.7	1983	1.7	1984	1.7	1985	1.3	1986	1.3	1987	1.3
1977	1.9	1978	1.9	1979	1.9	1980	1.9	1981	1.7	1982	1.7	1983	1.7	1984	1.7	1985	1.3	1986	1.3	1987	1.3	1988	1.3
1978	1.9	1979	1.9	1980	1.9	1981	1.7	1982	1.7	1983	1.7	1984	1.7	1985	1.2	1986	1.2	1987	1.2	1988	1.2	1989	1.2
1979	1.9	1980	1.9	1981	1.7	1982	1.7	1983	1.7	1984	1.7	1985	1.2	1986	1.2	1987	1.2	1988	1.2	1989	1.2	1990	1.2
1980	1.8	1981	1.6	1982	1.6	1983	1.6	1984	1.6	1985	1.2	1986	1.2	1987	1.2	1988	1.2	1989	1.2	1990	1.2	1991	1.2
1981	1.6	1982	1.6	1983	1.6	1984	1.6	1985	1.2	1986	1.2	1987	1.2	1988	1.2	1989	1.2	1990	1.2	1991	1.2	1992	1.2
1982	1.6	1983	1.6	1984	1.6	1985	1.2	1986	1.2	1987	1.2	1988	1.2	1989	1.2	1990	1.2	1991	1.2	1992	1.2	1993	1.2
1983	1.6	1984	1.6	1985	1.1	1986	1.1	1987	1.1	1988	1.1	1989	1.1	1990	1.1	1991	1.1	1992	1.1	1993	1.1	1994	1.1
1984	1.6	1985	1.1	1986	1.1	1987	1.1	1988	1.1	1989	1.1	1990	1.1	1991	1.1	1992	1.1	1993	1.1	1994	1.1	1995	1.1
1985	1.1	1986	1.1	1987	1.1	1988	1.1	1989	1.1	1990	1.1	1991	1.1	1992	1.1	1993	1.1	1994	1.1	1995	1.1	1996	1.1
1986	1.1	1987	1.1	1988	1.1	1989	1.1	1990	1.1	1991	1.1	1992	1.1	1993	1.1	1994	1.1	1995	1.1	1996	1.1	1997	1.1
1987	1.0	1988	1.0	1989	1.0	1990	1.0	1991	1.0	1992	1.0	1993	1.0	1994	1.0	1995	1.0	1996	1.0	1997	1.0	1998	1.0
1988	1.0	1989	1.0	1990	1.0	1991	1.0	1992	1.0	1993	1.0	1994	1.0	1995	1.0	1996	1.0	1997	1.0	1998	1.0	1999	1.0
1989	1.0	1990	1.0	1991	1.0	1992	1.0	1993	1.0	1994	1.0	1995	1.0	1996	1.0	1997	1.0	1998	1.0	1999	1.0	2000	1.0
1990	0.9	1991	0.9	1992	0.9	1993	0.9	1994	0.9	1995	0.9	1996	0.9	1997	0.9	1998	0.9	1999	0.9	2000	0.9	2001	0.9
1991	0.9	1992	0.9	1993	0.9	1994	0.9	1995	0.9	1996	0.9	1997	0.9	1998	0.9	1999	0.9	2000	0.9	2001	0.9	2002	0.9
1992	0.9	1993	0.9	1994	0.9	1995	0.9	1996	0.9	1997	0.9	1998	0.9	1999	0.9	2000	0.9	2001	0.9	2002	0.9	2003	0.9

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1.5.4.

TABLE 1.5.3

IDLE EMISSION RATES FOR
LOW ALTITUDE
LIGHT DUTY DIESEL POWERED VEHICLES

* IER = ZML + (DR * M)

Pol	Model Years	Zero Mile Emission Level (Grams/Min.)	Deterioration Rate (Gm/Min/10K Mi)
HC	Pre-1975	0.14	0.01
	1975-1976	0.03	0.0
	1977	0.04	0.0
	1978	0.06	0.0
	1979	0.05	0.0
	1980+	0.03	0.0
CO	Pre-1975	0.23	0.01
	1975-1976	0.14	0.01
	1977	0.16	0.01
	1978	0.17	0.01
	1979	0.18	0.01
	1980+	0.15	0.01
NOx	Pre-1975	0.13	0.0
	1975-1976	0.22	0.0
	1977	0.17	0.01
	1978	0.20	0.01
	1979	0.18	0.01
	1980	0.19	0.01
	1981-1984	0.14	0.01
	1985+	0.09	0.01

* WHERE : IER = Idle emission rate
ZML = Zero mile level
DR = Deterioration Rate
M = Cumulative Mileage / 10,000

DATE : MAY 25, 1985

TABLE 1.5.4

REGISTRATION MIX AND
MILEAGE ACCUMULATION RATES FOR
LOW ALTITUDE
LIGHT DUTY DIESEL POWERED VEHICLES

Model Year Index**	July 1 Registration Mix*	Mileage Accumulation Rate per vehicle*	Jan 1 Registration Mix	Jan 1 Mileage Accumulation Rate (fleet)	Jan 1 Mileage Accumulation (fleet)
1	0.080	12818.	0.027	12818.	1602.
2	0.101	12102.	0.101	12639.	9591.
3	0.095	11427.	0.095	11933.	21873.
4	0.089	10789.	0.089	11267.	33470.
5	0.083	10187.	0.083	10638.	44420.
6	0.077	9619.	0.077	10045.	54758.
7	0.071	9082.	0.071	9485.	64520.
8	0.065	8575.	0.065	8955.	73738.
9	0.059	8096.	0.059	8455.	82440.
10	0.053	7645.	0.053	7983.	90657.
11	0.047	7218.	0.047	7538.	98415.
12	0.041	6815.	0.041	7117.	105740.
13	0.035	6435.	0.035	6720.	112657.
14	0.029	6076.	0.029	6345.	119187.
15	0.023	5737.	0.023	5991.	125354.
16	0.017	5416.	0.017	5657.	131176.
17	0.011	5114.	0.011	5340.	136673.
18	0.008	4829.	0.008	5043.	141863.
19	0.006	4559.	0.006	4761.	146763.
20+	0.008	4305.	0.008	4495.	151390.

* Default information that may be altered by the MOBILE3 user with information about the local area.

** The indices refer to the most recent model year vehicles in any given calendar year. Index 1 references the newest model year vehicles and index 20+ references the oldest model year vehicles.

DATE : MAY 25, 1985

TABLE 1.5.5

EXAMPLE TRAVEL WEIGHTING FRACTION CALCULATION FOR
LOW ALTITUDE
LIGHT DUTY DIESEL POWERED VEHICLES
JANUARY 1, 1988

Model Years	(A) LDV Fleet Registration	(B) Sales Fraction	(A*B)	(C=A*B/DAF) LDDV Registration	(D) Annual Mileage Accrual Rate	(C*D)	(C*D/TFNORM) Travel Fractions
1988	0.027	0.090	0.002	0.055	12818.	701.6	0.065
1987	0.101	0.080	0.008	0.184	12639.	2328.9	0.214
1986	0.095	0.073	0.007	0.158	11933.	1887.3	0.174
1985	0.089	0.066	0.006	0.134	11267.	1509.4	0.139
1984	0.083	0.060	0.005	0.114	10638.	1208.2	0.111
1983	0.077	0.053	0.004	0.093	10045.	934.9	0.086
1982	0.071	0.046	0.003	0.074	9485.	706.4	0.065
1981	0.065	0.061	0.004	0.090	8955.	809.8	0.074
1980	0.059	0.034	0.002	0.046	8455.	386.8	0.036
1979	0.053	0.028	0.001	0.034	7983.	270.2	0.025
1978	0.047	0.009	0.000	0.010	7538.	72.7	0.007
1977	0.041	0.004	0.000	0.004	7117.	26.6	0.002
1976	0.035	0.003	0.000	0.002	6720.	16.1	0.001
1975	0.029	0.003	0.000	0.002	6345.	12.6	0.001
1974	0.023	0.0	0.0	0.0	5991.	0.0	0.0
1973	0.017	0.0	0.0	0.0	5657.	0.0	0.0
1972	0.011	0.0	0.0	0.0	5340.	0.0	0.0
1971	0.008	0.0	0.0	0.0	5043.	0.0	0.0
1970	0.006	0.0	0.0	0.0	4761.	0.0	0.0
1969-	0.008	0.0	0.0	0.0	4495.	0.0	0.0
		DAF:	0.044		TFNORM:	10871.3	

WHERE :

A = January 1 registration mix from Table 1.5.4.
B = Fleet sales fractions
D = Sales weighted fleet mileage accumulation rate from Table 1.5.4, adjusted to January 1
D(1) = Annual Miles(1)
D(MYI) = .25*(Annual Miles(MYI)) + .75*(Annual Miles(MYI-1)), MYI=2,...,20+

NOTE : In general, the travel weighting fractions will change for every calendar year since the sales fraction (column B) changes for almost every model year.

DATE : MAY 25, 1985

TABLE 1.5.6

SPEED CORRECTION FACTOR COEFFICIENTS FOR
LOW ALTITUDE
LIGHT DUTY DIESEL POWERED VEHICLES

$$* \; SCF(s,sadj) = SF(s)/SF(sadj)$$

$$SF(s) = EXP(A + B*s + C*s^2)$$

Pol	Model Years	Coefficients A	B	C
HC	All	0.90900	-0.05500	0.00044
CO	All	1.37520	-0.08800	0.00091
NOx	All	0.66800	-0.04800	0.00071

* WHERE :
s = average speed (mph)
sadj = basic test procedure speed; adjusted for fraction of cold start operation x and fraction of hot start operation w,
[1/sadj = (w+x)/26 + (1-w-x)/16]

DATE : MAY 25, 1985

TABLE 1.5.7

NORMALIZED BAG FRACTIONS FOR
LOW ALTITUDE
LIGHT DUTY DIESEL POWERED VEHICLES

		Normalized Fractions							
	Model	Test Seg.#1		Test Seg.#2		Test Seg.#3		Total Test	
Pol	Years	B1	D1	B2	D2	B3	D3	BO	DO
HC	Pre-1975	1.209	0.071	1.073	0.056	0.703	0.064	1.000	0.061
	1975-1976	1.209	0.105	1.073	0.084	0.703	0.088	1.000	0.098
	1977	1.209	0.105	1.073	0.084	0.703	0.088	1.000	0.098
	1978	1.209	0.105	1.073	0.084	0.703	0.088	1.000	0.098
	1979	1.209	0.105	1.073	0.084	0.703	0.088	1.000	0.098
	1980+	1.345	0.103	0.966	0.138	0.793	0.103	1.000	0.138
CO	Pre-1975	1.199	0.060	0.935	0.042	0.974	0.051	1.000	0.048
	1975-1976	1.199	0.067	0.935	0.048	0.974	0.057	1.000	0.054
	1977	1.199	0.067	0.935	0.048	0.974	0.057	1.000	0.054
	1978	1.199	0.067	0.935	0.048	0.974	0.057	1.000	0.054
	1979	1.199	0.067	0.935	0.048	0.974	0.057	1.000	0.054
	1980+	1.157	0.061	1.000	0.026	0.904	0.035	1.000	0.035
NOx	Pre-1975	1.068	0.026	0.981	0.029	0.985	0.026	1.000	0.028
	1975-1976	1.068	0.031	0.981	0.033	0.985	0.030	1.000	0.032
	1977	1.068	0.031	0.981	0.033	0.985	0.030	1.000	0.032
	1978	1.068	0.031	0.981	0.033	0.985	0.030	1.000	0.032
	1979	1.068	0.031	0.981	0.033	0.985	0.030	1.000	0.032
	1980	0.969	0.031	1.062	0.047	0.906	0.031	1.000	0.039
	1981-1982	0.969	0.031	1.062	0.047	0.906	0.031	1.000	0.039
	1983+	0.969	0.031	1.062	0.047	0.906	0.031	1.000	0.039

NOTE : The fractions given in this table are used in the calculation of the operating-mode/ temperature correction factor (OMTCF).

WHERE :

```
OMTCF   = ((TERM1 + TERM2 + TERM3)/DENOM)
TERM1   =    W    *TCF(1)*(B1+D1*M)
TERM2   = (1-W-X) *TCF(2)*(B2+D2*M)
TERM3   =    X    *TCF(3)*(B3+D3*M)
DENOM   = BO + DO*M
 W      = Fraction of VMT in the cold start mode
 X      = Fraction of VMT in the  hot start mode
TCF(b)  = Temperature correction factor for pollutant, model
          year; for test segment b
 M      = Cumulative mileage / 10,000
```

DATE : MAY 25, 1985

TABLE 1.6.1

EXHAUST EMISSION RATES FOR
LOW ALTITUDE
LIGHT DUTY DIESEL POWERED TRUCKS
(RATES REFLECT ZERO TAMPERING)

* BER = ZML + (DR * M)

Pol	Model Years	Zero Mile Emission Level (Grams/Mile)	Deterioration Rate (Gm/Mi/10K Mi)	50,000 Mile Emission Level (Grams/Mile)
HC	Pre-1978	0.86	0.08	1.26
	1978-1980	0.86	0.08	1.26
	1981+	0.43	0.04	0.63
CO	Pre-1978	1.97	0.10	2.47
	1978-1980	1.97	0.10	2.47
	1981+	1.33	0.04	1.53
NOx	Pre-1978	1.83	0.08	2.23
	1978-1980	1.83	0.08	2.23
	1981-1986	1.48	0.03	1.63
	1987+	0.94	0.03	1.09

* WHERE : BER = Basic emission rate (untampered)
ZML = Zero mile level
DR = Deterioration rate
M = Cumulative mileage / 10,000

DATE : MAY 25, 1985

TABLE 1 6.2A

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
LIGHT DUTY DIESEL POWERED TRUCKS
TOTAL HC

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	2.3	1962	2.3	1963	2.3	1964	2.3	1965	2.3	1966	2.3	1967	2.3	1968	2.3	1969	2.3	1970	2.3	1971	2.3	1972	2.3
1962	2.3	1963	2.3	1964	2.3	1965	2.3	1966	2.3	1967	2.3	1968	2.3	1969	2.3	1970	2.3	1971	2.3	1972	2.3	1973	2.3
1963	2.2	1964	2.2	1965	2.2	1966	2.2	1967	2.2	1968	2.2	1969	2.2	1970	2.2	1971	2.2	1972	2.2	1973	2.2	1974	2.2
1964	2.2	1965	2.2	1966	2.2	1967	2.2	1968	2.2	1969	2.2	1970	2.2	1971	2.2	1972	2.2	1973	2.2	1974	2.2	1975	2.2
1965	2.1	1966	2.1	1967	2.1	1968	2.1	1969	2.1	1970	2.1	1971	2.1	1972	2.1	1973	2.1	1974	2.1	1975	2.1	1976	2.1
1966	2.1	1967	2.1	1968	2.1	1969	2.1	1970	2.1	1971	2.1	1972	2.1	1973	2.1	1974	2.1	1975	2.1	1976	2.1	1977	2.1
1967	2.0	1968	2.0	1969	2.0	1970	2.0	1971	2.0	1972	2.0	1973	2.0	1974	2.0	1975	2.0	1976	2.0	1977	2.0	1978	2.0
1968	2.0	1969	2.0	1970	2.0	1971	2.0	1972	2.0	1973	2.0	1974	2.0	1975	2.0	1976	2.0	1977	2.0	1978	2.0	1979	2.0
1969	1.9	1970	1.9	1971	1.9	1972	1.9	1973	1.9	1974	1.9	1975	1.9	1976	1.9	1977	1.9	1978	1.9	1979	1.9	1980	1.9
1970	1.9	1971	1.9	1972	1.9	1973	1.9	1974	1.9	1975	1.9	1976	1.9	1977	1.9	1978	1.9	1979	1.9	1980	1.9	1981	0.9
1971	1.8	1972	1.8	1973	1.8	1974	1.8	1975	1.8	1976	1.8	1977	1.8	1978	1.8	1979	1.8	1980	1.8	1981	0.9	1982	0.9
1972	1.7	1973	1.7	1974	1.7	1975	1.7	1976	1.7	1977	1.7	1978	1.7	1979	1.7	1980	1.7	1981	0.9	1982	0.9	1983	0.9
1973	1.6	1974	1.6	1975	1.6	1976	1.6	1977	1.6	1978	1.6	1979	1.6	1980	1.6	1981	0.8	1982	0.8	1983	0.8	1984	0.8
1974	1.5	1975	1.5	1976	1.5	1977	1.5	1978	1.5	1979	1.5	1980	1.5	1981	0.8	1982	0.8	1983	0.8	1984	0.8	1985	0.8
1975	1.4	1976	1.4	1977	1.4	1978	1.4	1979	1.4	1980	1.4	1981	0.7	1982	0.7	1983	0.7	1984	0.7	1985	0.7	1986	0.7
1976	1.3	1977	1.3	1978	1.3	1979	1.3	1980	1.3	1981	0.7	1982	0.7	1983	0.7	1984	0.7	1985	0.7	1986	0.7	1987	0.7
1977	1.2	1978	1.2	1979	1.2	1980	1.2	1981	0.6	1982	0.6	1983	0.6	1984	0.6	1985	0.6	1986	0.6	1987	0.6	1988	0.6
1978	1.1	1979	1.1	1980	1.1	1981	0.5	1982	0.5	1983	0.5	1984	0.5	1985	0.5	1986	0.5	1987	0.5	1988	0.5	1989	0.5
1979	1.0	1980	1.0	1981	0.5	1982	0.5	1983	0.5	1984	0.5	1985	0.5	1986	0.5	1987	0.5	1988	0.5	1989	0.5	1990	0.5
1980	0.9	1981	0.4	1982	0.4	1983	0.4	1984	0.4	1985	0.4	1986	0.4	1987	0.4	1988	0.4	1989	0.4	1990	0.4	1991	0.4

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	2.3	1974	2.3	1975	2.3	1976	2.3	1977	2.3	1978	2.3	1979	2.3	1980	2.3	1981	1.2	1982	1.2	1983	1.2	1984	1.2
1974	2.3	1975	2.3	1976	2.3	1977	2.3	1978	2.3	1979	2.3	1980	2.3	1981	1.1	1982	1.1	1983	1.1	1984	1.1	1985	1.1
1975	2.2	1976	2.2	1977	2.2	1978	2.2	1979	2.2	1980	2.2	1981	1.1	1982	1.1	1983	1.1	1984	1.1	1985	1.1	1986	1.1
1976	2.2	1977	2.2	1978	2.2	1979	2.2	1980	2.2	1981	1.1	1982	1.1	1983	1.1	1984	1.1	1985	1.1	1986	1.1	1987	1.1
1977	2.1	1978	2.1	1979	2.1	1980	2.1	1981	1.1	1982	1.1	1983	1.1	1984	1.1	1985	1.1	1986	1.1	1987	1.1	1988	1.1
1978	2.1	1979	2.1	1980	2.1	1981	1.0	1982	1.0	1983	1.0	1984	1.0	1985	1.0	1986	1.0	1987	1.0	1988	1.0	1989	1.0
1979	2.0	1980	2.0	1981	1.0	1982	1.0	1983	1.0	1984	1.0	1985	1.0	1986	1.0	1987	1.0	1988	1.0	1989	1.0	1990	1.0
1980	2.0	1981	1.0	1982	1.0	1983	1.0	1984	1.0	1985	1.0	1986	1.0	1987	1.0	1988	1.0	1989	1.0	1990	1.0	1991	1.0
1981	1.0	1982	1.0	1983	1.0	1984	1.0	1985	1.0	1986	1.0	1987	1.0	1988	1.0	1989	1.0	1990	1.0	1991	1.0	1992	1.0
1982	0.9	1983	0.9	1984	0.9	1985	0.9	1986	0.9	1987	0.9	1988	0.9	1989	0.9	1990	0.9	1991	0.9	1992	0.9	1993	0.9
1983	0.9	1984	0.9	1985	0.9	1986	0.9	1987	0.9	1988	0.9	1989	0.9	1990	0.9	1991	0.9	1992	0.9	1993	0.9	1994	0.9
1984	0.9	1985	0.9	1986	0.9	1987	0.9	1988	0.9	1989	0.9	1990	0.9	1991	0.9	1992	0.9	1993	0.9	1994	0.9	1995	0.9
1985	0.8	1986	0.8	1987	0.8	1988	0.8	1989	0.8	1990	0.8	1991	0.8	1992	0.8	1993	0.8	1994	0.8	1995	0.8	1996	0.8
1986	0.8	1987	0.8	1988	0.8	1989	0.8	1990	0.8	1991	0.8	1992	0.8	1993	0.8	1994	0.8	1995	0.8	1996	0.8	1997	0.8
1987	0.7	1988	0.7	1989	0.7	1990	0.7	1991	0.7	1992	0.7	1993	0.7	1994	0.7	1995	0.7	1996	0.7	1997	0.7	1998	0.7
1988	0.7	1989	0.7	1990	0.7	1991	0.7	1992	0.7	1993	0.7	1994	0.7	1995	0.7	1996	0.7	1997	0.7	1998	0.7	1999	0.7
1989	0.6	1990	0.6	1991	0.6	1992	0.6	1993	0.6	1994	0.6	1995	0.6	1996	0.6	1997	0.6	1998	0.6	1999	0.6	2000	0.6
1990	0.5	1991	0.5	1992	0.5	1993	0.5	1994	0.5	1995	0.5	1996	0.5	1997	0.5	1998	0.5	1999	0.5	2000	0.5	2001	0.5
1991	0.5	1992	0.5	1993	0.5	1994	0.5	1995	0.5	1996	0.5	1997	0.5	1998	0.5	1999	0.5	2000	0.5	2001	0.5	2002	0.5
1992	0.4	1993	0.4	1994	0.4	1995	0.4	1996	0.4	1997	0.4	1998	0.4	1999	0.4	2000	0.4	2001	0.4	2002	0.4	2003	0.4

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1 6.4.

TABLE 1.6.2B

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
LIGHT DUTY DIESEL POWERED TRUCKS
CO

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	3.8	1962	3.8	1963	3.8	1964	3.8	1965	3.8	1966	3.8	1967	3.8	1968	3.8	1969	3.8	1970	3.8	1971	3.8	1972	3.8
1962	3.7	1963	3.7	1964	3.7	1965	3.7	1966	3.7	1967	3.7	1968	3.7	1969	3.7	1970	3.7	1971	3.7	1972	3.7	1973	3.7
1963	3.7	1964	3.7	1965	3.7	1966	3.7	1967	3.7	1968	3.7	1969	3.7	1970	3.7	1971	3.7	1972	3.7	1973	3.7	1974	3.7
1964	3.6	1965	3.6	1966	3.6	1967	3.6	1968	3.6	1969	3.6	1970	3.6	1971	3.6	1972	3.6	1973	3.6	1974	3.6	1975	3.6
1965	3.6	1966	3.6	1967	3.6	1968	3.6	1969	3.6	1970	3.6	1971	3.6	1972	3.6	1973	3.6	1974	3.6	1975	3.6	1976	3.6
1966	3.5	1967	3.5	1968	3.5	1969	3.5	1970	3.5	1971	3.5	1972	3.5	1973	3.5	1974	3.5	1975	3.5	1976	3.5	1977	3.5
1967	3.5	1968	3.5	1969	3.5	1970	3.5	1971	3.5	1972	3.5	1973	3.5	1974	3.5	1975	3.5	1976	3.5	1977	3.5	1978	3.5
1968	3.4	1969	3.4	1970	3.4	1971	3.4	1972	3.4	1973	3.4	1974	3.4	1975	3.4	1976	3.4	1977	3.4	1978	3.4	1979	3.4
1969	3.3	1970	3.3	1971	3.3	1972	3.3	1973	3.3	1974	3.3	1975	3.3	1976	3.3	1977	3.3	1978	3.3	1979	3.3	1980	3.3
1970	3.2	1971	3.2	1972	3.2	1973	3.2	1974	3.2	1975	3.2	1976	3.2	1977	3.2	1978	3.2	1979	3.2	1980	3.2	1981	1.8
1971	3.1	1972	3.1	1973	3.1	1974	3.1	1975	3.1	1976	3.1	1977	3.1	1978	3.1	1979	3.1	1980	3.1	1981	1.8	1982	1.8
1972	3.0	1973	3.0	1974	3.0	1975	3.0	1976	3.0	1977	3.0	1978	3.0	1979	3.0	1980	3.0	1981	1.8	1982	1.8	1983	1.8
1973	2.9	1974	2.9	1975	2.9	1976	2.9	1977	2.9	1978	2.9	1979	2.9	1980	2.9	1981	1.7	1982	1.7	1983	1.7	1984	1.7
1974	2.8	1975	2.8	1976	2.8	1977	2.8	1978	2.8	1979	2.8	1980	2.8	1981	1.7	1982	1.7	1983	1.7	1984	1.7	1985	1.7
1975	2.7	1976	2.7	1977	2.7	1978	2.7	1979	2.7	1980	2.7	1981	1.6	1982	1.6	1983	1.6	1984	1.6	1985	1.6	1986	1.6
1976	2.6	1977	2.6	1978	2.6	1979	2.6	1980	2.6	1981	1.6	1982	1.6	1983	1.6	1984	1.6	1985	1.6	1986	1.6	1987	1.6
1977	2.4	1978	2.4	1979	2.4	1980	2.4	1981	1.5	1982	1.5	1983	1.5	1984	1.5	1985	1.5	1986	1.5	1987	1.5	1988	1.5
1978	2.3	1979	2.3	1980	2.3	1981	1.5	1982	1.5	1983	1.5	1984	1.5	1985	1.5	1986	1.5	1987	1.5	1988	1.5	1989	1.5
1979	2.1	1980	2.1	1981	1.4	1982	1.4	1983	1.4	1984	1.4	1985	1.4	1986	1.4	1987	1.4	1988	1.4	1989	1.4	1990	1.4
1980	2.0	1981	1.3	1982	1.3	1983	1.3	1984	1.3	1985	1.3	1986	1.3	1987	1.3	1988	1.3	1989	1.3	1990	1.3	1991	1.3

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	3.8	1974	3.8	1975	3.8	1976	3.8	1977	3.8	1978	3.8	1979	3.8	1980	3.8	1981	2.1	1982	2.1	1983	2.1	1984	2.1
1974	3.7	1975	3.7	1976	3.7	1977	3.7	1978	3.7	1979	3.7	1980	3.7	1981	2.0	1982	2.0	1983	2.0	1984	2.0	1985	2.0
1975	3.7	1976	3.7	1977	3.7	1978	3.7	1979	3.7	1980	3.7	1981	2.0	1982	2.0	1983	2.0	1984	2.0	1985	2.0	1986	2.0
1976	3.6	1977	3.6	1978	3.6	1979	3.6	1980	3.6	1981	2.0	1982	2.0	1983	2.0	1984	2.0	1985	2.0	1986	2.0	1987	2.0
1977	3.6	1978	3.6	1979	3.6	1980	3.6	1981	2.0	1982	2.0	1983	2.0	1984	2.0	1985	2.0	1986	2.0	1987	2.0	1988	2.0
1978	3.5	1979	3.5	1980	3.5	1981	2.0	1982	2.0	1983	2.0	1984	2.0	1985	2.0	1986	2.0	1987	2.0	1988	2.0	1989	2.0
1979	3.5	1980	3.5	1981	1.9	1982	1.9	1983	1.9	1984	1.9	1985	1.9	1986	1.9	1987	1.9	1988	1.9	1989	1.9	1990	1.9
1980	3.4	1981	1.9	1982	1.9	1983	1.9	1984	1.9	1985	1.9	1986	1.9	1987	1.9	1988	1.9	1989	1.9	1990	1.9	1991	1.9
1981	1.9	1982	1.9	1983	1.9	1984	1.9	1985	1.9	1986	1.9	1987	1.9	1988	1.9	1989	1.9	1990	1.9	1991	1.9	1992	1.9
1982	1.8	1983	1.8	1984	1.8	1985	1.8	1986	1.8	1987	1.8	1988	1.8	1989	1.8	1990	1.8	1991	1.8	1992	1.8	1993	1.8
1983	1.8	1984	1.8	1985	1.8	1986	1.8	1987	1.8	1988	1.8	1989	1.8	1990	1.8	1991	1.8	1992	1.8	1993	1.8	1994	1.8
1984	1.8	1985	1.8	1986	1.8	1987	1.8	1988	1.8	1989	1.8	1990	1.8	1991	1.8	1992	1.8	1993	1.8	1994	1.8	1995	1.8
1985	1.7	1986	1.7	1987	1.7	1988	1.7	1989	1.7	1990	1.7	1991	1.7	1992	1.7	1993	1.7	1994	1.7	1995	1.7	1996	1.7
1986	1.7	1987	1.7	1988	1.7	1989	1.7	1990	1.7	1991	1.7	1992	1.7	1993	1.7	1994	1.7	1995	1.7	1996	1.7	1997	1.7
1987	1.6	1988	1.6	1989	1.6	1990	1.6	1991	1.6	1992	1.6	1993	1.6	1994	1.6	1995	1.6	1996	1.6	1997	1.6	1998	1.6
1988	1.6	1989	1.6	1990	1.6	1991	1.6	1992	1.6	1993	1.6	1994	1.6	1995	1.6	1996	1.6	1997	1.6	1998	1.6	1999	1.6
1989	1.5	1990	1.5	1991	1.5	1992	1.5	1993	1.5	1994	1.5	1995	1.5	1996	1.5	1997	1.5	1998	1.5	1999	1.5	2000	1.5
1990	1.5	1991	1.5	1992	1.5	1993	1.5	1994	1.5	1995	1.5	1996	1.5	1997	1.5	1998	1.5	1999	1.5	2000	1.5	2001	1.5
1991	1.4	1992	1.4	1993	1.4	1994	1.4	1995	1.4	1996	1.4	1997	1.4	1998	1.4	1999	1.4	2000	1.4	2001	1.4	2002	1.4
1992	1.3	1993	1.3	1994	1.3	1995	1.3	1996	1.3	1997	1.3	1998	1.3	1999	1.3	2000	1.3	2001	1.3	2002	1.3	2003	1.3

*MY -- Indicates the model year

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1.6.4.

TABLE 1.6.2C

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
LIGHT DUTY DIESEL POWERED TRUCKS
NOx

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	3.3	1962	3.3	1963	3.3	1964	3.3	1965	3.3	1966	3.3	1967	3.3	1968	3.3	1969	3.3	1970	3.3	1971	3.3	1972	3.3
1962	3.3	1963	3.3	1964	3.3	1965	3.3	1966	3.3	1967	3.3	1968	3.3	1969	3.3	1970	3.3	1971	3.3	1972	3.3	1973	3.3
1963	3.2	1964	3.2	1965	3.2	1966	3.2	1967	3.2	1968	3.2	1969	3.2	1970	3.2	1971	3.2	1972	3.2	1973	3.2	1974	3.2
1964	3.2	1965	3.2	1966	3.2	1967	3.2	1968	3.2	1969	3.2	1970	3.2	1971	3.2	1972	3.2	1973	3.2	1974	3.2	1975	3.2
1965	3.1	1966	3.1	1967	3.1	1968	3.1	1969	3.1	1970	3.1	1971	3.1	1972	3.1	1973	3.1	1974	3.1	1975	3.1	1976	3.1
1966	3.1	1967	3.1	1968	3.1	1969	3.1	1970	3.1	1971	3.1	1972	3.1	1973	3.1	1974	3.1	1975	3.1	1976	3.1	1977	3.1
1967	3.0	1968	3.0	1969	3.0	1970	3.0	1971	3.0	1972	3.0	1973	3.0	1974	3.0	1975	3.0	1976	3.0	1977	3.0	1978	3.0
1968	3.0	1969	3.0	1970	3.0	1971	3.0	1972	3.0	1973	3.0	1974	3.0	1975	3.0	1976	3.0	1977	3.0	1978	3.0	1979	3.0
1969	2.9	1970	2.9	1971	2.9	1972	2.9	1973	2.9	1974	2.9	1975	2.9	1976	2.9	1977	2.9	1978	2.9	1979	2.9	1980	2.9
1970	2.8	1971	2.8	1972	2.8	1973	2.8	1974	2.8	1975	2.8	1976	2.8	1977	2.8	1978	2.8	1979	2.8	1980	2.8	1981	1.9
1971	2.8	1972	2.8	1973	2.8	1974	2.8	1975	2.8	1976	2.8	1977	2.8	1978	2.8	1979	2.8	1980	2.8	1981	1.8	1982	1.8
1972	2.7	1973	2.7	1974	2.7	1975	2.7	1976	2.7	1977	2.7	1978	2.7	1979	2.7	1980	2.7	1981	1.8	1982	1.8	1983	1.8
1973	2.6	1974	2.6	1975	2.6	1976	2.6	1977	2.6	1978	2.6	1979	2.6	1980	2.6	1981	1.8	1982	1.8	1983	1.8	1984	1.8
1974	2.5	1975	2.5	1976	2.5	1977	2.5	1978	2.5	1979	2.5	1980	2.5	1981	1.7	1982	1.7	1983	1.7	1984	1.7	1985	1.7
1975	2.4	1976	2.4	1977	2.4	1978	2.4	1979	2.4	1980	2.4	1981	1.7	1982	1.7	1983	1.7	1984	1.7	1985	1.7	1986	1.7
1976	2.3	1977	2.3	1978	2.3	1979	2.3	1980	2.3	1981	1.7	1982	1.7	1983	1.7	1984	1.7	1985	1.7	1986	1.7	1987	1.1
1977	2.2	1978	2.2	1979	2.2	1980	2.2	1981	1.6	1982	1.6	1983	1.6	1984	1.6	1985	1.6	1986	1.6	1987	1.1	1988	1.1
1978	2.1	1979	2.1	1980	2.1	1981	1.6	1982	1.6	1983	1.6	1984	1.6	1985	1.6	1986	1.6	1987	1.0	1988	1.0	1989	1.0
1979	1.9	1980	1.9	1981	1.5	1982	1.5	1983	1.5	1984	1.5	1985	1.5	1986	1.5	1987	1.0	1988	1.0	1989	1.0	1990	1.0
1980	1.9	1981	1.5	1982	1.5	1983	1.5	1984	1.5	1985	1.5	1986	1.5	1987	0.9	1988	0.9	1989	0.9	1990	0.9	1991	0.9

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1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	3.3	1974	3.3	1975	3.3	1976	3.3	1977	3.3	1978	3.3	1979	3.3	1980	3.3	1981	2.0	1982	2.0	1983	2.0	1984	2.0
1974	3.3	1975	3.3	1976	3.3	1977	3.3	1978	3.3	1979	3.3	1980	3.3	1981	2.0	1982	2.0	1983	2.0	1984	2.0	1985	2.0
1975	3.2	1976	3.2	1977	3.2	1978	3.2	1979	3.2	1980	3.2	1981	2.0	1982	2.0	1983	2.0	1984	2.0	1985	2.0	1986	2.0
1976	3.2	1977	3.2	1978	3.2	1979	3.2	1980	3.2	1981	2.0	1982	2.0	1983	2.0	1984	2.0	1985	2.0	1986	2.0	1987	1.4
1977	3.1	1978	3.1	1979	3.1	1980	3.1	1981	2.0	1982	2.0	1983	2.0	1984	2.0	1985	2.0	1986	2.0	1987	1.4	1988	1.4
1978	3.1	1979	3.1	1980	3.1	1981	2.0	1982	2.0	1983	2.0	1984	2.0	1985	2.0	1986	2.0	1987	1.4	1988	1.4	1989	1.4
1979	3.0	1980	3.0	1981	1.9	1982	1.9	1983	1.9	1984	1.9	1985	1.9	1986	1.9	1987	1.4	1988	1.4	1989	1.4	1990	1.4
1980	3.0	1981	1.9	1982	1.9	1983	1.9	1984	1.9	1985	1.9	1986	1.9	1987	1.4	1988	1.4	1989	1.4	1990	1.4	1991	1.4
1981	1.9	1982	1.9	1983	1.9	1984	1.9	1985	1.9	1986	1.9	1987	1.3	1988	1.3	1989	1.3	1990	1.3	1991	1.3	1992	1.3
1982	1.9	1983	1.9	1984	1.9	1985	1.9	1986	1.9	1987	1.3	1988	1.3	1989	1.3	1990	1.3	1991	1.3	1992	1.3	1993	1.3
1983	1.8	1984	1.8	1985	1.8	1986	1.8	1987	1.3	1988	1.3	1989	1.3	1990	1.3	1991	1.3	1992	1.3	1993	1.3	1994	1.3
1984	1.8	1985	1.8	1986	1.8	1987	1.3	1988	1.3	1989	1.3	1990	1.3	1991	1.3	1992	1.3	1993	1.3	1994	1.3	1995	1.3
1985	1.8	1986	1.8	1987	1.2	1988	1.2	1989	1.2	1990	1.2	1991	1.2	1992	1.2	1993	1.2	1994	1.2	1995	1.2	1996	1.2
1986	1.7	1987	1.2	1988	1.2	1989	1.2	1990	1.2	1991	1.2	1992	1.2	1993	1.2	1994	1.2	1995	1.2	1996	1.2	1997	1.2
1987	1.2	1988	1.2	1989	1.2	1990	1.2	1991	1.2	1992	1.2	1993	1.2	1994	1.2	1995	1.2	1996	1.2	1997	1.2	1998	1.2
1988	1.1	1989	1.1	1990	1.1	1991	1.1	1992	1.1	1993	1.1	1994	1.1	1995	1.1	1996	1.1	1997	1.1	1998	1.1	1999	1.1
1989	1.1	1990	1.1	1991	1.1	1992	1.1	1993	1.1	1994	1.1	1995	1.1	1996	1.1	1997	1.1	1998	1.1	1999	1.1	2000	1.1
1990	1.0	1991	1.0	1992	1.0	1993	1.0	1994	1.0	1995	1.0	1996	1.0	1997	1.0	1998	1.0	1999	1.0	2000	1.0	2001	1.0
1991	1.0	1992	1.0	1993	1.0	1994	1.0	1995	1.0	1996	1.0	1997	1.0	1998	1.0	1999	1.0	2000	1.0	2001	1.0	2002	1.0
1992	0.9	1993	0.9	1994	0.9	1995	0.9	1996	0.9	1997	0.9	1998	0.9	1999	0.9	2000	0.9	2001	0.9	2002	0.9	2003	0.9

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1.6.4.

TABLE 1.6.3

IDLE EMISSION RATES FOR
LOW ALTITUDE
LIGHT DUTY DIESEL POWERED TRUCKS

* IER = ZML + (DR * M)

Pol	Model Years	Zero Mile Emission Level (Grams/Min.)	Deterioration Rate (Gm/Min/10K Mi)
HC	Pre-1978	0.08	0.01
	1978-1980	0.10	0.01
	1981+	0.07	0.01
CO	Pre-1978	0.30	0.02
	1978-1980	0.31	0.01
	1981+	0.31	0.01
NOx	Pre-1978	0.19	0.01
	1978-1980	0.32	0.01
	1981-1986	0.34	0.01
	1987+	0.13	0.01

* WHERE : IER = Idle emission rate
ZML = Zero mile level
DR = Deterioration Rate
M = Cumulative Mileage / 10,000

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TABLE 1.6.4

REGISTRATION MIX AND
MILEAGE ACCUMULATION RATES FOR
LOW ALTITUDE
LIGHT DUTY DIESEL POWERED TRUCKS

Model Year Index**	July 1 Registration Mix*	Mileage Accumulation Rate per truck *	Jan 1 Registration Mix	Jan 1 Mileage Accumulation Rate (fleet)	Jan 1 Mileage Accumulation (fleet)
1	0.067	17552.	0.022	17552.	2194.
2	0.085	16262.	0.085	17229.	13124.
3	0.081	15068.	0.081	15963.	29711.
4	0.077	13961.	0.077	14791.	45080.
5	0.073	12936.	0.073	13705.	59321.
6	0.069	11986.	0.069	12698.	72515.
7	0.065	11105.	0.065	11766.	84741.
8	0.061	10290.	0.061	10901.	96068.
9	0.057	9534.	0.057	10101.	106564.
10	0.053	8833.	0.053	9359.	116288.
11	0.048	8185.	0.048	8671.	125298.
12	0.044	7583.	0.044	8034.	133646.
13	0.040	7026.	0.040	7444.	141381.
14	0.036	6510.	0.036	6897.	148548.
15	0.032	6032.	0.032	6390.	155188.
16	0.028	5589.	0.028	5921.	161340.
17	0.024	5179.	0.024	5486.	167041.
18	0.020	4798.	0.020	5084.	172323.
19	0.016	4446.	0.016	4710.	177217.
20+	0.024	4119.	0.024	4364.	181752.

* Default information that may be altered by the MOBILE3 user with information about the local area.

** The indices refer to the most recent model year vehicles in any given calendar year. Index 1 references the newest model year vehicles and index 20+ references the oldest model year vehicles.

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TABLE 1.6.5

EXAMPLE TRAVEL WEIGHTING FRACTION CALCULATION FOR
LOW ALTITUDE
LIGHT DUTY DIESEL POWERED TRUCKS
JANUARY 1, 1988

Model Years	(A) LDT1 Fleet Registration	(B) Sales Fraction	(A*B)	(C=A*B/DAF) LDDT Registration	(D) Annual Mileage Accrual Rate	(C*D)	(C*D/TFNORM) Travel Fractions
1988	0.022	0.240	0.005	0.067	17552.	1181.5	0.080
1987	0.085	0.210	0.018	0.224	17229.	3862.4	0.262
1986	0.081	0.180	0.015	0.183	15963.	2923.0	0.198
1985	0.077	0.160	0.012	0.155	14791.	2288.6	0.155
1984	0.073	0.130	0.009	0.119	13705.	1633.4	0.111
1983	0.069	0.100	0.007	0.087	12698.	1100.4	0.075
1982	0.065	0.080	0.005	0.065	11766.	768.4	0.052
1981	0.061	0.060	0.004	0.046	10901.	501.1	0.034
1980	0.057	0.034	0.002	0.024	10101.	245.8	0.017
1979	0.053	0.028	0.001	0.019	9359.	174.4	0.012
1978	0.048	0.009	0.000	0.005	8671.	47.0	0.003
1977	0.044	0.005	0.000	0.003	8034.	22.2	0.002
1976	0.040	0.003	0.000	0.002	7444.	11.2	0.001
1975	0.036	0.002	0.000	0.001	6897.	6.2	0.000
1974	0.032	0.0	0.0	0.0	6390.	0.0	0.0
1973	0.028	0.0	0.0	0.0	5921.	0.0	0.0
1972	0.024	0.0	0.0	0.0	5486.	0.0	0.0
1971	0.020	0.0	0.0	0.0	5084.	0.0	0.0
1970	0.016	0.0	0.0	0.0	4710.	0.0	0.0
1969-	0.024	0.0	0.0	0.0	4364.	0.0	0.0
		DAF:	0.080		TFNORM:	14765.6	

WHERE :

A = January 1 registration mix from Table 1.6.4.
B = Fleet sales fractions
D = Sales weighted fleet mileage accumulation rate from Table 1.6.4, adjusted to January 1
D(1) = Annual Miles(1)
D(MYI) = .25*(Annual Miles(MYI)) + .75*(Annual Miles(MYI-1)), MYI=2,...,20+

NOTE : In general, the travel weighting fractions will change for every calendar year since the sales fraction (column B) changes for almost every model year.

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TABLE 1.6.6

SPEED CORRECTION FACTOR COEFFICIENTS FOR
LOW ALTITUDE
LIGHT DUTY DIESEL POWERED TRUCKS

$$* \; SCF(s,sadj) = SF(s)/SF(sadj)$$

$$SF(s) = EXP(A + B*s + C*s^2)$$

Pol	Model Years	Coefficients A	B	C
HC	All	0.90900	-0.05500	0.00044
CO	All	1.37520	-0.08800	0.00091
NOx	All	0.66800	-0.04800	0.00071

* WHERE :
s = average speed (mph)
sadj = basic test procedure speed; adjusted for fraction of cold start operation x and fraction of hot start operation w,
[1/sadj = (w+x)/26 + (1-w-x)/16]

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TABLE 1.6.7

NORMALIZED BAG FRACTIONS FOR
LOW ALTITUDE
LIGHT DUTY DIESEL POWERED TRUCKS

		Normalized Fractions							
Pol	Model Years	Test Seg.#1 B1	Test Seg.#1 D1	Test Seg.#2 B2	Test Seg.#2 D2	Test Seg.#3 B3	Test Seg.#3 D3	Total Test B0	Total Test D0
HC	Pre-1979	1.209	0.112	1.073	0.091	0.703	0.093	1.000	0.096
	1979	1.209	0.110	1.073	0.089	0.703	0.092	1.000	0.094
	1980-1982	1.209	0.110	1.073	0.089	0.703	0.092	1.000	0.094
	1983+	1.209	0.115	1.073	0.093	0.703	0.095	1.000	0.098
CO	Pre-1979	1.199	0.062	0.935	0.044	0.974	0.053	1.000	0.050
	1979	1.199	0.060	0.935	0.043	0.974	0.051	1.000	0.049
	1980-1982	1.199	0.057	0.935	0.040	0.974	0.048	1.000	0.046
	1983+	1.199	0.057	0.935	0.040	0.974	0.048	1.000	0.046
NOx	Pre-1979	1.068	0.033	0.981	0.036	0.985	0.032	1.000	0.034
	1979	1.068	0.033	0.981	0.035	0.985	0.032	1.000	0.034
	1980-1984	1.068	0.036	0.981	0.038	0.985	0.035	1.000	0.037
	1985+	1.068	0.071	0.981	0.072	0.985	0.068	1.000	0.071

NOTE : The fractions given in this table are used in the calculation of the operating-mode/ temperature correction factor (OMTCF).

WHERE :

```
OMTCF   = ((TERM1 + TERM2 + TERM3)/DENOM)
TERM1   =    W    *TCF(1)*(B1+D1*M)
TERM2   = (1-W-X)*TCF(2)*(B2+D2*M)
TERM3   =    X    *TCF(3)*(B3+D3*M)
DENOM   = B0 + D0*M
 W      = Fraction of VMT in the cold start mode
 X      = Fraction of VMT in the  hot start mode
TCF(b)  = Temperature correction factor for pollutant, model
          year; for test segment b
 M      = Cumulative mileage / 10,000
```

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TABLE 1.7.1

EXHAUST EMISSION RATES FOR
LOW ALTITUDE
HEAVY DUTY DIESEL POWERED VEHICLES
(RATES REFLECT ZERO TAMPERING)

* BER = ZML + (DR * M)

Pol	Model Years	Zero Mile Emission Level (Grams/Mile)	Deterioration Rate (Gm/Mi/10K Mi)	50,000 Mile Emission Level (Grams/Mile)
HC	Pre-1963	3.37	0.05	3.62
	1963-1965	3.36	0.05	3.61
	1966-1968	3.48	0.06	3.78
	1969-1971	3.70	0.06	4.00
	1972-1974	3.93	0.06	4.23
	1975-1979	3.89	0.06	4.19
	1980-1981	3.53	0.06	3.83
	1982-1984	3.25	0.05	3.50
	1985	3.11	0.02	3.21
	1986	2.50	0.02	2.60
	1987-1992	2.43	0.02	2.53
	1993-1996	2.39	0.02	2.49
	1997+	2.37	0.02	2.47
CO	Pre-1963	9.84	0.14	10.54
	1963-1965	9.80	0.14	10.50
	1966-1968	10.15	0.14	10.85
	1969-1971	10.80	0.15	11.55
	1972-1974	11.46	0.16	12.26
	1975-1979	11.18	0.16	11.98
	1980-1981	9.50	0.14	10.20
	1982-1984	8.75	0.13	9.40
	1985	8.45	0.12	9.05
	1986	8.30	0.12	8.90
	1987-1992	8.07	0.12	8.67
	1993-1996	7.93	0.12	8.53
	1997+	7.86	0.11	8.41
NOx	Pre-1963	21.94	0.0	21.94
	1963-1965	21.85	0.0	21.85
	1966-1968	22.61	0.0	22.61
	1969-1971	24.06	0.0	24.06
	1972-1974	25.53	0.0	25.53
	1975-1979	24.77	0.0	24.77
	1980-1981	20.50	0.0	20.50
	1982-1984	18 88	0 0	18.88
	1985	18.23	0.0	18.23
	1986	17.90	0.0	17.90
	1987-1992	11.19	0.05	11.44
	1993-1996	10.98	0 05	11.23
	1997+	10.89	0.05	11.14

* WHERE : BER = Basic emission rate (untampered)
ZML = Zero mile level
DR = Deterioration rate
M = Cumulative mileage / 10,000

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TABLE 1.7.2A

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EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
HEAVY DUTY DIESEL POWERED VEHICLES
TOTAL HC

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1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	6.4	1962	6.4	1963	6.4	1964	6.4	1965	6.4	1966	7.1	1967	7.1	1968	7.1	1969	7.3	1970	7.3	1971	7.3	1972	7.6
1962	6.3	1963	6.3	1964	6.3	1965	6.3	1966	7.0	1967	7.0	1968	7.0	1969	7.3	1970	7.3	1971	7.3	1972	7.5	1973	7.5
1963	6.3	1964	6.3	1965	6.3	1966	7.0	1967	7.0	1968	7.0	1969	7.2	1970	7.2	1971	7.2	1972	7.4	1973	7.4	1974	7.4
1964	6.2	1965	6.2	1966	6.9	1967	6.9	1968	6.9	1969	7.1	1970	7.1	1971	7.1	1972	7.3	1973	7.3	1974	7.3	1975	7.3
1965	6.1	1966	6.8	1967	6.8	1968	6.8	1969	7.0	1970	7.0	1971	7.0	1972	7.2	1973	7.2	1974	7.2	1975	7.2	1976	7.2
1966	6.7	1967	6.7	1968	6.7	1969	6.9	1970	6.9	1971	6.9	1972	7.1	1973	7.1	1974	7.1	1975	7.1	1976	7.1	1977	7.1
1967	6.5	1968	6.5	1969	6.8	1970	6.8	1971	6.8	1972	7.0	1973	7.0	1974	7.0	1975	6.9	1976	6.9	1977	6.9	1978	6.9
1968	6.4	1969	6.6	1970	6.6	1971	6.6	1972	6.9	1973	6.9	1974	6.9	1975	6.8	1976	6.8	1977	6.8	1978	6.8	1979	6.8
1969	6.5	1970	6.5	1971	6.5	1972	6.7	1973	6.7	1974	6.7	1975	6.7	1976	6.7	1977	6.7	1978	6.7	1979	6.7	1980	6.3
1970	6.3	1971	6.3	1972	6.5	1973	6.5	1974	6.5	1975	6.5	1976	6.5	1977	6.5	1978	6.5	1979	6.5	1980	6.1	1981	6.1
1971	6.1	1972	6.4	1973	6.4	1974	6.4	1975	6.3	1976	6.3	1977	6.3	1978	6.3	1979	6.3	1980	6.0	1981	6.0	1982	5.3
1972	6.2	1973	6.2	1974	6.2	1975	6.1	1976	6.1	1977	6.1	1978	6.1	1979	6.1	1980	5.8	1981	5.8	1982	5.1	1983	5.1
1973	6.0	1974	6.0	1975	5.9	1976	5.9	1977	5.9	1978	5.9	1979	5.9	1980	5.6	1981	5.6	1982	4.9	1983	4.9	1984	4.9
1974	5.7	1975	5.7	1976	5.7	1977	5.7	1978	5.7	1979	5.7	1980	5.3	1981	5.3	1982	4.7	1983	4.7	1984	4.7	1985	3.7
1975	5.4	1976	5.4	1977	5.4	1978	5.4	1979	5.4	1980	5.1	1981	5.1	1982	4.5	1983	4.5	1984	4.5	1985	3.6	1986	3.0
1976	5.1	1977	5.1	1978	5.1	1979	5.1	1980	4.8	1981	4.8	1982	4.3	1983	4.3	1984	4.3	1985	3.5	1986	2.9	1987	2.8
1977	4.8	1978	4.8	1979	4.8	1980	4.5	1981	4.5	1982	4.0	1983	4.0	1984	4.0	1985	3.4	1986	2.8	1987	2.7	1988	2.7
1978	4.5	1979	4.5	1980	4.1	1981	4.1	1982	3.7	1983	3.7	1984	3.7	1985	3.3	1986	2.7	1987	2.6	1988	2.6	1989	2.6
1979	4.1	1980	3.7	1981	3.7	1982	3.4	1983	3.4	1984	3.4	1985	3.2	1986	2.6	1987	2.5	1988	2.5	1989	2.5	1990	2.5
1980	3.5	1981	3.5	1982	3.3	1983	3.3	1984	3.3	1985	3.1	1986	2.5	1987	2.4	1988	2.4	1989	2.4	1990	2.4	1991	2.4

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1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	7.6	1974	7.6	1975	7.5	1976	7.5	1977	7.5	1978	7.5	1979	7.5	1980	7.2	1981	7.2	1982	6.3	1983	6.3	1984	6.3
1974	7.5	1975	7.5	1976	7.5	1977	7.5	1978	7.5	1979	7.5	1980	7.1	1981	7.1	1982	6.2	1983	6.2	1984	6.2	1985	4.3
1975	7.4	1976	7.4	1977	7.4	1978	7.4	1979	7.4	1980	7.0	1981	7.0	1982	6.2	1983	6.2	1984	6.2	1985	4.3	1986	3.7
1976	7.3	1977	7.3	1978	7.3	1979	7.3	1980	6.9	1981	6.9	1982	6.1	1983	6.1	1984	6.1	1985	4.2	1986	3.6	1987	3.6
1977	7.2	1978	7.2	1979	7.2	1980	6.8	1981	6.8	1982	6.0	1983	6.0	1984	6.0	1985	4.2	1986	3.6	1987	3.5	1988	3.5
1978	7.1	1979	7.1	1980	6.7	1981	6.7	1982	5.9	1983	5.9	1984	5.9	1985	4.2	1986	3.6	1987	3.5	1988	3.5	1989	3.5
1979	6.9	1980	6.6	1981	6.6	1982	5.8	1983	5.8	1984	5.8	1985	4.1	1986	3.5	1987	3.4	1988	3.4	1989	3.4	1990	3.4
1980	6.5	1981	6.5	1982	5.7	1983	5.7	1984	5.7	1985	4.1	1986	3.5	1987	3.4	1988	3.4	1989	3.4	1990	3.4	1991	3.4
1981	6.3	1982	5.6	1983	5.6	1984	5.6	1985	4.0	1986	3.4	1987	3.4	1988	3.4	1989	3.4	1990	3.4	1991	3.4	1992	3.4
1982	5.4	1983	5.4	1984	5.4	1985	4.0	1986	3.4	1987	3.3	1988	3.3	1989	3.3	1990	3.3	1991	3.3	1992	3.3	1993	3.3
1983	5.3	1984	5.3	1985	3.9	1986	3.3	1987	3.2	1988	3.2	1989	3.2	1990	3.2	1991	3.2	1992	3.2	1993	3.2	1994	3.2
1984	5.1	1985	3.9	1986	3.2	1987	3.2	1988	3.2	1989	3.2	1990	3.2	1991	3.2	1992	3.2	1993	3.1	1994	3.1	1995	3.1
1985	3.8	1986	3.2	1987	3.1	1988	3.1	1989	3.1	1990	3.1	1991	3.1	1992	3.1	1993	3.1	1994	3.1	1995	3.1	1996	3.1
1986	3.1	1987	3.0	1988	3.0	1989	3.0	1990	3.0	1991	3.0	1992	3.0	1993	3.0	1994	3.0	1995	3.0	1996	3.0	1997	3.0
1987	2.9	1988	2.9	1989	2.9	1990	2.9	1991	2.9	1992	2.9	1993	2.9	1994	2.9	1995	2.9	1996	2.9	1997	2.9	1998	2.9
1988	2.8	1989	2.8	1990	2.8	1991	2.8	1992	2.8	1993	2.8	1994	2.8	1995	2.8	1996	2.8	1997	2.8	1998	2.8	1999	2.8
1989	2.7	1990	2.7	1991	2.7	1992	2.7	1993	2.7	1994	2.7	1995	2.7	1996	2.7	1997	2.7	1998	2.7	1999	2.7	2000	2.7
1990	2.6	1991	2.6	1992	2.6	1993	2.6	1994	2.6	1995	2.6	1996	2.6	1997	2.6	1998	2.6	1999	2.6	2000	2.6	2001	2.6
1991	2.5	1992	2.5	1993	2.5	1994	2.5	1995	2.5	1996	2.5	1997	2.4	1998	2.4	1999	2.4	2000	2.4	2001	2.4	2002	2.4
1992	2.4	1993	2.4	1994	2.4	1995	2.4	1996	2.4	1997	2.4	1998	2.4	1999	2.4	2000	2.4	2001	2.4	2002	2.4	2003	2.4

*MY -- Indicates the model year.
**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F. Emissions are based on the January 1 mileage accumulation figures given in Table 1.7.4.

TABLE 1.7.2B

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
HEAVY DUTY DIESEL POWERED VEHICLES
CO

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	18.3	1962	18.3	1963	18.3	1964	18.3	1965	18.3	1966	18.7	1967	18.7	1968	18.7	1969	19.9	1970	19.9	1971	19.9	1972	21.2
1962	18.2	1963	18.1	1964	18.1	1965	18.1	1966	18.5	1967	18.5	1968	18.5	1969	19.7	1970	19.7	1971	19.7	1972	21.0	1973	21.0
1963	17.9	1964	17.9	1965	17.9	1966	18.3	1967	18.3	1968	18.3	1969	19.5	1970	19.5	1971	19.5	1972	20.7	1973	20.7	1974	20.7
1964	17.7	1965	17.7	1966	18.1	1967	18.1	1968	18.1	1969	19.3	1970	19.3	1971	19.3	1972	20.5	1973	20.5	1974	20.5	1975	20.2
1965	17.5	1966	17.8	1967	17.8	1968	17.8	1969	19.0	1970	19.0	1971	19.0	1972	20.2	1973	20.2	1974	20.2	1975	19.9	1976	19.9
1966	17.6	1967	17.6	1968	17.6	1969	18.7	1970	18.7	1971	18.7	1972	19.9	1973	19.9	1974	19.9	1975	19.7	1976	19.7	1977	19.7
1967	17.3	1968	17.3	1969	18.4	1970	18.4	1971	18.4	1972	19.6	1973	19.6	1974	19.6	1975	19.3	1976	19.3	1977	19.3	1978	19.3
1968	17.0	1969	18.1	1970	18.1	1971	18.1	1972	19.2	1973	19.2	1974	19.2	1975	19.0	1976	19.0	1977	19.0	1978	19.0	1979	19.0
1969	17.7	1970	17.7	1971	17.7	1972	18.9	1973	18.9	1974	18.9	1975	18.6	1976	18.6	1977	18.6	1978	18.6	1979	18.6	1980	16.0
1970	17.3	1971	17.3	1972	18.4	1973	18.4	1974	18.4	1975	18.1	1976	18.1	1977	18.1	1978	18.1	1979	18.1	1980	15.6	1981	15.6
1971	16.9	1972	17.9	1973	17.9	1974	17.9	1975	17.7	1976	17.7	1977	17.7	1978	17.7	1979	17.7	1980	15.2	1981	15.2	1982	14.0
1972	17.4	1973	17.4	1974	17.4	1975	17.1	1976	17.1	1977	17.1	1978	17.1	1979	17.1	1980	14.7	1981	14.7	1982	13.6	1983	13.6
1973	16.8	1974	16.8	1975	16.6	1976	16.6	1977	16.6	1978	16.6	1979	16.6	1980	14.2	1981	14.2	1982	13.1	1983	13.1	1984	13.1
1974	16.2	1975	15.9	1976	15.9	1977	15.9	1978	15.9	1979	15.9	1980	13.7	1981	13.7	1982	12.6	1983	12.6	1984	12.6	1985	12.0
1975	15.2	1976	15.2	1977	15.2	1978	15.2	1979	15.2	1980	13.1	1981	13.1	1982	12.1	1983	12.1	1984	12.1	1985	11.5	1986	11.3
1976	14.5	1977	14.5	1978	14.5	1979	14.5	1980	12.4	1981	12.4	1982	11.4	1983	11.4	1984	11.4	1985	10.9	1986	10.8	1987	10.5
1977	13.6	1978	13.6	1979	13.6	1980	11.7	1981	11.7	1982	10.8	1983	10.8	1984	10.8	1985	10.3	1986	10.1	1987	9.9	1988	9.9
1978	12.7	1979	12.7	1980	10.9	1981	10.9	1982	10.0	1983	10.0	1984	10.0	1985	9.6	1986	9.5	1987	9.2	1988	9.2	1989	9.2
1979	11.7	1980	10.0	1981	10.0	1982	9.2	1983	9.2	1984	9.2	1985	8.8	1986	8.7	1987	8.5	1988	8.5	1989	8.5	1990	8.5
1980	9.5	1981	9.5	1982	8.8	1983	8.8	1984	8.8	1985	8.4	1986	8.3	1987	8.1	1988	8.1	1989	8.1	1990	8.1	1991	8.1

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	21.2	1974	21.2	1975	20.9	1976	20.9	1977	20.9	1978	20.9	1979	20.9	1980	18.0	1981	18.0	1982	16.6	1983	16.6	1984	16.6
1974	21.0	1975	20.7	1976	20.7	1977	20.7	1978	20.7	1979	20.7	1980	17.8	1981	17.8	1982	16.5	1983	16.5	1984	16.5	1985	15.6
1975	20.5	1976	20.5	1977	20.5	1978	20.5	1979	20.5	1980	17.6	1981	17.6	1982	16.3	1983	16.3	1984	16.3	1985	15.4	1986	15.3
1976	20.2	1977	20.2	1978	20.2	1979	20.2	1980	17.4	1981	17.4	1982	16.1	1983	16.1	1984	16.1	1985	15.2	1986	15.1	1987	14.8
1977	19.9	1978	19.9	1979	19.9	1980	17.2	1981	17.2	1982	15.9	1983	15.9	1984	15.9	1985	15.0	1986	14.9	1987	14.6	1988	14.6
1978	19.7	1979	19.7	1980	16.9	1981	16.9	1982	15.6	1983	15.6	1984	15.6	1985	14.8	1986	14.7	1987	14.4	1988	14.4	1989	14.4
1979	19.3	1980	16.6	1981	16.6	1982	15.4	1983	15.4	1984	15.4	1985	14.6	1986	14.4	1987	14.2	1988	14.2	1989	14.2	1990	14.2
1980	16.3	1981	16.3	1982	15.1	1983	15.1	1984	15.1	1985	14.3	1986	14.1	1987	13.9	1988	13.9	1989	13.9	1990	13.9	1991	13.9
1981	16.0	1982	14.8	1983	14.8	1984	14.8	1985	14.0	1986	13.8	1987	13.6	1988	13.6	1989	13.6	1990	13.6	1991	13.6	1992	13.6
1982	14.4	1983	14.4	1984	14.4	1985	13.7	1986	13.5	1987	13.3	1988	13.3	1989	13.3	1990	13.3	1991	13.3	1992	13.3	1993	13.2
1983	14.0	1984	14.0	1985	13.3	1986	13.2	1987	12.9	1988	12.9	1989	12.9	1990	12.9	1991	12.9	1992	12.9	1993	12.8	1994	12.8
1984	13.6	1985	12.9	1986	12.8	1987	12.5	1988	12.5	1989	12.5	1990	12.5	1991	12.5	1992	12.5	1993	12.4	1994	12.4	1995	12.4
1985	12.5	1986	12.3	1987	12.1	1988	12.1	1989	12.1	1990	12.1	1991	12.1	1992	12.1	1993	12.0	1994	12.0	1995	12.0	1996	12.0
1986	11.9	1987	11.6	1988	11.6	1989	11.6	1990	11.6	1991	11.6	1992	11.6	1993	11.5	1994	11.5	1995	11.5	1996	11.5	1997	11.1
1987	11.1	1988	11.1	1989	11.1	1990	11.1	1991	11.1	1992	11.1	1993	11.0	1994	11.0	1995	11.0	1996	11.0	1997	10.7	1998	10.7
1988	10.5	1989	10.5	1990	10.5	1991	10.5	1992	10.5	1993	10.4	1994	10.4	1995	10.4	1996	10.4	1997	10.1	1998	10.1	1999	10.1
1989	9.9	1990	9.9	1991	9.9	1992	9.9	1993	9.8	1994	9.8	1995	9.8	1996	9.8	1997	9.6	1998	9.6	1999	9.6	2000	9.6
1990	9.2	1991	9.2	1992	9.2	1993	9.1	1994	9.1	1995	9.1	1996	9.1	1997	8.9	1998	8.9	1999	8.9	2000	8.9	2001	8.9
1991	8.5	1992	8.5	1993	8.3	1994	8.3	1995	8.3	1996	8.3	1997	8.2	1998	8.2	1999	8.2	2000	8.2	2001	8.2	2002	8.2
1992	8.1	1993	7.9	1994	7.9	1995	7.9	1996	7.9	1997	7.9	1998	7.9	1999	7.9	2000	7.9	2001	7.9	2002	7.9	2003	7.9

*MY -- Indicates the model year.
**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F. Emissions are based on the January 1 mileage accumulation figures given in Table 1.7.4.

TABLE 1.7.2C

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
HEAVY DUTY DIESEL POWERED VEHICLES
NOx

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	21.9	1962	21.9	1963	21.8	1964	21.8	1965	21.8	1966	22.6	1967	22.6	1968	22.6	1969	24.1	1970	24.1	1971	24.1	1972	25.5
1962	21.9	1963	21.8	1964	21.8	1965	21.8	1966	22.6	1967	22.6	1968	22.6	1969	24.1	1970	24.1	1971	24.1	1972	25.5	1973	25.5
1963	21.8	1964	21.8	1965	21.8	1966	22.6	1967	22.6	1968	22.6	1969	24.1	1970	24.1	1971	24.1	1972	25.5	1973	25.5	1974	25.5
1964	21.8	1965	21 8	1966	22.6	1967	22 6	1968	22.6	1969	24.1	1970	24.1	1971	24.1	1972	25.5	1973	25.5	1974	25.5	1975	24.8
1965	21.8	1966	22.6	1967	22.6	1968	22.6	1969	24.1	1970	24.1	1971	24.1	1972	25.5	1973	25.5	1974	25.5	1975	24.8	1976	24.8
1966	22.6	1967	22.6	1968	22.6	1969	24.1	1970	24.1	1971	24.1	1972	25.5	1973	25.5	1974	25.5	1975	24.8	1976	24.8	1977	24.8
1967	22.6	1968	22.6	1969	24.1	1970	24.1	1971	24.1	1972	25 5	1973	25.5	1974	25.5	1975	24.8	1976	24.8	1977	24.8	1978	24.8
1968	22.6	1969	24.1	1970	24.1	1971	24.1	1972	25.5	1973	25.5	1974	25.5	1975	24.8	1976	24.8	1977	24.8	1978	24.8	1979	24.8
1969	24.1	1970	24 1	1971	24.1	1972	25.5	1973	25.5	1974	25 5	1975	24.8	1976	24.8	1977	24.8	1978	24.8	1979	24.8	1980	20.5
1970	24.1	1971	24.1	1972	25.5	1973	25.5	1974	25.5	1975	24.8	1976	24.8	1977	24.8	1978	24.8	1979	24.8	1980	20.5	1981	20.5
1971	24.1	1972	25.5	1973	25 5	1974	25.5	1975	24.8	1976	24 8	1977	24.8	1978	24.8	1979	24.8	1980	20.5	1981	20.5	1982	18.9
1972	25.5	1973	25.5	1974	25 5	1975	24.8	1976	24.8	1977	24.8	1978	24 8	1979	24.8	1980	20.5	1981	20.5	1982	18.9	1983	18.9
1973	25.5	1974	25.5	1975	24.8	1976	24 8	1977	24.8	1978	24.8	1979	24.8	1980	20.5	1981	20.5	1982	18.9	1983	18.9	1984	18.9
1974	25.5	1975	24.8	1976	24.8	1977	24.8	1978	24.8	1979	24.8	1980	20.5	1981	20.5	1982	18.9	1983	18.9	1984	18.9	1985	18.2
1975	24.8	1976	24.8	1977	24.8	1978	24.8	1979	24.8	1980	20.5	1981	20.5	1982	18.9	1983	18.9	1984	18.9	1985	18.2	1986	17.9
1976	24.8	1977	24.8	1978	24.8	1979	24.8	1980	20.5	1981	20.5	1982	18.9	1983	18.9	1984	18.9	1985	18.2	1986	17.9	1987	12.2
1977	24.8	1978	24.8	1979	24.8	1980	20.5	1981	20.5	1982	18.9	1983	18.9	1984	18.9	1985	18.2	1986	17.9	1987	12.0	1988	12.0
1978	24.8	1979	24.8	1980	20.5	1981	20.5	1982	18.9	1983	18.9	1984	18.9	1985	18.2	1986	17.9	1987	11.7	1988	11.7	1989	11.7
1979	24.8	1980	20.5	1981	20.5	1982	18.9	1983	18.9	1984	18.9	1985	18.2	1986	17.9	1987	11.4	1988	11.4	1989	11.4	1990	11.4
1980	20.5	1981	20.5	1982	18.9	1983	18.9	1984	18.9	1985	18.2	1986	17.9	1987	11.2	1988	11.2	1989	11.2	1990	11.2	1991	11.2

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	25.5	1974	25.5	1975	24.8	1976	24.8	1977	24.8	1978	24.8	1979	24.8	1980	20.5	1981	20.5	1982	18.9	1983	18.9	1984	18.9
1974	25.5	1975	24.8	1976	24.8	1977	24.8	1978	24.8	1979	24 8	1980	20.5	1981	20.5	1982	18.9	1983	18.9	1984	18.9	1985	18.2
1975	24.8	1976	24.8	1977	24.8	1978	24.8	1979	24.8	1980	20.5	1981	20.5	1982	18.9	1983	18.9	1984	18.9	1985	18.2	1986	17.9
1976	24.8	1977	24.8	1978	24.8	1979	24.8	1980	20.5	1981	20.5	1982	18.9	1983	18.9	1984	18.9	1985	18.2	1986	17.9	1987	14.0
1977	24.8	1978	24.8	1979	24.8	1980	20.5	1981	20.5	1982	18.9	1983	18.9	1984	18.9	1985	18.2	1986	17.9	1987	13.9	1988	13.9
1978	24.8	1979	24.8	1980	20.5	1981	20.5	1982	18.9	1983	18 9	1984	18.9	1985	18.2	1986	17.9	1987	13.8	1988	13.8	1989	13.8
1979	24.8	1980	20.5	1981	20.5	1982	18.9	1983	18.9	1984	18 9	1985	18.2	1986	17.9	1987	13.7	1988	13.7	1989	13.7	1990	13.7
1980	20.5	1981	20.5	1982	18.9	1983	18.9	1984	18.9	1985	18.2	1986	17.9	1987	13.6	1988	13.6	1989	13.6	1990	13.6	1991	13.6
1981	20.5	1982	18.9	1983	18 9	1984	18.9	1985	18.2	1986	17.9	1987	13.5	1988	13.5	1989	13.5	1990	13.5	1991	13.5	1992	13.5
1982	18.9	1983	18.9	1984	18.9	1985	18.2	1986	17.9	1987	13.4	1988	13.4	1989	13.4	1990	13.4	1991	13.4	1992	13.4	1993	13.2
1983	18.9	1984	18.9	1985	18.2	1986	17.9	1987	13 2	1988	13.2	1989	13.2	1990	13.2	1991	13.2	1992	13.2	1993	13.0	1994	13.0
1984	18.9	1985	18.2	1986	17.9	1987	13.1	1988	13.1	1989	13.1	1990	13.1	1991	13.1	1992	13.1	1993	12.8	1994	12.8	1995	12.8
1985	18.2	1986	17.9	1987	12.9	1988	12.9	1989	12.9	1990	12.9	1991	12.9	1992	12.9	1993	12.7	1994	12.7	1995	12.7	1996	12.7
1986	17.9	1987	12.7	1988	12.7	1989	12.7	1990	12.7	1991	12.7	1992	12.7	1993	12.5	1994	12.5	1995	12.5	1996	12.5	1997	12.4
1987	12.5	1988	12.5	1989	12.5	1990	12.5	1991	12.5	1992	12.5	1993	12.3	1994	12.3	1995	12.3	1996	12.3	1997	12.2	1998	12.2
1988	12.2	1989	12.2	1990	12.2	1991	12.2	1992	12 2	1993	12.0	1994	12.0	1995	12.0	1996	12.0	1997	11.9	1998	11.9	1999	11.9
1989	12.0	1990	12.0	1991	12.0	1992	12.0	1993	11.8	1994	11.8	1995	11.8	1996	11.8	1997	11.7	1998	11.7	1999	11.7	2000	11.7
1990	11.7	1991	11.7	1992	11.7	1993	11.5	1994	11 5	1995	11.5	1996	11.5	1997	11.4	1998	11.4	1999	11.4	2000	11.4	2001	11.4
1991	11.4	1992	11.4	1993	11.1	1994	11.1	1995	11.1	1996	11.1	1997	11.1	1998	11.1	1999	11.1	2000	11.1	2001	11.1	2002	11.1
1992	11.2	1993	11.0	1994	11.0	1995	11.0	1996	11.0	1997	10.9	1998	10.9	1999	10.9	2000	10.9	2001	10.9	2002	10.9	2003	10.9

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F. Emissions are based on the January 1 mileage accumulation figures given in Table 1.7.4.

TABLE 1.7.3

IDLE EMISSION RATES FOR
LOW ALTITUDE
HEAVY DUTY DIESEL POWERED VEHICLES

* IER = ZML + (DR * M)

Pol	Model Years	Zero Mile Emission Level (Grams/Min.)	Deterioration Rate (Gm/Min/10K Mi)
HC	Pre-1963	0.36	0.0
	1963-1965	0.36	0.0
	1966-1968	0 36	0.0
	1969-1971	0.36	0.0
	1972-1974	0.36	0.0
	1975-1979	0.36	0.0
	1980-1981	0.36	0.0
	1982-1984	0.36	0.0
	1985	0.27	0.0
	1986	0.27	0.0
	1987-1992	0.27	0.0
	1993-1996	0.27	0.0
	1997+	0.27	0.0
CO	Pre-1963	0.67	0.01
	1963-1965	0.67	0.01
	1966-1968	0.67	0.01
	1969-1971	0.67	0.01
	1972-1974	0.67	0.01
	1975-1979	0.67	0.01
	1980-1981	0.67	0.01
	1982-1984	0.67	0.01
	1985	0.67	0.01
	1986	0.67	0.01
	1987-1992	0.67	0.01
	1993-1996	0.67	0.01
	1997+	0.67	0.01
NOx	Pre-1963	0.92	0.0
	1963-1965	0.92	0.0
	1966-1968	0.92	0.0
	1969-1971	0.92	0.0
	1972-1974	0.92	0.0
	1975-1979	0.92	0.0
	1980-1981	0.92	0.0
	1982-1984	0.92	0.0
	1985	0.22	0.0
	1986	0.22	0.0
	1987-1992	0 22	0.0
	1993-1996	0.22	0.0
	1997+	0.22	0.0

* WHERE : IER = Idle emission rate
ZML = Zero mile level
DR = Deterioration Rate
M = Cumulative Mileage / 10,000

DATE : MAY 25, 1985

TABLE 1.7.4

REGISTRATION MIX AND
MILEAGE ACCUMULATION RATES FOR
LOW ALTITUDE
HEAVY DUTY DIESEL POWERED VEHICLES

Model Year Index**	July 1 Registration Mix*	Mileage Accumulation Rate per vehicle*	Jan 1 Registration Mix	Jan 1 Mileage Accumulation Rate (fleet)	Jan 1 Mileage Accumulation (fleet)
1	0.090	66333.	0.0	0.	0.
2	0.151	60319.	0.151	66333.	33166.
3	0.126	54855.	0.126	60319.	96492.
4	0.105	49894.	0.105	54855.	154079.
5	0.088	45386.	0.088	49894.	206454.
6	0.073	41288.	0.073	45386.	254093.
7	0.061	37565.	0.061	41288.	297430.
8	0.051	34182.	0.051	37565.	336857.
9	0.043	31105.	0.043	34182.	372730.
10	0.036	28309.	0.036	31105.	405374.
11	0.030	25766.	0.030	28309.	435081.
12	0.025	23453.	0.025	25766.	462118.
13	0.021	21350.	0.021	23453.	486727.
14	0.017	19437.	0.017	21350.	509129.
15	0.014	17697.	0.014	19437.	529522.
16	0.012	16114.	0.012	17697.	548089.
17	0.010	14673.	0.010	16114.	564994.
18	0.008	13363.	0.008	14673.	580388.
19	0.007	12170.	0.007	13363.	594406.
20+	0.031	11085.	0.031	12170.	607173.

* Default information that may be altered by the MOBILE3 user with information about the local area. This mileage distribution is applicable to calendar year 1988 only.

** The indices refer to the most recent model year vehicles in any given calendar year. Index 1 references the newest model year vehicles and index 20+ references the oldest model year vehicles.

DATE : MAY 25, 1985

TABLE 1.7.5

EXAMPLE TRAVEL WEIGHTING FRACTION CALCULATION FOR
LOW ALTITUDE
HEAVY DUTY DIESEL POWERED VEHICLES
JANUARY 1, 1988

Model Years	(A) HDDV Fleet Registration	(B) Sales Fraction	(A*B)	(C=A*B/DAF) HDDV Registration	(D) Annual Mileage Accrual Rate	(C*D)	(C*D/TFNORM) Travel Fractions
1988	0.0	1.000	0.0	0.0	0.	0.0	0.0
1987	0.151	1.000	0.151	0.166	66333.	11019.0	0.240
1986	0.126	1.000	0.126	0.139	60319.	8361.1	0.182
1985	0.105	1.000	0.105	0.116	54855.	6336.4	0.138
1984	0.088	1.000	0.088	0.097	49894.	4830.2	0.105
1983	0.073	1.000	0.073	0.080	45386.	3644.8	0.079
1982	0.061	1.000	0.061	0.067	41288.	2770.7	0.060
1981	0.051	1.000	0.051	0.056	37565.	2107.6	0.046
1980	0.043	1.000	0.043	0.047	34182.	1617.0	0.035
1979	0.036	1.000	0.036	0.040	31105.	1231.9	0.027
1978	0.030	1.000	0.030	0.033	28309.	934.3	0.020
1977	0.025	1.000	0.025	0.028	25766.	708.6	0.015
1976	0.021	1.000	0.021	0.023	23453.	541.8	0.012
1975	0.017	1.000	0.017	0.019	21350.	399.3	0.009
1974	0.014	1.000	0.014	0.015	19437.	299.4	0.007
1973	0.012	1.000	0.012	0.013	17697.	233.6	0.005
1972	0.010	1.000	0.010	0.011	16114.	177.3	0.004
1971	0.008	1.000	0.008	0.009	14673.	129.1	0.003
1970	0.007	1.000	0.007	0.008	13363.	102.9	0.002
1969-	0.031	1.000	0.031	0.034	12170.	415.1	0.009
		DAF:	0.910		TFNORM:	45860.0	

WHERE :

A = January 1 registration mix from Table 1.7.4.
B = Fleet sales fractions
D = Sales weighted fleet mileage accumulation rate from Table 1.7.4, adjusted to January 1
D(1) = Annual Miles(1)
D(MYI) = .25*(Annual Miles(MYI)) + .75*(Annual Miles(MYI-1)), MYI=2,...,20+

DATE : MAY 25, 1985

TABLE 1.7.6

SPEED CORRECTION FACTOR COEFFICIENTS FOR
LOW ALTITUDE
HEAVY DUTY DIESEL POWERED VEHICLES

$$* \; SCF(s) = EXP(A + B*s + C*s^2)$$

Pol	Model Years	Coefficients A	B	C
HC	All	0.92400	-0.05500	0.00044
CO	All	1.39600	-0.08800	0.00091
NOx	All	0.67600	-0.04800	0.00071

* WHERE: s = average speed (mph)

DATE : MAY 25, 1985

TABLE 1.8.1A

EXHAUST EMISSION RATES FOR
LOW ALTITUDE
MOTORCYCLES
(RATES REFLECT ZERO TAMPERING)

* BER = ZML + (DR * M)

Pol	Model Years	Zero Mile Emission Level (Grams/Mile)	Deterioration Rate (Gm/Mi/10K Mi)	50,000 Mile Emission Level (Grams/Mile)
HC	Pre-1978	8.90	0.78	12.80
	1978-1979	3.40	1.65	11.65
	1980+	2.70	1.73	11.35
CO	Pre-1978	34.30	2.47	46.65
	1978-1979	23.10	3.96	42.90
	1980+	18.50	2.02	28.60
NOx	Pre-1978	0.20	0.06	0.50
	1978-1979	0.65	0.0	0.65
	1980+	0.85	0.0	0.85

* WHERE : BER = Basic emission rate (untampered)
ZML = Zero mile level
DR = Deterioration rate
M = Cumulative mileage / 10,000

DATE : MAY 25, 1985

TABLE 1.8.1B

CRANKCASE AND EVAPORATIVE HYDROCARBON EMISSIONS
FOR LOW ALTITUDE
MOTORCYCLES
(RATES REFLECT ZERO TAMPERING)

** CCEV = (HSK * TPD + DNL)/MPD + CC

Model Years	SHED Hot Soak Emissions (Gm/Trip)	Trips* Per Day	SHED Diurnal Emissions (Gm/Day)	Miles* Per Day	Crankcase Emissions (Gm/Mile)	Total Crankcase and Evap. Emissions (Gm/Mile)
Pre-1978	4.56	1.35	6.71	8.30	0.31	1.86
1978-1979	7.00	1.35	8.44	8.30	0.0	2.16
1980+	7.53	1.35	8.60	8.30	0.0	2.26

* Default information that may be altered by the MOBILE3 user with information about the local area.

** WHERE :

CCEV = Total untampered crankcase & evaporative HC emissions (Gm/Mile)
HSK = Hot soak emissions (Gm/Trip)
TPD = Trips per day
DNL = Diurnal emissions (Gm/Day)
MPD = Miles per day
CC = Crankcase emissions (Gm/Mile)

DATE : MAY 25, 1985

TABLE 1.8.2A

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
MOTORCYCLES
TOTAL HC (INCLUDES EVAP & CRANKCASE)

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	11.9	1962	11.9	1963	11.9	1964	11.9	1965	11.9	1966	11.9	1967	11.9	1968	11.9	1969	11.9	1970	11.9	1971	11.9	1972	11.9
1962	11.9	1963	11.9	1964	11.9	1965	11.9	1966	11.9	1967	11.9	1968	11.9	1969	11.9	1970	11.9	1971	11.9	1972	11.9	1973	11.9
1963	11.9	1964	11.9	1965	11.9	1966	11.9	1967	11.9	1968	11.9	1969	11.9	1970	11.9	1971	11.9	1972	11.9	1973	11.9	1974	11.9
1964	11.9	1965	11.9	1966	11.9	1967	11.9	1968	11.9	1969	11.9	1970	11.9	1971	11.9	1972	11.9	1973	11.9	1974	11.9	1975	11.9
1965	11.9	1966	11.9	1967	11.9	1968	11.9	1969	11.9	1970	11.9	1971	11.9	1972	11.9	1973	11.9	1974	11.9	1975	11.9	1976	11.9
1966	11.9	1967	11.9	1968	11.9	1969	11.9	1970	11.9	1971	11.9	1972	11.9	1973	11.9	1974	11.9	1975	11.9	1976	11.9	1977	11.9
1967	11.9	1968	11.9	1969	11.9	1970	11.9	1971	11.9	1972	11.9	1973	11.9	1974	11.9	1975	11.9	1976	11.9	1977	11.9	1978	7.9
1968	11.9	1969	11.9	1970	11.9	1971	11.9	1972	11.9	1973	11.9	1974	11.9	1975	11.9	1976	11.9	1977	11.9	1978	7.9	1979	7.9
1969	11.9	1970	11.9	1971	11.9	1972	11.9	1973	11.9	1974	11.9	1975	11.9	1976	11.9	1977	11.9	1978	7.9	1979	7.9	1980	7.4
1970	11.8	1971	11.8	1972	11.8	1973	11.8	1974	11.8	1975	11.8	1976	11.8	1977	11.8	1978	7.8	1979	7.8	1980	7.4	1981	7.4
1971	11.8	1972	11.8	1973	11.8	1974	11.8	1975	11.8	1976	11.8	1977	11.8	1978	7.8	1979	7.8	1980	7.3	1981	7.3	1982	7.3
1972	11.8	1973	11.8	1974	11.8	1975	11.8	1976	11.8	1977	11.8	1978	7.8	1979	7.8	1980	7.3	1981	7.3	1982	7.3	1983	7.3
1973	11.8	1974	11.8	1975	11.8	1976	11.8	1977	11.8	1978	7.7	1979	7.7	1980	7.2	1981	7.2	1982	7.2	1983	7.2	1984	7.2
1974	11.7	1975	11.7	1976	11.7	1977	11.7	1978	7.6	1979	7.6	1980	7.1	1981	7.1	1982	7.1	1983	7.1	1984	7.1	1985	7.1
1975	11.6	1976	11.6	1977	11.6	1978	7.4	1979	7.4	1980	6.9	1981	6.9	1982	6.9	1983	6.9	1984	6.9	1985	6.9	1986	6.9
1976	11.5	1977	11.5	1978	7.2	1979	7.2	1980	6.7	1981	6.7	1982	6.7	1983	6.7	1984	6.7	1985	6.7	1986	6.7	1987	6.7
1977	11.4	1978	6.9	1979	6.9	1980	6.3	1981	6.3	1982	6.3	1983	6.3	1984	6.3	1985	6.3	1986	6.3	1987	6.3	1988	6.3
1978	6.5	1979	6.5	1980	5.9	1981	5.9	1982	5.9	1983	5.9	1984	5.9	1985	5.9	1986	5.9	1987	5.9	1988	5.9	1989	5.9
1979	5.9	1980	5.3	1981	5.3	1982	5.3	1983	5.3	1984	5.3	1985	5.3	1986	5.3	1987	5.3	1988	5.3	1989	5.3	1990	5.3
1980	5.0	1981	5.0	1982	5.0	1983	5.0	1984	5.0	1985	5.0	1986	5.0	1987	5.0	1988	5.0	1989	5.0	1990	5.0	1991	5.0

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	11.9	1974	11.9	1975	11.9	1976	11.9	1977	11.9	1978	7.9	1979	7.9	1980	7.4	1981	7.4	1982	7.4	1983	7.4	1984	7.4
1974	11.9	1975	11.9	1976	11.9	1977	11.9	1978	7.9	1979	7.9	1980	7.4	1981	7.4	1982	7.4	1983	7.4	1984	7.4	1985	7.4
1975	11.9	1976	11.9	1977	11.9	1978	7.9	1979	7.9	1980	7.4	1981	7.4	1982	7.4	1983	7.4	1984	7.4	1985	7.4	1986	7.4
1976	11.9	1977	11.9	1978	7.9	1979	7.9	1980	7.4	1981	7.4	1982	7.4	1983	7.4	1984	7.4	1985	7.4	1986	7.4	1987	7.4
1977	11.9	1978	7.9	1979	7.9	1980	7.4	1981	7.4	1982	7.4	1983	7.4	1984	7.4	1985	7.4	1986	7.4	1987	7.4	1988	7.4
1978	7.9	1979	7.9	1980	7.4	1981	7.4	1982	7.4	1983	7.4	1984	7.4	1985	7.4	1986	7.4	1987	7.4	1988	7.4	1989	7.4
1979	7.9	1980	7.4	1981	7.4	1982	7.4	1983	7.4	1984	7.4	1985	7.4	1986	7.4	1987	7.4	1988	7.4	1989	7.4	1990	7.4
1980	7.4	1981	7.4	1982	7.4	1983	7.4	1984	7.4	1985	7.4	1986	7.4	1987	7.4	1988	7.4	1989	7.4	1990	7.4	1991	7.4
1981	7.4	1982	7.4	1983	7.4	1984	7.4	1985	7.4	1986	7.4	1987	7.4	1988	7.4	1989	7.4	1990	7.4	1991	7.4	1992	7.4
1982	7.4	1983	7.4	1984	7.4	1985	7.4	1986	7.4	1987	7.4	1988	7.4	1989	7.4	1990	7.4	1991	7.4	1992	7.4	1993	7.4
1983	7.3	1984	7.3	1985	7.3	1986	7.3	1987	7.3	1988	7.3	1989	7.3	1990	7.3	1991	7.3	1992	7.3	1993	7.3	1994	7.3
1984	7.3	1985	7.3	1986	7.3	1987	7.3	1988	7.3	1989	7.3	1990	7.3	1991	7.3	1992	7.3	1993	7.3	1994	7.3	1995	7.3
1985	7.2	1986	7.2	1987	7.2	1988	7.2	1989	7.2	1990	7.2	1991	7.2	1992	7.2	1993	7.2	1994	7.2	1995	7.2	1996	7.2
1986	7.1	1987	7.1	1988	7.1	1989	7.1	1990	7.1	1991	7.1	1992	7.1	1993	7.1	1994	7.1	1995	7.1	1996	7.1	1997	7.1
1987	6.9	1988	6.9	1989	6.9	1990	6.9	1991	6.9	1992	6.9	1993	6.9	1994	6.9	1995	6.9	1996	6.9	1997	.9	1998	6.9
1988	6.7	1989	6.7	1990	6.7	1991	6.7	1992	6.7	1993	6.7	1994	6.7	1995	6.7	1996	6.7	1997	6.7	1998	6.7	1999	6.7
1989	6.3	1990	6.3	1991	6.3	1992	6.3	1993	6.3	1994	6.3	1995	6.3	1996	6.3	1997	6.3	1998	6.3	1999	6.3	2000	6.3
1990	5.9	1991	5.9	1992	5.9	1993	5.9	1994	5.9	1995	5.9	1996	5.9	1997	5.9	1998	5.9	1999	5.9	2000	5.9	2001	5.9
1991	5.3	1992	5.3	1993	5.3	1994	5.3	1995	5.3	1996	5.3	1997	5.3	1998	5.3	1999	5.3	2000	5.3	2001	5.3	2002	5.3
1992	5.0	1993	5.0	1994	5.0	1995	5.0	1996	5.0	1997	5.0	1998	5.0	1999	5.0	2000	5.0	2001	5.0	2002	5.0	2003	5.0

*MY -- *Indicates the model year*

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of *the given calendar year*. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1.8.4.

TABLE 1.8.2B

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
MOTORCYCLES
CO

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	37.8	1962	37.8	1963	37.8	1964	37.8	1965	37.8	1966	37.8	1967	37.8	1968	37.8	1969	37.8	1970	37.8	1971	37.8	1972	37.8
1962	37.8	1963	37.8	1964	37.8	1965	37.8	1966	37.8	1967	37.8	1968	37.8	1969	37.8	1970	37.8	1971	37.8	1972	37.8	1973	37.8
1963	37.8	1964	37.8	1965	37.8	1966	37.8	1967	37.8	1968	37.8	1969	37.8	1970	37.8	1971	37.8	1972	37.8	1973	37.8	1974	37.8
1964	37.8	1965	37.8	1966	37.8	1967	37.8	1968	37.8	1969	37.8	1970	37.8	1971	37.8	1972	37.8	1973	37.8	1974	37.8	1975	37.8
1965	37.8	1966	37.8	1967	37.8	1968	37.8	1969	37.8	1970	37.8	1971	37.8	1972	37.8	1973	37.8	1974	37.8	1975	37.8	1976	37.8
1966	37.8	1967	37.8	1968	37.8	1969	37.8	1970	37.8	1971	37.8	1972	37.8	1973	37.8	1974	37.8	1975	37.8	1976	37.8	1977	37.8
1967	37.8	1968	37.8	1969	37.8	1970	37.8	1971	37.8	1972	37.8	1973	37.8	1974	37.8	1975	37.8	1976	37.8	1977	37.8	1978	28.7
1968	37.8	1969	37.8	1970	37.8	1971	37.8	1972	37.8	1973	37 8	1974	37.8	1975	37.8	1976	37.8	1977	37.8	1978	28.7	1979	28.7
1969	37.8	1970	37.8	1971	37.8	1972	37.8	1973	37.8	1974	37.8	1975	37.8	1976	37.8	1977	37.8	1978	28.7	1979	28.7	1980	21.3
1970	37.7	1971	37.7	1972	37.7	1973	37.7	1974	37.7	1975	37.7	1976	37.7	1977	37.7	1978	28.6	1979	28.6	1980	21.3	1981	21.3
1971	37.7	1972	37.7	1973	37.7	1974	37.7	1975	37.7	1976	37.7	1977	37.7	1978	28.5	1979	28.5	1980	21.3	1981	21.3	1982	21.3
1972	37.6	1973	37.6	1974	37.6	1975	37.6	1976	37.6	1977	37.6	1978	28.4	1979	28.4	1980	21.2	1981	21.2	1982	21.2	1983	21.2
1973	37.5	1974	37.5	1975	37.5	1976	37.5	1977	37.5	1978	28.2	1979	28.2	1980	21.1	1981	21.1	1982	21.1	1983	21.1	1984	21.1
1974	37.3	1975	37.3	1976	37.3	1977	37.3	1978	27.9	1979	27.9	1980	21.0	1981	21.0	1982	21.0	1983	21.0	1984	21.0	1985	21.0
1975	37.0	1976	37.0	1977	37.0	1978	27.5	1979	27.5	1980	20.8	1981	20.8	1982	20.8	1983	20.8	1984	20.8	1985	20.8	1986	20.8
1976	36.7	1977	36.7	1978	27.0	1979	27.0	1980	20.5	1981	20.5	1982	20.5	1983	20.5	1984	20.5	1985	20.5	1986	20.5	1987	20.5
1977	36.2	1978	26.2	1979	26.2	1980	20.1	1981	20.1	1982	20.1	1983	20.1	1984	20.1	1985	20.1	1986	20.1	1987	20.1	1988	20.1
1978	25.3	1979	25.3	1980	19.6	1981	19.6	1982	19.6	1983	19.6	1984	19.6	1985	19.6	1986	19.6	1987	19.6	1988	19.6	1989	19.6
1979	23.9	1980	18.9	1981	18.9	1982	18.9	1983	18.9	1984	18.9	1985	18.9	1986	18.9	1987	18.9	1988	18.9	1989	18.9	1990	18.9
1980	18.5	1981	18.5	1982	18.5	1983	18.5	1984	18.5	1985	18.5	1986	18.5	1987	18.5	1988	18.5	1989	18.5	1990	18.5	1991	18.5

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	37.8	1974	37.8	1975	37.8	1976	37.8	1977	37.8	1978	28.7	1979	28.7	1980	21.4	1981	21.4	1982	21.4	1983	21.4	1984	21.4
1974	37.8	1975	37.8	1976	37.8	1977	37.8	1978	28.7	1979	28.7	1980	21.4	1981	21.4	1982	21.4	1983	21.4	1984	21.4	1985	21.4
1975	37.8	1976	37.8	1977	37.8	1978	28.7	1979	28.7	1980	21.4	1981	21.4	1982	21.4	1983	21.4	1984	21.4	1985	21.4	1986	21.4
1976	37.8	1977	37.8	1978	28.7	1979	28.7	1980	21.4	1981	21.4	1982	21.4	1983	21.4	1984	21.4	1985	21.4	1986	21.4	1987	21.4
1977	37.8	1978	28.7	1979	28.7	1980	21.4	1981	21.4	1982	21.4	1983	21.4	1984	21.4	1985	21.4	1986	21.4	1987	21.4	1988	21.4
1978	28.7	1979	28.7	1980	21.4	1981	21.4	1982	21 4	1983	21 4	1984	21.4	1985	21.4	1986	21.4	1987	21.4	1988	21.4	1989	21.4
1979	28.7	1980	21.4	1981	21.4	1982	21.4	1983	21.4	1984	21 4	1985	21.4	1986	21.4	1987	21.4	1988	21.4	1989	21.4	1990	21.4
1980	21.4	1981	21.4	1982	21.4	1983	21.4	1984	21.4	1985	21.4	1986	21.4	1987	21.4	1988	21.4	1989	21.4	1990	21.4	1991	21.4
1981	21.3	1982	21.3	1983	21.3	1984	21.3	1985	21.3	1986	21.3	1987	21.3	1988	21.3	1989	21.3	1990	21.3	1991	21.3	1992	21.3
1982	21.3	1983	21 3	1984	21.3	1985	21.3	1986	21.3	1987	21.3	1988	21.3	1989	21.3	1990	21.3	1991	21.3	1992	21.3	1993	21.3
1983	21.3	1984	21.3	1985	21.3	1986	21.3	1987	21.3	1988	21.3	1989	21.3	1990	21.3	1991	21.3	1992	21.3	1993	21.3	1994	21.3
1984	21.2	1985	21.2	1986	21.2	1987	21.2	1988	21.2	1989	21.2	1990	21.2	1991	21.2	1992	21.2	1993	21.2	1994	21.2	1995	21.2
1985	21.1	1986	21.1	1987	21.1	1988	21.1	1989	21 1	1990	21.1	1991	21.1	1992	21.1	1993	21.1	1994	21.1	1995	21.1	1996	21.1
1986	21.0	1987	21.0	1988	21.0	1989	21.0	1990	21.0	1991	21.0	1992	21.0	1993	21.0	1994	21.0	1995	21.0	1996	21.0	1997	21.0
1987	20.8	1988	20.8	1989	20.8	1990	20.8	1991	20.8	1992	20.8	1993	20.8	1994	20.8	1995	20.8	1996	20.8	1997	20.8	1998	20.8
1988	20.5	1989	20.5	1990	20.5	1991	20.5	1992	20.5	1993	20.5	1994	20.5	1995	20.5	1996	20.5	1997	20.5	1998	20.5	1999	20.5
1989	20.1	1990	20.1	1991	20.1	1992	20.1	1993	20.1	1994	20.1	1995	20.1	1996	20.1	1997	20.1	1998	20.1	1999	20.1	2000	20.1
1990	19.6	1991	19.6	1992	19.6	1993	19.6	1994	19.6	1995	19.6	1996	19.6	1997	19.6	1998	19.6	1999	19.6	2000	19.6	2001	19.6
1991	18.9	1992	18.9	1993	18.9	1994	18.9	1995	18.9	1996	18.9	1997	18.9	1998	18.9	1999	18.9	2000	18.9	2001	18.9	2002	18.9
1992	18.5	1993	18.5	1994	18.5	1995	18.5	1996	18.5	1997	18.5	1998	18.5	1999	18.5	2000	18.5	2001	18.5	2002	18.5	2003	18.5

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1.8.4.

TABLE 1.8.2C

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
MOTORCYCLES
NOx

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	0.3	1962	0.3	1963	0.3	1964	0.3	1965	0.3	1966	0.3	1967	0.3	1968	0.3	1969	0.3	1970	0.3	1971	0.3	1972	0.3
1962	0.3	1963	0.3	1964	0.3	1965	0.3	1966	0.3	1967	0.3	1968	0.3	1969	0.3	1970	0.3	1971	0.3	1972	0.3	1973	0.3
1963	0.3	1964	0.3	1965	0.3	1966	0.3	1967	0.3	1968	0.3	1969	0.3	1970	0.3	1971	0.3	1972	0.3	1973	0.3	1974	0.3
1964	0.3	1965	0.3	1966	0.3	1967	0.3	1968	0.3	1969	0.3	1970	0.3	1971	0.3	1972	0.3	1973	0.3	1974	0.3	1975	0.3
1965	0.3	1966	0.3	1967	0.3	1968	0.3	1969	0.3	1970	0.3	1971	0.3	1972	0.3	1973	0.3	1974	0.3	1975	0.3	1976	0.3
1966	0.3	1967	0.3	1968	0.3	1969	0.3	1970	0.3	1971	0.3	1972	0.3	1973	0.3	1974	0.3	1975	0.3	1976	0.3	1977	0.3
1967	0.3	1968	0.3	1969	0.3	1970	0.3	1971	0.3	1972	0.3	1973	0.3	1974	0.3	1975	0.3	1976	0.3	1977	0.3	1978	0.6
1968	0.3	1969	0.3	1970	0.3	1971	0.3	1972	0.3	1973	0.3	1974	0.3	1975	0.3	1976	0.3	1977	0.3	1978	0.6	1979	0.6
1969	0.3	1970	0.3	1971	0.3	1972	0.3	1973	0.3	1974	0.3	1975	0.3	1976	0.3	1977	0.3	1978	0.6	1979	0.6	1980	0.8
1970	0.3	1971	0.3	1972	0.3	1973	0.3	1974	0.3	1975	0.3	1976	0.3	1977	0.3	1978	0.6	1979	0.6	1980	0.8	1981	0.8
1971	0.3	1972	0.3	1973	0.3	1974	0.3	1975	0.3	1976	0.3	1977	0.3	1978	0.6	1979	0.6	1980	0.8	1981	0.8	1982	0.8
1972	0.3	1973	0.3	1974	0.3	1975	0.3	1976	0.3	1977	0.3	1978	0.6	1979	0.6	1980	0.8	1981	0.8	1982	0.8	1983	0.8
1973	0.3	1974	0.3	1975	0.3	1976	0.3	1977	0.3	1978	0.6	1979	0.6	1980	0.8	1981	0.8	1982	0.8	1983	0.8	1984	0.8
1974	0.3	1975	0.3	1976	0.3	1977	0.3	1978	0.6	1979	0.6	1980	0.8	1981	0.8	1982	0.8	1983	0.8	1984	0.8	1985	0.8
1975	0.3	1976	0.3	1977	0.3	1978	0.6	1979	0.6	1980	0.8	1981	0.8	1982	0.8	1983	0.8	1984	0.8	1985	0.8	1986	0.8
1976	0.3	1977	0.3	1978	0.6	1979	0.6	1980	0.8	1981	0.8	1982	0.8	1983	0.8	1984	0.8	1985	0.8	1986	0.8	1987	0.8
1977	0.2	1978	0.6	1979	0.6	1980	0.8	1981	0.8	1982	0.8	1983	0.8	1984	0.8	1985	0.8	1986	0.8	1987	0.8	1988	0.8
1978	0.6	1979	0.6	1980	0.8	1981	0.8	1982	0.8	1983	0.8	1984	0.8	1985	0.8	1986	0.8	1987	0.8	1988	0.8	1989	0.8
1979	0.6	1980	0.8	1981	0.8	1982	0.8	1983	0.8	1984	0.8	1985	0.8	1986	0.8	1987	0.8	1988	0.8	1989	0.8	1990	0.8
1980	0.8	1981	0.8	1982	0.8	1983	0.8	1984	0.8	1985	0.8	1986	0.8	1987	0.8	1988	0.8	1989	0.8	1990	0.8	1991	0.8

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	0.3	1974	0.3	1975	0.3	1976	0.3	1977	0.3	1978	0.6	1979	0.6	1980	0.8	1981	0.8	1982	0.8	1983	0.8	1984	0.8
1974	0.3	1975	0.3	1976	0.3	1977	0.3	1978	0.6	1979	0.6	1980	0.8	1981	0.8	1982	0.8	1983	0.8	1984	0.8	1985	0.8
1975	0.3	1976	0.3	1977	0.3	1978	0.6	1979	0.6	1980	0.8	1981	0.8	1982	0.8	1983	0.8	1984	0.8	1985	0.8	1986	0.8
1976	0.3	1977	0.3	1978	0.6	1979	0.6	1980	0.8	1981	0.8	1982	0.8	1983	0.8	1984	0.8	1985	0.8	1986	0.8	1987	0.8
1977	0.3	1978	0.6	1979	0.6	1980	0.8	1981	0.8	1982	0.8	1983	0.8	1984	0.8	1985	0.8	1986	0.8	1987	0.8	1988	0.8
1978	0.6	1979	0.6	1980	0.8	1981	0.8	1982	0.8	1983	0.8	1984	0.8	1985	0.8	1986	0.8	1987	0.8	1988	0.8	1989	0.8
1979	0.6	1980	0.8	1981	0.8	1982	0.8	1983	0.8	1984	0.8	1985	0.8	1986	0.8	1987	0.8	1988	0.8	1989	0.8	1990	0.8
1980	0.8	1981	0.8	1982	0.8	1983	0.8	1984	0.8	1985	0.8	1986	0.8	1987	0.8	1988	0.8	1989	0.8	1990	0.8	1991	0.8
1981	0.8	1982	0.8	1983	0.8	1984	0.8	1985	0.8	1986	0.8	1987	0.8	1988	0.8	1989	0.8	1990	0.8	1991	0.8	1992	0.8
1982	0.8	1983	0.8	1984	0.8	1985	0.8	1986	0.8	1987	0.8	1988	0.8	1989	0.8	1990	0.8	1991	0.8	1992	0.8	1993	0.8
1983	0.8	1984	0.8	1985	0.8	1986	0.8	1987	0.8	1988	0.8	1989	0.8	1990	0.8	1991	0.8	1992	0.8	1993	0.8	1994	0.8
1984	0.8	1985	0.8	1986	0.8	1987	0.8	1988	0.8	1989	0.8	1990	0.8	1991	0.8	1992	0.8	1993	0.8	1994	0.8	1995	0.8
1985	0.8	1986	0.8	1987	0.8	1988	0.8	1989	0.8	1990	0.8	1991	0.8	1992	0.8	1993	0.8	1994	0.8	1995	0.8	1996	0.8
1986	0.8	1987	0.8	1988	0.8	1989	0.8	1990	0.8	1991	0.8	1992	0.8	1993	0.8	1994	0.8	1995	0.8	1996	0.8	1997	0.8
1987	0.8	1988	0.8	1989	0.8	1990	0.8	1991	0.8	1992	0.8	1993	0.8	1994	0.8	1995	0.8	1996	0.8	1997	0.8	1998	0.8
1988	0.8	1989	0.8	1990	0.8	1991	0.8	1992	0.8	1993	0.8	1994	0.8	1995	0.8	1996	0.8	1997	0.8	1998	0.8	1999	0.8
1989	0.8	1990	0.8	1991	0.8	1992	0.8	1993	0.8	1994	0.8	1995	0.8	1996	0.8	1997	0.8	1998	0.8	1999	0.8	2000	0.8
1990	0.8	1991	0.8	1992	0.8	1993	0.8	1994	0.8	1995	0.8	1996	0.8	1997	0.8	1998	0.8	1999	0.8	2000	0.8	2001	0.8
1991	0.8	1992	0.8	1993	0.8	1994	0.8	1995	0.8	1996	0.8	1997	0.8	1998	0.8	1999	0.8	2000	0.8	2001	0.8	2002	0.8
1992	0.8	1993	0.8	1994	0.8	1995	0.8	1996	0.8	1997	0.8	1998	0.8	1999	0.8	2000	0.8	2001	0.8	2002	0.8	2003	0.8

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1.8.4.

TABLE 1.8.3

IDLE EMISSION RATES FOR
LOW ALTITUDE
MOTORCYCLES

* IER = ZML + (DR * M)

Pol	Model Years	Zero Mile Emission Level (Grams/Min.)	Deterioration Rate (Gm/Min/10K Mi)
HC	Pre-1978	1.95	0.42
	1978-1979	0.74	0.36
	1980+	0.59	0.38
CO	Pre-1978	4.33	0.23
	1978-1979	2.92	0.50
	1980+	2.34	0.26
NOx	Pre-1978	0.01	0.0
	1978-1979	0.03	0.0
	1980+	0.04	0.0

* WHERE : IER = Idle emission rate
ZML = Zero mile level
DR = Deterioration Rate
M = Cumulative Mileage / 10,000

DATE : MAY 25, 1985

TABLE 1.8.4

REGISTRATION MIX AND
MILEAGE ACCUMULATION RATES FOR
LOW ALTITUDE
MOTORCYCLES

Model Year Index**	July 1 Registration Mix*	Mileage Accumulation Rate per vehicle*	Jan 1 Registration Mix	Jan 1 Mileage Accumulation Rate (fleet)	Jan 1 Mileage Accumulation (fleet)
1	0.133	4100.	0.044	0.	0.
2	0.145	2800.	0.145	4100.	2050.
3	0.138	2100.	0.138	2800.	5500.
4	0.116	1600.	0.116	2100.	7950.
5	0.123	1200.	0.123	1600.	9800.
6	0.114	800.	0.114	1200.	11200.
7	0.069	600.	0.069	800.	12200.
8	0.044	400.	0.044	600.	12900.
9	0.024	200.	0.024	400.	13400.
10	0.009	200.	0.009	200.	13700.
11	0.085	200.	0.085	200.	13900.
12	0.0	0.	0.0	200.	14100.
13	0.0	0.	0.0	0.	14200.
14	0.0	0.	0.0	0.	14200.
15	0.0	0.	0.0	0.	14200.
16	0.0	0.	0.0	0.	14200.
17	0.0	0.	0.0	0.	14200.
18	0.0	0.	0.0	0.	14200.
19	0.0	0.	0.0	0.	14200.
20+	0.0	0.	0.0	0.	14200.

* Default information that may be altered by the MOBILE3 user with information about the local area.

** The indices refer to the most recent model year vehicles in any given calendar year. Index 1 references the newest model year vehicles and index 20+ references the oldest model year vehicles.

DATE : MAY 25, 1985

TABLE 1.8.5

EXAMPLE TRAVEL WEIGHTING FRACTION CALCULATION FOR
LOW ALTITUDE
MOTORCYCLES
JANUARY 1, 1988

Model Years	(A) MC Fleet Registration	(B) Sales Fraction	(A*B)	(C=A*B/DAF) MC Registration	(D) Annual Mileage Accrual Rate	(C*D)	(C*D/TFNORM) Travel Fractions
1988	0.044	1.000	0.044	0.0	0.	0.0	0.0
1987	0.145	1.000	0.145	0.167	4100.	685.7	0.356
1986	0.138	1.000	0.138	0.159	2800.	445.7	0.232
1985	0.116	1.000	0.116	0.134	2100.	281.0	0.146
1984	0.123	1.000	0.123	0.142	1600.	227.0	0.118
1983	0.114	1.000	0.114	0.131	1200.	157.8	0.082
1982	0.069	1.000	0.069	0.080	800.	63.7	0.033
1981	0.044	1.000	0.044	0.051	600.	30.4	0.016
1980	0.024	1.000	0.024	0.028	400.	11.1	0.006
1979	0.009	1.000	0.009	0.010	200.	2.1	0.001
1978	0.085	1.000	0.085	0.098	200.	19.6	0.010
1977	0.0	1.000	0.0	0.0	200.	0.0	0.0
1976	0.0	1.000	0.0	0.0	0.	0.0	0.0
1975	0.0	1.000	0.0	0.0	0.	0.0	0.0
1974	0.0	1.000	0.0	0.0	0.	0.0	0.0
1973	0.0	1.000	0.0	0.0	0.	0.0	0.0
1972	0.0	1.000	0.0	0.0	0.	0.0	0.0
1971	0.0	1.000	0.0	0.0	0.	0.0	0.0
1970	0.0	1.000	0.0	0.0	0.	0.0	0.0
1969-	0.0	1.000	0.0	0.0	0.	0.0	0.0
		DAF:	0.911		TFNORM:	1924.0	

WHERE :

A = January 1 registration mix from Table 1.8.4.
B = Fleet sales fractions
D = Sales weighted fleet mileage accumulation rate from Table 1.8.4, adjusted to January 1
D(1) = Annual Miles(1)
D(MYI) = .25*(Annual Miles(MYI)) + .75*(Annual Miles(MYI-1)), MYI=2,...,20+

DATE : MAY 25, 1985

TABLE 1.8.6

SPEED CORRECTION FACTOR COEFFICIENTS FOR LOW ALTITUDE MOTORCYCLES

$$* \; SCF(s,sadj) = SF(s)/SF(sadj)$$

$$SF(s) = EXP(A + B*s + C*s^2 + D*S^3 + E*s^4 + F*s^5), \text{ HC \& CO}$$
$$= A + B*s + C*s^2 + D*s^3 + E*s^4 + F*s^5, \text{ NOx}$$

Pollutant and Model Years	A	B	C	D	E	F
HC						
Pre-1978	0.231026E+01	-0.289572E+00	0.152990E-01	-0.446689E-03	0.648183E-05	-0.363456E-07
1978-1979	0.240873E+01	-0.308187E+00	0.168168E-01	-0.506843E-03	0.753855E-05	-0.431596E-07
1980+	0.225223E+01	-0.287778E+00	0.156820E-01	-0.473179E-03	0.707954E-05	-0.408456E-07
CO						
Pre-1978	0.233989E+01	-0 296978E+00	0.160071E-01	-0.477396E-03	0.706752E-05	-0.403978E-07
1978-1979	0.277804E+01	-0.319130E+00	0.153183E-01	-0.422327E-03	0.584948E-05	-0.314969E-07
1980+	0.270743E+01	-0.331038E+00	0.176179E-01	-0.538583E-03	0.817402E-05	-0.477803E-07
NOx						
Pre-1978	0.168635E+01	-0.118303E+00	0.654975E-02	-0.137139E-03	0.100849E-05	0.0
1978+	0.128169E+01	-0.804874E-01	0.535735E-02	-0.118891E-03	0.901060E-06	0.0

* WHERE : s = average speed (mph)
sadj = basic test procedure speed; adjusted for fraction of cold start operation x and fraction of hot start operation w, [1/sadj = (w+x)/26 + (1-w-x)/16]

DATE : MAY 25, 1985

TABLE 1.8.7A

TEMPERATURE CORRECTION FACTOR COEFFICIENTS FOR
LOW ALTITUDE
MOTORCYCLES

* TCF(b) = EXP(TC(b) * (T - 75.0))

Pol	Model Years	Test segment 1 TC Low	Test segment 1 TC High	Test segment 2 TC Low	Test segment 2 TC High	Test segment 3 TC Low	Test segment 3 TC High
HC	Pre-1978	-0.20623E-01	-0.14381E-01	-0.24032E-02	0.13219E-02	-0.10081E-02	0.34799E-02
	1978-1979	-0.24462E-01	-0.12552E-01	-0.32017E-02	0.42667E-02	-0.86884E-03	0.75843E-02
	1980+	-0.21255E-01	-0.10888E-01	-0.52755E-03	-0.47925E-03	0.93659E-03	0.76666E-02
CO	Pre-1978	-0.13487E-01	-0.14691E-01	0.15784E-02	0.37462E-02	0.11097E-02	0.11014E-01
	1978-1979	-0.21126E-01	-0.38767E-01	-0.15289E-02	0.84685E-02	0.15749E-02	0.25179E-01
	1980+	-0.20843E-01	-0.21165E-01	-0.59951E-02	0.23603E-01	0.18253E-02	0.28483E-01
NOx	Pre-1978	-0.16897E-03	0.38841E-02	-0.89245E-02	-0.87325E-02	-0.72580E-02	-0.10839E-01
	1978+	-0.25074E-03	-0.10389E-02	-0.59791E-02	-0.92466E-02	-0.62690E-02	-0.10108E-01

* WHERE :

TCF(b) = Temperature correction factor for appropriate pollutant, ambient temperature, and model year; for test segment b
T = Ambient temperature (Fahrenheit)
TC(b) = Temperature correction factor coefficient for appropriate pollutant, reference temperature and model year; for test segment b
75.0 = Reference temperature

NOTE : The temperature correction factor is used in conjunction with the Ripstwxn correction factor given in Table 1.8.7B.

DATE : MAY 25, 1985

TABLE 1.8.7B

NORMALIZED BAG FRACTIONS FOR
LOW ALTITUDE
MOTORCYCLES

Pol	Model Years	Normalized Fractions Test Seg.#1 B1	D1	Test Seg.#2 B2	D2	Test Seg.#3 B3	D3	Total Test B0	D0
HC	Pre-1978	1.282	0.025	0.973	0.028	0.839	0.019	1.000	0.025
	1978-1979	1.345	0.074	0.946	0.054	0.842	0.048	1.000	0.056
	1980+	1.345	0.178	0.919	0.118	0.894	0.093	1.000	0.124
CO	Pre-1978	1.277	0.033	1.017	0.029	0.758	0.025	1.000	0.029
	1978-1979	1.442	0.071	0.996	0.042	0.674	0.033	1.000	0.046
	1980+	1.553	0.109	0.933	0.079	0.711	0.038	1.000	0.074
NOx	Pre-1978	1.121	0.009	0.785	0.001	1.319	-0.009	1.000	0.0
	1978+	1.199	-0.004	0.793	-0.002	1.245	0.006	1.000	0.0

NOTE : The fractions given in this table are used in the calculation of the operating-mode/ temperature correction factor (OMTCF).

WHERE :

OMTCF = ((TERM1 + TERM2 + TERM3)/DENOM)
TERM1 = W *TCF(1)*(B1+D1*M)
TERM2 = (1-W-X)*TCF(2)*(B2+D2*M)
TERM3 = X *TCF(3)*(B3+D3*M)
DENOM = B0 + D0*M
W = Fraction of VMT in the cold start mode
X = Fraction of VMT in the hot start mode
TCF(b) = Temperature correction factor for pollutant, model year; for test segment b
M = Cumulative mileage / 10,000

DATE : MAY 25, 1985

TABLE 2.1.1A

EXHAUST EMISSION RATES FOR
HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED VEHICLES
(RATES REFLECT ZERO TAMPERING)

* BER = ZML + (DR * M)

Pol	Model Years	Zero Mile Emission Level (Grams/Mile)	Deterioration Rate (Gm/Mi/10K Mi)	50,000 Mile Emission Level (Grams/Mile)
HC	Pre-1968	9.35	0.18	10.25
	1968-1969	5.60	0.25	6.85
	1970-1971	4.58	0.37	6.43
	1972-1974	4.58	0.17	5.43
	1975-1976	2.02	0.27	3.37
	1977	0.95	0.27	2.30
	1978-1979	2.10	0.27	3.45
	1980	0.78	0.10	1.28
	1981	0.54	0.14	1.24
	1982	0.37	0.14	1.07
	1983	0.36	0.14	1.06
	1984	0.29	0.15	1.04
	1985-1989	0.29	0.14	0.99
	1990+	0.29	0.13	0.94
CO	Pre-1968	117.70	2.25	128.95
	1968-1969	85.54	2.55	98.29
	1970-1971	79.64	3.13	95.29
	1972-1974	75.63	2.44	87.83
	1975-1976	43.07	2.59	56.02
	1977	16.97	2.59	29.92
	1978-1979	39.78	2.59	52.73
	1980	22.80	0.73	26.45
	1981	11.43	3.26	27.73
	1982	7.18	3.29	23.63
	1983	5.01	3.33	21.66
	1984	3.18	3.55	20.93
	1985-1986	3.16	3.35	19.91
	1987-1989	3.02	3.13	18.67
	1990+	3.03	3.05	18.28
NOx	Pre-1968	1.96	0.0	1.96
	1968-1972	2.91	0.0	2.91
	1973-1974	1.91	0.04	2.11
	1975-1976	1.70	0.03	1.85
	1977	1.42	0.09	1.87
	1978-1979	1.00	0.09	1.45
	1980	0.82	0.07	1.17
	1981	0.46	0.08	0.86
	1982	0.60	0.08	1.00
	1983	0.56	0.08	0.96
	1984	0.54	0.09	0.99
	1985-1986	0.54	0.09	0.99
	1987-1989	0.54	0.10	1.04
	1990+	0.54	0.10	1.04

* WHERE : BER = Basic emission rate (untampered)
ZML = Zero mile level
DR = Deterioration rate
M = Cumulative mileage / 10,000

DATE : MAY 25, 1985

TABLE 2.1.1B

EXHAUST EMISSION RATES FOR
HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED VEHICLES
AT VARIOUS MILEAGE INTERVALS
(RATES INCLUDE TAMPERING)

Pol	Model Years	Emission Rate (Grams/Mile) 0K	20K	40K	60K	80K	100K	120K	140K
HC	Pre-1968	9.35	9.71	10.07	10.43	10.79	11.14	11.50	11.86
	1968-1969	5.60	6.11	6.61	7.12	7.63	8.14	8.65	9.16
	1970-1971	4.58	5.32	6.06	6.80	7.54	8.28	9.02	9.76
	1972	4.58	4.92	5.27	5.61	5.96	6.31	6.65	7.00
	1973-1974	4.58	4.93	5.29	5.65	6.01	6.37	6.73	7.09
	1975	2.05	2.69	3.38	4.08	4.77	5.47	6.16	6.86
	1976	2.05	2.70	3.39	4.09	4.79	5.49	6.19	6.89
	1977	0.98	1.62	2.32	3.01	3.71	4.41	5.10	5.80
	1978-1979	2.14	2.78	3.48	4.18	4.89	5.59	6.29	6.99
	1980	0.82	1.13	1.51	1.89	2.27	2.64	3.02	3.40
	1981	0.57	0.93	1.33	1.73	2.13	2.53	2.93	3.33
	1982	0.40	0.76	1.15	1.55	1.95	2.35	2.75	3.15
	1983	0.39	0.74	1.14	1.54	1.93	2.33	2.73	3.12
	1984	0.32	0.69	1.09	1.50	1.90	2.31	2.71	3.12
	1985-1986	0.32	0.66	1.05	1.43	1.81	2.19	2.58	2.96
	1987-1989	0.32	0.66	1.04	1.43	1.81	2.19	2.57	2.95
	1990+	0.32	0.64	1.00	1.36	1.73	2.09	2.45	2.81
CO	Pre-1968	117.68	122.12	126.56	131.00	135.45	139.89	144.34	148.79
	1968-1969	85.54	90.60	95.70	100.81	105.92	111.03	116.15	121.27
	1970-1971	79.65	85.95	92.29	98.62	104.96	111.30	117.64	123.98
	1972	75.64	80.62	85.69	90.76	95.83	100.89	105.95	111.02
	1973-1974	75.64	80.78	86.18	91.57	96.96	102.35	107.74	113.12
	1975	43.35	49.54	56.41	63.28	70.15	77 02	83.89	90.76
	1976	43.37	49.56	56.43	63.29	70.15	77.01	83.88	90.74
	1977	17.27	23.41	30.19	36 96	43.73	50.50	57.28	64.05
	1978-1979	40.10	46.27	53.08	59.89	66.70	73.51	80.32	87.13
	1980	23.18	25.78	29.14	32.51	35.89	39 26	42.63	46.01
	1981	11.64	18.99	26.92	34.86	42.79	50.72	58.66	66.59
	1982	7.39	14.75	22.67	30.58	38.49	46.40	54.31	62.22
	1983	5.22	12.63	20.57	28.50	36.44	44.37	52.31	60.24
	1984	3.37	11.15	19.42	27.69	35.96	44 22	52.49	60.76
	1985-1986	3.35	10.68	18.46	26.23	34.00	41.77	49.54	57.31
	1987-1989	3.21	10.08	17.37	24.65	31.94	39.23	46.51	53.80
	1990+	3.22	9.93	17.05	24.18	31.30	38.42	45.55	52.67
NOx	Pre-1968	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96
	1968-1972	2.91	2.91	2.91	2.91	2.90	2.90	2.90	2.90
	1973	1.91	2.03	2.15	2.28	2.40	2.52	2.64	2.77
	1974	1.91	2.04	2.17	2.29	2.42	2.55	2.68	2.80
	1975-1976	1.70	1.89	2.08	2.27	2.46	2.65	2.84	3.03
	1977	1.42	1.74	2.06	2.37	2.69	3.01	3.33	3.65
	1978-1979	1.00	1.32	1.64	1.95	2.27	2.59	2.91	3.23
	1980	0.82	1.11	1.39	1.68	1.97	2.26	2.55	2.84
	1981	0.47	0.72	1.00	1.28	1.56	1.84	2.12	2.40
	1982	0.61	0.86	1.14	1.42	1.70	1.98	2.26	2.54
	1983	0.57	0.82	1.10	1.38	1.66	1.94	2.22	2.50
	1984	0.55	0.83	1.15	1.47	1.79	2.11	2.43	2.75
	1985-1986	0.55	0.83	1.15	1.47	1.79	2.11	2.43	2.75
	1987-1989	0.55	0.85	1.19	1.53	1.87	2.21	2.54	2.88
	1990+	0.55	0.85	1.19	1.53	1.87	2.21	2.54	2.88

DATE : MAY 25, 1985

TABLE 2.1.1C

CRANKCASE AND EVAPORATIVE HYDROCARBON EMISSIONS
FOR HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED VEHICLES
(RATES REFLECT ZERO TAMPERING)

** CCEV = (HSK * TPD + DNL)/MPD + CC

Model Years	SHED Hot Soak Emissions (Gm/Trip)	Trips* Per Day	SHED Diurnal Emissions (Gm/Day)	Miles* Per Day	Crankcase Emissions (Gm/Mile)	Total Crankcase and Evap. Emissions (Gm/Mile)
Pre-1963	29.18	3.05	62.38	31.10	5.29	10.16
1963-1967	29.18	3.05	62.38	31.10	1.03	5.90
1968-1970	29.18	3.05	62.38	31.10	0.0	4.87
1971	20.99	3.05	50.15	31.10	0.0	3.67
1972-1976	20.96	3.05	44.93	31.10	0.0	3.50
1977	12.32	3.05	22.53	31.10	0.0	1.93
1978-1980	10.31	3.05	24.11	31.10	0.0	1.79
1981	9.71	3.05	24.11	31.10	0.0	1.73
1982	4.60	3.05	12.10	31.10	0.0	0.84
1983	4.30	3.05	12.10	31.10	0.0	0.81
1984	3.01	3.05	9.31	31.10	0.0	0.59
1985-1986	2.50	3.05	9.31	31.10	0.0	0.54
1987-1989	2.05	3.05	9.31	31.10	0.0	0.50
1990+	1.82	3.05	9.31	31.10	0.0	0.48

* Default information that may be altered by the MOBILE3 user with information about the local area.

** WHERE :

CCEV = Total untampered crankcase & evaporative HC emissions (Gm/Mile)
HSK = Hot soak emissions (Gm/Trip)
TPD = Trips per day
DNL = Diurnal emissions (Gm/Day)
MPD = Miles per day
CC = Crankcase emissions (Gm/Mile)

DATE : MAY 25, 1985

TABLE 2.1.1D

TOTAL CRANKCASE AND EVAPORATIVE HC EMISSIONS
FOR HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED VEHICLES
AT VARIOUS MILEAGE INTERVALS
(RATES INCLUDE TAMPERING)

Model Years	Emission Rate (Grams/Mile) 0K	20K	40K	60K	80K	100K	120K	140K
Pre-1963	10.16	10.16	10.16	10.16	10.16	10.16	10.16	10.16
1963-1967	5.90	5.90	5.90	5.90	5.90	5.90	5.90	5.90
1968-1970	4.87	4.89	4.91	4.92	4.94	4.96	4.98	5.00
1971	3.67	3.69	3.72	3.74	3.77	3.79	3.82	3.84
1972-1974	3.50	3.52	3.55	3.59	3.62	3.65	3.68	3.72
1975-1976	3.50	3.52	3.55	3.59	3.62	3.65	3.68	3.71
1977	1.93	1.95	1.99	2.02	2.05	2.08	2.11	2.15
1978-1979	1.79	1.81	1.83	1.86	1.89	1.91	1.94	1.97
1980	1.79	1.80	1.83	1.85	1.88	1.90	1.93	1.95
1981	1.73	1.74	1.77	1.79	1.81	1.84	1.86	1.89
1982	0.84	0.86	0.88	0.90	0.92	0.95	0.97	0.99
1983	0.81	0.83	0.85	0.87	0.89	0.91	0.93	0.95
1984	0.60	0.61	0.63	0.65	0.67	0.69	0.71	0.73
1985-1986	0.55	0.56	0.58	0.60	0.61	0.63	0.65	0.67
1987-1989	0.50	0.51	0.53	0.55	0.56	0.58	0.60	0.61
1990+	0.48	0.49	0.51	0.52	0.54	0.55	0.57	0.59

DATE : MAY 25, 1985

TABLE 2.1.2A

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED VEHICLES
TOTAL HC (INCLUDES EVAP & CRANKCASE)

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	22.3	1962	22.3	1963	18.0	1964	18.0	1965	18.0	1966	18.0	1967	18.0	1968	14.4	1969	14.4	1970	15.3	1971	14.1	1972	10.9
1962	22.2	1963	17.9	1964	17.9	1965	17.9	1966	17.9	1967	17.9	1968	14.3	1969	14.3	1970	15.1	1971	13.9	1972	10.8	1973	10.8
1963	17.8	1964	17.8	1965	17.8	1966	17.8	1967	17.8	1968	14.2	1969	14.2	1970	14.9	1971	13.7	1972	10.7	1973	10.7	1974	10.7
1964	17.8	1965	17.8	1966	17.8	1967	17.8	1968	14.1	1969	14.1	1970	14.7	1971	13.5	1972	10.6	1973	10.6	1974	10.6	1975	9.4
1965	17.7	1966	17 7	1967	17.7	1968	13.9	1969	13.9	1970	14.5	1971	13.3	1972	10.5	1973	10.5	1974	10.5	1975	9.3	1976	9 3
1966	17.5	1967	17.5	1968	13.8	1969	13 8	1970	14.3	1971	13.1	1972	10.4	1973	10.4	1974	10.4	1975	9.1	1976	9.1	1977	6.5
1967	17.4	1968	13 6	1969	13.6	1970	14 1	1971	12.9	1972	10.3	1973	10.3	1974	10.3	1975	9.0	1976	9.0	1977	6.3	1978	7.3
1968	13.5	1969	13.5	1970	13.8	1971	12.6	1972	10.2	1973	10 2	1974	10.2	1975	8.8	1976	8.8	1977	6.1	1978	7.1	1979	7.1
1969	13.3	1970	13 6	1971	12.4	1972	10.1	1973	10.1	1974	10.1	1975	8.6	1976	8.6	1977	5.9	1978	6.9	1979	6.9	1980	3.8
1970	13.3	1971	12.1	1972	10.0	1973	10.0	1974	10.0	1975	8.4	1976	8 4	1977	5.7	1978	6.7	1979	6.7	1980	3.7	1981	3.8
1971	11.8	1972	9.9	1973	9 9	1974	9.9	1975	8.2	1976	8.2	1977	5.5	1978	6.5	1979	6.5	1980	3.6	1981	3.7	1982	2.6
1972	9.7	1973	9 7	1974	9.7	1975	8 0	1976	8.0	1977	5.3	1978	6.3	1979	6 3	1980	3.6	1981	3.6	1982	2.5	1983	2.4
1973	9 6	1974	9.6	1975	7.7	1976	7.7	1977	5.1	1978	6.1	1979	6.1	1980	3.5	1981	3.5	1982	2.4	1983	2.3	1984	2.1
1974	9.4	1975	7.5	1976	7.5	1977	4.8	1978	5.8	1979	5 8	1980	3.4	1981	3.3	1982	2.2	1983	2.2	1984	2.0	1985	1.8
1975	7 2	1976	7 2	1977	4 6	1978	5.6	1979	5.6	1980	3.3	1981	3.2	1982	2.1	1983	2.1	1984	1.8	1985	1.7	1986	1.7
1976	6.9	1977	4 3	1978	5 3	1979	5.3	1980	3.2	1981	3.1	1982	2.0	1983	1 9	1984	1.6	1985	1.5	1986	1.5	1987	1.5
1977	4.0	1978	5.0	1979	5.0	1980	3 1	1981	2.9	1982	1.8	1983	1.8	1984	1.5	1985	1.4	1986	1.4	1987	1.3	1988	1.3
1978	4.7	1979	4 7	1980	3.0	1981	2.7	1982	1.6	1983	1.6	1984	1.3	1985	1.2	1986	1.2	1987	1.2	1988	1.2	1989	1.2
1979	4.3	1980	2.8	1981	2.6	1982	1 5	1983	1 4	1984	1.1	1985	1.1	1986	1.1	1987	1.0	1988	1.0	1989	1.0	1990	1.0
1980	2.8	1981	2.5	1982	1.4	1983	1.3	1984	1.0	1985	0.9	1986	0.9	1987	0.9	1988	0.9	1989	0.9	1990	0.9	1991	0.9

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	10.9	1974	10.9	1975	9.8	1976	9.8	1977	7.2	1978	8 2	1979	8.2	1980	4.3	1981	4.6	1982	3.5	1983	3.4	1984	3.3
1974	10.8	1975	9.7	1976	9.7	1977	7 1	1978	8.1	1979	8.1	1980	4.2	1981	4.5	1982	3.4	1983	3.3	1984	3.2	1985	3.0
1975	9.6	1976	9.6	1977	6 9	1978	7.9	1979	7.9	1980	4.2	1981	4.4	1982	3.3	1983	3.3	1984	3 1	1985	2.9	1986	2.9
1976	9.4	1977	6.8	1978	7.8	1979	7.8	1980	4.1	1981	4.3	1982	3.3	1983	3.2	1984	3.0	1985	2.8	1986	2.8	1987	2.8
1977	6.6	1978	7.6	1979	7.6	1980	4.1	1981	4 3	1982	3.2	1983	3.1	1984	3.0	1985	2.8	1986	2.8	1987	2.7	1988	2.7
1978	7.5	1979	7.5	1980	4.0	1981	4.2	1982	3.1	1983	3 0	1984	2.9	1985	2.7	1986	2.7	1987	2.6	1988	2.6	1989	2.6
1979	7.3	1980	3.9	1981	4.1	1982	3 0	1983	3 0	1984	2 8	1985	2.6	1986	2.6	1987	2.5	1988	2.5	1989	2.5	1990	2.4
1980	3.9	1981	4 0	1982	2.9	1983	2.9	1984	2.7	1985	2.5	1986	2.5	1987	2.5	1988	2.5	1989	2.5	1990	2.3	1991	2.3
1981	3 9	1982	2 8	1983	2 8	1984	2.6	1985	2.4	1986	2.4	1987	2.4	1988	2.4	1989	2.4	1990	2.2	1991	2.2	1992	2.2
1982	2.7	1983	2.7	1984	2 5	1985	2.3	1986	2 3	1987	2.3	1988	2.3	1989	2.3	1990	2.1	1991	2.1	1992	2.1	1993	2.1
1983	2.6	1984	2.3	1985	2.2	1986	2.2	1987	2.1	1988	2 1	1989	2.1	1990	2.0	1991	2.0	1992	2.0	1993	2.0	1994	2.0
1984	2.2	1985	2.1	1986	2.1	1987	2 0	1988	2.0	1989	2.0	1990	1.9	1991	1.9	1992	1.9	1993	1.9	1994	1.9	1995	1 9
1985	2.0	1986	2.0	1987	1.9	1988	1.9	1989	1.9	1990	1.8	1991	1.8	1992	1.8	1993	1.8	1994	1.8	1995	1.8	1996	1.8
1986	1.8	1987	1.8	1988	1.8	1989	1.8	1990	1.7	1991	1.7	1992	1.7	1993	1.7	1994	1.7	1995	1.7	1996	1.7	1997	1.7
1987	1.6	1988	1.6	1989	1.6	1990	1.6	1991	1.6	1992	1.6	1993	1.6	1994	1.6	1995	1.6	1996	1.6	1997	1.6	1998	1.6
1988	1.5	1989	1.5	1990	1.4	1991	1.4	1992	1.4	1993	1.4	1994	1.4	1995	1.4	1996	1.4	1997	1.4	1998	1.4	1999	1.4
1989	1.3	1990	1.3	1991	1.3	1992	1.3	1993	1.3	1994	1.3	1995	1.3	1996	1.3	1997	1.3	1998	1.3	1999	1.3	2000	1.3
1990	1.1	1991	1.1	1992	1.1	1993	1.1	1994	1.1	1995	1.1	1996	1.1	1997	1.1	1998	1.1	1999	1.1	2000	1.1	2001	1.1
1991	1.0	1992	1 0	1993	1.0	1994	1.0	1995	1.0	1996	1 0	1997	1.0	1998	1.0	1999	1.0	2000	1.0	2001	1.0	2002	1.0
1992	0.9	1993	0 9	1994	0.9	1995	0.9	1996	0.9	1997	0 9	1998	0.9	1999	0.9	2000	0.9	2001	0.9	2002	0.9	2003	0.9

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52 1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.1.4.

TABLE 2.1.2B

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED VEHICLES
CO

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	151.1	1962	151.1	1963	151.1	1964	151.1	1965	151.1	1966	151.1	1967	151.1	1968	123.6	1969	123.6	1970	126.5	1971	126.5	1972	112.1
1962	150.1	1963	150.1	1964	150.1	1965	150.1	1966	150.1	1967	150.1	1968	122.4	1969	122.4	1970	125.0	1971	125.0	1972	111.0	1973	111 0
1963	149.0	1964	149.0	1965	149.0	1966	149.0	1967	149.0	1968	121.2	1969	121.2	1970	123.5	1971	123.5	1972	109.8	1973	109.8	1974	109.8
1964	147.8	1965	147.8	1966	147.8	1967	147.8	1968	119.9	1969	119.9	1970	121.9	1971	121.9	1972	108.5	1973	108.5	1974	108.5	1975	78.1
1965	146.6	1966	146.6	1967	146.6	1968	118.5	1969	118.5	1970	120.2	1971	120.2	1972	107.2	1973	107.2	1974	107.2	1975	76.7	1976	76.7
1966	145.3	1967	145.3	1968	117.0	1969	117.0	1970	118.4	1971	118.4	1972	105.8	1973	105.8	1974	105.8	1975	75.2	1976	75.2	1977	49.2
1967	143.9	1968	115.4	1969	115.4	1970	116.4	1971	116.4	1972	104.3	1973	104.3	1974	104.3	1975	73.6	1976	73.6	1977	47.6	1978	70.3
1968	113.8	1969	113.8	1970	114.4	1971	114.4	1972	102 7	1973	102.7	1974	102.7	1975	71.9	1976	71.9	1977	45.9	1978	68.7	1979	68.7
1969	112.0	1970	112 2	1971	112.2	1972	101.0	1973	101.0	1974	101.0	1975	70.2	1976	70.2	1977	44.2	1978	66.9	1979	66.9	1980	30.4
1970	110.0	1971	110.0	1972	99.2	1973	99.2	1974	99.2	1975	68.3	1976	68.3	1977	42.3	1978	65.0	1979	65.0	1980	29.9	1981	43.3
1971	107.5	1972	97.3	1973	97.3	1974	97.3	1975	66.3	1976	66.3	1977	40.3	1978	63.0	1979	63.0	1980	29.3	1981	40.8	1982	36.8
1972	95.3	1973	95.3	1974	95.3	1975	64 1	1976	64 1	1977	38.2	1978	60.9	1979	60.9	1980	28.7	1981	38.1	1982	34.2	1983	32.3
1973	93.2	1974	93.2	1975	61.9	1976	61.9	1977	35.9	1978	58.6	1979	58.6	1980	28.1	1981	35.3	1982	31.3	1983	29.4	1984	29.2
1974	91.0	1975	59.5	1976	59.5	1977	33.5	1978	56.2	1979	56.2	1980	27.4	1981	32.3	1982	28.3	1983	26.4	1984	26.0	1985	24.7
1975	57.0	1976	57.0	1977	31.0	1978	53.7	1979	53.7	1980	26.7	1981	29.2	1982	25.1	1983	23.1	1984	22.5	1985	21.4	1986	21.4
1976	54.3	1977	28.4	1978	51.1	1979	51.1	1980	25.9	1981	25.8	1982	21.7	1983	19.7	1984	18.9	1985	18.0	1986	18.0	1987	16.9
1977	25.5	1978	48.2	1979	48.2	1980	25.1	1981	22.2	1982	18.1	1983	16.1	1984	15.0	1985	14.3	1986	14.3	1987	13.4	1988	13.4
1978	45.2	1979	45.2	1980	24.3	1981	18.5	1982	14 3	1983	12.2	1984	10.9	1985	10.4	1986	10.4	1987	9.8	1988	9.8	1989	9.8
1979	42.1	1980	23.4	1981	14.5	1982	10.3	1983	8 2	1984	6.6	1985	6.3	1986	6.3	1987	6.0	1988	6.0	1989	6.0	1990	5 9
1980	22 8	1981	11.9	1982	7.7	1983	5.5	1984	3.7	1985	3.7	1986	3.7	1987	3.5	1988	3.5	1989	3.5	1990	3.5	1991	3.5

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	112.1	1974	112.1	1975	81.9	1976	81.9	1977	55 9	1978	78.6	1979	78.6	1980	33.7	1981	60.5	1982	56.7	1983	55.2	1984	56.7
1974	111.0	1975	80.7	1976	80.7	1977	54.7	1978	77.5	1979	77.5	1980	33.4	1981	59.0	1982	55.2	1983	53.6	1984	55.0	1985	52.1
1975	79.5	1976	79.5	1977	53.5	1978	76.2	1979	76.2	1980	33.0	1981	57.4	1982	53.6	1983	52.0	1984	53.3	1985	50.5	1986	50.5
1976	78.1	1977	52.1	1978	74.9	1979	74.9	1980	32 6	1981	55.7	1982	51.9	1983	50.3	1984	51.5	1985	48.7	1986	48.7	1987	45.6
1977	50.7	1978	73.4	1979	73.4	1980	32.2	1981	54.0	1982	50.1	1983	48.5	1984	49.5	1985	46.9	1986	46.9	1987	43.9	1988	43.9
1978	71.9	1979	71.9	1980	31.8	1981	52.1	1982	48.2	1983	46 6	1984	47.5	1985	45.0	1986	45.0	1987	42.1	1988	42.1	1989	42.1
1979	70.3	1980	31.4	1981	50.1	1982	46.2	1983	44.5	1984	45 3	1985	42.9	1986	42.9	1987	40.2	1988	40.2	1989	40.2	1990	39.2
1980	30.9	1981	47.9	1982	44.1	1983	42.3	1984	43.0	1985	40.7	1986	40.7	1987	38.1	1988	38.1	1989	38.1	1990	37.2	1991	37.2
1981	45.7	1982	41.8	1983	40 0	1984	40.5	1985	38 4	1986	38.4	1987	36.0	1988	36.0	1989	36.0	1990	35.1	1991	35.1	1992	35.1
1982	39.4	1983	37.6	1984	38.0	1985	36.0	1986	36.0	1987	33.7	1988	33.7	1989	33.7	1990	32.9	1991	32.9	1992	32.9	1993	32.9
1983	35.0	1984	35.2	1985	33.4	1986	33.4	1987	31 3	1988	31.3	1989	31.3	1990	30.5	1991	30.5	1992	30.5	1993	30.5	1994	30.5
1984	32.3	1985	30.6	1986	30.6	1987	28.7	1988	28.7	1989	28.7	1990	28.1	1991	28.1	1992	28.1	1993	28.1	1994	28.1	1995	28.1
1985	27.7	1986	27.7	1987	26.0	1988	26.0	1989	26.0	1990	25.4	1991	25.4	1992	25.4	1993	25.4	1994	25.4	1995	25.4	1996	25.4
1986	24.7	1987	23.1	1988	23.1	1989	23.1	1990	22.6	1991	22.6	1992	22.6	1993	22.6	1994	22.6	1995	22.6	1996	22.6	1997	22.6
1987	20.1	1988	20.1	1989	20.1	1990	19.6	1991	19.6	1992	19.6	1993	19.6	1994	19.6	1995	19.6	1996	19.6	1997	19.6	1998	19.6
1988	16.9	1989	16.9	1990	16.5	1991	16.5	1992	16.5	1993	16.5	1994	16.5	1995	16.5	1996	16.5	1997	16.5	1998	16.5	1999	16.5
1989	13.4	1990	13.2	1991	13.2	1992	13.2	1993	13.2	1994	13.2	1995	13.2	1996	13.2	1997	13.2	1998	13.2	1999	13.2	2000	13.2
1990	9.7	1991	9.7	1992	9.7	1993	9.7	1994	9.7	1995	9.7	1996	9.7	1997	9.7	1998	9.7	1999	9.7	2000	9.7	2001	9.7
1991	5.9	1992	5.9	1993	5.9	1994	5.9	1995	5.9	1996	5.9	1997	5.9	1998	5.9	1999	5.9	2000	5.9	2001	5.9	2002	5.9
1992	3.5	1993	3.5	1994	3.5	1995	3.5	1996	3.5	1997	3.5	1998	3.5	1999	3.5	2000	3.5	2001	3	2002	3.5	2003	3.5

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.1.4.

TABLE 2.1.2C

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED VEHICLES
NOx

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	2.0	1962	2.0	1963	2.0	1964	2.0	1965	2.0	1966	2.0	1967	2.0	1968	2.9	1969	2.9	1970	2.9	1971	2.9	1972	2.9
1962	2.0	1963	2.0	1964	2.0	1965	2.0	1966	2.0	1967	2 0	1968	2.9	1969	2.9	1970	2.9	1971	2.9	1972	2.9	1973	2.5
1963	2.0	1964	2.0	1965	2.0	1966	2.0	1967	2.0	1968	2.9	1969	2.9	1970	2.9	1971	2.9	1972	2.9	1973	2.5	1974	2.5
1964	2.0	1965	2.0	1966	2.0	1967	2.0	1968	2.9	1969	2.9	1970	2.9	1971	2.9	1972	2.9	1973	2.4	1974	2.4	1975	2.1
1965	2.0	1966	2.0	1967	2.0	1968	2.9	1969	2.9	1970	2.9	1971	2.9	1972	2.9	1973	2.4	1974	2.4	1975	2.1	1976	2.1
1966	2.0	1967	2.0	1968	2.9	1969	2.9	1970	2.9	1971	2.9	1972	2.9	1973	2.4	1974	2.4	1975	2.1	1976	2.1	1977	2.5
1967	2.0	1968	2.9	1969	2.9	1970	2.9	1971	2.9	1972	2.9	1973	2.4	1974	2.4	1975	2.1	1976	2.1	1977	2.5	1978	2.1
1968	2.9	1969	2.9	1970	2.9	1971	2.9	1972	2.9	1973	2.4	1974	2.4	1975	2.0	1976	2.0	1977	2.4	1978	2.0	1979	2.0
1969	2.9	1970	2.9	1971	2.9	1972	2.9	1973	2.3	1974	2.3	1975	2.0	1976	2.0	1977	2.4	1978	1.9	1979	1.9	1980	1.6
1970	2.9	1971	2.9	1972	2.9	1973	2.3	1974	2.3	1975	2.0	1976	2.0	1977	2.3	1978	1.9	1979	1.9	1980	1.5	1981	1.2
1971	2.9	1972	2.9	1973	2.3	1974	2.3	1975	2.0	1976	2.0	1977	2.2	1978	1.8	1979	1.8	1980	1.4	1981	1.2	1982	1.3
1972	2.9	1973	2.2	1974	2.2	1975	1 9	1976	1.9	1977	2.2	1978	1.7	1979	1.7	1980	1.4	1981	1.1	1982	1.3	1983	1.2
1973	2.2	1974	2.2	1975	1.9	1976	1.9	1977	2.1	1978	1.7	1979	1.7	1980	1.3	1981	1.0	1982	1.2	1983	1.1	1984	1.2
1974	2.2	1975	1.9	1976	1.9	1977	2.0	1978	1.6	1979	1.6	1980	1.3	1981	1.0	1982	1.1	1983	1.1	1984	1.1	1985	1.1
1975	1.9	1976	1.9	1977	1.9	1978	1 5	1979	1.5	1980	1.2	1981	0.9	1982	1.0	1983	1.0	1984	1.0	1985	1.0	1986	1.0
1976	1.8	1977	1.8	1978	1.4	1979	1.4	1980	1.1	1981	0.8	1982	1.0	1983	0.9	1984	0.9	1985	0.9	1986	0.9	1987	1.0
1977	1.7	1978	1.3	1979	1.3	1980	1.1	1981	0.7	1982	0.9	1983	0.8	1984	0.8	1985	0.8	1986	0.8	1987	0.9	1988	0.9
1978	1.2	1979	1.2	1980	1.0	1981	0.6	1982	0.8	1983	0.7	1984	0.7	1985	0.7	1986	0.7	1987	0.8	1988	0.8	1989	0.8
1979	1.1	1980	0.9	1981	0.5	1982	0.7	1983	0.6	1984	0.6	1985	0.6	1986	0.6	1987	0.6	1988	0.6	1989	0.6	1990	0.6
1980	0.8	1981	0.5	1982	0.6	1983	0 6	1984	0.6	1985	0.6	1986	0.6	1987	0.6	1988	0.6	1989	0.6	1990	0.6	1991	0.6

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	2.5	1974	2.5	1975	2.1	1976	2.1	1977	2.8	1978	2.4	1979	2.4	1980	1.9	1981	1.7	1982	1.8	1983	1.8	1984	1.9
1974	2.5	1975	2.1	1976	2.1	1977	2.7	1978	2.3	1979	2.3	1980	1.8	1981	1.6	1982	1.8	1983	1.7	1984	1.9	1985	1.9
1975	2.1	1976	2.1	1977	2.7	1978	2.3	1979	2.3	1980	1.8	1981	1.6	1982	1.7	1983	1.7	1984	1.8	1985	1.8	1986	1.8
1976	2.1	1977	2.6	1978	2 2	1979	2.2	1980	1.8	1981	1.5	1982	1.7	1983	1.6	1984	1.8	1985	1.8	1986	1.8	1987	1.9
1977	2.6	1978	2.2	1979	2.2	1980	1 7	1981	1.5	1982	1.6	1983	1.6	1984	1.7	1985	1.7	1986	1.7	1987	1.8	1988	1.8
1978	2.1	1979	2.1	1980	1.7	1981	1.5	1982	1.6	1983	1 6	1984	1.7	1985	1.7	1986	1.7	1987	1.8	1988	1.8	1989	1.8
1979	2.1	1980	1.6	1981	1.4	1982	1.5	1983	1.5	1984	1 6	1985	1.6	1986	1.6	1987	1.7	1988	1.7	1989	1.7	1990	1.7
1980	1.6	1981	1.4	1982	1.5	1983	1 5	1984	1.5	1985	1.5	1986	1.5	1987	1.7	1988	1.7	1989	1.7	1990	1.7	1991	1.7
1981	1.3	1982	1.4	1983	1.4	1984	1.5	1985	1.5	1986	1.5	1987	1.6	1988	1.6	1989	1.6	1990	1.6	1991	1.6	1992	1 6
1982	1.4	1983	1.3	1984	1.4	1985	1.4	1986	1.4	1987	1.5	1988	1.5	1989	1.5	1990	1.5	1991	1.5	1992	1.5	1993	1.5
1983	1.3	1984	1 4	1985	1.4	1986	1.4	1987	1.4	1988	1.4	1989	1.4	1990	1.4	1991	1.4	1992	1.4	1993	1.4	1994	1.4
1984	1.3	1985	1.3	1986	1.3	1987	1.4	1988	1.4	1989	1.4	1990	1.4	1991	1.4	1992	1.4	1993	1.4	1994	1.4	1995	1.4
1985	1.2	1986	1.2	1987	1.3	1988	1.3	1989	1.3	1990	1.3	1991	1.3	1992	1.3	1993	1.3	1994	1.3	1995	1.3	1996	1.3
1986	1.1	1987	1.2	1988	1.2	1989	1.2	1990	1.2	1991	1.2	1992	1.2	1993	1.2	1994	1.2	1995	1.2	1996	1.2	1997	1.2
1987	1.1	1988	1.1	1989	1.1	1990	1.1	1991	1.1	1992	1.1	1993	1.1	1994	1.1	1995	1.1	1996	1.1	1997	1.1	1998	1.1
1988	1.0	1989	1.0	1990	1.0	1991	1.0	1992	1.0	1993	1.0	1994	1.0	1995	1.0	1996	1.0	1997	1.0	1998	1.0	1999	1.0
1989	0.9	1990	0.9	1991	0.9	1992	0.9	1993	0.9	1994	0.9	1995	0.9	1996	0.9	1997	0.9	1998	0.9	1999	0.9	2000	0.9
1990	0.8	1991	0.8	1992	0.8	1993	0.8	1994	0.8	1995	0.8	1996	0.8	1997	0.8	1998	0.8	1999	0.8	2000	0.8	2001	0.8
1991	0.6	1992	0.6	1993	0.6	1994	0.6	1995	0.6	1996	0.6	1997	0.6	1998	0.6	1999	0.6	2000	0.6	2001	0.6	2002	0.6
1992	0.6	1993	0.6	1994	0.6	1995	0.6	1996	0.6	1997	0.6	1998	0.6	1999	0.6	2000	0.6	2001	0.6	2002	0.6	2003	0.6

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.1.4.

TABLE 2.1.3

IDLE EMISSION RATES FOR
HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED VEHICLES

* IER = ZML + (DR * M)

Pol	Model Years	Zero Mile Emission Level (Grams/Min.)	Deterioration Rate (Gm/Min/10K Mi)
HC	Pre-1968	1.63	0.03
	1968-1969	0.76	0.06
	1970-1971	0.71	0.07
	1972-1974	0.74	0.04
	1975-1976	0.27	0.07
	1977	0.12	0.03
	1978-1979	0.24	0.03
	1980	0.05	0.03
	1981	0.07	0.03
	1982	0.06	0.03
	1983	0.06	0.03
	1984	0.06	0.03
	1985-1989	0.05	0.03
	1990+	0.05	0.03
CO	Pre-1968	15.98	0.40
	1968-1969	11.24	0.63
	1970-1971	12.93	0.88
	1972-1974	13.99	0.76
	1975-1976	7.42	0.85
	1977	2.87	0.42
	1978-1979	5.79	0.42
	1980	2.68	0.42
	1981	1.74	0.61
	1982	1.46	0.61
	1983	1.44	0.61
	1984	1.06	0.62
	1985-1986	1.06	0 62
	1987-1989	1 06	0.62
	1990+	1.06	0.62
NOx	Pre-1968	0.11	0.0
	1968-1972	0.09	0.0
	1973-1974	0.07	0.0
	1975-1976	0.07	0.0
	1977	0.06	0.0
	1978-1979	0 04	0.0
	1980	0.04	0.0
	1981	0.03	0 01
	1982	0.03	0.01
	1983	0.03	0.01
	1984	0.03	0.01
	1985-1986	0.03	0.01
	1987-1989	0.03	0.01
	1990+	0.03	0.01

* WHERE : IER = Idle emission rate
ZML = Zero mile level
DR = Deterioration Rate
M = Cumulative Mileage / 10,000

DATE : MAY 25, 1985

TABLE 2.1.4

REGISTRATION MIX AND
MILEAGE ACCUMULATION RATES FOR
HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED VEHICLES

Model Year Index**	July 1 Registration Mix*	Mileage Accumulation Rate per vehicle*	Jan 1 Registration Mix	Jan 1 Mileage Accumulation Rate (fleet)	Jan 1 Mileage Accumulation (fleet)
1	0.080	12818.	0.027	12818.	1602.
2	0.101	12102.	0.101	12639.	9591.
3	0.095	11427.	0.095	11933.	21873.
4	0.089	10789.	0.089	11267.	33470.
5	0.083	10187.	0.083	10638.	44420.
6	0.077	9619.	0.077	10045.	54758.
7	0.071	9082.	0.071	9485.	64520.
8	0.065	8575.	0.065	8955.	73738.
9	0.059	8096.	0.059	8455.	82440.
10	0.053	7645.	0.053	7983.	90657.
11	0.047	7218.	0.047	7538.	98415.
12	0.041	6815.	0.041	7117.	105740.
13	0.035	6435.	0.035	6720.	112657.
14	0.029	6076.	0.029	6345.	119187.
15	0.023	5737.	0.023	5991.	125354.
16	0.017	5416.	0.017	5657.	131176.
17	0.011	5114.	0.011	5340.	136673.
18	0.008	4829.	0.008	5043.	141863.
19	0.006	4559.	0.006	4761.	146763.
20+	0.008	4305.	0.008	4495.	151390.

* Default information that may be altered by the MOBILE3 user with information about the local area.

** The indices refer to the most recent model year vehicles in any given calendar year. Index 1 references the newest model year vehicles and index 20+ references the oldest model year vehicles.

DATE : MAY 25, 1985

TABLE 2.1.5

EXAMPLE TRAVEL WEIGHTING FRACTION CALCULATION FOR
HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED VEHICLES
JANUARY 1, 1988

Model Years	(A) LDV Fleet Registration	(B) Sales Fraction	(A*B)	(C=A*B/DAF) LDGV Registration	(D) Annual Mileage Accrual Rate	(C*D)	(C*D/TFNORM) Travel Fractions
1988	0.027	0.910	0.024	0.027	12818.	345.4	0.036
1987	0.101	0.920	0.093	0.103	12639.	1304.3	0.137
1986	0.095	0.923	0.088	0.097	11933.	1162.1	0.122
1985	0.089	0.934	0.083	0.092	11267.	1040.2	0.109
1984	0.083	0.940	0.078	0.087	10638.	921.8	0.097
1983	0.077	0.947	0.073	0.081	10045.	813.5	0.085
1982	0.071	0.954	0.068	0.075	9485.	713.5	0.075
1981	0.065	0.939	0.061	0.068	8955.	607.0	0.064
1980	0.059	0.966	0.057	0.063	8455.	535.2	0.056
1979	0.053	0.972	0.052	0.057	7983.	456.7	0.048
1978	0.047	0.991	0.047	0.052	7538.	389.9	0.041
1977	0.041	0.996	0.041	0.045	7117.	322.8	0.034
1976	0.035	0.997	0.035	0.039	6720.	260.4	0.027
1975	0.029	0.997	0.029	0.032	6345.	203.7	0.021
1974	0.023	1.000	0.023	0.026	5991.	153.0	0.016
1973	0.017	1.000	0.017	0.019	5657.	106.8	0.011
1972	0.011	1.000	0.011	0.012	5340.	65.2	0.007
1971	0.008	1.000	0.008	0.009	5043.	44.8	0.005
1970	0.006	1.000	0.006	0.007	4761.	31.7	0.003
1969-	0.008	1.000	0.008	0.009	4495.	39.9	0.004
		DAF:	0.902		TFNORM:	9518.0	

WHERE :

A = January 1 registration mix from Table 2.1.4.
B = Fleet sales fractions
D = Sales weighted fleet mileage accumulation rate from Table 2.1.4, adjusted to January 1
D(1) = Annual Miles(1)
D(MYI) = .25*(Annual Miles(MYI)) + .75*(Annual Miles(MYI-1)), MYI=2,...,20+

NOTE : In general, the travel weighting fractions will change for every calendar year since the sales fraction (column B) changes for almost every model year.

DATE : MAY 25, 1985

TABLE 2.1.6

SPEED CORRECTION FACTOR COEFFICIENTS FOR HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED VEHICLES

* SCF(s,sadj) = SF(s)/SF(sadj)

$$SF(s) = EXP(A + B*s + C*s^2 + D*S^3 + E*s^4 + F*s^5),\ HC\ \&\ CO$$
$$= A + B*s + C*s^2 + D*s^3 + E*s^4 + F*s^5\ ,\ NOx$$

Pollutant and Model Years	A	B	C	D	E	F
HC						
Pre-1968	0.224612E+01	-0.290973E+00	0.158890E-01	-0.472494E-03	0.694077E-05	-0.392798E-07
1968	0.202779E+01	-0.273049E+00	0 153577E-01	-0.460304E-03	0.678527E-05	-0.384880E-07
1969	0.215056E+01	-0.283620E+00	0.153836E-01	-0.442136E-03	0.628732E-05	-0.346311E-07
1970	0.223021E+01	-0.293648E+00	0.162356E-01	-0.484148E-03	0.711591E-05	-0.402861E-07
1971	0 212230E+01	-0.291072E+00	0 169089E-01	-0.526148E-03	0.802705E-05	-0.470117E-07
1972	0.215361E+01	-0 283451E+00	0.156948E-01	-0.469759E-03	0.693832E-05	-0.394707E-07
1973-1974	0.211340E+01	-0.285676E+00	0 163180E-01	-0.500793E-03	0.755067E-05	-0.437187E-07
1975+	0.239540E+01	-0.335781E+00	0.211609E-01	-0.731550E-03	0.120715E-04	-0.748566E-07
CO						
Pre-1968	0.181978E+01	-0.254663E+00	0.152347E-01	-0.487397E-03	0.758207E-05	-0.449514E-07
1968	0.186919E+01	-0.276679E+00	0.172335E-01	-0.558279E-03	0.871678E-05	-0.516980E-07
1969	0.182133E+01	-0 272054E+00	0.170304E-01	-0.552021E-03	0.862543E-05	-0.511440E-07
1970	0.201421E+01	-0.295188E+00	0 186353E-01	-0.621606E-03	0.993657E-05	-0.599779E-07
1971	0.204533E+01	-0.310618E+00	0.204852E-01	-0.708527E-03	0.116215E-04	-0.715690E-07
1972	0.231868E+01	-0.341147E+00	0.209446E-01	-0.665891E-03	0.102225E-04	-0.598264E-07
1973-1974	0.215487E+01	-0.329116E+00	0.210112E-01	-0.689057E-03	0.108390E-04	-0.647125E-07
1975+	0.248747E+01	-0.391562E+00	0.270721E-01	-0.976178E-03	0.165270E-04	-0.104317E-06
NOx						
Pre-1968	0.244424E+01	-0.250107E+00	0.138293E-01	-0.287025E-03	0.207585E-05	0.0
1968	0.188656E+01	-0.161289E+00	0 904995E-02	-0.185609E-03	0.132555E-05	0.0
1969	0.155777E+01	-0.113032E+00	0 671832E-02	-0.143409E-03	0.106079E-05	0.0
1970	0.204516E+01	-0.194014E+00	0.110736E-01	-0.231754E-03	0.168072E-05	0.0
1971	0.163262E+01	-0.121861E+00	0.703020E-02	-0.146293E-03	0.106141E-05	0.0
1972	0.144825E+01	-0.122444E+00	0.795024E-02	-0.171078E-03	0.125777E-05	0.0
1973-1974	0.153447E+01	-0.125671E+00	0.785919E-02	-0.169428E-03	0.125494E-05	0.0
1975+	0.942131E+00	-0.423240E-01	0.386253E-02	-0.939853E-04	0.753883E-06	0.0

* WHERE : s = average speed (mph)
sadj = basic test procedure speed; adjusted for fraction of cold start operation x and fraction of hot start operation w, [1/sadj = (w+x)/26 + (1-w-x)/16]

DATE : MAY 25, 1985

TABLE 2.1.7A

TEMPERATURE CORRECTION FACTOR COEFFICIENTS FOR
HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED VEHICLES

* TCF(b) = EXP(TC(b) * (T - 75.0))

Pol	Model Years	Test segment 1 TC Low	Test segment 1 TC High	Test segment 2 TC Low	Test segment 2 TC High	Test segment 3 TC Low	Test segment 3 TC High
HC	Pre-1968	-0.20623E-01	-0.14381E-01	-0.24032E-02	0.13219E-02	-0.10081E-02	0.34799E-02
	1968-1969	-0.24462E-01	-0.12552E-01	-0.32017E-02	0.42667E-02	-0.86884E-03	0.75843E-02
	1970-1971	-0.21255E-01	-0.10888E-01	-0.52755E-03	-0.47925E-03	0.93659E-03	0.76666E-02
	1972-1974	-0.21427E-01	-0.66107E-02	-0.39442E-03	0.26288E-02	0.49731E-02	0.12320E-01
	1975-1979	-0.23517E-01	-0.14095E-01	-0 88057E-02	0.26179E-01	-0.16222E-02	0.24297E-01
	1980	-0.27793E-01	-0.14095E-01	-0.10177E-01	0 26179E-01	-0.82680E-02	0.24297E-01
	1981+	-0.33883E-01	0.11959E-01	-0.10113E-01	-0.12627E-04	-0.80650E-02	0.78765E-02
CO	Pre-1968	-0.13487E-01	-0.14691E-01	0.15784E-02	0.37462E-02	0.11097E-02	0.11014E-01
	1968-1969	-0.21126E-01	-0.38767E-01	-0.15289E-02	0.84685E-02	0.15749E-02	0.25179E-01
	1970-1971	-0.20843E-01	-0.21165E-01	-0.59951E-02	0.23603E-01	0.18253E-02	0.28483E-01
	1972-1974	-0.19091E-01	-0.13146E-01	-0.42373E-03	0.24717E-01	0.57982E-02	0.25848E-01
	1975-1979	-0.24835E-01	-0.19612E-01	-0.88336E-02	0.48537E-01	-0.11553E-02	0.31439E-01
	1980	see NOTE 2	-0.19612E-01	-0.17783E-01	0.48537E-01	-0.10871E-01	0.31439E-01
	1981+	see NOTE 2	-0.12596E-01	-0.18813E-01	0.13861E-01	-0.11951E-01	0.96939E-02
NOx	Pre-1968	-0.16897E-03	0.38841E-02	-0.89245E-02	-0.87325E-02	-0.72580E-02	-0.10839E-01
	1968-1972	-0.25074E-03	-0.10389E-02	-0 59791E-02	-0.92466E-02	-0.62690E-02	-0.10108E-01
	1973-1974	0.38855E-02	-0.18301E-01	-0.24156E-02	-0.10925E-01	-0.21188E-02	-0.18042E-01
	1975-1976	-0.45504E-04	-0 71420E-02	-0 12575E-02	-0.87910E-02	-0.53153E-03	-0.75470E-02
	1977-1979	-0.76044E-02	-0.26153E-01	-0 68045E-02	-0.18603E-01	-0.54198E-02	-0.20878E-01
	1980	-0.30110E-02	-0.26153E-01	-0.67130E-02	-0.18603E-01	-0.45310E-02	-0.20878E-01
	1981+	-0.53710E-02	-0.34416E-01	-0.65050E-02	-0.35871E-01	-0.85650E-02	-0.28830E-01

* WHERE :

TCF(b) = Temperature correction factor for appropriate pollutant, ambient temperature, and model year; for test segment b
T = Ambient temperature (Fahrenheit)
TC(b) = Temperature correction factor coefficient for appropriate pollutant, reference temperature and model year; for test segment b
75.0 = Reference temperature

NOTE 1 : The temperature correction factor is used in conjunction with the Ripstwxn correction factor given in Table 2.1.7B.

NOTE 2 : Offset model used for Bag 1 CO. Offset = -1.3812*(T - 75.0).

DATE : MAY 25, 1985

TABLE 2 1.7B

NORMALIZED BAG FRACTIONS FOR
HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED VEHICLES

		Normalized Fractions							
Pol	Model Years	Test Seg.#1 B1	D1	Test Seg.#2 B2	D2	Test Seg.#3 B3	D3	Total Test B0	D0
HC	Pre-1968	1.282	0.025	0.973	0.028	0.839	0.019	1.000	0.025
	1968-1969	1.345	0.074	0.946	0.054	0.842	0.048	1.000	0.056
	1970-1971	1.345	0.178	0.919	0.118	0.894	0.093	1.000	0.124
	1972-1974	1.398	0.060	0.885	0.055	0.919	0.036	1.000	0.051
	1975-1979	1.856	0.345	0.765	0.233	0 802	0.196	1.000	0.246
	1980	2.200	0.714	0.571	0.171	0.914	0.143	1.000	0.274
	1981	2.654	0.960	0.383	0.375	0.929	0.310	1.000	0.478
	1982	2.609	1.101	0.387	0.435	0.957	0.365	1.000	0.553
	1983	2.613	1.097	0.384	0 443	0.958	0.367	1.000	0.557
	1984	2.603	1.285	0.372	0.529	0.989	0.417	1.000	0.654
	1985-1986	2.617	1.173	0.371	0.510	0.981	0.404	1.000	0.618
	1987-1989	2.634	1.104	0.368	0 499	0.973	0.391	1.000	0.594
	1990+	2.639	1 051	0.368	0.489	0.969	0.385	1.000	0.577
CO	Pre-1968	1.277	0.033	1.017	0.029	0.758	0.025	1.000	0.029
	1968-1969	1.442	0.071	0.996	0.042	0.674	0.033	1.000	0.046
	1970-1971	1.553	0.109	0.933	0.079	0.711	0.038	1.000	0.074
	1972-1974	1.573	0.054	0.902	0.079	0.755	0.029	1.000	0.060
	1975-1979	1.792	0.177	0.882	0.157	0.628	0.109	1.000	0.148
	1980	2.403	0.278	0.649	0.061	0.621	0.076	1.000	0.110
	1981	3.724	1.325	0.0	0.792	0.853	0.659	1.000	0.865
	1982	3.854	2.041	0.0	1.152	0.755	1.010	1.000	1.296
	1983	3.865	2.030	0.0	1.153	0.746	1.007	1.000	1.294
	1984	3.959	2.285	0.0	1.351	0.675	1.163	1.000	1.492
	1985-1986	3.946	2 124	0.0	1.254	0.686	1.081	1.000	1.386
	1987-1989	3.941	2.009	0.0	1.186	0.689	1.014	1.000	1.308
	1990+	3.935	1.940	0.0	1.144	0.694	0.979	1.000	1.263
NOx	Pre-1968	1.121	0.009	0.785	0.001	1.319	-0.009	1.000	0.0
	1968-1972	1.199	-0 004	0.793	-0.002	1.245	0.006	1.000	0.0
	1973-1974	1.262	0.022	0.770	0.004	1.242	0.027	1.000	0.014
	1975-1976	1.297	0 012	0 781	0.004	1.194	0.016	1.000	0.009
	1977-1979	1.371	0.040	0 766	0.046	1.166	0.063	1.000	0.049
	1980	1 313	0.047	0 810	0.034	1.125	0.054	1.000	0.042
	1981	1.752	0.129	0.737	0.123	0.935	0.173	1.000	0.138
	1982	1.652	0 121	0.768	0.115	0.951	0.162	1.000	0.129
	1983	1.725	0.137	0.728	0.129	0.973	0.183	1.000	0.145
	1984	1 817	0.167	0.707	0.148	0.942	0.219	1.000	0.172
	1985-1986	1.818	0.167	0.707	0.148	0.942	0.219	1.000	0.172
	1987-1989	1.830	0.169	0.703	0.149	0.939	0.222	1.000	0.173
	1990+	1.830	0.169	0.704	0.149	0.939	0.222	1 000	0.173

NOTE : The fractions given in this table are used in the calculation of the operating-mode/ temperature correction factor (OMTCF).

WHERE :

```
OMTCF   = ((TERM1 + TERM2 + TERM3)/DENOM)
TERM1   =    W   *TCF(1)*(B1+D1*M)
TERM2   = (1-W-X)*TCF(2)*(B2+D2*M)
TERM3   =    X   *TCF(3)*(B3+D3*M)
DENOM   = BO + DO*M
 W      = Fraction of VMT in the cold start mode
 X      = Fraction of VMT in the  hot start mode
TCF(b)  = Temperature correction factor for pollutant, model
          year; for test segment b
 M      = Cumulative mileage / 10,000
```

DATE : MAY 25, 1985

TABLE 2.1.8A

AIR CONDITIONING CORRECTION FACTOR COEFFICIENTS FOR
HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED VEHICLES

* ACCF= U*V*(A + B*(T-75) -1) + 1

Model Years	HC A	HC B	CO A	CO B	NOx A	NOx B
Pre-1975	0.1023E+01	0.3344E-02	0.1202E+01	0.1808E-02	0.1299E+01	0.5643E-04
1975+	0.1000E+01	0.3512E-02	0.1130E+01	0.1528E-02	0.1221E+01	0.4262E-03

* WHERE :

ACCF = Air Conditioning Correction Factor
V = Fraction of vehicles which are equipped with AC given in Table 2.1.8B
U = Fraction of vehicles with AC that are using it = (DI-DILO)/(DIHI-DI), 0<=U<=1
DI = Discomfort index = (DB+WB)*.4+15
DILO = The highest discomfort index where no AC is used
DIHI = The lowest discomfort index where all vehicles with AC use it
DB = Dry bulb temperature (Fahrenheit)
WB = Wet bulb temperature (Fahrenheit)
T = Ambient temperature (Fahrenheit)

TABLE 2.1.8B

ESTIMATED FRACTION OF
HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED VEHICLES
EQUIPPED WITH AIR CONDITIONING

Model Years	Fraction Equipped With Air Conditioning
Pre-1962	0.07
1962-1964	0.14
1965-1966	0.24
1967-1968	0.37
1969-1971	0.51
1972-1976	0.61
1977+	0.72

DATE : MAY 25, 1985

TABLE 2.1.9

EXTRA LOAD CORRECTION FACTOR COEFFICIENTS
FOR HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED VEHICLES

* XLCF = (XLC-1)*U + 1

Model Years	Coefficients (XLC) HC	CO	NOx
Pre-1968	1.0786	1.2765	0.9535
1968-1969	1.0495	1.1384	1.0313
1970-1971	1.0852	1.2478	1.0313
1972	1.0556	1.1347	1.0313
1973-1974	1.0556	1.1347	1.0753
1975+	1.0455	1.3058	1.0719

* WHERE :

XLCF = Extra load correction factor
U = Fraction of VMT with an extra load
XLC = Correction factor coefficient

TABLE 2.1.10

TRAILER TOWING CORRECTION FACTOR COEFFICIENTS
FOR HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED VEHICLES

* TTCF = (TTC-1)*U + 1

Model Years	Coefficients (TTC) HC	CO	NOx
Pre-1968	1.2614	1.9327	1.1184
1968-1969	1.2762	1.8940	1.1384
1970-1971	1.4598	2.4753	1.1384
1972	1.7288	2.1414	1.1384
1973-1974	1.7288	2.1414	1.2170
1975+	1.5909	3.9722	1.3875

* WHERE :

TTCF = Trailer towing correction factor
U = Fraction of VMT towing a trailer
TTC = Correction factor coefficient

DATE : MAY 25, 1985

TABLE 2.2.1A

EXHAUST EMISSION RATES FOR
HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS I
(RATES REFLECT ZERO TAMPERING)

* BER = ZML + (DR * M)

Pol	Model Years	Zero Mile Emission Level (Grams/Mile)	Deterioration Rate (Gm/Mi/10K Mi)	50,000 Mile Emission Level (Grams/Mile)
HC	Pre-1968	9.35	0.18	10.25
	1968-1969	5.60	0.25	6.85
	1970-1971	4.58	0.37	6.43
	1972-1974	4.58	0.17	5.43
	1975-1976	3.40	0.27	4.75
	1977	1.60	0.27	2.95
	1978	3.53	0.27	4.88
	1979-1980	1.81	0.27	3.16
	1981	1.81	0.19	2.76
	1982-1983	1.08	0.19	2.03
	1984	0.72	0.13	1.37
	1985-1986	0.55	0.07	0.90
	1987+	0.62	0.07	0.97
CO	Pre-1968	117.70	2.25	128.95
	1968-1969	85.54	2.25	96.79
	1970-1971	79.64	3.13	95.29
	1972-1974	75.63	2.44	87.83
	1975-1976	58.01	2.59	70.96
	1977	22.86	2.59	35.81
	1978	53.57	2.59	66.52
	1979-1980	29.83	2.59	42.78
	1981	29.83	1.13	35.48
	1982-1983	19.75	1.13	25.40
	1984	12.95	0.98	17.85
	1985-1986	8.88	0.49	11.33
	1987+	7.74	1.56	15.54
NOx	Pre-1968	1.96	0.0	1.96
	1968-1972	2.91	0.0	2.91
	1973-1974	1.91	0.04	2.11
	1975-1976	1.88	0.03	2.03
	1977	2.25	0.03	2.40
	1978	1.88	0.03	2.03
	1979-1980	1.02	0.09	1.47
	1981	1.02	0.09	1.47
	1982-1983	1.74	0.09	2.19
	1984	1.74	0.09	2.19
	1985-1986	1.74	0.04	1.94
	1987+	0.86	0 04	1.06

* WHERE : BER = Basic emission rate (untampered)
ZML = Zero mile level
DR = Deterioration rate
M = Cumulative mileage / 10,000

DATE : MAY 25, 1985

TABLE 2.2.1B

EXHAUST EMISSION RATES FOR
HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS I
AT VARIOUS MILEAGE INTERVALS
(RATES INCLUDE TAMPERING)

Pol	Model Years	Emission Rate (Grams/Mile) 0K	20K	40K	60K	80K	100K	120K	140K
HC	Pre-1968	9.35	9.71	10.07	10.43	10.79	11.14	11.50	11.86
	1968-1969	5.60	6.11	6.62	7.13	7.64	8.15	8.65	9.16
	1970-1971	4.58	5.32	6.06	6.80	7.54	8.28	9.02	9.77
	1972	4.59	4.93	5.28	5.62	5.97	6.32	6.66	7.01
	1973-1974	4.60	4.96	5.32	5.68	6.04	6.40	6.76	7.12
	1975	3.83	4.53	5.21	5.90	6.58	7.27	7.95	8.64
	1976	3.89	4.60	5.31	6.01	6.71	7.41	8.11	8.81
	1977	2.06	2.75	3.44	4.13	4.81	5.50	6.19	6.87
	1978	3.99	4.69	5.38	6.07	6.76	7.45	8.14	8.83
	1979-1980	2.30	3.01	3.71	4.42	5.12	5.82	6.53	7.23
	1981	2.40	2.97	3.54	4.11	4.68	5.24	5.81	6.38
	1982	1.63	2.19	2.74	3.30	3.85	4.41	4.96	5.52
	1983	1.61	2.16	2.70	3.25	3.80	4.34	4.89	5.44
	1984	1.22	1.62	2.02	2.42	2.83	3.23	3.63	4.03
	1985-1986	1.05	1.33	1.62	1.91	2.19	2.48	2.77	3.05
	1987+	1 01	1.26	1.52	1.78	2.03	2.29	2.55	2.80
CO	Pre-1968	117.68	122.12	126.56	131.00	135.45	139.89	144.34	148.79
	1968-1969	85.61	90.11	94.62	99.13	103.64	108.16	112.68	117.20
	1970-1971	79.72	86.06	92.40	98 74	105.08	111.42	117.76	124.10
	1972	75.79	80.86	85.93	90.99	96.06	101.12	106.19	111.25
	1973-1974	76.09	81.48	86 87	92.27	97.66	103.05	108.43	113.82
	1975	64.07	71.25	78.37	85.44	92.48	99.51	106.53	113.54
	1976	64.61	71.94	79.20	86.42	93.61	100 79	107.95	115.10
	1977	27.90	34.87	41.83	48.80	55.76	62.72	69.68	76.64
	1978	59.73	66 88	73.96	81.01	88.03	95.03	102.03	109.01
	1979-1980	35.39	42.65	49 89	57 13	64.36	71.58	78.80	86.02
	1981	36.22	40.60	44.97	49.31	53.63	57.95	62.26	66.56
	1982	25.45	29.66	33.86	38.06	42.24	46.42	50.60	54.77
	1983	25.24	29.37	33.49	37.61	41.71	45.81	49.91	54.00
	1984	17.69	21.23	24 79	28.35	31.92	35.48	39.05	42.61
	1985-1986	13.56	16.12	18.69	21.27	23.85	26.43	29.01	31.59
	1987+	11.33	15.68	20.04	24.41	28.77	33.13	37.49	41.85
NOx	Pre-1968	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96
	1968-1972	2.91	2.91	2.91	2 91	2.90	2.90	2.90	2.90
	1973	1.96	2.08	2.20	2.33	2.45	2.57	2.69	2.82
	1974	1.97	2.09	2.22	2.35	2.48	2.60	2.73	2.86
	1975-1976	2.03	2.21	2.39	2.57	2.75	2.93	3 11	3.29
	1977	2.40	2.58	2.76	2.94	3.11	3.29	3.47	3.64
	1978	2.03	2 21	2.39	2 57	2.75	2.93	3.11	3.29
	1979-1980	1.19	1 52	1.85	2.18	2.51	2.84	3.17	3.50
	1981	1.19	1.52	1.85	2.18	2.51	2.84	3.17	3.49
	1982	1 92	2.25	2.58	2.91	3.24	3.56	3.89	4.22
	1983	1 93	2.26	2.59	2.93	3.26	3.59	3.92	4.25
	1984	1.95	2.28	2.62	2.95	3.29	3.62	3.95	4.29
	1985-1986	1.95	2.18	2.42	2.65	2.89	3.12	3.36	3.60
	1987+	1.19	1.39	1.59	1.80	2 00	2.20	2.41	2.61

DATE : MAY 25, 1985

TABLE 2.2.1C

CRANKCASE AND EVAPORATIVE HYDROCARBON EMISSIONS
FOR HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS I
(RATES REFLECT ZERO TAMPERING)

** CCEV = (HSK * TPD + DNL)/MPD + CC

Model Years	SHED Hot Soak Emissions (Gm/Trip)	Trips* Per Day	SHED Diurnal Emissions (Gm/Day)	Miles* Per Day	Crankcase Emissions (Gm/Mile)	Total Crankcase and Evap. Emissions (Gm/Mile)
Pre-1963	29.18	3.05	62.38	26.30	5.29	11.05
1963-1967	29.18	3.05	62.38	26.30	1.03	6.79
1968-1970	29.18	3.05	62.38	26.30	0.0	5.76
1971	20.99	3.05	50.15	26.30	0.0	4.34
1972-1976	20.96	3.05	44.93	26.30	0.0	4.14
1977	12.32	3.05	23.53	26.30	0.0	2.32
1978-1981	10.31	3.05	24.11	26.30	0.0	2.11
1982-1983	10.31	3.05	12.10	26.30	0.0	1.66
1984	4.67	3.05	12.10	26.30	0.0	1.00
1985	4.16	3.05	12.10	26.30	0.0	0.94
1986	3.65	3.05	12.10	26.30	0.0	0.88
1987	3.21	3.05	12.10	26.30	0.0	0.83
1988-1989	2.67	3.05	12.10	26.30	0.0	0.77
1990+	2.37	3.05	12.10	26.30	0.0	0.73

* Default information that may be altered by the MOBILE3 user with information about the local area.

** WHERE :

CCEV = Total untampered crankcase & evaporative HC emissions (Gm/Mile)
HSK = Hot soak emissions (Gm/Trip)
TPD = Trips per day
DNL = Diurnal emissions (Gm/Day)
MPD = Miles per day
CC = Crankcase emissions (Gm/Mile)

DATE : MAY 25, 1985

TABLE 2.2.1D

TOTAL CRANKCASE AND EVAPORATIVE HC EMISSIONS
FOR HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS I
AT VARIOUS MILEAGE INTERVALS
(RATES INCLUDE TAMPERING)

Model Years	Emission Rate (Grams/Mile) 0K	20K	40K	60K	80K	100K	120K	140K
Pre-1963	11.05	11.05	11.05	11.05	11.05	11.05	11.05	11.05
1963-1967	6.79	6.79	6.79	6.79	6.79	6.79	6.79	6.79
1968-1970	5.87	5.89	5.91	5.93	5.95	5.96	5.98	6.00
1971	4.50	4.53	4.55	4.58	4.61	4.63	4.66	4.69
1972-1974	4.35	4.38	4.42	4.45	4.49	4.52	4.56	4.59
1975-1976	4.34	4.38	4.41	4.45	4.48	4.52	4.55	4.59
1977	2.53	2.56	2.60	2.63	2.67	2.70	2.74	2.77
1978-1979	2.28	2.31	2.34	2.37	2.40	2.43	2.46	2.49
1980	2.27	2.30	2.32	2.35	2.38	2.40	2.43	2.46
1981	2.27	2.29	2.32	2.35	2.37	2.40	2.43	2.45
1982	1.81	1.84	1.86	1.89	1.92	1.94	1.97	2.00
1983	1.81	1.83	1.86	1.88	1.91	1.93	1.96	1.98
1984	1.14	1.17	1.19	1.21	1.24	1.26	1.29	1.31
1985	1.07	1.10	1.12	1.14	1.16	1.18	1.21	1.23
1986	1.01	1.03	1.05	1.07	1.09	1.11	1.13	1.15
1987	0.95	0.97	0.98	1.00	1.02	1.04	1.06	1.08
1988-1989	0.87	0.89	0.91	0.93	0.94	0.96	0.98	0.99
1990+	0.83	0.85	0.87	0.88	0.90	0.91	0.93	0.95

DATE : MAY 25, 1985

TABLE 2.2.2A

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS I
TOTAL HC (INCLUDES EVAP & CRANKCASE)

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	23.7	1962	23.7	1963	19.5	1964	19.5	1965	19.5	1966	19.5	1967	19.5	1968	16.2	1969	16.2	1970	17.5	1971	16.1	1972	12.3
1962	23.6	1963	19.4	1964	19.4	1965	19.4	1966	19.4	1967	19.4	1968	16.1	1969	16.1	1970	17.3	1971	15.9	1972	12.3	1973	12.3
1963	19.3	1964	19.3	1965	19.3	1966	19.3	1967	19.3	1968	16.0	1969	16.0	1970	17.1	1971	15.7	1972	12.2	1973	12.2	1974	12.2
1964	19.2	1965	19.2	1966	19.2	1967	19.2	1968	15.8	1969	15.8	1970	16.9	1971	15.5	1972	12.1	1973	12.1	1974	12.1	1975	12.6
1965	19.1	1966	19.1	1967	19.1	1968	15.7	1969	15.7	1970	16.7	1971	15.3	1972	12.0	1973	12.0	1974	12.0	1975	12.4	1976	12.4
1966	19.0	1967	19 0	1968	15.5	1969	15.5	1970	16.5	1971	15.1	1972	11.9	1973	11.9	1974	11.9	1975	12.2	1976	12.2	1977	8.6
1967	18.8	1968	15.4	1969	15.4	1970	16 2	1971	14.8	1972	11.8	1973	11.8	1974	11.8	1975	12.1	1976	12.1	1977	8.4	1978	10.1
1968	15.2	1969	15.2	1970	16.0	1971	14.6	1972	11.6	1973	11.6	1974	11.6	1975	11.9	1976	11.9	1977	8.2	1978	9.9	1979	8.2
1969	15.0	1970	15.7	1971	14.3	1972	11.5	1973	11.5	1974	11.5	1975	11.6	1976	11.6	1977	8.0	1978	9.7	1979	8.0	1980	8.0
1970	15.4	1971	14.0	1972	11.4	1973	11.4	1974	11.4	1975	11.4	1976	11.4	1977	7.8	1978	9.5	1979	7.8	1980	7.8	1981	6.7
1971	13.6	1972	11.2	1973	11.2	1974	11.2	1975	11 2	1976	11.2	1977	7.5	1978	9.3	1979	7.5	1980	7.5	1981	6.6	1982	5.3
1972	11.0	1973	11.0	1974	11.0	1975	10.9	1976	10.9	1977	7.3	1978	9.0	1979	7.3	1980	7.3	1981	6.4	1982	5.1	1983	5.1
1973	10.9	1974	10.9	1975	10 6	1976	10.6	1977	7.0	1978	8.7	1979	7.0	1980	7.0	1981	6.2	1982	4.9	1983	4.9	1984	3.3
1974	10.7	1975	10.3	1976	10.3	1977	6.7	1978	8 4	1979	6.7	1980	6.7	1981	6.0	1982	4.7	1983	4.7	1984	3.2	1985	2.4
1975	10.0	1976	10.0	1977	6.4	1978	8.1	1979	6.3	1980	6.3	1981	5.7	1982	4.5	1983	4.5	1984	3.0	1985	2.3	1986	2 2
1976	9.6	1977	6.0	1978	7.7	1979	6.0	1980	6.0	1981	5.5	1982	4.2	1983	4.2	1984	2.8	1985	2.2	1986	2.1	1987	2.2
1977	5.6	1978	7.3	1979	5.6	1980	5.6	1981	5.2	1982	3.9	1983	3.9	1984	2.6	1985	2.1	1986	2.0	1987	2.1	1988	2.0
1978	6.9	1979	5.2	1980	5.2	1981	4.9	1982	3.7	1983	3.7	1984	2.4	1985	2.0	1986	1.9	1987	1.9	1988	1.9	1989	1.9
1979	4.7	1980	4.7	1981	4.6	1982	3.3	1983	3.3	1984	2.2	1985	1.9	1986	1.8	1987	1.8	1988	1.8	1989	1.8	1990	1.7
1980	4.4	1981	4.4	1982	3.1	1983	3.1	1984	2.1	1985	1.8	1986	1.7	1987	1.8	1988	1.7	1989	1.7	1990	1.7	1991	1.7

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	12.3	1974	12.3	1975	13.0	1976	13.0	1977	9.3	1978	11.0	1979	9.3	1980	9.3	1981	7.8	1982	6.6	1983	6.6	1984	4.4
1974	12.3	1975	12.8	1976	12.8	1977	9.2	1978	10.9	1979	9.2	1980	9.2	1981	7.7	1982	6.5	1983	6.5	1984	4.4	1985	3.0
1975	12.7	1976	12.7	1977	9.1	1978	10.8	1979	9.0	1980	9.0	1981	7.6	1982	6.4	1983	6.4	1984	4.3	1985	3.0	1986	2.9
1976	12.6	1977	8.9	1978	10.6	1979	8.9	1980	8.9	1981	7.5	1982	6.3	1983	6.3	1984	4.2	1985	3.0	1986	2.9	1987	2.9
1977	8.8	1978	10.5	1979	8.7	1980	8.7	1981	7.4	1982	6.2	1983	6.2	1984	4.2	1985	2.9	1986	2.9	1987	2.9	1988	2.8
1978	10.3	1979	8.6	1980	8.6	1981	7.3	1982	6.0	1983	6 0	1984	4.1	1985	2.9	1986	2.8	1987	2.8	1988	2.8	1989	2.8
1979	8.4	1980	8.4	1981	7.2	1982	5.9	1983	5.9	1984	4.0	1985	2.8	1986	2.8	1987	2.8	1988	2.7	1989	2.7	1990	2.7
1980	8.2	1981	7.1	1982	5.8	1983	5.8	1984	3.9	1985	2.8	1986	2.7	1987	2.7	1988	2.7	1989	2.7	1990	2.6	1991	2.6
1981	6.9	1982	5.6	1983	5.6	1984	3.8	1985	2.7	1986	2.7	1987	2.7	1988	2.6	1989	2.6	1990	2.6	1991	2.6	1992	2.6
1982	5.5	1983	5.5	1984	3.7	1985	2.7	1986	2.6	1987	2.6	1988	2.6	1989	2.6	1990	2.5	1991	2.5	1992	2.5	1993	2.5
1983	5.3	1984	3.6	1985	2.6	1986	2.5	1987	2.5	1988	2.5	1989	2.5	1990	2.5	1991	2.5	1992	2.5	1993	2.5	1994	2.5
1984	3.4	1985	2.5	1986	2.5	1987	2.5	1988	2.4	1989	2.4	1990	2.4	1991	2.4	1992	2.4	1993	2.4	1994	2.4	1995	2.4
1985	2.5	1986	2.4	1987	2.4	1988	2.3	1989	2.3	1990	2.3	1991	2.3	1992	2.3	1993	2.3	1994	2.3	1995	2.3	1996	2.3
1986	2.3	1987	2.3	1988	2.3	1989	2.3	1990	2.2	1991	2.2	1992	2.2	1993	2.2	1994	2.2	1995	2.2	1996	2.2	1997	2.2
1987	2.2	1988	2.2	1989	2.2	1990	2.1	1991	2.1	1992	2.1	1993	2.1	1994	2.1	1995	2.1	1996	2.1	1997	2.1	1998	2.1
1988	2.1	1989	2.1	1990	2.1	1991	2.1	1992	2.1	1993	2.1	1994	2.1	1995	2.1	1996	2.1	1997	2.1	1998	2.1	1999	2.1
1989	2.0	1990	2.0	1991	2.0	1992	2.0	1993	2.0	1994	2.0	1995	2.0	1996	2.0	1997	2.0	1998	2.0	1999	2.0	2000	2.0
1990	1.8	1991	1.8	1992	1.8	1993	1.8	1994	1.8	1995	1.8	1996	1.8	1997	1.8	1998	1.8	1999	1.8	2000	1.8	2001	1.8
1991	1.7	1992	1.7	1993	1.7	1994	1.7	1995	1.7	1996	1.7	1997	1.7	1998	1.7	1999	1.7	2000	1.7	2001	1.7	2002	1.7
1992	1.7	1993	1.7	1994	1.7	1995	1.7	1996	1.7	1997	1.7	1998	1.7	1999	1.7	2000	1.7	2001	1.7	2002	1.7	2003	1.7

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.2.4.

EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS I
CO

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	157.7	1962	157.7	1963	157.7	1964	157.7	1965	157.7	1966	157.7	1967	157.7	1968	125.7	1969	125.7	1970	135.7	1971	135.7	1972	119.3
1962	156.7	1963	156.7	1964	156.7	1965	156.7	1966	156.7	1967	156.7	1968	124.7	1969	124.7	1970	134.3	1971	134.3	1972	118.2	1973	118.2
1963	155.6	1964	155.6	1965	155.6	1966	155.6	1967	155.6	1968	123.6	1969	123.6	1970	132.8	1971	132.8	1972	117.0	1973	117.0	1974	117.0
1964	154.4	1965	154.4	1966	154.4	1967	154.4	1968	122.4	1969	122.4	1970	131.1	1971	131.1	1972	115.7	1973	115.7	1974	115.7	1975	100.6
1965	153.1	1966	153.1	1967	153.1	1968	121.1	1969	121.1	1970	129.3	1971	129.3	1972	114.3	1973	114.3	1974	114.3	1975	99.2	1976	99.2
1966	151.7	1967	151.7	1968	119.7	1969	119.7	1970	127.4	1971	127.4	1972	112.8	1973	112.8	1974	112.8	1975	97.6	1976	97.6	1977	62.6
1967	150.3	1968	118.2	1969	118.2	1970	125.3	1971	125.3	1972	111.2	1973	111.2	1974	111.2	1975	95.9	1976	95.9	1977	60.9	1978	91.4
1968	116.6	1969	116.6	1970	123.1	1971	123.1	1972	109.4	1973	109.4	1974	109.4	1975	94.0	1976	94.0	1977	59.0	1978	89.6	1979	66.0
1969	114.9	1970	120.7	1971	120.7	1972	107.6	1973	107.6	1974	107.6	1975	92.0	1976	92.0	1977	57.0	1978	87.6	1979	64.0	1980	64.0
1970	118.1	1971	118.1	1972	105.5	1973	105.5	1974	105.5	1975	89.9	1976	89.9	1977	54.9	1978	85.4	1979	61.8	1980	61.8	1981	43.7
1971	115.3	1972	103.3	1973	103.3	1974	103.3	1975	87 5	1976	87.5	1977	52.6	1978	83.1	1979	59.5	1980	59.5	1981	42.7	1982	32.7
1972	101.0	1973	101.0	1974	101.0	1975	85.0	1976	85.0	1977	50.1	1978	80.6	1979	57.0	1980	57.0	1981	41.6	1982	31.6	1983	31.6
1973	98.4	1974	98.4	1975	82.3	1976	82.3	1977	47 4	1978	77.9	1979	54.3	1980	54.3	1981	40.4	1982	30 4	1983	30.4	1984	22.2
1974	95.7	1975	79.4	1976	79.4	1977	44.4	1978	75.0	1979	51.4	1980	51.4	1981	39.2	1982	29.1	1983	29.1	1984	21.1	1985	12.9
1975	76.3	1976	76.3	1977	41.3	1978	71.9	1979	48.2	1980	48 2	1981	37 8	1982	27.8	1983	27.8	1984	19.9	1985	12 3	1986	12.3
1976	72.9	1977	37.9	1978	68.5	1979	44.9	1980	44.9	1981	36.3	1982	26.3	1983	26.3	1984	18.6	1985	11.7	1986	11.7	1987	16.8
1977	34.3	1978	64.8	1979	41.2	1980	41.2	1981	34.7	1982	24.7	1983	24 7	1984	17.2	1985	11.0	1986	11.0	1987	14.6	1988	14.6
1978	60.9	1979	37 3	1980	37.3	1981	33.0	1982	23.0	1983	23.0	1984	15.8	1985	10.3	1986	10.3	1987	12.3	1988	12.3	1989	12.3
1979	33.0	1980	33.0	1981	31.1	1982	21.1	1983	21.1	1984	14.2	1985	9.5	1986	9.5	1987	9.7	1988	9.7	1989	9.7	1990	9.7
1980	30.2	1981	29.9	1982	19.9	1983	19 9	1984	13.1	1985	8.9	1986	8.9	1987	8.0	1988	8.0	1989	8.0	1990	8.0	1991	8.0

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	119.3	1974	119 3	1975	104 5	1976	104.5	1977	69.5	1978	100.0	1979	76 4	1980	76.4	1981	50.1	1982	40.0	1983	40.0	1984	30.6
1974	118.2	1975	103.3	1976	103.3	1977	68.3	1978	98.9	1979	75.2	1980	75.2	1981	49.6	1982	39.5	1983	39.5	1984	30.1	1985	17.5
1975	102.0	1976	102.0	1977	67.0	1978	97.6	1979	74.0	1980	74.0	1981	49.0	1982	39.0	1983	39.0	1984	29.6	1985	17.2	1986	17.2
1976	100.6	1977	65.7	1978	96.2	1979	72.6	1980	72 6	1981	48.4	1982	38.4	1983	38.4	1984	29.1	1985	17.0	1986	17.0	1987	33.5
1977	64.2	1978	94.7	1979	71.1	1980	71.1	1981	47.8	1982	37.7	1983	37.7	1984	28.6	1985	16.7	1986	16.7	1987	32.7	1988	32.7
1978	93.2	1979	69.5	1980	69.5	1981	47.1	1982	37.0	1983	37 0	1984	28.0	1985	16.4	1986	16.4	1987	31.7	1988	31.7	1989	31.7
1979	67.8	1980	67.8	1981	46.3	1982	36.3	1983	36.3	1984	27 3	1985	16.0	1986	16.0	1987	30.7	1988	30.7	1989	30.7	1990	30.7
1980	66.0	1981	45.5	1982	35.5	1983	35.5	1984	26.6	1985	15.7	1986	15.7	1987	29.6	1988	29.6	1989	29.6	1990	29.6	1991	29.6
1981	44.6	1982	34.6	1983	34.6	1984	25.9	1985	15 3	1986	15 3	1987	28.3	1988	28.3	1989	28.3	1990	28.3	1991	28.3	1992	28.3
1982	33.7	1983	33.7	1984	25.0	1985	14.9	1986	14.9	1987	27.1	1988	27.1	1989	27.1	1990	27.1	1991	27.1	1992	27.1	1993	27.1
1983	32.7	1984	24.2	1985	14.5	1986	14.5	1987	25.7	1988	25.7	1989	25.7	1990	25.7	1991	25.7	1992	25.7	1993	25.7	1994	25.7
1984	23.2	1985	14.0	1986	14.0	1987	24.1	1988	24.1	1989	24.1	1990	24.1	1991	24.1	1992	24.1	1993	24.1	1994	24.1	1995	24.1
1985	13.5	1986	13.5	1987	22.5	1988	22.5	1989	22 5	1990	22.5	1991	22.5	1992	22.5	1993	22.5	1994	22.5	1995	22.5	1996	22.5
1986	12.9	1987	20.8	1988	20.8	1989	20.8	1990	20.8	1991	20.8	1992	20.8	1993	20.8	1994	20.8	1995	20.8	1996	20.8	1997	20.8
1987	18.9	1988	18.9	1989	18.9	1990	18.9	1991	18.9	1992	18.9	1993	18.9	1994	18.9	1995	18.9	1996	18.9	1997	18.9	1998	18.9
1988	16.8	1989	16.8	1990	16.8	1991	16.8	1992	16.8	1993	16.8	1994	16.8	1995	16.8	1996	16.8	1997	16.8	1998	16.8	1999	16.8
1989	14.6	1990	14.6	1991	14.6	1992	14.6	1993	14.6	1994	14.6	1995	14.6	1996	14.6	1997	14.6	1998	14.6	1999	14.6	2000	14.6
1990	12.3	1991	12.3	1992	12.3	1993	12.3	1994	12.3	1995	12.3	1996	12.3	1997	12.3	1998	12.3	1999	12.3	2000	12.3	2001	12.3
1991	9.7	1992	9.7	1993	9.7	1994	9.7	1995	9 7	1996	9.7	1997	9.7	1998	9.7	1999	9.7	2000	9.7	2001	9.7	2002	9.7
1992	8.0	1993	8.0	1994	8.0	1995	8.0	1996	8.0	1997	8.0	1998	8.0	1999	8.0	2000	8.0	2001	8.0	2002	8.0	2003	8.0

*MY -- Indicates the model year.
**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.2 4.

TABLE 2.2.2C

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS I
NOx

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	2.0	1962	2.0	1963	2.0	1964	2.0	1965	2.0	1966	2.0	1967	2.0	1968	2.9	1969	2.9	1970	2.9	1971	2.9	1972	2.9
1962	2.0	1963	2.0	1964	2.0	1965	2.0	1966	2.0	1967	2.0	1968	2.9	1969	2.9	1970	2.9	1971	2.9	1972	2.9	1973	2.6
1963	2.0	1964	2.0	1965	2.0	1966	2.0	1967	2 0	1968	2.9	1969	2.9	1970	2.9	1971	2.9	1972	2.9	1973	2.6	1974	2.6
1964	2.0	1965	2.0	1966	2.0	1967	2.0	1968	2.9	1969	2.9	1970	2.9	1971	2.9	1972	2.9	1973	2.6	1974	2.6	1975	2.4
1965	2.0	1966	2.0	1967	2.0	1968	2.9	1969	2.9	1970	2.9	1971	2.9	1972	2.9	1973	2.5	1974	2.5	1975	2.4	1976	2.4
1966	2.0	1967	2.0	1968	2.9	1969	2.9	1970	2.9	1971	2 9	1972	2.9	1973	2.5	1974	2.5	1975	2.3	1976	2.3	1977	2.7
1967	2.0	1968	2.9	1969	2.9	1970	2.9	1971	2.9	1972	2 9	1973	2.5	1974	2.5	1975	2.3	1976	2.3	1977	2.7	1978	2.3
1968	2.9	1969	2.9	1970	2.9	1971	2.9	1972	2.9	1973	2 5	1974	2.5	1975	2.3	1976	2.3	1977	2.7	1978	2.3	1979	2.3
1969	2.9	1970	2.9	1971	2.9	1972	2.9	1973	2 4	1974	2.4	1975	2 3	1976	2.3	1977	2.6	1978	2.3	1979	2.2	1980	2.2
1970	2.9	1971	2.9	1972	2.9	1973	2.4	1974	2 4	1975	2.2	1976	2.2	1977	2.6	1978	2.2	1979	2.1	1980	2.1	1981	2.1
1971	2.9	1972	2.9	1973	2 4	1974	2.4	1975	2 2	1976	2 2	1977	2.6	1978	2.2	1979	2.1	1980	2.1	1981	2.1	1982	2.8
1972	2.9	1973	2.3	1974	2 3	1975	2.2	1976	2.2	1977	2.6	1978	2.2	1979	2.0	1980	2.0	1981	2.0	1982	2.7	1983	2.7
1973	2.3	1974	2.3	1975	2.2	1976	2.2	1977	2.5	1978	2.2	1979	1.9	1980	1.9	1981	1.9	1982	2.6	1983	2.6	1984	2.6
1974	2.2	1975	2.1	1976	2.1	1977	2.5	1978	2.1	1979	1.8	1980	1.8	1981	1.8	1982	2.5	1983	2.5	1984	2.5	1985	2.1
1975	2.1	1976	2.1	1977	2.5	1978	2.1	1979	1.7	1980	1.7	1981	1.7	1982	2.4	1983	2.4	1984	2.4	1985	2.0	1986	2.0
1976	2.0	1977	2.4	1978	2.0	1979	1.5	1980	1.5	1981	1.5	1982	2.3	1983	2.3	1984	2.3	1985	2.0	1986	2.0	1987	1.1
1977	2.4	1978	2.0	1979	1.4	1980	1.4	1981	1.4	1982	2.1	1983	2.1	1984	2.1	1985	1.9	1986	1.9	1987	1.0	1988	1.0
1978	2.0	1979	1.3	1980	1.3	1981	1.3	1982	2.0	1983	2 0	1984	2.0	1985	1.9	1986	1.9	1987	1.0	1988	1.0	1989	1.0
1979	1.1	1980	1.1	1981	1 1	1982	1.8	1983	1.8	1984	1.8	1985	1.8	1986	1.8	1987	0.9	1988	0.9	1989	0.9	1990	0.9
1980	1.0	1981	1.0	1982	1.8	1983	1.8	1984	1.8	1985	1.7	1986	1.7	1987	0.9	1988	0.9	1989	0.9	1990	0.9	1991	0.9

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	2.6	1974	2.6	1975	2.4	1976	2.4	1977	2.8	1978	2.4	1979	2.6	1980	2.6	1981	2.6	1982	3.4	1983	3.4	1984	3.4
1974	2.6	1975	2.4	1976	2.4	1977	2.8	1978	2.4	1979	2.6	1980	2.6	1981	2.6	1982	3.3	1983	3.3	1984	3.3	1985	2.4
1975	2.4	1976	2.4	1977	2.8	1978	2.4	1979	2.6	1980	2.6	1981	2.6	1982	3.3	1983	3.3	1984	3.3	1985	2.4	1986	2.4
1976	2.4	1977	2.7	1978	2.4	1979	2.5	1980	2.5	1981	2.5	1982	3.2	1983	3.2	1984	3.2	1985	2.4	1986	2.4	1987	1.5
1977	2.7	1978	2.4	1979	2.5	1980	2.5	1981	2.5	1982	3 2	1983	3.2	1984	3.2	1985	2.4	1986	2.4	1987	1.5	1988	1.5
1978	2.3	1979	2.4	1980	2.4	1981	2.4	1982	3.1	1983	3 1	1984	3.1	1985	2.3	1986	2.3	1987	1.5	1988	1.5	1989	1.5
1979	2.3	1980	2.3	1981	2.3	1982	3.1	1983	3 1	1984	3.1	1985	2.3	1986	2.3	1987	1.4	1988	1.4	1989	1.4	1990	1.4
1980	2.3	1981	2.3	1982	3.0	1983	3.0	1984	3.0	1985	2.3	1986	2.3	1987	1.4	1988	1.4	1989	1.4	1990	1.4	1991	1.4
1981	2.2	1982	2.9	1983	2.9	1984	2.9	1985	2.3	1986	2.3	1987	1.4	1988	1.4	1989	1.4	1990	1.4	1991	1.4	1992	1.4
1982	2.8	1983	2.8	1984	2.8	1985	2.2	1986	2.2	1987	1.4	1988	1.4	1989	1.4	1990	1.4	1991	1.4	1992	1.4	1993	1.4
1983	2.8	1984	2.8	1985	2.2	1986	2.2	1987	1.3	1988	1.3	1989	1.3	1990	1.3	1991	1.3	1992	1.3	1993	1.3	1994	1.3
1984	2.7	1985	2.2	1986	2.2	1987	1.3	1988	1.3	1989	1.3	1990	1.3	1991	1.3	1992	1.3	1993	1.3	1994	1.3	1995	1.3
1985	2.1	1986	2.1	1987	1.2	1988	1.2	1989	1.2	1990	1.2	1991	1.2	1992	1.2	1993	1.2	1994	1.2	1995	1.2	1996	1.2
1986	2.1	1987	1.2	1988	1.2	1989	1.2	1990	1.2	1991	1.2	1992	1.2	1993	1.2	1994	1.2	1995	1.2	1996	1.2	1997	1.2
1987	1.1	1988	1.1	1989	1.1	1990	1.1	1991	1.1	1992	1.1	1993	1.1	1994	1.1	1995	1.1	1996	1.1	1997	1.1	1998	1.1
1988	1.1	1989	1.1	1990	1.1	1991	1.1	1992	1.1	1993	1.1	1994	1.1	1995	1.1	1996	1.1	1997	1.1	1998	1.1	1999	1.1
1989	1.0	1990	1.0	1991	1.0	1992	1.0	1993	1.0	1994	1.0	1995	1.0	1996	1.0	1997	1.0	1998	1.0	1999	1.0	2000	1.0
1990	1.0	1991	1.0	1992	1.0	1993	1.0	1994	1.0	1995	1.0	1996	1.0	1997	1.0	1998	1.0	1999	1.0	2000	1.0	2001	1.0
1991	0.9	1992	0.9	1993	0.9	1994	0.9	1995	0.9	1996	0.9	1997	0.9	1998	0.9	1999	0.9	2000	0.9	2001	0.9	2002	0.9
1992	0.9	1993	0.9	1994	0.9	1995	0.9	1996	0.9	1997	0.9	1998	0 9	1999	0.9	2000	0.9	2001	0.9	2002	0.9	2003	0.9

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.2.4.

TABLE 2.2.3

IDLE EMISSION RATES FOR
HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS I

* IER = ZML + (DR * M)

Pol	Model Years	Zero Mile Emission Level (Grams/Min.)	Deterioration Rate (Gm/Min/10K Mi)
HC	Pre-1968	1.63	0.03
	1968-1969	0.76	0.06
	1970-1971	0.71	0.07
	1972-1974	0.74	0.04
	1975-1976	0.33	0.06
	1977	0.15	0.06
	1978	0.30	0.06
	1979-1980	0.06	0.02
	1981	0.10	0.02
	1982-1983	0.07	0.02
	1984	0.04	0.01
	1985-1986	0 04	0.01
	1987+	0.04	0.01
CO	Pre-1968	15.98	0.40
	1968-1969	11.24	0.63
	1970-1971	12.93	0.88
	1972-1974	13.99	0.76
	1975-1976	7.76	0.72
	1977	3.00	0.72
	1978	6.05	0.72
	1979-1980	1.52	0.32
	1981	2.27	0.27
	1982-1983	1.72	0.24
	1984	0.69	0.14
	1985-1986	0.49	0.28
	1987+	0.49	0.28
NOx	Pre-1968	0.11	0.0
	1968-1972	0.09	0.0
	1973-1974	0.07	0.0
	1975-1976	0.02	0.0
	1977	0.02	0.0
	1978	0.01	0.0
	1979-1980	0.01	0.0
	1981	0.06	0.0
	1982-1983	0.06	0.0
	1984	0.05	0.0
	1985-1986	0.02	0.0
	1987+	0.02	0.0

* WHERE : IER = Idle emission rate
ZML = Zero mile level
DR = Deterioration Rate
M = Cumulative Mileage / 10,000

DATE : MAY 25, 1985

TABLE 2.2.4

REGISTRATION MIX AND
MILEAGE ACCUMULATION RATES FOR
HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS I

Model Year Index**	July 1 Registration Mix*	Mileage Accumulation Rate per truck *	Jan 1 Registration Mix	Jan 1 Mileage Accumulation Rate (fleet)	Jan 1 Mileage Accumulation (fleet)
1	0.067	17394.	0.022	17394.	2174.
2	0.085	16132.	0.085	17078.	13006.
3	0.081	14961.	0.081	15839.	29456.
4	0.077	13876.	0.077	14690.	44713.
5	0.073	12869.	0.073	13624.	58862.
6	0.069	11935.	0.069	12635.	71986.
7	0.065	11069.	0.065	11718.	84156.
8	0.061	10266.	0.061	10868.	95444.
9	0.057	9521.	0.057	10080.	105912.
10	0.053	8830.	0.053	9348.	115621.
11	0.048	8189.	0.048	8670.	124625.
12	0.044	7595.	0.044	8040.	132976.
13	0.040	7044.	0.040	7457.	140720.
14	0.036	6533.	0.036	6916.	147903.
15	0.032	6059.	0.032	6414.	154565.
16	0.028	5619.	0.028	5949.	160744.
17	0.024	5211.	0.024	5517.	166474.
18	0.020	4833.	0.020	5116.	171787.
19	0.016	4483.	0.016	4745.	176716.
20+	0.024	4157.	0.024	4401.	181287.

* Default information that may be altered by the MOBILE3 user with information about the local area.

** The indices refer to the most recent model year vehicles in any given calendar year. Index 1 references the newest model year vehicles and index 20+ references the oldest model year vehicles.

DATE : MAY 25, 1985

TABLE 2.2.5

EXAMPLE TRAVEL WEIGHTING FRACTION CALCULATION FOR
HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS I
JANUARY 1, 1988

Model Years	(A) LDT1 Fleet Registration	(B) Sales Fraction	(A*B)	(C=A*B/DAF) LDGT1 Registration	(D) Annual Mileage Accrual Rate	(C*D)	(C*D/TFNORM) Travel Fractions
1988	0.022	0.760	0.017	0.019	17394.	337.1	0.031
1987	0.085	0.790	0.067	0.077	17078.	1309.6	0.120
1986	0.081	0.820	0.066	0.076	15839.	1201.4	0.110
1985	0.077	0.840	0.065	0.074	14690.	1085.0	0.099
1984	0.073	0.870	0.064	0.073	13624.	988.1	0.091
1983	0.069	0.900	0.062	0.071	12635.	896.0	0.082
1982	0.065	0.920	0.060	0.068	11718.	800.2	0.073
1981	0.061	0.940	0.057	0.065	10868.	711.6	0.065
1980	0.057	0.966	0.055	0.063	10080.	633.8	0.058
1979	0.053	0.972	0.052	0.059	9348.	549.9	0.050
1978	0.048	0.991	0.048	0.054	8670.	470.9	0.043
1977	0.044	0.995	0.044	0.050	8040.	402.0	0.037
1976	0.040	0.997	0.040	0.046	7457.	339.6	0.031
1975	0.036	0.998	0.036	0.041	6916.	283.8	0.026
1974	0.032	1.000	0.032	.037	6414.	234.4	0.021
1973	0.028	1.000	0.028	0.032	5949.	190.2	0.017
1972	0.024	1.000	0.024	0.027	5517.	151.2	0.014
1971	0.020	1.000	0.020	0.023	5116.	116.9	0.011
1970	0.016	1.000	0.016	0.018	4745.	86.7	0.008
1969-	0.024	1.000	0.024	0.027	4401.	120.6	0.011
		DAF:	0.876		TFNORM:	10909.0	

WHERE :

A = January 1 registration mix from Table 2.2.4.
B = Fleet sales fractions
D = Sales weighted fleet mileage accumulation rate from Table 2.2.4, adjusted to January 1
D(1) = Annual Miles(1)
D(MYI)= .25*(Annual Miles(MYI)) + .75*(Annual Miles(MYI-1)), MYI=2,...,20+

NOTE : In general, the travel weighting fractions will change for every calendar year since the sales fraction (column B) changes for almost every model year.

DATE : MAY 25, 1985

TABLE 2.2 6

SPEED CORRECTION FACTOR COEFFICIENTS FOR HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS I

* SCF(s,sadj) = SF(s)/SF(sadj)

$$SF(s) = EXP(A + B*s + C*s^2 + D*S^3 + E*s^4 + F*s^5), \text{ HC \& CO}$$
$$= A + B*s + C*s^2 + D*s^3 + E*s^4 + F*s^5, \text{ NOx}$$

Pollutant and Model Years	A	B	C	D	E	F
HC						
Pre-1968	0.224612E+01	-0.290973E+00	0.158890E-01	-0.472494E-03	0.694077E-05	-0.392798E-07
1968	0.202779E+01	-0.273049E+00	0.153577E-01	-0.460304E-03	0.678527E-05	-0.384880E-07
1969	0.215056E+01	-0.283620E+00	0.153836E-01	-0.442136E-03	0.628732E-05	-0.346311E-07
1970	0.223021E+01	-0.293648E+00	0.162356E-01	-0.484148E-03	0.711591E-05	-0.402861E-07
1971	0.212230E+01	-0.291072E+00	0.169089E-01	-0.526148E-03	0.802705E-05	-0.470117E-07
1972	0.215361E+01	-0 283451E+00	0.156948E-01	-0 469759E-03	0.693832E-05	-0.394707E-07
1973-1974	0.211340E+01	-0.285676E+00	0.163180E-01	-0.500793E-03	0.755067E-05	-0.437187E-07
1975+	0.239540E+01	-0.335781E+00	0.211609E-01	-0.731550E-03	0.120715E-04	-0.748566E-07
CO						
Pre-1968	0.181978E+01	-0.254663E+00	0.152347E-01	-0.487397E-03	0.758207E-05	-0.449514E-07
1968	0.186919E+01	-0.276679E+00	0.172335E-01	-0.558279E-03	0.871678E-05	-0.516980E-07
1969	0.182133E+01	-0.272054E+00	0.170304E-01	-0.552021E-03	0.862543E-05	-0 511440E-07
1970	0.201421E+01	-0 295188E+00	0.186353E-01	-0.621606E-03	0.993657E-05	-0.599779E-07
1971	0 204533E+01	-0.310618E+00	0.204852E-01	-0.708527E-03	0.116215E-04	-0.715690E-07
1972	0.231868E+01	-0 341147E+00	0.209446E-01	-0.665891E-03	0.102225E-04	-0.598264E-07
1973-1974	0.215487E+01	-0.329116E+00	0 210112E-01	-0.689057E-03	0.108390E-04	-0.647125E-07
1975+	0.248747E+01	-0.391562E+00	0 270721E-01	-0.976178E-03	0.165270E-04	-0.104317E-06
NOx						
Pre-1968	0.244424E+01	-0.250107E+00	0.138293E-01	-0.287025E-03	0.207585E-05	0.0
1968	0.188656E+01	-0.161289E+00	0 904995E-02	-0.185609E-03	0.132555E-05	0.0
1969	0.155777E+01	-0.113032E+00	0 671832E-02	-0.143409E-03	0.106079E-05	0.0
1970	0.204516E+01	-0.194014E+00	0.110736E-01	-0.231754E-03	0.168372E-05	0.0
1971	0 163262E+01	-0.121861E+00	0.703020E-02	-0.146293E-03	0.106141E-05	0.0
1972	0.144825E+01	-0.122444E+00	0.795024E-02	-0.171078E-03	0.125777E-05	0.0
1973-1974	0.153447E+01	-0.125671E+00	0.785919E-02	-0.169428E-03	0.125494E-05	0.0
1975+	0.942131E+00	-0.423240E-01	0.386253E-02	-0.939853E-04	0.753883E-06	0.0

* WHERE : s = average speed (mph)
sadj = basic test procedure speed; adjusted for fraction of cold start operation x and fraction of hot start operation w, [1/sadj = (w+x)/26 + (1-w-x)/16]

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TABLE 2.2.7A

TEMPERATURE CORRECTION FACTOR COEFFICIENTS FOR
HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS I

* TCF(b) = EXP(TC(b) * (T - 75.0))

Pol	Model Years	Test segment 1 TC Low	Test segment 1 TC High	Test segment 2 TC Low	Test segment 2 TC High	Test segment 3 TC Low	Test segment 3 TC High
HC	Pre-1968	-0.20623E-01	-0.14381E-01	-0.24032E-02	0.13219E-02	-0.10081E-02	0.34799E-02
	1968-1969	-0.24462E-01	-0.12552E-01	-0 32017E-02	0.42667E-02	-0.86884E-03	0.75843E-02
	1970-1971	-0.21255E-01	-0.10888E-01	-0.52755E-03	-0.47925E-03	0.93659E-03	0.76666E-02
	1972-1974	-0.21427E-01	-0.66107E-02	-0.39442E-03	0 26288E-02	0.49731E-02	0.12320E-01
	1975-1983	-0.23517E-01	-0.14095E-01	-0.88057E-02	0.26179E-01	-0.16222E-02	0.24297E-01
	1984+	-0.33883E-01	0.11959E-01	-0.10113E-01	-0.12627E-04	-0.80650E-02	0.78765E-02
CO	Pre-1968	-0.13487E-01	-0 14691E-01	0.15784E-02	0 37462E-02	0.11097E-02	0.11014E-01
	1968-1969	-0.21126E-01	-0.38767E-01	-0.15289E-02	0.84685E-02	0.15749E-02	0.25179E-01
	1970-1971	-0.20843E-01	-0.21165E-01	-0.59951E-02	0.23603E-01	0.18253E-02	0.28483E-01
	1972-1974	-0.19091E-01	-0.13146E-01	-0.42373E-03	0.24717E-01	0.57982E-02	0.25848E-01
	1975-1983	-0.24835E-01	-0.19612E-01	-0.88336E-02	0.48537E-01	-0.11553E-02	0.31439E-01
	1984+	see NOTE 2	-0.12596E-01	-0.18813E-01	0.13861E-01	-0.11951E-01	0.96939E-02
NOx	Pre-1968	-0.16897E-03	0.38841E-02	-0.89245E-02	-0.87325E-02	-0.72580E-02	-0.10839E-01
	1968-1972	-0.25074E-03	-0.10389E-02	-0.59791E-02	-0.92466E-02	-0.62690E-02	-0.10108E-01
	1973-1974	0.38855E-02	-0.18301E-01	-0.24156E-02	-0.10925E-01	-0.21188E-02	-0.18042E-01
	1975-1978	-0.45504E-04	-0.71420E-02	-0.12575E-02	-0.87910E-02	-0.53153E-03	-0.75470E-02
	1979-1986	-0.76044E-02	-0.26153E-01	-0 68045E-02	-0.18603E-01	-0.54198E-02	-0.20878E-01
	1987+	-0.53710E-02	-0.34416E-01	-0 65050E-02	-0.35871E-01	-0.85650E-02	-0.28830E-01

* WHERE :

TCF(b) = Temperature correction factor for appropriate pollutant, ambient temperature, and model year; for test segment b
T = Ambient temperature (Fahrenheit)
TC(b) = Temperature correction factor coefficient for appropriate pollutant, reference temperature and model year; for test segment b
75.0 = Reference temperature

NOTE 1 : The temperature correction factor is used in conjunction with the Ripstwxn correction factor given in Table 2.2.7B.

NOTE 2 : Offset model used for Bag 1 CO. Offset = -1.3812*(T - 75.0).

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TABLE 2.2.7B

NORMALIZED BAG FRACTIONS FOR
HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS I

		Normalized Fractions							
	Model	Test Seg.#1		Test Seg.#2		Test Seg.#3		Total Test	
Pol	Years	B1	D1	B2	D2	B3	D3	B0	D0
HC	Pre-1968	1.282	0.025	0.973	0.028	0.839	0.019	1.000	0.025
	1968-1969	1.345	0.074	0.946	0.054	0.842	0.048	1.000	0.056
	1970-1971	1.345	0.178	0.919	0.118	0.894	0.093	1.000	0.124
	1972-1974	1.398	0.060	0.885	0.055	0.919	0.036	1.000	0.051
	1975-1983	1.860	0.345	0.766	0.234	0.804	0.196	1.000	0.243
	1984-1986	2.200	0.714	0.571	0.171	0.914	0.143	1.000	0.286
	1987+	2.634	1.104	0.368	0.499	0.973	0.391	1.000	0.594
CO	Pre-1968	1.277	0.033	1.017	0.029	0.758	0.025	1.000	0.029
	1968-1969	1.442	0.071	0.996	0.042	0.674	0.033	1.000	0.046
	1970-1971	1.553	0.109	0.933	0.079	0.711	0.038	1.000	0.074
	1972-1974	1.573	0.054	0.902	0.079	0.755	0.029	1.000	0.060
	1975-1983	1.972	0.176	0.881	0.157	0.628	0.109	1.000	0.139
	1984-1986	2.438	0.282	0.658	0.062	0.621	0.077	1.000	0.111
	1987+	3.941	2.009	0.0	1.186	0.689	1.014	1.000	1.308
NOx	Pre-1968	1.121	0.009	0.785	0.001	1.319	-0.009	1.000	0.0
	1968-1972	1.199	-0.004	0.793	-0.002	1.245	0.006	1.000	0.0
	1973-1974	1.262	0.022	0.770	0.004	1.242	0.027	1.000	0.014
	1975-1978	1.299	0.012	0.783	0.004	1.197	0.016	1.000	0.012
	1979-1986	1.372	0.040	0.766	0.046	1.167	0.063	1.000	0.051
	1987+	1.830	0.169	0.703	0.149	0.939	0.222	1.000	0.173

NOTE : The fractions given in this table are used in the calculation of the operating-mode/ temperature correction factor (OMTCF).

WHERE :

```
OMTCF   = ((TERM1 + TERM2 + TERM3)/DENOM)
TERM1   =    W    *TCF(1)*(B1+D1*M)
TERM2   = (1-W-X) *TCF(2)*(B2+D2*M)
TERM3   =    X    *TCF(3)*(B3+D3*M)
DENOM   = B0 + D0*M
 W      = Fraction of VMT in the cold start mode
 X      = Fraction of VMT in the  hot start mode
TCF(b)  = Temperature correction factor for pollutant, model
          year; for test segment b
 M      = Cumulative mileage / 10,000
```

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TABLE 2.2.8A

AIR CONDITIONING CORRECTION FACTOR COEFFICIENTS FOR
HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS I

* ACCF= U*V*(A + B*(T-75) -1) + 1

Model	HC		CO		NOx	
Years	A	B	A	B	A	B
Pre-1975	0.1023E+01	0.3344E-02	0.1202E+01	0.1808E-02	0.1299E+01	0.5643E-04
1975+	0.1000E+01	0.3512E-02	0.1130E+01	0.1528E-02	0.1221E+01	0.4262E-03

* WHERE :

ACCF = Air Conditioning Correction Factor
V = Fraction of vehicles which are equipped with AC given in Table 2.2.8B
U = Fraction of vehicles with AC that are using it = (DI-DILO)/(DIHI-DI), 0<=U<=1
DI = Discomfort index = (DB+WB)*.4+15
DILO = The highest discomfort index where no AC is used
DIHI = The lowest discomfort index where all vehicles with AC use it
DB = Dry bulb temperature (Fahrenheit)
WB = Wet bulb temperature (Fahrenheit)
T = Ambient temperature (Fahrenheit)

TABLE 2.2.8B

ESTIMATED FRACTION OF
HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS I
EQUIPPED WITH AIR CONDITIONING

Model Years	Fraction Equipped With Air Conditioning
Pre-1977	0.32
1977	0.52
1978+	0.39

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TABLE 2.2.9

EXTRA LOAD CORRECTION FACTOR COEFFICIENTS
FOR HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS I

* XLCF = (XLC-1)*U + 1

Model Years	Coefficients (XLC) HC	CO	NOx
Pre-1968	1.0786	1.2765	0.9535
1968-1969	1.0495	1.1384	1.0313
1970-1971	1.0852	1.2478	1.0313
1972	1.0556	1.1347	1.0313
1973-1974	1.0556	1.1347	1.0753
1975+	1.0455	1.3058	1.0719

* WHERE :

XLCF = Extra load correction factor
U = Fraction of VMT with an extra load
XLC = Correction factor coefficient

TABLE 2.2.10

TRAILER TOWING CORRECTION FACTOR COEFFICIENTS
FOR HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS I

* TTCF = (TTC-1)*U + 1

Model Years	Coefficients (TTC) HC	CO	NOx
Pre-1968	1.2614	1.9327	1.1184
1968-1969	1.2762	1.8940	1.1384
1970-1971	1.4598	2.4753	1.1384
1972	1.7288	2.1414	1.1384
1973-1974	1.7288	2.1414	1.2170
1975+	1.5909	3.9722	1.3875

* WHERE :

TTCF = Trailer towing correction factor
U = Fraction of VMT towing a trailer
TTC = Correction factor coefficient

DATE : MAY 25, 1985

TABLE 2.3.1A

EXHAUST EMISSION RATES FOR
HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS II
(RATES REFLECT ZERO TAMPERING)

* BER = ZML + (DR * M)

Pol	Model Years	Zero Mile Emission Level (Grams/Mile)	Deterioration Rate (Gm/Mi/10K Mi)	50,000 Mile Emission Level (Grams/Mile)
HC	Pre-1970	12.35	0.18	13.25
	1970-1973	8.56	0.25	9.81
	1974-1978	8.56	0.17	9.41
	1979-1980	1.81	0.27	3.16
	1981	1.81	0.19	2.76
	1982-1983	1.08	0.19	2.03
	1984	0.72	0.13	1.37
	1985-1986	0.55	0.07	0.90
	1987+	0.62	0.06	0.92
CO	Pre-1970	141.35	2.25	152.60
	1970-1973	107.72	2.55	120.47
	1974-1978	107.72	2.44	119.92
	1979-1980	29.83	2.59	42.78
	1981	29.83	1.13	35.48
	1982-1983	19.75	1.13	25.40
	1984	12.95	0.98	17.85
	1985-1986	8.88	0.49	11.33
	1987+	7.74	0.91	12.29
NOx	Pre-1970	3.10	0.0	3.10
	1970-1973	4.32	0.0	4.32
	1974-1978	3.07	0.04	3.27
	1979-1980	1.02	0.09	1.47
	1981	1.02	0.09	1.47
	1982-1983	1.74	0.09	2.19
	1984	1.74	0.09	2.19
	1985-1986	1.74	0.04	1.94
	1987+	0.86	0.04	1.06

* WHERE : BER = Basic emission rate (untampered)
ZML = Zero mile level
DR = Deterioration rate
M = Cumulative mileage / 10,000

DATE : MAY 25, 1985

TABLE 2.3.1B

EXHAUST EMISSION RATES FOR
HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS II
AT VARIOUS MILEAGE INTERVALS
(RATES INCLUDE TAMPERING)

Pol	Model Years	Emission Rate (Grams/Mile) 0K	20K	40K	60K	80K	100K	120K	140K
HC	Pre-1970	12.35	12.71	13.07	13.43	13.78	14.14	14.50	14.86
	1970-1973	8.56	9.07	9.57	10.08	10.59	11.09	11.60	12.10
	1974-1978	8.56	8.90	9.23	9.57	9.91	10.25	10.59	10.93
	1979-1980	2.42	3.15	3.89	4.62	5.35	6.09	6.82	7.55
	1981	2.42	2.99	3.56	4.13	4.71	5.28	5.85	6.42
	1982	1.68	2.26	2.83	3.40	3.97	4.54	5.11	5.68
	1983	1.66	2.22	2.79	3.35	3.91	4.47	5.04	5.60
	1984	1.22	1.62	2.02	2.42	2.83	3.23	3.63	4.03
	1985-1986	1.05	1.33	1.62	1.91	2.19	2.48	2.77	3.05
	1987+	1.01	1.24	1.48	1.72	1.95	2.19	2.43	2.66
CO	Pre-1970	141.33	145.76	150.19	154.62	159.05	163.49	167.93	172.37
	1970-1973	107.72	112.72	117.72	122 74	127.76	132.78	137.80	142.83
	1974-1978	107.73	112.65	117.56	122 48	127.39	132.29	137.20	142.10
	1979-1980	36.32	43.79	51.26	58.72	66.17	73.62	81 06	88.50
	1981	36.32	40.75	45.15	49.53	53.90	58.25	62.60	66.95
	1982	25.87	30.24	34.61	38 96	43.31	47.65	51.98	56.32
	1983	25 66	29.95	34.24	38.51	42.78	47.04	51.29	55.55
	1984	17.69	21.23	24 79	28.35	31.92	35.48	39.05	42.61
	1985-1986	13.56	16.12	18.69	21 27	23.85	26.43	29.01	31.59
	1987+	11.33	14.38	17.44	20.50	23 56	26.62	29.68	32.74
NOx	Pre-1970	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10
	1970-1972	4 32	4 32	4.32	4.31	4.31	4.31	4.31	4.31
	1973	4.34	4.35	4.37	4.38	4.39	4.41	4.42	4.44
	1974-1978	3.09	3.18	3.28	3.38	3.47	3.57	3.66	3.76
	1979-1981	1.19	1.52	1.85	2.18	2.51	2.84	3.17	3.50
	1982	1.92	2 24	2.57	2.90	3.23	3.55	3.88	4.21
	1983	1 92	2 24	2.57	2.90	3.23	3.55	3.88	4.21
	1984	1 95	2.28	2.62	2.95	3 29	3.62	3.95	4.29
	1985-1986	1 95	2.18	2 42	2.65	2.89	3.12	3.36	3.60
	1987+	1.19	1.39	1.59	1.80	2.00	2.20	2.41	2.61

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TABLE 2.3.1C

CRANKCASE AND EVAPORATIVE HYDROCARBON EMISSIONS
FOR HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS II
(RATES REFLECT ZERO TAMPERING)

** CCEV = (HSK * TPD + DNL)/MPD + CC

Model Years	SHED Hot Soak Emissions (Gm/Trip)	Trips* Per Day	SHED Diurnal Emissions (Gm/Day)	Miles* Per Day	Crankcase Emissions (Gm/Mile)	Total Crankcase and Evap. Emissions (Gm/Mile)
Pre-1968	35.96	3.05	101.26	33.70	7.35	13.61
1968-1978	35.96	3.05	101.26	33.70	0.0	6.26
1979-1981	10.31	3.05	24.11	33.70	0.0	1.65
1982-1983	10.31	3.05	12.10	33.70	0.0	1.29
1984	4.67	3.05	12.10	33.70	0.0	0.78
1985	4.16	3.05	12.10	33.70	0.0	0.74
1986	3.65	3.05	12.10	33.70	0.0	0.69
1987	3.21	3.05	12.10	33.70	0.0	0.65
1988-1989	2.67	3.05	12.10	33.70	0.0	0.60
1990+	2.37	3.05	12.10	33.70	0.0	0.57

* Default information that may be altered by the MOBILE3 user with information about the local area.

** WHERE :

CCEV = Total untampered crankcase & evaporative HC emissions (Gm/Mile)
HSK = Hot soak emissions (Gm/Trip)
TPD = Trips per day
DNL = Diurnal emissions (Gm/Day)
MPD = Miles per day
CC = Crankcase emissions (Gm/Mile)

DATE : MAY 25, 1985

TABLE 2.3.1D

TOTAL CRANKCASE AND EVAPORATIVE HC EMISSIONS
FOR HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS II
AT VARIOUS MILEAGE INTERVALS
(RATES INCLUDE TAMPERING)

Model Years	Emission Rate (Grams/Mile) 0K	20K	40K	60K	80K	100K	120K	140K
Pre-1968	13.61	13.61	13.61	13.61	13.61	13.61	13.61	13.61
1968-1970	6.42	6.45	6.47	6.50	6.52	6.55	6.57	6.60
1971-1974	6.41	6.43	6.46	6.48	6.51	6.53	6.55	6.58
1975-1977	6.41	6.43	6.45	6.48	6.50	6.53	6.55	6.57
1978	6.40	6.42	6.45	6.47	6.49	6.51	6.54	6.56
1979	1.84	1.88	1.91	1.94	1.97	2.01	2.04	2.07
1980	1.82	1.85	1.88	1.91	1.94	1.97	2.00	2.03
1981	1.82	1.85	1.88	1.91	1.94	1.96	1.99	2.02
1982	1.46	1.49	1.52	1.55	1.58	1.61	1.64	1.67
1983	1.46	1.48	1.51	1.54	1.57	1.59	1.62	1.65
1984	0.94	0.96	0.99	1.02	1.04	1.07	1.09	1.12
1985	0.88	0.91	0.93	0.96	0.98	1.01	1.03	1.06
1986	0.83	0.86	0.88	0.90	0.93	0.95	0.97	1.00
1987	0.79	0.81	0.83	0.85	0.87	0.90	0.92	0.94
1988-1989	0.73	0.75	0.77	0.79	0.81	0.83	0.85	0.88
1990+	0.70	0.72	0.74	0.76	0.78	0.80	0.82	0.84

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TABLE 2.3.2A

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS II
TOTAL HC (INCLUDES EVAP & CRANKCASE)

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	29.3	1962	29.3	1963	29.3	1964	29.3	1965	29.3	1966	29.3	1967	29.3	1968	21.9	1969	21.9	1970	19.8	1971	19.8	1972	19.8
1962	29.2	1963	29.2	1964	29.2	1965	29.2	1966	29.2	1967	29.2	1968	21.9	1969	21 9	1970	19.7	1971	19.7	1972	19.7	1973	19.7
1963	29.1	1964	29.1	1965	29.1	1966	29.1	1967	29.1	1968	21.8	1969	21.8	1970	19.6	1971	19.6	1972	19.6	1973	19.6	1974	18.2
1964	29.0	1965	29.0	1966	29.0	1967	29.0	1968	21.7	1969	21.7	1970	19.5	1971	19.5	1972	19.5	1973	19.5	1974	18.1	1975	18.1
1965	28.9	1966	28.9	1967	28.9	1968	21.6	1969	21.6	1970	19.3	1971	19.3	1972	19.3	1973	19.3	1974	18.0	1975	18.0	1976	18.0
1966	28.8	1967	28.8	1968	21.5	1969	21.5	1970	19.2	1971	19.2	1972	19.2	1973	19.2	1974	17.9	1975	17.9	1976	17.9	1977	17.9
1967	28.7	1968	21.3	1969	21.3	1970	19.0	1971	19.0	1972	19.0	1973	19.0	1974	17.8	1975	17.8	1976	17.8	1977	17.8	1978	17.8
1968	21.2	1969	21.2	1970	18.8	1971	18.8	1972	18.8	1973	18.8	1974	17.6	1975	17.6	1976	17.6	1977	17.6	1978	17.6	1979	7.7
1969	21.1	1970	18.6	1971	18.6	1972	18.6	1973	18.6	1974	17.5	1975	17.5	1976	17.5	1977	17.5	1978	17.5	1979	7.5	1980	7.5
1970	18.4	1971	18.4	1972	18.4	1973	18.4	1974	17.4	1975	17.4	1976	17.4	1977	17.4	1978	17.4	1979	7.3	1980	7.3	1981	6.3
1971	18.2	1972	18.2	1973	18.2	1974	17.2	1975	17.2	1976	17.2	1977	17.2	1978	17.2	1979	7.1	1980	7.1	1981	6.1	1982	5.0
1972	18.0	1973	18.0	1974	17.0	1975	17.0	1976	17.0	1977	17.0	1978	17.0	1979	6.8	1980	6.8	1981	5.9	1982	4.8	1983	4.8
1973	17.7	1974	16.9	1975	16.9	1976	16.9	1977	16.9	1978	16.9	1979	6.5	1980	6.5	1981	5.7	1982	4.6	1983	4.6	1984	3.1
1974	16.7	1975	16.7	1976	16.7	1977	16.7	1978	16.7	1979	6.2	1980	6.2	1981	5.5	1982	4.4	1983	4.4	1984	3.0	1985	2.2
1975	16.5	1976	16.5	1977	16.5	1978	16.5	1979	5.8	1980	5.8	1981	5.2	1982	4.1	1983	4.1	1984	2.8	1985	2.1	1986	2.1
1976	16.2	1977	16.2	1978	16.2	1979	5.5	1980	5.5	1981	5.0	1982	3.9	1983	3.9	1984	2.6	1985	2.0	1986	2.0	1987	1.9
1977	16.0	1978	16.0	1979	5.1	1980	5.1	1981	4.7	1982	3.6	1983	3.6	1984	2.4	1985	1.9	1986	1.9	1987	1.9	1988	1.8
1978	15.7	1979	4.7	1980	4.7	1981	4.4	1982	3.3	1983	3.3	1984	2.2	1985	1.8	1986	1.8	1987	1.8	1988	1.7	1989	1.7
1979	4.2	1980	4.2	1981	4.1	1982	3.0	1983	3.0	1984	2.0	1985	1.7	1986	1.7	1987	1.7	1988	1.6	1989	1.6	1990	1.6
1980	3 9	1981	3.9	1982	2.8	1983	2.8	1984	1 9	1985	1.6	1986	1.6	1987	1.6	1988	1.5	1989	1.5	1990	1.5	1991	1.5

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	19.8	1974	18.3	1975	18.3	1976	18.3	1977	18.3	1978	18.3	1979	8.8	1980	8.8	1981	7.3	1982	6.2	1983	6.2	1984	4.2
1974	18.3	1975	18.3	1976	18.3	1977	18.3	1978	18.3	1979	8.7	1980	8.7	1981	7.2	1982	6.2	1983	6.2	1984	4.2	1985	2.9
1975	18.2	1976	18.2	1977	18.2	1978	18.2	1979	8.6	1980	8.6	1981	7.2	1982	6.1	1983	6.1	1984	4.1	1985	2.8	1986	2.8
1976	18.1	1977	18.1	1978	18.1	1979	8.4	1980	8.4	1981	7.1	1982	6.0	1983	6.0	1984	4.1	1985	2.8	1986	2.8	1987	2.6
1977	18.0	1978	18.0	1979	8.3	1980	8.3	1981	7.0	1982	5.9	1983	5.9	1984	4.0	1985	2.8	1986	2.7	1987	2.6	1988	2.5
1978	17.9	1979	8.1	1980	8.1	1981	6.8	1982	5.7	1983	5 7	1984	3.9	1985	2.7	1986	2.7	1987	2.5	1988	2.5	1989	2.5
1979	7.9	1980	7.9	1981	6.7	1982	5.6	1983	5.6	1984	3.8	1985	2.7	1986	2.6	1987	2.5	1988	2.4	1989	2.4	1990	2.4
1980	7.7	1981	6.6	1982	5.5	1983	5 5	1984	3.7	1985	2.6	1986	2.6	1987	2.5	1988	2.4	1989	2.4	1990	2.4	1991	2.4
1981	6.4	1982	5.3	1983	5.3	1984	3.6	1985	2.6	1986	2.5	1987	2.4	1988	2.4	1989	2.4	1990	2.3	1991	2.3	1992	2.3
1982	5.2	1983	5.2	1984	3.5	1985	2.5	1986	2.5	1987	2.4	1988	2.3	1989	2.3	1990	2.3	1991	2.3	1992	2.3	1993	2.3
1983	5.0	1984	3.4	1985	2.4	1986	2 4	1987	2.3	1988	2.3	1989	2.3	1990	2.2	1991	2.2	1992	2.2	1993	2.2	1994	2.2
1984	3.3	1985	2.4	1986	2 3	1987	2.2	1988	2.2	1989	2.2	1990	2.2	1991	2.2	1992	2.2	1993	2.2	1994	2.2	1995	2.2
1985	2.3	1986	2.3	1987	2.2	1988	2.1	1989	2.1	1990	2.1	1991	2.1	1992	2.1	1993	2.1	1994	2.1	1995	2.1	1996	2.1
1986	2.2	1987	2.1	1988	2.1	1989	2.1	1990	2.0	1991	2.0	1992	2.0	1993	2.0	1994	2.0	1995	2.0	1996	2.0	1997	2.0
1987	2.0	1988	2.0	1989	2.0	1990	2.0	1991	2.0	1992	2.0	1993	2.0	1994	2.0	1995	2.0	1996	2.0	1997	2.0	1998	2.0
1988	1 9	1989	1.9	1990	1.9	1991	1.9	1992	1.9	1993	1.9	1994	1.9	1995	1.9	1996	1.9	1997	1.9	1998	1.9	1999	1.9
1989	1.8	1990	1.8	1991	1.8	1992	1.8	1993	1.8	1994	1.8	1995	1.8	1996	1.8	1997	1.8	1998	1.8	1999	1.8	2000	1.8
1990	1.7	1991	1.7	1992	1.7	1993	1.7	1994	1.7	1995	1.7	1996	1.7	1997	1.7	1998	1.7	1999	1.7	2000	1.7	2001	1.7
1991	1.6	1992	1.6	1993	1.6	1994	1.6	1995	1.6	1996	1.6	1997	1.6	1998	1.6	1999	1.6	2000	1.6	2001	1.6	2002	1.6
1992	1.5	1993	1.5	1994	1 5	1995	1.5	1996	1 5	1997	1.5	1998	1.5	1999	1.5	2000	1.5	2001	1.5	2002	1.5	2003	1.5

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20 6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.3 4

TABLE 2.3.2B

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS II
CO

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	182.5	1962	182.5	1963	182.5	1964	182.5	1965	182.5	1966	182.5	1967	182.5	1968	182.5	1969	182.5	1970	154.6	1971	154.6	1972	154.6
1962	181.5	1963	181.5	1964	181.5	1965	181.5	1966	181.5	1967	181.5	1968	181.5	1969	181.5	1970	153.4	1971	153.4	1972	153.4	1973	153.4
1963	180.4	1964	180.4	1965	180.4	1966	180.4	1967	180.4	1968	180.4	1969	180.4	1970	152.2	1971	152.2	1972	152.2	1973	152.2	1974	150.3
1964	179.3	1965	179.3	1966	179.3	1967	179.3	1968	179.3	1969	179.3	1970	150.9	1971	150.9	1972	150.9	1973	150.9	1974	149.0	1975	149.0
1965	178.0	1966	178 0	1967	178.0	1968	178.0	1969	178.0	1970	149.4	1971	149.4	1972	149.4	1973	149.4	1974	147.6	1975	147.6	1976	147.6
1966	176.6	1967	176.6	1968	176.6	1969	176.6	1970	147.9	1971	147.9	1972	147.9	1973	147.9	1974	146.1	1975	146.1	1976	146.1	1977	146.1
1967	175 1	1968	175.1	1969	175.1	1970	146.2	1971	146.2	1972	146.2	1973	146.2	1974	144.5	1975	144.5	1976	144.5	1977	144.5	1978	144.5
1968	173.5	1969	173.5	1970	144.4	1971	144.4	1972	144.4	1973	144.4	1974	142.8	1975	142.8	1976	142.8	1977	142.8	1978	142.8	1979	67.3
1969	171.8	1970	142.4	1971	142.4	1972	142.4	1973	142.4	1974	140.9	1975	140.9	1976	140.9	1977	140.9	1978	140.9	1979	65.3	1980	65.3
1970	140.2	1971	140.2	1972	140.2	1973	140.2	1974	138.8	1975	138.8	1976	138.8	1977	138.8	1978	138.8	1979	63.1	1980	63.1	1981	44.3
1971	137.9	1972	137.9	1973	137.9	1974	136.6	1975	136.6	1976	136.6	1977	136.6	1978	136.6	1979	60.8	1980	60.8	1981	43.3	1982	33.2
1972	135.4	1973	135.4	1974	134.2	1975	134.2	1976	134.2	1977	134.2	1978	134.2	1979	58.2	1980	58.2	1981	42.2	1982	32.1	1983	32.1
1973	132.7	1974	131.6	1975	131.6	1976	131.6	1977	131.6	1978	131.6	1979	55.4	1980	55.4	1981	40.9	1982	30.9	1983	30.9	1984	22.6
1974	128.7	1975	128.7	1976	128.7	1977	128.7	1978	128.7	1979	52.4	1980	52.4	1981	39.6	1982	29.6	1983	29.6	1984	21.5	1985	13.1
1975	125.7	1976	125.7	1977	125.7	1978	125.7	1979	49.2	1980	49 2	1981	38.2	1982	28.2	1983	28.2	1984	20.3	1985	12.5	1986	12.5
1976	122 4	1977	122.4	1978	122.4	1979	45.7	1980	45.7	1981	36.7	1982	26.6	1983	26.6	1984	18.9	1985	11.9	1986	11.9	1987	13.3
1977	118.8	1978	118.8	1979	41.9	1980	41.9	1981	35.0	1982	25.0	1983	25.0	1984	17.5	1985	11.1	1986	11.1	1987	12.0	1988	12.0
1978	114.9	1979	37.7	1980	37.7	1981	33.2	1982	23.2	1983	23.2	1984	15.9	1985	10.4	1986	10.4	1987	10.5	1988	10.5	1989	10.5
1979	33.3	1980	33.3	1981	31.3	1982	21.2	1983	21.2	1984	14.2	1985	9.5	1986	9.5	1987	9.0	1988	9.0	1989	9.0	1990	9.0
1980	30.3	1981	30.0	1982	19.9	1983	19.9	1984	13.1	1985	9.0	1986	9.0	1987	7.9	1988	7 9	1989	7.9	1990	7.9	1991	7.9

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	154.6	1974	152.5	1975	152.5	1976	152.5	1977	152.5	1978	152.5	1979	77.7	1980	77.7	1981	50.7	1982	40.6	1983	40.6	1984	31.0
1974	151.4	1975	151.4	1976	151.4	1977	151.4	1978	151 4	1979	76.5	1980	76.5	1981	50.1	1982	40.1	1983	40.1	1984	30.6	1985	17.7
1975	150.3	1976	150.3	1977	150.3	1978	150.3	1979	75.3	1980	75.3	1981	49.6	1982	39.6	1983	39.6	1984	30.1	1985	17.5	1986	17.5
1976	149.0	1977	149.0	1978	149.0	1979	73.9	1980	73.9	1981	49.0	1982	39.0	1983	39.0	1984	29.6	1985	17.2	1986	17.2	1987	23.2
1977	147.6	1978	147.6	1979	72.5	1980	72.5	1981	48.4	1982	38.3	1983	38.3	1984	29.1	1985	16.9	1986	16.9	1987	22.7	1988	22.7
1978	146.1	1979	70.9	1980	70.9	1981	47.7	1982	37.6	1983	37.6	1984	28.5	1985	16.6	1986	16.6	1987	22.2	1988	22.2	1989	22.2
1979	69.2	1980	69 2	1981	46.9	1982	36.9	1983	36.9	1984	27.8	1985	16.3	1986	16.3	1987	21.6	1988	21.6	1989	21.6	1990	21.6
1980	67.3	1981	46.1	1982	36.1	1983	36.1	1984	27.1	1985	16.0	1986	16.0	1987	20.9	1988	20.9	1989	20.9	1990	20.9	1991	20.9
1981	45.2	1982	35.2	1983	35.2	1984	26.4	1985	15.6	1986	15.6	1987	20.2	1988	20.2	1989	20.2	1990	20.2	1991	20.2	1992	20.2
1982	34.2	1983	34.2	1984	25.5	1985	15.2	1986	15.2	1987	19.4	1988	19.4	1989	19.4	1990	19.4	1991	19.4	1992	19.4	1993	19.4
1983	33.2	1984	24.6	1985	14.7	1986	14.7	1987	18.6	1988	18.6	1989	18.6	1990	18.6	1991	18.6	1992	18.6	1993	18.6	1994	18.6
1984	23.7	1985	14.2	1986	14.2	1987	17.7	1988	17.7	1989	17.7	1990	17.7	1991	17.7	1992	17.7	1993	17.7	1994	17.7	1995	17.7
1985	13.7	1986	13.7	1987	16.7	1988	16.7	1989	16.7	1990	16.7	1991	16.7	1992	16.7	1993	16.7	1994	16.7	1995	16.7	1996	16.7
1986	13.1	1987	15.7	1988	15.7	1989	15.7	1990	15.7	1991	15.7	1992	15.7	1993	15.7	1994	15.7	1995	15.7	1996	15.7	1997	15.7
1987	14.5	1988	14.5	1989	14.5	1990	14.5	1991	14.5	1992	14.5	1993	14.5	1994	14.5	1995	14.5	1996	14.5	1997	14.5	1998	14.5
1988	13.3	1989	13.3	1990	13.3	1991	13.3	1992	13.3	1993	13.3	1994	13.3	1995	13.3	1996	13.3	1997	13.3	1998	13.3	1999	13.3
1989	12.0	1990	12.0	1991	12.0	1992	12.0	1993	12.0	1994	12.0	1995	12.0	1996	12.0	1997	12.0	1998	12.0	1999	12.0	2000	12.0
1990	10.5	1991	10.5	1992	10.5	1993	10.5	1994	10.5	1995	10.5	1996	10.5	1997	10.5	1998	10.5	1999	10.5	2000	10.5	2001	10.5
1991	9.0	1992	9.0	1993	9.0	1994	9.0	1995	9.0	1996	9.0	1997	9.0	1998	9.0	1999	9.0	2000	9.0	2001	9.0	2002	9.0
1992	7.9	1993	7.9	1994	7.9	1995	7.9	1996	7.9	1997	7.9	1998	7.9	1999	7.9	2000	7.9	2001	7.9	2002	7.9	2003	7.9

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.3.4.

TABLE 2.3.2C

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS II
NOx

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	3.1	1962	3.1	1963	3.1	1964	3.1	1965	3.1	1966	3.1	1967	3.1	1968	3.1	1969	3.1	1970	4.3	1971	4.3	1972	4.3
1962	3.1	1963	3.1	1964	3.1	1965	3.1	1966	3.1	1967	3.1	1968	3.1	1969	3.1	1970	4.3	1971	4.3	1972	4.3	1973	4.3
1963	3.1	1964	3.1	1965	3.1	1966	3.1	1967	3.1	1968	3.1	1969	3.1	1970	4.3	1971	4.3	1972	4.3	1973	4.3	1974	3.8
1964	3.1	1965	3.1	1966	3.1	1967	3.1	1968	3.1	1969	3.1	1970	4.3	1971	4.3	1972	4.3	1973	4.3	1974	3.7	1975	3.7
1965	3.1	1966	3.1	1967	3.1	1968	3 1	1969	3.1	1970	4.3	1971	4.3	1972	4.3	1973	4.3	1974	3.7	1975	3.7	1976	3.7
1966	3.1	1967	3.1	1968	3.1	1969	3.1	1970	4.3	1971	4.3	1972	4.3	1973	4.3	1974	3.7	1975	3.7	1976	3.7	1977	3.7
1967	3.1	1968	3.1	1969	3.1	1970	4.3	1971	4.3	1972	4.3	1973	4.3	1974	3.7	1975	3.7	1976	3.7	1977	3.7	1978	3.7
1968	3.1	1969	3.1	1970	4.3	1971	4.3	1972	4.3	1973	4.3	1974	3.6	1975	3.6	1976	3.6	1977	3.6	1978	3.6	1979	2.3
1969	3.1	1970	4.3	1971	4.3	1972	4.3	1973	4.3	1974	3.6	1975	3.6	1976	3.6	1977	3.6	1978	3.6	1979	2.3	1980	2.3
1970	4.3	1971	4.3	1972	4.3	1973	4.3	1974	3.6	1975	3.6	1976	3.6	1977	3.6	1978	3.6	1979	2.2	1980	2.2	1981	2.2
1971	4.3	1972	4.3	1973	4.3	1974	3.5	1975	3.5	1976	3.5	1977	3.5	1978	3.5	1979	2.1	1980	2.1	1981	2.1	1982	2.8
1972	4.3	1973	4.3	1974	3.5	1975	3.5	1976	3.5	1977	3.5	1978	3.5	1979	2.0	1980	2.0	1981	2.0	1982	2.7	1983	2.7
1973	4.3	1974	3.5	1975	3.5	1976	3.5	1977	3.5	1978	3.5	1979	1.9	1980	1.9	1981	1.9	1982	2.6	1983	2.6	1984	2.6
1974	3.4	1975	3.4	1976	3.4	1977	3.4	1978	3.4	1979	1.8	1980	1.8	1981	1.8	1982	2.5	1983	2.5	1984	2.5	1985	2.1
1975	3.4	1976	3.4	1977	3.4	1978	3.4	1979	1.7	1980	1.7	1981	1.7	1982	2.4	1983	2.4	1984	2.4	1985	2.0	1986	2.0
1976	3.3	1977	3.3	1978	3.3	1979	1 6	1980	1.6	1981	1.6	1982	2.3	1983	2.3	1984	2.3	1985	2.0	1986	2.0	1987	1.1
1977	3.3	1978	3.3	1979	1.4	1980	1.4	1981	1.4	1982	2.2	1983	2.2	1984	2.2	1985	1.9	1986	1.9	1987	1.0	1988	1.0
1978	3.2	1979	1.3	1980	1.3	1981	1.3	1982	2.0	1983	2.0	1984	2.0	1985	1.9	1986	1.9	1987	1.0	1988	1.0	1989	1.0
1979	1.1	1980	1.1	1981	1.1	1982	1.9	1983	1.9	1984	1.9	1985	1.8	1986	1.8	1987	0.9	1988	0.9	1989	0.9	1990	0.9
1980	1.0	1981	1.0	1982	1.8	1983	1.8	1984	1.8	1985	1.7	1986	1.7	1987	0.9	1988	0.9	1989	0.9	1990	0.9	1991	0.9

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	4.3	1974	3.8	1975	3.8	1976	3.8	1977	3.8	1978	3.8	1979	2.7	1980	2.7	1981	2.7	1982	3.4	1983	3.4	1984	3.4
1974	3.8	1975	3.8	1976	3.8	1977	3.8	1978	3.8	1979	2.6	1980	2.6	1981	2.6	1982	3.4	1983	3.4	1984	3.4	1985	2.5
1975	3.8	1976	3.8	1977	3.8	1978	3.8	1979	2.6	1980	2.6	1981	2.6	1982	3.3	1983	3.3	1984	3.3	1985	2.4	1986	2.4
1976	3.7	1977	3.7	1978	3.7	1979	2.6	1980	2.6	1981	2.6	1982	3.3	1983	3.3	1984	3.3	1985	2.4	1986	2.4	1987	1.5
1977	3.7	1978	3.7	1979	2.5	1980	2.5	1981	2.5	1982	3.2	1983	3.2	1984	3.2	1985	2.4	1986	2.4	1987	1.5	1988	1.5
1978	3.7	1979	2.5	1980	2.5	1981	2.5	1982	3.2	1983	3.2	1984	3.2	1985	2.4	1986	2.4	1987	1.5	1988	1.5	1989	1.5
1979	2.4	1980	2.4	1981	2.4	1982	3.1	1983	3.1	1984	3.1	1985	2.3	1986	2.3	1987	1.5	1988	1.5	1989	1.5	1990	1.5
1980	2.3	1981	2.3	1982	3.0	1983	3.0	1984	3.0	1985	2.3	1986	2.3	1987	1.4	1988	1.4	1989	1.4	1990	1.4	1991	1.4
1981	2.3	1982	3.0	1983	3.0	1984	3.0	1985	2.3	1986	2.3	1987	1.4	1988	1.4	1989	1.4	1990	1.4	1991	1.4	1992	1.4
1982	2.9	1983	2.9	1984	2.9	1985	2.3	1986	2.3	1987	1.4	1988	1.4	1989	1.4	1990	1.4	1991	1.4	1992	1.4	1993	1.4
1983	2.8	1984	2.8	1985	2.2	1986	2.2	1987	1.3	1988	1.3	1989	1.3	1990	1.3	1991	1.3	1992	1.3	1993	1.3	1994	1.3
1984	2.7	1985	2.2	1986	2.2	1987	1.3	1988	1.3	1989	1.3	1990	1.3	1991	1.3	1992	1.3	1993	1.3	1994	1.3	1995	1.3
1985	2.1	1986	2.1	1987	1.3	1988	1.3	1989	1.3	1990	1.3	1991	1.3	1992	1.3	1993	1.3	1994	1.3	1995	1.3	1996	1.3
1986	2.1	1987	1.2	1988	1.2	1989	1.2	1990	1.2	1991	1.2	1992	1.2	1993	1.2	1994	1.2	1995	1.2	1996	1.2	1997	1.2
1987	1.2	1988	1.2	1989	1.2	1990	1.2	1991	1.2	1992	1.2	1993	1.2	1994	1.2	1995	1.2	1996	1.2	1997	1.2	1998	1.2
1988	1.1	1989	1.1	1990	1.1	1991	1.1	1992	1.1	1993	1.1	1994	1.1	1995	1.1	1996	1.1	1997	1.1	1998	1.1	1999	1.1
1989	1.0	1990	1.0	1991	1.0	1992	1.0	1993	1.0	1994	1.0	1995	1.0	1996	1.0	1997	1.0	1998	1.0	1999	1.0	2000	1.0
1990	1.0	1991	1.0	1992	1.0	1993	1.0	1994	1.0	1995	1.0	1996	1.0	1997	1.0	1998	1.0	1999	1.0	2000	1.0	2001	1.0
1991	0.9	1992	0.9	1993	0.9	1994	0.9	1995	0.9	1996	0.9	1997	0.9	1998	0.9	1999	0.9	2000	0.9	2001	0.9	2002	0.9
1992	0.9	1993	0.9	1994	0.9	1995	0.9	1996	0.9	1997	0.9	1998	0.9	1999	0.9	2000	0.9	2001	0.9	2002	0.9	2003	0.9

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.3.4.

TABLE 2.3.3

IDLE EMISSION RATES FOR
HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS II

* IER = ZML + (DR * M)

Pol	Model Years	Zero Mile Emission Level (Grams/Min.)	Deterioration Rate (Gm/Min/10K Mi)
HC	Pre-1970	2.06	0.03
	1970-1973	1.09	0.04
	1974-1978	1.09	0.03
	1979-1980	0.06	0.02
	1981	0.10	0.02
	1982-1983	0.07	0.02
	1984	0.04	0.01
	1985-1986	0.04	0.01
	1987+	0.04	0.01
CO	Pre-1970	22.04	0.45
	1970-1973	12.74	0.52
	1974-1978	12.74	0.49
	1979-1980	1.52	0.32
	1981	2.27	0.27
	1982-1983	1.72	0.24
	1984	0.69	0.14
	1985-1986	0.49	0.28
	1987+	0.49	0.28
NOx	Pre-1970	0.10	0.0
	1970-1973	0.05	0.0
	1974-1978	0.04	0.0
	1979-1980	0.01	0.0
	1981	0.06	0.0
	1982-1983	0.06	0.0
	1984	0.05	0.0
	1985-1986	0.02	0.0
	1987+	0.02	0.0

* WHERE : IER = Idle emission rate
ZML = Zero mile level
DR = Deterioration Rate
M = Cumulative Mileage / 10,000

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TABLE 2.3.4

REGISTRATION MIX AND
MILEAGE ACCUMULATION RATES FOR
HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS II

Model Year Index**	July 1 Registration Mix*	Mileage Accumulation Rate per truck *	Jan 1 Registration Mix	Jan 1 Mileage Accumulation Rate (fleet)	Jan 1 Mileage Accumulation (fleet)
1	0.067	18352.	0.022	18352.	2294.
2	0.085	16946.	0.085	18000.	13720.
3	0.081	15648.	0.081	16621.	31021.
4	0.077	14449.	0.077	15348.	46997.
5	0.073	13342.	0.073	14172.	61748.
6	0.069	12320.	0.069	13086.	75370.
7	0.065	11376.	0.065	12084.	87947.
8	0.061	10504.	0.061	11158.	99562.
9	0.057	9700.	0.057	10303.	110286.
10	0.053	8956.	0.053	9514.	120188.
11	0.048	8270.	0.048	8784.	129332.
12	0.044	7637.	0.044	8112.	137775.
13	0.040	7052.	0.040	7491.	145572.
14	0.036	6511.	0.036	6917.	152771.
15	0.032	6012.	0.032	6386.	159419.
16	0.028	5552.	0.028	5897.	165557.
17	0.024	5126.	0.024	5445.	171225.
18	0.020	4734.	0.020	5028.	176458.
19	0.016	4371.	0.016	4643.	181291.
20+	0.024	4036.	0.024	4287.	185753.

* Default information that may be altered by the MOBILE3 user with information about the local area.

** The indices refer to the most recent model year vehicles in any given calendar year. Index 1 references the newest model year vehicles and index 20+ references the oldest model year vehicles.

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TABLE 2.3.5

EXAMPLE TRAVEL WEIGHTING FRACTION CALCULATION FOR
HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS II
JANUARY 1, 1988

Model Years	(A) LDT2 Fleet Registration	(B) Sales Fraction	(A*B)	(C=A*B/DAF) LDGT2 Registration	(D) Annual Mileage Accrual Rate	(C*D)	(C*D/TFNORM) Travel Fractions
1988	0.022	0.760	0.017	0.019	18352.	355.7	0.032
1987	0.085	0.790	0.067	0.077	18000.	1380.3	0.123
1986	0.081	0.820	0.066	0.076	16621.	1260.7	0.112
1985	0.077	0.840	0.065	0.074	15348.	1133.6	0.101
1984	0.073	0.870	0.064	0.073	14172.	1027.8	0.091
1983	0.069	0.900	0.062	0.071	13086.	928.0	0.083
1982	0.065	0.920	0.060	0.068	12084.	825.2	0.073
1981	0.061	0.940	0.057	0.065	11158.	730.6	0.065
1980	0.057	0.966	0.055	0.063	10303.	647.8	0.058
1979	0.053	0.972	0.052	0.059	9514.	559.7	0.050
1978	0.048	0.991	0.048	0.054	8784.	477.2	0.042
1977	0.044	0.995	0.044	0.050	8112.	405.5	0.036
1976	0.040	0.997	0.040	0.046	7491.	341.1	0.030
1975	0.036	0.998	0.036	0.041	6917.	283.8	0.025
1974	0.032	1.000	0.032	0.037	6386.	233.4	0.021
1973	0.028	1.000	0.028	0.032	5897.	188.6	0.017
1972	0.024	1.000	0.024	0.027	5445.	149.2	0.013
1971	0.020	1.000	0.020	0.023	5028.	114.8	0.010
1970	0.016	1.000	0.016	0.018	4643.	84.8	0.008
1969-	0.024	1.000	0.024	0.027	4287.	117.5	0.010
		DAF:	0.876		TFNORM:	11245.4	

WHERE :

A = January 1 registration mix from Table 2.3.4.
B = Fleet sales fractions
D = Sales weighted fleet mileage accumulation rate from Table 2.3.4, adjusted to January 1
D(1) = Annual Miles(1)
D(MYI) = .25*(Annual Miles(MYI)) + .75*(Annual Miles(MYI-1)), MYI=2,...,20+

NOTE : In general, the travel weighting fractions will change for every calendar year since the sales fraction (column B) changes for almost every model year.

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TABLE 2.3.6

SPEED CORRECTION FACTOR COEFFICIENTS FOR HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS II

$$* \; SCF(s,sadj) = SF(s)/SF(sadj)$$

$$SF(s) = EXP(A + B*s + C*s^2 + D*S^3 + E*s^4 + F*s^5), \text{ HC \& CO}$$
$$= A + B*s + C*s^2 + D*s^3 + E*s^4 + F*s^5 , \text{ NOx}$$

Pollutant and Model Years	A	B	C	D	E	F
HC						
Pre-1970	0.224612E+01	-0.290973E+00	0.158890E-01	-0.472494E-03	0.694077E-05	-0.392798E-07
1970-1973	0.215361E+01	-0.283451E+00	0.156948E-01	-0.469759E-03	0.693832E-05	-0.394707E-07
1974-1978	0.211340E+01	-0.285676E+00	0.163180E-01	-0.500793E-03	0.755067E-05	-0.437187E-07
1979+	0.239540E+01	-0.335781E+00	0.211609E-01	-0.731550E-03	0.120715E-04	-0.748566E-07
CO						
Pre-1970	0.181978E+01	-0.254663E+00	0.152347E-01	-0.487397E-03	0.758207E-05	-0.449514E-07
1970-1973	0.231868E+01	-0.341147E+00	0.209446E-01	-0.665891E-03	0.102225E-04	-0.598264E-07
1974-1978	0.215487E+01	-0.329116E+00	0.210112E-01	-0.689057E-03	0.108390E-04	-0.647125E-07
1979+	0.248747E+01	-0.391562E+00	0.270721E-01	-0.976178E-03	0.165270E-04	-0.104317E-06
NOx						
Pre-1970	0.244424E+01	-0.250107E+00	0.138293E-01	-0.287025E-03	0.207585E-05	0.0
1970-1973	0.144825E+01	-0.122444E+00	0.795024E-02	-0.171078E-03	0.125777E-05	0.0
1974-1978	0.153447E+01	-0.125671E+00	0.785919E-02	-0.169428E-03	0.125494E-05	0.0
1979+	0.942131E+00	-0.423240E-01	0.386253E-02	-0.939853E-04	0.753883E-06	0.0

* WHERE : s = average speed (mph)
sadj = basic test procedure speed; adjusted for fraction of cold start operation x and fraction of hot start operation w, [1/sadj = (w+x)/26 + (1-w-x)/16]

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TABLE 2.3.7A

TEMPERATURE CORRECTION FACTOR COEFFICIENTS FOR
HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS II

* TCF(b) = EXP(TC(b) * (T - 75.0))

Pol	Model Years	Test segment 1 TC Low	Test segment 1 TC High	Test segment 2 TC Low	Test segment 2 TC High	Test segment 3 TC Low	Test segment 3 TC High
HC	Pre-1970	-0.20623E-01	-0.14381E-01	-0.24032E-02	0.13219E-02	-0.10081E-02	0.34799E-02
	1970-1973	-0.24462E-01	-0.12552E-01	-0.32017E-02	0.42667E-02	-0.86884E-03	0.75843E-02
	1974-1978	-0.21255E-01	-0.10888E-01	-0.52755E-03	-0.47925E-03	0.93659E-03	0.76666E-02
	1979-1983	-0.23517E-01	-0.14095E-01	-0.88057E-02	0.26179E-01	-0.16222E-02	0.24297E-01
	1984-1987	-0.27793E-01	-0.14095E-01	-0.10177E-01	0.26179E-01	-0.82680E-02	0.24297E-01
	1988+	-0.33883E-01	0.11959E-01	-0.10113E-01	-0.12627E-04	-0.80650E-02	0.78765E-02
CO	Pre-1970	-0.13487E-01	-0.14691E-01	0.15784E-02	0.37462E-02	0.11097E-02	0.11014E-01
	1970-1973	-0.21126E-01	-0.38767E-01	-0.15289E-02	0.84685E-02	0.15749E-02	0.25179E-01
	1974-1978	-0.20843E-01	-0.21165E-01	-0.59951E-02	0.23603E-01	0.18253E-02	0.28483E-01
	1979-1983	-0.24835E-01	-0.19612E-01	-0.88336E-02	0.48537E-01	-0.11553E-02	0.31439E-01
	1984-1987	see NOTE 2	-0.19612E-01	-0.17783E-01	0.48537E-01	-0.10871E-01	0.31439E-01
	1988+	see NOTE 2	-0.12596E-01	-0.18813E-01	0.13861E-01	-0.11951E-01	0.96939E-02
NOx	Pre-1970	-0.16897E-03	0.38841E-02	-0.89245E-02	-0.87325E-02	-0.72580E-02	-0.10839E-01
	1970-1973	-0.25074E-03	-0.10389E-02	-0.59791E-02	-0.92466E-02	-0.62690E-02	-0.10108E-01
	1974-1978	0.38855E-02	-0.18301E-01	-0.24156E-02	-0.10925E-01	-0.21188E-02	-0.18042E-01
	1979-1987	-0.76044E-02	-0.26153E-01	-0.68045E-02	-0.18603E-01	-0.54198E-02	-0.20878E-01
	1988+	-0.53710E-02	-0.34416E-01	-0.65050E-02	-0.35871E-01	-0.85650E-02	-0.28830E-01

* WHERE :

TCF(b) = Temperature correction factor for appropriate pollutant, ambient temperature, and model year; for test segment b
T = Ambient temperature (Fahrenheit)
TC(b) = Temperature correction factor coefficient for appropriate pollutant, reference temperature and model year; for test segment b
75.0 = Reference temperature

NOTE 1 : The temperature correction factor is used in conjunction with the Ripstwxn correction factor given in Table 2.3.7B.

NOTE 2 : Offset model used for Bag 1 CO. Offset = -1.3812*(T - 75.0).

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TABLE 2.3.7B

NORMALIZED BAG FRACTIONS FOR
HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS II

		Normalized Fractions							
Pol	Model Years	Test Seg.#1 B1	Test Seg.#1 D1	Test Seg.#2 B2	Test Seg.#2 D2	Test Seg.#3 B3	Test Seg.#3 D3	Total Test B0	Total Test D0
HC	Pre-1970	1.282	0.025	0.973	0.028	0.839	0.019	1.000	0.025
	1970-1973	1.345	0.074	0.946	0.054	0.842	0.048	1.000	0.056
	1974-1978	1.398	0.060	0.885	0.055	0.919	0.036	1.000	0.051
	1979-1983	1.860	0.345	0.766	0.234	0.804	0.196	1.000	0.243
	1984-1986	2.200	0.714	0.571	0.171	0.914	0.143	1.000	0.286
	1987+	2.634	1.104	0.368	0.499	0.973	0.391	1.000	0.594
CO	Pre-1970	1.277	0.033	1.017	0.029	0.758	0.025	1.000	0.029
	1970-1973	1.442	0.071	0.996	0.042	0.674	0.033	1.000	0.046
	1974-1978	1.573	0.054	0.902	0.079	0.755	0.029	1.000	0.060
	1979-1983	1.972	0.176	0.881	0.157	0.628	0.109	1.000	0.139
	1984-1986	2.438	0.282	0.658	0.062	0.621	0.077	1.000	0.111
	1987+	3.941	2.009	0.0	1.186	0.689	1.014	1.000	1.308
NOx	Pre-1970	1.121	0.009	0.785	0.001	1.319	-0.009	1.000	0.0
	1970-1973	1.199	-0.004	0.793	-0.002	1.245	0.006	1.000	0.0
	1974-1978	1.262	0.022	0.770	0.004	1.242	0.027	1.000	0.014
	1979-1986	1.372	0.040	0.766	0.046	1.167	0.063	1.000	0.051
	1987+	1.830	0.169	0.703	0.149	0.939	0.222	1.000	0.173

NOTE : The fractions given in this table are used in the calculation of the operating-mode/ temperature correction factor (OMTCF).

WHERE :

```
OMTCF   = ((TERM1 + TERM2 + TERM3)/DENOM)
TERM1   =    W    *TCF(1)*(B1+D1*M)
TERM2   = (1-W-X)*TCF(2)*(B2+D2*M)
TERM3   =    X    *TCF(3)*(B3+D3*M)
DENOM   = B0 + D0*M
 W      = Fraction of VMT in the cold start mode
 X      = Fraction of VMT in the  hot start mode
TCF(b)  = Temperature correction factor for pollutant, model
          year; for test segment b
 M      = Cumulative mileage / 10,000
```

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TABLE 2.3.8A

AIR CONDITIONING CORRECTION FACTOR COEFFICIENTS FOR
HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS II

* ACCF= U*V*(A + B*(T-75) -1) + 1

Model	HC		CO		NOx	
Years	A	B	A	B	A	B
Pre-1979	0.1023E+01	0.3344E-02	0.1202E+01	0.1808E-02	0.1299E+01	0.5643E-04
1979+	0.1000E+01	0.3512E-02	0.1130E+01	0.1528E-02	0.1221E+01	0.4262E-03

* WHERE :

ACCF = Air Conditioning Correction Factor
V = Fraction of vehicles which are equipped with AC given in Table 2.3.8B
U = Fraction of vehicles with AC that are using it = (DI-DILO)/(DIHI-DI), 0<=U<=1
DI = Discomfort index = (DB+WB)*.4+15
DILO = The highest discomfort index where no AC is used
DIHI = The lowest discomfort index where all vehicles with AC use it
DB = Dry bulb temperature (Fahrenheit)
WB = Wet bulb temperature (Fahrenheit)
T = Ambient temperature (Fahrenheit)

TABLE 2.3.8B

ESTIMATED FRACTION OF
HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS II
EQUIPPED WITH AIR CONDITIONING

Model Years	Fraction Equipped With Air Conditioning
Pre-1977	0.32
1977	0.52
1978+	0.39

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TABLE 2.3.9

EXTRA LOAD CORRECTION FACTOR COEFFICIENTS
FOR HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS II

* XLCF = (XLC-1)*U + 1

Model Years	Coefficients (XLC) HC	CO	NOx
Pre-1970	1.0786	1.2765	0.9535
1970-1973	1.0495	1.1384	1.0313
1974-1978	1.0556	1.1347	1.0753
1979+	1.0455	1.3058	1.0719

* WHERE :

XLCF = Extra load correction factor
U = Fraction of VMT with an extra load
XLC = Correction factor coefficient

TABLE 2.3.10

TRAILER TOWING CORRECTION FACTOR COEFFICIENTS
FOR HIGH ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS II

* TTCF = (TTC-1)*U + 1

Model Years	Coefficients (TTC) HC	CO	NOx
Pre-1970	1.2614	1.9327	1.1184
1970-1973	1.2762	1.8940	1.1384
1974-1978	1.7288	2.1414	1.2170
1979+	1.5909	3.9722	1.3875

* WHERE :

TTCF = Trailer towing correction factor
U = Fraction of VMT towing a trailer
TTC = Correction factor coefficient

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TABLE 2.4.1A

EXHAUST EMISSION RATES FOR
HIGH ALTITUDE
HEAVY DUTY GASOLINE POWERED VEHICLES
(RATES REFLECT ZERO TAMPERING)

* BER = ZML + (DR * M)

Pol	Model Years	Zero Mile Emission Level (Grams/Mile)	Deterioration Rate (Gm/Mi/10K Mi)	50,000 Mile Emission Level (Grams/Mile)
HC	Pre-1963	22.46	0.31	24.01
	1963-1969	23.28	0.32	24.88
	1970-1973	12.55	0.37	14.40
	1974-1977	11.28	0.22	12.38
	1978	9.96	0.19	10.91
	1979-1980	4.18	0.19	5.13
	1981-1982	3.90	0.17	4.75
	1983	3.85	0.17	4.70
	1984	3.87	0.17	4.72
	1985	3.34	0.06	3.64
	1986	2.94	0.06	3.24
	1987-1990	1.60	0.09	2.05
	1991-1993	1.56	0.08	1.96
	1994-1996	1.52	0.08	1.92
	1997+	1.49	0.08	1.89
CO	Pre-1963	360.04	4.81	384.09
	1963-1969	373.12	4.99	398.07
	1970-1973	282.36	6.68	315.76
	1974-1977	253.67	5.74	282.37
	1978	223.94	5.07	249.29
	1979-1980	187.87	4.83	212.02
	1981-1982	175.19	4.50	197.69
	1983	173.09	4.45	195.34
	1984	174.18	4.47	196.53
	1985	68.67	0.92	73.27
	1986	54.59	0.93	59.24
	1987-1990	34.41	0.58	37.31
	1991-1993	33.68	0.57	36.53
	1994-1996	32.77	0.55	35.52
	1997+	32.14	0.54	34.84
NOx	Pre-1963	5.24	0.0	5.24
	1963-1969	5.43	0.0	5.43
	1970-1973	6.23	0.0	6.23
	1974-1977	4.08	0.07	4.43
	1978	3.60	0.06	3.90
	1979-1980	3.43	0.06	3.73
	1981-1982	3.20	0.06	3.50
	1983	3.16	0.06	3.46
	1984	3.18	0.06	3.48
	1985	3.19	0.03	3.34
	1986	3.21	0.03	3.36
	1987-1990	3.64	0.10	4.14
	1991-1993	3.56	0.09	4.01
	1994-1996	3.46	0.09	3.91
	1997+	3.40	0.09	3.85

* WHERE : BER = Basic emission rate (untampered)
ZML = Zero mile level
DR = Deterioration rate
M = Cumulative mileage / 10,000

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TABLE 2.4.1B

EXHAUST EMISSION RATES FOR
HIGH ALTITUDE
HEAVY DUTY GASOLINE POWERED VEHICLES
AT VARIOUS MILEAGE INTERVALS
(RATES INCLUDE TAMPERING)

Pol	Model Years	Emission Rate (Grams/Mile) 0K	20K	40K	60K	80K	100K	120K	140K
HC	Pre-1963	22.46	23.08	23.70	24.32	24.94	25.56	26.18	26.80
	1963-1969	23.28	23.92	24.56	25.20	25.84	26.48	27.12	27.76
	1970-1973	12.55	13.29	14.03	14.77	15.51	16.25	16.99	17.73
	1974-1977	11.28	11.72	12.16	12.60	13.04	13.48	13.92	14.36
	1978	9.96	10.34	10.72	11.10	11.48	11.86	12.24	12.62
	1979-1980	4.18	4.56	4.94	5.32	5.70	6.08	6.46	6.84
	1981-1982	3.90	4.24	4.58	4.92	5.26	5.60	5.94	6.28
	1983	3.85	4.19	4.53	4.87	5.21	5.55	5.89	6.23
	1984	3.87	4.21	4.55	4.89	5.23	5.57	5.91	6.25
	1985	3.34	3.46	3.58	3.70	3.82	3.94	4.06	4.18
	1986	2.94	3.06	3.18	3.30	3.42	3.54	3.66	3.78
	1987-1990	2.05	2.36	2.68	3.00	3.31	3.63	3.95	4.27
	1991-1993	2.01	2.30	2.60	2.90	3.19	3.49	3.79	4.09
	1994-1996	1.97	2.26	2.56	2.86	3.15	3.45	3.75	4.05
	1997+	1.94	2.23	2.53	2.83	3.12	3.42	3.72	4.02
CO	Pre-1963	360.04	369.66	379.28	388.90	398.52	408.14	417.76	427.38
	1963-1969	373.12	383.10	393.08	403.06	413.04	423.02	433.00	442.98
	1970-1973	282.36	295.72	309.08	322.44	335.80	349.16	362.52	375.88
	1974-1977	253.67	265.15	276.63	288.11	299.59	311.07	322.55	334.03
	1978	223.94	234.08	244.22	254.36	264.50	274.64	284.78	294.92
	1979-1980	187.87	197.53	207.19	216.85	226.51	236.17	245.83	255.49
	1981-1982	175.19	184.19	193.19	202.19	211.19	220.19	229.19	238.19
	1983	173.09	181.99	190.89	199.79	208.69	217.59	226.49	235.39
	1984	174.18	183.12	192.06	201.00	209.94	218.88	227.82	236.76
	1985	68.67	70.51	72.35	74.19	76.03	77.87	79.71	81.55
	1986	54.59	56.45	58.31	60.17	62.03	63.89	65.75	67.61
	1987-1990	38.40	40 97	43.55	46.13	48.71	51.29	53.87	56.45
	1991-1993	37.67	40.22	42.78	45.34	47.90	50.46	53.02	55.58
	1994-1996	36.76	39.27	41.79	44.31	46.83	49.35	51.87	54.39
	1997+	36.13	38.62	41.12	43.62	46.12	48.62	51.12	53.62
NOx	Pre-1963	5.24	5.24	5.24	5.24	5.24	5.24	5.24	5.24
	1963-1969	5.43	5.43	5.43	5.43	5.43	5.43	5.43	5.43
	1970-1973	6.23	6.23	6.23	6.23	6.23	6.23	6.23	6.23
	1974-1977	4.08	4.22	4.36	4.50	4.64	4.78	4.92	5.06
	1978	3.60	3.72	3.84	3.96	4.08	4.20	4.32	4.44
	1979-1980	3.43	3.55	3.67	3.79	3.91	4.03	4.15	4.27
	1981-1982	3.20	3.32	3.44	3.56	3.68	3.80	3.92	4.04
	1983	3.16	3.28	3.40	3.52	3.64	3.76	3.88	4.00
	1984	3.18	3.30	3.42	3.54	3.66	3.78	3.90	4.02
	1985	3.19	3.25	3.31	3.37	3.43	3.49	3.55	3.61
	1986	3.21	3.27	3.33	3.39	3.45	3.51	3.57	3.63
	1987-1990	3.81	4.15	4.50	4.84	5.19	5.53	5.88	6.22
	1991-1993	3.73	4.05	4.38	4.70	5.03	5.35	5.68	6.00
	1994-1996	3.63	3.95	4.28	4.60	4.93	5.25	5.58	5.90
	1997+	3.57	3.89	4.22	4.54	4.87	5.19	5.52	5.84

DATE : MAY 25, 1985

TABLE 2.4.1C

CRANKCASE AND EVAPORATIVE HYDROCARBON EMISSIONS
FOR HIGH ALTITUDE
HEAVY DUTY GASOLINE POWERED VEHICLES
(RATES REFLECT ZERO TAMPERING)

** CCEV = (HSK * TPD + DNL)/MPD + CC

Model Years	SHED Hot Soak Emissions (Gm/Trip)	Trips* Per Day	SHED Diurnal Emissions (Gm/Day)	Miles* Per Day	Crankcase Emissions (Gm/Mile)	Total Crankcase and Evap. Emissions (Gm/Mile)
Pre-1968	35.96	6.88	101.26	36.70	7.35	16.85
1968-1984	35.96	6.88	101.26	36.70	0.0	9.50
1985+	8.24	6.88	19.28	36.70	0.0	2.07

* Default information that may be altered by the MOBILE3 user with information about the local area.

** WHERE :

CCEV = Total untampered crankcase & evaporative HC emissions (Gm/Mile)
HSK = Hot soak emissions (Gm/Trip)
TPD = Trips per day
DNL = Diurnal emissions (Gm/Day)
MPD = Miles per day
CC = Crankcase emissions (Gm/Mile)

DATE : MAY 25, 1985

TABLE 2.4.1D

TOTAL CRANKCASE AND EVAPORATIVE HC EMISSIONS
FOR HIGH ALTITUDE
HEAVY DUTY GASOLINE POWERED VEHICLES
AT VARIOUS MILEAGE INTERVALS
(RATES INCLUDE TAMPERING)

Model Years	Emission Rate (Grams/Mile) 0K	20K	40K	60K	80K	100K	120K	140K
Pre-1968	16.85	16.85	16.85	16.85	16.85	16.85	16.85	16.85
1968-1984	9.68	9.70	9.73	9.76	9.79	9.82	9.85	9.87
1985+	2.39	2.45	2.50	2.56	2.61	2.67	2.72	2.78

DATE : MAY 25, 1985

TABLE 2.4.2A

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
HEAVY DUTY GASOLINE POWERED VEHICLES
TOTAL HC (INCLUDES EVAP & CRANKCASE)

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	44.8	1962	44.8	1963	46.2	1964	46.2	1965	46.2	1966	46.2	1967	46.2	1968	38.9	1969	38.9	1970	29.0	1971	29.0	1972	29.0
1962	44.7	1963	46.1	1964	46.1	1965	46.1	1966	46.1	1967	46.1	1968	38.8	1969	38.8	1970	28.9	1971	28.9	1972	28.9	1973	28.9
1963	46.0	1964	46.0	1965	46.0	1966	46.0	1967	46.0	1968	38.6	1969	38.6	1970	28.8	1971	28.8	1972	28.8	1973	28.8	1974	24.9
1964	45.9	1965	45.9	1966	45.9	1967	45.9	1968	38.5	1969	38.5	1970	28.6	1971	28.6	1972	28.6	1973	28.6	1974	24.8	1975	24.8
1965	45.7	1966	45.7	1967	45.7	1968	38.4	1969	38.4	1970	28.4	1971	28.4	1972	28.4	1973	28.4	1974	24.7	1975	24.7	1976	24.7
1966	45.5	1967	45.5	1968	38.2	1969	38.2	1970	28.2	1971	28.2	1972	28.2	1973	28.2	1974	24.6	1975	24.6	1976	24.6	1977	24.6
1967	45.4	1968	38.0	1969	38.0	1970	28.0	1971	28.0	1972	28.0	1973	28.0	1974	24.5	1975	24.5	1976	24.5	1977	24.5	1978	22.7
1968	37.8	1969	37.8	1970	27.8	1971	27.8	1972	27.8	1973	27.8	1974	24.3	1975	24.3	1976	24.3	1977	24.3	1978	22.6	1979	16.8
1969	37.6	1970	27.5	1971	27.5	1972	27.5	1973	27.5	1974	24.2	1975	24.2	1976	24.2	1977	24.2	1978	22.5	1979	16.7	1980	16.7
1970	27.2	1971	27.2	1972	27.2	1973	27.2	1974	24.0	1975	24.0	1976	24.0	1977	24.0	1978	22.3	1979	16.5	1980	16.5	1981	16.0
1971	26.9	1972	26.9	1973	26.9	1974	23.8	1975	23.8	1976	23.8	1977	23.8	1978	22.1	1979	16.4	1980	16.4	1981	15.8	1982	15.8
1972	26.6	1973	26.6	1974	23.6	1975	23.6	1976	23.6	1977	23.6	1978	22.0	1979	16.2	1980	16.2	1981	15.7	1982	15.7	1983	15.6
1973	26.2	1974	23.4	1975	23.4	1976	23.4	1977	23.4	1978	21.8	1979	16.0	1980	16.0	1981	15.5	1982	15.5	1983	15.4	1984	15.4
1974	23.1	1975	23.1	1976	23.1	1977	23.1	1978	21.5	1979	15.8	1980	15.8	1981	15.3	1982	15.3	1983	15.2	1984	15.2	1985	6.3
1975	22.9	1976	22.9	1977	22.9	1978	21.3	1979	15.5	1980	15.5	1981	15.1	1982	15.1	1983	15.0	1984	15.0	1985	6.2	1986	5.8
1976	22.6	1977	22.6	1978	21.0	1979	15.3	1980	15.3	1981	14.8	1982	14.8	1983	14.8	1984	14.8	1985	6.1	1986	5.7	1987	4.6
1977	22.2	1978	20.7	1979	15.0	1980	15.0	1981	14.6	1982	14.6	1983	14.5	1984	14.5	1985	6.0	1986	5.6	1987	4.4	1988	4.4
1978	20.4	1979	14.6	1980	14.6	1981	14.3	1982	14.3	1983	14.2	1984	14.2	1985	5.9	1986	5.5	1987	4.3	1988	4.3	1989	4.3
1979	14.3	1980	14.3	1981	14.0	1982	14.0	1983	13.9	1984	13.9	1985	5.8	1986	5.4	1987	4.1	1988	4.1	1989	4.1	1990	4.1
1980	14.1	1981	13.8	1982	13.8	1983	13.7	1984	13.7	1985	5.8	1986	5.4	1987	4.0	1988	4.0	1989	4.0	1990	4.0	1991	3.9

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	29.0	1974	25.1	1975	25.1	1976	25.1	1977	25.1	1978	23.2	1979	17.4	1980	17.4	1981	16.8	1982	16.8	1983	16.7	1984	16.8
1974	25.0	1975	25.0	1976	25.0	1977	25.0	1978	23.2	1979	17.4	1980	17.4	1981	16.7	1982	16.7	1983	16.7	1984	16.7	1985	6.8
1975	24.9	1976	24.9	1977	24.9	1978	23.1	1979	17.3	1980	17.3	1981	16.7	1982	16.7	1983	16.6	1984	16.6	1985	6.8	1986	6.4
1976	24.8	1977	24.8	1978	23.0	1979	17.2	1980	17.2	1981	16.6	1982	16.6	1983	16.5	1984	16.6	1985	6.8	1986	6.3	1987	5.5
1977	24.7	1978	22.9	1979	17.1	1980	17.1	1981	16.5	1982	16.5	1983	16.5	1984	16.5	1985	6.7	1986	6.3	1987	5.5	1988	5.5
1978	22.8	1979	17.0	1980	17.0	1981	16.4	1982	16.4	1983	16.4	1984	16.4	1985	6.7	1986	6.3	1987	5.4	1988	5.4	1989	5.4
1979	16.9	1980	16.9	1981	16.3	1982	16.3	1983	16.3	1984	16.3	1985	6.7	1986	6.3	1987	5.4	1988	5.4	1989	5.4	1990	5.4
1980	16.8	1981	16.2	1982	16.2	1983	16.2	1984	16.2	1985	6.6	1986	6.2	1987	5.3	1988	5.3	1989	5.3	1990	5.3	1991	5.1
1981	16.1	1982	16.1	1983	16.1	1984	16.1	1985	6.6	1986	6.2	1987	5.2	1988	5.2	1989	5.2	1990	5.2	1991	5.0	1992	5.0
1982	16.0	1983	15.9	1984	15.9	1985	6.5	1986	6.1	1987	5.2	1988	5.2	1989	5.2	1990	5.2	1991	5.0	1992	5.0	1993	5.0
1983	15.8	1984	15.8	1985	6.5	1986	6.1	1987	5.1	1988	5.1	1989	5.1	1990	5.1	1991	4.9	1992	4.9	1993	4.9	1994	4.9
1984	15.6	1985	6.4	1986	6.0	1987	5.0	1988	5.0	1989	5.0	1990	5.0	1991	4.8	1992	4.8	1993	4.8	1994	4.8	1995	4.8
1985	6.4	1986	6.0	1987	4.9	1988	4.9	1989	4.9	1990	4.9	1991	4.7	1992	4.7	1993	4.7	1994	4.7	1995	4.7	1996	4.7
1986	5.9	1987	4.8	1988	4.8	1989	4.8	1990	4.8	1991	4.7	1992	4.7	1993	4.7	1994	4.6	1995	4.6	1996	4.6	1997	4.6
1987	4.7	1988	4.7	1989	4.7	1990	4.7	1991	4.6	1992	4.6	1993	4.6	1994	4.5	1995	4.5	1996	4.5	1997	4.5	1998	4.5
1988	4.6	1989	4.6	1990	4.6	1991	4.4	1992	4.4	1993	4.4	1994	4.4	1995	4.4	1996	4.4	1997	4.3	1998	4.3	1999	4.3
1989	4.4	1990	4.4	1991	4.3	1992	4.3	1993	4.3	1994	4.3	1995	4.3	1996	4.3	1997	4.2	1998	4.2	1999	4.2	2000	4.2
1990	4.3	1991	4.2	1992	4.2	1993	4.2	1994	4.1	1995	4.1	1996	4.1	1997	4.1	1998	4.1	1999	4.1	2000	4.1	2001	4.1
1991	4.0	1992	4.0	1993	4.0	1994	4.0	1995	4.0	1996	4.0	1997	3.9	1998	3.9	1999	3.9	2000	3.9	2001	3.9	2002	3.9
1992	3.9	1993	3.9	1994	3.9	1995	3.9	1996	3.9	1997	3.8	1998	3.8	1999	3.8	2000	3.8	2001	3.8	2002	3.8	2003	3.8

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F. Emissions are based on the January 1 mileage accumulation figures given in Table 2.4.4.

TABLE 2.4.2B

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE HEAVY DUTY GASOLINE POWERED VEHICLES CO

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	445.3	1962	445.3	1963	461.6	1964	461.6	1965	461.6	1966	461.6	1967	461.6	1968	461.6	1969	461.6	1970	400.8	1971	400.8	1972	400.8
1962	443.7	1963	459.9	1964	459.9	1965	459.9	1966	459.9	1967	459.9	1968	459.9	1969	459.9	1970	398.5	1971	398.5	1972	398.5	1973	398.5
1963	457.9	1964	457.9	1965	457.9	1966	457.9	1967	457.9	1968	457.9	1969	457.9	1970	395.9	1971	395.9	1972	395.9	1973	395.9	1974	351.2
1964	455.8	1965	455.8	1966	455.8	1967	455.8	1968	455.8	1969	455.8	1970	393.0	1971	393.0	1972	393.0	1973	393.0	1974	348.8	1975	348.8
1965	453.4	1966	453.4	1967	453.4	1968	453 4	1969	453.4	1970	389.9	1971	389.9	1972	389.9	1973	389.9	1974	346.1	1975	346.1	1976	346.1
1966	450.8	1967	450.8	1968	450.8	1969	450.8	1970	386.4	1971	386.4	1972	386.4	1973	386.4	1974	343.1	1975	343.1	1976	343.1	1977	343.1
1967	448.0	1968	448.0	1969	448.0	1970	382.5	1971	382.5	1972	382.5	1973	382.5	1974	339.8	1975	339.8	1976	339.8	1977	339.8	1978	300.0
1968	444.8	1969	444.8	1970	378.3	1971	378.3	1972	378.3	1973	378.3	1974	336.1	1975	336.1	1976	336.1	1977	336.1	1978	296.8	1979	257.2
1969	441.3	1970	373.6	1971	373.6	1972	373.6	1973	373.6	1974	332.1	1975	332.1	1976	332.1	1977	332.1	1978	293.2	1979	253.8	1980	253.8
1970	368.4	1971	368.4	1972	368.4	1973	368.4	1974	327.6	1975	327.6	1976	327.6	1977	327.6	1978	289.2	1979	250.1	1980	250.1	1981	233.2
1971	362.7	1972	362.7	1973	362.7	1974	322.7	1975	322 7	1976	322.7	1977	322.7	1978	284.9	1979	245.9	1980	245.9	1981	229.3	1982	229.3
1972	356.3	1973	356.3	1974	317.2	1975	317.2	1976	317.2	1977	317.2	1978	280.1	1979	241.4	1980	241.4	1981	225.0	1982	225.0	1983	222.4
1973	349.3	1974	311.2	1975	311.2	1976	311.2	1977	311.2	1978	274.8	1979	236.3	1980	236.3	1981	220.3	1982	220.3	1983	217.7	1984	219.0
1974	304.6	1975	304.6	1976	304.6	1977	304.6	1978	268.9	1979	230.7	1980	230.7	1981	215.1	1982	215.1	1983	212.6	1984	213.8	1985	76.8
1975	297.3	1976	297.3	1977	297.3	1978	262.4	1979	224.5	1980	224.5	1981	209.4	1982	209.4	1983	206.9	1984	208.1	1985	75.7	1986	61.7
1976	289.2	1977	289.2	1978	255.3	1979	217.7	1980	217.7	1981	203.0	1982	203.0	1983	200.6	1984	201.8	1985	74.4	1986	60.3	1987	38.0
1977	280.2	1978	247.4	1979	210.2	1980	210.2	1981	196.0	1982	196.0	1983	193.7	1984	194.8	1985	72.9	1986	58.9	1987	37.1	1988	37.1
1978	238.6	1979	201.9	1980	201.9	1981	188.2	1982	188.2	1983	186.0	1984	187.1	1985	71.3	1986	57.3	1987	36.1	1988	36.1	1989	36.1
1979	192.7	1980	192.7	1981	179.7	1982	179.7	1983	177.5	1984	178.6	1985	69.6	1986	55.5	1987	35.0	1988	35.0	1989	35.0	1990	35.0
1980	187.9	1981	175.2	1982	175.2	1983	173.1	1984	174.2	1985	68.7	1986	54.6	1987	34.4	1988	34.4	1989	34.4	1990	34.4	1991	33.7

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	400.8	1974	355.5	1975	355.5	1976	355.5	1977	355.5	1978	313.9	1979	273.5	1980	273.5	1981	255.0	1982	255.0	1983	252.0	1984	253 5
1974	353.5	1975	353.5	1976	353.5	1977	353.5	1978	312.1	1979	271.8	1980	271.8	1981	253.4	1982	253.4	1983	250.5	1984	251.9	1985	84.7
1975	351.2	1976	351.2	1977	351.2	1978	310.1	1979	270.0	1980	270.0	1981	251.7	1982	251.7	1983	248.7	1984	250.2	1985	84.3	1986	70.4
1976	348.8	1977	348.8	1978	307.9	1979	267.9	1980	267.9	1981	249.8	1982	249.8	1983	246.8	1984	248.2	1985	83.9	1986	70.0	1987	44.0
1977	346.1	1978	305.6	1979	265.6	1980	265.6	1981	247.6	1982	247.6	1983	244.7	1984	246.1	1985	83.5	1986	69.6	1987	43.7	1988	43.7
1978	302.9	1979	263.1	1980	263.1	1981	245.3	1982	245.3	1983	242 4	1984	243.8	1985	83.0	1986	69.1	1987	43.4	1988	43.4	1989	43.4
1979	260.3	1980	260.3	1981	242.7	1982	242.7	1983	239.8	1984	241.2	1985	82.5	1986	68.5	1987	43.1	1988	43.1	1989	43.1	1990	43.1
1980	257.2	1981	239.8	1982	239.8	1983	237.0	1984	238.4	1985	81.9	1986	67.9	1987	42.7	1988	42.7	1989	42.7	1990	42.7	1991	41.9
1981	236.7	1982	236.7	1983	233.9	1984	235.2	1985	81.2	1986	67.3	1987	42.3	1988	42.3	1989	42.3	1990	42.3	1991	41.5	1992	41.5
1982	233.2	1983	230.4	1984	231.8	1985	80.5	1986	66 6	1987	41.9	1988	41.9	1989	41.9	1990	41.9	1991	41.0	1992	41.0	1993	41.0
1983	226.6	1984	227.9	1985	79.7	1986	65.8	1987	41.4	1988	41.4	1989	41.4	1990	41.4	1991	40.5	1992	40.5	1993	40.5	1994	39.4
1984	223.7	1985	78.9	1986	64.9	1987	40.8	1988	40.8	1989	40.8	1990	40.8	1991	40.0	1992	40.0	1993	40.0	1994	38.9	1995	38.9
1985	77.9	1986	63.9	1987	40.2	1988	40.2	1989	40.2	1990	40.2	1991	39.4	1992	39.4	1993	39.4	1994	38.3	1995	38.3	1996	38.3
1986	62.8	1987	39.6	1988	39.6	1989	39.6	1990	39.6	1991	38.7	1992	38.7	1993	38.7	1994	37.6	1995	37.6	1996	37.6	1997	36.9
1987	38.8	1988	38.8	1989	38.8	1990	38.8	1991	38.0	1992	38.0	1993	38.0	1994	36.9	1995	36.9	1996	36.9	1997	36.2	1998	36.2
1988	38.0	1989	38.0	1990	38.0	1991	37.2	1992	37.2	1993	37.2	1994	36.2	1995	36.2	1996	36.2	1997	35.5	1998	35.5	1999	35.5
1989	37.1	1990	37.1	1991	36.3	1992	36.3	1993	36.3	1994	35.3	1995	35.3	1996	35.3	1997	34.6	1998	34.6	1999	34.6	2000	34.6
1990	36.1	1991	35 3	1992	35.3	1993	35.3	1994	34.4	1995	34.4	1996	34.4	1997	33.7	1998	33.7	1999	33.7	2000	33.7	2001	33.7
1991	34.2	1992	34.2	1993	34.2	1994	33.3	1995	33.3	1996	33.3	1997	32.7	1998	32.7	1999	32.7	2000	32.7	2001	32.7	2002	32.7
1992	33.7	1993	33.7	1994	32.8	1995	32.8	1996	32.8	1997	32.1	1998	32.1	1999	32.1	2000	32.1	2001	32.1	2002	32.1	2003	32.1

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F. Emissions are based on the January 1 mileage accumulation figures given in Table 2.4.4.

TABLE 2.4.2C

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
HEAVY DUTY GASOLINE POWERED VEHICLES
NOx

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	5.2	1962	5.2	1963	5.4	1964	5.4	1965	5.4	1966	5.4	1967	5.4	1968	5.4	1969	5.4	1970	6.2	1971	6.2	1972	6.2
1962	5.2	1963	5.4	1964	5.4	1965	5.4	1966	5.4	1967	5.4	1968	5.4	1969	5.4	1970	6.2	1971	6.2	1972	6.2	1973	6.2
1963	5.4	1964	5.4	1965	5.4	1966	5.4	1967	5.4	1968	5.4	1969	5.4	1970	6.2	1971	6.2	1972	6.2	1973	6.2	1974	5.3
1964	5.4	1965	5.4	1966	5.4	1967	5.4	1968	5.4	1969	5.4	1970	6.2	1971	6.2	1972	6.2	1973	6.2	1974	5.2	1975	5.2
1965	5.4	1966	5.4	1967	5.4	1968	5.4	1969	5.4	1970	6.2	1971	6.2	1972	6.2	1973	6.2	1974	5.2	1975	5.2	1976	5.2
1966	5.4	1967	5.4	1968	5.4	1969	5.4	1970	6.2	1971	6.2	1972	6.2	1973	6.2	1974	5.2	1975	5.2	1976	5.2	1977	5.2
1967	5.4	1968	5.4	1969	5.4	1970	6.2	1971	6.2	1972	6.2	1973	6.2	1974	5.1	1975	5.1	1976	5.1	1977	5.1	1978	4.5
1968	5.4	1969	5.4	1970	6.2	1971	6.2	1972	6.2	1973	6.2	1974	5.1	1975	5.1	1976	5.1	1977	5.1	1978	4.5	1979	4.3
1969	5.4	1970	6.2	1971	6.2	1972	6.2	1973	6.2	1974	5.0	1975	5.0	1976	5.0	1977	5.0	1978	4.4	1979	4.2	1980	4.2
1970	6.2	1971	6.2	1972	6.2	1973	6.2	1974	5.0	1975	5.0	1976	5.0	1977	5.0	1978	4.4	1979	4.2	1980	4.2	1981	4.0
1971	6.2	1972	6.2	1973	6.2	1974	4.9	1975	4.9	1976	4.9	1977	4.9	1978	4.3	1979	4.2	1980	4.2	1981	3.9	1982	3.9
1972	6.2	1973	6.2	1974	4.9	1975	4.9	1976	4.9	1977	4.9	1978	4.3	1979	4.1	1980	4.1	1981	3.9	1982	3.9	1983	3.8
1973	6.2	1974	4.8	1975	4.8	1976	4.8	1977	4.8	1978	4.2	1979	4.0	1980	4.0	1981	3.8	1982	3.8	1983	3.8	1984	3.8
1974	4.7	1975	4.7	1976	4.7	1977	4.7	1978	4.1	1979	4.0	1980	4.0	1981	3.7	1982	3.7	1983	3.7	1984	3.7	1985	3.5
1975	4.6	1976	4.6	1977	4.6	1978	4.1	1979	3.9	1980	3.9	1981	3.7	1982	3.7	1983	3.6	1984	3.6	1985	3.4	1986	3.4
1976	4.5	1977	4.5	1978	4.0	1979	3.8	1980	3.8	1981	3.6	1982	3.6	1983	3.5	1984	3.6	1985	3.4	1986	3.4	1987	4.3
1977	4.4	1978	3.9	1979	3.7	1980	3.7	1981	3.5	1982	3.5	1983	3.4	1984	3.5	1985	3.3	1986	3.3	1987	4.1	1988	4.1
1978	3.8	1979	3.6	1980	3.6	1981	3.4	1982	3.4	1983	3.3	1984	3.4	1985	3.3	1986	3.3	1987	3.9	1988	3.9	1989	3.9
1979	3.5	1980	3.5	1981	3.3	1982	3.3	1983	3.2	1984	3.2	1985	3.2	1986	3.2	1987	3.7	1988	3.7	1989	3.7	1990	3.7
1980	3.4	1981	3.2	1982	3.2	1983	3.2	1984	3.2	1985	3.2	1986	3.2	1987	3.6	1988	3.6	1989	3.6	1990	3.6	1991	3.6

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	6.2	1974	5.3	1975	5.3	1976	5.3	1977	5.3	1978	4.7	1979	4.5	1980	4.5	1981	4.3	1982	4.3	1983	4.2	1984	4.2
1974	5.3	1975	5.3	1976	5.3	1977	5.3	1978	4.6	1979	4.5	1980	4.5	1981	4.2	1982	4.2	1983	4.2	1984	4.2	1985	3.7
1975	5.3	1976	5.3	1977	5.3	1978	4.6	1979	4.4	1980	4.4	1981	4.2	1982	4.2	1983	4.2	1984	4.2	1985	3.7	1986	3.7
1976	5.2	1977	5.2	1978	4.6	1979	4.4	1980	4.4	1981	4.2	1982	4.2	1983	4.2	1984	4.2	1985	3.7	1986	3.7	1987	5.3
1977	5.2	1978	4.6	1979	4.4	1980	4.4	1981	4.2	1982	4.2	1983	4.1	1984	4.1	1985	3.7	1986	3.7	1987	5.2	1988	5.2
1978	4.5	1979	4.4	1980	4.4	1981	4.1	1982	4.1	1983	4.1	1984	4.1	1985	3.7	1986	3.7	1987	5.2	1988	5.2	1989	5.2
1979	4.3	1980	4.3	1981	4.1	1982	4.1	1983	4.1	1984	4.1	1985	3.6	1986	3.7	1987	5.1	1988	5.1	1989	5.1	1990	5.1
1980	4.3	1981	4.1	1982	4.1	1983	4.0	1984	4.0	1985	3.6	1986	3.6	1987	5.1	1988	5.1	1989	5.1	1990	5.1	1991	4.9
1981	4.0	1982	4.0	1983	4.0	1984	4.0	1985	3.6	1986	3.6	1987	5.0	1988	5.0	1989	5.0	1990	5.0	1991	4.8	1992	4.8
1982	4.0	1983	3.9	1984	4.0	1985	3.6	1986	3.6	1987	4.9	1988	4.9	1989	4.9	1990	4.9	1991	4.7	1992	4.7	1993	4.7
1983	3.9	1984	3.9	1985	3.6	1986	3.6	1987	4.8	1988	4.8	1989	4.8	1990	4.8	1991	4.6	1992	4.6	1993	4.6	1994	4.5
1984	3.8	1985	3.5	1986	3.5	1987	4.7	1988	4.7	1989	4.7	1990	4.7	1991	4.6	1992	4.6	1993	4.6	1994	4.5	1995	4.5
1985	3.5	1986	3.5	1987	4.6	1988	4.6	1989	4.6	1990	4.6	1991	4.5	1992	4.5	1993	4.5	1994	4.4	1995	4.4	1996	4.4
1986	3.5	1987	4.5	1988	4.5	1989	4.5	1990	4.5	1991	4.4	1992	4.4	1993	4.4	1994	4.3	1995	4.3	1996	4.3	1997	4.2
1987	4.4	1988	4.4	1989	4.4	1990	4.4	1991	4.2	1992	4.2	1993	4.2	1994	4.1	1995	4.1	1996	4.1	1997	4.1	1998	4.1
1988	4.3	1989	4.3	1990	4.3	1991	4.1	1992	4.1	1993	4.1	1994	4.0	1995	4.0	1996	4.0	1997	4.0	1998	4.0	1999	4.0
1989	4.1	1990	4.1	1991	4.0	1992	4.0	1993	4.0	1994	3.9	1995	3.9	1996	3.9	1997	3.8	1998	3.8	1999	3.8	2000	3.8
1990	3.9	1991	3.8	1992	3.8	1993	3.8	1994	3.7	1995	3.7	1996	3.7	1997	3.7	1998	3.7	1999	3.7	2000	3.7	2001	3.7
1991	3.6	1992	3.6	1993	3.6	1994	3.5	1995	3.5	1996	3.5	1997	3.5	1998	3.5	1999	3.5	2000	3.5	2001	3.5	2002	3.5
1992	3.6	1993	3.6	1994	3.5	1995	3.5	1996	3.5	1997	3.4	1998	3.4	1999	3.4	2000	3.4	2001	3.4	2002	3.4	2003	3.4

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F. Emissions are based on the January 1 mileage accumulation figures given in Table 2.4.4.

TABLE 2.4.3

IDLE EMISSION RATES FOR
HIGH ALTITUDE
HEAVY DUTY GASOLINE POWERED VEHICLES

* IER = ZML + (DR * M)

Pol	Model Years	Zero Mile Emission Level (Grams/Min.)	Deterioration Rate (Gm/Min/10K Mi)
HC	Pre-1963	2.83	0.04
	1963-1969	2.83	0.04
	1970-1973	0.87	0.04
	1974-1977	0.87	0.02
	1978	0.87	0.02
	1979-1980	0.44	0.01
	1981-1982	0.44	0.01
	1983	0.44	0.01
	1984	0.23	0.03
	1985	0.12	0.04
	1986	0.12	0.04
	1987-1990	0.12	0.04
	1991-1993	0.12	0.04
	1994-1996	0.12	0.04
	1997+	0.12	0.04
CO	Pre-1963	25.75	0.53
	1963-1969	25.75	0.53
	1970-1973	6.80	0.28
	1974-1977	6.80	0.27
	1978	6.80	0.27
	1979-1980	7.09	0.28
	1981-1982	7.09	0.28
	1983	7.09	0.28
	1984	1.21	0.14
	1985	0.49	0.28
	1986	0.49	0.28
	1987-1990	0.49	0.28
	1991-1993	0.49	0.28
	1994-1996	0.49	0.28
	1997+	0.49	0.28
NOx	Pre-1963	0.05	0.0
	1963-1969	0.05	0.0
	1970-1973	0.03	0.0
	1974-1977	0.03	0.0
	1978	0.03	0.0
	1979-1980	0.03	0.0
	1981-1982	0.03	0.0
	1983	0.03	0.0
	1984	0.07	0.0
	1985	0.01	0.0
	1986	0.01	0.0
	1987-1990	0.01	0.0
	1991-1993	0.01	0.0
	1994-1996	0.01	0.0
	1997+	0.01	0.0

* WHERE : IER = Idle emission rate
ZML = Zero mile level
DR = Deterioration Rate
M = Cumulative Mileage / 10,000

DATE : MAY 25, 1985

TABLE 2.4.4

REGISTRATION MIX AND
MILEAGE ACCUMULATION RATES FOR
HIGH ALTITUDE
HEAVY DUTY GASOLINE POWERED VEHICLES

Model Year Index**	July 1 Registration Mix*	Mileage Accumulation Rate per vehicle*	Jan 1 Registration Mix	Jan 1 Mileage Accumulation Rate (fleet)	Jan 1 Mileage Accumulation (fleet)
1	0.079	19967.	0.0	0.	0.
2	0.136	18077.	0.136	19967.	9983.
3	0.116	16365.	0.116	18077.	29005.
4	0.099	14815.	0.099	16365.	46226.
5	0.085	13413.	0.085	14815.	61816.
6	0.072	12143.	0.072	13413.	75930.
7	0.062	10993.	0.062	12143.	88708.
8	0.053	9952.	0.053	10993.	100276.
9	0.045	9010.	0.045	9952.	110749.
10	0.038	8156.	0.038	9010.	120230.
11	0.033	7384.	0.033	8156.	128813.
12	0.028	6685.	0.028	7384.	136583.
13	0.024	6052.	0.024	6685.	143617.
14	0.020	5479.	0.020	6052.	149985.
15	0.018	4960.	0.018	5479.	155751.
16	0.015	4490.	0.015	4960.	160970.
17	0.013	4065.	0.013	4490.	165695.
18	0.011	3680.	0.011	4065.	169973.
19	0.009	3332.	0.009	3680.	173845.
20+	0.045	3016.	0.045	3332.	177351.

* Default information that may be altered by the MOBILE3 user with information about the local area.

** The indices refer to the most recent model year vehicles in any given calendar year. Index 1 references the newest model year vehicles and index 20+ references the oldest model year vehicles.

DATE : MAY 25, 1985

TABLE 2.4.5

EXAMPLE TRAVEL WEIGHTING FRACTION CALCULATION FOR
HIGH ALTITUDE
HEAVY DUTY GASOLINE POWERED VEHICLES
JANUARY 1, 1988

Model Years	(A) HDGV Fleet Registration	(B) Sales Fraction	(A*B)	(C=A*B/DAF) HDGV Registration	(D) Annual Mileage Accrual Rate	(C*D)	(C*D/TFNORM) Travel Fractions
1988	0.0	1.000	0.0	0.0	0.	0.0	0.0
1987	0.136	1.000	0.136	0.148	19967.	2945.2	0.226
1986	0.116	1.000	0.116	0.126	18077.	2274.3	0.175
1985	0.099	1.000	0.099	0.107	16365.	1757.2	0.135
1984	0.085	1.000	0.085	0.092	14815.	1365.8	0.105
1983	0.072	1.000	0.072	0.078	13413.	1047.4	0.080
1982	0.062	1.000	0.062	0.067	12143.	816.6	0.063
1981	0.053	1.000	0.053	0.057	10993.	631.9	0.049
1980	0.045	1.000	0.045	0.049	9952.	485.7	0.037
1979	0.038	1.000	0.038	0.041	9010.	371.3	0.029
1978	0.033	1.000	0.033	0.036	8156.	291.9	0.022
1977	0.028	1.000	0.028	0.030	7384.	224.2	0.017
1976	0.024	1.000	0.024	0.026	6685.	174.0	0.013
1975	0.020	1.000	0.020	0.022	6052.	131.3	0.010
1974	0.018	1.000	0.018	0.020	5479.	107.0	0.008
1973	0.015	1.000	0.015	0.016	4960.	80.7	0.006
1972	0.013	1.000	0.013	0.014	4490.	63.3	0.005
1971	0.011	1.000	0.011	0.012	4065.	48.5	0.004
1970	0.009	1.000	0.009	0.010	3680.	35.9	0.003
1969-	0.045	1.000	0.045	0.049	3332.	162.6	0.012
		DAF:	0.921		TFNORM:	13015.0	

WHERE :

A = January 1 registration mix from Table 2.4.4.
B = Fleet sales fractions
D = Sales weighted fleet mileage accumulation rate from Table 2.4.4, adjusted to January 1
D(1) = Annual Miles(1)
D(MYI) = .25*(Annual Miles(MYI)) + .75*(Annual Miles(MYI-1)), MYI=2,...,20+

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TABLE 2.4.6

SPEED CORRECTION FACTOR COEFFICIENTS FOR
HIGH ALTITUDE
HEAVY DUTY GASOLINE POWERED VEHICLES

$$* \; SCF(s) = EXP(A + B*s + C*s^2) \;,\; HC \;\&\; CO$$
$$= A + B*s + C*s^2 \;,\; NOx$$

Pol	Model Years	Coefficients A	B	C
HC	All	1.60800	-0.09700	0.00083
CO	All	1.52000	-0.09800	0.00110
NOx	All	0.82400	0.00880	0.0

* WHERE: s = average speed (mph)

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TABLE 2.4.7

TEMPERATURE CORRECTION FACTOR COEFFICIENTS FOR
HIGH ALTITUDE
HEAVY DUTY GASOLINE POWERED VEHICLES

* TCF = EXP(TC * (T - 75.0))

Pol	Model Years	TC Low	TC High
HC	Pre-1970	-0.58903E-02	0.13458E-02
	1970-1973	-0.73870E-02	0.52317E-02
	1974-1978	-0.49759E-02	0.54651E-02
	1979-1983	-0.28549E-02	0.10082E-01
	1984	-0.74107E-02	0.20546E-01
	1985+	-0.92859E-02	0.84842E-02
CO	Pre-1970	-0.20576E-02	0.81720E-02
	1970-1973	-0.45541E-02	0.20268E-01
	1974-1978	-0.42899E-02	0.24127E-01
	1979-1983	-0.13085E-02	0.22061E-01
	1984	-0.77117E-02	0.27019E-01
	1985+	-0.60195E-02	0.71457E-02
NOx	Pre-1970	-0.64315E-02	-0.83986E-02
	1970-1973	-0.55456E-02	-0.86880E-02
	1974-1978	-0.13969E-02	-0.18079E-01
	1979-1983	-0.46352E-03	-0.74889E-02
	1984	-0.57524E-02	-0.21593E-01
	1985+	-0.19733E-02	-0.29584E-01

* WHERE :

TCF = Temperature correction factor for appropriate pollutant, ambient temperature, and model year
T = Ambient temperature (Fahrenheit)
TC = Temperature correction factor coefficient for appropriate pollutant, reference temperature, and model year
75.0 = Reference temperature

DATE : MAY 25, 1985

TABLE 2.5.1

EXHAUST EMISSION RATES FOR
HIGH ALTITUDE
LIGHT DUTY DIESEL POWERED VEHICLES
(RATES REFLECT ZERO TAMPERING)

* BER = ZML + (DR * M)

Pol	Model Years	Zero Mile Emission Level (Grams/Mile)	Deterioration Rate (Gm/Mi/10K Mi)	50,000 Mile Emission Level (Grams/Mile)
HC	Pre-1975	3.01	0.08	3.41
	1975-1976	0.97	0.07	1.32
	1977	0.97	0.07	1.32
	1978	0.97	0.07	1.32
	1979	0.97	0.07	1.32
	1980-1981	0.67	0.03	0.82
	1982-1983	0.40	0.03	0.55
	1984+	0.29	0.03	0.44
CO	Pre-1975	4.74	0.13	5.39
	1975-1976	2.05	0.09	2.50
	1977	2.05	0.09	2.50
	1978	2.05	0.09	2.50
	1979	2.05	0.09	2.50
	1980-1981	2.01	0.04	2.21
	1982-1983	2.01	0.04	2.21
	1984+	1.15	0.04	1.35
NOx	Pre-1975	1.46	0.04	1.66
	1975-1976	1.40	0.04	1.60
	1977	1.40	0.04	1.60
	1978	1.40	0.04	1.60
	1979	1.40	0.04	1.60
	1980	1.40	0.04	1.60
	1981-1984	1.31	0.03	1.46
	1985+	0.87	0.03	1.02

* WHERE : BER = Basic emission rate (untampered)
ZML = Zero mile level
DR = Deterioration rate
M = Cumulative mileage / 10,000

DATE : MAY 25, 1985

TABLE 2.5.2A

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
LIGHT DUTY DIESEL POWERED VEHICLES
TOTAL HC

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	4.2	1962	4.2	1963	4.2	1964	4.2	1965	4.2	1966	4.2	1967	4.2	1968	4.2	1969	4.2	1970	4.2	1971	4.2	1972	4.2
1962	4.2	1963	4.2	1964	4.2	1965	4.2	1966	4.2	1967	4.2	1968	4.2	1969	4.2	1970	4.2	1971	4.2	1972	4.2	1973	4.2
1963	4.2	1964	4.2	1965	4.2	1966	4.2	1967	4.2	1968	4.2	1969	4.2	1970	4.2	1971	4.2	1972	4.2	1973	4.2	1974	4.2
1964	4.1	1965	4.1	1966	4.1	1967	4.1	1968	4.1	1969	4.1	1970	4.1	1971	4.1	1972	4.1	1973	4.1	1974	4.1	1975	1.9
1965	4.1	1966	4.1	1967	4.1	1968	4.1	1969	4.1	1970	4.1	1971	4.1	1972	4.1	1973	4.1	1974	4.1	1975	1.9	1976	1.9
1966	4.0	1967	4.0	1968	4.0	1969	4.0	1970	4.0	1971	4.0	1972	4.0	1973	4.0	1974	4.0	1975	1.9	1976	1.9	1977	1.9
1967	4.0	1968	4.0	1969	4.0	1970	4.0	1971	4.0	1972	4.0	1973	4.0	1974	4.0	1975	1.8	1976	1.8	1977	1.8	1978	1.8
1968	3.9	1969	3.9	1970	3.9	1971	3.9	1972	3.9	1973	3.9	1974	3.9	1975	1.8	1976	1.8	1977	1.8	1978	1.8	1979	1.8
1969	3.9	1970	3.9	1971	3.9	1972	3.9	1973	3.9	1974	3.9	1975	1.7	1976	1.7	1977	1.7	1978	1.7	1979	1.7	1980	1.0
1970	3.8	1971	3.8	1972	3.8	1973	3.8	1974	3.8	1975	1.7	1976	1.7	1977	1.7	1978	1.7	1979	1.7	1980	1.0	1981	1.0
1971	3.7	1972	3.7	1973	3.7	1974	3.7	1975	1.6	1976	1.6	1977	1.6	1978	1.6	1979	1.6	1980	0.9	1981	0.9	1982	0.7
1972	3.7	1973	3.7	1974	3.7	1975	1.6	1976	1.6	1977	1.6	1978	1.6	1979	1.6	1980	0.9	1981	0.9	1982	0.6	1983	0.6
1973	3.6	1974	3.6	1975	1.5	1976	1.5	1977	1.5	1978	1.5	1979	1.5	1980	0.9	1981	0.9	1982	0.6	1983	0.6	1984	0.5
1974	3.5	1975	1.4	1976	1.4	1977	1.4	1978	1.4	1979	1.4	1980	0.9	1981	0.9	1982	0.6	1983	0.6	1984	0.5	1985	0.5
1975	1.4	1976	1.4	1977	1.4	1978	1.4	1979	1.4	1980	0.8	1981	0.8	1982	0.6	1983	0.6	1984	0.5	1985	0.5	1986	0.5
1976	1.3	1977	1.3	1978	1.3	1979	1.3	1980	0.8	1981	0.8	1982	0.5	1983	0.5	1984	0.4	1985	0.4	1986	0.4	1987	0.4
1977	1.2	1978	1.2	1979	1.2	1980	0.8	1981	0.8	1982	0.5	1983	0.5	1984	0.4	1985	0.4	1986	0.4	1987	0.4	1988	0.4
1978	1.1	1979	1.1	1980	0.7	1981	0.7	1982	0.5	1983	0.5	1984	0.4	1985	0.4	1986	0.4	1987	0.4	1988	0.4	1989	0.4
1979	1.0	1980	0.7	1981	0.7	1982	0.4	1983	0.4	1984	0.3	1985	0.3	1986	0.3	1987	0.3	1988	0.3	1989	0.3	1990	0.3
1980	0.7	1981	0.7	1982	0.4	1983	0.4	1984	0.3	1985	0.3	1986	0.3	1987	0.3	1988	0.3	1989	0.3	1990	0.3	1991	0.3

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	4.2	1974	4.2	1975	2.0	1976	2.0	1977	2.0	1978	2.0	1979	2.0	1980	1.1	1981	1.1	1982	0.9	1983	0.9	1984	0.7
1974	4.2	1975	2.0	1976	2.0	1977	2.0	1978	2.0	1979	2.0	1980	1.1	1981	1.1	1982	0.8	1983	0.8	1984	0.7	1985	0.7
1975	2.0	1976	2.0	1977	2.0	1978	2.0	1979	2.0	1980	1.1	1981	1.1	1982	0.8	1983	0.8	1984	0.7	1985	0.7	1986	0.7
1976	1.9	1977	1.9	1978	1.9	1979	1.9	1980	1.1	1981	1.1	1982	0.8	1983	0.8	1984	0.7	1985	0.7	1986	0.7	1987	0.7
1977	1.9	1978	1.9	1979	1.9	1980	1.1	1981	1.1	1982	0.8	1983	0.8	1984	0.7	1985	0.7	1986	0.7	1987	0.7	1988	0.7
1978	1.9	1979	1.9	1980	1.0	1981	1.0	1982	0.8	1983	0.8	1984	0.7	1985	0.7	1986	0.7	1987	0.7	1988	0.7	1989	0.7
1979	1.8	1980	1.0	1981	1.0	1982	0.8	1983	0.8	1984	0.6	1985	0.6	1986	0.6	1987	0.6	1988	0.6	1989	0.6	1990	0.6
1980	1.0	1981	1.0	1982	0.7	1983	0.7	1984	0.6	1985	0.6	1986	0.6	1987	0.6	1988	0.6	1989	0.6	1990	0.6	1991	0.6
1981	1.0	1982	0.7	1983	0.7	1984	0.6	1985	0.6	1986	0.6	1987	0.6	1988	0.6	1989	0.6	1990	0.6	1991	0.6	1992	0.6
1982	0.7	1983	0.7	1984	0.6	1985	0.6	1986	0.6	1987	0.6	1988	0.6	1989	0.6	1990	0.6	1991	0.6	1992	0.6	1993	0.6
1983	0.7	1984	0.6	1985	0.6	1986	0.6	1987	0.6	1988	0.6	1989	0.6	1990	0.6	1991	0.6	1992	0.6	1993	0.6	1994	0.6
1984	0.5	1985	0.5	1986	0.5	1987	0.5	1988	0.5	1989	0.5	1990	0.5	1991	0.5	1992	0.5	1993	0.5	1994	0.5	1995	0.5
1985	0.5	1986	0.5	1987	0.5	1988	0.5	1989	0.5	1990	0.5	1991	0.5	1992	0.5	1993	0.5	1994	0.5	1995	0.5	1996	0.5
1986	0.5	1987	0.5	1988	0.5	1989	0.5	1990	0.5	1991	0.5	1992	0.5	1993	0.5	1994	0.5	1995	0.5	1996	0.5	1997	0.5
1987	0.5	1988	0.5	1989	0.5	1990	0.5	1991	0.5	1992	0.5	1993	0.5	1994	0.5	1995	0.5	1996	0.5	1997	0.5	1998	0.5
1988	0.4	1989	0.4	1990	0.4	1991	0.4	1992	0.4	1993	0.4	1994	0.4	1995	0.4	1996	0.4	1997	0.4	1998	0.4	1999	0.4
1989	0.4	1990	0.4	1991	0.4	1992	0.4	1993	0.4	1994	0.4	1995	0.4	1996	0.4	1997	0.4	1998	0.4	1999	0.4	2000	0.4
1990	0.4	1991	0.4	1992	0.4	1993	0.4	1994	0.4	1995	0.4	1996	0.4	1997	0.4	1998	0.4	1999	0.4	2000	0.4	2001	0.4
1991	0.3	1992	0.3	1993	0.3	1994	0.3	1995	0.3	1996	0.3	1997	0.3	1998	0.3	1999	0.3	2000	0.3	2001	0.3	2002	0.3
1992	0.3	1993	0.3	1994	0.3	1995	0.3	1996	0.3	1997	0.3	1998	0.3	1999	0.3	2000	0.3	2001	0.3	2002	0.3	2003	0.3

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27 3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.5.4.

TABLE 2.5.2B

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
LIGHT DUTY DIESEL POWERED VEHICLES
CO

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	6.7	1962	6.7	1963	6.7	1964	6.7	1965	6.7	1966	6.7	1967	6.7	1968	6.7	1969	6.7	1970	6.7	1971	6.7	1972	6.7
1962	6.7	1963	6.7	1964	6.7	1965	6.7	1966	6.7	1967	6.7	1968	6.7	1969	6.7	1970	6.7	1971	6.7	1972	6.7	1973	6.7
1963	6.6	1964	6.6	1965	6.6	1966	6.6	1967	6.6	1968	6.6	1969	6.6	1970	6.6	1971	6.6	1972	6.6	1973	6.6	1974	6.6
1964	6.5	1965	6.5	1966	6.5	1967	6.5	1968	6.5	1969	6.5	1970	6.5	1971	6.5	1972	6.5	1973	6.5	1974	6.5	1975	3.3
1965	6.5	1966	6.5	1967	6.5	1968	6.5	1969	6.5	1970	6.5	1971	6.5	1972	6.5	1973	6.5	1974	6.5	1975	3.2	1976	3.2
1966	6.4	1967	6.4	1968	6.4	1969	6.4	1970	6.4	1971	6.4	1972	6.4	1973	6.4	1974	6.4	1975	3.2	1976	3.2	1977	3.2
1967	6.3	1968	6.3	1969	6.3	1970	6.3	1971	6.3	1972	6.3	1973	6.3	1974	6.3	1975	3.1	1976	3.1	1977	3.1	1978	3.1
1968	6.2	1969	6.2	1970	6.2	1971	6.2	1972	6.2	1973	6.2	1974	6.2	1975	3.1	1976	3.1	1977	3.1	1978	3.1	1979	3.1
1969	6.1	1970	6.1	1971	6.1	1972	6.1	1973	6.1	1974	6.1	1975	3.0	1976	3.0	1977	3.0	1978	3.0	1979	3.0	1980	2.4
1970	6.0	1971	6.0	1972	6.0	1973	6.0	1974	6.0	1975	2.9	1976	2.9	1977	2.9	1978	2.9	1979	2.9	1980	2.4	1981	2.4
1971	5.9	1972	5.9	1973	5.9	1974	5.9	1975	2.9	1976	2.9	1977	2.9	1978	2.9	1979	2.9	1980	2.4	1981	2.4	1982	2.4
1972	5.8	1973	5.8	1974	5.8	1975	2.8	1976	2.8	1977	2.8	1978	2.8	1979	2.8	1980	2.3	1981	2.3	1982	2.3	1983	2.3
1973	5.7	1974	5.7	1975	2.7	1976	2.7	1977	2.7	1978	2.7	1979	2.7	1980	2.3	1981	2.3	1982	2.3	1983	2.3	1984	1.4
1974	5.6	1975	2.6	1976	2.6	1977	2.6	1978	2.6	1979	2.6	1980	2.3	1981	2.3	1982	2.3	1983	2.3	1984	1.4	1985	1.4
1975	2.5	1976	2.5	1977	2.5	1978	2.5	1979	2.5	1980	2.2	1981	2.2	1982	2.2	1983	2.2	1984	1.4	1985	1.4	1986	1.4
1976	2.5	1977	2.5	1978	2.5	1979	2.5	1980	2.2	1981	2.2	1982	2.2	1983	2.2	1984	1.3	1985	1.3	1986	1.3	1987	1.3
1977	2.4	1978	2.4	1979	2.4	1980	2.1	1981	2.1	1982	2.1	1983	2.1	1984	1.3	1985	1.3	1986	1.3	1987	1.3	1988	1.3
1978	2.3	1979	2.3	1980	2.1	1981	2.1	1982	2.1	1983	2.1	1984	1.2	1985	1.2	1986	1.2	1987	1.2	1988	1.2	1989	1.2
1979	2.1	1980	2.1	1981	2.1	1982	2.1	1983	2.1	1984	1.2	1985	1.2	1986	1.2	1987	1.2	1988	1.2	1989	1.2	1990	1.2
1980	2.0	1981	2.0	1982	2.0	1983	2.0	1984	1.2	1985	1.2	1986	1.2	1987	1.2	1988	1.2	1989	1.2	1990	1.2	1991	1.2

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	6.7	1974	6.7	1975	3.4	1976	3.4	1977	3.4	1978	3.4	1979	3.4	1980	2.6	1981	2.6	1982	2.6	1983	2.6	1984	1.8
1974	6.7	1975	3.4	1976	3.4	1977	3.4	1978	3.4	1979	3.4	1980	2.6	1981	2.6	1982	2.6	1983	2.6	1984	1.7	1985	1.7
1975	3.3	1976	3.3	1977	3.3	1978	3.3	1979	3.3	1980	2.6	1981	2.6	1982	2.6	1983	2.6	1984	1.7	1985	1.7	1986	1.7
1976	3.3	1977	3.3	1978	3.3	1979	3.3	1980	2.6	1981	2.6	1982	2.6	1983	2.6	1984	1.7	1985	1.7	1986	1.7	1987	1.7
1977	3.2	1978	3.2	1979	3.2	1980	2.5	1981	2.5	1982	2.5	1983	2.5	1984	1.7	1985	1.7	1986	1.7	1987	1.7	1988	1.7
1978	3.2	1979	3.2	1980	2.5	1981	2.5	1982	2.5	1983	2.5	1984	1.7	1985	1.7	1986	1.7	1987	1.7	1988	1.7	1989	1.7
1979	3.1	1980	2.5	1981	2.5	1982	2.5	1983	2.5	1984	1.6	1985	1.6	1986	1.6	1987	1.6	1988	1.6	1989	1.6	1990	1.6
1980	2.5	1981	2.5	1982	2.5	1983	2.5	1984	1.6	1985	1.6	1986	1.6	1987	1.6	1988	1.6	1989	1.6	1990	1.6	1991	1.6
1981	2.4	1982	2.4	1983	2.4	1984	1.6	1985	1.6	1986	1.6	1987	1.6	1988	1.6	1989	1.6	1990	1.6	1991	1.6	1992	1.6
1982	2.4	1983	2.4	1984	1.5	1985	1.5	1986	1.5	1987	1.5	1988	1.5	1989	1.5	1990	1.5	1991	1.5	1992	1.5	1993	1.5
1983	2.4	1984	1.5	1985	1.5	1986	1.5	1987	1.5	1988	1.5	1989	1.5	1990	1.5	1991	1.5	1992	1.5	1993	1.5	1994	1.5
1984	1.5	1985	1.5	1986	1.5	1987	1.5	1988	1.5	1989	1.5	1990	1.5	1991	1.5	1992	1.5	1993	1.5	1994	1.5	1995	1.5
1985	1.4	1986	1.4	1987	1.4	1988	1.4	1989	1.4	1990	1.4	1991	1.4	1992	1.4	1993	1.4	1994	1.4	1995	1.4	1996	1.4
1986	1.4	1987	1.4	1988	1.4	1989	1.4	1990	1.4	1991	1.4	1992	1.4	1993	1.4	1994	1.4	1995	1.4	1996	1.4	1997	1.4
1987	1.4	1988	1.4	1989	1.4	1990	1.4	1991	1.4	1992	1.4	1993	1.4	1994	1.4	1995	1.4	1996	1.4	1997	1.4	1998	1.4
1988	1.3	1989	1.3	1990	1.3	1991	1.3	1992	1.3	1993	1.3	1994	1.3	1995	1.3	1996	1.3	1997	1.3	1998	1.3	1999	1.3
1989	1.3	1990	1.3	1991	1.3	1992	1.3	1993	1.3	1994	1.3	1995	1.3	1996	1.3	1997	1.3	1998	1.3	1999	1.3	2000	1.3
1990	1.2	1991	1.2	1992	1.2	1993	1.2	1994	1.2	1995	1.2	1996	1.2	1997	1.2	1998	1.2	1999	1.2	2000	1.2	2001	1.2
1991	1.2	1992	1.2	1993	1.2	1994	1.2	1995	1.2	1996	1.2	1997	1.2	1998	1.2	1999	1.2	2000	1.2	2001	1.2	2002	1.2
1992	1.2	1993	1.2	1994	1.2	1995	1.2	1996	1.2	1997	1.2	1998	1.2	1999	1.2	2000	1.2	2001	1.2	2002	1.2	2003	1.2

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.5.4.

TABLE 2.5.2C

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
LIGHT DUTY DIESEL POWERED VEHICLES
NOx

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	2.1	1962	2.1	1963	2.1	1964	2.1	1965	2.1	1966	2.1	1967	2.1	1968	2.1	1969	2.1	1970	2.1	1971	2.1	1972	2.1
1962	2.0	1963	2.0	1964	2.0	1965	2.0	1966	2.0	1967	2.0	1968	2.0	1969	2.0	1970	2.0	1971	2.0	1972	2.0	1973	2.0
1963	2.0	1964	2.0	1965	2.0	1966	2.0	1967	2.0	1968	2.0	1969	2.0	1970	2.0	1971	2.0	1972	2.0	1973	2.0	1974	2.0
1964	2.0	1965	2.0	1966	2.0	1967	2.0	1968	2.0	1969	2.0	1970	2.0	1971	2.0	1972	2.0	1973	2.0	1974	2.0	1975	1.9
1965	2.0	1966	2.0	1967	2.0	1968	2.0	1969	2.0	1970	2.0	1971	2.0	1972	2.0	1973	2.0	1974	2.0	1975	1.9	1976	1.9
1966	2.0	1967	2.0	1968	2.0	1969	2.0	1970	2.0	1971	2.0	1972	2.0	1973	2.0	1974	2.0	1975	1.9	1976	1.9	1977	1.9
1967	1.9	1968	1.9	1969	1.9	1970	1.9	1971	1.9	1972	1.9	1973	1.9	1974	1.9	1975	1.9	1976	1.9	1977	1.9	1978	1.9
1968	1.9	1969	1.9	1970	1.9	1971	1.9	1972	1.9	1973	1.9	1974	1.9	1975	1.8	1976	1.8	1977	1.8	1978	1.8	1979	1.8
1969	1.9	1970	1.9	1971	1.9	1972	1.9	1973	1.9	1974	1.9	1975	1.8	1976	1.8	1977	1.8	1978	1.8	1979	1.8	1980	1.8
1970	1.8	1971	1.8	1972	1.8	1973	1.8	1974	1.8	1975	1.8	1976	1.8	1977	1.8	1978	1.8	1979	1.8	1980	1.8	1981	1.6
1971	1.8	1972	1.8	1973	1.8	1974	1.8	1975	1.8	1976	1.8	1977	1.8	1978	1.8	1979	1.8	1980	1.8	1981	1.6	1982	1.6
1972	1.8	1973	1.8	1974	1.8	1975	1.7	1976	1.7	1977	1.7	1978	1.7	1979	1.7	1980	1.7	1981	1.6	1982	1.6	1983	1.6
1973	1.7	1974	1.7	1975	1.7	1976	1.7	1977	1.7	1978	1.7	1979	1.7	1980	1.7	1981	1.5	1982	1.5	1983	1.5	1984	1.5
1974	1.7	1975	1.7	1976	1.7	1977	1.7	1978	1.7	1979	1.7	1980	1.7	1981	1.5	1982	1.5	1983	1.5	1984	1.5	1985	1.1
1975	1.6	1976	1.6	1977	1.6	1978	1.6	1979	1.6	1980	1.6	1981	1.5	1982	1.5	1983	1.5	1984	1.5	1985	1.0	1986	1.0
1976	1.6	1977	1.6	1978	1.6	1979	1.6	1980	1.6	1981	1.4	1982	1.4	1983	1.4	1984	1.4	1985	1.0	1986	1.0	1987	1.0
1977	1.5	1978	1.5	1979	1.5	1980	1.5	1981	1.4	1982	1.4	1983	1.4	1984	1.4	1985	1.0	1986	1.0	1987	1.0	1988	1.0
1978	1.5	1979	1.5	1980	1.5	1981	1.4	1982	1.4	1983	1.4	1984	1.4	1985	0.9	1986	0.9	1987	0.9	1988	0.9	1989	0.9
1979	1.4	1980	1.4	1981	1.3	1982	1.3	1983	1.3	1984	1.3	1985	0.9	1986	0.9	1987	0.9	1988	0.9	1989	0.9	1990	0.9
1980	1.4	1981	1.3	1982	1.3	1983	1.3	1984	1.3	1985	0.9	1986	0.9	1987	0.9	1988	0.9	1989	0.9	1990	0.9	1991	0.9

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	2.1	1974	2.1	1975	2.0	1976	2.0	1977	2.0	1978	2.0	1979	2.0	1980	2.0	1981	1.8	1982	1.8	1983	1.8	1984	1.8
1974	2.0	1975	2.0	1976	2.0	1977	2.0	1978	2.0	1979	2.0	1980	2.0	1981	1.7	1982	1.7	1983	1.7	1984	1.7	1985	1.3
1975	2.0	1976	2.0	1977	2.0	1978	2.0	1979	2.0	1980	2.0	1981	1.7	1982	1.7	1983	1.7	1984	1.7	1985	1.3	1986	1.3
1976	1.9	1977	1.9	1978	1.9	1979	1.9	1980	1.9	1981	1.7	1982	1.7	1983	1.7	1984	1.7	1985	1.3	1986	1.3	1987	1.3
1977	1.9	1978	1.9	1979	1.9	1980	1.9	1981	1.7	1982	1.7	1983	1.7	1984	1.7	1985	1.3	1986	1.3	1987	1.3	1988	1.3
1978	1.9	1979	1.9	1980	1.9	1981	1.7	1982	1.7	1983	1.7	1984	1.7	1985	1.2	1986	1.2	1987	1.2	1988	1.2	1989	1.2
1979	1.9	1980	1.9	1981	1.7	1982	1.7	1983	1.7	1984	1.7	1985	1.2	1986	1.2	1987	1.2	1988	1.2	1989	1.2	1990	1.2
1980	1.8	1981	1.6	1982	1.6	1983	1.6	1984	1.6	1985	1.2	1986	1.2	1987	1.2	1988	1.2	1989	1.2	1990	1.2	1991	1.2
1981	1.6	1982	1.6	1983	1.6	1984	1.6	1985	1.2	1986	1.2	1987	1.2	1988	1.2	1989	1.2	1990	1.2	1991	1.2	1992	1.2
1982	1.6	1983	1.6	1984	1.6	1985	1.2	1986	1.2	1987	1.2	1988	1.2	1989	1.2	1990	1.2	1991	1.2	1992	1.2	1993	1.2
1983	1.6	1984	1.6	1985	1.1	1986	1.1	1987	1.1	1988	1.1	1989	1.1	1990	1.1	1991	1.1	1992	1.1	1993	1.1	1994	1.1
1984	1.6	1985	1.1	1986	1.1	1987	1.1	1988	1.1	1989	1.1	1990	1.1	1991	1.1	1992	1.1	1993	1.1	1994	1.1	1995	1.1
1985	1.1	1986	1.1	1987	1.1	1988	1.1	1989	1.1	1990	1.1	1991	1.1	1992	1.1	1993	1.1	1994	1.1	1995	1.1	1996	1.1
1986	1.1	1987	1.1	1988	1.1	1989	1.1	1990	1.1	1991	1.1	1992	1.1	1993	1.1	1994	1.1	1995	1.1	1996	1.1	1997	1.1
1987	1.0	1988	1.0	1989	1.0	1990	1.0	1991	1.0	1992	1.0	1993	1.0	1994	1.0	1995	1.0	1996	1.0	1997	1.0	1998	1.0
1988	1.0	1989	1.0	1990	1.0	1991	1.0	1992	1.0	1993	1.0	1994	1.0	1995	1.0	1996	1.0	1997	1.0	1998	1.0	1999	1.0
1989	1.0	1990	1.0	1991	1.0	1992	1.0	1993	1.0	1994	1.0	1995	1.0	1996	1.0	1997	1.0	1998	1.0	1999	1.0	2000	1.0
1990	0.9	1991	0.9	1992	0.9	1993	0.9	1994	0.9	1995	0.9	1996	0.9	1997	0.9	1998	0.9	1999	0.9	2000	0.9	2001	0.9
1991	0.9	1992	0.9	1993	0.9	1994	0.9	1995	0.9	1996	0.9	1997	0.9	1998	0.9	1999	0.9	2000	0.9	2001	0.9	2002	0.9
1992	0.9	1993	0.9	1994	0.9	1995	0.9	1996	0.9	1997	0.9	1998	0.9	1999	0.9	2000	0.9	2001	0.9	2002	0.9	2003	0.9

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.5.4.

TABLE 2.5.3

IDLE EMISSION RATES FOR
HIGH ALTITUDE
LIGHT DUTY DIESEL POWERED VEHICLES

* IER = ZML + (DR * M)

Pol	Model Years	Zero Mile Emission Level (Grams/Min.)	Deterioration Rate (Gm/Min/10K Mi)
HC	Pre-1975	0.32	0.01
	1975-1976	0.07	0.0
	1977	0.09	0.0
	1978	0.14	0.0
	1979	0.12	0.0
	1980-1981	0.07	0.0
	1982-1983	0.04	0.0
	1984+	0.03	0.0
CO	Pre-1975	0.40	0.01
	1975-1976	0.25	0.01
	1977	0.28	0.01
	1978	0.30	0.01
	1979	0.32	0.01
	1980-1981	0.26	0.01
	1982-1983	0.26	0.01
	1984+	0.15	0.01
NOx	Pre-1975	0.13	0.0
	1975-1976	0.22	0.0
	1977	0.17	0.01
	1978	0.20	0.01
	1979	0.18	0.01
	1980	0.19	0.01
	1981-1984	0.14	0.01
	1985+	0.09	0.01

* WHERE : IER = Idle emission rate
ZML = Zero mile level
DR = Deterioration Rate
M = Cumulative Mileage / 10,000

DATE : MAY 25, 1985

TABLE 2.5.4

REGISTRATION MIX AND
MILEAGE ACCUMULATION RATES FOR
HIGH ALTITUDE
LIGHT DUTY DIESEL POWERED VEHICLES

Model Year Index**	July 1 Registration Mix*	Mileage Accumulation Rate per vehicle*	Jan 1 Registration Mix	Jan 1 Mileage Accumulation Rate (fleet)	Jan 1 Mileage Accumulation (fleet)
1	0.080	12818.	0.027	12818.	1602.
2	0.101	12102.	0.101	12639.	9591.
3	0.095	11427.	0.095	11933.	21873.
4	0.089	10789.	0.089	11267.	33470.
5	0.083	10187.	0.083	10638.	44420.
6	0.077	9619.	0.077	10045.	54758.
7	0.071	9082.	0.071	9485.	64520.
8	0.065	8575.	0.065	8955.	73738.
9	0.059	8096.	0.059	8455.	82440.
10	0.053	7645.	0.053	7983.	90657.
11	0.047	7218.	0.047	7538.	98415.
12	0.041	6815.	0.041	7117.	105740.
13	0.035	6435.	0.035	6720.	112657.
14	0.029	6076.	0.029	6345.	119187.
15	0.023	5737.	0.023	5991.	125354.
16	0.017	5416.	0.017	5657.	131176.
17	0.011	5114.	0.011	5340.	136673.
18	0.008	4829.	0.008	5043.	141863.
19	0.006	4559.	0.006	4761.	146763.
20+	0.008	4305.	0.008	4495.	151390.

* Default information that may be altered by the MOBILE3 user with information about the local area.

** The indices refer to the most recent model year vehicles in any given calendar year. Index 1 references the newest model year vehicles and index 20+ references the oldest model year vehicles.

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TABLE 2.5.5

EXAMPLE TRAVEL WEIGHTING FRACTION CALCULATION FOR
HIGH ALTITUDE
LIGHT DUTY DIESEL POWERED VEHICLES
JANUARY 1, 1988

Model Years	(A) LDV Fleet Registration	(B) Sales Fraction	(A*B)	(C=A*B/DAF) LDDV Registration	(D) Annual Mileage Accrual Rate	(C*D)	(C*D/TFNORM) Travel Fractions
1988	0.027	0.090	0.002	0.055	12818.	701.6	0.065
1987	0.101	0.080	0.008	0.184	12639.	2328.9	0.214
1986	0.095	0.073	0.007	0.158	11933.	1887.3	0.174
1985	0.089	0.066	0.006	0.134	11267.	1509.4	0.139
1984	0.083	0.060	0.005	0.114	10638.	1208.2	0.111
1983	0.077	0.053	0.004	0.093	10045.	934.9	0.086
1982	0.071	0.046	0.003	0.074	9485.	706.4	0.065
1981	0.065	0.061	0.004	0.090	8955.	809.8	0.074
1980	0.059	0.034	0.002	0.046	8455.	386.8	0.036
1979	0.053	0.028	0.001	0.034	7983.	270.2	0.025
1978	0.047	0.009	0.000	0.010	7538.	72.7	0.007
1977	0.041	0.004	0.000	0.004	7117.	26.6	0.002
1976	0.035	0.003	0.000	0.002	6720.	16.1	0.001
1975	0.029	0.003	0.000	0.002	6345.	12.6	0.001
1974	0.023	0.0	0.0	0.0	5991.	0.0	0.0
1973	0.017	0.0	0.0	0.0	5657.	0.0	0.0
1972	0.011	0.0	0.0	0.0	5340.	0.0	0.0
1971	0.008	0.0	0.0	0.0	5043.	0.0	0.0
1970	0.006	0.0	0.0	0.0	4761.	0.0	0.0
1969-	0.008	0.0	0.0	0.0	4495.	0.0	0.0
		DAF:	0.044		TFNORM:	10871.3	

WHERE :

A = January 1 registration mix from Table 2.5.4.
B = Fleet sales fractions
D = Sales weighted fleet mileage accumulation rate from Table 2.5.4, adjusted to January 1
D(1) = Annual Miles(1)
D(MYI) = .25*(Annual Miles(MYI)) + .75*(Annual Miles(MYI-1)), MYI=2,...,20+

NOTE : In general, the travel weighting fractions will change for every calendar year since the sales fraction (column B) changes for almost every model year.

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TABLE 2.5.6

SPEED CORRECTION FACTOR COEFFICIENTS FOR
HIGH ALTITUDE
LIGHT DUTY DIESEL POWERED VEHICLES

$$* \; SCF(s,sadj) = SF(s)/SF(sadj)$$

$$SF(s) = EXP(A + B*s + C*s^2)$$

Pol	Model Years	Coefficients A	B	C
HC	All	0.90900	-0.05500	0.00044
CO	All	1.37520	-0.08800	0.00091
NOx	All	0.66800	-0.04800	0.00071

* WHERE :
s = average speed (mph)
sadj = basic test procedure speed; adjusted for fraction of cold start operation x and fraction of hot start operation w,
[1/sadj = (w+x)/26 + (1-w-x)/16]

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TABLE 2.5.7

NORMALIZED BAG FRACTIONS FOR
HIGH ALTITUDE
LIGHT DUTY DIESEL POWERED VEHICLES

		Normalized Fractions							
Pol	Model Years	Test Seg.#1 B1	Test Seg.#1 D1	Test Seg.#2 B2	Test Seg.#2 D2	Test Seg.#3 B3	Test Seg.#3 D3	Total Test B0	Total Test D0
HC	Pre-1975	1.209	0.071	1.073	0.056	0.703	0.064	1.000	0.061
	1975-1976	1.209	0.105	1.073	0.084	0.703	0.088	1.000	0.098
	1977	1.209	0.105	1.073	0.084	0.703	0.088	1.000	0.098
	1978	1.209	0.105	1.073	0.084	0.703	0.088	1.000	0.098
	1979	1.209	0.105	1.073	0.084	0.703	0.088	1.000	0.098
	1980+	1.345	0.103	0.966	0.138	0.793	0.103	1.000	0.138
CO	Pre-1975	1.199	0.060	0.935	0.042	0.974	0.051	1.000	0.048
	1975-1976	1.199	0.067	0.935	0.048	0.974	0.057	1.000	0.054
	1977	1.199	0.067	0.935	0.048	0.974	0.057	1.000	0.054
	1978	1.199	0.067	0.935	0.048	0.974	0.057	1.000	0.054
	1979	1.199	0.067	0.935	0.048	0.974	0.057	1.000	0.054
	1980+	1.157	0.061	1.000	0.026	0.904	0.035	1.000	0.035
NOx	Pre-1975	1.068	0.026	0.981	0.029	0.985	0.026	1.000	0.028
	1975-1976	1.068	0.031	0.981	0.033	0.985	0.030	1.000	0.032
	1977	1.068	0.031	0.981	0.033	0.985	0.030	1.000	0.032
	1978	1.068	0.031	0.981	0.033	0.985	0.030	1.000	0.032
	1979	1.068	0.031	0.981	0.033	0.985	0.030	1.000	0.032
	1980	0.969	0.031	1.062	0.047	0.906	0.031	1.000	0.039
	1981-1982	0.969	0.031	1.062	0.047	0.906	0.031	1.000	0.039
	1983+	0.969	0.031	1.062	0.047	0.906	0.031	1.000	0.039

NOTE : The fractions given in this table are used in the calculation of the operating-mode/ temperature correction factor (OMTCF).

WHERE :

```
OMTCF   = ((TERM1 + TERM2 + TERM3)/DENOM)
TERM1   =    W    *TCF(1)*(B1+D1*M)
TERM2   = (1-W-X)*TCF(2)*(B2+D2*M)
TERM3   =    X    *TCF(3)*(B3+D3*M)
DENOM   = B0 + D0*M
 W      = Fraction of VMT in the cold start mode
 X      = Fraction of VMT in the  hot start mode
TCF(b)  = Temperature correction factor for pollutant, model
          year; for test segment b
 M      = Cumulative mileage / 10,000
```

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TABLE 2.6.1

EXHAUST EMISSION RATES FOR
HIGH ALTITUDE
LIGHT DUTY DIESEL POWERED TRUCKS
(RATES REFLECT ZERO TAMPERING)

* BER = ZML + (DR * M)

Pol	Model Years	Zero Mile Emission Level (Grams/Mile)	Deterioration Rate (Gm/Mi/10K Mi)	50,000 Mile Emission Level (Grams/Mile)
HC	Pre-1978	1.98	0.08	2.38
	1978	1.98	0.08	2.38
	1979-1980	1.98	0.08	2.38
	1981-1983	0.99	0.04	1.19
	1984+	0.54	0.04	0.74
CO	Pre-1978	3.45	0.10	3.95
	1978	3.45	0.10	3.95
	1979-1980	3.45	0.10	3.95
	1981-1983	3.45	0.10	3.95
	1984+	2.33	0.04	2.53
NOx	Pre-1978	1.83	0.06	2.13
	1978	1.83	0.06	2.13
	1979	1.83	0.06	2.13
	1980	1.83	0.06	2.13
	1981-1984	1.48	0.03	1.63
	1985-1986	1.48	0.03	1.63
	1987+	0.94	0.03	1.09

* WHERE : BER = Basic emission rate (untampered)
ZML = Zero mile level
DR = Deterioration rate
M = Cumulative mileage / 10,000

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TABLE 2.6.2A

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
LIGHT DUTY DIESEL POWERED TRUCKS
TOTAL HC

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	3.4	1962	3.4	1963	3.4	1964	3.4	1965	3.4	1966	3.4	1967	3.4	1968	3.4	1969	3.4	1970	3.4	1971	3.4	1972	3.4
1962	3.4	1963	3.4	1964	3.4	1965	3.4	1966	3.4	1967	3.4	1968	3.4	1969	3.4	1970	3.4	1971	3.4	1972	3.4	1973	3.4
1963	3.4	1964	3.4	1965	3.4	1966	3.4	1967	3.4	1968	3.4	1969	3.4	1970	3.4	1971	3.4	1972	3.4	1973	3.4	1974	3.4
1964	3.3	1965	3.3	1966	3.3	1967	3.3	1968	3.3	1969	3.3	1970	3.3	1971	3.3	1972	3.3	1973	3.3	1974	3.3	1975	3.3
1965	3.3	1966	3.3	1967	3.3	1968	3.3	1969	3.3	1970	3.3	1971	3.3	1972	3.3	1973	3.3	1974	3.3	1975	3.3	1976	3.3
1966	3.2	1967	3.2	1968	3.2	1969	3.2	1970	3.2	1971	3.2	1972	3.2	1973	3.2	1974	3.2	1975	3.2	1976	3.2	1977	3.2
1967	3.2	1968	3.2	1969	3.2	1970	3.2	1971	3.2	1972	3.2	1973	3.2	1974	3.2	1975	3.2	1976	3.2	1977	3.2	1978	3.2
1968	3.1	1969	3.1	1970	3.1	1971	3.1	1972	3.1	1973	3.1	1974	3.1	1975	3.1	1976	3.1	1977	3.1	1978	3.1	1979	3.1
1969	3.0	1970	3.0	1971	3.0	1972	3.0	1973	3.0	1974	3.0	1975	3.0	1976	3.0	1977	3.0	1978	3.0	1979	3.0	1980	3.0
1970	3.0	1971	3.0	1972	3.0	1973	3.0	1974	3.0	1975	3.0	1976	3.0	1977	3.0	1978	3.0	1979	3.0	1980	3.0	1981	1.5
1971	2.9	1972	2.9	1973	2.9	1974	2.9	1975	2.9	1976	2.9	1977	2.9	1978	2.9	1979	2.9	1980	2.9	1981	1.5	1982	1.5
1972	2.8	1973	2.8	1974	2.8	1975	2.8	1976	2.8	1977	2.8	1978	2.8	1979	2.8	1980	2.8	1981	1.4	1982	1.4	1983	1.4
1973	2.7	1974	2.7	1975	2.7	1976	2.7	1977	2.7	1978	2.7	1979	2.7	1980	2.7	1981	1.4	1982	1.4	1983	1.4	1984	0.9
1974	2.7	1975	2.7	1976	2.7	1977	2.7	1978	2.7	1979	2.7	1980	2.7	1981	1.3	1982	1.3	1983	1.3	1984	0.9	1985	0.9
1975	2.6	1976	2.6	1977	2.6	1978	2.6	1979	2.6	1980	2.6	1981	1.3	1982	1.3	1983	1.3	1984	0.8	1985	0.8	1986	0.8
1976	2.5	1977	2.5	1978	2.5	1979	2.5	1980	2.5	1981	1.2	1982	1.2	1983	1.2	1984	0.8	1985	0.8	1986	0.8	1987	0.8
1977	2.3	1978	2.3	1979	2.3	1980	2.3	1981	1.2	1982	1.2	1983	1.2	1984	0.7	1985	0.7	1986	0.7	1987	0.7	1988	0.7
1978	2.2	1979	2.2	1980	2.2	1981	1.1	1982	1.1	1983	1.1	1984	0.7	1985	0.7	1986	0.7	1987	0.7	1988	0.7	1989	0.7
1979	2.1	1980	2.1	1981	1.0	1982	1.0	1983	1.0	1984	0.6	1985	0.6	1986	0.6	1987	0.6	1988	0.6	1989	0.6	1990	0.6
1980	2.0	1981	1.0	1982	1.0	1983	1.0	1984	0.5	1985	0.5	1986	0.5	1987	0.5	1988	0.5	1989	0.5	1990	0.5	1991	0.5

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	3.4	1974	3.4	1975	3.4	1976	3.4	1977	3.4	1978	3.4	1979	3.4	1980	3.4	1981	1.7	1982	1.7	1983	1.7	1984	1.3
1974	3.4	1975	3.4	1976	3.4	1977	3.4	1978	3.4	1979	3.4	1980	3.4	1981	1.7	1982	1.7	1983	1.7	1984	1.2	1985	1.2
1975	3.4	1976	3.4	1977	3.4	1978	3.4	1979	3.4	1980	3.4	1981	1.7	1982	1.7	1983	1.7	1984	1.2	1985	1.2	1986	1.2
1976	3.3	1977	3.3	1978	3.3	1979	3.3	1980	3.3	1981	1.7	1982	1.7	1983	1.7	1984	1.2	1985	1.2	1986	1.2	1987	1.2
1977	3.3	1978	3.3	1979	3.3	1980	3.3	1981	1.6	1982	1.6	1983	1.6	1984	1.2	1985	1.2	1986	1.2	1987	1.2	1988	1.2
1978	3.2	1979	3.2	1980	3.2	1981	1.6	1982	1.6	1983	1.6	1984	1.2	1985	1.2	1986	1.2	1987	1.2	1988	1.2	1989	1.2
1979	3.2	1980	3.2	1981	1.6	1982	1.6	1983	1.6	1984	1.1	1985	1.1	1986	1.1	1987	1.1	1988	1.1	1989	1.1	1990	1.1
1980	3.1	1981	1.6	1982	1.6	1983	1.6	1984	1.1	1985	1.1	1986	1.1	1987	1.1	1988	1.1	1989	1.1	1990	1.1	1991	1.1
1981	1.5	1982	1.5	1983	1.5	1984	1.1	1985	1.1	1986	1.1	1987	1.1	1988	1.1	1989	1.1	1990	1.1	1991	1.1	1992	1.1
1982	1.5	1983	1.5	1984	1.0	1985	1.0	1986	1.0	1987	1.0	1988	1.0	1989	1.0	1990	1.0	1991	1.0	1992	1.0	1993	1.0
1983	1.5	1984	1.0	1985	1.0	1986	1.0	1987	1.0	1988	1.0	1989	1.0	1990	1.0	1991	1.0	1992	1.0	1993	1.0	1994	1.0
1984	1.0	1985	1.0	1986	1.0	1987	1.0	1988	1.0	1989	1.0	1990	1.0	1991	1.0	1992	1.0	1993	1.0	1994	1.0	1995	1.0
1985	0.9	1986	0.9	1987	0.9	1988	0.9	1989	0.9	1990	0.9	1991	0.9	1992	0.9	1993	0.9	1994	0.9	1995	0.9	1996	0.9
1986	0.9	1987	0.9	1988	0.9	1989	0.9	1990	0.9	1991	0.9	1992	0.9	1993	0.9	1994	0.9	1995	0.9	1996	0.9	1997	0.9
1987	0.8	1988	0.8	1989	0.8	1990	0.8	1991	0.8	1992	0.8	1993	0.8	1994	0.8	1995	0.8	1996	0.8	1997	0.8	1998	0.8
1988	0.8	1989	0.8	1990	0.8	1991	0.8	1992	0.8	1993	0.8	1994	0.8	1995	0.8	1996	0.8	1997	0.8	1998	0.8	1999	0.8
1989	0.7	1990	0.7	1991	0.7	1992	0.7	1993	0.7	1994	0.7	1995	0.7	1996	0.7	1997	0.7	1998	0.7	1999	0.7	2000	0.7
1990	0.7	1991	0.7	1992	0.7	1993	0.7	1994	0.7	1995	0.7	1996	0.7	1997	0.7	1998	0.7	1999	0.7	2000	0.7	2001	0.7
1991	0.6	1992	0.6	1993	0.6	1994	0.6	1995	0.6	1996	0.6	1997	0.6	1998	0.6	1999	0.6	2000	0.6	2001	0.6	2002	0.6
1992	0.5	1993	0.5	1994	0.5	1995	0.5	1996	0.5	1997	0.5	1998	0.5	1999	0.5	2000	0.5	2001	0.5	2002	0.5	2003	0.5

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.6.4.

TABLE 2.6.2B

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
LIGHT DUTY DIESEL POWERED TRUCKS
CO

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	5.3	1962	5.3	1963	5.3	1964	5.3	1965	5.3	1966	5.3	1967	5.3	1968	5.3	1969	5.3	1970	5.3	1971	5.3	1972	5.3
1962	5.2	1963	5.2	1964	5.2	1965	5.2	1966	5.2	1967	5.2	1968	5.2	1969	5.2	1970	5.2	1971	5.2	1972	5.2	1973	5.2
1963	5.2	1964	5.2	1965	5.2	1966	5.2	1967	5.2	1968	5.2	1969	5.2	1970	5.2	1971	5.2	1972	5.2	1973	5.2	1974	5.2
1964	5.1	1965	5.1	1966	5.1	1967	5.1	1968	5.1	1969	5.1	1970	5.1	1971	5.1	1972	5.1	1973	5.1	1974	5.1	1975	5.1
1965	5.1	1966	5.1	1967	5.1	1968	5.1	1969	5.1	1970	5.1	1971	5.1	1972	5.1	1973	5.1	1974	5.1	1975	5.1	1976	5.1
1966	5.0	1967	5.0	1968	5.0	1969	5.0	1970	5.0	1971	5.0	1972	5.0	1973	5.0	1974	5.0	1975	5.0	1976	5.0	1977	5.0
1967	4.9	1968	4.9	1969	4.9	1970	4.9	1971	4.9	1972	4.9	1973	4.9	1974	4.9	1975	4.9	1976	4.9	1977	4.9	1978	4.9
1968	4.9	1969	4.9	1970	4.9	1971	4.9	1972	4.9	1973	4.9	1974	4.9	1975	4.9	1976	4.9	1977	4.9	1978	4.9	1979	4.9
1969	4.8	1970	4.8	1971	4.8	1972	4.8	1973	4.8	1974	4.8	1975	4.8	1976	4.8	1977	4.8	1978	4.8	1979	4.8	1980	4.8
1970	4.7	1971	4.7	1972	4.7	1973	4.7	1974	4.7	1975	4.7	1976	4.7	1977	4.7	1978	4.7	1979	4.7	1980	4.7	1981	4.7
1971	4.6	1972	4.6	1973	4.6	1974	4.6	1975	4.6	1976	4.6	1977	4.6	1978	4.6	1979	4.6	1980	4.6	1981	4.6	1982	4.6
1972	4.5	1973	4.5	1974	4.5	1975	4.5	1976	4.5	1977	4.5	1978	4.5	1979	4.5	1980	4.5	1981	4.5	1982	4.5	1983	4.5
1973	4.4	1974	4.4	1975	4.4	1976	4.4	1977	4.4	1978	4.4	1979	4.4	1980	4.4	1981	4.4	1982	4.4	1983	4.4	1984	2.7
1974	4.3	1975	4.3	1976	4.3	1977	4.3	1978	4.3	1979	4.3	1980	4.3	1981	4.3	1982	4.3	1983	4.3	1984	2.7	1985	2.7
1975	4.2	1976	4.2	1977	4.2	1978	4.2	1979	4.2	1980	4.2	1981	4.2	1982	4.2	1983	4.2	1984	2.6	1985	2.6	1986	2.6
1976	4.0	1977	4.0	1978	4.0	1979	4.0	1980	4.0	1981	4.0	1982	4.0	1983	4.0	1984	2.6	1985	2.6	1986	2.6	1987	2.6
1977	3.9	1978	3.9	1979	3.9	1980	3.9	1981	3.9	1982	3.9	1983	3.9	1984	2.5	1985	2.5	1986	2.5	1987	2.5	1988	2.5
1978	3.8	1979	3.8	1980	3.8	1981	3.8	1982	3.8	1983	3.8	1984	2.5	1985	2.5	1986	2.5	1987	2.5	1988	2.5	1989	2.5
1979	3.6	1980	3.6	1981	3.6	1982	3.6	1983	3.6	1984	2.4	1985	2.4	1986	2.4	1987	2.4	1988	2.4	1989	2.4	1990	2.4
1980	3.5	1981	3.5	1982	3.5	1983	3.5	1984	2.3	1985	2.3	1986	2.3	1987	2.3	1988	2.3	1989	2.3	1990	2.3	1991	2.3

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	5.3	1974	5.3	1975	5.3	1976	5.3	1977	5.3	1978	5.3	1979	5.3	1980	5.3	1981	5.3	1982	5.3	1983	5.3	1984	3.1
1974	5.2	1975	5.2	1976	5.2	1977	5.2	1978	5.2	1979	5.2	1980	5.2	1981	5.2	1982	5.2	1983	5.2	1984	3.0	1985	3.0
1975	5.2	1976	5.2	1977	5.2	1978	5.2	1979	5.2	1980	5.2	1981	5.2	1982	5.2	1983	5.2	1984	3.0	1985	3.0	1986	3.0
1976	5.1	1977	5.1	1978	5.1	1979	5.1	1980	5.1	1981	5.1	1982	5.1	1983	5.1	1984	3.0	1985	3.0	1986	3.0	1987	3.0
1977	5.1	1978	5.1	1979	5.1	1980	5.1	1981	5.1	1982	5.1	1983	5.1	1984	3.0	1985	3.0	1986	3.0	1987	3.0	1988	3.0
1978	5.0	1979	5.0	1980	5.0	1981	5.0	1982	5.0	1983	5.0	1984	3.0	1985	3.0	1986	3.0	1987	3.0	1988	3.0	1989	3.0
1979	4.9	1980	4.9	1981	4.9	1982	4.9	1983	4.9	1984	2.9	1985	2.9	1986	2.9	1987	2.9	1988	2.9	1989	2.9	1990	2.9
1980	4.9	1981	4.9	1982	4.9	1983	4.9	1984	2.9	1985	2.9	1986	2.9	1987	2.9	1988	2.9	1989	2.9	1990	2.9	1991	2.9
1981	4.8	1982	4.8	1983	4.8	1984	2.9	1985	2.9	1986	2.9	1987	2.9	1988	2.9	1989	2.9	1990	2.9	1991	2.9	1992	2.9
1982	4.7	1983	4.7	1984	2.8	1985	2.8	1986	2.8	1987	2.8	1988	2.8	1989	2.8	1990	2.8	1991	2.8	1992	2.8	1993	2.8
1983	4.6	1984	2.8	1985	2.8	1986	2.8	1987	2.8	1988	2.8	1989	2.8	1990	2.8	1991	2.8	1992	2.8	1993	2.8	1994	2.8
1984	2.8	1985	2.8	1986	2.8	1987	2.8	1988	2.8	1989	2.8	1990	2.8	1991	2.8	1992	2.8	1993	2.8	1994	2.8	1995	2.8
1985	2.7	1986	2.7	1987	2.7	1988	2.7	1989	2.7	1990	2.7	1991	2.7	1992	2.7	1993	2.7	1994	2.7	1995	2.7	1996	2.7
1986	2.7	1987	2.7	1988	2.7	1989	2.7	1990	2.7	1991	2.7	1992	2.7	1993	2.7	1994	2.7	1995	2.7	1996	2.7	1997	2.7
1987	2.6	1988	2.6	1989	2.6	1990	2.6	1991	2.6	1992	2.6	1993	2.6	1994	2.6	1995	2.6	1996	2.6	1997	2.6	1998	2.6
1988	2.6	1989	2.6	1990	2.6	1991	2.6	1992	2.6	1993	2.6	1994	2.6	1995	2.6	1996	2.6	1997	2.6	1998	2.6	1999	2.6
1989	2.5	1990	2.5	1991	2.5	1992	2.5	1993	2.5	1994	2.5	1995	2.5	1996	2.5	1997	2.5	1998	2.5	1999	2.5	2000	2.5
1990	2.5	1991	2.5	1992	2.5	1993	2.5	1994	2.5	1995	2.5	1996	2.5	1997	2.5	1998	2.5	1999	2.5	2000	2.5	2001	2.5
1991	2.4	1992	2.4	1993	2.4	1994	2.4	1995	2.4	1996	2.4	1997	2.4	1998	2.4	1999	2.4	2000	2.4	2001	2.4	2002	2.4
1992	2.3	1993	2.3	1994	2.3	1995	2.3	1996	2.3	1997	2.3	1998	2.3	1999	2.3	2000	2.3	2001	2.3	2002	2.3	2003	2.3

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.6.4.

TABLE 2.6.2C

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
LIGHT DUTY DIESEL POWERED TRUCKS
NOx

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	2.9	1962	2.9	1963	2.9	1964	2.9	1965	2.9	1966	2.9	1967	2.9	1968	2.9	1969	2.9	1970	2.9	1971	2.9	1972	2.9
1962	2.9	1963	2.9	1964	2.9	1965	2.9	1966	2.9	1967	2.9	1968	2.9	1969	2.9	1970	2.9	1971	2.9	1972	2.9	1973	2.9
1963	2.9	1964	2.9	1965	2.9	1966	2.9	1967	2.9	1968	2.9	1969	2.9	1970	2.9	1971	2.9	1972	2.9	1973	2.9	1974	2.9
1964	2.8	1965	2.8	1966	2.8	1967	2.8	1968	2.8	1969	2.8	1970	2.8	1971	2.8	1972	2.8	1973	2.8	1974	2.8	1975	2.8
1965	2.8	1966	2.8	1967	2.8	1968	2.8	1969	2.8	1970	2.8	1971	2.8	1972	2.8	1973	2.8	1974	2.8	1975	2.8	1976	2.8
1966	2.8	1967	2.8	1968	2.8	1969	2.8	1970	2.8	1971	2.8	1972	2.8	1973	2.8	1974	2.8	1975	2.8	1976	2.8	1977	2.8
1967	2.7	1968	2.7	1969	2.7	1970	2.7	1971	2.7	1972	2.7	1973	2.7	1974	2.7	1975	2.7	1976	2.7	1977	2.7	1978	2.7
1968	2.7	1969	2.7	1970	2.7	1971	2.7	1972	2.7	1973	2.7	1974	2.7	1975	2.7	1976	2.7	1977	2.7	1978	2.7	1979	2.7
1969	2.6	1970	2.6	1971	2.6	1972	2.6	1973	2.6	1974	2.6	1975	2.6	1976	2.6	1977	2.6	1978	2.6	1979	2.6	1980	2.6
1970	2.6	1971	2.6	1972	2.6	1973	2.6	1974	2.6	1975	2.6	1976	2.6	1977	2.6	1978	2.6	1979	2.6	1980	2.6	1981	1.9
1971	2.5	1972	2.5	1973	2.5	1974	2.5	1975	2.5	1976	2.5	1977	2.5	1978	2.5	1979	2.5	1980	2.5	1981	1.8	1982	1.8
1972	2.5	1973	2.5	1974	2.5	1975	2.5	1976	2.5	1977	2.5	1978	2.5	1979	2.5	1980	2.5	1981	1.8	1982	1.8	1983	1.8
1973	2.4	1974	2.4	1975	2.4	1976	2.4	1977	2.4	1978	2.4	1979	2.4	1980	2.4	1981	1.8	1982	1.8	1983	1.8	1984	1.8
1974	2.3	1975	2.3	1976	2.3	1977	2.3	1978	2.3	1979	2.3	1980	2.3	1981	1.7	1982	1.7	1983	1.7	1984	1.7	1985	1.7
1975	2.3	1976	2.3	1977	2.3	1978	2.3	1979	2.3	1980	2.3	1981	1.7	1982	1.7	1983	1.7	1984	1.7	1985	1.7	1986	1.7
1976	2.2	1977	2.2	1978	2.2	1979	2.2	1980	2.2	1981	1.7	1982	1.7	1983	1.7	1984	1.7	1985	1.7	1986	1.7	1987	1.1
1977	2.1	1978	2.1	1979	2.1	1980	2.1	1981	1.6	1982	1.6	1983	1.6	1984	1.6	1985	1.6	1986	1.6	1987	1.1	1988	1.1
1978	2.0	1979	2.0	1980	2.0	1981	1.6	1982	1.6	1983	1.6	1984	1.6	1985	1.6	1986	1.6	1987	1.0	1988	1.0	1989	1.0
1979	1.9	1980	1.9	1981	1.5	1982	1.5	1983	1.5	1984	1.5	1985	1.5	1986	1.5	1987	1.0	1988	1.0	1989	1.0	1990	1.0
1980	1.8	1981	1.5	1982	1.5	1983	1.5	1984	1.5	1985	1.5	1986	1.5	1987	0.9	1988	0.9	1989	0.9	1990	0.9	1991	0.9

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	2.9	1974	2.9	1975	2.9	1976	2.9	1977	2.9	1978	2.9	1979	2.9	1980	2.9	1981	2.0	1982	2.0	1983	2.0	1984	2.0
1974	2.9	1975	2.9	1976	2.9	1977	2.9	1978	2.9	1979	2.9	1980	2.9	1981	2.0	1982	2.0	1983	2.0	1984	2.0	1985	2.0
1975	2.9	1976	2.9	1977	2.9	1978	2.9	1979	2.9	1980	2.9	1981	2.0	1982	2.0	1983	2.0	1984	2.0	1985	2.0	1986	2.0
1976	2.8	1977	2.8	1978	2.8	1979	2.8	1980	2.8	1981	2.0	1982	2.0	1983	2.0	1984	2.0	1985	2.0	1986	2.0	1987	1.4
1977	2.8	1978	2.8	1979	2.8	1980	2.8	1981	2.0	1982	2.0	1983	2.0	1984	2.0	1985	2.0	1986	2.0	1987	1.4	1988	1.4
1978	2.8	1979	2.8	1980	2.8	1981	2.0	1982	2.0	1983	2.0	1984	2.0	1985	2.0	1986	2.0	1987	1.4	1988	1.4	1989	1.4
1979	2.7	1980	2.7	1981	1.9	1982	1.9	1983	1.9	1984	1.9	1985	1.9	1986	1.9	1987	1.4	1988	1.4	1989	1.4	1990	1.4
1980	2.7	1981	1.9	1982	1.9	1983	1.9	1984	1.9	1985	1.9	1986	1.9	1987	1.4	1988	1.4	1989	1.4	1990	1.4	1991	1.4
1981	1.9	1982	1.9	1983	1.9	1984	1.9	1985	1.9	1986	1.9	1987	1.3	1988	1.3	1989	1.3	1990	1.3	1991	1.3	1992	1.3
1982	1.9	1983	1.9	1984	1.9	1985	1.9	1986	1.9	1987	1.3	1988	1.3	1989	1.3	1990	1.3	1991	1.3	1992	1.3	1993	1.3
1983	1.8	1984	1.8	1985	1.8	1986	1.8	1987	1.3	1988	1.3	1989	1.3	1990	1.3	1991	1.3	1992	1.3	1993	1.3	1994	1.3
1984	1.8	1985	1.8	1986	1.8	1987	1.3	1988	1.3	1989	1.3	1990	1.3	1991	1.3	1992	1.3	1993	1.3	1994	1.3	1995	1.3
1985	1.8	1986	1.8	1987	1.2	1988	1.2	1989	1.2	1990	1.2	1991	1.2	1992	1.2	1993	1.2	1994	1.2	1995	1.2	1996	1.2
1986	1.7	1987	1.2	1988	1.2	1989	1.2	1990	1.2	1991	1.2	1992	1.2	1993	1.2	1994	1.2	1995	1.2	1996	1.2	1997	1.2
1987	1.2	1988	1.2	1989	1.2	1990	1.2	1991	1.2	1992	1.2	1993	1.2	1994	1.2	1995	1.2	1996	1.2	1997	1.2	1998	1.2
1988	1.1	1989	1.1	1990	1.1	1991	1.1	1992	1.1	1993	1.1	1994	1.1	1995	1.1	1996	1.1	1997	1.1	1998	1.1	1999	1.1
1989	1.1	1990	1.1	1991	1.1	1992	1.1	1993	1.1	1994	1.1	1995	1.1	1996	1.1	1997	1.1	1998	1.1	1999	1.1	2000	1.1
1990	1.0	1991	1.0	1992	1.0	1993	1.0	1994	1.0	1995	1.0	1996	1.0	1997	1.0	1998	1.0	1999	1.0	2000	1.0	2001	1.0
1991	1.0	1992	1.0	1993	1.0	1994	1.0	1995	1.0	1996	1.0	1997	1.0	1998	1.0	1999	1.0	2000	1.0	2001	1.0	2002	1.0
1992	0.9	1993	0.9	1994	0.9	1995	0.9	1996	0.9	1997	0.9	1998	0.9	1999	0.9	2000	0.9	2001	0.9	2002	0.9	2003	0.9

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.6.4.

TABLE 2.6.3

IDLE EMISSION RATES FOR
HIGH ALTITUDE
LIGHT DUTY DIESEL POWERED TRUCKS

* IER = ZML + (DR * M)

Pol	Model Years	Zero Mile Emission Level (Grams/Min.)	Deterioration Rate (Gm/Min/10K Mi)
HC	Pre-1978	0.18	0.01
	1978	0.23	0.01
	1979-1980	0.23	0.01
	1981-1983	0.07	0.0
	1984+	0.07	0.0
CO	Pre-1978	0.53	0.02
	1978	0.54	0.01
	1979-1980	0.54	0.01
	1981-1983	0.54	0.0
	1984+	0.31	0.0
NOx	Pre-1978	0.19	0.01
	1978	0.32	0.01
	1979	0.32	0.01
	1980	0.32	0.01
	1981-1984	0.34	0.0
	1985-1986	0.34	0.0
	1987+	0.13	0.0

* WHERE : IER = Idle emission rate
ZML = Zero mile level
DR = Deterioration Rate
M = Cumulative Mileage / 10,000

DATE : MAY 25, 1985

TABLE 2.6.4

REGISTRATION MIX AND
MILEAGE ACCUMULATION RATES FOR
HIGH ALTITUDE
LIGHT DUTY DIESEL POWERED TRUCKS

Model Year Index**	July 1 Registration Mix*	Mileage Accumulation Rate per truck *	Jan 1 Registration Mix	Jan 1 Mileage Accumulation Rate (fleet)	Jan 1 Mileage Accumulation (fleet)
1	0.067	17552.	0.022	17552.	2194.
2	0.085	16262.	0.085	17229.	13124.
3	0.081	15068.	0.081	15963.	29711.
4	0.077	13961.	0.077	14791.	45080.
5	0.073	12936.	0.073	13705.	59321.
6	0.069	11986.	0.069	12698.	72515.
7	0.065	11105.	0.065	11766.	84741.
8	0.061	10290.	0.061	10901.	96068.
9	0.057	9534.	0.057	10101.	106564.
10	0.053	8833.	0.053	9359.	116288.
11	0.048	8185.	0.048	8671.	125298.
12	0.044	7583.	0.044	8034.	133646.
13	0.040	7026.	0.040	7444.	141381.
14	0.036	6510.	0.036	6897.	148548.
15	0.032	6032.	0.032	6390.	155188.
16	0.028	5589.	0.028	5921.	161340.
17	0.024	5179.	0.024	5486.	167041.
18	0.020	4798.	0.020	5084.	172323.
19	0.016	4446.	0.016	4710.	177217.
20+	0.024	4119.	0.024	4364.	181752.

* Default information that may be altered by the MOBILE3 user with information about the local area.

** The indices refer to the most recent model year vehicles in any given calendar year. Index 1 references the newest model year vehicles and index 20+ references the oldest model year vehicles.

DATE : MAY 25, 1985

TABLE 2.6.5

EXAMPLE TRAVEL WEIGHTING FRACTION CALCULATION FOR
HIGH ALTITUDE
LIGHT DUTY DIESEL POWERED TRUCKS
JANUARY 1, 1988

Model Years	(A) LDT1 Fleet Registration	(B) Sales Fraction	(A*B)	(C=A*B/DAF) LDDT Registration	(D) Annual Mileage Accrual Rate	(C*D)	(C*D/TFNORM) Travel Fractions
1988	0.022	0.240	0.005	0.067	17552.	1181.5	0.080
1987	0.085	0.210	0.018	0.224	17229.	3862.4	0.262
1986	0.081	0.180	0.015	0.183	15963.	2923.0	0.198
1985	0.077	0.160	0.012	0.155	14791.	2288.6	0.155
1984	0.073	0.130	0.009	0.119	13705.	1633.4	0.111
1983	0.069	0.100	0.007	0.087	12698.	1100.4	0.075
1982	0.065	0.080	0.005	0.065	11766.	768.4	0.052
1981	0.061	0.060	0.004	0.046	10901.	501.1	0.034
1980	0.057	0.034	0.002	0.024	10101.	245.8	0.017
1979	0.053	0.028	0.001	0.019	9359.	174.4	0.012
1978	0.048	0.009	0.000	0.005	8671.	47.0	0.003
1977	0.044	0.005	0.000	0.003	8034.	22.2	0.002
1976	0.040	0.003	0.000	0.002	7444.	11.2	0.001
1975	0.036	0.002	0.000	0.001	6897.	6.2	0.000
1974	0.032	0.0	0.0	0.0	6390.	0.0	0.0
1973	0.028	0.0	0.0	0.0	5921.	0.0	0.0
1972	0.024	0.0	0.0	0.0	5486.	0.0	0.0
1971	0.020	0.0	0.0	0.0	5084.	0.0	0.0
1970	0.016	0.0	0.0	0.0	4710.	0.0	0.0
1969-	0.024	0.0	0.0	0.0	4364.	0.0	0.0
		DAF:	0.080		TFNORM:	14765.6	

WHERE :

A = January 1 registration mix from Table 2.6.4.
B = Fleet sales fractions
D = Sales weighted fleet mileage accumulation rate from Table 2.6.4, adjusted to January 1
D(1) = Annual Miles(1)
D(MYI) = .25*(Annual Miles(MYI)) + .75*(Annual Miles(MYI-1)), MYI=2,...,20+

NOTE : In general, the travel weighting fractions will change for every calendar year since the sales fraction (column B) changes for almost every model year.

DATE : MAY 25, 1985

TABLE 2.6.6

SPEED CORRECTION FACTOR COEFFICIENTS FOR
HIGH ALTITUDE
LIGHT DUTY DIESEL POWERED TRUCKS

$$* \; SCF(s,sadj) = SF(s)/SF(sadj)$$

$$SF(s) = EXP(A + B*s + C*s^2)$$

Pol	Model Years	Coefficients A	B	C
HC	All	0.90900	-0.05500	0.00044
CO	All	1.37520	-0.08800	0.00091
NOx	All	0.66800	-0.04800	0.00071

* WHERE :

s = average speed (mph)

sadj = basic test procedure speed; adjusted for fraction of cold start operation x and fraction of hot start operation w,
[$1/sadj = (w+x)/26 + (1-w-x)/16$]

DATE : MAY 25, 1985

TABLE 2.6.7

NORMALIZED BAG FRACTIONS FOR
HIGH ALTITUDE
LIGHT DUTY DIESEL POWERED TRUCKS

		Normalized Fractions							
	Model	Test Seg.#1		Test Seg.#2		Test Seg.#3		Total Test	
Pol	Years	B1	D1	B2	D2	B3	D3	B0	D0
HC	Pre-1979	1.209	0.112	1.073	0.091	0.703	0.093	1.000	0.096
	1979	1.209	0.110	1.073	0.089	0.703	0.092	1.000	0.094
	1980-1982	1.209	0.110	1.073	0.089	0.703	0.092	1.000	0.094
	1983+	1.209	0.115	1.073	0.093	0.703	0.095	1.000	0.098
CO	Pre-1979	1.199	0.062	0.935	0.044	0.974	0.053	1.000	0.050
	1979	1.199	0.060	0.935	0.043	0.974	0.051	1.000	0.049
	1980-1982	1.199	0.057	0.935	0.040	0.974	0.048	1.000	0.046
	1983+	1.199	0.057	0.935	0.040	0.974	0.048	1.000	0.046
NOx	Pre-1979	1.068	0.033	0.981	0.036	0.985	0.032	1.000	0.034
	1979	1.068	0.033	0.981	0.035	0.985	0.032	1.000	0.034
	1980-1984	1.068	0.036	0.981	0.038	0.985	0.035	1.000	0.037
	1985+	1.068	0.071	0.981	0.072	0.985	0.068	1.000	0.071

NOTE : The fractions given in this table are used in the calculation of the operating-mode/ temperature correction factor (OMTCF).

WHERE :

```
OMTCF   = ((TERM1 + TERM2 + TERM3)/DENOM)
TERM1   =    W    *TCF(1)*(B1+D1*M)
TERM2   = (1-W-X)*TCF(2)*(B2+D2*M)
TERM3   =    X    *TCF(3)*(B3+D3*M)
DENOM   = B0 + D0*M
 W      = Fraction of VMT in the cold start mode
 X      = Fraction of VMT in the  hot start mode
TCF(b)  = Temperature correction factor for pollutant, model
          year; for test segment b
 M      = Cumulative mileage / 10,000
```

DATE : MAY 25, 1985

TABLE 2.7.1

EXHAUST EMISSION RATES FOR
HIGH ALTITUDE
HEAVY DUTY DIESEL POWERED VEHICLES
(RATES REFLECT ZERO TAMPERING)

* BER = ZML + (DR * M)

Pol	Model Years	Zero Mile Emission Level (Grams/Mile)	Deterioration Rate (Gm/Mi/10K Mi)	50,000 Mile Emission Level (Grams/Mile)
HC	Pre-1963	7.76	0.05	8.01
	1963-1965	7.73	0.05	7.98
	1966-1968	8.00	0.06	8.30
	1969-1971	8.51	0.06	8.81
	1972-1974	9.03	0.06	9.33
	1975-1979	8.95	0.06	9.25
	1980-1981	8.11	0.06	8.41
	1982-1984	7.47	0.05	7.72
	1985	7.16	0.02	7.26
	1986	5.75	0.02	5.85
	1987-1992	5.59	0.02	5.69
	1993-1996	5.49	0.02	5.59
	1997+	5.44	0.02	5.54
CO	Pre-1963	17.22	0.14	17.92
	1963-1965	17.15	0.14	17.85
	1966-1968	17.75	0.14	18.45
	1969-1971	18.89	0.15	19.64
	1972-1974	20.04	0.16	20.84
	1975-1979	19.56	0.16	20.36
	1980-1981	16.64	0.14	17.34
	1982-1984	15.32	0.13	15.97
	1985	14.80	0.12	15.40
	1986	14.53	0.12	15.13
	1987-1992	14.14	0.12	14.74
	1993-1996	13.88	0.12	14.48
	1997+	13.76	0.11	14.31
NOx	Pre-1963	21.94	0.0	21.94
	1963-1965	21.85	0.0	21.85
	1966-1968	22.61	0.0	22.61
	1969-1971	24.06	0.0	24.06
	1972-1974	25.53	0 0	25.53
	1975-1979	24.77	0.0	24.77
	1980-1981	20.50	0.0	20.50
	1982-1984	18.88	0.0	18.88
	1985	18.23	0.0	18.23
	1986	17.90	0.0	17.90
	1987-1992	11.19	0.05	11.44
	1993-1996	10.98	0.05	11.23
	1997+	10.89	0.05	11.14

* WHERE : BER = Basic emission rate (untampered)
ZML = Zero mile level
DR = Deterioration rate
M = Cumulative mileage / 10,000

DATE : MAY 25, 1985

TABLE 2.7.2A

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
HEAVY DUTY DIESEL POWERED VEHICLES
TOTAL HC

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	10.8	1962	10.8	1963	10.8	1964	10.8	1965	10.8	1966	11.6	1967	11.6	1968	11.6	1969	12.2	1970	12.2	1971	12.2	1972	12.7
1962	10.7	1963	10.7	1964	10.7	1965	10.7	1966	11.6	1967	11.6	1968	11.6	1969	12.1	1970	12.1	1971	12.1	1972	12.6	1973	12.6
1963	10.6	1964	10.6	1965	10.6	1966	11.5	1967	11.5	1968	11.5	1969	12.0	1970	12.0	1971	12.0	1972	12.5	1973	12.5	1974	12.5
1964	10.6	1965	10 6	1966	11.4	1967	11.4	1968	11.4	1969	11.9	1970	11.9	1971	11.9	1972	12.4	1973	12.4	1974	12.4	1975	12.3
1965	10.5	1966	11.3	1967	11.3	1968	11 3	1969	11 8	1970	11.8	1971	11.8	1972	12.3	1973	12.3	1974	12.3	1975	12.2	1976	12.2
1966	11.2	1967	11.2	1968	11.2	1969	11.7	1970	11.7	1971	11.7	1972	12.2	1973	12.2	1974	12.2	1975	12.1	1976	12.1	1977	12.1
1967	11.1	1968	11.1	1969	11.6	1970	11.6	1971	11.6	1972	12.1	1973	12.1	1974	12.1	1975	12.0	1976	12.0	1977	12.0	1978	12.0
1968	10.9	1969	11.4	1970	11.4	1971	11.4	1972	12.0	1973	12.0	1974	12.0	1975	11.9	1976	11.9	1977	11.9	1978	11.9	1979	11.9
1969	11.3	1970	11.3	1971	11.3	1972	11.8	1973	11.8	1974	11 8	1975	11.7	1976	11.7	1977	11.7	1978	11.7	1979	11.7	1980	10.9
1970	11.1	1971	11.1	1972	11.6	1973	11.6	1974	11.6	1975	11.6	1976	11.6	1977	11.6	1978	11.6	1979	11.6	1980	10.7	1981	10.7
1971	10.9	1972	11.5	1973	11.5	1974	11.5	1975	11.4	1976	11.4	1977	11.4	1978	11.4	1979	11.4	1980	10.5	1981	10.5	1982	9.5
1972	11.3	1973	11.3	1974	11.3	1975	11.2	1976	11.2	1977	11.2	1978	11.2	1979	11.2	1980	10.3	1981	10.3	1982	9.3	1983	9.3
1973	11.1	1974	11.1	1975	11.0	1976	11 0	1977	11.0	1978	11.0	1979	11.0	1980	10.1	1981	10.1	1982	9.2	1983	9.2	1984	9.2
1974	10.8	1975	10.7	1976	10.7	1977	10.7	1978	10.7	1979	10.7	1980	9.9	1981	9.9	1982	9.0	1983	9.0	1984	9.0	1985	7.8
1975	10.5	1976	10.5	1977	10.5	1978	10.5	1979	10.5	1980	9.6	1981	9.6	1982	8.7	1983	8.7	1984	8.7	1985	7.7	1986	6.3
1976	10.2	1977	10.2	1978	10.2	1979	10.2	1980	9.3	1981	9.3	1982	8.5	1983	8.5	1984	8.5	1985	7.6	1986	6.2	1987	6.0
1977	9.9	1978	9.9	1979	9 9	1980	9.0	1981	9.0	1982	8.2	1983	8.2	1984	8.2	1985	7.5	1986	6.1	1987	5.9	1988	5.9
1978	9.5	1979	9.5	1980	8.7	1981	8.7	1982	8.0	1983	8.0	1984	8.0	1985	7.4	1986	5.9	1987	5.8	1988	5.8	1989	5.8
1979	9.1	1980	8.3	1981	8.3	1982	7.6	1983	7.6	1984	7 6	1985	7.2	1986	5.8	1987	5.7	1988	5.7	1989	5.7	1990	5.7
1980	8.1	1981	8.1	1982	7.5	1983	7.5	1984	7.5	1985	7.2	1986	5.8	1987	5.6	1988	5.6	1989	5.6	1990	5.6	1991	5.6

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	12.7	1974	12.7	1975	12.6	1976	12.6	1977	12.6	1978	12.6	1979	12.6	1980	11.8	1981	11.8	1982	10.5	1983	10.5	1984	10.5
1974	12.6	1975	12.5	1976	12.5	1977	12.5	1978	12.5	1979	12.5	1980	11.7	1981	11.7	1982	10.4	1983	10.4	1984	10.4	1985	8.3
1975	12.4	1976	12.4	1977	12.4	1978	12.4	1979	12.4	1980	11.6	1981	11.6	1982	10.4	1983	10.4	1984	10.4	1985	8.3	1986	6.9
1976	12.3	1977	12.3	1978	12.3	1979	12.3	1980	11.5	1981	11 5	1982	10.3	1983	10.3	1984	10.3	1985	8.3	1986	6.9	1987	6.7
1977	12.2	1978	12.2	1979	12.2	1980	11.4	1981	11.4	1982	10.2	1983	10.2	1984	10.2	1985	8.3	1986	6.8	1987	6.7	1988	6.7
1978	12.1	1979	12.1	1980	11.3	1981	11.3	1982	10.1	1983	10 1	1984	10.1	1985	8.2	1986	6.8	1987	6.6	1988	6.6	1989	6.6
1979	12.0	1980	11.2	1981	11.2	1982	10.0	1983	10.0	1984	10 0	1985	8.2	1986	6.8	1987	6.6	1988	6.6	1989	6.6	1990	6.6
1980	11.0	1981	11.0	1982	9.9	1983	9.9	1984	9.9	1985	8.1	1986	6.7	1987	6.6	1988	6.6	1989	6.6	1990	6.6	1991	6.6
1981	10.9	1982	9.8	1983	9.8	1984	9.8	1985	8.1	1986	6.7	1987	6.5	1988	6.5	1989	6.5	1990	6.5	1991	6.5	1992	6.5
1982	9.6	1983	9.6	1984	9.6	1985	8.0	1986	6.6	1987	6.5	1988	6.5	1989	6.5	1990	6.5	1991	6.5	1992	6.5	1993	6.4
1983	9.5	1984	9.5	1985	8.0	1986	6.6	1987	6.4	1988	6.4	1989	6.4	1990	6.4	1991	6.4	1992	6.4	1993	6.3	1994	6.3
1984	9.3	1985	7.9	1986	6.5	1987	6.3	1988	6.3	1989	6.3	1990	6.3	1991	6.3	1992	6.3	1993	6.2	1994	6.2	1995	6.2
1985	7.8	1986	6.4	1987	6.3	1988	6 3	1989	6.3	1990	6.3	1991	6.3	1992	6.3	1993	6.2	1994	6.2	1995	6.2	1996	6.2
1986	6.3	1987	6.2	1988	6.2	1989	6.2	1990	6.2	1991	6.2	1992	6.2	1993	6.1	1994	6.1	1995	6.1	1996	6.1	1997	6.0
1987	6.1	1988	6.1	1989	6.1	1990	6.1	1991	6.1	1992	6.1	1993	6.0	1994	6.0	1995	6.0	1996	6.0	1997	5.9	1998	5.9
1988	6.0	1989	6.0	1990	6.0	1991	6.0	1992	6.0	1993	5.9	1994	5.9	1995	5.9	1996	5.9	1997	5.9	1998	5.9	1999	5.9
1989	5.9	1990	5.9	1991	5.9	1992	5.9	1993	5.8	1994	5.8	1995	5.8	1996	5.8	1997	5.7	1998	5.7	1999	5.7	2000	5.7
1990	5.8	1991	5.8	1992	5.8	1993	5.7	1994	5.7	1995	5.7	1996	5.7	1997	5.6	1998	5.6	1999	5.6	2000	5.6	2001	5.6
1991	5.7	1992	5.7	1993	5.6	1994	5.6	1995	5.6	1996	5.6	1997	5.5	1998	5.5	1999	5.5	2000	5.5	2001	5.5	2002	5.5
1992	5.6	1993	5.5	1994	5.5	1995	5.5	1996	5.5	1997	5.4	1998	5.4	1999	5.4	2000	5.4	2001	5.4	2002	5.4	2003	5.4

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F. Emissions are based on the January 1 mileage accumulation figures given in Table 2.7.4.

TABLE 2.7.2B

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
HEAVY DUTY DIESEL POWERED VEHICLES
CO

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	25.7	1962	25.7	1963	25.7	1964	25.7	1965	25.7	1966	26.3	1967	26.3	1968	26.3	1969	28.0	1970	28.0	1971	28.0	1972	29.8
1962	25.5	1963	25.5	1964	25.5	1965	25.5	1966	26.1	1967	26.1	1968	26.1	1969	27.8	1970	27.8	1971	27.8	1972	29.6	1973	29.6
1963	25.3	1964	25.3	1965	25.3	1966	25.9	1967	25.9	1968	25.9	1969	27.6	1970	27.6	1971	27.6	1972	29.3	1973	29.3	1974	29.3
1964	25.1	1965	25 1	1966	25.7	1967	25.7	1968	25.7	1969	27.4	1970	27.4	1971	27.4	1972	29.1	1973	29.1	1974	29.1	1975	28.6
1965	24.8	1966	25.4	1967	25.4	1968	25.4	1969	27.1	1970	27.1	1971	27.1	1972	28.8	1973	28.8	1974	28.8	1975	28.3	1976	28.3
1966	25.2	1967	25.2	1968	25.2	1969	26 8	1970	26.8	1971	26.8	1972	28.5	1973	28.5	1974	28.5	1975	28.0	1976	28.0	1977	28.0
1967	24.9	1968	24.9	1969	26.5	1970	26.5	1971	26 5	1972	28.2	1973	28.2	1974	28.2	1975	27.7	1976	27.7	1977	27.7	1978	27.7
1968	24.6	1969	26.2	1970	26.2	1971	26.2	1972	27.8	1973	27.8	1974	27.8	1975	27.3	1976	27.3	1977	27.3	1978	27.3	1979	27.3
1969	25 8	1970	25.8	1971	25.8	1972	27.4	1973	27.4	1974	27 4	1975	27.0	1976	27.0	1977	27.0	1978	27.0	1979	27.0	1980	23.1
1970	25.4	1971	25.4	1972	27.0	1973	27.0	1974	27.0	1975	26.5	1976	26.5	1977	26.5	1978	26.5	1979	26.5	1980	22.7	1981	22.7
1971	25.0	1972	26.5	1973	26.5	1974	26.5	1975	26.0	1976	26 0	1977	26.0	1978	26 0	1979	26.0	1980	22.3	1981	22.3	1982	20.6
1972	26.0	1973	26.0	1974	26.0	1975	25.5	1976	25.5	1977	25.5	1978	25.5	1979	25.5	1980	21.9	1981	21.9	1982	20.2	1983	20.2
1973	25.4	1974	25.4	1975	24 9	1976	24.9	1977	24.9	1978	24.9	1979	24.9	1980	21.4	1981	21.4	1982	19.7	1983	19.7	1984	19.7
1974	24.8	1975	24.3	1976	24.3	1977	24.3	1978	24.3	1979	24.3	1980	20.8	1981	20.8	1982	19.2	1983	19.2	1984	19.2	1985	18.4
1975	23.6	1976	23.6	1977	23.6	1978	23.6	1979	23.6	1980	20.2	1981	20.2	1982	18.6	1983	18.6	1984	18.6	1985	17.8	1986	17.6
1976	22.9	1977	22.9	1978	22.9	1979	22.9	1980	19.5	1981	19.5	1982	18.0	1983	18.0	1984	18.0	1985	17.3	1986	17.0	1987	16.6
1977	22.0	1978	22.0	1979	22.0	1980	18.8	1981	18.8	1982	17.3	1983	17.3	1984	17.3	1985	16.6	1986	16.4	1987	16.0	1988	16.0
1978	21.1	1979	21 1	1980	18.0	1981	18.0	1982	16.6	1983	16.6	1984	16.6	1985	16.0	1986	15.7	1987	15.3	1988	15.3	1989	15.3
1979	20.1	1980	17.1	1981	17.1	1982	15.8	1983	15.8	1984	15.8	1985	15.2	1986	14.9	1987	14.5	1988	14.5	1989	14.5	1990	14.5
1980	16.6	1981	16.6	1982	15.3	1983	15.3	1984	15.3	1985	14.8	1986	14.5	1987	14 1	1988	14.1	1989	14.1	1990	14.1	1991	14.1

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	29.8	1974	29.8	1975	29 3	1976	29.3	1977	29.3	1978	29.3	1979	29.3	1980	25.1	1981	25.1	1982	23.2	1983	23.2	1984	23.2
1974	29.6	1975	29.1	1976	29.1	1977	29.1	1978	29.1	1979	29.1	1980	25.0	1981	25.0	1982	23.0	1983	23.0	1984	23.0	1985	21.9
1975	28.8	1976	28.8	1977	28.8	1978	28.8	1979	28.8	1980	24.8	1981	24.8	1982	22.9	1983	22.9	1984	22.9	1985	21.8	1986	21.5
1976	28.6	1977	28.6	1978	28.6	1979	28 6	1980	24.5	1981	24.5	1982	22.7	1983	22.7	1984	22.7	1985	21.6	1986	21.3	1987	20.9
1977	28.3	1978	28.3	1979	28.3	1980	24.3	1981	24.3	1982	22.4	1983	22.4	1984	22.4	1985	21.4	1986	21.1	1987	20.7	1988	20.7
1978	28.0	1979	28.0	1980	24 1	1981	24.1	1982	22.2	1983	22 2	1984	22.2	1985	21.2	1986	20.9	1987	20.5	1988	20.5	1989	20.5
1979	27.7	1980	23.8	1981	23.8	1982	21.9	1983	21.9	1984	21 9	1985	20.9	1986	20.6	1987	20.2	1988	20.2	1989	20.2	1990	20.2
1980	23.5	1981	23.5	1982	21.6	1983	21.6	1984	21.6	1985	20 6	1986	20.4	1987	20.0	1988	20.0	1989	20.0	1990	20.0	1991	20.0
1981	23.1	1982	21.3	1983	21.3	1984	21.3	1985	20.3	1986	20.1	1987	19.7	1988	19.7	1989	19.7	1990	19.7	1991	19.7	1992	19.7
1982	21.0	1983	21.0	1984	21.0	1985	20.0	1986	19.8	1987	19.4	1988	19.4	1989	19.4	1990	19.4	1991	19.4	1992	19.4	1993	19.1
1983	20.6	1984	20.6	1985	19.7	1986	19.4	1987	19.0	1988	19.0	1989	19.0	1990	19.0	1991	19.0	1992	19.0	1993	18.7	1994	18.7
1984	20.2	1985	19.3	1986	19.0	1987	18 6	1988	18.6	1989	18.6	1990	18.6	1991	18.6	1992	18.6	1993	18.4	1994	18.4	1995	18.4
1985	18.8	1986	18.6	1987	18.2	1988	18.2	1989	18.2	1990	18.2	1991	18.2	1992	18.2	1993	17.9	1994	17.9	1995	17.9	1996	17.9
1986	18.1	1987	17.7	1988	17.7	1989	17.7	1990	17.7	1991	17.7	1992	17.7	1993	17.4	1994	17.4	1995	17.4	1996	17.4	1997	17.0
1987	17.2	1988	17.2	1989	17.2	1990	17.2	1991	17.2	1992	17.2	1993	16.9	1994	16.9	1995	16.9	1996	16.9	1997	16.6	1998	16.6
1988	16.6	1989	16.6	1990	16.6	1991	16.6	1992	16.6	1993	16.4	1994	16.4	1995	16.4	1996	16.4	1997	16.0	1998	16.0	1999	16.0
1989	16.0	1990	16.0	1991	16.0	1992	16.0	1993	15.7	1994	15.7	1995	15.7	1996	15.7	1997	15.5	1998	15.5	1999	15.5	2000	15.5
1990	15.3	1991	15.3	1992	15.3	1993	15.0	1994	15.0	1995	15.0	1996	15.0	1997	14.8	1998	14.8	1999	14.8	2000	14.8	2001	14.8
1991	14.5	1992	14.5	1993	14.3	1994	14.3	1995	14.3	1996	14.3	1997	14.1	1998	14.1	1999	14.1	2000	14.1	2001	14.1	2002	14.1
1992	14.1	1993	13.9	1994	13.9	1995	13.9	1996	13.9	1997	13.8	1998	13.8	1999	13.8	2000	13.8	2001	13.8	2002	13.8	2003	13.8

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F. Emissions are based on the January 1 mileage accumulation figures given in Table 2.7.4.

TABLE 2.7.2C

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
HEAVY DUTY DIESEL POWERED VEHICLES
NOx

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	21.9	1962	21.9	1963	21.8	1964	21.8	1965	21.8	1966	22.6	1967	22.6	1968	22.6	1969	24.1	1970	24.1	1971	24.1	1972	25.5
1962	21.9	1963	21.8	1964	21.8	1965	21.8	1966	22.6	1967	22.6	1968	22.6	1969	24.1	1970	24.1	1971	24.1	1972	25.5	1973	25.5
1963	21.8	1964	21.8	1965	21.8	1966	22.6	1967	22.6	1968	22.6	1969	24.1	1970	24.1	1971	24.1	1972	25.5	1973	25.5	1974	25.5
1964	21.8	1965	21.8	1966	22.6	1967	22.6	1968	22.6	1969	24.1	1970	24.1	1971	24.1	1972	25.5	1973	25.5	1974	25.5	1975	24.8
1965	21.8	1966	22.6	1967	22.6	1968	22.6	1969	24.1	1970	24.1	1971	24.1	1972	25 5	1973	25.5	1974	25.5	1975	24.8	1976	24.8
1966	22.6	1967	22.6	1968	22.6	1969	24.1	1970	24.1	1971	24.1	1972	25.5	1973	25.5	1974	25.5	1975	24.8	1976	24.8	1977	24.8
1967	22.6	1968	22.6	1969	24.1	1970	24.1	1971	24.1	1972	25.5	1973	25.5	1974	25.5	1975	24.8	1976	24.8	1977	24.8	1978	24.8
1968	22.6	1969	24.1	1970	24.1	1971	24.1	1972	25.5	1973	25.5	1974	25.5	1975	24.8	1976	24.8	1977	24.8	1978	24.8	1979	24.8
1969	24.1	1970	24.1	1971	24.1	1972	25.5	1973	25.5	1974	25.5	1975	24.8	1976	24 8	1977	24.8	1978	24.8	1979	24.8	1980	20.5
1970	24.1	1971	24.1	1972	25.5	1973	25.5	1974	25.5	1975	24.8	1976	24.8	1977	24.8	1978	24.8	1979	24.8	1980	20.5	1981	20.5
1971	24.1	1972	25.5	1973	25.5	1974	25.5	1975	24.8	1976	24.8	1977	24.8	1978	24.8	1979	24.8	1980	20.5	1981	20.5	1982	18.9
1972	25.5	1973	25.5	1974	25.5	1975	24.8	1976	24.8	1977	24.8	1978	24.8	1979	24.8	1980	20.5	1981	20.5	1982	18.9	1983	18.9
1973	25.5	1974	25 5	1975	24.8	1976	24.8	1977	24.8	1978	24.8	1979	24.8	1980	20.5	1981	20.5	1982	18.9	1983	18.9	1984	18.9
1974	25.5	1975	24.8	1976	24.8	1977	24.8	1978	24.8	1979	24.8	1980	20.5	1981	20.5	1982	18.9	1983	18.9	1984	18.9	1985	18.2
1975	24.8	1976	24.8	1977	24.8	1978	24.8	1979	24.8	1980	20.5	1981	20.5	1982	18.9	1983	18.9	1984	18.9	1985	18.2	1986	17.9
1976	24.8	1977	24.8	1978	24.8	1979	24.8	1980	20.5	1981	20.5	1982	18.9	1983	18.9	1984	18.9	1985	18.2	1986	17.9	1987	12.2
1977	24.8	1978	24 8	1979	24.8	1980	20.5	1981	20.5	1982	18.9	1983	18.9	1984	18.9	1985	18.2	1986	17.9	1987	12.0	1988	12.0
1978	24.8	1979	24 8	1980	20.5	1981	20.5	1982	18.9	1983	18.9	1984	18.9	1985	18.2	1986	17.9	1987	11.7	1988	11.7	1989	11.7
1979	24.8	1980	20.5	1981	20.5	1982	18.9	1983	18.9	1984	18.9	1985	18.2	1986	17.9	1987	11.4	1988	11.4	1989	11.4	1990	11.4
1980	20.5	1981	20.5	1982	18.9	1983	18.9	1984	18.9	1985	18.2	1986	17.9	1987	11.2	1988	11.2	1989	11.2	1990	11.2	1991	11.2

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	25.5	1974	25.5	1975	24.8	1976	24.8	1977	24.8	1978	24.8	1979	24.8	1980	20.5	1981	20.5	1982	18.9	1983	18.9	1984	18.9
1974	25.5	1975	24.8	1976	24.8	1977	24.8	1978	24.8	1979	24.8	1980	20.5	1981	20.5	1982	18.9	1983	18.9	1984	18.9	1985	18.2
1975	24.8	1976	24.8	1977	24.8	1978	24.8	1979	24.8	1980	20.5	1981	20.5	1982	18.9	1983	18.9	1984	18.9	1985	18.2	1986	17.9
1976	24.8	1977	24.8	1978	24.8	1979	24.8	1980	20.5	1981	20.5	1982	18.9	1983	18.9	1984	18.9	1985	18.2	1986	17.9	1987	14.0
1977	24.8	1978	24.8	1979	24.8	1980	20.5	1981	20.5	1982	18.9	1983	18.9	1984	18.9	1985	18.2	1986	17.9	1987	13.9	1988	13.9
1978	24.8	1979	24.8	1980	20.5	1981	20.5	1982	18.9	1983	18 9	1984	18.9	1985	18.2	1986	17.9	1987	13.8	1988	13.8	1989	13.8
1979	24.8	1980	20.5	1981	20 5	1982	18.9	1983	18.9	1984	18 9	1985	18.2	1986	17.9	1987	13.7	1988	13.7	1989	13.7	1990	13.7
1980	20.5	1981	20.5	1982	18.9	1983	18 9	1984	18.9	1985	18.2	1986	17.9	1987	13.6	1988	13.6	1989	13.6	1990	13.6	1991	13.6
1981	20.5	1982	18.9	1983	18.9	1984	18.9	1985	18.2	1986	17.9	1987	13.5	1988	13.5	1989	13.5	1990	13.5	1991	13.5	1992	13.5
1982	18.9	1983	18.9	1984	18.9	1985	18.2	1986	17.9	1987	13.4	1988	13.4	1989	13.4	1990	13.4	1991	13.4	1992	13.4	1993	13.2
1983	18.9	1984	18 9	1985	18.2	1986	17.9	1987	13.2	1988	13.2	1989	13.2	1990	13.2	1991	13.2	1992	13.2	1993	13.0	1994	13.0
1984	18.9	1985	18 2	1986	17.9	1987	13.1	1988	13.1	1989	13.1	1990	13.1	1991	13.1	1992	13.1	1993	12.8	1994	12.8	1995	12.8
1985	18.2	1986	17.9	1987	12.9	1988	12.9	1989	12.9	1990	12.9	1991	12.9	1992	12.9	1993	12.7	1994	12.7	1995	12.7	1996	12.7
1986	17.9	1987	12.7	1988	12.7	1989	12.7	1990	12.7	1991	12.7	1992	12.7	1993	12.5	1994	12.5	1995	12.5	1996	12.5	1997	12.4
1987	12.5	1988	12.5	1989	12.5	1990	12.5	1991	12.5	1992	12.5	1993	12.3	1994	12.3	1995	12.3	1996	12.3	1997	12.2	1998	12.2
1988	12.2	1989	12.2	1990	12.2	1991	12.2	1992	12.2	1993	12.0	1994	12.0	1995	12.0	1996	12.0	1997	11.9	1998	11.9	1999	11.9
1989	12.0	1990	12.0	1991	12.0	1992	12.0	1993	11.8	1994	11.8	1995	11.8	1996	11.8	1997	11.7	1998	11.7	1999	11.7	2000	11.7
1990	11.7	1991	11.7	1992	11.7	1993	11.5	1994	11.5	1995	11.5	1996	11.5	1997	11.4	1998	11.4	1999	11.4	2000	11.4	2001	11.4
1991	11.4	1992	11.4	1993	11.1	1994	11.1	1995	11.1	1996	11.1	1997	11.1	1998	11.1	1999	11.1	2000	11.1	2001	11.1	2002	11.1
1992	11.2	1993	11.0	1994	11.0	1995	11.0	1996	11.0	1997	10.9	1998	10.9	1999	10.9	2000	10.9	2001	10.9	2002	10.9	2003	10.9

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F. Emissions are based on the January 1 mileage accumulation figures given in Table 2.7.4.

TABLE 2.7.3

IDLE EMISSION RATES FOR
HIGH ALTITUDE
HEAVY DUTY DIESEL POWERED VEHICLES

* IER = ZML + (DR * M)

Pol	Model Years	Zero Mile Emission Level (Grams/Min.)	Deterioration Rate (Gm/Min/10K Mi)
HC	Pre-1963	0.83	0.0
	1963-1965	0.83	0.0
	1966-1968	0.83	0.0
	1969-1971	0.83	0.0
	1972-1974	0.83	0.0
	1975-1979	0.83	0.0
	1980-1981	0.83	0.0
	1982-1984	0.83	0.0
	1985	0.62	0.0
	1986	0.62	0.0
	1987-1992	0.62	0.0
	1993-1996	0.62	0.0
	1997+	0.62	0.0
CO	Pre-1963	1.17	0.01
	1963-1965	1.17	0.01
	1966-1968	1.17	0.01
	1969-1971	1.17	0.01
	1972-1974	1.17	0.01
	1975-1979	1.17	0.01
	1980-1981	1.17	0.01
	1982-1984	1.17	0.01
	1985	1.17	0.01
	1986	1.17	0.01
	1987-1992	1.17	0.01
	1993-1996	1.17	0.01
	1997+	1.17	0.01
NOx	Pre-1963	0.92	0.0
	1963-1965	0.92	0.0
	1966-1968	0.92	0.0
	1969-1971	0.92	0.0
	1972-1974	0.92	0.0
	1975-1979	0.92	0.0
	1980-1981	0.92	0.0
	1982-1984	0.92	0.0
	1985	0.22	0.0
	1986	0.22	0.0
	1987-1992	0.22	0.0
	1993-1996	0.22	0.0
	1997+	0.22	0.0

* WHERE : IER = Idle emission rate
ZML = Zero mile level
DR = Deterioration Rate
M = Cumulative Mileage / 10,000

DATE : MAY 25, 1985

TABLE 2.7.4

REGISTRATION MIX AND
MILEAGE ACCUMULATION RATES FOR
HIGH ALTITUDE
HEAVY DUTY DIESEL POWERED VEHICLES

Model Year Index**	July 1 Registration Mix*	Mileage Accumulation Rate per vehicle*	Jan 1 Registration Mix	Jan 1 Mileage Accumulation Rate (fleet)	Jan 1 Mileage Accumulation (fleet)
1	0.090	66333.	0.0	0.	0.
2	0.151	60319.	0.151	66333.	33166.
3	0.126	54855.	0.126	60319.	96492.
4	0.105	49894.	0.105	54855.	154079.
5	0.088	45386.	0.088	49894.	206454.
6	0.073	41288.	0.073	45386.	254093.
7	0.061	37565.	0.061	41288.	297430.
8	0.051	34182.	0.051	37565.	336857.
9	0.043	31105.	0.043	34182.	372730.
10	0.036	28309.	0.036	31105.	405374.
11	0.030	25766.	0.030	28309.	435081.
12	0.025	23453.	0.025	25766.	462118.
13	0.021	21350.	0.021	23453.	486727.
14	0.017	19437.	0.017	21350.	509129.
15	0.014	17697.	0.014	19437.	529522.
16	0.012	16114.	0.012	17697.	548089.
17	0.010	14673.	0.010	16114.	564994.
18	0.008	13363.	0.008	14673.	580388.
19	0.007	12170.	0.007	13363.	594406.
20+	0.031	11085.	0.031	12170.	607173.

* Default information that may be altered by the MOBILE3 user with information about the local area. This mileage distribution is applicable to calendar year 1988 only.

** The indices refer to the most recent model year vehicles in any given calendar year. Index 1 references the newest model year vehicles and index 20+ references the oldest model year vehicles.

DATE : MAY 25, 1985

TABLE 2.7.5

EXAMPLE TRAVEL WEIGHTING FRACTION CALCULATION FOR
HIGH ALTITUDE
HEAVY DUTY DIESEL POWERED VEHICLES
JANUARY 1, 1988

Model Years	(A) HDDV Fleet Registration	(B) Sales Fraction	(A*B)	(C=A*B/DAF) HDDV Registration	(D) Annual Mileage Accrual Rate	(C*D)	(C*D/TFNORM) Travel Fractions
1988	0.0	1.000	0.0	0.0	0.	0.0	0.0
1987	0.151	1.000	0.151	0.166	66333.	11019.0	0.240
1986	0.126	1.000	0.126	0.139	60319.	8361.1	0.182
1985	0.105	1.000	0.105	0.116	54855.	6336.4	0.138
1984	0.088	1.000	0.088	0.097	49894.	4830.2	0.105
1983	0.073	1.000	0.073	0.080	45386.	3644.8	0.079
1982	0.061	1.000	0.061	0.067	41288.	2770.7	0.060
1981	0.051	1.000	0.051	0.056	37565.	2107.6	0.046
1980	0.043	1.000	0.043	0.047	34182.	1617.0	0.035
1979	0.036	1.000	0.036	0.040	31105.	1231.9	0.027
1978	0.030	1.000	0.030	0.033	28309.	934.3	0.020
1977	0.025	1.000	0.025	0.028	25766.	708.6	0.015
1976	0.021	1.000	0.021	0.023	23453.	541.8	0.012
1975	0.017	1.000	0.017	0.019	21350.	399.3	0.009
1974	0.014	1.000	0.014	0.015	19437.	299.4	0.007
1973	0.012	1.000	0.012	0.013	17697.	233.6	0.005
1972	0.010	1.000	0.010	0.011	16114.	177.3	0.004
1971	0.008	1.000	0.008	0.009	14673.	129.1	0.003
1970	0.007	1.000	0.007	0.008	13363.	102.9	0.002
1969-	0.031	1.000	0.031	0.034	12170.	415.1	0.009
		DAF:	0.910		TFNORM:	45860.0	

WHERE :

A = January 1 registration mix from Table 2.7.4.
B = Fleet sales fractions
D = Sales weighted fleet mileage accumulation rate from Table 2.7.4, adjusted to January 1
D(1) = Annual Miles(1)
D(MYI) = .25*(Annual Miles(MYI)) + .75*(Annual Miles(MYI-1)), MYI=2,...,20+

DATE : MAY 25, 1985

TABLE 2.7.6

SPEED CORRECTION FACTOR COEFFICIENTS FOR
HIGH ALTITUDE
HEAVY DUTY DIESEL POWERED VEHICLES

$$* \; SCF(s) = EXP(A + B*s + C*s^2)$$

Pol	Model Years	Coefficients A	B	C
HC	All	0.92400	-0.05500	0.00044
CO	All	1.39600	-0.08800	0.00091
NOx	All	0.67600	-0.04800	0.00071

* WHERE: s = average speed (mph)

DATE : MAY 25, 1985

TABLE 2.8.1A

EXHAUST EMISSION RATES FOR
HIGH ALTITUDE
MOTORCYCLES
(RATES REFLECT ZERO TAMPERING)

* BER = ZML + (DR * M)

Pol	Model Years	Zero Mile Emission Level (Grams/Mile)	Deterioration Rate (Gm/Mi/10K Mi)	50,000 Mile Emission Level (Grams/Mile)
HC	Pre-1978	11.48	0.78	15.38
	1978-1979	4.30	1.65	12.55
	1980+	4.12	1.73	12.77
CO	Pre-1978	51.59	2.47	63.94
	1978-1979	35.07	3.96	54.87
	1980+	34.95	2.02	45.05
NOx	Pre-1978	0.11	0.06	0.41
	1978-1979	0.43	0.0	0.43
	1980+	0.57	0.0	0.57

* WHERE : BER = Basic emission rate (untampered)
ZML = Zero mile level
DR = Deterioration rate
M = Cumulative mileage / 10,000

DATE : MAY 25, 1985

TABLE 2.8.1B

CRANKCASE AND EVAPORATIVE HYDROCARBON EMISSIONS
FOR HIGH ALTITUDE
MOTORCYCLES
(RATES REFLECT ZERO TAMPERING)

** CCEV = (HSK * TPD + DNL)/MPD + CC

Model Years	SHED Hot Soak Emissions (Gm/Trip)	Trips* Per Day	SHED Diurnal Emissions (Gm/Day)	Miles* Per Day	Crankcase Emissions (Gm/Mile)	Total Crankcase and Evap. Emissions (Gm/Mile)
Pre-1978	5.93	1.35	8.72	8.30	0.40	2.42
1978-1979	9.10	1.35	10.97	8.30	0.0	2.80
1980+	9.79	1.35	11.18	8.30	0.0	2.94

* Default information that may be altered by the MOBILE3 user with information about the local area.

** WHERE :

CCEV = Total untampered crankcase & evaporative HC emissions (Gm/Mile)
HSK = Hot soak emissions (Gm/Trip)
TPD = Trips per day
DNL = Diurnal emissions (Gm/Day)
MPD = Miles per day
CC = Crankcase emissions (Gm/Mile)

DATE : MAY 25, 1985

TABLE 2.8.2A

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
MOTORCYCLES
TOTAL HC (INCLUDES EVAP & CRANKCASE)

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	15.0	1962	15.0	1963	15.0	1964	15.0	1965	15.0	1966	15.0	1967	15.0	1968	15.0	1969	15.0	1970	15.0	1971	15.0	1972	15.0
1962	15.0	1963	15.0	1964	15.0	1965	15.0	1966	15.0	1967	15.0	1968	15.0	1969	15.0	1970	15.0	1971	15.0	1972	15.0	1973	15.0
1963	15.0	1964	15.0	1965	15.0	1966	15.0	1967	15.0	1968	15.0	1969	15.0	1970	15.0	1971	15.0	1972	15.0	1973	15.0	1974	15.0
1964	15.0	1965	15.0	1966	15.0	1967	15.0	1968	15.0	1969	15.0	1970	15.0	1971	15.0	1972	15.0	1973	15.0	1974	15.0	1975	15.0
1965	15.0	1966	15.0	1967	15.0	1968	15.0	1969	15.0	1970	15.0	1971	15.0	1972	15.0	1973	15.0	1974	15.0	1975	15.0	1976	15.0
1966	15.0	1967	15.0	1968	15.0	1969	15.0	1970	15.0	1971	15.0	1972	15.0	1973	15.0	1974	15.0	1975	15.0	1976	15.0	1977	15.0
1967	15.0	1968	15.0	1969	15.0	1970	15.0	1971	15.0	1972	15.0	1973	15.0	1974	15.0	1975	15.0	1976	15.0	1977	15.0	1978	9.4
1968	15.0	1969	15.0	1970	15.0	1971	15.0	1972	15.0	1973	15.0	1974	15.0	1975	15.0	1976	15.0	1977	15.0	1978	9.4	1979	9.4
1969	15.0	1970	15.0	1971	15.0	1972	15.0	1973	15.0	1974	15.0	1975	15.0	1976	15.0	1977	15.0	1978	9.4	1979	9.4	1980	9.5
1970	15.0	1971	15.0	1972	15.0	1973	15.0	1974	15.0	1975	15.0	1976	15.0	1977	15.0	1978	9.4	1979	9.4	1980	9.5	1981	9.5
1971	15.0	1972	15.0	1973	15.0	1974	15.0	1975	15.0	1976	15.0	1977	15.0	1978	9.4	1979	9.4	1980	9.4	1981	9.4	1982	9.4
1972	14.9	1973	14.9	1974	14.9	1975	14.9	1976	14.9	1977	14.9	1978	9.3	1979	9.3	1980	9.4	1981	9.4	1982	9.4	1983	9.4
1973	14 9	1974	14.9	1975	14.9	1976	14.9	1977	14.9	1978	9.2	1979	9.2	1980	9.3	1981	9.3	1982	9.3	1983	9.3	1984	9.3
1974	14.8	1975	14.8	1976	14.8	1977	14.8	1978	9.1	1979	9.1	1980	9.2	1981	9.2	1982	9.2	1983	9.2	1984	9.2	1985	9.2
1975	14.8	1976	14.8	1977	14.8	1978	8.9	1979	8.9	1980	9.0	1981	9.0	1982	9.0	1983	9.0	1984	9.0	1985	9.0	1986	9.0
1976	14.7	1977	14.7	1978	8.7	1979	8.7	1980	8.8	1981	8.8	1982	8.8	1983	8.8	1984	8.8	1985	8.8	1986	8.8	1987	8.8
1977	14.5	1978	8.4	1979	8.4	1980	8.4	1981	8.4	1982	8.4	1983	8.4	1984	8.4	1985	8.4	1986	8.4	1987	8.4	1988	8.4
1978	8.0	1979	8.0	1980	8.0	1981	8.0	1982	8.0	1983	8.0	1984	8.0	1985	8.0	1986	8.0	1987	8.0	1988	8.0	1989	8.0
1979	7.4	1980	7.4	1981	7.4	1982	7.4	1983	7.4	1984	7.4	1985	7.4	1986	7.4	1987	7.4	1988	7.4	1989	7.4	1990	7.4
1980	7.1	1981	7.1	1982	7.1	1983	7.1	1984	7.1	1985	7.1	1986	7.1	1987	7.1	1988	7.1	1989	7.1	1990	7.1	1991	7.1

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	15.0	1974	15.0	1975	15.0	1976	15.0	1977	15.0	1978	9.4	1979	9.4	1980	9.5	1981	9.5	1982	9.5	1983	9.5	1984	9.5
1974	15.0	1975	15.0	1976	15.0	1977	15.0	1978	9.4	1979	9.4	1980	9.5	1981	9.5	1982	9.5	1983	9.5	1984	9.5	1985	9.5
1975	15.0	1976	15.0	1977	15.0	1978	9.4	1979	9.4	1980	9.5	1981	9.5	1982	9.5	1983	9.5	1984	9.5	1985	9.5	1986	9.5
1976	15.0	1977	15.0	1978	9.4	1979	9.4	1980	9.5	1981	9.5	1982	9.5	1983	9.5	1984	9.5	1985	9.5	1986	9.5	1987	9.5
1977	15.0	1978	9 4	1979	9.4	1980	9.5	1981	9.5	1982	9.5	1983	9.5	1984	9.5	1985	9.5	1986	9.5	1987	9.5	1988	9.5
1978	9.4	1979	9.4	1980	9.5	1981	9.5	1982	9.5	1983	9 5	1984	9.5	1985	9.5	1986	9.5	1987	9.5	1988	9.5	1989	9.5
1979	9.4	1980	9.5	1981	9.5	1982	9.5	1983	9.5	1984	9 5	1985	9.5	1986	9.5	1987	9.5	1988	9.5	1989	9.5	1990	9.5
1980	9.5	1981	9.5	1982	9.5	1983	9.5	1984	9.5	1985	9.5	1986	9.5	1987	9.5	1988	9.5	1989	9.5	1990	9.5	1991	9.5
1981	9.5	1982	9.5	1983	9.5	1984	9.5	1985	9 5	1986	9.5	1987	9.5	1988	9.5	1989	9.5	1990	9.5	1991	9.5	1992	9.5
1982	9.5	1983	9.5	1984	9.5	1985	9.5	1986	9.5	1987	9.5	1988	9.5	1989	9.5	1990	9.5	1991	9.5	1992	9.5	1993	9.5
1983	9.4	1984	9.4	1985	9.4	1986	9.4	1987	9.4	1988	9.4	1989	9.4	1990	9.4	1991	9.4	1992	9.4	1993	9.4	1994	9.4
1984	9 4	1985	9.4	1986	9.4	1987	9.4	1988	9.4	1989	9.4	1990	9.4	1991	9.4	1992	9.4	1993	9.4	1994	9.4	1995	9.4
1985	9.3	1986	9.3	1987	9.3	1988	9.3	1989	9.3	1990	9.3	1991	9.3	1992	9.3	1993	9.3	1994	9.3	1995	9.3	1996	9.3
1986	9.2	1987	9.2	1988	9.2	1989	9.2	1990	9.2	1991	9.2	1992	9.2	1993	9.2	1994	9.2	1995	9.2	1996	9.2	1997	9.2
1987	9.0	1988	9.0	1989	9.0	1990	9.0	1991	9.0	1992	9.0	1993	9.0	1994	9.0	1995	9.0	1996	9.0	1997	9.0	1998	9.0
1988	8.8	1989	8.8	1990	8.8	1991	8.8	1992	8.8	1993	8.8	1994	8.8	1995	8.8	1996	8.8	1997	8.8	1998	8.8	1999	8.8
1989	8.4	1990	8.4	1991	8.4	1992	8.4	1993	8.4	1994	8.4	1995	8.4	1996	8.4	1997	8.4	1998	8.4	1999	8.4	2000	8.4
1990	8.0	1991	8.0	1992	8.0	1993	8.0	1994	8.0	1995	8.0	1996	8.0	1997	8.0	1998	8.0	1999	8.0	2000	8 0	2001	8.0
1991	7.4	1992	7.4	1993	7.4	1994	7 4	1995	7.4	1996	7.4	1997	7.4	1998	7.4	1999	7.4	2000	7.4	2001	7.4	2002	7.4
1992	7.1	1993	7.1	1994	7.1	1995	7.1	1996	7.1	1997	7.1	1998	7.1	1999	7.1	2000	7.1	2001	7.1	2002	7.1	2003	7.1

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52 1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.8.4.

EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
MOTORCYCLES
CO

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	55.1	1962	55.1	1963	55.1	1964	55.1	1965	55.1	1966	55.1	1967	55.1	1968	55.1	1969	55.1	1970	55.1	1971	55.1	1972	55.1
1962	55.1	1963	55.1	1964	55.1	1965	55.1	1966	55.1	1967	55.1	1968	55.1	1969	55.1	1970	55.1	1971	55.1	1972	55.1	1973	55.1
1963	55.1	1964	55.1	1965	55.1	1966	55.1	1967	55.1	1968	55.1	1969	55.1	1970	55.1	1971	55.1	1972	55.1	1973	55.1	1974	55.1
1964	55.1	1965	55 1	1966	55.1	1967	55.1	1968	55.1	1969	55.1	1970	55.1	1971	55.1	1972	55.1	1973	55.1	1974	55.1	1975	55.1
1965	55.1	1966	55.1	1967	55.1	1968	55.1	1969	55.1	1970	55.1	1971	55.1	1972	55.1	1973	55.1	1974	55.1	1975	55.1	1976	55.1
1966	55.1	1967	55.1	1968	55.1	1969	55.1	1970	55.1	1971	55.1	1972	55.1	1973	55.1	1974	55.1	1975	55.1	1976	55.1	1977	55.1
1967	55.1	1968	55.1	1969	55.1	1970	55.1	1971	55.1	1972	55.1	1973	55.1	1974	55.1	1975	55.1	1976	55.1	1977	55.1	1978	40.7
1968	55.1	1969	55.1	1970	55.1	1971	55.1	1972	55.1	1973	55.1	1974	55.1	1975	55.1	1976	55.1	1977	55.1	1978	40.7	1979	40.7
1969	55.0	1970	55.0	1971	55.0	1972	55.0	1973	55.0	1974	55.0	1975	55.0	1976	55.0	1977	55.0	1978	40.6	1979	40.6	1980	37.8
1970	55.0	1971	55.0	1972	55.0	1973	55.0	1974	55.0	1975	55.0	1976	55.0	1977	55.0	1978	40.6	1979	40.6	1980	37.7	1981	37.7
1971	54.9	1972	54.9	1973	54.9	1974	54.9	1975	54.9	1976	54.9	1977	54.9	1978	40.5	1979	40.5	1980	37.7	1981	37.7	1982	37.7
1972	54.9	1973	54.9	1974	54.9	1975	54.9	1976	54.9	1977	54.9	1978	40 4	1979	40.4	1980	37.6	1981	37.6	1982	37.6	1983	37.6
1973	54.7	1974	54.7	1975	54.7	1976	54.7	1977	54.7	1978	40.2	1979	40.2	1980	37.5	1981	37.5	1982	37.5	1983	37.5	1984	37.5
1974	54.6	1975	54.6	1976	54.6	1977	54.6	1978	39.9	1979	39.9	1980	37.4	1981	37.4	1982	37.4	1983	37.4	1984	37.4	1985	37.4
1975	54.3	1976	54.3	1977	54.3	1978	39.5	1979	39.5	1980	37 2	1981	37.2	1982	37.2	1983	37.2	1984	37.2	1985	37.2	1986	37.2
1976	54.0	1977	54.0	1978	38.9	1979	38.9	1980	36 9	1981	36.9	1982	36 9	1983	36.9	1984	36.9	1985	36.9	1986	36.9	1987	36.9
1977	53.5	1978	38.2	1979	38.2	1980	36.5	1981	36.5	1982	36.5	1983	36.5	1984	36.5	1985	36.5	1986	36.5	1987	36.5	1988	36.5
1978	37.2	1979	37.2	1980	36.0	1981	36.0	1982	36.0	1983	36.0	1984	36.0	1985	36.0	1986	36.0	1987	36.0	1988	36.0	1989	36.0
1979	35.9	1980	35.3	1981	35.3	1982	35.3	1983	35.3	1984	35.3	1985	35.3	1986	35.3	1987	35.3	1988	35.3	1989	35.3	1990	35.3
1980	34.9	1981	34.9	1982	34.9	1983	34.9	1984	34.9	1985	34.9	1986	34.9	1987	34.9	1988	34.9	1989	34.9	1990	34.9	1991	34.9

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	55.1	1974	55.1	1975	55.1	1976	55.1	1977	55.1	1978	40.7	1979	40.7	1980	37.8	1981	37.8	1982	37.8	1983	37.8	1984	37.8
1974	55.1	1975	55.1	1976	55.1	1977	55.1	1978	40 7	1979	40 7	1980	37.8	1981	37.8	1982	37.8	1983	37.8	1984	37.8	1985	37.8
1975	55.1	1976	55.1	1977	55.1	1978	40.7	1979	40.7	1980	37.8	1981	37.8	1982	37.8	1983	37.8	1984	37.8	1985	37.8	1986	37.8
1976	55.1	1977	55.1	1978	40.7	1979	40.7	1980	37.8	1981	37.8	1982	37.8	1983	37.8	1984	37.8	1985	37.8	1986	37.8	1987	37.8
1977	55.1	1978	40.7	1979	40.7	1980	37.8	1981	37.8	1982	37.8	1983	37.8	1984	37.8	1985	37.8	1986	37.8	1987	37.8	1988	37.8
1978	40.7	1979	40.7	1980	37.8	1981	37.8	1982	37.8	1983	37 8	1984	37.8	1985	37.8	1986	37.8	1987	37.8	1988	37.8	1989	37.8
1979	40.7	1980	37.8	1981	37.8	1982	37.8	1983	37.8	1984	37.8	1985	37.8	1986	37.8	1987	37.8	1988	37.8	1989	37.8	1990	37.8
1980	37.8	1981	37.8	1982	37.8	1983	37.8	1984	37.8	1985	37.8	1986	37.8	1987	37.8	1988	37.8	1989	37.8	1990	37.8	1991	37.8
1981	37.8	1982	37.8	1983	37.8	1984	37 8	1985	37 8	1986	37.8	1987	37.8	1988	37.8	1989	37.8	1990	37.8	1991	37.8	1992	37.8
1982	37.7	1983	37.7	1984	37.7	1985	37.7	1986	37.7	1987	37.7	1988	37.7	1989	37.7	1990	37.7	1991	37.7	1992	37.7	1993	37.7
1983	37.7	1984	37.7	1985	37.7	1986	37.7	1987	37.7	1988	37.7	1989	37.7	1990	37.7	1991	37.7	1992	37.7	1993	37.7	1994	37.7
1984	37.6	1985	37.6	1986	37.6	1987	37.6	1988	37.6	1989	37.6	1990	37.6	1991	37.6	1992	37.6	1993	37.6	1994	37.6	1995	37.6
1985	37.5	1986	37.5	1987	37.5	1988	37.5	1989	37.5	1990	37.5	1991	37.5	1992	37.5	1993	37.5	1994	37.5	1995	37.5	1996	37.5
1986	37.4	1987	37.4	1988	37.4	1989	37.4	1990	37.4	1991	37.4	1992	37.4	1993	37.4	1994	37.4	1995	37.4	1996	37.4	1997	37.4
1987	37.2	1988	37.2	1989	37.2	1990	37.2	1991	37.2	1992	37.2	1993	37.2	1994	37.2	1995	37.2	1996	37.2	1997	37.2	1998	37.2
1988	36.9	1989	36.9	1990	36.9	1991	36.9	1992	36.9	1993	36.9	1994	36.9	1995	36.9	1996	36.9	1997	36.9	1998	36.9	1999	36.9
1989	36.5	1990	36.5	1991	36.5	1992	36.5	1993	36.5	1994	36.5	1995	36.5	1996	36.5	1997	36.5	1998	36.5	1999	36.5	2000	36.5
1990	36.0	1991	36.0	1992	36.0	1993	36.0	1994	36.0	1995	36.0	1996	36.0	1997	36.0	1998	36.0	1999	36.0	2000	36.0	2001	36.0
1991	35.3	1992	35.3	1993	35.3	1994	35.3	1995	35.3	1996	35.3	1997	35.3	1998	35.3	1999	35.3	2000	35.3	2001	35.3	2002	35.3
1992	34.9	1993	34.9	1994	34.9	1995	34.9	1996	34.9	1997	34.9	1998	34.9	1999	34.9	2000	34.9	2001	34.9	2002	34.9	2003	34.9

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.8.4.

TABLE 2.8.2C

DATE : MAY 25, 1985

EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
MOTORCYCLES
NOx

January 1 of Calendar Year

1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1961	0.2	1962	0.2	1963	0.2	1964	0 2	1965	0.2	1966	0.2	1967	0.2	1968	0.2	1969	0.2	1970	0.2	1971	0.2	1972	0.2
1962	0.2	1963	0.2	1964	0.2	1965	0.2	1966	0.2	1967	0.2	1968	0.2	1969	0.2	1970	0.2	1971	0.2	1972	0.2	1973	0.2
1963	0.2	1964	0.2	1965	0.2	1966	0.2	1967	0.2	1968	0.2	1969	0.2	1970	0.2	1971	0.2	1972	0.2	1973	0.2	1974	0.2
1964	0.2	1965	0.2	1966	0.2	1967	0.2	1968	0.2	1969	0.2	1970	0.2	1971	0.2	1972	0.2	1973	0.2	1974	0.2	1975	0.2
1965	0.2	1966	0.2	1967	0.2	1968	0.2	1969	0.2	1970	0.2	1971	0.2	1972	0.2	1973	0.2	1974	0.2	1975	0.2	1976	0.2
1966	0.2	1967	0.2	1968	0.2	1969	0.2	1970	0.2	1971	0.2	1972	0.2	1973	0.2	1974	0.2	1975	0.2	1976	0.2	1977	0.2
1967	0.2	1968	0.2	1969	0.2	1970	0.2	1971	0.2	1972	0.2	1973	0.2	1974	0.2	1975	0.2	1976	0.2	1977	0.2	1978	0.4
1968	0.2	1969	0.2	1970	0.2	1971	0.2	1972	0.2	1973	0.2	1974	0.2	1975	0.2	1976	0.2	1977	0.2	1978	0.4	1979	0.4
1969	0.2	1970	0.2	1971	0.2	1972	0.2	1973	0.2	1974	0.2	1975	0.2	1976	0.2	1977	0.2	1978	0.4	1979	0.4	1980	0.6
1970	0.2	1971	0.2	1972	0.2	1973	0.2	1974	0.2	1975	0.2	1976	0.2	1977	0.2	1978	0.4	1979	0.4	1980	0.6	1981	0.6
1971	0.2	1972	0.2	1973	0.2	1974	0.2	1975	0 2	1976	0.2	1977	0.2	1978	0.4	1979	0.4	1980	0.6	1981	0.6	1982	0.6
1972	0.2	1973	0.2	1974	0.2	1975	0.2	1976	0.2	1977	0.2	1978	0.4	1979	0.4	1980	0.6	1981	0.6	1982	0.6	1983	0.6
1973	0.2	1974	0.2	1975	0.2	1976	0.2	1977	0.2	1978	0.4	1979	0.4	1980	0.6	1981	0.6	1982	0.6	1983	0.6	1984	0.6
1974	0.2	1975	0.2	1976	0.2	1977	0.2	1978	0.4	1979	0.4	1980	0.6	1981	0 6	1982	0.6	1983	0.6	1984	0.6	1985	0.6
1975	0.2	1976	0.2	1977	0.2	1978	0.4	1979	0.4	1980	0.6	1981	0.6	1982	0.6	1983	0.6	1984	0.6	1985	0.6	1986	0.6
1976	0.2	1977	0.2	1978	0.4	1979	0.4	1980	0.6	1981	0.6	1982	0.6	1983	0.6	1984	0.6	1985	0.6	1986	0.6	1987	0.6
1977	0.2	1978	0.4	1979	0.4	1980	0.6	1981	0.6	1982	0.6	1983	0.6	1984	0.6	1985	0.6	1986	0.6	1987	0 6	1988	0.6
1978	0.4	1979	0.4	1980	0.6	1981	0.6	1982	0.6	1983	0.6	1984	0.6	1985	0.6	1986	0.6	1987	0.6	1988	0.6	1989	0.6
1979	0.4	1980	0.6	1981	0.6	1982	0.6	1983	0.6	1984	0.6	1985	0.6	1986	0.6	1987	0.6	1988	0.6	1989	0.6	1990	0.6
1980	0.6	1981	0.6	1982	0.6	1983	0.6	1984	0.6	1985	0.6	1986	0.6	1987	0.6	1988	0.6	1989	0.6	1990	0.6	1991	0.6

January 1 of Calendar Year

1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003	
MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**	MY*	E**
1973	0.2	1974	0.2	1975	0.2	1976	0.2	1977	0.2	1978	0.4	1979	0.4	1980	0.6	1981	0.6	1982	0.6	1983	0.6	1984	0.6
1974	0.2	1975	0.2	1976	0.2	1977	0.2	1978	0.4	1979	0.4	1980	0.6	1981	0.6	1982	0.6	1983	0.6	1984	0.6	1985	0.6
1975	0.2	1976	0.2	1977	0.2	1978	0.4	1979	0 4	1980	0.6	1981	0.6	1982	0.6	1983	0.6	1984	0.6	1985	0.6	1986	0.6
1976	0.2	1977	0.2	1978	0 4	1979	0.4	1980	0.6	1981	0.6	1982	0.6	1983	0 6	1984	0.6	1985	0.6	1986	0.6	1987	0.6
1977	0.2	1978	0.4	1979	0.4	1980	0.6	1981	0.6	1982	0 6	1983	0.6	1984	0.6	1985	0.6	1986	0.6	1987	0.6	1988	0.6
1978	0.4	1979	0.4	1980	0.6	1981	0.6	1982	0.6	1983	0 6	1984	0.6	1985	0.6	1986	0.6	1987	0.6	1988	0.6	1989	0.6
1979	0.4	1980	0.6	1981	0.6	1982	0 6	1983	0 6	1984	0 6	1985	0.6	1986	0.6	1987	0.6	1988	0.6	1989	0.6	1990	0.6
1980	0.6	1981	0.6	1982	0 6	1983	0.6	1984	0.6	1985	0.6	1986	0.6	1987	0.6	1988	0.6	1989	0.6	1990	0.6	1991	0.6
1981	0.6	1982	0.6	1983	0.6	1984	0.6	1985	0.6	1986	0.6	1987	0.6	1988	0 6	1989	0.6	1990	0.6	1991	0.6	1992	0.6
1982	0.6	1983	0.6	1984	0.6	1985	0.6	1986	0.6	1987	0 6	1988	0.6	1989	0.6	1990	0.6	1991	0.6	1992	0.6	1993	0.6
1983	0.6	1984	0.6	1985	0 6	1986	0.6	1987	0.6	1988	0.6	1989	0.6	1990	0.6	1991	0.6	1992	0.6	1993	0.6	1994	0.6
1984	0.6	1985	0.6	1986	0.6	1987	0.6	1988	0.6	1989	0.6	1990	0.6	1991	0.6	1992	0.6	1993	0.6	1994	0.6	1995	0.6
1985	0.6	1986	0.6	1987	0.6	1988	0.6	1989	0.6	1990	0.6	1991	0.6	1992	0.6	1993	0.6	1994	0.6	1995	0.6	1996	0.6
1986	0.6	1987	0.6	1988	0.6	1989	0.6	1990	0.6	1991	0.6	1992	0.6	1993	0.6	1994	0.6	1995	0.6	1996	0.6	1997	0.6
1987	0.6	1988	0.6	1989	0 6	1990	0.6	1991	0.6	1992	0.6	1993	0.6	1994	0.6	1995	0.6	1996	0.6	1997	0.6	1998	0.6
1988	0.6	1989	0.6	1990	0.6	1991	0.6	1992	0.6	1993	0.6	1994	0.6	1995	0.6	1996	0.6	1997	0.6	1998	0.6	1999	0.6
1989	0.6	1990	0.6	1991	0.6	1992	0 6	1993	0.6	1994	0.6	1995	0.6	1996	0.6	1997	0.6	1998	0.6	1999	0.6	2000	0.6
1990	0.6	1991	0.6	1992	0.6	1993	0.6	1994	0.6	1995	0.6	1996	0.6	1997	0.6	1998	0.6	1999	0.6	2000	0.6	2001	0.6
1991	0.6	1992	0.6	1993	0.6	1994	0 6	1995	0 6	1996	0.6	1997	0.6	1998	0.6	1999	0.6	2000	0.6	2001	0.6	2002	0.6
1992	0.6	1993	0.6	1994	0.6	1995	0.6	1996	0.6	1997	0.6	1998	0.6	1999	0.6	2000	0.6	2001	0.6	2002	0.6	2003	0.6

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.8.4.

TABLE 2.8.3

IDLE EMISSION RATES FOR
HIGH ALTITUDE
MOTORCYCLES

* IER = ZML + (DR * M)

Pol	Model Years	Zero Mile Emission Level (Grams/Min.)	Deterioration Rate (Gm/Min/10K Mi)
HC	Pre-1978	2.41	0.42
	1978-1979	0.53	0.36
	1980+	0.78	0.38
CO	Pre-1978	5.03	0.23
	1978-1979	2.34	0.50
	1980+	2.56	0.26
NOx	Pre-1978	0.01	0.0
	1978-1979	0.02	0.0
	1980+	0.02	0.0

* WHERE : IER = Idle emission rate
ZML = Zero mile level
DR = Deterioration Rate
M = Cumulative Mileage / 10,000

DATE : MAY 25, 1985

TABLE 2.8.4

REGISTRATION MIX AND
MILEAGE ACCUMULATION RATES FOR
HIGH ALTITUDE
MOTORCYCLES

Model Year Index**	July 1 Registration Mix*	Mileage Accumulation Rate per vehicle*	Jan 1 Registration Mix	Jan 1 Mileage Accumulation Rate (fleet)	Jan 1 Mileage Accumulation (fleet)
1	0.133	4100.	0.044	0.	0.
2	0.145	2800.	0.145	4100.	2050.
3	0.138	2100.	0.138	2800.	5500.
4	0.116	1600.	0.116	2100.	7950.
5	0.123	1200.	0.123	1600.	9800.
6	0.114	800.	0.114	1200.	11200.
7	0.069	600.	0.069	800.	12200.
8	0.044	400.	0.044	600.	12900.
9	0.024	200.	0.024	400.	13400.
10	0.009	200.	0.009	200.	13700.
11	0.085	200.	0.085	200.	13900.
12	0.0	0.	0.0	200.	14100.
13	0.0	0.	0.0	0.	14200.
14	0.0	0.	0.0	0.	14200.
15	0.0	0.	0.0	0.	14200.
16	0.0	0.	0.0	0.	14200.
17	0.0	0.	0.0	0.	14200.
18	0.0	0.	0.0	0.	14200.
19	0.0	0.	0.0	0.	14200.
20+	0.0	0.	0.0	0.	14200.

* Default information that may be altered by the MOBILE3 user with information about the local area.

** The indices refer to the most recent model year vehicles in any given calendar year. Index 1 references the newest model year vehicles and index 20+ references the oldest model year vehicles.

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TABLE 2.8.5

EXAMPLE TRAVEL WEIGHTING FRACTION CALCULATION FOR
HIGH ALTITUDE
MOTORCYCLES
JANUARY 1, 1988

Model Years	(A) MC Fleet Registration	(B) Sales Fraction	(A*B)	(C=A*B/DAF) MC Registration	(D) Annual Mileage Accrual Rate	(C*D)	(C*D/TFNORM) Travel Fractions
1988	0.044	1.000	0.044	0.0	0.	0.0	0.0
1987	0.145	1.000	0.145	0.167	4100.	685.7	0.356
1986	0.138	1.000	0.138	0.159	2800.	445.7	0.232
1985	0.116	1.000	0.116	0.134	2100.	281.0	0.146
1984	0.123	1.000	0.123	0.142	1600.	227.0	0.118
1983	0.114	1.000	0.114	0.131	1200.	157.8	0.082
1982	0.069	1.000	0.069	0.080	800.	63.7	0.033
1981	0.044	1.000	0.044	0.051	600.	30.4	0.016
1980	0.024	1.000	0.024	0.028	400.	11.1	0.006
1979	0.009	1.000	0.009	0.010	200.	2.1	0.001
1978	0.085	1.000	0.085	0.098	200.	19.6	0.010
1977	0.0	1.000	0.0	0.0	200.	0.0	0.0
1976	0.0	1.000	0.0	0.0	0.	0.0	0.0
1975	0.0	1.000	0.0	0.0	0.	0.0	0.0
1974	0.0	1.000	0.0	0.0	0.	0.0	0.0
1973	0.0	1.000	0.0	0.0	0.	0.0	0.0
1972	0.0	1.000	0.0	0.0	0.	0.0	0.0
1971	0.0	1.000	0.0	0.0	0.	0.0	0.0
1970	0.0	1.000	0.0	0.0	0.	0.0	0.0
1969-	0.0	1.000	0.0	0.0	0.	0.0	0.0
		DAF:	0.911		TFNORM:	1924.0	

WHERE :

A = January 1 registration mix from Table 2.8.4.
B = Fleet sales fractions
D = Sales weighted fleet mileage accumulation rate from Table 2.8.4, adjusted to January 1
D(1) = Annual Miles(1)
D(MYI) = .25*(Annual Miles(MYI)) + .75*(Annual Miles(MYI-1)), MYI=2,...,20+

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TABLE 2.8.6

SPEED CORRECTION FACTOR COEFFICIENTS FOR HIGH ALTITUDE MOTORCYCLES

$$* \; SCF(s,sadj) = SF(s)/SF(sadj)$$

$$SF(s) = EXP(A + B*s + C*s^2 + D*S^3 + E*s^4 + F*s^5), \text{ HC \& CO}$$
$$= A + B*s + C*s^2 + D*s^3 + E*s^4 + F*s^5 , \text{ NOx}$$

Pollutant and Model Years	A	B	C	D	E	F
HC						
Pre-1978	0.224612E+01	-0.290973E+00	0.158890E-01	-0.472494E-03	0.694077E-05	-0.392798E-07
1978-1979	0.215056E+01	-0.283620E+00	0 153836E-01	-0.442136E-03	0.628732E-05	-0.346311E-07
1980+	0.212230E+01	-0.291072E+00	0.169089E-01	-0.526148E-03	0.802705E-05	-0.470117E-07
CO						
Pre-1978	0.181978E+01	-0.254663E+00	0.152347E-01	-0.487397E-03	0.758207E-05	-0.449514E-07
1978-1979	0.182133E+01	-0.272054E+00	0.170304E-01	-0.552021E-03	0.862543E-05	-0.511440E-07
1980+	0.204533E+01	-0.310618E+00	0.204852E-01	-0.708527E-03	0.116215E-04	-0.715690E-07
NOx						
Pre-1978	0.244424E+01	-0.250107E+00	0.138293E-01	-0.287025E-03	0.207585E-05	0.0
1978+	0.144825E+01	-0.122444E+00	0.795024E-02	-0.171078E-03	0.125777E-05	0.0

* WHERE : s = average speed (mph)
sadj = basic test procedure speed; adjusted for fraction of cold start operation x and fraction of hot start operation w, [1/sadj = (w+x)/26 + (1-w-x)/16]

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TABLE 2.8 7A

TEMPERATURE CORRECTION FACTOR COEFFICIENTS FOR
HIGH ALTITUDE
MOTORCYCLES

* TCF(b) = EXP(TC(b) * (T - 75.0))

Pol	Model Years	Test segment 1 TC Low	Test segment 1 TC High	Test segment 2 TC Low	Test segment 2 TC High	Test segment 3 TC Low	Test segment 3 TC High
HC	Pre-1978	-0.20623E-01	-0.14381E-01	-0.24032E-02	0.13219E-02	-0.10081E-02	0.34799E-02
	1978-1979	-0.24462E-01	-0.12552E-01	-0 32017E-02	0.42667E-02	-0.86884E-03	0.75843E-02
	1980+	-0.21255E-01	-0.10888E-01	-0.52755E-03	-0.47925E-03	0.93659E-03	0.76666E-02
CO	Pre-1978	-0.13487E-01	-0.14691E-01	0.15784E-02	0.37462E-02	0.11097E-02	0.11014E-01
	1978-1979	-0.21126E-01	-0.38767E-01	-0 15289E-02	0.84685E-02	0.15749E-02	0.25179E-01
	1980+	-0.20843E-01	-0.21165E-01	-0.59951E-02	0.23603E-01	0.18253E-02	0.28483E-01
NOx	Pre-1978	-0.16897E-03	0.38841E-02	-0 89245E-02	-0.87325E-02	-0.72580E-02	-0.10839E-01
	1978+	-0.25074E-03	-0.10389E-02	-0.59791E-02	-0.92466E-02	-0.62690E-02	-0.10108E-01

* WHERE :

TCF(b) = Temperature correction factor for appropriate pollutant, ambient temperature, and model year; for test segment b
T = Ambient temperature (Fahrenheit)
TC(b) = Temperature correction factor coefficient for appropriate pollutant, reference temperature and model year; for test segment b
75.0 = Reference temperature

NOTE : The temperature correction factor is used in conjunction with the Ripstwxn correction factor given in Table 2.8.7B.

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TABLE 2.8.7B

NORMALIZED BAG FRACTIONS FOR
HIGH ALTITUDE
MOTORCYCLES

		Normalized Fractions							
	Model	Test Seg.#1		Test Seg.#2		Test Seg.#3		Total Test	
Pol	Years	B1	D1	B2	D2	B3	D3	B0	D0
HC	Pre-1978	1.282	0.025	0.973	0.028	0.839	0.019	1.000	0.025
	1978-1979	1.345	0.074	0.946	0.054	0.842	0.048	1.000	0.056
	1980+	1.345	0.178	0.919	0.118	0.894	0.093	1.000	0.124
CO	Pre-1978	1.277	0.033	1.017	0.029	0.758	0.025	1.000	0.029
	1978-1979	1.442	0.071	0.996	0.042	0.674	0.033	1.000	0.046
	1980+	1.553	0.109	0.933	0.079	0.711	0.038	1.000	0.074
NOx	Pre-1978	1.121	0.009	0.785	0.001	1.319	-0.009	1.000	0.0
	1978+	1.199	-0.004	0.793	-0.002	1.245	0.006	1.000	0.0

NOTE : The fractions given in this table are used in the calculation of the operating-mode/ temperature correction factor (OMTCF).

WHERE :

```
OMTCF  = ((TERM1 + TERM2 + TERM3)/DENOM)
TERM1  =    W    *TCF(1)*(B1+D1*M)
TERM2  = (1-W-X) *TCF(2)*(B2+D2*M)
TERM3  =    X    *TCF(3)*(B3+D3*M)
DENOM  = B0 + D0*M
 W     = Fraction of VMT in the cold start mode
 X     = Fraction of VMT in the  hot start mode
TCF(b) = Temperature correction factor for pollutant, model
         year; for test segment b
 M     = Cumulative mileage / 10,000
```

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Appendix I

EMISSION SENSITIVITY TABLES - ALL VEHICLES COMBINED

This appendix contains average emission factors for all mobile sources combined for several calendar years between 1980 and 2000, for various ambient temperatures, cold/hot start VMT weightings, and for a range of average speed combinations. This appendix includes one case that represents the average national emission factors as generated from the standard test conditions (in Tables 3, 9, and 15 for HC, CO, and NOx; respectively) as well as other scenarios that can be used to assess the sensitivity of the emission factors to changing input conditions. All emission factors are given in units of grams of pollutant per vehicle mile traveled. The hydrocarbon emission levels include the crankcase and evaporative HC emission results. Further, the hydrocarbon emissions are total, rather than nonmethane.

Emission factors presented in this section are intended to assist those individuals interested in compiling approximate mobile source emission estimates for large areas, such as an individual air quality region or the entire nation.

The emission factor calculation techniques presented in this document are strongly recommended for the formulation of localized emission estimates required for air quality modeling or for the evaluation of air pollutant control strategies. Many factors, which vary with geographic location and estimation situation, can affect emission estimates considerably. The factors of concern include average speed, percentage of VMT in cold/hot start vehicle operation, percentage of travel by vehicle type, ambient temperature, air conditioning usage, vehicle load, trailer towing, and humidity. Clearly, the innumerable combinations make it impossible to present mobile source emission factors for each application. An effort has been made, therefore, to present emission factors for a range of conditions. The following conditions are considered for each of these cases:

1. Each table represents one average speed. There are 6 basic tables with speeds of 5.0, 10.0, 19.6, 35.0, 50.0, and 55.0 mph.

2. Each table presents six calendar years: 1980, 1985, 1988, 1990, 1995, and 2000.

3. Each calendar year presents 35 combinations of five temperatures and seven operating modes. The five temperatures are 0°, 25°, 50°, 75°, and 100°F. The seven operating mode combinations are shown in the following Table.

Operating Mode Combinations

MOBILE3 Input	Description
0/0/0	100% Stabilized
0/100/0	100% Hot Start
100/0/100	100% Cold Start
50/0/50	50% Cold Start, 50% Stabilized
0/50/0	50% Hot Start, 50% Stabilized
50/50/50	50% Cold Start, 50% Hot Start
20.6/27.3/20.6	20.6% Cold Start, 52.1% Stabilized, 27.3% Hot Start

NOTES: All percentages are percent of VMT accumulated in that mode.

4. The VMT mixes are those calculated from MOBILE3. They are as follows:

Calendar Year	LDGV	LDGT1	LDGT2	HDGV	LDDV	LDDT	HDDV	MC
1980	0.666	0.133	0.088	0.040	0.005	0.001	0.060	0.007
1985	0.652	0.128	0.087	0.040	0.023	0.008	0.054	0.007
1987	0.647	0.124	0.087	0.040	0.031	0.012	0.051	0.007
1990	0.635	0.115	0.086	0.041	0.046	0.021	0.049	0.007
1995	0.617	0.102	0.086	0.041	0.067	0.035	0.045	0.007
2000	0.608	0.095	0.087	0.041	0.076	0.042	0.044	0.007

TABLE 1

LOW ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE) AT 5.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	18.17	16.71	15.48	14.43	17.09
1980	0.0	100.0	0.0	18.12	17.96	17.88	17.88	23.21
1980	100.0	0.0	100.0	124.47	72.94	43.50	26.63	21.18
1980	50.0	0.0	50.0	59.90	38.74	26.40	19.13	18.56
1980	0.0	50.0	0.0	18.02	17.08	16.31	15.69	19.34
1980	50.0	50.0	50.0	71.29	45.45	30.69	22.26	22.19
1980	20.6	27.3	20.6	35.13	25.91	20.39	17.03	18.91
1985	0.0	0.0	0.0	12.20	10.78	9.62	8.68	11.56
1985	0.0	100.0	0.0	12.06	11.63	11.30	11.05	15.70
1985	100.0	0.0	100.0	91.77	50.78	28.89	17.05	14.17
1985	50.0	0.0	50.0	42.60	26.02	16.92	11.81	12.44
1985	0.0	50.0	0.0	12.00	10.99	10.17	9.51	13.01
1985	50.0	50.0	50.0	51.91	31.21	20.10	14.05	14.94
1985	20.6	27.3	20.6	24.50	17.11	12.89	10.40	12.70
1988	0.0	0.0	0.0	9.47	8.13	7.06	6.21	8.53
1988	0.0	100.0	0.0	9.67	9.01	8.47	8.04	11.66
1988	100.0	0.0	100.0	81.01	42.33	22.87	12.92	11.40
1988	50.0	0.0	50.0	36.58	21.05	12.99	8.69	9.53
1988	0.0	50.0	0.0	9.42	8.36	7.51	6.83	9.60
1988	50.0	50.0	50.0	45.34	25.67	15.67	10.48	11.53
1988	20.6	27.3	20.6	20.51	13.52	9.73	7.56	9.51
1990	0.0	0.0	0.0	7.98	6.75	5.78	5.01	6.80
1990	0.0	100.0	0.0	8.35	7.61	7.00	6.50	9.32
1990	100.0	0.0	100.0	75.30	37.79	19.67	10.76	10.11
1990	50.0	0.0	50.0	33.49	18.47	10.98	7.13	7.99
1990	0.0	50.0	0.0	8.01	6.99	6.17	5.51	7.67
1990	50.0	50.0	50.0	41.83	22.70	13.33	8.63	9.72
1990	20.6	27.3	20.6	18.40	11.66	8.11	6.14	7.75
1995	0.0	0.0	0.0	5.64	4.67	3.92	3.32	4.02
1995	0.0	100.0	0.0	6.28	5.46	4.78	4.23	5.56
1995	100.0	0.0	100.0	64.59	29.99	14.44	7.37	8.19
1995	50.0	0.0	50.0	28.14	14.29	7.89	4.83	5.58
1995	0.0	50.0	0.0	5.81	4.91	4.20	3.63	4.56
1995	50.0	50.0	50.0	35.43	17.72	9.61	5.80	6.88
1995	20.6	27.3	20.6	14.91	8.73	5.69	4.10	4.95
2000	0.0	0.0	0.0	4.72	3.89	3.25	2.75	2.95
2000	0.0	100.0	0.0	5.40	4.60	3.95	3.42	4.11
2000	100.0	0.0	100.0	58.62	26.27	12.19	6.02	7.40
2000	50.0	0.0	50.0	25.44	12.47	6.66	3.98	4.64
2000	0.0	50.0	0.0	4.91	4.11	3.48	2.98	3.36
2000	50.0	50.0	50.0	32.01	15.44	8.07	4.72	5.75
2000	20.6	27.3	20.6	13.28	7.51	4.76	3.37	3.86

TABLE 1 : THC AT 5.0 MPH.

TABLE 2

LOW ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE) AT 10.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	11.30	10.45	9.73	9.13	10.67
1980	0.0	100.0	0.0	11.25	11.12	11.03	10.99	13.95
1980	100.0	0.0	100.0	68.58	40.73	24.84	15.74	12.79
1980	50.0	0.0	50.0	33.75	22.29	15.61	11.67	11.43
1980	0.0	50.0	0.0	11.20	10.64	10.18	9.80	11.87
1980	50.0	50.0	50.0	39.92	25.92	17.93	13.36	13.37
1980	20.6	27.3	20.6	20.42	15.39	12.38	10.53	11.63
1985	0.0	0.0	0.0	8.02	7.12	6.39	5.80	7.59
1985	0.0	100.0	0.0	8.00	7.68	7.43	7.23	10.06
1985	100.0	0.0	100.0	56.91	31.42	18.00	10.84	9.24
1985	50.0	0.0	50.0	26.64	16.35	10.77	7.67	8.15
1985	0.0	50.0	0.0	7.93	7.26	6.73	6.29	8.45
1985	50.0	50.0	50.0	32.45	19.55	12.71	9.03	9.65
1985	20.6	27.3	20.6	15.57	10.96	8.36	6.83	8.28
1988	0.0	0.0	0.0	6.48	5.59	4.88	4.31	5.79
1988	0.0	100.0	0.0	6.68	6.20	5.81	5.48	7.78
1988	100.0	0.0	100.0	54.16	28.06	15.15	8.65	7.84
1988	50.0	0.0	50.0	24.52	14.06	8.72	5.91	6.52
1988	0.0	50.0	0.0	6.48	5.76	5.18	4.71	6.47
1988	50.0	50.0	50.0	30.42	17.13	10.48	7.06	7.81
1988	20.6	27.3	20.6	13.84	9.13	6.61	5.18	6.45
1990	0.0	0.0	0.0	5.63	4.79	4.12	3.60	4.76
1990	0.0	100.0	0.0	5.95	5.41	4.96	4.59	6.43
1990	100.0	0.0	100.0	52.66	26.19	13.59	7.48	7.22
1990	50.0	0.0	50.0	23.45	12.86	7.67	5.03	5.65
1990	0.0	50.0	0.0	5.68	4.97	4.39	3.93	5.33
1990	50.0	50.0	50.0	29.30	15.80	9.27	6.04	6.83
1990	20.6	27.3	20.6	12.93	8.18	5.71	4.36	5.43
1995	0.0	0.0	0.0	4.26	3.55	3.00	2.57	3.04
1995	0.0	100.0	0.0	4.75	4.14	3.64	3.23	4.16
1995	100.0	0.0	100.0	48.38	22.39	10.78	5.55	6.24
1995	50.0	0.0	50.0	21.11	10.72	5.94	3.68	4.24
1995	0.0	50.0	0.0	4.39	3.73	3.21	2.79	3.43
1995	50.0	50.0	50.0	26.56	13.26	7.21	4.39	5.20
1995	20.6	27.3	20.6	11.21	6.57	4.31	3.14	3.74
2000	0.0	0.0	0.0	3.67	3.05	2.57	2.19	2.33
2000	0.0	100.0	0.0	4.19	3.59	3.10	2.70	3.21
2000	100.0	0.0	100.0	44.93	20.15	9.38	4.68	5.75
2000	50.0	0.0	50.0	19.53	9.60	5.17	3.13	3.63
2000	0.0	50.0	0.0	3.82	3.22	2.74	2.36	2.64
2000	50.0	50.0	50.0	24.56	11.87	6.24	3.69	4.48
2000	20.6	27.3	20.6	10.23	5.82	3.72	2.67	3.03

TABLE 2 : THC AT 10.0 MPH.

TABLE 3

LOW ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE) AT 19.6 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	7.44	6.97	6.56	6.22	7.11
1980	0.0	100.0	0.0	7.40	7.33	7.28	7.26	8.93
1980	100.0	0.0	100.0	39.70	24.01	15.06	9.94	8.27
1980	50.0	0.0	50.0	20.09	13.64	9.87	7.65	7.52
1980	0.0	50.0	0.0	7.39	7.07	6.81	6.60	7.78
1980	50.0	50.0	50.0	23.55	15.67	11.17	8.60	8.60
1980	20.6	27.3	20.6	12.58	9.75	8.05	7.01	7.64
1985	0.0	0.0	0.0	5.23	4.71	4.29	3.95	4.98
1985	0.0	100.0	0.0	5.21	5.03	4.88	4.77	6.37
1985	100.0	0.0	100.0	33.51	18.70	10.96	6.84	5.95
1985	50.0	0.0	50.0	16.01	10.03	6.81	5.03	5.31
1985	0.0	50.0	0.0	5.17	4.79	4.48	4.24	5.46
1985	50.0	50.0	50.0	19.36	11.87	7.92	5.80	6.16
1985	20.6	27.3	20.6	9.60	6.93	5.42	4.54	5.37
1988	0.0	0.0	0.0	4.19	3.68	3.26	2.94	3.78
1988	0.0	100.0	0.0	4.31	4.03	3.80	3.61	4.92
1988	100.0	0.0	100.0	32.42	16.89	9.27	5.46	5.04
1988	50.0	0.0	50.0	14.89	8.66	5.52	3.87	4.23
1988	0.0	50.0	0.0	4.19	3.77	3.44	3.17	4.17
1988	50.0	50.0	50.0	18.37	10.46	6.54	4.54	4.98
1988	20.6	27.3	20.6	8.55	5.76	4.28	3.44	4.17
1990	0.0	0.0	0.0	3.66	3.16	2.77	2.46	3.12
1990	0.0	100.0	0.0	3.86	3.53	3.27	3.05	4.10
1990	100.0	0.0	100.0	32.00	15.98	8.41	4.77	4.67
1990	50.0	0.0	50.0	14.41	8.01	4.89	3.32	3.69
1990	0.0	50.0	0.0	3.69	3.27	2.93	2.66	3.46
1990	50.0	50.0	50.0	17.93	9.76	5.84	3.91	4.39
1990	20.6	27.3	20.6	8.06	5.20	3.72	2.92	3.53
1995	0.0	0.0	0.0	2.82	2.40	2.07	1.81	2.07
1995	0.0	100.0	0.0	3.13	2.76	2.46	2.21	2.75
1995	100.0	0.0	100.0	30.31	14.09	6.87	3.64	4.10
1995	50.0	0.0	50.0	13.33	6.85	3.88	2.49	2.83
1995	0.0	50.0	0.0	2.91	2.51	2.19	1.94	2.31
1995	50.0	50.0	50.0	16.72	8.42	4.66	2.92	3.42
1995	20.6	27.3	20.6	7.16	4.27	2.88	2.16	2.51
2000	0.0	0.0	0.0	2.48	2.10	1.80	1.57	1.65
2000	0.0	100.0	0.0	2.80	2.44	2.14	1.89	2.20
2000	100.0	0.0	100.0	28.60	12.91	6.10	3.14	3.82
2000	50.0	0.0	50.0	12.52	6.24	3.44	2.16	2.47
2000	0.0	50.0	0.0	2.57	2.20	1.91	1.68	1.84
2000	50.0	50.0	50.0	15.70	7.67	4.12	2.52	3.01
2000	20.6	27.3	20.6	6.63	3.85	2.53	1.87	2.09

TABLE 3 : THC AT 19.6 MPH.

TABLE 4

LOW ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE) AT 35.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	5.30	5.05	4.83	4.65	5.12
1980	0.0	100.0	0.0	5.29	5.26	5.24	5.23	6.14
1980	100.0	0.0	100.0	23.91	14.88	9.72	6.77	5.79
1980	50.0	0.0	50.0	12.64	8.92	6.75	5.47	5.36
1980	0.0	50.0	0.0	5.28	5.11	4.97	4.86	5.50
1980	50.0	50.0	50.0	14.60	10.07	7.48	6.00	5.97
1980	20.6	27.3	20.6	8.28	6.66	5.69	5.10	5.42
1985	0.0	0.0	0.0	3.51	3.24	3.02	2.85	3.37
1985	0.0	100.0	0.0	3.50	3.41	3.34	3.28	4.12
1985	100.0	0.0	100.0	18.81	10.81	6.63	4.40	3.92
1985	50.0	0.0	50.0	9.36	6.13	4.39	3.43	3.56
1985	0.0	50.0	0.0	3.48	3.28	3.13	3.00	3.63
1985	50.0	50.0	50.0	11.15	7.11	4.98	3.84	4.02
1985	20.6	27.3	20.6	5.88	4.44	3.64	3.17	3.59
1988	0.0	0.0	0.0	2.71	2.45	2.24	2.07	2.49
1988	0.0	100.0	0.0	2.78	2.64	2.52	2.42	3.09
1988	100.0	0.0	100.0	17.79	9.49	5.43	3.40	3.19
1988	50.0	0.0	50.0	8.44	5.12	3.44	2.56	2.74
1988	0.0	50.0	0.0	2.71	2.50	2.33	2.19	2.70
1988	50.0	50.0	50.0	10.29	6.07	3.97	2.91	3.14
1988	20.6	27.3	20.6	5.05	3.56	2.77	2.33	2.71
1990	0.0	0.0	0.0	2.34	2.09	1.88	1.72	2.05
1990	0.0	100.0	0.0	2.45	2.28	2.14	2.03	2.57
1990	100.0	0.0	100.0	17.52	8.93	4.88	2.94	2.91
1990	50.0	0.0	50.0	8.11	4.68	3.01	2.18	2.37
1990	0.0	50.0	0.0	2.36	2.14	1.97	1.83	2.23
1990	50.0	50.0	50.0	9.99	5.61	3.51	2.49	2.74
1990	20.6	27.3	20.6	4.71	3.17	2.39	1.96	2.28
1995	0.0	0.0	0.0	1.81	1.58	1.41	1.27	1.40
1995	0.0	100.0	0.0	1.97	1.78	1.62	1.48	1.76
1995	100.0	0.0	100.0	16.76	7.93	4.01	2.26	2.52
1995	50.0	0.0	50.0	7.53	4.00	2.39	1.64	1.82
1995	0.0	50.0	0.0	1.85	1.64	1.47	1.34	1.53
1995	50.0	50.0	50.0	9.37	4.85	2.81	1.87	2.14
1995	20.6	27.3	20.6	4.17	2.60	1.84	1.46	1.64
2000	0.0	0.0	0.0	1.61	1.40	1.24	1.12	1.15
2000	0.0	100.0	0.0	1.79	1.59	1.42	1.29	1.46
2000	100.0	0.0	100.0	15.98	7.35	3.61	1.98	2.36
2000	50.0	0.0	50.0	7.14	3.68	2.14	1.44	1.61
2000	0.0	50.0	0.0	1.66	1.46	1.30	1.18	1.26
2000	50.0	50.0	50.0	8.88	4.47	2.52	1.64	1.91
2000	20.6	27.3	20.6	3.89	2.36	1.64	1.28	1.40

TABLE 4 : THC AT 35.0 MPH.

TABLE 5

LOW ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE) AT 50.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	4.64	4.45	4.29	4.15	4.49
1980	0.0	100.0	0.0	4.63	4.60	4.59	4.59	5.27
1980	100.0	0.0	100.0	18.90	11.98	8.03	5.77	5.01
1980	50.0	0.0	50.0	10.28	7.42	5.76	4.78	4.68
1980	0.0	50.0	0.0	4.61	4.49	4.39	4.31	4.78
1980	50.0	50.0	50.0	11.76	8.29	6.31	5.18	5.14
1980	20.6	27.3	20.6	6.93	5.69	4.95	4.49	4.72
1985	0.0	0.0	0.0	2.94	2.76	2.61	2.49	2.85
1985	0.0	100.0	0.0	2.93	2.87	2.83	2.79	3.37
1985	100.0	0.0	100.0	13.74	8.13	5.17	3.59	3.23
1985	50.0	0.0	50.0	7.09	4.82	3.59	2.90	2.98
1985	0.0	50.0	0.0	2.92	2.79	2.68	2.59	3.03
1985	50.0	50.0	50.0	8.34	5.50	4.00	3.19	3.30
1985	20.6	27.3	20.6	4.62	3.61	3.05	2.71	3.00
1988	0.0	0.0	0.0	2.21	2.03	1.89	1.77	2.06
1988	0.0	100.0	0.0	2.25	2.16	2.08	2.01	2.47
1988	100.0	0.0	100.0	12.45	6.84	4.07	2.69	2.53
1988	50.0	0.0	50.0	6.11	3.85	2.71	2.11	2.23
1988	0.0	50.0	0.0	2.21	2.06	1.95	1.86	2.20
1988	50.0	50.0	50.0	7.35	4.50	3.08	2.35	2.50
1988	20.6	27.3	20.6	3.80	2.79	2.26	1.96	2.21
1990	0.0	0.0	0.0	1.88	1.71	1.57	1.46	1.69
1990	0.0	100.0	0.0	1.95	1.84	1.74	1.67	2.03
1990	100.0	0.0	100.0	12.02	6.29	3.59	2.29	2.25
1990	50.0	0.0	50.0	5.74	3.45	2.33	1.77	1.89
1990	0.0	50.0	0.0	1.89	1.74	1.63	1.53	1.81
1990	50.0	50.0	50.0	6.98	4.07	2.67	1.98	2.14
1990	20.6	27.3	20.6	3.46	2.44	1.91	1.63	1.84
1995	0.0	0.0	0.0	1.42	1.27	1.15	1.06	1.15
1995	0.0	100.0	0.0	1.53	1.40	1.29	1.21	1.39
1995	100.0	0.0	100.0	11.23	5.44	2.87	1.72	1.89
1995	50.0	0.0	50.0	5.17	2.86	1.80	1.31	1.43
1995	0.0	50.0	0.0	1.45	1.31	1.20	1.11	1.23
1995	50.0	50.0	50.0	6.38	3.42	2.08	1.46	1.64
1995	20.6	27.3	20.6	2.97	1.94	1.44	1.19	1.31
2000	0.0	0.0	0.0	1.26	1.12	1.02	0.94	0.96
2000	0.0	100.0	0.0	1.38	1.25	1.14	1.05	1.16
2000	100.0	0.0	100.0	10.67	5.02	2.57	1.51	1.75
2000	50.0	0.0	50.0	4.88	2.62	1.61	1.15	1.26
2000	0.0	50.0	0.0	1.29	1.16	1.06	0.98	1.03
2000	50.0	50.0	50.0	6.02	3.13	1.86	1.28	1.46
2000	20.6	27.3	20.6	2.75	1.75	1.28	1.05	1.12

TABLE 5 : THC AT 50.0 MPH.

TABLE 6

LOW ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE) AT 55.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	4.50	4.33	4.18	4.05	4.36
1980	0.0	100.0	0.0	4.49	4.47	4.46	4.46	5.08
1980	100.0	0.0	100.0	17.80	11.35	7.67	5.56	4.85
1980	50.0	0.0	50.0	9.77	7.11	5.55	4.64	4.54
1980	0.0	50.0	0.0	4.48	4.37	4.28	4.20	4.63
1980	50.0	50.0	50.0	11.15	7.91	6.06	5.01	4.96
1980	20.6	27.3	20.6	6.64	5.49	4.79	4.37	4.58
1985	0.0	0.0	0.0	2.83	2.66	2.53	2.42	2.74
1985	0.0	100.0	0.0	2.82	2.77	2.73	2.69	3.22
1985	100.0	0.0	100.0	12.70	7.57	4.87	3.42	3.10
1985	50.0	0.0	50.0	6.62	4.55	3.42	2.80	2.86
1985	0.0	50.0	0.0	2.81	2.69	2.59	2.51	2.91
1985	50.0	50.0	50.0	7.76	5.17	3.80	3.06	3.16
1985	20.6	27.3	20.6	4.37	3.45	2.93	2.62	2.88
1988	0.0	0.0	0.0	2.11	1.95	1.82	1.72	1.98
1988	0.0	100.0	0.0	2.15	2.06	1.99	1.93	2.35
1988	100.0	0.0	100.0	11.41	6.32	3.81	2.55	2.40
1988	50.0	0.0	50.0	5.65	3.61	2.57	2.03	2.13
1988	0.0	50.0	0.0	2.11	1.98	1.87	1.79	2.11
1988	50.0	50.0	50.0	6.78	4.19	2.90	2.24	2.38
1988	20.6	27.3	20.6	3.55	2.64	2.15	1.88	2.11
1990	0.0	0.0	0.0	1.79	1.63	1.51	1.42	1.62
1990	0.0	100.0	0.0	1.85	1.75	1.67	1.60	1.93
1990	100.0	0.0	100.0	10.96	5.79	3.34	2.16	2.13
1990	50.0	0.0	50.0	5.28	3.21	2.20	1.69	1.80
1990	0.0	50.0	0.0	1.80	1.67	1.56	1.48	1.73
1990	50.0	50.0	50.0	6.41	3.77	2.50	1.88	2.03
1990	20.6	27.3	20.6	3.22	2.29	1.82	1.56	1.75
1995	0.0	0.0	0.0	1.35	1.21	1.11	1.03	1.11
1995	0.0	100.0	0.0	1.45	1.33	1.23	1.16	1.32
1995	100.0	0.0	100.0	10.18	4.97	2.65	1.62	1.77
1995	50.0	0.0	50.0	4.73	2.65	1.69	1.25	1.36
1995	0.0	50.0	0.0	1.37	1.25	1.15	1.07	1.18
1995	50.0	50.0	50.0	5.81	3.15	1.94	1.39	1.55
1995	20.6	27.3	20.6	2.74	1.82	1.37	1.14	1.25
2000	0.0	0.0	0.0	1.19	1.07	0.98	0.91	0.93
2000	0.0	100.0	0.0	1.30	1.18	1.09	1.01	1.11
2000	100.0	0.0	100.0	9.65	4.58	2.38	1.42	1.64
2000	50.0	0.0	50.0	4.45	2.42	1.51	1.10	1.20
2000	0.0	50.0	0.0	1.23	1.11	1.02	0.94	0.99
2000	50.0	50.0	50.0	5.48	2.88	1.73	1.22	1.37
2000	20.6	27.3	20.6	2.54	1.64	1.22	1.00	1.07

TABLE 6 : THC AT 55.0 MPH.

TABLE 7

LOW ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE) AT 5.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	209.88	189.00	171.68	157.31	302.54
1980	0.0	100.0	0.0	157.76	160.48	164.14	168.81	313.84
1980	100.0	0.0	100.0	1533.32	910.75	546.95	332.53	224.41
1980	50.0	0.0	50.0	713.77	463.42	313.89	223.14	268.86
1980	0.0	50.0	0.0	187.83	176.32	167.31	160.43	303.21
1980	50.0	50.0	50.0	845.54	535.61	355.54	250.67	269.13
1980	20.6	27.3	20.6	403.58	294.10	227.31	185.82	289.00
1985	0.0	0.0	0.0	147.22	124.34	106.69	92.89	208.19
1985	0.0	100.0	0.0	108.78	104.42	101.64	100.18	193.67
1985	100.0	0.0	100.0	1051.92	618.55	360.14	198.51	142.25
1985	50.0	0.0	50.0	485.02	308.49	200.65	131.42	179.77
1985	0.0	50.0	0.0	130.27	114.89	103.24	94.39	199.16
1985	50.0	50.0	50.0	580.35	361.48	230.89	149.35	167.96
1985	20.6	27.3	20.6	275.83	194.31	143.12	109.38	191.56
1988	0.0	0.0	0.0	116.60	92.21	74.62	61.69	142.55
1988	0.0	100.0	0.0	89.32	80.47	73.96	69.29	130.76
1988	100.0	0.0	100.0	812.72	478.87	275.13	140.36	99.97
1988	50.0	0.0	50.0	375.10	235.54	148.60	90.16	123.82
1988	0.0	50.0	0.0	103.96	86.03	73.03	63.51	135.28
1988	50.0	50.0	50.0	451.02	279.67	174.55	104.83	115.36
1988	20.6	27.3	20.6	215.18	147.30	103.91	74.26	130.86
1990	0.0	0.0	0.0	101.83	76.64	59.17	46.84	106.66
1990	0.0	100.0	0.0	80.50	69.26	60.85	54.60	98.80
1990	100.0	0.0	100.0	684.56	404.50	231.08	111.88	80.63
1990	50.0	0.0	50.0	317.92	198.07	122.58	70.34	94.77
1990	0.0	50.0	0.0	91.53	72.24	58.62	48.87	101.45
1990	50.0	50.0	50.0	382.53	236.88	145.97	83.24	89.72
1990	20.6	27.3	20.6	184.37	123.76	84.71	57.49	98.90
1995	0.0	0.0	0.0	80.95	55.15	38.39	27.40	51.16
1995	0.0	100.0	0.0	68.92	54.42	43.53	35.34	53.66
1995	100.0	0.0	100.0	495.24	296.00	168.47	73.26	54.45
1995	50.0	0.0	50.0	235.16	144.77	86.67	44.10	51.39
1995	0.0	50.0	0.0	74.39	53.56	39.47	29.81	50.98
1995	50.0	50.0	50.0	282.08	175.21	106.00	54.30	54.05
1995	20.6	27.3	20.6	140.27	90.83	58.65	35.50	51.11
2000	0.0	0.0	0.0	73.14	47.86	31.83	21.63	31.90
2000	0.0	100.0	0.0	63.84	48.79	37.54	29.12	38.47
2000	100.0	0.0	100.0	430.17	258.83	147.20	60.51	45.86
2000	50.0	0.0	50.0	206.99	126.90	74.97	35.94	36.53
2000	0.0	50.0	0.0	67.73	47.03	33.26	24.01	33.69
2000	50.0	50.0	50.0	247.00	153.81	92.37	44.82	42.17
2000	20.6	27.3	20.6	124.79	79.64	50.19	28.74	34.73

TABLE 7 : CO AT 5.0 MPH.

TABLE 8

LOW ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE) AT 10.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	112.95	101.24	91.57	83.55	163.50
1980	0.0	100.0	0.0	86.23	86.92	88.12	89.84	166.70
1980	100.0	0.0	100.0	809.12	479.39	287.60	174.90	121.41
1980	50.0	0.0	50.0	376.69	244.32	165.49	117.68	145.33
1980	0.0	50.0	0.0	101.56	94.78	89.40	85.23	162.68
1980	50.0	50.0	50.0	447.67	283.16	187.86	132.37	144.05
1980	20.6	27.3	20.6	214.40	156.11	120.54	98.36	155.56
1985	0.0	0.0	0.0	88.53	73.57	62.24	53.52	122.69
1985	0.0	100.0	0.0	67.45	63.52	60.73	58.86	113.38
1985	100.0	0.0	100.0	638.33	375.87	217.77	116.68	85.47
1985	50.0	0.0	50.0	292.38	185.49	119.56	76.38	106.60
1985	0.0	50.0	0.0	79.06	68.59	60.71	54.75	117.03
1985	50.0	50.0	50.0	352.89	219.70	139.25	87.77	99.42
1985	20.6	27.3	20.6	166.53	116.50	84.77	63.49	112.98
1988	0.0	0.0	0.0	76.35	59.00	46.73	37.88	88.55
1988	0.0	100.0	0.0	60.37	53.17	47.79	43.79	81.58
1988	100.0	0.0	100.0	537.15	317.70	181.87	89.58	64.67
1988	50.0	0.0	50.0	246.63	154.52	96.42	56.50	77.92
1988	0.0	50.0	0.0	68.74	55.64	46.24	39.41	84.14
1988	50.0	50.0	50.0	298.76	185.44	114.83	66.69	73.13
1988	20.6	27.3	20.6	141.66	96.12	66.71	46.28	81.75
1990	0.0	0.0	0.0	70.61	51.94	39.20	30.36	69.05
1990	0.0	100.0	0.0	57.37	48.38	41.61	36.53	64.86
1990	100.0	0.0	100.0	479.09	284.16	161.89	75.84	55.05
1990	50.0	0.0	50.0	221.61	137.74	84.38	46.76	62.46
1990	0.0	50.0	0.0	64.01	49.47	39.29	32.07	66.00
1990	50.0	50.0	50.0	268.23	166.27	101.75	56.18	59.96
1990	20.6	27.3	20.6	128.60	85.58	57.66	37.95	64.65
1995	0.0	0.0	0.0	61.87	41.63	28.56	20.06	36.93
1995	0.0	100.0	0.0	53.05	41.52	32.86	26.36	39.43
1995	100.0	0.0	100.0	382.11	228.64	129.87	55.48	41.13
1995	50.0	0.0	50.0	181.05	111.21	66.18	32.96	37.78
1995	0.0	50.0	0.0	56.97	40.57	29.52	21.99	37.04
1995	50.0	50.0	50.0	217.58	135.08	81.37	40.92	40.28
1995	20.6	27.3	20.6	107.81	69.42	44.41	26.35	37.30
2000	0.0	0.0	0.0	57.60	37.43	24.67	16.58	24.49
2000	0.0	100.0	0.0	50.20	38.19	29.22	22.52	29.66
2000	100.0	0.0	100.0	342.13	205.64	116.66	47.45	35.76
2000	50.0	0.0	50.0	164.28	100.46	59.07	27.94	28.23
2000	0.0	50.0	0.0	53.28	36.77	25.81	18.46	25.89
2000	50.0	50.0	50.0	196.16	121.92	72.94	34.99	32.71
2000	20.6	27.3	20.6	98.77	62.78	39.31	22.22	26.75

TABLE 8 : CO AT 10.0 MPH.

TABLE 9

LOW ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE) AT 19.6 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	61.73	55.09	49.63	45.13	90.23
1980	0.0	100.0	0.0	46.98	47.23	47.73	48.52	90.08
1980	100.0	0.0	100.0	442.77	261.35	156.22	94.63	65.81
1980	50.0	0.0	50.0	206.23	133.19	89.84	63.61	79.63
1980	0.0	50.0	0.0	55.38	51.49	48.40	46.00	88.94
1980	50.0	50.0	50.0	244.88	154.29	101.98	71.57	77.95
1980	20.6	27.3	20.6	117.26	85.00	65.36	53.13	85.16
1985	0.0	0.0	0.0	50.51	41.53	34.80	29.67	69.42
1985	0.0	100.0	0.0	38.57	36.01	34.15	32.86	63.30
1985	100.0	0.0	100.0	369.26	217.37	125.34	65.81	47.99
1985	50.0	0.0	50.0	168.83	106.70	68.20	42.75	60.09
1985	0.0	50.0	0.0	45.08	38.73	33.98	30.40	65.82
1985	50.0	50.0	50.0	203.92	126.69	79.75	49.33	55.64
1985	20.6	27.3	20.6	95.82	66.59	47.97	35.39	63.61
1988	0.0	0.0	0.0	45.34	34.55	26.99	21.60	51.19
1988	0.0	100.0	0.0	36.03	31.38	27.88	25.27	46.87
1988	100.0	0.0	100.0	322.29	190.88	108.91	52.45	37.68
1988	50.0	0.0	50.0	147.86	92.37	57.17	32.73	45.10
1988	0.0	50.0	0.0	40.83	32.63	26.78	22.57	48.47
1988	50.0	50.0	50.0	179.16	111.13	68.39	38.86	42.27
1988	20.6	27.3	20.6	84.70	57.08	39.17	26.65	47.19
1990	0.0	0.0	0.0	43.02	31.22	23.23	17.74	40.53
1990	0.0	100.0	0.0	35.14	29.32	24.93	21.64	38.10
1990	100.0	0.0	100.0	294.40	174.90	99.40	45.62	32.92
1990	50.0	0.0	50.0	136.12	84.40	51.33	27.81	36.85
1990	0.0	50.0	0.0	39.03	29.79	23.37	18.83	38.72
1990	50.0	50.0	50.0	164.77	102.11	62.16	33.63	35.51
1990	20.6	27.3	20.6	78.82	52.13	34.75	22.43	38.01
1995	0.0	0.0	0.0	39.31	26.21	17.79	12.34	22.56
1995	0.0	100.0	0.0	33.74	26.24	20.62	16.40	24.32
1995	100.0	0.0	100.0	244.71	146.49	83.06	35.02	25.81
1995	50.0	0.0	50.0	115.85	71.02	42.05	20.61	23.32
1995	0.0	50.0	0.0	36.19	25.57	18.43	13.59	22.70
1995	50.0	50.0	50.0	139.22	86.36	51.84	25.71	25.06
1995	20.6	27.3	20.6	68.83	44.13	28.03	16.38	22.93
2000	0.0	0.0	0.0	37.18	24.01	15.70	10.44	15.44
2000	0.0	100.0	0.0	32.35	24.51	18.67	14.31	18.82
2000	100.0	0.0	100.0	222.99	133.91	75.81	30.56	22.89
2000	50.0	0.0	50.0	106.87	65.20	38.18	17.85	17.92
2000	0.0	50.0	0.0	34.36	23.59	16.44	11.67	16.36
2000	50.0	50.0	50.0	127.67	79.21	47.24	22.44	20.85
2000	20.6	27.3	20.6	64.07	40.58	25.27	14.12	16.93

TABLE 9 : CO AT 19.6 MPH.

TABLE 10

LOW ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE) AT 35.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	33.49	30.07	27.27	24.96	48.55
1980	0.0	100.0	0.0	25.80	25.96	26.26	26.72	48.93
1980	100.0	0.0	100.0	234.34	139.29	83.90	51.26	35.82
1980	50.0	0.0	50.0	110.17	71.71	48.78	34.85	43.01
1980	0.0	50.0	0.0	30.17	28.19	26.63	25.41	48.06
1980	50.0	50.0	50.0	130.07	82.62	55.08	38.99	42.37
1980	20.6	27.3	20.6	62.99	46.04	35.69	29.24	46.00
1985	0.0	0.0	0.0	25.86	21.39	18.04	15.48	35.29
1985	0.0	100.0	0.0	19.82	18.53	17.59	16.95	32.34
1985	100.0	0.0	100.0	183.61	108.73	63.10	33.39	24.69
1985	50.0	0.0	50.0	84.83	53.98	34.77	22.01	30.64
1985	0.0	50.0	0.0	23.11	19.95	17.59	15.81	33.53
1985	50.0	50.0	50.0	101.71	63.63	40.35	25.17	28.52
1985	20.6	27.3	20.6	48.43	33.90	24.61	18.32	32.41
1988	0.0	0.0	0.0	22.84	17.45	13.68	11.00	25.47
1988	0.0	100.0	0.0	18.19	15.82	14.05	12.73	23.38
1988	100.0	0.0	100.0	158.59	94.39	54.08	26.09	19.01
1988	50.0	0.0	50.0	73.37	46.05	28.63	16.47	22.52
1988	0.0	50.0	0.0	20.58	16.48	13.55	11.45	24.15
1988	50.0	50.0	50.0	88.39	55.10	34.06	19.41	21.20
1988	20.6	27.3	20.6	42.22	28.58	19.71	13.47	23.53
1990	0.0	0.0	0.0	21.61	15.70	11.70	8.96	20.00
1990	0.0	100.0	0.0	17.70	14.73	12.51	10.83	18.87
1990	100.0	0.0	100.0	144.94	86.48	49.31	22.61	16.53
1990	50.0	0.0	50.0	67.49	42.00	25.63	13.92	18.28
1990	0.0	50.0	0.0	19.62	14.98	11.75	9.49	19.13
1990	50.0	50.0	50.0	81.32	50.61	30.91	16.72	17.70
1990	20.6	27.3	20.6	39.24	26.03	17.41	11.26	18.81
1995	0.0	0.0	0.0	19.90	13.27	9.01	6.26	11.18
1995	0.0	100.0	0.0	17.12	13.30	10.43	8.28	12.14
1995	100.0	0.0	100.0	122.36	73.43	41.72	17.56	13.05
1995	50.0	0.0	50.0	58.15	35.72	21.19	10.39	11.65
1995	0.0	50.0	0.0	18.34	12.95	9.34	6.88	11.29
1995	50.0	50.0	50.0	69.74	43.37	26.08	12.92	12.60
1995	20.6	27.3	20.6	34.65	22.25	14.15	8.28	11.42
2000	0.0	0.0	0.0	19.00	12.29	8.06	5.37	7.87
2000	0.0	100.0	0.0	16.55	12.55	9.57	7.34	9.61
2000	100.0	0.0	100.0	113.25	68.07	38.58	15.58	11.72
2000	50.0	0.0	50.0	54.36	33.20	19.48	9.13	9.16
2000	0.0	50.0	0.0	17.57	12.08	8.43	6.00	8.35
2000	50.0	50.0	50.0	64.90	40.31	24.08	11.46	10.67
2000	20.6	27.3	20.6	32.64	20.70	12.92	7.24	8.65

TABLE 10 : CO AT 35.0 MPH.

TABLE 11

LOW ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE) AT 50.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	26.20	23.62	21.49	19.73	37.82
1980	0.0	100.0	0.0	20.41	20.47	20.64	20.94	37.92
1980	100.0	0.0	100.0	173.21	103.66	63.01	39.00	28.10
1980	50.0	0.0	50.0	82.83	54.39	37.39	27.04	33.56
1980	0.0	50.0	0.0	23.69	22.18	20.97	20.04	37.37
1980	50.0	50.0	50.0	96.81	62.06	41.83	29.97	33.01
1980	20.6	27.3	20.6	47.96	35.40	27.70	22.88	35.82
1985	0.0	0.0	0.0	18.33	15.47	13.28	11.58	25.56
1985	0.0	100.0	0.0	14.00	13.24	12.69	12.32	23.29
1985	100.0	0.0	100.0	118.31	70.37	41.44	22.97	17.89
1985	50.0	0.0	50.0	56.16	36.18	23.84	15.78	22.18
1985	0.0	50.0	0.0	16.37	14.38	12.87	11.72	24.25
1985	50.0	50.0	50.0	66.16	41.80	27.07	17.65	20.59
1985	20.6	27.3	20.6	32.71	23.33	17.37	13.36	23.46
1988	0.0	0.0	0.0	14.74	11.60	9.35	7.72	17.35
1988	0.0	100.0	0.0	11.61	10.29	9.30	8.56	15.69
1988	100.0	0.0	100.0	94.31	56.24	32.61	16.53	12.65
1988	50.0	0.0	50.0	44.65	28.33	18.02	10.94	15.22
1988	0.0	50.0	0.0	13.25	10.88	9.17	7.91	16.37
1988	50.0	50.0	50.0	52.96	33.27	20.96	12.55	14.17
1988	20.6	27.3	20.6	26.13	18.04	12.79	9.13	15.93
1990	0.0	0.0	0.0	13.15	9.85	7.58	5.99	13.05
1990	0.0	100.0	0.0	10.67	9.05	7.83	6.91	12.06
1990	100.0	0.0	100.0	82.23	49.18	28.34	13.59	10.40
1990	50.0	0.0	50.0	39.05	24.56	15.31	8.76	11.77
1990	0.0	50.0	0.0	11.92	9.34	7.53	6.23	12.39
1990	50.0	50.0	50.0	46.45	29.12	18.09	10.25	11.23
1990	20.6	27.3	20.6	23.05	15.57	10.70	7.25	12.16
1995	0.0	0.0	0.0	11.08	7.56	5.28	3.79	6.62
1995	0.0	100.0	0.0	9.58	7.53	5.99	4.83	7.06
1995	100.0	0.0	100.0	64.70	39.01	22.36	9.71	7.48
1995	50.0	0.0	50.0	31.15	19.32	11.65	5.96	6.81
1995	0.0	50.0	0.0	10.24	7.38	5.44	4.11	6.64
1995	50.0	50.0	50.0	37.14	23.27	14.18	7.27	7.27
1995	20.6	27.3	20.6	18.81	12.26	7.96	4.85	6.70
2000	0.0	0.0	0.0	10.35	6.83	4.59	3.16	4.51
2000	0.0	100.0	0.0	9.10	6.98	5.39	4.19	5.44
2000	100.0	0.0	100.0	59.20	35.76	20.43	8.48	6.55
2000	50.0	0.0	50.0	28.68	17.68	10.52	5.12	5.19
2000	0.0	50.0	0.0	9.62	6.72	4.79	3.49	4.77
2000	50.0	50.0	50.0	34.15	21.37	12.91	6.34	6.00
2000	20.6	27.3	20.6	17.43	11.19	7.11	4.13	4.93

TABLE 11 : CO AT 50.0 MPH.

TABLE 12

LOW ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE) AT 55.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	24.89	22.51	20.54	18.90	35.68
1980	0.0	100.0	0.0	19.66	19.66	19.77	20.00	35.97
1980	100.0	0.0	100.0	158.52	95.41	58.42	36.50	26.95
1980	50.0	0.0	50.0	76.47	50.59	35.07	25.59	31.85
1980	0.0	50.0	0.0	22.62	21.21	20.07	19.19	35.36
1980	50.0	50.0	50.0	89.09	57.53	39.09	28.25	31.46
1980	20.6	27.3	20.6	44.72	33.27	26.22	21.78	33.93
1985	0.0	0.0	0.0	16.96	14.45	12.51	10.99	23.73
1985	0.0	100.0	0.0	13.11	12.42	11.93	11.59	21.76
1985	100.0	0.0	100.0	103.65	61.97	36.87	20.92	16.91
1985	50.0	0.0	50.0	49.87	32.43	21.67	14.67	20.73
1985	0.0	50.0	0.0	15.23	13.48	12.13	11.10	22.59
1985	50.0	50.0	50.0	58.38	37.20	24.40	16.26	19.34
1985	20.6	27.3	20.6	29.46	21.26	16.04	12.54	21.87
1988	0.0	0.0	0.0	13.19	10.53	8.60	7.18	15.77
1988	0.0	100.0	0.0	10.45	9.33	8.49	7.85	14.30
1988	100.0	0.0	100.0	80.27	48.05	28.11	14.62	11.59
1988	50.0	0.0	50.0	38.47	24.62	15.89	9.91	13.88
1988	0.0	50.0	0.0	11.90	9.89	8.42	7.33	14.91
1988	50.0	50.0	50.0	45.36	28.69	18.30	11.24	12.95
1988	20.6	27.3	20.6	22.81	15.93	11.47	8.37	14.52
1990	0.0	0.0	0.0	11.51	8.75	6.84	5.49	11.70
1990	0.0	100.0	0.0	9.38	8.02	7.00	6.22	10.80
1990	100.0	0.0	100.0	68.75	41.26	23.97	11.79	9.33
1990	50.0	0.0	50.0	33.02	20.94	13.23	7.79	10.56
1990	0.0	50.0	0.0	10.46	8.31	6.78	5.68	11.12
1990	50.0	50.0	50.0	39.06	24.64	15.48	9.00	10.07
1990	20.6	27.3	20.6	19.72	13.48	9.41	6.53	10.92
1995	0.0	0.0	0.0	9.35	6.47	4.60	3.37	5.78
1995	0.0	100.0	0.0	8.13	6.44	5.17	4.21	6.12
1995	100.0	0.0	100.0	52.64	31.85	18.38	8.16	6.44
1995	50.0	0.0	50.0	25.57	15.97	9.74	5.12	5.92
1995	0.0	50.0	0.0	8.67	6.32	4.73	3.63	5.79
1995	50.0	50.0	50.0	30.38	19.15	11.78	6.18	6.28
1995	20.6	27.3	20.6	15.60	10.26	6.76	4.22	5.84
2000	0.0	0.0	0.0	8.64	5.78	3.95	2.78	3.91
2000	0.0	100.0	0.0	7.65	5.91	4.60	3.62	4.67
2000	100.0	0.0	100.0	47.91	29.04	16.70	7.07	5.57
2000	50.0	0.0	50.0	23.38	14.50	8.72	4.36	4.46
2000	0.0	50.0	0.0	8.06	5.70	4.11	3.04	4.12
2000	50.0	50.0	50.0	27.78	17.47	10.65	5.34	5.12
2000	20.6	27.3	20.6	14.34	9.29	5.98	3.56	4.25

TABLE 12 : CO AT 55.0 MPH.

TABLE 13

LOW ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE) AT 5.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	5.89	5.45	5.07	4.75	4.15
1980	0.0	100.0	0.0	7.20	6.65	6.18	5.77	4.79
1980	100.0	0.0	100.0	6.40	6.15	5.95	5.79	5.02
1980	50.0	0.0	50.0	6.19	5.85	5.56	5.33	4.64
1980	0.0	50.0	0.0	6.63	6.13	5.70	5.33	4.51
1980	50.0	50.0	50.0	6.80	6.40	6.06	5.78	4.90
1980	20.6	27.3	20.6	6.42	5.99	5.62	5.31	4.55
1985	0.0	0.0	0.0	4.66	4.30	3.98	3.71	3.07
1985	0.0	100.0	0.0	5.91	5.40	4.97	4.60	3.60
1985	100.0	0.0	100.0	5.90	5.45	5.08	4.77	3.63
1985	50.0	0.0	50.0	5.28	4.87	4.53	4.25	3.36
1985	0.0	50.0	0.0	5.30	4.87	4.49	4.17	3.35
1985	50.0	50.0	50.0	5.90	5.43	5.02	4.68	3.61
1985	20.6	27.3	20.6	5.27	4.85	4.49	4.18	3.34
1988	0.0	0.0	0.0	4.14	3.78	3.48	3.22	2.51
1988	0.0	100.0	0.0	5.43	4.88	4.42	4.03	2.99
1988	100.0	0.0	100.0	5.54	5.04	4.61	4.26	2.98
1988	50.0	0.0	50.0	4.82	4.39	4.03	3.73	2.74
1988	0.0	50.0	0.0	4.78	4.33	3.95	3.63	2.75
1988	50.0	50.0	50.0	5.49	4.96	4.52	4.15	2.99
1988	20.6	27.3	20.6	4.77	4.33	3.96	3.65	2.74
1990	0.0	0.0	0.0	3.84	3.48	3.18	2.93	2.17
1990	0.0	100.0	0.0	5.18	4.59	4.10	3.69	2.63
1990	100.0	0.0	100.0	5.23	4.73	4.30	3.94	2.61
1990	50.0	0.0	50.0	4.50	4.08	3.72	3.41	2.38
1990	0.0	50.0	0.0	4.48	4.02	3.63	3.30	2.39
1990	50.0	50.0	50.0	5.21	4.66	4.20	3.82	2.62
1990	20.6	27.3	20.6	4.46	4.02	3.65	3.33	2.38
1995	0.0	0.0	0.0	3.48	3.14	2.86	2.61	1.78
1995	0.0	100.0	0.0	4.93	4.27	3.73	3.28	2.21
1995	100.0	0.0	100.0	4.78	4.31	3.91	3.56	2.20
1995	50.0	0.0	50.0	4.09	3.69	3.35	3.05	1.98
1995	0.0	50.0	0.0	4.16	3.67	3.26	2.92	1.98
1995	50.0	50.0	50.0	4.86	4.29	3.82	3.42	2.20
1995	20.6	27.3	20.6	4.10	3.65	3.28	2.96	1.97
2000	0.0	0.0	0.0	3.33	3.01	2.73	2.49	1.65
2000	0.0	100.0	0.0	4.81	4.12	3.57	3.12	2.06
2000	100.0	0.0	100.0	4.54	4.11	3.73	3.41	2.07
2000	50.0	0.0	50.0	3.89	3.51	3.19	2.91	1.84
2000	0.0	50.0	0.0	4.01	3.52	3.11	2.78	1.84
2000	50.0	50.0	50.0	4.67	4.12	3.65	3.26	2.06
2000	20.6	27.3	20.6	3.93	3.50	3.13	2.82	1.83

TABLE 13 : NOx AT 5.0 MPH.

TABLE 14

LOW ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE) AT 10.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	5.34	4.93	4.58	4.28	3.69
1980	0.0	100.0	0.0	6.60	6.09	5.65	5.26	4.31
1980	100.0	0.0	100.0	5.83	5.60	5.41	5.27	4.51
1980	50.0	0.0	50.0	5.63	5.31	5.05	4.84	4.16
1980	0.0	50.0	0.0	6.05	5.58	5.18	4.83	4.04
1980	50.0	50.0	50.0	6.21	5.84	5.53	5.27	4.41
1980	20.6	27.3	20.6	5.85	5.45	5.10	4.81	4.08
1985	0.0	0.0	0.0	4.21	3.86	3.57	3.32	2.71
1985	0.0	100.0	0.0	5.37	4.90	4.50	4.16	3.21
1985	100.0	0.0	100.0	5.34	4.93	4.59	4.30	3.23
1985	50.0	0.0	50.0	4.77	4.40	4.08	3.82	2.99
1985	0.0	50.0	0.0	4.81	4.40	4.05	3.76	2.98
1985	50.0	50.0	50.0	5.36	4.92	4.54	4.23	3.22
1985	20.6	27.3	20.6	4.77	4.38	4.05	3.77	2.97
1988	0.0	0.0	0.0	3.72	3.39	3.11	2.87	2.20
1988	0.0	100.0	0.0	4.91	4.41	3.99	3.63	2.66
1988	100.0	0.0	100.0	5.00	4.54	4.15	3.82	2.64
1988	50.0	0.0	50.0	4.34	3.95	3.62	3.34	2.42
1988	0.0	50.0	0.0	4.31	3.90	3.55	3.25	2.43
1988	50.0	50.0	50.0	4.95	4.47	4.07	3.73	2.65
1988	20.6	27.3	20.6	4.30	3.90	3.56	3.27	2.42
1990	0.0	0.0	0.0	3.44	3.12	2.84	2.60	1.90
1990	0.0	100.0	0.0	4.67	4.13	3.68	3.31	2.32
1990	100.0	0.0	100.0	4.71	4.25	3.86	3.53	2.31
1990	50.0	0.0	50.0	4.04	3.66	3.33	3.05	2.10
1990	0.0	50.0	0.0	4.03	3.61	3.25	2.95	2.11
1990	50.0	50.0	50.0	4.69	4.19	3.77	3.42	2.32
1990	20.6	27.3	20.6	4.01	3.61	3.26	2.98	2.09
1995	0.0	0.0	0.0	3.10	2.80	2.53	2.31	1.55
1995	0.0	100.0	0.0	4.41	3.81	3.32	2.92	1.93
1995	100.0	0.0	100.0	4.27	3.85	3.48	3.17	1.93
1995	50.0	0.0	50.0	3.65	3.29	2.98	2.71	1.72
1995	0.0	50.0	0.0	3.71	3.27	2.90	2.59	1.73
1995	50.0	50.0	50.0	4.34	3.83	3.40	3.04	1.93
1995	20.6	27.3	20.6	3.66	3.26	2.92	2.63	1.72
2000	0.0	0.0	0.0	2.96	2.67	2.41	2.20	1.43
2000	0.0	100.0	0.0	4.29	3.67	3.17	2.76	1.79
2000	100.0	0.0	100.0	4.05	3.66	3.32	3.02	1.80
2000	50.0	0.0	50.0	3.46	3.12	2.83	2.58	1.60
2000	0.0	50.0	0.0	3.57	3.13	2.76	2.46	1.60
2000	50.0	50.0	50.0	4.17	3.67	3.24	2.89	1.80
2000	20.6	27.3	20.6	3.50	3.11	2.78	2.50	1.59

TABLE 14 : NOx AT 10.0 MPH.

TABLE 15

LOW ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE) AT 19.6 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	5.10	4.68	4.32	4.01	3.39
1980	0.0	100.0	0.0	6.42	5.89	5.44	5.05	4.04
1980	100.0	0.0	100.0	5.55	5.34	5.17	5.05	4.24
1980	50.0	0.0	50.0	5.38	5.07	4.81	4.60	3.88
1980	0.0	50.0	0.0	5.85	5.37	4.96	4.60	3.76
1980	50.0	50.0	50.0	5.98	5.62	5.31	5.05	4.14
1980	20.6	27.3	20.6	5.63	5.22	4.87	4.57	3.80
1985	0.0	0.0	0.0	3.84	3.51	3.23	2.99	2.40
1985	0.0	100.0	0.0	4.96	4.52	4.14	3.81	2.90
1985	100.0	0.0	100.0	4.86	4.49	4.18	3.93	2.91
1985	50.0	0.0	50.0	4.35	4.01	3.72	3.48	2.68
1985	0.0	50.0	0.0	4.43	4.04	3.71	3.42	2.67
1985	50.0	50.0	50.0	4.91	4.50	4.16	3.87	2.90
1985	20.6	27.3	20.6	4.37	4.00	3.69	3.43	2.66
1988	0.0	0.0	0.0	3.32	3.01	2.75	2.53	1.91
1988	0.0	100.0	0.0	4.41	3.95	3.57	3.24	2.33
1988	100.0	0.0	100.0	4.45	4.04	3.69	3.40	2.32
1988	50.0	0.0	50.0	3.87	3.52	3.22	2.97	2.12
1988	0.0	50.0	0.0	3.86	3.48	3.16	2.89	2.13
1988	50.0	50.0	50.0	4.43	4.00	3.63	3.32	2.33
1988	20.6	27.3	20.6	3.84	3.48	3.17	2.91	2.11
1990	0.0	0.0	0.0	3.03	2.74	2.49	2.27	1.63
1990	0.0	100.0	0.0	4.12	3.65	3.25	2.92	2.01
1990	100.0	0.0	100.0	4.14	3.73	3.39	3.10	1.99
1990	50.0	0.0	50.0	3.56	3.22	2.92	2.67	1.81
1990	0.0	50.0	0.0	3.56	3.18	2.86	2.59	1.82
1990	50.0	50.0	50.0	4.13	3.69	3.32	3.01	2.00
1990	20.6	27.3	20.6	3.54	3.18	2.87	2.61	1.81
1995	0.0	0.0	0.0	2.67	2.40	2.17	1.97	1.29
1995	0.0	100.0	0.0	3.79	3.27	2.85	2.50	1.62
1995	100.0	0.0	100.0	3.67	3.31	2.99	2.71	1.61
1995	50.0	0.0	50.0	3.14	2.82	2.55	2.32	1.44
1995	0.0	50.0	0.0	3.19	2.81	2.49	2.22	1.45
1995	50.0	50.0	50.0	3.73	3.29	2.92	2.61	1.62
1995	20.6	27.3	20.6	3.15	2.79	2.50	2.25	1.44
2000	0.0	0.0	0.0	2.52	2.27	2.05	1.86	1.18
2000	0.0	100.0	0.0	3.66	3.13	2.70	2.34	1.49
2000	100.0	0.0	100.0	3.45	3.12	2.82	2.57	1.50
2000	50.0	0.0	50.0	2.95	2.66	2.41	2.19	1.32
2000	0.0	50.0	0.0	3.05	2.66	2.35	2.08	1.32
2000	50.0	50.0	50.0	3.56	3.12	2.76	2.45	1.49
2000	20.6	27.3	20.6	2.98	2.64	2.36	2.12	1.32

TABLE 15 : NOx AT 19.6 MPH.

TABLE 16

LOW ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE) AT 35.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	5.47	4.99	4.58	4.22	3.51
1980	0.0	100.0	0.0	6.95	6.36	5.84	5.40	4.25
1980	100.0	0.0	100.0	5.91	5.69	5.52	5.39	4.50
1980	50.0	0.0	50.0	5.75	5.41	5.12	4.89	4.08
1980	0.0	50.0	0.0	6.32	5.77	5.30	4.90	3.94
1980	50.0	50.0	50.0	6.43	6.02	5.68	5.39	4.37
1980	20.6	27.3	20.6	6.05	5.59	5.20	4.87	3.98
1985	0.0	0.0	0.0	3.89	3.55	3.25	3.00	2.38
1985	0.0	100.0	0.0	5.05	4.60	4.21	3.87	2.91
1985	100.0	0.0	100.0	4.87	4.50	4.21	3.96	2.93
1985	50.0	0.0	50.0	4.39	4.04	3.75	3.51	2.69
1985	0.0	50.0	0.0	4.51	4.11	3.76	3.47	2.67
1985	50.0	50.0	50.0	4.96	4.55	4.21	3.92	2.92
1985	20.6	27.3	20.6	4.43	4.06	3.74	3.47	2.67
1988	0.0	0.0	0.0	3.25	2.95	2.69	2.47	1.84
1988	0.0	100.0	0.0	4.32	3.88	3.51	3.19	2.28
1988	100.0	0.0	100.0	4.32	3.93	3.60	3.32	2.26
1988	50.0	0.0	50.0	3.78	3.44	3.15	2.90	2.06
1988	0.0	50.0	0.0	3.79	3.42	3.11	2.84	2.07
1988	50.0	50.0	50.0	4.32	3.90	3.55	3.26	2.27
1988	20.6	27.3	20.6	3.76	3.41	3.11	2.85	2.06
1990	0.0	0.0	0.0	2.91	2.63	2.39	2.18	1.55
1990	0.0	100.0	0.0	3.95	3.50	3.12	2.81	1.93
1990	100.0	0.0	100.0	3.94	3.56	3.24	2.96	1.90
1990	50.0	0.0	50.0	3.41	3.08	2.80	2.56	1.72
1990	0.0	50.0	0.0	3.42	3.06	2.75	2.49	1.74
1990	50.0	50.0	50.0	3.95	3.53	3.18	2.89	1.91
1990	20.6	27.3	20.6	3.39	3.05	2.76	2.51	1.72
1995	0.0	0.0	0.0	2.46	2.22	2.00	1.82	1.18
1995	0.0	100.0	0.0	3.48	3.01	2.63	2.31	1.49
1995	100.0	0.0	100.0	3.37	3.04	2.74	2.49	1.47
1995	50.0	0.0	50.0	2.89	2.60	2.35	2.14	1.32
1995	0.0	50.0	0.0	2.94	2.59	2.30	2.05	1.32
1995	50.0	50.0	50.0	3.43	3.02	2.68	2.40	1.48
1995	20.6	27.3	20.6	2.90	2.58	2.31	2.08	1.32
2000	0.0	0.0	0.0	2.30	2.07	1.87	1.70	1.06
2000	0.0	100.0	0.0	3.31	2.83	2.45	2.13	1.34
2000	100.0	0.0	100.0	3.13	2.82	2.56	2.33	1.35
2000	50.0	0.0	50.0	2.68	2.42	2.19	1.99	1.19
2000	0.0	50.0	0.0	2.77	2.42	2.14	1.90	1.19
2000	50.0	50.0	50.0	3.22	2.83	2.50	2.23	1.34
2000	20.6	27.3	20.6	2.71	2.40	2.14	1.93	1.19

TABLE 16 : NOx AT 35.0 MPH.

TABLE 17

LOW ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE) AT 50.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	6.18	5.65	5.19	4.80	4.01
1980	0.0	100.0	0.0	7.81	7.16	6.59	6.10	4.83
1980	100.0	0.0	100.0	6.69	6.44	6.24	6.10	5.10
1980	50.0	0.0	50.0	6.50	6.12	5.80	5.54	4.63
1980	0.0	50.0	0.0	7.12	6.52	5.99	5.55	4.48
1980	50.0	50.0	50.0	7.25	6.80	6.42	6.10	4.96
1980	20.6	27.3	20.6	6.83	6.32	5.89	5.52	4.53
1985	0.0	0.0	0.0	4.43	4.05	3.72	3.44	2.75
1985	0.0	100.0	0.0	5.71	5.21	4.78	4.41	3.34
1985	100.0	0.0	100.0	5.53	5.12	4.78	4.51	3.36
1985	50.0	0.0	50.0	5.00	4.60	4.28	4.00	3.08
1985	0.0	50.0	0.0	5.11	4.67	4.29	3.96	3.07
1985	50.0	50.0	50.0	5.62	5.16	4.78	4.46	3.35
1985	20.6	27.3	20.6	5.04	4.62	4.26	3.96	3.06
1988	0.0	0.0	0.0	3.70	3.36	3.07	2.82	2.13
1988	0.0	100.0	0.0	4.87	4.38	3.98	3.63	2.61
1988	100.0	0.0	100.0	4.88	4.44	4.07	3.77	2.58
1988	50.0	0.0	50.0	4.28	3.90	3.57	3.30	2.37
1988	0.0	50.0	0.0	4.29	3.88	3.53	3.24	2.38
1988	50.0	50.0	50.0	4.87	4.41	4.02	3.70	2.60
1988	20.6	27.3	20.6	4.26	3.87	3.53	3.25	2.37
1990	0.0	0.0	0.0	3.28	2.97	2.70	2.48	1.78
1990	0.0	100.0	0.0	4.41	3.92	3.51	3.17	2.20
1990	100.0	0.0	100.0	4.41	3.99	3.63	3.33	2.17
1990	50.0	0.0	50.0	3.83	3.47	3.16	2.90	1.98
1990	0.0	50.0	0.0	3.83	3.44	3.11	2.82	2.00
1990	50.0	50.0	50.0	4.41	3.96	3.57	3.25	2.19
1990	20.6	27.3	20.6	3.81	3.43	3.11	2.84	1.98
1995	0.0	0.0	0.0	2.73	2.46	2.23	2.04	1.35
1995	0.0	100.0	0.0	3.80	3.30	2.90	2.56	1.68
1995	100.0	0.0	100.0	3.69	3.33	3.02	2.75	1.66
1995	50.0	0.0	50.0	3.18	2.87	2.60	2.37	1.50
1995	0.0	50.0	0.0	3.23	2.86	2.55	2.28	1.51
1995	50.0	50.0	50.0	3.75	3.32	2.96	2.65	1.67
1995	20.6	27.3	20.6	3.19	2.84	2.55	2.31	1.50
2000	0.0	0.0	0.0	2.51	2.27	2.06	1.89	1.21
2000	0.0	100.0	0.0	3.57	3.07	2.67	2.34	1.50
2000	100.0	0.0	100.0	3.38	3.06	2.78	2.54	1.51
2000	50.0	0.0	50.0	2.91	2.64	2.40	2.19	1.35
2000	0.0	50.0	0.0	3.00	2.64	2.34	2.09	1.35
2000	50.0	50.0	50.0	3.47	3.07	2.72	2.44	1.50
2000	20.6	27.3	20.6	2.94	2.62	2.35	2.12	1.34

TABLE 17 : NOx AT 50.0 MPH.

TABLE 18

LOW ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE) AT 55.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	6.72	6.15	5.66	5.25	4.39
1980	0.0	100.0	0.0	8.46	7.76	7.16	6.63	5.27
1980	100.0	0.0	100.0	7.27	7.00	6.79	6.63	5.56
1980	50.0	0.0	50.0	7.07	6.66	6.32	6.04	5.07
1980	0.0	50.0	0.0	7.72	7.08	6.52	6.04	4.91
1980	50.0	50.0	50.0	7.87	7.38	6.97	6.63	5.42
1980	20.6	27.3	20.6	7.42	6.87	6.40	6.01	4.95
1985	0.0	0.0	0.0	4.84	4.42	4.07	3.77	3.03
1985	0.0	100.0	0.0	6.21	5.67	5.21	4.81	3.67
1985	100.0	0.0	100.0	6.02	5.58	5.21	4.92	3.68
1985	50.0	0.0	50.0	5.44	5.02	4.67	4.37	3.39
1985	0.0	50.0	0.0	5.57	5.09	4.68	4.33	3.38
1985	50.0	50.0	50.0	6.11	5.62	5.21	4.86	3.67
1985	20.6	27.3	20.6	5.49	5.04	4.65	4.32	3.37
1988	0.0	0.0	0.0	4.03	3.67	3.36	3.09	2.36
1988	0.0	100.0	0.0	5.28	4.77	4.33	3.96	2.87
1988	100.0	0.0	100.0	5.30	4.83	4.43	4.10	2.84
1988	50.0	0.0	50.0	4.66	4.25	3.90	3.60	2.61
1988	0.0	50.0	0.0	4.66	4.23	3.86	3.54	2.63
1988	50.0	50.0	50.0	5.29	4.80	4.38	4.03	2.86
1988	20.6	27.3	20.6	4.63	4.21	3.85	3.55	2.61
1990	0.0	0.0	0.0	3.57	3.23	2.95	2.70	1.97
1990	0.0	100.0	0.0	4.77	4.25	3.82	3.45	2.42
1990	100.0	0.0	100.0	4.78	4.32	3.94	3.62	2.38
1990	50.0	0.0	50.0	4.15	3.76	3.43	3.15	2.18
1990	0.0	50.0	0.0	4.16	3.74	3.38	3.08	2.20
1990	50.0	50.0	50.0	4.77	4.29	3.88	3.53	2.40
1990	20.6	27.3	20.6	4.13	3.73	3.38	3.09	2.18
1995	0.0	0.0	0.0	2.94	2.66	2.42	2.21	1.49
1995	0.0	100.0	0.0	4.07	3.55	3.12	2.77	1.84
1995	100.0	0.0	100.0	3.97	3.58	3.25	2.96	1.82
1995	50.0	0.0	50.0	3.42	3.09	2.81	2.57	1.65
1995	0.0	50.0	0.0	3.47	3.08	2.75	2.47	1.65
1995	50.0	50.0	50.0	4.02	3.57	3.19	2.86	1.83
1995	20.6	27.3	20.6	3.43	3.06	2.76	2.50	1.64
2000	0.0	0.0	0.0	2.70	2.44	2.23	2.04	1.33
2000	0.0	100.0	0.0	3.81	3.28	2.86	2.51	1.64
2000	100.0	0.0	100.0	3.61	3.27	2.98	2.72	1.64
2000	50.0	0.0	50.0	3.12	2.83	2.57	2.36	1.48
2000	0.0	50.0	0.0	3.21	2.83	2.52	2.26	1.48
2000	50.0	50.0	50.0	3.71	3.28	2.92	2.62	1.64
2000	20.6	27.3	20.6	3.15	2.81	2.53	2.29	1.47

TABLE 18 : NOx AT 55.0 MPH.

TABLE 19

HIGH ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE) AT 5.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	23.35	21.36	19.69	18.29	22.06
1980	0.0	100.0	0.0	21.98	21.62	21.36	21.18	27.66
1980	100.0	0.0	100.0	142.53	83.88	50.48	31.41	25.10
1980	50.0	0.0	50.0	72.28	46.98	32.25	23.57	23.19
1980	0.0	50.0	0.0	22.64	21.33	20.26	19.37	24.20
1980	50.0	50.0	50.0	82.25	52.75	35.92	26.29	26.38
1980	20.6	27.3	20.6	42.98	31.83	25.14	21.04	23.68
1985	0.0	0.0	0.0	16.58	14.56	12.93	11.61	15.51
1985	0.0	100.0	0.0	15.74	15.01	14.42	13.93	19.66
1985	100.0	0.0	100.0	122.97	66.33	37.10	21.78	18.85
1985	50.0	0.0	50.0	58.73	35.05	22.45	15.55	16.67
1985	0.0	50.0	0.0	16.04	14.57	13.38	12.42	16.98
1985	50.0	50.0	50.0	69.36	40.67	25.76	17.86	19.25
1985	20.6	27.3	20.6	33.52	22.94	17.07	13.66	16.78
1988	0.0	0.0	0.0	13.31	11.36	9.80	8.56	12.80
1988	0.0	100.0	0.0	13.16	12.11	11.25	10.54	16.43
1988	100.0	0.0	100.0	119.67	60.27	31.56	17.44	17.13
1988	50.0	0.0	50.0	54.91	30.46	18.26	11.96	14.34
1988	0.0	50.0	0.0	13.05	11.50	10.25	9.24	14.07
1988	50.0	50.0	50.0	66.42	36.19	21.41	13.99	16.78
1988	20.6	27.3	20.6	30.17	19.24	13.50	10.32	14.11
1990	0.0	0.0	0.0	11.57	9.73	8.27	7.12	9.43
1990	0.0	100.0	0.0	11.83	10.65	9.67	8.87	12.39
1990	100.0	0.0	100.0	118.35	57.26	28.77	15.27	15.47
1990	50.0	0.0	50.0	53.12	28.19	16.19	10.22	11.65
1990	0.0	50.0	0.0	11.49	9.94	8.71	7.71	10.45
1990	50.0	50.0	50.0	65.09	33.96	19.22	12.07	13.93
1990	20.6	27.3	20.6	28.50	17.39	11.74	8.70	10.88
1995	0.0	0.0	0.0	8.80	7.24	6.01	5.06	5.93
1995	0.0	100.0	0.0	9.72	8.38	7.28	6.38	8.16
1995	100.0	0.0	100.0	112.49	50.98	23.82	11.73	13.80
1995	50.0	0.0	50.0	48.98	24.14	12.85	7.58	8.90
1995	0.0	50.0	0.0	9.01	7.57	6.42	5.50	6.71
1995	50.0	50.0	50.0	61.11	29.68	15.55	9.05	10.98
1995	20.6	27.3	20.6	25.33	14.32	9.02	6.33	7.57
2000	0.0	0.0	0.0	7.62	6.23	5.15	4.30	4.54
2000	0.0	100.0	0.0	8.76	7.41	6.32	5.42	6.47
2000	100.0	0.0	100.0	106.29	46.96	21.30	10.17	12.87
2000	50.0	0.0	50.0	45.84	21.97	11.35	6.52	7.71
2000	0.0	50.0	0.0	7.94	6.59	5.53	4.68	5.22
2000	50.0	50.0	50.0	57.52	27.19	13.81	7.79	9.67
2000	20.6	27.3	20.6	23.41	12.85	7.89	5.41	6.20

TABLE 19 : THC AT 5.0 MPH.

TABLE 20

HIGH ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE) AT 10.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	14.94	13.83	12.91	12.12	14.17
1980	0.0	100.0	0.0	14.20	13.98	13.81	13.69	17.23
1980	100.0	0.0	100.0	79.99	47.96	29.71	19.27	15.86
1980	50.0	0.0	50.0	41.67	27.83	19.77	15.00	14.80
1980	0.0	50.0	0.0	14.55	13.82	13.21	12.71	15.34
1980	50.0	50.0	50.0	47.09	30.97	21.76	16.48	16.55
1980	20.6	27.3	20.6	25.67	19.55	15.88	13.62	15.06
1985	0.0	0.0	0.0	10.40	9.30	8.41	7.69	9.80
1985	0.0	100.0	0.0	9.95	9.54	9.21	8.94	12.05
1985	100.0	0.0	100.0	67.84	37.27	21.48	13.19	11.62
1985	50.0	0.0	50.0	33.18	20.38	13.56	9.82	10.44
1985	0.0	50.0	0.0	10.11	9.31	8.66	8.13	10.61
1985	50.0	50.0	50.0	38.89	23.41	15.35	11.07	11.84
1985	20.6	27.3	20.6	19.55	13.83	10.65	8.80	10.50
1988	0.0	0.0	0.0	8.19	7.12	6.28	5.60	8.03
1988	0.0	100.0	0.0	8.10	7.53	7.05	6.66	9.98
1988	100.0	0.0	100.0	65.33	33.43	17.99	10.38	10.36
1988	50.0	0.0	50.0	30.55	17.40	10.83	7.43	8.86
1988	0.0	50.0	0.0	8.05	7.20	6.51	5.96	8.71
1988	50.0	50.0	50.0	36.72	20.48	12.52	8.52	10.17
1988	20.6	27.3	20.6	17.25	11.36	8.26	6.54	8.73
1990	0.0	0.0	0.0	7.05	6.05	5.25	4.62	5.87
1990	0.0	100.0	0.0	7.19	6.54	6.01	5.57	7.47
1990	100.0	0.0	100.0	64.32	31.56	16.27	9.01	9.12
1990	50.0	0.0	50.0	29.34	15.96	9.51	6.29	7.07
1990	0.0	50.0	0.0	7.01	6.16	5.49	4.94	6.43
1990	50.0	50.0	50.0	35.76	19.05	11.14	7.29	8.30
1990	20.6	27.3	20.6	16.14	10.16	7.12	5.48	6.66
1995	0.0	0.0	0.0	5.31	4.46	3.79	3.27	3.75
1995	0.0	100.0	0.0	5.81	5.07	4.47	3.98	4.95
1995	100.0	0.0	100.0	60.81	27.88	13.34	6.85	7.97
1995	50.0	0.0	50.0	26.82	13.51	7.46	4.63	5.34
1995	0.0	50.0	0.0	5.43	4.64	4.01	3.50	4.17
1995	50.0	50.0	50.0	33.31	16.48	8.90	5.42	6.46
1995	20.6	27.3	20.6	14.16	8.25	5.40	3.95	4.62
2000	0.0	0.0	0.0	4.60	3.84	3.25	2.79	2.92
2000	0.0	100.0	0.0	5.22	4.48	3.88	3.39	3.96
2000	100.0	0.0	100.0	57.40	25.65	11.91	5.94	7.40
2000	50.0	0.0	50.0	25.06	12.27	6.58	3.98	4.63
2000	0.0	50.0	0.0	4.78	4.04	3.45	2.99	3.29
2000	50.0	50.0	50.0	31.31	15.07	7.90	4.67	5.68
2000	20.6	27.3	20.6	13.05	7.39	4.72	3.39	3.82

TABLE 20 : THC AT 10.0 MPH.

TABLE 21

HIGH ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE) AT 19.6 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	10.38	9.74	9.21	8.76	9.95
1980	0.0	100.0	0.0	9.94	9.83	9.75	9.70	11.81
1980	100.0	0.0	100.0	49.78	30.41	19.38	13.08	11.00
1980	50.0	0.0	50.0	26.60	18.24	13.37	10.50	10.35
1980	0.0	50.0	0.0	10.15	9.74	9.39	9.12	10.67
1980	50.0	50.0	50.0	29.86	20.12	14.57	11.39	11.41
1980	20.6	27.3	20.6	16.89	13.21	11.01	9.66	10.50
1985	0.0	0.0	0.0	7.10	6.46	5.94	5.52	6.75
1985	0.0	100.0	0.0	6.82	6.60	6.42	6.27	8.10
1985	100.0	0.0	100.0	41.26	23.12	13.73	8.80	7.84
1985	50.0	0.0	50.0	20.66	13.07	9.02	6.80	7.14
1985	0.0	50.0	0.0	6.92	6.46	6.09	5.79	7.23
1985	50.0	50.0	50.0	24.04	14.86	10.07	7.53	7.97
1985	20.6	27.3	20.6	12.55	9.16	7.28	6.19	7.17
1988	0.0	0.0	0.0	5.45	4.83	4.35	3.95	5.46
1988	0.0	100.0	0.0	5.40	5.07	4.80	4.58	6.63
1988	100.0	0.0	100.0	39.17	20.37	11.27	6.78	6.85
1988	50.0	0.0	50.0	18.65	10.91	7.04	5.04	5.96
1988	0.0	50.0	0.0	5.37	4.88	4.49	4.17	5.87
1988	50.0	50.0	50.0	22.29	12.72	8.04	5.68	6.74
1988	20.6	27.3	20.6	10.80	7.34	5.52	4.51	5.88
1990	0.0	0.0	0.0	4.64	4.06	3.60	3.23	3.96
1990	0.0	100.0	0.0	4.72	4.35	4.04	3.79	4.90
1990	100.0	0.0	100.0	38.32	19.08	10.09	5.82	5.87
1990	50.0	0.0	50.0	17.76	9.90	6.11	4.22	4.66
1990	0.0	50.0	0.0	4.61	4.12	3.74	3.42	4.29
1990	50.0	50.0	50.0	21.52	11.71	7.07	4.81	5.39
1990	20.6	27.3	20.6	9.98	6.48	4.70	3.74	4.42
1995	0.0	0.0	0.0	3.42	2.93	2.55	2.25	2.52
1995	0.0	100.0	0.0	3.72	3.29	2.95	2.66	3.23
1995	100.0	0.0	100.0	35.96	16.67	8.15	4.35	5.00
1995	50.0	0.0	50.0	16.03	8.24	4.70	3.04	3.46
1995	0.0	50.0	0.0	3.49	3.04	2.67	2.39	2.77
1995	50.0	50.0	50.0	19.84	9.98	5.55	3.51	4.11
1995	20.6	27.3	20.6	8.61	5.16	3.50	2.65	3.04
2000	0.0	0.0	0.0	2.95	2.52	2.18	1.91	1.98
2000	0.0	100.0	0.0	3.31	2.89	2.55	2.26	2.59
2000	100.0	0.0	100.0	33.89	15.30	7.26	3.76	4.61
2000	50.0	0.0	50.0	14.94	7.46	4.13	2.61	2.98
2000	0.0	50.0	0.0	3.05	2.63	2.30	2.03	2.20
2000	50.0	50.0	50.0	18.60	9.10	4.90	3.01	3.60
2000	20.6	27.3	20.6	7.90	4.60	3.04	2.26	2.51

TABLE 21 : THC AT 19.6 MPH.

TABLE 22

HIGH ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE) AT 35.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	7.82	7.47	7.17	6.91	7.57
1980	0.0	100.0	0.0	7.56	7.53	7.51	7.50	8.76
1980	100.0	0.0	100.0	33.20	20.78	13.70	9.65	8.31
1980	50.0	0.0	50.0	18.35	12.98	9.86	8.03	7.86
1980	0.0	50.0	0.0	7.69	7.47	7.29	7.14	8.04
1980	50.0	50.0	50.0	20.38	14.16	10.60	8.58	8.54
1980	20.6	27.3	20.6	12.06	9.72	8.33	7.49	7.94
1985	0.0	0.0	0.0	5.08	4.74	4.46	4.23	4.89
1985	0.0	100.0	0.0	4.92	4.81	4.73	4.66	5.69
1985	100.0	0.0	100.0	25.04	14.53	9.05	6.15	5.55
1985	50.0	0.0	50.0	13.06	8.65	6.28	4.98	5.13
1985	0.0	50.0	0.0	4.98	4.74	4.54	4.38	5.18
1985	50.0	50.0	50.0	14.98	9.67	6.89	5.40	5.62
1985	20.6	27.3	20.6	8.29	6.34	5.25	4.62	5.15
1988	0.0	0.0	0.0	3.73	3.41	3.14	2.93	3.87
1988	0.0	100.0	0.0	3.70	3.53	3.40	3.28	4.54
1988	100.0	0.0	100.0	22.65	12.17	7.06	4.53	4.66
1988	50.0	0.0	50.0	11.17	6.85	4.68	3.55	4.16
1988	0.0	50.0	0.0	3.69	3.43	3.22	3.05	4.11
1988	50.0	50.0	50.0	13.17	7.85	5.23	3.91	4.60
1988	20.6	27.3	20.6	6.75	4.82	3.81	3.25	4.12
1990	0.0	0.0	0.0	3.10	2.79	2.55	2.36	2.74
1990	0.0	100.0	0.0	3.14	2.95	2.79	2.66	3.27
1990	100.0	0.0	100.0	21.67	11.11	6.15	3.79	3.80
1990	50.0	0.0	50.0	10.35	6.03	3.95	2.90	3.13
1990	0.0	50.0	0.0	3.09	2.83	2.62	2.46	2.93
1990	50.0	50.0	50.0	12.41	7.03	4.47	3.23	3.53
1990	20.6	27.3	20.6	6.06	4.14	3.16	2.64	3.00
1995	0.0	0.0	0.0	2.21	1.95	1.74	1.58	1.73
1995	0.0	100.0	0.0	2.37	2.14	1.96	1.81	2.11
1995	100.0	0.0	100.0	19.85	9.41	4.79	2.73	3.07
1995	50.0	0.0	50.0	9.05	4.83	2.92	2.02	2.24
1995	0.0	50.0	0.0	2.25	2.00	1.81	1.66	1.86
1995	50.0	50.0	50.0	11.11	5.78	3.38	2.27	2.59
1995	20.6	27.3	20.6	5.02	3.16	2.26	1.80	2.01
2000	0.0	0.0	0.0	1.89	1.66	1.48	1.34	1.37
2000	0.0	100.0	0.0	2.08	1.86	1.68	1.53	1.71
2000	100.0	0.0	100.0	18.63	8.58	4.23	2.34	2.80
2000	50.0	0.0	50.0	8.38	4.33	2.54	1.72	1.92
2000	0.0	50.0	0.0	1.94	1.72	1.54	1.40	1.49
2000	50.0	50.0	50.0	10.36	5.22	2.96	1.94	2.25
2000	20.6	27.3	20.6	4.57	2.78	1.94	1.53	1.66

TABLE 22 : THC AT 35.0 MPH.

TABLE 23

HIGH ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE) AT 50.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	7.09	6.81	6.57	6.37	6.88
1980	0.0	100.0	0.0	6.87	6.86	6.85	6.86	7.89
1980	100.0	0.0	100.0	28.53	18.06	12.08	8.66	7.54
1980	50.0	0.0	50.0	16.01	11.48	8.85	7.31	7.14
1980	0.0	50.0	0.0	6.98	6.81	6.67	6.56	7.28
1980	50.0	50.0	50.0	17.70	12.46	9.47	7.76	7.71
1980	20.6	27.3	20.6	10.68	8.72	7.56	6.86	7.20
1985	0.0	0.0	0.0	4.51	4.24	4.03	3.85	4.36
1985	0.0	100.0	0.0	4.38	4.30	4.24	4.20	5.01
1985	100.0	0.0	100.0	20.57	12.15	7.74	5.40	4.90
1985	50.0	0.0	50.0	10.95	7.41	5.51	4.46	4.56
1985	0.0	50.0	0.0	4.43	4.25	4.10	3.98	4.60
1985	50.0	50.0	50.0	12.48	8.23	5.99	4.80	4.96
1985	20.6	27.3	20.6	7.10	5.54	4.67	4.17	4.57
1988	0.0	0.0	0.0	3.25	3.00	2.80	2.64	3.42
1988	0.0	100.0	0.0	3.22	3.10	3.00	2.91	3.96
1988	100.0	0.0	100.0	18.12	9.91	5.90	3.90	4.05
1988	50.0	0.0	50.0	9.11	5.72	4.01	3.12	3.65
1988	0.0	50.0	0.0	3.21	3.02	2.86	2.73	3.61
1988	50.0	50.0	50.0	10.67	6.50	4.45	3.41	4.00
1988	20.6	27.3	20.6	5.62	4.12	3.33	2.89	3.61
1990	0.0	0.0	0.0	2.67	2.44	2.25	2.10	2.40
1990	0.0	100.0	0.0	2.70	2.56	2.44	2.34	2.81
1990	100.0	0.0	100.0	17.13	8.92	5.07	3.22	3.22
1990	50.0	0.0	50.0	8.32	4.97	3.34	2.53	2.70
1990	0.0	50.0	0.0	2.66	2.46	2.31	2.18	2.54
1990	50.0	50.0	50.0	9.91	5.74	3.75	2.78	3.01
1990	20.6	27.3	20.6	4.97	3.48	2.73	2.32	2.60
1995	0.0	0.0	0.0	1.86	1.67	1.51	1.39	1.50
1995	0.0	100.0	0.0	1.99	1.82	1.68	1.57	1.80
1995	100.0	0.0	100.0	15.45	7.42	3.86	2.28	2.53
1995	50.0	0.0	50.0	7.14	3.89	2.42	1.73	1.89
1995	0.0	50.0	0.0	1.89	1.71	1.56	1.45	1.60
1995	50.0	50.0	50.0	8.72	4.62	2.77	1.92	2.17
1995	20.6	27.3	20.6	4.03	2.60	1.91	1.56	1.72
2000	0.0	0.0	0.0	1.59	1.41	1.27	1.17	1.19
2000	0.0	100.0	0.0	1.74	1.57	1.43	1.32	1.45
2000	100.0	0.0	100.0	14.47	6.74	3.40	1.94	2.29
2000	50.0	0.0	50.0	6.58	3.47	2.09	1.46	1.61
2000	0.0	50.0	0.0	1.63	1.46	1.32	1.22	1.29
2000	50.0	50.0	50.0	8.10	4.15	2.41	1.63	1.87
2000	20.6	27.3	20.6	3.65	2.28	1.63	1.31	1.41

TABLE 23 : THC AT 50.0 MPH.

TABLE 24

HIGH ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE) AT 55.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	6.94	6.68	6.46	6.27	6.74
1980	0.0	100.0	0.0	6.74	6.72	6.72	6.74	7.70
1980	100.0	0.0	100.0	27.44	17.44	11.72	8.45	7.38
1980	50.0	0.0	50.0	15.48	11.15	8.64	7.16	6.99
1980	0.0	50.0	0.0	6.83	6.68	6.55	6.45	7.12
1980	50.0	50.0	50.0	17.09	12.08	9.22	7.59	7.54
1980	20.6	27.3	20.6	10.38	8.51	7.40	6.73	7.05
1985	0.0	0.0	0.0	4.37	4.13	3.93	3.77	4.23
1985	0.0	100.0	0.0	4.25	4.18	4.12	4.08	4.84
1985	100.0	0.0	100.0	19.27	11.48	7.38	5.20	4.74
1985	50.0	0.0	50.0	10.36	7.08	5.31	4.33	4.42
1985	0.0	50.0	0.0	4.29	4.13	3.99	3.88	4.45
1985	50.0	50.0	50.0	11.76	7.83	5.75	4.64	4.79
1985	20.6	27.3	20.6	6.78	5.33	4.53	4.06	4.43
1988	0.0	0.0	0.0	3.12	2.89	2.71	2.57	3.30
1988	0.0	100.0	0.0	3.09	2.98	2.89	2.82	3.80
1988	100.0	0.0	100.0	16.73	9.23	5.56	3.72	3.88
1988	50.0	0.0	50.0	8.49	5.39	3.83	3.39	3.51
1988	0.0	50.0	0.0	3.09	2.91	2.77	3.00	3.48
1988	50.0	50.0	50.0	9.91	6.11	4.22	3.66	3.84
1988	20.6	27.3	20.6	5.30	3.92	3.20	3.15	3.48
1990	0.0	0.0	0.0	2.55	2.34	2.17	2.04	2.30
1990	0.0	100.0	0.0	2.58	2.45	2.34	2.25	2.68
1990	100.0	0.0	100.0	15.69	8.24	4.74	3.06	3.05
1990	50.0	0.0	50.0	7.69	4.65	3.17	2.43	2.58
1990	0.0	50.0	0.0	2.54	2.36	2.22	2.11	2.44
1990	50.0	50.0	50.0	9.13	5.35	3.54	2.66	2.87
1990	20.6	27.3	20.6	4.65	3.30	2.61	2.24	2.49
1995	0.0	0.0	0.0	1.77	1.59	1.45	1.34	1.44
1995	0.0	100.0	0.0	1.88	1.73	1.60	1.50	1.71
1995	100.0	0.0	100.0	14.04	6.79	3.58	2.14	2.37
1995	50.0	0.0	50.0	6.53	3.60	2.27	1.64	1.79
1995	0.0	50.0	0.0	1.80	1.63	1.50	1.39	1.54
1995	50.0	50.0	50.0	7.96	4.26	2.59	1.82	2.04
1995	20.6	27.3	20.6	3.73	2.43	1.81	1.49	1.64
2000	0.0	0.0	0.0	1.50	1.34	1.22	1.12	1.15
2000	0.0	100.0	0.0	1.64	1.49	1.36	1.26	1.38
2000	100.0	0.0	100.0	13.12	6.16	3.14	1.83	2.14
2000	50.0	0.0	50.0	6.01	3.21	1.96	1.39	1.53
2000	0.0	50.0	0.0	1.54	1.39	1.27	1.17	1.23
2000	50.0	50.0	50.0	7.38	3.82	2.25	1.54	1.76
2000	20.6	27.3	20.6	3.36	2.13	1.55	1.26	1.35

TABLE 24 : THC AT 55.0 MPH.

TABLE 25

HIGH ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE) AT 5.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	281.80	248.94	222.06	199.99	417.04
1980	0.0	100.0	0.0	186.74	185.75	185.90	187.20	352.65
1980	100.0	0.0	100.0	1738.47	1018.19	605.49	366.64	262.06
1980	50.0	0.0	50.0	883.13	565.82	378.90	266.72	345.85
1980	0.0	50.0	0.0	237.49	218.53	203.46	191.62	384.07
1980	50.0	50.0	50.0	962.60	601.97	395.70	276.92	307.36
1980	20.6	27.3	20.6	503.95	362.14	276.13	222.71	369.82
1985	0.0	0.0	0.0	234.03	189.29	156.41	131.82	306.39
1985	0.0	100.0	0.0	165.90	150.92	139.77	131.64	249.35
1985	100.0	0.0	100.0	1316.55	783.09	465.94	265.99	199.77
1985	50.0	0.0	50.0	669.28	426.97	279.24	183.94	256.50
1985	0.0	50.0	0.0	201.04	169.54	146.37	129.15	277.06
1985	50.0	50.0	50.0	741.23	467.00	302.86	198.81	224.56
1985	20.6	27.3	20.6	394.18	275.77	201.16	151.64	269.88
1988	0.0	0.0	0.0	208.25	156.41	120.59	95.39	245.31
1988	0.0	100.0	0.0	154.75	131.88	114.68	101.78	201.82
1988	100.0	0.0	100.0	1094.68	657.50	391.28	213.01	169.20
1988	50.0	0.0	50.0	560.11	354.44	226.77	140.67	208.81
1988	0.0	50.0	0.0	181.41	142.66	115.34	95.83	222.33
1988	50.0	50.0	50.0	624.72	394.69	252.98	157.39	185.51
1988	20.6	27.3	20.6	337.56	229.90	161.13	114.10	217.75
1990	0.0	0.0	0.0	197.59	141.69	104.22	78.74	171.17
1990	0.0	100.0	0.0	151.52	124.29	103.82	88.43	148.70
1990	100.0	0.0	100.0	974.51	590.33	352.99	188.07	138.74
1990	50.0	0.0	50.0	503.65	317.76	201.26	120.68	153.77
1990	0.0	50.0	0.0	173.85	131.03	101.45	80.75	157.96
1990	50.0	50.0	50.0	563.01	357.31	228.41	138.25	143.72
1990	20.6	27.3	20.6	309.82	207.86	142.36	96.94	156.77
1995	0.0	0.0	0.0	180.84	120.00	81.01	55.85	96.84
1995	0.0	100.0	0.0	146.33	113.09	88.20	69.54	99.07
1995	100.0	0.0	100.0	773.48	478.51	290.60	150.01	112.12
1995	50.0	0.0	50.0	411.67	259.41	162.28	91.92	100.35
1995	0.0	50.0	0.0	162.03	113.97	81.74	59.90	95.20
1995	50.0	50.0	50.0	459.91	295.80	189.40	109.77	105.60
1995	20.6	27.3	20.6	264.95	173.68	114.60	72.76	97.31
2000	0.0	0.0	0.0	170.43	110.04	71.93	47.79	68.92
2000	0.0	100.0	0.0	140.30	106.25	80.85	61.88	80.07
2000	100.0	0.0	100.0	692.02	432.58	264.29	133.81	100.87
2000	50.0	0.0	50.0	372.98	235.23	146.48	80.77	79.81
2000	0.0	50.0	0.0	153.62	105.49	73.56	52.18	71.56
2000	50.0	50.0	50.0	416.16	269.42	172.57	97.85	90.47
2000	20.6	27.3	20.6	244.05	158.71	103.26	63.63	74.76

TABLE 25 : CO AT 5.0 MPH.

TABLE 26

HIGH ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE) AT 10.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	161.36	143.20	128.28	116.00	236.23
1980	0.0	100.0	0.0	109.18	108.34	108.18	108.68	202.52
1980	100.0	0.0	100.0	961.85	566.91	339.84	207.91	152.18
1980	50.0	0.0	50.0	492.51	318.12	215.02	152.89	197.58
1980	0.0	50.0	0.0	137.04	126.43	117.96	111.28	218.87
1980	50.0	50.0	50.0	535.51	337.63	224.01	158.30	177.35
1980	20.6	27.3	20.6	283.75	205.70	158.17	128.51	210.89
1985	0.0	0.0	0.0	130.91	106.69	88.82	75.39	171.44
1985	0.0	100.0	0.0	94.03	85.75	79.57	75.03	141.13
1985	100.0	0.0	100.0	713.13	426.07	255.23	147.47	114.13
1985	50.0	0.0	50.0	365.32	234.70	154.94	103.43	144.62
1985	0.0	50.0	0.0	113.06	95.94	83.29	73.84	155.83
1985	50.0	50.0	50.0	403.58	255.91	167.40	111.25	127.63
1985	20.6	27.3	20.6	217.12	153.21	112.84	85.99	151.90
1988	0.0	0.0	0.0	114.52	86.71	67.43	53.81	136.19
1988	0.0	100.0	0.0	85.81	73.43	64.09	57.06	113.05
1988	100.0	0.0	100.0	587.54	354.01	211.74	116.49	95.34
1988	50.0	0.0	50.0	302.44	192.43	124.08	77.95	116.60
1988	0.0	50.0	0.0	100.13	79.29	64.55	53.97	123.96
1988	50.0	50.0	50.0	336.67	213.72	137.91	86.77	104.20
1988	20.6	27.3	20.6	183.56	125.91	89.01	63.75	121.46
1990	0.0	0.0	0.0	107.74	77.86	57.78	44.06	94.22
1990	0.0	100.0	0.0	83.14	68.49	57.45	49.13	82.27
1990	100.0	0.0	100.0	520.79	316.31	189.94	102.15	76.84
1990	50.0	0.0	50.0	270.53	171.48	109.35	66.35	84.91
1990	0.0	50.0	0.0	95.08	72.14	56.25	45.10	87.20
1990	50.0	50.0	50.0	301.96	192.40	123.70	75.64	79.56
1990	20.6	27.3	20.6	167.42	113.02	78.02	53.72	86.54
1995	0.0	0.0	0.0	97.65	65.26	44.46	31.00	53.14
1995	0.0	100.0	0.0	79.37	61.60	48.27	38.26	54.35
1995	100.0	0.0	100.0	411.70	255.23	155.52	80.93	61.24
1995	50.0	0.0	50.0	219.98	139.14	87.53	50.12	55.00
1995	0.0	50.0	0.0	87.68	62.06	44.84	33.15	52.28
1995	50.0	50.0	50.0	245.54	158.42	101.90	59.59	57.79
1995	20.6	27.3	20.6	142.23	93.71	62.26	39.97	53.40
2000	0.0	0.0	0.0	91.78	59.66	39.36	26.46	37.88
2000	0.0	100.0	0.0	75.86	57.69	44.12	33.97	43.83
2000	100.0	0.0	100.0	368.07	230.53	141.28	72.09	54.84
2000	50.0	0.0	50.0	199.08	125.99	78.86	43.96	43.66
2000	0.0	50.0	0.0	82.89	57.27	40.23	28.80	39.29
2000	50.0	50.0	50.0	221.97	144.11	92.70	53.03	49.34
2000	20.6	27.3	20.6	130.79	85.46	55.97	34.87	40.98

TABLE 26 : CO AT 10.0 MPH.

TABLE 27

HIGH ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE) AT 19.6 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	102.56	91.13	81.76	74.06	150.21
1980	0.0	100.0	0.0	68.24	68.10	68.37	69.05	128.92
1980	100.0	0.0	100.0	627.23	369.32	220.79	134.39	95.56
1980	50.0	0.0	50.0	320.05	206.22	138.89	98.33	125.07
1980	0.0	50.0	0.0	86.57	80.06	74.91	70.88	139.20
1980	50.0	50.0	50.0	347.74	218.71	144.58	101.72	112.24
1980	20.6	27.3	20.6	182.94	132.24	101.41	82.25	133.88
1985	0.0	0.0	0.0	81.73	66.51	55.30	46.89	107.06
1985	0.0	100.0	0.0	57.76	52.78	49.10	46.45	87.69
1985	100.0	0.0	100.0	456.51	272.07	162.32	93.18	70.07
1985	50.0	0.0	50.0	232.84	149.02	97.88	64.92	89.75
1985	0.0	50.0	0.0	70.15	59.49	51.64	45.81	97.08
1985	50.0	50.0	50.0	257.14	162.43	105.71	69.81	78.88
1985	20.6	27.3	20.6	137.27	96.45	70.72	53.66	94.50
1988	0.0	0.0	0.0	71.47	53.97	41.86	33.31	84.98
1988	0.0	100.0	0.0	52.96	45.30	39.55	35.25	70.19
1988	100.0	0.0	100.0	373.70	224.67	133.92	73.25	58.63
1988	50.0	0.0	50.0	191.65	121.55	78.03	48.71	72.35
1988	0.0	50.0	0.0	62.21	49.15	39.94	33.36	77.16
1988	50.0	50.0	50.0	213.33	134.98	86.73	54.25	64.41
1988	20.6	27.3	20.6	115.59	78.98	55.60	39.62	75.52
1990	0.0	0.0	0.0	67.26	48.44	35.81	27.20	58.67
1990	0.0	100.0	0.0	51.48	42.35	35.49	30.33	51.01
1990	100.0	0.0	100.0	330.10	200.10	119.81	64.08	47.44
1990	50.0	0.0	50.0	170.91	108.02	68.60	41.36	52.67
1990	0.0	50.0	0.0	59.15	44.75	34.79	27.82	54.18
1990	50.0	50.0	50.0	190.79	121.23	77.65	47.21	49.22
1990	20.6	27.3	20.6	105.23	70.79	48.65	33.31	53.74
1995	0.0	0.0	0.0	61.01	40.60	27.51	19.05	32.91
1995	0.0	100.0	0.0	49.39	38.24	29.89	23.63	33.65
1995	100.0	0.0	100.0	260.00	160.94	97.84	50.65	37.97
1995	50.0	0.0	50.0	138.54	87.41	54.78	31.16	34.05
1995	0.0	50.0	0.0	54.68	38.56	27.74	20.40	32.35
1995	50.0	50.0	50.0	154.70	99.59	63.86	37.14	35.81
1995	20.6	27.3	20.6	89.26	58.62	38.77	24.72	33.05
2000	0.0	0.0	0.0	57.39	37.15	24.36	16.26	23.39
2000	0.0	100.0	0.0	47.30	35.88	27.36	20.99	27.15
2000	100.0	0.0	100.0	232.32	145.30	88.86	45.12	34.09
2000	50.0	0.0	50.0	125.33	79.13	49.36	27.33	27.04
2000	0.0	50.0	0.0	51.76	35.62	24.91	17.73	24.28
2000	50.0	50.0	50.0	139.81	90.59	58.11	33.05	30.62
2000	20.6	27.3	20.6	82.09	53.47	34.87	21.58	25.35

TABLE 27 : CO AT 19.6 MPH.

TABLE 28

HIGH ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE) AT 35.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	65.35	58.62	53.08	48.52	94.86
1980	0.0	100.0	0.0	43.18	43.44	43.98	44.79	82.99
1980	100.0	0.0	100.0	401.04	237.70	142.87	87.28	60.81
1980	50.0	0.0	50.0	205.55	133.27	90.27	64.24	79.16
1980	0.0	50.0	0.0	55.02	51.35	48.47	46.27	88.62
1980	50.0	50.0	50.0	222.11	140.57	93.42	66.03	71.90
1980	20.6	27.3	20.6	117.16	85.24	65.80	53.72	85.01
1985	0.0	0.0	0.0	48.72	40.05	33.64	28.81	64.11
1985	0.0	100.0	0.0	33.87	31.23	29.33	28.02	52.86
1985	100.0	0.0	100.0	273.14	163.07	97.48	56.24	41.71
1985	50.0	0.0	50.0	139.76	89.74	59.19	39.55	53.64
1985	0.0	50.0	0.0	41.58	35.59	31.20	27.94	58.31
1985	50.0	50.0	50.0	153.50	97.15	63.40	42.13	47.28
1985	20.6	27.3	20.6	82.10	57.96	42.76	32.72	56.64
1988	0.0	0.0	0.0	41.35	31.49	24.64	19.80	50.13
1988	0.0	100.0	0.0	30.23	26.03	22.90	20.58	41.53
1988	100.0	0.0	100.0	216.90	130.43	77.80	42.74	34.23
1988	50.0	0.0	50.0	111.46	70.82	45.61	28.67	42.54
1988	0.0	50.0	0.0	35.82	28.52	23.36	19.68	45.59
1988	50.0	50.0	50.0	123.56	78.23	50.35	31.66	37.88
1988	20.6	27.3	20.6	67.02	45.96	32.52	23.36	44.53
1990	0.0	0.0	0.0	38.31	27.76	20.66	15.81	33.85
1990	0.0	100.0	0.0	29.05	24.00	20.21	17.38	29.37
1990	100.0	0.0	100.0	188.39	114.19	68.38	36.69	27.04
1990	50.0	0.0	50.0	97.66	61.80	39.33	23.84	30.25
1990	0.0	50.0	0.0	33.58	25.53	19.97	16.07	31.24
1990	50.0	50.0	50.0	108.72	69.09	44.29	27.03	28.20
1990	20.6	27.3	20.6	60.01	40.46	27.91	19.23	30.94
1995	0.0	0.0	0.0	34.13	22.74	15.44	10.71	18.50
1995	0.0	100.0	0.0	27.57	21.36	16.71	13.23	18.89
1995	100.0	0.0	100.0	145.50	90.05	54.73	28.35	21.23
1995	50.0	0.0	50.0	77.55	48.93	30.68	17.47	19.10
1995	0.0	50.0	0.0	30.56	21.57	15.54	11.45	18.18
1995	50.0	50.0	50.0	86.53	55.70	35.72	20.79	20.06
1995	20.6	27.3	20.6	49.94	32.81	21.72	13.87	18.56
2000	0.0	0.0	0.0	31.99	20.71	13.59	9.07	13.06
2000	0.0	100.0	0.0	26.35	19.99	15.25	11.71	15.16
2000	100.0	0.0	100.0	129.56	81.03	49.55	25.16	19.01
2000	50.0	0.0	50.0	69.89	44.13	27.53	15.24	15.09
2000	0.0	50.0	0.0	28.84	19.86	13.89	9.89	13.56
2000	50.0	50.0	50.0	77.96	50.51	32.40	18.44	17.08
2000	20.6	27.3	20.6	45.76	29.81	19.45	12.04	14.15

TABLE 28 : CO AT 35.0 MPH.

TABLE 29

HIGH ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE) AT 50.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	58.63	52.71	47.84	43.81	84.84
1980	0.0	100.0	0.0	38.89	39.14	39.64	40.38	74.67
1980	100.0	0.0	100.0	357.07	212.12	127.80	78.28	54.74
1980	50.0	0.0	50.0	183.51	119.29	81.02	57.82	70.96
1980	0.0	50.0	0.0	49.44	46.22	43.70	41.77	79.48
1980	50.0	50.0	50.0	197.98	125.63	83.72	59.33	64.71
1980	20.6	27.3	20.6	104.79	76.45	59.17	48.43	76.21
1985	0.0	0.0	0.0	43.08	35.55	29.96	25.75	56.77
1985	0.0	100.0	0.0	29.98	27.70	26.06	24.95	47.00
1985	100.0	0.0	100.0	239.39	143.14	85.75	49.68	37.11
1985	50.0	0.0	50.0	122.84	79.07	52.33	35.13	47.58
1985	0.0	50.0	0.0	36.79	31.59	27.77	24.94	51.74
1985	50.0	50.0	50.0	134.69	85.42	55.91	37.31	42.06
1985	20.6	27.3	20.6	72.30	51.21	37.92	29.14	50.25
1988	0.0	0.0	0.0	36.21	27.68	21.75	17.55	44.20
1988	0.0	100.0	0.0	26.47	22.84	20.14	18.14	36.72
1988	100.0	0.0	100.0	188.67	113.56	67.84	37.41	30.25
1988	50.0	0.0	50.0	97.17	61.86	39.95	25.24	37.54
1988	0.0	50.0	0.0	31.37	25.06	20.60	17.41	40.26
1988	50.0	50.0	50.0	107.57	68.20	43.99	27.78	33.49
1988	20.6	27.3	20.6	58.52	40.24	28.56	20.61	39.31
1990	0.0	0.0	0.0	33.35	24.24	18.11	13.91	29.62
1990	0.0	100.0	0.0	25.28	20.92	17.66	15.21	25.72
1990	100.0	0.0	100.0	163.01	98.88	59.28	31.90	23.64
1990	50.0	0.0	50.0	84.65	53.65	34.22	20.83	26.47
1990	0.0	50.0	0.0	29.23	22.29	17.48	14.11	27.36
1990	50.0	50.0	50.0	94.15	59.90	38.47	23.56	24.68
1990	20.6	27.3	20.6	52.09	35.20	24.35	16.84	27.09
1995	0.0	0.0	0.0	29.50	19.70	13.40	9.33	16.08
1995	0.0	100.0	0.0	23.85	18.50	14.49	11.48	16.40
1995	100.0	0.0	100.0	125.25	77.55	47.17	24.49	18.40
1995	50.0	0.0	50.0	66.83	42.21	26.51	15.14	16.58
1995	0.0	50.0	0.0	26.43	18.69	13.49	9.96	15.80
1995	50.0	50.0	50.0	74.55	48.02	30.83	17.98	17.40
1995	20.6	27.3	20.6	43.09	28.35	18.80	12.04	16.12
2000	0.0	0.0	0.0	27.60	17.90	11.77	7.88	11.33
2000	0.0	100.0	0.0	22.76	17.28	13.19	10.14	13.12
2000	100.0	0.0	100.0	111.39	69.70	42.65	21.69	16.43
2000	50.0	0.0	50.0	60.15	38.01	23.74	13.18	13.06
2000	0.0	50.0	0.0	24.90	17.16	12.02	8.58	11.75
2000	50.0	50.0	50.0	67.08	43.49	27.92	15.92	14.78
2000	20.6	27.3	20.6	39.43	25.71	16.80	10.42	12.26

TABLE 29 : CO AT 50.0 MPH.

TABLE 30

HIGH ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE) AT 55.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	56.84	51.24	46.63	42.81	81.77
1980	0.0	100.0	0.0	38.15	38.34	38.77	39.46	72.59
1980	100.0	0.0	100.0	338.82	202.10	122.37	75.41	53.56
1980	50.0	0.0	50.0	175.06	114.38	78.12	56.09	68.76
1980	0.0	50.0	0.0	48.14	45.07	42.67	40.83	76.90
1980	50.0	50.0	50.0	188.49	120.22	80.57	57.43	63.07
1980	20.6	27.3	20.6	100.54	73.75	57.37	47.16	73.77
1985	0.0	0.0	0.0	41.11	34.13	28.93	24.99	54.26
1985	0.0	100.0	0.0	28.86	26.72	25.19	24.14	45.30
1985	100.0	0.0	100.0	223.15	133.89	80.61	47.13	35.98
1985	50.0	0.0	50.0	115.20	74.55	49.69	33.69	45.72
1985	0.0	50.0	0.0	35.23	30.41	26.85	24.20	49.64
1985	50.0	50.0	50.0	126.00	80.31	52.90	35.63	40.64
1985	20.6	27.3	20.6	68.24	48.65	36.29	28.11	48.23
1988	0.0	0.0	0.0	34.05	26.22	20.75	16.85	41.97
1988	0.0	100.0	0.0	25.03	21.68	19.18	17.33	35.11
1988	100.0	0.0	100.0	174.16	105.09	63.03	35.06	29.02
1988	50.0	0.0	50.0	90.15	57.65	37.46	26.72	35.79
1988	0.0	50.0	0.0	29.58	23.77	19.65	18.85	38.35
1988	50.0	50.0	50.0	99.60	63.39	41.10	28.88	32.06
1988	20.6	27.3	20.6	54.57	37.74	26.98	22.08	37.46
1990	0.0	0.0	0.0	31.10	22.76	17.12	13.25	27.87
1990	0.0	100.0	0.0	23.67	19.66	16.65	14.40	24.29
1990	100.0	0.0	100.0	149.58	90.92	54.69	29.66	22.33
1990	50.0	0.0	50.0	78.02	49.64	31.84	19.56	24.96
1990	0.0	50.0	0.0	27.31	20.95	16.53	13.42	25.80
1990	50.0	50.0	50.0	86.63	55.29	35.67	22.03	23.31
1990	20.6	27.3	20.6	48.23	32.76	22.81	15.92	25.54
1995	0.0	0.0	0.0	27.22	18.28	12.52	8.79	15.04
1995	0.0	100.0	0.0	22.08	17.18	13.50	10.74	15.33
1995	100.0	0.0	100.0	114.19	70.82	43.19	22.56	17.13
1995	50.0	0.0	50.0	61.14	38.73	24.42	14.07	15.48
1995	0.0	50.0	0.0	24.43	17.36	12.60	9.36	14.78
1995	50.0	50.0	50.0	68.13	44.00	28.35	16.65	16.23
1995	20.6	27.3	20.6	39.56	26.13	17.43	11.25	15.07
2000	0.0	0.0	0.0	25.39	16.55	10.96	7.40	10.58
2000	0.0	100.0	0.0	21.00	16.00	12.26	9.46	12.22
2000	100.0	0.0	100.0	101.43	63.56	38.99	19.95	15.22
2000	50.0	0.0	50.0	54.93	34.80	21.82	12.21	12.16
2000	0.0	50.0	0.0	22.94	15.89	11.19	8.04	10.97
2000	50.0	50.0	50.0	61.22	39.78	25.62	14.70	13.72
2000	20.6	27.3	20.6	36.13	23.65	15.52	9.71	11.43

TABLE 30 : CO AT 55.0 MPH.

TABLE 31

HIGH ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE) AT 5.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	4.95	4.64	4.37	4.14	3.71
1980	0.0	100.0	0.0	5.54	5.20	4.90	4.64	4.00
1980	100.0	0.0	100.0	4.85	4.75	4.67	4.62	4.15
1980	50.0	0.0	50.0	4.99	4.78	4.62	4.48	4.02
1980	0.0	50.0	0.0	5.39	5.05	4.75	4.50	3.93
1980	50.0	50.0	50.0	5.19	4.97	4.78	4.63	4.08
1980	20.6	27.3	20.6	5.21	4.93	4.69	4.48	3.96
1985	0.0	0.0	0.0	3.84	3.59	3.37	3.18	2.73
1985	0.0	100.0	0.0	4.22	3.94	3.70	3.50	2.93
1985	100.0	0.0	100.0	4.12	3.90	3.72	3.57	2.94
1985	50.0	0.0	50.0	4.06	3.82	3.61	3.44	2.88
1985	0.0	50.0	0.0	4.12	3.85	3.61	3.41	2.87
1985	50.0	50.0	50.0	4.17	3.92	3.71	3.53	2.94
1985	20.6	27.3	20.6	4.09	3.82	3.60	3.41	2.87
1988	0.0	0.0	0.0	3.39	3.14	2.92	2.74	2.46
1988	0.0	100.0	0.0	3.71	3.42	3.17	2.97	2.63
1988	100.0	0.0	100.0	3.73	3.47	3.25	3.07	2.63
1988	50.0	0.0	50.0	3.63	3.37	3.15	2.96	2.58
1988	0.0	50.0	0.0	3.63	3.34	3.10	2.90	2.58
1988	50.0	50.0	50.0	3.72	3.45	3.21	3.02	2.63
1988	20.6	27.3	20.6	3.62	3.35	3.12	2.92	2.58
1990	0.0	0.0	0.0	3.12	2.87	2.65	2.47	1.92
1990	0.0	100.0	0.0	3.43	3.12	2.86	2.64	2.05
1990	100.0	0.0	100.0	3.44	3.18	2.96	2.77	2.05
1990	50.0	0.0	50.0	3.35	3.08	2.86	2.67	2.01
1990	0.0	50.0	0.0	3.34	3.05	2.80	2.60	2.01
1990	50.0	50.0	50.0	3.43	3.15	2.91	2.70	2.05
1990	20.6	27.3	20.6	3.34	3.06	2.82	2.62	2.01
1995	0.0	0.0	0.0	2.83	2.58	2.38	2.20	1.59
1995	0.0	100.0	0.0	3.15	2.80	2.52	2.29	1.70
1995	100.0	0.0	100.0	3.07	2.83	2.62	2.43	1.70
1995	50.0	0.0	50.0	3.01	2.76	2.54	2.36	1.66
1995	0.0	50.0	0.0	3.05	2.74	2.49	2.27	1.66
1995	50.0	50.0	50.0	3.11	2.82	2.57	2.36	1.70
1995	20.6	27.3	20.6	3.03	2.74	2.51	2.31	1.66
2000	0.0	0.0	0.0	2.71	2.48	2.28	2.10	1.49
2000	0.0	100.0	0.0	3.04	2.69	2.40	2.16	1.59
2000	100.0	0.0	100.0	2.92	2.69	2.49	2.32	1.60
2000	50.0	0.0	50.0	2.87	2.63	2.43	2.25	1.56
2000	0.0	50.0	0.0	2.94	2.63	2.37	2.16	1.55
2000	50.0	50.0	50.0	2.98	2.69	2.45	2.24	1.59
2000	20.6	27.3	20.6	2.90	2.63	2.39	2.20	1.55

TABLE 31 : NOx AT 5.0 MPH.

TABLE 32

HIGH ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE) AT 10.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	4.24	3.97	3.74	3.54	3.15
1980	0.0	100.0	0.0	4.74	4.45	4.19	3.98	3.41
1980	100.0	0.0	100.0	4.21	4.11	4.02	3.96	3.52
1980	50.0	0.0	50.0	4.30	4.12	3.97	3.84	3.41
1980	0.0	50.0	0.0	4.61	4.32	4.07	3.85	3.34
1980	50.0	50.0	50.0	4.48	4.28	4.11	3.97	3.46
1980	20.6	27.3	20.6	4.47	4.23	4.02	3.84	3.36
1985	0.0	0.0	0.0	3.44	3.20	2.99	2.82	2.38
1985	0.0	100.0	0.0	3.79	3.53	3.30	3.11	2.56
1985	100.0	0.0	100.0	3.74	3.52	3.33	3.18	2.57
1985	50.0	0.0	50.0	3.67	3.43	3.23	3.06	2.51
1985	0.0	50.0	0.0	3.70	3.44	3.21	3.02	2.50
1985	50.0	50.0	50.0	3.77	3.52	3.32	3.14	2.56
1985	20.6	27.3	20.6	3.68	3.43	3.21	3.03	2.50
1988	0.0	0.0	0.0	3.11	2.86	2.65	2.47	2.16
1988	0.0	100.0	0.0	3.42	3.13	2.89	2.68	2.31
1988	100.0	0.0	100.0	3.46	3.20	2.98	2.79	2.31
1988	50.0	0.0	50.0	3.36	3.09	2.87	2.68	2.26
1988	0.0	50.0	0.0	3.34	3.06	2.82	2.62	2.27
1988	50.0	50.0	50.0	3.44	3.16	2.93	2.74	2.31
1988	20.6	27.3	20.6	3.34	3.07	2.84	2.64	2.26
1990	0.0	0.0	0.0	2.90	2.65	2.43	2.25	1.70
1990	0.0	100.0	0.0	3.20	2.89	2.63	2.42	1.83
1990	100.0	0.0	100.0	3.22	2.96	2.73	2.54	1.82
1990	50.0	0.0	50.0	3.12	2.86	2.64	2.45	1.78
1990	0.0	50.0	0.0	3.12	2.82	2.58	2.37	1.79
1990	50.0	50.0	50.0	3.21	2.92	2.68	2.48	1.82
1990	20.6	27.3	20.6	3.11	2.83	2.60	2.40	1.78
1995	0.0	0.0	0.0	2.66	2.41	2.20	2.02	1.41
1995	0.0	100.0	0.0	2.97	2.63	2.34	2.11	1.52
1995	100.0	0.0	100.0	2.90	2.66	2.44	2.26	1.52
1995	50.0	0.0	50.0	2.84	2.59	2.37	2.18	1.48
1995	0.0	50.0	0.0	2.88	2.57	2.31	2.10	1.49
1995	50.0	50.0	50.0	2.94	2.64	2.39	2.18	1.52
1995	20.6	27.3	20.6	2.86	2.57	2.33	2.13	1.48
2000	0.0	0.0	0.0	2.55	2.32	2.11	1.94	1.32
2000	0.0	100.0	0.0	2.88	2.53	2.24	2.00	1.42
2000	100.0	0.0	100.0	2.75	2.53	2.33	2.15	1.43
2000	50.0	0.0	50.0	2.71	2.47	2.26	2.09	1.39
2000	0.0	50.0	0.0	2.78	2.47	2.21	2.00	1.38
2000	50.0	50.0	50.0	2.82	2.53	2.28	2.08	1.42
2000	20.6	27.3	20.6	2.74	2.47	2.23	2.03	1.38

TABLE 32 : NOx AT 10.0 MPH.

TABLE 33

HIGH ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE) AT 19.6 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	4.05	3.76	3.51	3.29	2.84
1980	0.0	100.0	0.0	4.61	4.29	4.01	3.77	3.13
1980	100.0	0.0	100.0	4.08	3.95	3.84	3.77	3.25
1980	50.0	0.0	50.0	4.15	3.94	3.77	3.63	3.13
1980	0.0	50.0	0.0	4.47	4.15	3.87	3.63	3.06
1980	50.0	50.0	50.0	4.34	4.12	3.93	3.77	3.19
1980	20.6	27.3	20.6	4.32	4.05	3.82	3.62	3.08
1985	0.0	0.0	0.0	3.44	3.15	2.91	2.70	2.18
1985	0.0	100.0	0.0	3.85	3.53	3.26	3.03	2.38
1985	100.0	0.0	100.0	3.82	3.54	3.31	3.13	2.39
1985	50.0	0.0	50.0	3.72	3.43	3.19	2.99	2.33
1985	0.0	50.0	0.0	3.74	3.43	3.16	2.93	2.32
1985	50.0	50.0	50.0	3.83	3.54	3.29	3.08	2.39
1985	20.6	27.3	20.6	3.72	3.42	3.17	2.95	2.32
1988	0.0	0.0	0.0	3.20	2.90	2.64	2.42	1.98
1988	0.0	100.0	0.0	3.56	3.22	2.92	2.67	2.16
1988	100.0	0.0	100.0	3.62	3.30	3.03	2.81	2.15
1988	50.0	0.0	50.0	3.50	3.18	2.91	2.68	2.10
1988	0.0	50.0	0.0	3.47	3.13	2.85	2.61	2.11
1988	50.0	50.0	50.0	3.59	3.26	2.98	2.74	2.16
1988	20.6	27.3	20.6	3.47	3.14	2.87	2.63	2.10
1990	0.0	0.0	0.0	3.03	2.73	2.47	2.25	1.59
1990	0.0	100.0	0.0	3.39	3.02	2.70	2.44	1.74
1990	100.0	0.0	100.0	3.42	3.10	2.83	2.59	1.72
1990	50.0	0.0	50.0	3.31	2.99	2.71	2.48	1.68
1990	0.0	50.0	0.0	3.29	2.94	2.64	2.39	1.69
1990	50.0	50.0	50.0	3.41	3.06	2.77	2.52	1.73
1990	20.6	27.3	20.6	3.29	2.95	2.67	2.43	1.69
1995	0.0	0.0	0.0	2.82	2.52	2.27	2.05	1.32
1995	0.0	100.0	0.0	3.20	2.78	2.44	2.15	1.44
1995	100.0	0.0	100.0	3.11	2.81	2.55	2.33	1.44
1995	50.0	0.0	50.0	3.04	2.73	2.47	2.24	1.40
1995	0.0	50.0	0.0	3.09	2.72	2.40	2.14	1.40
1995	50.0	50.0	50.0	3.16	2.80	2.50	2.24	1.44
1995	20.6	27.3	20.6	3.06	2.72	2.43	2.18	1.40
2000	0.0	0.0	0.0	2.71	2.43	2.18	1.97	1.22
2000	0.0	100.0	0.0	3.11	2.68	2.33	2.04	1.34
2000	100.0	0.0	100.0	2.95	2.67	2.43	2.22	1.34
2000	50.0	0.0	50.0	2.90	2.61	2.36	2.14	1.30
2000	0.0	50.0	0.0	2.99	2.61	2.30	2.04	1.30
2000	50.0	50.0	50.0	3.03	2.68	2.38	2.13	1.34
2000	20.6	27.3	20.6	2.94	2.61	2.32	2.08	1.30

TABLE 33 : NOx AT 19.6 MPH.

TABLE 34

HIGH ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE) AT 35.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	4.70	4.31	3.97	3.68	3.08
1980	0.0	100.0	0.0	5.45	5.02	4.65	4.32	3.47
1980	100.0	0.0	100.0	4.70	4.53	4.40	4.31	3.63
1980	50.0	0.0	50.0	4.82	4.54	4.31	4.13	3.47
1980	0.0	50.0	0.0	5.26	4.83	4.46	4.14	3.37
1980	50.0	50.0	50.0	5.07	4.78	4.53	4.32	3.55
1980	20.6	27.3	20.6	5.06	4.69	4.38	4.12	3.40
1985	0.0	0.0	0.0	3.97	3.60	3.28	3.00	2.32
1985	0.0	100.0	0.0	4.51	4.10	3.75	3.45	2.60
1985	100.0	0.0	100.0	4.44	4.09	3.80	3.56	2.61
1985	50.0	0.0	50.0	4.33	3.95	3.64	3.38	2.53
1985	0.0	50.0	0.0	4.37	3.96	3.61	3.31	2.52
1985	50.0	50.0	50.0	4.48	4.10	3.77	3.50	2.60
1985	20.6	27.3	20.6	4.34	3.95	3.61	3.33	2.52
1988	0.0	0.0	0.0	3.72	3.33	3.00	2.72	2.11
1988	0.0	100.0	0.0	4.20	3.75	3.37	3.05	2.35
1988	100.0	0.0	100.0	4.26	3.85	3.51	3.22	2.33
1988	50.0	0.0	50.0	4.11	3.69	3.35	3.05	2.27
1988	0.0	50.0	0.0	4.07	3.64	3.27	2.96	2.28
1988	50.0	50.0	50.0	4.23	3.80	3.44	3.13	2.34
1988	20.6	27.3	20.6	4.08	3.65	3.29	2.99	2.27
1990	0.0	0.0	0.0	3.55	3.16	2.83	2.54	1.70
1990	0.0	100.0	0.0	4.03	3.54	3.14	2.80	1.89
1990	100.0	0.0	100.0	4.05	3.64	3.29	2.99	1.87
1990	50.0	0.0	50.0	3.91	3.50	3.14	2.85	1.82
1990	0.0	50.0	0.0	3.90	3.44	3.06	2.74	1.84
1990	50.0	50.0	50.0	4.04	3.59	3.21	2.89	1.88
1990	20.6	27.3	20.6	3.89	3.46	3.09	2.78	1.83
1995	0.0	0.0	0.0	3.33	2.94	2.61	2.34	1.40
1995	0.0	100.0	0.0	3.82	3.28	2.83	2.47	1.56
1995	100.0	0.0	100.0	3.70	3.31	2.98	2.69	1.55
1995	50.0	0.0	50.0	3.61	3.21	2.87	2.58	1.50
1995	0.0	50.0	0.0	3.68	3.19	2.79	2.45	1.51
1995	50.0	50.0	50.0	3.76	3.29	2.90	2.58	1.55
1995	20.6	27.3	20.6	3.64	3.19	2.82	2.50	1.50
2000	0.0	0.0	0.0	3.20	2.83	2.51	2.24	1.29
2000	0.0	100.0	0.0	3.72	3.16	2.70	2.33	1.44
2000	100.0	0.0	100.0	3.50	3.14	2.83	2.56	1.44
2000	50.0	0.0	50.0	3.44	3.06	2.74	2.46	1.39
2000	0.0	50.0	0.0	3.56	3.07	2.67	2.33	1.39
2000	50.0	50.0	50.0	3.61	3.15	2.77	2.45	1.44
2000	20.6	27.3	20.6	3.50	3.06	2.69	2.38	1.39

TABLE 34 : NOx AT 35.0 MPH.

TABLE 35

HIGH ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE) AT 50.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	5.39	4.94	4.56	4.24	3.57
1980	0.0	100.0	0.0	6.23	5.75	5.33	4.96	4.01
1980	100.0	0.0	100.0	5.38	5.19	5.05	4.95	4.19
1980	50.0	0.0	50.0	5.52	5.21	4.95	4.74	4.00
1980	0.0	50.0	0.0	6.02	5.53	5.12	4.75	3.90
1980	50.0	50.0	50.0	5.81	5.47	5.19	4.96	4.10
1980	20.6	27.3	20.6	5.79	5.38	5.03	4.73	3.93
1985	0.0	0.0	0.0	4.54	4.11	3.75	3.45	2.69
1985	0.0	100.0	0.0	5.14	4.68	4.29	3.95	3.00
1985	100.0	0.0	100.0	5.06	4.67	4.34	4.08	3.01
1985	50.0	0.0	50.0	4.93	4.51	4.16	3.87	2.92
1985	0.0	50.0	0.0	4.98	4.53	4.13	3.80	2.91
1985	50.0	50.0	50.0	5.10	4.67	4.31	4.01	3.00
1985	20.6	27.3	20.6	4.95	4.51	4.14	3.82	2.91
1988	0.0	0.0	0.0	4.23	3.80	3.43	3.11	2.44
1988	0.0	100.0	0.0	4.77	4.27	3.84	3.48	2.71
1988	100.0	0.0	100.0	4.84	4.38	3.99	3.67	2.69
1988	50.0	0.0	50.0	4.66	4.20	3.82	3.49	2.62
1988	0.0	50.0	0.0	4.63	4.14	3.73	3.38	2.63
1988	50.0	50.0	50.0	4.81	4.32	3.92	3.58	2.70
1988	20.6	27.3	20.6	4.63	4.16	3.76	3.42	2.62
1990	0.0	0.0	0.0	4.03	3.60	3.22	2.91	1.96
1990	0.0	100.0	0.0	4.56	4.02	3.57	3.19	2.18
1990	100.0	0.0	100.0	4.59	4.13	3.74	3.41	2.16
1990	50.0	0.0	50.0	4.43	3.97	3.58	3.24	2.10
1990	0.0	50.0	0.0	4.42	3.91	3.48	3.12	2.11
1990	50.0	50.0	50.0	4.58	4.08	3.65	3.30	2.17
1990	20.6	27.3	20.6	4.41	3.93	3.51	3.16	2.10
1995	0.0	0.0	0.0	3.77	3.34	2.97	2.66	1.61
1995	0.0	100.0	0.0	4.32	3.71	3.22	2.81	1.79
1995	100.0	0.0	100.0	4.18	3.75	3.38	3.06	1.78
1995	50.0	0.0	50.0	4.08	3.64	3.26	2.93	1.73
1995	0.0	50.0	0.0	4.16	3.62	3.17	2.79	1.74
1995	50.0	50.0	50.0	4.25	3.73	3.30	2.93	1.79
1995	20.6	27.3	20.6	4.12	3.62	3.20	2.85	1.73
2000	0.0	0.0	0.0	3.63	3.21	2.86	2.55	1.49
2000	0.0	100.0	0.0	4.20	3.58	3.07	2.65	1.66
2000	100.0	0.0	100.0	3.96	3.56	3.22	2.91	1.66
2000	50.0	0.0	50.0	3.89	3.47	3.11	2.80	1.60
2000	0.0	50.0	0.0	4.03	3.48	3.03	2.65	1.60
2000	50.0	50.0	50.0	4.08	3.57	3.14	2.78	1.66
2000	20.6	27.3	20.6	3.96	3.47	3.06	2.71	1.60

TABLE 35 : NOx AT 50.0 MPH.

TABLE 36

HIGH ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE) AT 55.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	Combined for Eight Vehicle Types @ Ambient Temperature 0 F	25 F	50 F	75 F	100 F
1980	0.0	0.0	0.0	5.91	5.43	5.02	4.66	3.95
1980	0.0	100.0	0.0	6.82	6.30	5.84	5.45	4.42
1980	100.0	0.0	100.0	5.90	5.70	5.55	5.44	4.62
1980	50.0	0.0	50.0	6.05	5.71	5.44	5.21	4.42
1980	0.0	50.0	0.0	6.59	6.07	5.61	5.22	4.30
1980	50.0	50.0	50.0	6.36	6.00	5.70	5.44	4.52
1980	20.6	27.3	20.6	6.34	5.90	5.52	5.20	4.34
1985	0.0	0.0	0.0	4.96	4.51	4.12	3.79	2.97
1985	0.0	100.0	0.0	5.61	5.12	4.69	4.33	3.31
1985	100.0	0.0	100.0	5.53	5.11	4.76	4.47	3.32
1985	50.0	0.0	50.0	5.39	4.94	4.56	4.25	3.22
1985	0.0	50.0	0.0	5.44	4.95	4.53	4.17	3.21
1985	50.0	50.0	50.0	5.57	5.11	4.72	4.40	3.31
1985	20.6	27.3	20.6	5.41	4.93	4.53	4.19	3.21
1988	0.0	0.0	0.0	4.62	4.15	3.75	3.41	2.69
1988	0.0	100.0	0.0	5.20	4.66	4.20	3.81	2.99
1988	100.0	0.0	100.0	5.27	4.78	4.36	4.02	2.97
1988	50.0	0.0	50.0	5.08	4.59	4.17	4.02	2.89
1988	0.0	50.0	0.0	5.05	4.52	4.08	3.92	2.90
1988	50.0	50.0	50.0	5.24	4.72	4.28	4.14	2.98
1988	20.6	27.3	20.6	5.05	4.54	4.11	3.95	2.89
1990	0.0	0.0	0.0	4.40	3.92	3.52	3.18	2.16
1990	0.0	100.0	0.0	4.97	4.38	3.89	3.49	2.40
1990	100.0	0.0	100.0	5.00	4.50	4.08	3.72	2.38
1990	50.0	0.0	50.0	4.83	4.33	3.90	3.54	2.32
1990	0.0	50.0	0.0	4.81	4.26	3.80	3.41	2.33
1990	50.0	50.0	50.0	4.98	4.44	3.99	3.60	2.39
1990	20.6	27.3	20.6	4.81	4.28	3.84	3.46	2.32
1995	0.0	0.0	0.0	4.10	3.64	3.24	2.91	1.78
1995	0.0	100.0	0.0	4.70	4.04	3.50	3.06	1.98
1995	100.0	0.0	100.0	4.55	4.08	3.68	3.33	1.97
1995	50.0	0.0	50.0	4.44	3.96	3.55	3.20	1.91
1995	0.0	50.0	0.0	4.52	3.94	3.45	3.05	1.91
1995	50.0	50.0	50.0	4.62	4.06	3.59	3.20	1.97
1995	20.6	27.3	20.6	4.47	3.94	3.49	3.11	1.91
2000	0.0	0.0	0.0	3.94	3.50	3.11	2.79	1.64
2000	0.0	100.0	0.0	4.57	3.89	3.34	2.89	1.83
2000	100.0	0.0	100.0	4.31	3.88	3.50	3.18	1.83
2000	50.0	0.0	50.0	4.23	3.78	3.39	3.06	1.77
2000	0.0	50.0	0.0	4.38	3.79	3.30	2.90	1.77
2000	50.0	50.0	50.0	4.44	3.88	3.42	3.04	1.83
2000	20.6	27.3	20.6	4.30	3.77	3.33	2.96	1.76

TABLE 36 : NOx AT 55.0 MPH.

Appendix J

EMISSION SENSITIVITY TABLES BY VEHICLE TYPE

Appendix J is the same as the Appendix I except that the emission factors are disaggregated by vehicle type. The LDGT category combines LDGT1s and LDGT2s.

TABLE 1

LOW ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE) AT 5.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	-LDDV- 0-100F	-LDDT- 0-100F	-HDDV- 0-100F	----HDGV----
1980	0.0	0.0	0.0	14.81	13.56	12.51	11.63	14.33	24.60	22.85	21.36	20.08	23.28	0.85	1.77	10.10	52.27 @ OF
1980	0.0	100.0	0.0	14.40	14.51	14.68	14.92	20.29	25.57	25.56	25.60	25.68	32.77	0.88	1.80	10.10	46.53 @ 25F
1980	100.0	0 0	100.0	118.18	68.25	39.84	23.64	18.32	189.02	109.83	64.53	38.59	29.55	1.43	2.91	10.10	41.55 @ 50F
1980	50.0	0.0	50.0	55.37	34.97	23.16	16.26	15.76	89.16	56.91	38.18	27.20	25.53	1.07	2.20	10.10	37.25 @ 75F
1980	0 0	50.0	0.0	14.51	13.81	13.26	12.83	16.52	24.77	23.72	22.85	22.12	26.77	0.85	1.75	10.10	41.23 @100F
1980	50.0	50.0	50.0	66.29	41.38	27.26	19.28	19.30	107.29	67.69	45.06	32.14	31.16	1.15	2.35	10.10	
1980	20.6	27.3	20.6	31.21	22.44	17.26	14.17	16.09	51.06	37.23	29.03	24.09	26.08	0.94	1.93	10.10	
1985	0.0	0.0	0.0	9.51	8.26	7.25	6.43	8.95	18.93	16.70	14.88	13.39	18.31	0.67	1.10	8.96	32.71 @ OF
1985	0.0	100.0	0.0	9.32	8.98	8.74	8.58	12.73	18.80	18.39	18.06	17.80	25.89	0.78	1.18	8.96	29.78 @ 25F
1985	100.0	0.0	100.0	89.09	47.50	25.89	14.51	12.12	144.40	81.96	47.00	27.38	20.60	1.18	1.83	8.96	27.22 @ 50F
1985	50.0	0.0	50.0	39.96	23.23	14.32	9.46	10.05	66.67	41.47	27.00	18.59	18.98	0.87	1.37	8.96	25.00 @ 75F
1985	0.0	50.0	0.0	9.30	8.42	7.72	7.18	10.27	18.64	17.14	15.91	14.92	20.95	0.70	1.11	8 96	29.40 @100F
1985	50.0	50.0	50.0	49.20	28.24	17.31	11.54	12.42	81.60	50.18	32.53	22.59	23.25	0.98	1.50	8.96	
1985	20.6	27.3	20.6	21.82	14.45	10.39	8.07	10.11	38.25	27.04	20.38	16.33	20.00	0.77	1.22	8.96	
1988	0 0	0.0	0.0	7.22	6.07	5.16	4.43	6.26	15.91	13.64	11.82	10.36	15.24	0.67	1.06	7.50	24.93 @ OF
1988	0.0	100.0	0.0	7.38	6.82	6.36	6.01	8.95	16.29	15.43	14.72	14.14	21.72	0.78	1.16	7 50	21.91 @ 25F
1988	100.0	0.0	100.0	80.29	39.89	20.36	10.77	10.02	130.85	71.76	39.86	22.55	17.07	1.15	1.77	7.50	19.40 @ 50F
1988	50.0	0.0	50.0	35.07	18.91	10.89	6 79	7.61	58.89	35.32	22.22	14.81	15.74	0.85	1.33	7.50	17.30 @ 75F
1988	0.0	50.0	0.0	7.17	6.26	5.54	4.97	7.19	15.82	14.12	12.75	11.65	17.46	0.70	1.08	7.50	20.56 @100F
1988	50.0	50.0	50.0	43.84	23.35	13.36	8.39	9.49	73.57	43.59	27.29	18.34	19.40	0.96	1.46	7.50	
1988	20.6	27.3	20.6	18.56	11.41	7.70	5.68	7.31	33.39	22.74	16.56	12.87	16.63	0.76	1.18	7.50	
1990	0.0	0.0	0.0	6.04	4.99	4.16	3.51	4.80	13.98	11.80	10.06	8.67	12.97	0.67	1.07	6.69	21.11 @ OF
1990	0.0	100.0	0.0	6.43	5.76	5.22	4.78	6.94	14.51	13.48	12.63	11.93	18.52	0.77	1.17	6.69	18.20 @ 25F
1990	100.0	0.0	100.0	76.19	36.22	17.68	8.96	9.11	123.63	65.53	35.34	19.49	15.43	1.14	1.78	6.69	15.82 @ 50F
1990	50.0	0.0	50.0	32.80	16.85	9.27	5 54	6.39	54.87	31.76	19.39	12.61	13.73	0.85	1.34	6.69	13.88 @ 75F
1990	0.0	50.0	0.0	6.09	5.20	4.50	3.94	5.54	13.97	12.25	10.88	9.78	14.86	0.70	1.09	6.69	16.58 @100F
1990	50.0	50.0	50.0	41.31	20.99	11.45	6.87	8.02	69.07	39.50	23.99	15.71	16.97	0.96	1.48	6.69	
1990	20.6	27.3	20.6	16.99	9.95	6.43	4.57	5.84	30.64	20.18	14.30	10.87	14.29	0.76	1.19	6.69	
1995	0.0	0.0	0.0	4.25	3.44	2.81	2.31	2.59	9.95	8.10	6.65	5.51	7.92	0.69	1.12	5.70	17.50 @ OF
1995	0.0	100.0	0.0	4.98	4.23	3.61	3.10	3.93	10.82	9.52	8.45	7.56	11.42	0.79	1.26	5.70	14.63 @ 25F
1995	100.0	0.0	100.0	69.06	30.50	13.70	6.36	7.85	107.08	51.81	25.64	13.08	12.27	1.14	1.88	5.70	12.33 @ 50F
1995	50.0	0.0	50.0	29.15	13.80	6.95	3.84	4.58	46.39	24.40	13.67	8.26	9.47	0.86	1.41	5.70	10.49 @ 75F
1995	0.0	50.0	0.0	4.46	3.68	3.07	2.58	3.06	10.11	8.50	7.22	6.20	9.10	0.72	1.16	5.70	12.47 @100F
1995	50.0	50.0	50.0	37.02	17.36	8.66	4.73	5.89	58.95	30.67	17.05	10.32	11.84	0.97	1.57	5.70	
1995	20.6	27.3	20.6	14.53	7.80	4.64	3.08	3.66	24.90	14.96	9.82	7.00	9.19	0.78	1.26	5.70	
2000	0.0	0.0	0.0	3.77	3.04	2.48	2.04	2.04	7.33	5.87	4.73	3.84	4.58	0.72	1.18	5.35	16.37 @ OF
2000	0.0	100.0	0.0	4.51	3.79	3.19	2.70	3.18	8.42	7.09	6.00	5.11	6.81	0.82	1.34	5.35	13.50 @ 25F
2000	100.0	0.0	100.0	64.75	28.06	12.33	5.58	7.35	96.07	43.08	19.65	9.24	10.68	1.16	1.98	5.35	11.22 @ 50F
2000	50.0	0.0	50.0	27.28	12.66	6.25	3.38	4.06	41.12	19.97	10.33	5.83	6.86	0.89	1.48	5.35	9.40 @ 75F
2000	0.0	50.0	0.0	3.99	3.28	2.71	2.27	2.45	7.62	6.23	5.14	4.26	5.35	0.75	1.22	5.35	11.16 @100F
2000	50.0	50.0	50.0	34.63	15.92	7.76	4.14	5.26	52.24	25.08	12.83	7.18	8.75	0.99	1.66	5.35	
2000	20.6	27.3	20.6	13.49	7.10	4.14	2.71	3.09	21.27	11.82	7.23	4.88	5.93	0.80	1.32	5.35	

TABLE 1 : THC AT 5.0 MPH.

TABLE 2

LOW ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE) AT 10.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	-LDDV- 0-100F	-LDDT- 0-100F	-HDDV- 0-100F	----HDGV----
1980	0.0	0.0	0.0	9.01	8.29	7.69	7.19	8.75	14.69	13.72	12.89	12.19	13.99	0 67	1.39	7.93	36.95 @ OF
1980	0.0	100.0	0.0	8.78	8.82	8.89	8.99	11.99	15 11	15.09	15.09	15.11	18.93	0.69	1.41	7.93	33.18 @ 25F
1980	100.0	0.0	100.0	65.57	38.20	22.65	13.80	10.86	100.79	59.22	35.47	21.88	17.12	1.12	2.28	7 93	29.93 @ 50F
1980	50.0	0.0	50.0	31.14	19.97	13.50	9.73	9.50	48.48	31.53	21.69	15.92	15.11	0.84	1.73	7 93	27.10 @ 75F
1980	0.0	50.0	0.0	8.84	8.43	8.10	7.84	9.93	14.74	14.15	13.66	13.25	15.81	0.66	1 38	7.93	29.71 @100F
1980	50.0	50.0	50.0	37.18	23.51	15.77	11.39	11.42	57.95	37.15	25.28	18.49	18.02	0.90	1.85	7.93	
1980	20.6	27.3	20.6	17.96	13.13	10.29	8.58	9.69	28.52	21.23	16.90	14.28	15.43	0.74	1.52	7.93	
1985	0.0	0.0	0.0	6.15	5.35	4.72	4.21	5.73	12.03	10.61	9.46	8.52	11.69	0.53	0.86	7.03	24.07 @ OF
1985	0 0	100.0	0.0	6.14	5.87	5.66	5.51	8.00	11.88	11.58	11.34	11.13	16.16	0.61	0.93	7.03	22.15 @ 25F
1985	100.0	0 0	100.0	56.37	29.76	16.19	9.16	7.87	85.28	48.60	28.13	16.69	12.71	0.92	1.43	7 03	20 47 @ 50F
1985	50.0	0.0	50.0	25.31	14.64	9.06	6.06	6.48	39.75	24.95	16.46	11.54	11.95	0.68	1.08	7.03	19.02 @ 75F
1985	0.0	50.0	0.0	6.06	5.48	5.02	4.66	6.52	11.83	10.86	10.07	9.42	13.24	0.55	0.87	7.03	21.90 @100F
1985	50.0	50.0	50.0	31.25	17.82	10.93	7.34	7.93	48.58	30.09	19.73	13 91	14.44	0 77	1.18	7.03	
1985	20.6	27.3	20.6	13.92	9.21	6.65	5.21	6.46	23.23	16.59	12.64	10.23	12.63	0.60	0.96	7.03	
1988	0.0	0.0	0.0	4.95	4.18	3.57	3.09	4 21	10.49	8.99	7.79	6.83	10.06	0.53	0.84	5.89	17.92 @ OF
1988	0.0	100.0	0.0	5.18	4.75	4.40	4.12	5.95	10.74	10.13	9.62	9.20	14.09	0.61	0.91	5.89	15.94 @ 25F
1988	100.0	0.0	100.0	55.31	27.14	13.76	7.29	7.02	82.31	45.07	25.13	14.38	11.02	0.90	1.39	5.89	14.29 @ 50F
1988	50.0	0.0	50.0	24.13	12.89	7.41	4.65	5.24	37.23	22.39	14.19	9.57	10.30	0.67	1.05	5.89	12.92 @ 75F
1988	0.0	50.0	0.0	4.96	4.34	3.84	3.44	4.81	10.44	9.30	8.38	7.63	11.43	0 55	0.85	5.89	15.06 @100F
1988	50.0	50.0	50.0	30.24	15 94	9.08	5.71	6.49	46.53	27.60	17.37	11.79	12.56	0.76	1.15	5 89	
1988	20.6	27.3	20.6	12.79	7.82	5.28	3.92	4.95	21.36	14.61	10.71	8.38	10.89	0.60	0.93	5.89	
1990	0.0	0.0	0.0	4.34	3.61	3.03	2.58	3.38	9 49	8.01	6.83	5.89	8.77	0.53	0.84	5.25	15.06 @ OF
1990	0.0	100.0	0.0	4.71	4.20	3.79	3.45	4.84	9.86	9.12	8.50	7.99	12.33	0.61	0.92	5.25	13.16 @ 25F
1990	100.0	0.0	100.0	54.97	25.89	12.57	6.39	6.68	81.42	42.91	23.12	12.84	10.35	0.89	1 40	5.25	11.60 @ 50F
1990	50.0	0.0	50.0	23.65	12.07	6.63	4.00	4.61	36.24	20.94	12.82	8.41	9.26	0.67	1 05	5.25	10.33 @ 75F
1990	0.0	50.0	0.0	4.41	3.78	3 28	2.88	3.89	9.49	8.31	7.36	6.60	9.97	0.55	0.86	5.25	12.10 @100F
1990	50.0	50.0	50.0	29.84	15.05	8.18	4.92	5.76	45.64	26.01	15.81	10.42	11.34	0.75	1.16	5.25	
1990	20.6	27.3	20.6	12.26	7.15	4 63	3.32	4.15	20.40	13.44	9.56	7.30	9.61	0.60	0.93	5.25	
1995	0 0	0.0	0.0	3.34	2.73	2.25	1.88	2.05	7.30	5.97	4.92	4.10	5.75	0.54	0.88	4.47	12.32 @ OF
1995	0.0	100.0	0.0	3.91	3.33	2.86	2.47	3.06	7.94	6.98	6.19	5.54	8.20	0.62	0.99	4.47	10.45 @ 25F
1995	100.0	0.0	100.0	52.82	23.34	10.53	4.94	6.12	77.47	37.26	18.39	9.42	9.04	0.90	1.48	4.47	8.94 @ 50F
1995	50.0	0.0	50.0	22.35	10.62	5.40	3.03	3.60	33.65	17.65	9.90	6.03	6.93	0.68	1.11	4.47	7.73 @ 75F
1995	0.0	50.0	0.0	3.50	2.91	2.45	2.08	2.41	7.42	6.25	5.32	4.58	6.58	0.57	0.91	4.47	9.03 @100F
1995	50.0	50.0	50.0	28.37	13 33	6.69	3.71	4.59	42.71	22.12	12.29	7.48	8.62	0.76	1.23	4.47	
1995	20.6	27.3	20.6	11.19	6.05	3.64	2.46	2.88	18.11	10.89	7.17	5.14	6.68	0.61	0.99	4.47	
2000	0.0	0.0	0.0	3.03	2.47	2.03	1.70	1.70	5.72	4.61	3.75	3.08	3.60	0.56	0.92	4.20	11.48 @ OF
2000	0.0	100.0	0.0	3.61	3.04	2.58	2.21	2.57	6.53	5.53	4.70	4.03	5.27	0.64	1.05	4.20	9.60 @ 25F
2000	100.0	0.0	100.0	50.11	21.78	9.64	4.43	5.79	73.09	32.79	15.01	7.13	8.29	0.91	1.55	4.20	8.11 @ 50F
2000	50.0	0.0	50.0	21.18	9.90	4.94	2.73	3.26	31.39	15.30	7.98	4.57	5.36	0.70	1.16	4.20	6.92 @ 75F
2000	0.0	50.0	0.0	3.20	2.65	2.22	1.87	2.01	5.93	4.88	4.05	3.39	4.18	0.59	0.96	4.20	8.07 @100F
2000	50.0	50.0	50.0	26.86	12.41	6.11	3.32	4.18	39.81	19.16	9.86	5.58	6.78	0.78	1.30	4.20	
2000	20.6	27.3	20.6	10.53	5.60	3.32	2.21	2.50	16.31	9.12	5.64	3.86	4.63	0.63	1.04	4.20	

TABLE 2 : THC AT 10.0 MPH.

TABLE 3

LOW ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE) AT 19.6 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	-LDDV- 0-100F	-LDDT- 0-100F	-HDDV- 0-100F	----HDGV----
1980	0.0	0.0	0.0	6.01	5.59	5.25	4.96	5.86	9.81	9.25	8.78	8.38	9.42	0.45	0.93	5.30	22.35 @ OF
1980	0.0	100.0	0.0	5.87	5.89	5.92	5.97	7.68	10.01	9.99	9.98	9.98	12.13	0.46	0 94	5.30	20.48 @ 25F
1980	100.0	0.0	100.0	38.04	22.52	13.71	8.70	7.02	57.73	34.55	21.32	13.75	11.09	0.75	1.53	5.30	18.85 @ 50F
1980	50.0	0.0	50.0	18.55	12.21	8.54	6.40	6.27	28.64	19.17	13.67	10.44	10.02	0.56	1.15	5.30	17.44 @ 75F
1980	0 0	50.0	0.0	5.91	5.67	5.48	5.32	6.52	9.82	9.48	9.20	8.96	10.42	0.44	0.92	5.30	18.74 @100F
1980	50.0	50.0	50.0	21.95	14.21	9.82	7.33	7.35	33.87	22.27	15.65	11.86	11.61	0.60	1.24	5.30	
1980	20.6	27.3	20.6	11.08	8.34	6.71	5.74	6.38	17.51	13.43	11.00	9.53	10.20	0.49	1.01	5.30	
1985	0.0	0.0	0.0	4.04	3.57	3.20	2.90	3.78	7.68	6.87	6.21	5 67	7.49	0.35	0.58	4.70	15.84 @ OF
1985	0.0	100.0	0.0	4.04	3.88	3.75	3.65	5.07	7.55	7.39	7.24	7.13	9.98	0.41	0.62	4.70	14.88 @ 25F
1985	100.0	0.0	100.0	33.54	17.83	9.87	5 77	5.06	48.66	28.11	16.64	10.24	8.00	0.62	0.96	4.70	14.05 @ 50F
1985	50.0	0.0	50.0	15.30	9.00	5.72	3.97	4 23	23.20	14.89	10.12	7.36	7.61	0.45	0.72	4.70	13.32 @ 75F
1985	0.0	50.0	0.0	3.99	3.65	3.38	3.16	4.23	7.55	6.99	6.54	6.17	8.35	0.37	0.58	4.70	14.76 @100F
1985	50.0	50.0	50.0	18.79	10.85	6.81	4.71	5.07	28.11	17.75	11.94	8.68	8.99	0.51	0.79	4.70	
1985	20.6	27.3	20.6	8.61	5.83	4.32	3.48	4.21	13.94	10.21	7.98	6.63	8.00	0.40	0.64	4.70	
1988	0 0	0.0	0.0	3.28	2.82	2.45	2.16	2.81	6.58	5.72	5.04	4.49	6.33	0.35	0.56	3.94	11.24 @ OF
1988	0.0	100 0	0.0	3.43	3.16	2.95	2.77	3.83	6.68	6.34	6.05	5.81	8.58	0.41	0.61	3.94	10.26 @ 25F
1988	100.0	0 0	100.0	33.80	16.64	8.55	4.67	4.57	46.90	25.95	14.74	8.71	6.84	0.60	0.93	3.94	9.43 @ 50F
1988	50 0	0.0	50.0	14.91	8.07	4.75	3.09	3.45	21.60	13.24	8.62	6.02	6.45	0.45	0.70	3.94	8.75 @ 75F
1988	0.0	50.0	0.0	3.29	2.91	2.61	2.37	3.16	6.53	5.88	5.36	4.94	7.10	0.37	0.57	3.94	9.81 @100F
1988	50.0	50.0	50.0	18.61	9.90	5.75	3.72	4.20	26.79	16.15	10.40	7.26	7.71	0.51	0.77	3.94	
1988	20.6	27.3	20.6	8.03	5.01	3.48	2.65	3.26	12.68	8.87	6.67	5.36	6.79	0.40	0.62	3.94	
1990	0.0	0.0	0.0	2.90	2.46	2.11	1.83	2.30	5.95	5.10	4.42	3.88	5.51	0.35	0.56	3.51	9.31 @ OF
1990	0.0	100.0	0.0	3.14	2.82	2.57	2.36	3.17	6.14	5.72	5.36	5 06	7.52	0.41	0.61	3.51	8.36 @ 25F
1990	100 0	0.0	100.0	34.12	16.12	7.93	4.14	4.38	47.11	24.98	13.66	7.81	6.45	0.60	0.94	3.51	7.58 @ 50F
1990	50.0	0.0	50.0	14.82	7.66	4.31	2.69	3.07	21.29	12.47	7.82	5.30	5.80	0.45	0.70	3.51	6.95 @ 75F
1990	0.0	50.0	0.0	2.95	2.56	2.26	2.01	2.60	5.94	5.26	4.72	4.28	6.19	0.37	0.57	3.51	7.83 @100F
1990	50.0	50.0	50.0	18.63	9.47	5.25	3.25	3.78	26.63	15.35	9.51	6.44	6.99	0.50	0.77	3.51	
1990	20.6	27.3	20.6	7.79	4.64	3.08	2.28	2.77	12.20	8.19	5.97	4.67	6.00	0.40	0.62	3.51	
1995	0.0	0.0	0.0	2.31	1.92	1.62	1.39	1.49	4.67	3.88	3.26	2.77	3.71	0.36	0.59	2.99	7.40 @ OF
1995	0.0	100.0	0.0	2.67	2.31	2.01	1.76	2.12	5.06	4.48	4.01	3.61	5.14	0.41	0.66	2.99	6.46 @ 25F
1995	100.0	0.0	100.0	33.62	14.94	6.84	3.32	4.08	46.85	22.56	11.24	5.89	5.77	0.60	0.99	2.99	5.71 @ 50F
1995	50.0	0.0	50.0	14.34	6.91	3.61	2.11	2.47	20.55	10.87	6.22	3.91	4.45	0.45	0.74	2.99	5.11 @ 75F
1995	0.0	50.0	0.0	2.41	2.04	1.75	1.52	1.71	4.75	4.05	3.50	3.05	4.19	0.38	0.61	2.99	5.76 @100F
1995	50.0	50.0	50.0	18.14	8.62	4.42	2.54	3.10	25.95	13.52	7.62	4.75	5.46	0.51	0.82	2.99	
1995	20.6	27.3	20.6	7.28	4.02	2.50	1.75	2.01	11.19	6.82	4.59	3.38	4.27	0.41	0.66	2.99	
2000	0.0	0.0	0.0	2.12	1.76	1.49	1.27	1.27	3.81	3.13	2.59	2.18	2.47	0.38	0.62	2.81	6.83 @ OF
2000	0.0	100.0	0.0	2.49	2.13	1.84	1.60	1.83	4.31	3.69	3.18	2.76	3.50	0.43	0.70	2.81	5.89 @ 25F
2000	100.0	0.0	100.0	32.14	14.08	6.34	3.02	3.88	45.82	20.63	9.56	4.66	5.45	0.61	1.04	2.81	5.15 @ 50F
2000	50.0	0.0	50.0	13.69	6.50	3.34	1.93	2.27	19.84	9.77	5.21	3.09	3.58	0.46	0.78	2.81	4.56 @ 75F
2000	0.0	50.0	0.0	2.23	1.88	1.60	1.38	1.47	3.94	3.29	2.78	2.37	2.82	0.39	0.64	2.81	5.13 @100F
2000	50.0	50.0	50.0	17.31	8.10	4.09	2.31	2.86	25.06	12.16	6.37	3.71	4.47	0.52	0.87	2.81	
2000	20.6	27.3	20.6	6.91	3.76	2.31	1.60	1.79	10.43	5.93	3.76	2.65	3.11	0.42	0.69	2.81	

TABLE 3 : THC AT 19.6 MPH.

TABLE 4

LOW ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE) AT 35.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	-LDDV- 0-100F	-LDDT- 0-100F	-HDDV- 0-100F	----HDGV----
1980	0.0	0.0	0.0	4.34	4.12	3.93	3.77	4.24	7.21	6.90	6.63	6.40	6.97	0.28	0.58	3.29	14.38 @ 0F
1980	0.0	100.0	0.0	4.28	4.29	4.31	4.33	5.27	7.32	7.31	7.30	7.30	8.49	0.29	0.59	3.29	13.53 @ 25F
1980	100.0	0.0	100.0	22.76	13.85	8.79	5.90	4.93	34.93	21.52	13.86	9.48	7.93	0.46	0.95	3.29	12.80 @ 50F
1980	50.0	0.0	50.0	11.59	7.94	5.83	4.59	4.49	18.15	12.65	9.46	7.59	7.31	0.35	0.72	3.29	12.16 @ 75F
1980	0.0	50.0	0.0	4.29	4.16	4.06	3.97	4.62	7.22	7.03	6.87	6.73	7.53	0.28	0.57	3.29	12.75 @100F
1980	50.0	50.0	50.0	13.52	9.07	6.55	5.12	5.10	21.13	14.41	10.58	8.39	8.21	0.37	0.77	3.29	
1980	20.6	27.3	20.6	7.28	5.70	4.77	4.22	4.55	11.69	9.32	7.91	7.06	7.41	0.30	0.63	3.29	
1985	0.0	0.0	0.0	2.71	2.47	2.27	2.11	2.56	5.05	4.63	4.29	4.01	4.94	0.22	0.36	2.92	11.34 @ 0F
1985	0.0	100.0	0.0	2.72	2.63	2.56	2.51	3.26	4.98	4.90	4.83	4.77	6.25	0.25	0.38	2.92	10.91 @ 25F
1985	100.0	0.0	100.0	18.72	10.20	5.89	3.66	3.29	26.96	16.00	9.87	6.44	5.25	0.38	0.59	2.92	10.53 @ 50F
1985	50.0	0.0	50.0	8.85	5.42	3.64	2.69	2.82	13.39	8.95	6.40	4.91	5.02	0.28	0.45	2.92	10.21 @ 75F
1985	0.0	50.0	0.0	2.69	2.51	2.36	2.25	2.81	4.98	4.70	4.47	4.28	5.39	0.23	0.36	2.92	10.86 @100F
1985	50.0	50.0	50.0	10.72	6.42	4.22	3.09	3.27	15.97	10.45	7.35	5.61	5.75	0.32	0.49	2.92	
1985	20.6	27.3	20.6	5.20	3.69	2.88	2.42	2.80	8.42	6.43	5.24	4.52	5.22	0.25	0.40	2.92	
1988	0.0	0.0	0.0	2.14	1.90	1.71	1.56	1.89	4.12	3.69	3.35	3.07	3.99	0.22	0.35	2.44	7.60 @ 0F
1988	0.0	100.0	0.0	2.23	2.09	1.97	1.88	2.43	4.17	4.00	3.86	3.75	5.15	0.25	0.38	2.44	7.15 @ 25F
1988	100.0	0.0	100.0	18.62	9.35	4.98	2.89	2.86	25.01	14.18	8.37	5.25	4.29	0.37	0.58	2.44	6.78 @ 50F
1988	50.0	0.0	50.0	8.44	4.73	2.95	2.05	2.24	11.94	7.60	5.21	3.86	4.07	0.28	0.43	2.44	6.47 @ 75F
1988	0.0	50.0	0.0	2.15	1.95	1.79	1.67	2.07	4.10	3.77	3.51	3.30	4.39	0.23	0.35	2.44	6.95 @100F
1988	50.0	50.0	50.0	10.42	5.72	3.48	2.38	2.64	14.59	9.09	6.12	4.50	4.72	0.31	0.48	2.44	
1988	20.6	27.3	20.6	4.72	3.08	2.26	1.82	2.13	7.30	5.33	4.19	3.52	4.23	0.25	0.39	2.44	
1990	0.0	0.0	0.0	1.89	1.65	1.46	1.32	1.55	3.66	3.23	2.89	2.61	3.43	0.22	0.35	2.18	6.17 @ 0F
1990	0.0	100.0	0.0	2.02	1.85	1.71	1.59	2.02	3.76	3.55	3.37	3.22	4.45	0.25	0.38	2.18	5.74 @ 25F
1990	100.0	0.0	100.0	18.80	9 04	4.60	2.56	2.71	24.97	13.50	7.65	4.63	3.95	0.37	0.58	2.18	5.39 @ 50F
1990	50.0	0.0	50.0	8.36	4.46	2.65	1.78	1.98	11.63	7.05	4.65	3.34	3.59	0.28	0.44	2.18	5.10 @ 75F
1990	0.0	50.0	0.0	1.91	1.71	1.54	1.41	1.71	3.66	3.32	3.04	2.82	3.78	0.23	0.36	2.18	5.50 @100F
1990	50.0	50.0	50.0	10.41	5.44	3.15	2.08	2.36	14.37	8.52	5.51	3.92	4.20	0.31	0.48	2.18	
1990	20.6	27.3	20.6	4.54	2.83	1.99	1.56	1.81	6.91	4.83	3.69	3.02	3.68	0.25	0.39	2.18	
1995	0.0	0.0	0.0	1.52	1.31	1.14	1.02	1.07	2.85	2.43	2.11	1.85	2.32	0.23	0.37	1.86	4.71 @ 0F
1995	0.0	100.0	0.0	1.72	1.52	1.35	1.22	1.41	3.05	2.75	2.49	2.29	3.06	0.26	0.41	1.86	4.29 @ 25F
1995	100.0	0.0	100.0	18.71	8.45	4.00	2.07	2.50	25.13	12.25	6.28	3.47	3.46	0.37	0.61	1.86	3.95 @ 50F
1995	50.0	0.0	50.0	8.13	4.04	2.23	1.41	1.61	11.25	6.11	3.66	2.44	2.73	0.28	0.46	1.86	3.68 @ 75F
1995	0.0	50.0	0.0	1.57	1.37	1.21	1.08	1.19	2.89	2.52	2.23	2.00	2.57	0.23	0.38	1.86	3.97 @100F
1995	50.0	50.0	50.0	10.21	4.98	2.68	1.64	1.95	14.09	7.50	4.39	2.88	3.26	0.31	0.51	1.86	
1995	20.6	27.3	20.6	4.25	2.46	1.62	1.21	1.35	6.30	3.98	2.80	2.17	2.62	0.25	0.41	1.86	
2000	0.0	0.0	0.0	1.41	1.21	1.06	0.94	0.94	2.38	2.01	1.72	1.50	1.64	0.23	0.38	1.74	4.29 @ 0F
2000	0.0	100.0	0.0	1.61	1.41	1.25	1.12	1.25	2.65	2.32	2.04	1.81	2.19	0.27	0.44	1.74	3.87 @ 25F
2000	100.0	0.0	100.0	17.98	8.01	3.73	1.90	2.38	25.19	11.49	5.48	2.83	3.28	0.38	0.64	1.74	3.53 @ 50F
2000	50.0	0.0	50.0	7.80	3.82	2.08	1.30	1.49	11.10	5.62	3.14	1.99	2.26	0.29	0.48	1.74	3.26 @ 75F
2000	0.0	50.0	0.0	1.47	1.27	1.12	1.00	1.05	2.45	2.10	1.82	1.60	1.83	0.24	0.40	1.74	3.52 @100F
2000	50.0	50.0	50.0	9.80	4.71	2.49	1.51	1.81	13.92	6.90	3.76	2.32	2.74	0.32	0.54	1.74	
2000	20.6	27.3	20.6	4.05	2.31	1.51	1.12	1.22	5.98	3.53	2.36	1.76	2.00	0.26	0.43	1.74	

TABLE 4 : THC AT 35.0 MPH.

TABLE 5

LOW ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE) AT 50.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	-LDDV- 0-100F	-LDDT- 0-100F	-HDDV- 0-100F	----HDGV----
1980	0.0	0.0	0.0	3.82	3.65	3.51	3.39	3.74	6.39	6.15	5.95	5.77	6.19	0.21	0.44	2.53	12.23 @ OF
1980	0.0	100 0	0.0	3.77	3.78	3.79	3.82	4.51	6 47	6.46	6.45	6.45	7.34	0.22	0.45	2.53	11.66 @ 25F
1980	100.0	0.0	100.0	17.90	11.10	7.22	5.01	4.26	27.72	17.40	11.50	8.12	6.93	0.36	0.73	2.53	11.17 @ 50F
1980	50.0	0.0	50.0	9.38	6.59	4.97	4.02	3.93	14.83	10.59	8.13	6.69	6.46	0.27	0.55	2.53	10.74 @ 75F
1980	0.0	50.0	0.0	3.78	3.69	3.61	3.55	4.02	6.40	6.25	6.13	6.02	6.62	0.21	0.44	2.53	11.14 @100F
1980	50.0	50 0	50.0	10.83	7.44	5.51	4.41	4.39	17.10	11.93	8.98	7.29	7.13	0.29	0.59	2.53	
1980	20.6	27.3	20.6	6.07	4.87	4.16	3.73	3.97	9.85	8.02	6.94	6.28	6.53	0.23	0.48	2.53	
1985	0.0	0.0	0.0	2.27	2.10	1.96	1.85	2.17	4.18	3.89	3.66	3.46	4.09	0.17	0.27	2.24	10.13 @ OF
1985	0.0	100.0	0.0	2.26	2.21	2.17	2.14	2.67	4.13	4.08	4.03	4.00	5.00	0.19	0.29	2.24	9.84 @ 25F
1985	100.0	0.0	100.0	13.50	7.56	4.52	2.95	2.66	19.79	11.99	7.63	5.19	4.34	0.29	0.46	2.24	9.59 @ 50F
1985	50.0	0.0	50.0	6.59	4.19	2.94	2.27	2.35	10.15	6.98	5.16	4.11	4.16	0.22	0.34	2.24	9.37 @ 75F
1985	0.0	50.0	0.0	2.25	2.13	2.03	1.95	2.35	4.13	3.94	3.78	3.65	4.41	0.18	0.28	2.24	9.81 @100F
1985	50.0	50.0	50.0	7.88	4.88	3.35	2.54	2 67	11.96	8.04	5.83	4.59	4.67	0.24	0.38	2.24	
1985	20.6	27.3	20.6	4.02	2.97	2.40	2.07	2.34	6.59	5.18	4.34	3.83	4.29	0.19	0.30	2.24	
1988	0.0	0.0	0.0	1.74	1.58	1.45	1.34	1.57	3.30	3.01	2.78	2 59	3.21	0.17	0.27	1.88	6.61 @ OF
1988	0.0	100.0	0.0	1.79	1.70	1.62	1.56	1.94	3.34	3.22	3.13	3.05	3.99	0.19	0.29	1.88	6.31 @ 25F
1988	100.0	0.0	100.0	12.84	6.62	3.67	2.25	2.21	17.68	10.24	6 25	4.09	3.43	0.29	0.44	1.88	6.06 @ 50F
1988	50.0	0.0	50.0	5.99	3.50	2.29	1.68	1.81	8.70	5.72	4.07	3.14	3.27	0.21	0.33	1.88	5.86 @ 75F
1988	0.0	50.0	0.0	1.74	1.61	1.50	1.42	1.70	3.29	3.07	2.89	2.75	3.48	0.18	0.27	1.88	6.18 @100F
1988	50.0	50.0	50.0	7.32	4.16	2.65	1.91	2.08	10.51	6.73	4.69	3.57	3.71	0.24	0.37	1.88	
1988	20.6	27.3	20.6	3.48	2.38	1.82	1.52	1.74	5.49	4.14	3.37	2.90	3.38	0.19	0.30	1.88	
1990	0.0	0.0	0.0	1.51	1.35	1.22	1.13	1.29	2.87	2.59	2.36	2.18	2.72	0.17	0.27	1.67	5.32 @ OF
1990	0.0	100.0	0.0	1.59	1.48	1.39	1.31	1.60	2.94	2.80	2.68	2.58	3.41	0.19	0.29	1 67	5.03 @ 25F
1990	100 0	0.0	100.0	12.73	6.26	3.32	1.95	2.04	17 24	9.53	5.58	3.54	3.08	0.28	0.45	1.67	4.79 @ 50F
1990	50.0	0.0	50.0	5.80	3.22	2.02	1.44	1.57	8.25	5.18	3.55	2.67	2.83	0.21	0.33	1.67	4.60 @ 75F
1990	0.0	50.0	0.0	1.52	1.39	1.28	1.19	1.40	2.87	2.64	2.46	2.31	2.95	0.18	0.27	1.67	4.87 @100F
1990	50.0	50.0	50.0	7.16	3.87	2.35	1.63	1.82	10.09	6.16	4.13	3.06	3.24	0.24	0.37	1.67	
1990	20.6	27.3	20.6	3.27	2.13	1.58	1.29	1.46	5.07	3.67	2.90	2.45	2.89	0.19	0.30	1.67	
1995	0.0	0.0	0.0	1.19	1.05	0.94	0.86	0.89	2.16	1.89	1.68	1.51	1.81	0.17	0.28	1.42	3.98 @ OF
1995	0.0	100.0	0.0	1.32	1.19	1.08	0.99	1.12	2.30	2.10	1.93	1.79	2.30	0.20	0.31	1.42	3.70 @ 25F
1995	100.0	0.0	100.0	12.43	5.72	2.82	1.55	1.83	16.79	8.34	4.42	2.58	2.56	0.29	0.47	1.42	3.47 @ 50F
1995	50.0	0.0	50.0	5.51	2.84	1.66	1.12	1.25	7.68	4.31	2.70	1.90	2.08	0.22	0.35	1.42	3.29 @ 75F
1995	0.0	50.0	0.0	1.23	1.09	0.99	0.91	0.97	2.19	1.95	1.76	1.60	1.98	0.18	0.29	1.42	3.49 @100F
1995	50.0	50.0	50.0	6.88	3.46	1.95	1.27	1.47	9.54	5.22	3.17	2.18	2.43	0.24	0.39	1.42	
1995	20.6	27.3	20.6	2.97	1.81	1.26	0.99	1.08	4.42	2.91	2.13	1.72	2.01	0.19	0.31	1.42	
2000	0.0	0.0	0.0	1.10	0.97	0.87	0.79	0.79	1.80	1.56	1.37	1.22	1.32	0.18	0.29	1.34	3.61 @ OF
2000	0.0	100.0	0.0	1.23	1.10	1.00	0.91	1.00	1.98	1.76	1.58	1.43	1.68	0.20	0.33	1.34	3.32 @ 25F
2000	100.0	0.0	100.0	11.92	5.41	2.62	1.42	1.74	16.70	7.75	3.82	2.10	2.39	0.29	0.49	1.34	3.09 @ 50F
2000	50.0	0.0	50.0	5.27	2.68	1.54	1.03	1.15	7.49	3.91	2.30	1.55	1.72	0.22	0.37	1.34	2.91 @ 75F
2000	0.0	50.0	0.0	1.14	1.01	0.91	0.83	0.87	1.85	1.62	1.44	1.29	1.44	0.19	0.31	1.34	3.09 @100F
2000	50 0	50.0	50.0	6.58	3.26	1.81	1.17	1.37	9.34	4.75	2.70	1.76	2.03	0.25	0.41	1.34	
2000	20.6	27.3	20.6	2.83	1.69	1.17	0.91	0.98	4.15	2.55	1.78	1.39	1.55	0.20	0.33	1.34	

TABLE 5 : THC AT 50.0 MPH.

TABLE 6

LOW ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE) AT 55.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	-LDDV- 0-100F	-LDDT- 0-100F	-HDDV- 0-100F	----HDGV----
1980	0.0	0.0	0.0	3.70	3.54	3.42	3.31	3.62	6.21	5.99	5.80	5.64	6.02	0.20	0.42	2 42	12.02 @ 0F
1980	0.0	100.0	0.0	3.66	3 67	3.68	3.70	4.34	6.29	6.27	6.26	6.26	7.08	0.21	0.43	2.42	11.48 @ 25F
1980	100.0	0.0	100.0	16.81	10.48	6.87	4.81	4.11	26.09	16.47	10.97	7.82	6.70	0.34	0 70	2.42	11.01 @ 50F
1980	50.0	0 0	50.0	8.89	6.29	4.78	3.89	3.80	14.09	10.13	7.84	6.49	6.27	0.26	0.53	2.42	10.60 @ 75F
1980	0.0	50.0	0.0	3.67	3.58	3.51	3.45	3.89	6.22	6.08	5.96	5.87	6.41	0.20	0.42	2.42	10.98 @100F
1980	50.0	50.0	50.0	10.24	7.08	5.28	4.26	4.23	16.19	11.37	8.62	7.04	6.89	0.28	0.56	2.42	
1980	20.6	27.3	20.6	5.80	4.68	4.02	3.62	3.84	9 43	7.73	6.72	6 11	6.33	0.22	0.46	2.42	
1985	0.0	0.0	0.0	2.17	2.02	1.89	1.80	2.08	3.99	3 73	3.52	3.35	3.91	0.16	0.26	2.14	10.01 @ 0F
1985	0.0	100.0	0.0	2.17	2.12	2.08	2.05	2.54	3.96	3.91	3.87	3.83	4.74	0.19	0.28	2.14	9.74 @ 25F
1985	100.0	0.0	100.0	12.41	7.00	4.23	2.80	2.53	18.31	11 16	7.17	4.93	4.15	0.28	0.44	2.14	9.50 @ 50F
1985	50 0	0.0	50.0	6.11	3.93	2.79	2.17	2.24	9.48	6.57	4.91	3.94	3.98	0.21	0.33	2.14	9.29 @ 75F
1985	0.0	50.0	0.0	2.15	2.04	1.95	1.89	2.24	3.95	3.78	3.64	3.52	4.20	0.17	0 27	2.14	9.70 @100F
1985	50.0	50.0	50.0	7.29	4.56	3.16	2.42	2.53	11.14	7.54	5.52	4.38	4.44	0.23	0.36	2.14	
1985	20.6	27.3	20.6	3.77	2.81	2.29	2.00	2.23	6.21	4.92	4.15	3.68	4.10	0.18	0.29	2.14	
1988	0.0	0.0	0.0	1.66	1.51	1.39	1.30	1.50	3.14	2.88	2.67	2.50	3.05	0.16	0.25	1.80	6.52 @ 0F
1988	0.0	100.0	0.0	1.70	1.62	1 55	1.49	1.84	3.18	3.07	2 99	2.92	3.77	0.19	0.28	1.80	6.23 @ 25F
1988	100.0	0.0	100.0	11.68	6.06	3.40	2.12	2.08	16.29	9.48	5.84	3.87	3.26	0.28	0.42	1.80	5.99 @ 50F
1988	50.0	0.0	50.0	5.49	3.24	2.15	1.60	1.72	8.08	5.35	3.85	3.00	3.11	0.20	0.32	1.80	5.79 @ 75F
1988	0.0	50.0	0.0	1.66	1.54	1.44	1.36	1.62	3.13	2.93	2.77	2.64	3.30	0.17	0.26	1.80	6.10 @100F
1988	50.0	50.0	50.0	6.69	3.84	2.48	1.81	1.96	9.73	6.28	4.41	3.39	3.51	0.23	0.35	1.80	
1988	20.6	27.3	20.6	3.22	2.23	1.73	1.46	1.65	5.15	3.91	3.20	2.78	3.21	0.18	0.28	1.80	
1990	0.0	0.0	0.0	1.43	1.29	1.17	1 09	1.23	2.72	2.46	2.26	2.09	2.58	0.16	0.26	1.60	5.23 @ 0F
1990	0.0	100.0	0.0	1.50	1.40	1.32	1.25	1.51	2.79	2.66	2.55	2.46	3.21	0.19	0.28	1.60	4.96 @ 25F
1990	100.0	0.0	100.0	11.54	5.72	3.06	1.83	1.91	15.80	8.78	5.19	3 33	2.91	0.27	0.43	1.60	4.74 @ 50F
1990	50.0	0.0	50.0	5.30	2.98	1.89	1.37	1.49	7.62	4.82	3.34	2.54	2.69	0.20	0.32	1.60	4.55 @ 75F
1990	0.0	50.0	0.0	1.44	1.32	1.22	1.14	1.33	2.72	2.52	2.35	2.22	2.79	0.17	0.26	1.60	4.81 @100F
1990	50.0	50.0	50.0	6.52	3.56	2.19	1.54	1.71	9.30	5.72	3.87	2.90	3.06	0.23	0.35	1.60	
1990	20.6	27.3	20.6	3.02	1.99	1.49	1.23	1.39	4.72	3.45	2.75	2.34	2.74	0.18	0.28	1 60	
1995	0.0	0.0	0.0	1.13	1.00	0.91	0.83	0.86	2.03	1.79	1.60	1.45	1.72	0.17	0.27	1 36	3.91 @ 0F
1995	0.0	100.0	0.0	1.24	1.12	1.03	0.95	1.06	2.16	1.98	1.83	1 70	2.16	0.19	0.30	1.36	3.64 @ 25F
1995	100.0	0.0	100.0	11.22	5.20	2.59	1.45	1.70	15.26	7.62	4.08	2.41	2.40	0.27	0.45	1.36	3.43 @ 50F
1995	50.0	0.0	50.0	5.01	2.61	1.55	1.06	1.18	7.02	3.97	2.52	1.80	1.96	0.21	0.34	1.36	3.25 @ 75F
1995	0.0	50.0	0.0	1.16	1.04	0.95	0.87	0.93	2.06	1.84	1.67	1.53	1.87	0.17	0.28	1.36	3.44 @100F
1995	50.0	50.0	50.0	6.23	3.16	1.81	1.20	1.38	8.71	4.80	2.95	2.06	2.28	0.23	0.38	1 36	
1995	20.6	27.3	20.6	2.73	1.68	1.19	0.95	1.03	4.08	2.71	2.01	1.64	1.90	0.19	0.30	1.36	
2000	0.0	0.0	0.0	1.04	0.93	0.84	0.77	0.77	1.69	1.47	1.30	1.17	1.26	0.17	0.28	1.28	3.54 @ 0F
2000	0.0	100.0	0.0	1.16	1.04	0.95	0.87	0.95	1.85	1.65	1.49	1.36	1.58	0.20	0.32	1.28	3.27 @ 25F
2000	100.0	0.0	100.0	10.74	4.91	2.40	1.33	1.61	15.11	7.05	3.52	1.96	2.22	0.28	0.47	1.28	3.05 @ 50F
2000	50.0	0.0	50.0	4.78	2.46	1.44	0.98	1.09	6.82	3.59	2.14	1.46	1.62	0.21	0.35	1.28	2.88 @ 75F
2000	0.0	50.0	0.0	1.08	0.96	0.87	0.80	0.83	1.73	1.53	1.36	1.23	1.37	0.18	0.29	1.28	3.05 @100F
2000	50.0	50.0	50.0	5.95	2.98	1.68	1.10	1.28	8.48	4.35	2.50	1.66	1.90	0.24	0.40	1.28	
2000	20.6	27.3	20.6	2.59	1.57	1.10	0.87	0.93	3.81	2.37	1.68	1.32	1.47	0.19	0.32	1.28	

TABLE 6 : THC AT 55.0 MPH.

TABLE 7

LOW ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE) AT 5.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	-LDDV- 0-100F	-LDDT- 0-100F	-HDDV- 0-100F	----HDGV----
1980	0.0	0.0	0.0	181.00	162.21	146.89	134.39	275.49	272.66	245.22	222.46	203.59	372.06	2.60	4.29	39.13	650.51 @ 0F
1980	0.0	100.0	0.0	127.37	132.51	138.51	145.45	277.90	198.40	205.54	213 36	221.94	413.96	4.41	7.45	39.13	592.94 @ 25F
1980	100.0	0.0	100.0	1530.38	896.75	528.12	311.85	192.81	2171.84	1284.37	764.49	458.24	267.92	5.44	9.13	39.13	540.94 @ 50F
1980	50.0	0.0	50.0	693.77	440.91	291.01	200.85	239.73	998.59	641.96	428.83	299.83	327.49	3.65	6.07	39.13	493.95 @ 75F
1980	0.0	50.0	0.0	158.20	148.93	142.06	137.23	272.42	241.59	227.83	217.13	209.04	383.53	3.26	5.44	39.13	842.23 @100F
1980	50.0	50.0	50.0	828.88	514.63	333.32	228.65	235.35	1185.12	744.95	488 93	340.09	340.94	4.92	8.29	39.13	
1980	20.6	27.3	20.6	377.91	268.73	203.05	163.01	259.07	552.11	397.70	303.76	245.77	359.89	3.38	5.64	39.13	
1985	0.0	0.0	0.0	118.18	96.82	80.98	69.05	167.66	215.93	183.33	157.20	136.14	313.98	2.70	3.12	33.24	522.62 @ 0F
1985	0.0	100.0	0.0	83.12	79.14	76.94	76.23	150.22	144.29	144.55	145.65	147.54	297.60	4.22	5.45	33.24	476.98 @ 25F
1985	100.0	0.0	100.0	994.95	582.50	331.42	168.64	107.75	1737.99	993.92	568.23	321.09	189.17	5.52	6 67	33.24	436.99 @ 50F
1985	50.0	0.0	50.0	447.46	278.79	174.33	105.53	141.42	778.35	482.24	308.02	203.10	261.48	3.74	4.43	33.24	401.80 @ 75F
1985	0.0	50.0	0.0	102.36	88.15	77.90	70.54	157.50	185.37	165.76	150.37	138.34	302.14	3.25	3.97	33.24	708.37 @100F
1985	50.0	50.0	50.0	539.03	330.82	204.18	122.43	128.98	941.14	569.23	356.94	234.32	243.38	4.87	6.06	33.24	
1985	20.6	27.3	20.6	243.96	166.35	117.37	84.70	151.31	428.70	295.66	214.94	164.56	285.91	3.42	4.11	33.24	
1988	0.0	0.0	0.0	97.19	72.83	56.01	44.21	109.49	181.07	146.32	119.97	99.72	251.76	2.72	3.03	30.32	346.72 @ 0F
1988	0.0	100 0	0.0	73.75	64.04	57.08	52.24	97.92	123.06	117.12	113.06	110.52	228.87	4.24	5.31	30.32	312.41 @ 25F
1988	100.0	0.0	100.0	768.54	452.35	254.27	117.05	76.74	1426.99	817.47	462.91	248.33	147 93	5.62	6.50	30.32	282.57 @ 50F
1988	50.0	0.0	50.0	348.12	214.41	129.62	70.70	94.50	638.54	392.25	245.00	153.04	207.93	3.79	4 31	30.32	256.52 @ 75F
1988	0.0	50.0	0.0	85.84	67.70	55.08	46 24	102.41	155.69	132.50	115.07	101.88	237.95	3.27	3 86	30.32	427.03 @100F
1988	50.0	50.0	50.0	421.15	258.20	155.68	84.64	87.33	775.03	467.29	287.99	179.43	188.40	4.93	5.90	30.32	
1988	20.6	27.3	20.6	193.40	127.79	85.51	56.08	99.44	353.82	239.06	168.24	122.57	226.19	3.45	4.00	30.32	
1990	0.0	0.0	0.0	88.36	62.24	44 86	33.15	78.77	162.75	126.22	99.65	79.99	207.77	2.72	3.02	28.96	260.28 @ 0F
1990	0.0	100.0	0.0	70.58	57.86	48.48	41.62	72.70	113.56	103.40	95.99	90.69	185.73	4.24	5 30	28.96	232.44 @ 25F
1990	100.0	0.0	100.0	651.94	387.47	217.60	94.04	63.60	1251.16	712.57	399.45	205.90	125.87	5.65	6.49	28.96	208.28 @ 50F
1990	50.0	0.0	50.0	298.71	183.49	109.01	55.28	71.08	561.90	340.80	208.80	125.00	172.84	3.80	4 30	28.96	187.28 @ 75F
1990	0.0	50.0	0.0	79.23	58.92	45.05	35.49	74.41	140.69	114.90	96.12	82.27	194.89	3.27	3.85	28.96	303.44 @100F
1990	50.0	50.0	50.0	361.26	222.67	133.04	67.83	68.15	682.36	407.99	247.72	148.29	155.80	4.94	5.89	28.96	
1990	20.6	27.3	20.6	169.21	109.88	71.11	43.42	73.19	313.51	207.54	142.19	99.52	186.36	3.45	3.99	28.96	
1995	0.0	0.0	0.0	77.37	49.31	31.58	20.35	34.87	130.83	90.42	63.53	45.42	112.15	2.74	3.07	27.20	155.54 @ 0F
1995	0.0	100.0	0.0	67.04	50.54	38.28	29.15	40.57	101.02	82.09	67.89	57.21	104.09	4.29	5.42	27.20	136.46 @ 25F
1995	100.0	0.0	100.0	493.19	302.40	171.68	66.66	47.70	939.92	523.50	285.45	131.40	86.32	5.79	6.62	27.20	119.98 @ 50F
1995	50.0	0.0	50.0	233.09	144.07	83.93	37.35	38.81	428.75	249.54	144.71	76.23	100.02	3.86	4.38	27.20	105.73 @ 75F
1995	0.0	50.0	0.0	71.25	48.38	33.23	23.11	36.05	116.18	84.93	63.49	48.62	106.32	3.30	3.93	27.20	151.86 @100F
1995	50.0	50.0	50.0	280.12	176.47	104.98	47.91	44.13	520.47	302.80	176.67	94.30	95.20	5.04	6.02	27.20	
1995	20.6	27.3	20.6	137.56	87.45	53.81	28.76	37.08	244.34	152.29	96.58	59.67	103.93	3.50	4.07	27.20	
2000	0.0	0.0	0.0	74.03	46.25	28.90	18.06	25.53	115.58	73.48	46.90	30.07	54.49	2.78	3.13	26.28	120.35 @ 0F
2000	0.0	100.0	0.0	64.76	48.03	35.63	26.43	33.67	95.43	71.98	54.52	41.50	60.43	4.36	5.54	26.28	104.53 @ 25F
2000	100.0	0.0	100.0	451.80	281.60	161.00	60.56	44.20	785.67	428.91	229.06	95.40	67.26	5.92	6.76	26.28	90.90 @ 50F
2000	50.0	0.0	50.0	215.90	134.63	78.42	33.74	31.92	365.88	205.94	114.54	53.91	58.02	3.93	4.47	26.28	79.17 @ 75F
2000	0.0	50.0	0.0	68.40	45.62	30.64	20.73	27.91	104.69	70.85	48.47	33.55	55.28	3.35	4.01	26.28	101.70 @100F
2000	50.0	50.0	50.0	258.28	164.82	98.31	43.49	38.94	440.55	250.45	141.79	68.45	63.84	5.14	6.15	26.28	
2000	20.6	27.3	20.6	128.83	81.95	50.03	25.89	29.40	211.75	126.06	75.31	41.65	56.30	3.56	4.15	26.28	

TABLE 7 : CO AT 5.0 MPH.

TABLE 8

LOW ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE) AT 10.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	-LDDV- 0-100F	-LDDT- 0-100F	-HDDV- 0-100F	----HDGV----
1980	0.0	0.0	0.0	95.21	84.61	76.03	69.06	146.06	136.93	122.81	111.15	101.53	189.08	1.79	2.96	26.98	432.79 @ 0F
1980	0.0	100.0	0.0	67.32	69.55	72.21	75.33	144.69	100.02	103.32	106.94	110.93	206.73	3.04	5.13	26.98	394.49 @ 25F
1980	100.0	0.0	100.0	817.22	475.91	278.43	163.01	100.74	1100.24	648.38	384.79	230.10	135.27	3.75	6.29	26.98	359.89 @ 50F
1980	50.0	0.0	50.0	367.92	232.20	152.08	104.01	126.46	504.23	322.99	215.08	149.98	165.97	2.51	4.19	26.98	328.63 @ 75F
1980	0.0	50.0	0.0	83.25	77.76	73.63	70.65	143.28	121.38	114.16	108.54	104.28	193.39	2.25	3.75	26.98	560.35 @100F
1980	50.0	50.0	50.0	442.27	272.73	175.32	119.17	122.72	600.13	375.85	245.87	170.51	171.00	3.39	5.71	26.98	
1980	20.6	27.3	20.6	200.01	141.11	105.74	84.16	136.46	278.41	199.81	152.13	122.77	181.88	2.33	3.89	26.98	
1985	0.0	0.0	0.0	70.98	56.64	46.22	38.53	96.12	123.44	103.34	87.43	74.75	182.61	1.86	2.15	22.92	347.71 @ 0F
1985	0.0	100.0	0.0	51.88	48.01	45.46	43.96	86.16	83.68	82.82	82.52	82.71	168.66	2.91	3.76	22.92	317.34 @ 25F
1985	100.0	0.0	100.0	613.42	360.32	203.62	98.87	63.36	1022.36	580.88	329.32	183.32	108.84	3.81	4.60	22.92	290.73 @ 50F
1985	50.0	0.0	50.0	273.51	169.84	104.63	60.50	81.69	452.37	277.74	175.32	113.63	151.59	2.58	3.05	22.92	267.32 @ 75F
1985	0.0	50.0	0.0	62.16	52.15	44.97	39.82	90.23	106.30	93.79	84.03	76.41	173.84	2.24	2.74	22.92	471.29 @100F
1985	50.0	50.0	50.0	332.65	204.17	124.54	71.42	74.76	553.02	331.85	205.92	133.01	138.75	3.36	4.18	22.92	
1985	20.6	27.3	20.6	148.82	100.38	69.35	48.17	86.96	248.24	169.24	121.38	91.45	165.06	2.36	2.83	22.92	
1988	0.0	0.0	0.0	65.62	47.73	35.60	27.24	67.24	112.09	88.64	71.20	58.04	155.09	1.87	2.09	20.91	230.68 @ 0F
1988	0.0	100.0	0.0	51.73	43.69	37.81	33.57	61.43	78.41	73.07	69.15	66.37	138.55	2.92	3.66	20.91	207.85 @ 25F
1988	100.0	0.0	100.0	522.46	309.39	173.42	76.35	50.49	902.75	516.35	290.78	152.52	91.73	3.88	4.48	20.91	187.99 @ 50F
1988	50.0	0.0	50.0	235.70	145.05	86.66	45.05	59.35	400.25	244.29	150.74	91.69	128.30	2.61	2.97	20.91	170.67 @ 75F
1988	0.0	50.0	0.0	58.66	44.99	35.54	28.96	63.36	97.09	80.93	68.92	59.91	145.50	2.25	2.66	20.91	284.11 @100F
1988	50.0	50.0	50.0	287.09	176.54	105.62	54.96	55.96	490.58	294.71	179.96	109.45	115.14	3.40	4.07	20.91	
1988	20.6	27.3	20.6	131.22	85.93	56.38	35.42	61.85	221.41	147.88	102.35	72.73	138.83	2.38	2.76	20.91	
1990	0.0	0.0	0.0	63.95	44.04	30.94	22.23	51.38	106.69	80.79	62.31	48.90	132.51	1.87	2.08	19.97	173.17 @ 0F
1990	0.0	100.0	0.0	52.56	42.27	34.64	29.01	49.14	77.05	68.55	62.20	57.50	117.65	2.92	3.66	19.97	154.64 @ 25F
1990	100.0	0.0	100.0	471.85	282.14	158.39	66.26	45.14	834.77	474.96	264.97	133.26	82.28	3.90	4.47	19.97	138.57 @ 50F
1990	50.0	0.0	50.0	215.82	132.65	78.22	38.22	47.79	372.31	224.37	135.79	78.91	110.99	2.62	2.96	19.97	124.60 @ 75F
1990	0.0	50.0	0.0	57.90	42.18	31.51	24.19	49.19	93.10	74.33	60.81	50.95	123.88	2.25	2.66	19.97	201.88 @100F
1990	50.0	50.0	50.0	262.21	162.21	96.52	47.63	47.14	455.91	271.75	163.58	95.38	99.97	3.41	4.06	19.97	
1990	20.6	27.3	20.6	122.61	79.16	50.52	29.80	48.67	207.59	135.79	91.42	62.21	118.94	2.38	2.75	19.97	
1995	0.0	0.0	0.0	61.30	38.92	24.82	15.90	26.53	97.95	66.73	46.14	32.42	79.67	1.89	2.12	18.76	103.48 @ 0F
1995	0.0	100.0	0.0	53.34	40.10	30.27	22.95	31.56	77.07	61.88	50.47	41.88	74.97	2.96	3.74	18.76	90.79 @ 25F
1995	100.0	0.0	100.0	390.09	239.64	136.15	52.60	37.73	707.39	393.88	214.37	97.18	64.30	3.99	4.57	18.76	79.82 @ 50F
1995	50.0	0.0	50.0	184.40	114.07	66.42	29.38	30.09	322.24	186.90	107.69	55.64	72.19	2.66	3.02	18.76	70.35 @ 75F
1995	0.0	50.0	0.0	56.54	38.27	26.18	18.13	27.70	87.49	63.13	46.52	35.07	75.89	2.28	2.71	18.76	101.04 @100F
1995	50.0	50.0	50.0	221.71	139.87	83.21	37.78	34.65	392.23	227.88	132.42	69.53	69.63	3.47	4.15	18.76	
1995	20.6	27.3	20.6	108.92	69.21	42.52	22.59	28.59	183.71	113.75	71.42	43.29	74.49	2.41	2.80	18.76	
2000	0.0	0.0	0.0	59.47	37.16	23.21	14.50	20.51	92.44	58.71	37.42	23.96	43.10	1.91	2.16	18.12	80.07 @ 0F
2000	0.0	100.0	0.0	52.02	38.59	28.62	21.23	27.05	76.36	57.54	43.53	33.08	47.98	3.01	3.82	18.12	69.54 @ 25F
2000	100.0	0.0	100.0	362.95	226.22	129.33	48.65	35.51	627.65	342.66	182.98	76.09	53.69	4.08	4.66	18.12	60.48 @ 50F
2000	50.0	0.0	50.0	173.44	108.15	63.00	27.10	25.64	292.45	164.57	91.50	42.99	46.07	2.71	3.08	18.12	52.67 @ 75F
2000	0.0	50.0	0.0	54.94	36.65	24.62	16.66	22.42	83.74	56.62	38.68	26.73	43.79	2.31	2.77	18.12	67.67 @100F
2000	50.0	50.0	50.0	207.49	132.40	78.98	34.94	31.28	352.01	200.10	113.25	54.59	50.84	3.55	4.24	18.12	
2000	20.6	27.3	20.6	103.50	65.83	40.19	20.80	23.62	169.29	100.74	60.14	33.20	44.64	2.45	2.86	18.12	

TABLE 8· : CO AT 10.0 MPH.

TABLE 9

LOW ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE) AT 19.6 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	-LDDV- 0-100F	-LDDT- 0-100F	-HDDV- 0-100F	----HDGV----
1980	0.0	0.0	0.0	52.62	46.49	41.54	37.55	81.42	74.07	66.20	59.73	54.43	103.77	1.00	1.65	15.01	230.91 @ OF
1980	0.0	100.0	0.0	37.13	38.17	39.44	40.96	78.82	53.99	55.61	57.40	59.37	110.47	1.69	2.86	15.01	210.48 @ 25F
1980	100.0	0.0	100.0	450.61	261.41	152.33	88.76	54.96	593.45	348.68	206.43	123.22	73.08	2.09	3.50	15.01	192.02 @ 50F
1980	50.0	0.0	50.0	203.07	127.60	83.18	56.58	69.92	272.38	173.92	115.50	80.36	90.49	1.40	2.33	15.01	175.34 @ 75F
1980	0.0	50.0	0.0	45.91	42.65	40.18	38.37	79.07	65.52	61.43	58.25	55.82	104.87	1.25	2.09	15.01	298.97 @100F
1980	50.0	50.0	50.0	243.87	149.79	95.89	64.86	66.89	323.72	202.14	131.91	91.30	91.77	1.89	3.18	15.01	
1980	20.6	27.3	20.6	110.38	77.50	57.78	45.75	75.40	150.38	107.58	81.67	65.75	98.88	1.30	2.16	15.01	
1985	0.0	0.0	0.0	41.84	32.96	26.56	21.87	55.58	68.96	57.34	48.20	40.96	102.76	1.04	1.20	12.75	185.52 @ OF
1985	0.0	100.0	0.0	30.92	28.23	26.39	25.20	49.25	46.77	46.01	45 59	45.47	93.04	1.62	2.09	12.75	169.32 @ 25F
1985	100.0	0.0	100.0	362.91	213.46	120.23	57.05	36.65	571.10	323.92	183.13	101.26	60.46	2.12	2.56	12.75	155.12 @ 50F
1985	50 0	0.0	50.0	161.88	100.33	61.35	34.68	47.16	252.74	154.70	97.21	62.53	84.89	1.43	1.70	12.75	142.63 @ 75F
1985	0.0	50 0	0.0	36.72	30.42	25.91	22.67	51.89	59.31	52.00	46.31	41.88	97.01	1.25	1.52	12.75	251.45 @100F
1985	50.0	50.0	50.0	196.91	120.85	73.31	41.13	42.95	308.93	184.97	114.36	73.36	76.75	1.87	2.33	12.75	
1985	20.6	27.3	20.6	88.03	59.06	40.39	27.52	50.09	138.65	94.12	67.14	50.23	92.27	1.31	1.58	12.75	
1988	0.0	0.0	0.0	40.54	29.13	21.44	16.17	39.98	64.76	50.66	40.27	32.50	88.99	1.04	1.16	11.63	123.07 @ OF
1988	0.0	100.0	0.0	32.28	26.96	23.04	20.18	36.51	45.64	42.07	39.40	37.46	78.40	1.63	2.04	11.63	110.90 @ 25F
1988	100.0	0.0	100.0	321.70	191.00	106.93	46.16	30.67	520.84	298.21	167.70	86.95	52.59	2.16	2.49	11.63	100.30 @ 50F
1988	50.0	0 0	50.0	145.39	89.43	53.16	27.06	35.48	231.15	140.83	86.47	51.90	73.51	1.45	1.65	11.63	91.06 @ 75F
1988	0.0	50.0	0.0	36.33	27.55	21.49	17.28	37.63	56.15	46.31	39.05	33.62	82.99	1.25	1.48	11.63	151.58 @100F
1988	50.0	50.0	50.0	176.99	108.98	64.99	33.17	33.59	283.24	170.14	103.55	62.21	65.50	1.89	2.26	11.63	
1988	20.6	27.3	20.6	81.03	52 86	34.40	21.20	36.83	127.92	85.05	58.42	40.99	79.34	1.32	1.53	11.63	
1990	0.0	0.0	0.0	40.48	27.64	19 22	13.66	31.20	63.32	47.38	36.11	28.01	77.04	1.04	1.16	11.11	92.39 @ OF
1990	0.0	100 0	0.0	33.52	26.76	21.73	18.01	30.08	46.22	40.63	36.42	33.28	67.92	1.63	2.03	11.11	82 51 @ 25F
1990	100.0	0.0	100.0	297.37	178.28	100.08	41 30	28.23	494.41	281.61	156 91	77 89	48.36	2 17	2.49	11.11	73 93 @ 50F
1990	50.0	0.0	50.0	136.27	83.78	49.27	23.71	29.30	220.86	132.85	79.99	45.78	64.65	1.46	1.65	11.11	66.48 @ 75F
1990	0 0	50.0	0.0	36.73	26.55	19.65	14.93	29.94	55.39	43.71	35.35	29 29	71.78	1.25	1.48	11.11	107.71 @100F
1990	50.0	50.0	50.0	165.45	102.52	60.91	29.65	29.16	270.32	161.12	96.67	55.58	58.14	1.90	2 26	11.11	
1990	20.6	27.3	20.6	77.51	49.94	31.70	18.44	29.71	123.24	80.22	53.57	35.93	69.06	1.32	1.53	11 11	
1995	0.0	0.0	0.0	40.02	25.38	16.15	10.33	17.03	61.68	41.68	28.56	19.87	48.23	1.05	1.18	10.44	55.21 @ OF
1995	0.0	100.0	0.0	34.87	26.18	19.73	14.93	20.41	48.88	38.94	31.48	25.87	45.71	1.65	2.08	10.44	48.44 @ 25F
1995	100.0	0.0	100.0	254.25	156.33	88.85	34.24	24.60	443.61	247.15	134.44	60.34	40.11	2.22	2.54	10.44	42.59 @ 50F
1995	50.0	0.0	50.0	120.27	74.43	43.33	19.12	19.45	202.56	117.32	67.39	34.42	44.12	1.48	1.68	10.44	37.53 @ 75F
1995	0.0	50.0	0.0	36.93	24.97	17.05	11.78	17.84	55.20	39.53	28.88	21.57	46.05	1.27	1.51	10.44	53.91 @100F
1995	50.0	50.0	50.0	144.56	91.26	54.29	24.59	22.50	246.24	143.04	82.96	43.11	42.91	1.93	2.31	10.44	
1995	20.6	27.3	20.6	71.07	45.16	27.72	14.69	18.44	115.60	71.34	44.55	26.71	45.32	1.34	1.56	10.44	
2000	0.0	0.0	0.0	39.06	24.40	15.25	9.53	13.47	60.24	38.19	24.29	15.51	27.54	1.07	1.20	10.08	42.72 @ OF
2000	0.0	100.0	0.0	34.17	25.34	18.80	13.94	17.77	49.81	37.47	28.28	21.44	30.87	1.67	2.13	10.08	37.10 @ 25F
2000	100.0	0.0	100.0	238.37	148.57	84.94	31.95	23.32	408.24	222.88	119.00	49.34	34.88	2.27	2.59	10.08	32.27 @ 50F
2000	50.0	0.0	50.0	113.91	71.03	41.37	17.80	16.84	190.39	107.10	59.50	27.87	29.64	1.51	1.71	10.08	28.10 @ 75F
2000	0.0	50.0	0.0	36.08	24.07	16.17	10.94	14.73	54.59	36.84	25.12	17.31	28.06	1.29	1.54	10.08	36.10 @100F
2000	50.0	50.0	50.0	136.27	86.96	51.87	22.95	20.54	229.02	130.18	73.64	35 39	32.87	1.97	2.36	10.08	
2000	20.6	27.3	20.6	67.97	43.24	26.40	13.66	15.51	110.25	65.56	39.09	21.52	28.65	1.36	1.59	10.08	

TABLE 10

LOW ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE) AT 35.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	LDDV- 0-100F	LDDT- 0-100F	HDDV- 0-100F	HDGV
1980	0.0	0.0	0.0	28.16	25.07	22.58	20.57	43.17	40.62	36.55	33.21	30.49	56.59	0.55	0.91	8.32	128.74 @ 0F
1980	0.0	100.0	0.0	20.09	20.70	21.43	22.30	42.26	30.15	31 07	32.08	33.19	60.77	0.94	1.58	8.32	117.34 @ 25F
1980	100.0	0.0	100.0	236.05	137.83	80.90	47.53	29.45	319.84	189.08	112.71	67.79	40.36	1.16	1.94	8.32	107.05 @ 50F
1980	50.0	0.0	50.0	107.33	67.94	44.66	30.67	37.19	147.77	95.01	63.59	44.63	49.56	0.78	1.29	8.32	97.75 @ 75F
1980	0.0	50.0	0.0	24.66	23.06	21.86	20.99	42.13	36.15	34.08	32.47	31.27	57.42	0.69	1.16	8.32	166.68 @100F
1980	50.0	50.0	50.0	128.07	79.27	51.17	34.91	35.85	174.99	110.07	72.39	50.49	50.57	1 05	1.76	8.32	
1980	20.6	27.3	20.6	58.58	41.47	31.19	24.91	40.14	81.94	59.07	45.21	36.67	54.14	0.72	1.20	8.32	
1985	0.0	0.0	0.0	21.26	16.81	13.61	11.27	28.13	34.06	28.51	24.15	20.70	50.08	0.57	0.66	7.07	103.43 @ 0F
1985	0.0	100.0	0.0	15.64	14.31	13.41	12.85	24.94	23.09	22.79	22.66	22.69	45.83	0.90	1.16	7.07	94.39 @ 25F
1985	100.0	0.0	100.0	182.49	107.68	60.82	28.94	18.61	275.27	157.17	89.47	49.82	29.70	1.17	1.42	7.07	86.48 @ 50F
1985	50.0	0.0	50.0	81.89	50.91	31.24	17.75	23.87	123.13	75.92	48.09	31.22	41.43	0.80	0.94	7.07	79.52 @ 75F
1985	0.0	50.0	0.0	18.63	15.49	13.25	11.64	26.27	29.29	25.84	23.16	21.09	47.48	0.69	0 84	7.07	140.19 @100F
1985	50.0	50.0	50.0	99.06	60.99	37.12	20.90	21.77	149.18	89.98	56.07	36.25	37.76	1.04	1.29	7 07	
1985	20.6	27.3	20.6	44.57	30.00	20.60	14.11	25.36	67.80	46 39	33.37	25.19	45.10	0.73	0.87	7.07	
1988	0 0	0.0	0.0	20.36	14.62	10.76	8.13	19.86	31.35	24.56	19.58	15.86	42.42	0.58	0 64	6.45	68.62 @ 0F
1988	0.0	100.0	0.0	16.16	13.47	11.50	10.06	18 09	21.99	20.25	18.97	18.05	37.54	0.90	1.13	6.45	61.83 @ 25F
1988	100.0	0.0	100.0	160.38	95.45	53.51	23.02	15.32	247.82	142.63	80.54	41.78	25.23	1 20	1.38	6.45	55 92 @ 50F
1988	50 0	0.0	50.0	72.80	44.85	26.68	13.56	17.63	110.89	67.87	41.83	25.16	35.06	0.81	0.92	6.45	50.77 @ 75F
1988	0.0	50.0	0.0	18.22	13.80	10.76	8.66	18.67	27.14	22.40	18.93	16.34	39.62	0 69	0.82	6 45	84.51 @100F
1988	50.0	50.0	50.0	88.27	54.46	32.50	16.54	16.71	134.91	81.44	49.76	29.92	31.38	1.05	1.26	6.45	
1988	20.6	27.3	20.6	40.59	26.51	17.25	10.62	18.29	61.49	41.04	28.29	19.91	37.86	0.73	0.85	6.45	
1990	0.0	0 0	0.0	20.32	13.85	9.62	6.82	15.39	30.64	22.88	17.42	13.51	36.44	0.58	0.64	6.16	51 51 @ 0F
1990	0.0	100.0	0.0	16.82	13.38	10.84	8.95	14.84	22.29	19.51	17.43	15.89	32.22	0.90	1.13	6.16	46.00 @ 25F
1990	100.0	0.0	100.0	148.31	89.12	50.08	20.56	14.09	235.66	134.77	75.29	37.23	23.12	1 20	1.38	6 16	41.22 @ 50F
1990	50.0	0.0	50.0	68.21	41.99	24.69	11.84	14.50	106.03	63.95	38.56	22.02	30.64	0.81	0.91	6.16	37.06 @ 75F
1990	0.0	50.0	0.0	18.43	13.29	9.82	7.45	14.76	26.76	21 06	17.01	14.08	33.98	0 69	0.82	6.16	60.05 @100F
1990	50.0	50.0	50.0	82.56	51.25	30.46	14.76	14.47	128.98	77.14	46.36	26.56	27.67	1.05	1.25	6.16	
1990	20.6	27.3	20.6	38.83	25.02	15.87	9.20	14.67	59.27	38.63	25.81	17.28	32.71	0.73	0.85	6.16	
1995	0.0	0.0	0.0	20.29	12.85	8.17	5.21	8.51	30.32	20.37	13.87	9.58	22.72	0.58	0.65	5.79	30.78 @ 0F
1995	0.0	100.0	0.0	17.69	13.26	9.98	7.54	10.25	24.07	19.05	15.29	12.46	21.71	0.91	1.15	5.79	27.00 @ 25F
1995	100.0	0.0	100.0	128.61	79.15	45.00	17.30	12.44	215.82	120.41	65.52	29.15	19.46	1.23	1.41	5.79	23.74 @ 50F
1995	50.0	0.0	50.0	60.90	37.70	21.95	9.66	9.78	99.01	57.34	32.88	16.65	20.97	0.82	0.93	5.79	20.92 @ 75F
1995	0.0	50.0	0.0	18.72	12.64	8.62	5.95	8.93	27.14	19.32	14.03	10.40	21.75	0.70	0.84	5.79	30.05 @100F
1995	50.0	50.0	50.0	73.15	46.21	27.49	12 42	11.34	119.95	69.73	40.40	20.81	20.58	1.07	1.28	5.79	
1995	20.6	27.3	20.6	36.01	22.87	14.03	7.42	9.25	56.61	34.87	21.70	12.90	21.45	0.74	0.87	5.79	
2000	0.0	0.0	0.0	19.90	12.43	7.77	4.85	6.86	30.37	19.20	12.18	7.75	13.51	0.59	0.67	5.59	23.82 @ 0F
2000	0.0	100.0	0.0	17.41	12.91	9.58	7.10	9.05	25.14	18.87	14.20	10.72	15.29	0.93	1.18	5.59	20.69 @ 25F
2000	100.0	0.0	100.0	121.43	75.69	43.27	16.28	11.88	205.25	112.06	59.82	24.70	17.50	1.26	1.44	5.59	17.99 @ 50F
2000	50.0	0.0	50.0	58.03	36.18	21.08	9.07	8.58	95.84	53.89	29.91	13.95	14.68	0.84	0.95	5.59	15.67 @ 75F
2000	0.0	50.0	0.0	18.38	12.26	8.24	5.57	7.50	27.52	18.53	12.60	8.65	13.82	0.71	0.85	5.59	20.13 @100F
2000	50.0	50.0	50.0	69.42	44.30	26.42	11.69	10.46	115.19	65.46	37.01	17.71	16.39	1.09	1.31	5.59	
2000	20.6	27.3	20.6	34.63	22.03	13.45	6.96	7.90	55.53	32.98	19.63	10.76	14.14	0.76	0.88	5.59	

TABLE 10 : CO AT 35.0 MPH.

TABLE 11

LOW ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE) AT 50.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	-LDDV- 0-100F	-LDDT- 0-100F	-HDDV- 0-100F	----HDGV----
1980	0.0	0.0	0.0	20.99	18.78	16.99	15.55	32.17	31.21	28.13	25.61	23.56	43.59	0.47	0.78	7.09	120.33 @ OF
1980	0.0	100.0	0.0	14.94	15.44	16.02	16.69	31.33	23.21	23.91	24.69	25.53	46.39	0.80	1.35	7.09	109.68 @ 25F
1980	100.0	0.0	100.0	171.26	100.38	59.21	35.05	21.79	241.23	142.99	85.50	51.61	30.92	0.99	1.65	7.09	100.06 @ 50F
1980	50.0	0.0	50.0	78.81	50.11	33.13	22.93	27.61	112.29	72.41	48.62	34.25	38.07	0.66	1.10	7.09	91.37 @ 75F
1980	0.0	50.0	0.0	18.36	17.24	16.41	15.82	31.32	27.78	26.22	25.01	24.12	44.05	0.59	0.99	7.09	155.80 @100F
1980	50.0	50.0	50.0	93.10	57.91	37.61	25.87	26.56	132.22	83.45	55.09	38.57	38.66	0.89	1.50	7.09	
1980	20.6	27.3	20.6	43.17	30.73	23.26	18.70	29.83	62.46	45.17	34.68	28.22	41.56	0.61	1.02	7.09	
1985	0.0	0.0	0.0	14.07	11.36	9.37	7.89	19.61	22.51	19.08	16.36	14.19	32.85	0.49	0.57	6.03	96.68 @ OF
1985	0.0	100.0	0.0	9.93	9.29	8.89	8.67	16.96	15.01	14.96	15.02	15.16	30.17	0.77	0.99	6.03	88.23 @ 25F
1985	100.0	0.0	100.0	116.55	68.36	38.74	19.18	12.29	174.22	100.09	57.45	32.47	19.34	1.00	1.21	6.03	80.83 @ 50F
1985	50.0	0.0	50.0	53.01	32.94	20.42	12.06	16.34	79.45	49.40	31.65	20.89	27.06	0.68	0.80	6.03	74.33 @ 75F
1985	0.0	50.0	0.0	12.15	10.31	8.99	8.04	18.13	19.26	17.19	15.58	14.34	31.18	0.59	0.72	6.03	131.04 @100F
1985	50.0	50.0	50.0	63.24	38.83	23.82	13.93	14.63	94.61	57.53	36.23	23.81	24.76	0.88	1.10	6.03	
1985	20.6	27.3	20.6	28.92	19.60	13.67	9.67	17.46	43.98	30.42	22.17	17.00	29.56	0.62	0.75	6.03	
1988	0.0	0.0	0.0	12.15	8.93	6.73	5.20	13.01	19.04	15.17	12.29	10.11	25.99	0.49	0.55	5.50	64.14 @ OF
1988	0.0	100.0	0.0	9.26	7.88	6.88	6.16	11.35	12.92	12.08	11.49	11.09	22.90	0.77	0.96	5.50	57.79 @ 25F
1988	100.0	0.0	100.0	94.22	55.68	31.22	13.90	9.19	145.49	83.86	47.57	25.11	15.10	1.02	1.18	5.50	52.27 @ 50F
1988	50.0	0.0	50.0	43.14	26.53	15.90	8.39	11.20	66.13	40.68	25.31	15.56	21.29	0.69	0.78	5.50	47.45 @ 75F
1988	0.0	50.0	0.0	10.72	8.29	6.61	5.44	12.03	16.31	13.68	11.74	10.29	24.23	0.59	0.70	5.50	78.99 @100F
1988	50.0	50.0	50.0	51.74	31.78	19.05	10.03	10.27	79.20	47.97	29.53	18.10	19.00	0.89	1.07	5.50	
1988	20.6	27.3	20.6	24.02	15.76	10.41	6.63	11.73	36.76	24.76	17.30	12.42	23.10	0.63	0.72	5.50	
1990	0.0	0.0	0.0	11.44	7.94	5.62	4.08	9.54	17.73	13.46	10.42	8.22	21.56	0.49	0.55	5.25	48.15 @ OF
1990	0.0	100.0	0.0	9.20	7.43	6.11	5.15	8.76	12.46	11.07	10.04	9.29	18.85	0.77	0.96	5.25	43.00 @ 25F
1990	100.0	0.0	100.0	82.91	49.54	27.82	11.70	7.97	132.70	75.98	42.60	21.40	13.22	1.02	1.18	5.25	38.53 @ 50F
1990	50.0	0.0	50.0	38.35	23.57	13.93	6.87	8.67	60.47	36.64	22.28	12.99	17.90	0.69	0.78	5.25	34.64 @ 75F
1990	0.0	50.0	0.0	10.27	7.52	5.66	4.38	8.97	15.31	12.24	10.04	8.44	20.01	0.59	0.70	5.25	56.13 @100F
1990	50.0	50.0	50.0	46.05	28.48	16.97	8.42	8.36	72.58	43.52	26.32	15.35	16.03	0.90	1.07	5.25	
1990	20.6	27.3	20.6	21.78	14.09	9.03	5.38	8.87	33.85	22.25	15.05	10.28	19.21	0.63	0.72	5.25	
1995	0.0	0.0	0.0	10.62	6.75	4.30	2.76	4.59	16.01	10.81	7.41	5.16	12.15	0.50	0.56	4.93	28.77 @ OF
1995	0.0	100.0	0.0	9.22	6.93	5.22	3.95	5.41	12.54	9.95	8.02	6.57	11.46	0.78	0.98	4.93	25.24 @ 25F
1995	100.0	0.0	100.0	67.26	41.35	23.49	9.06	6.51	112.44	62.78	34.20	15.27	10.18	1.05	1.20	4.93	22.19 @ 50F
1995	50.0	0.0	50.0	31.89	19.73	11.49	5.08	5.19	51.89	30.11	17.31	8.83	11.11	0.70	0.79	4.93	19.56 @ 75F
1995	0.0	50.0	0.0	9.78	6.62	4.53	3.13	4.77	14.26	10.20	7.44	5.55	11.57	0.60	0.71	4.93	28.09 @100F
1995	50.0	50.0	50.0	38.24	24.14	14.36	6.51	5.96	62.49	36.37	21.11	10.92	10.82	0.91	1.09	4.93	
1995	20.6	27.3	20.6	18.84	11.97	7.35	3.90	4.93	29.70	18.34	11.46	6.86	11.40	0.63	0.74	4.93	
2000	0.0	0.0	0.0	10.31	6.44	4.03	2.52	3.56	15.61	9.85	6.23	3.95	6.79	0.50	0.57	4.76	22.26 @ OF
2000	0.0	100.0	0.0	9.02	6.69	4.96	3.68	4.69	12.93	9.69	7.27	5.48	7.75	0.79	1.00	4.76	19.34 @ 25F
2000	100.0	0.0	100.0	62.95	39.24	22.43	8.44	6.16	105.30	57.49	30.68	12.63	8.96	1.07	1.23	4.76	16.82 @ 50F
2000	50.0	0.0	50.0	30.08	18.76	10.93	4.70	4.45	49.22	27.66	15.34	7.13	7.44	0.71	0.81	4.76	14.65 @ 75F
2000	0.0	50.0	0.0	9.53	6.36	4.27	2.89	3.89	14.15	9.51	6.45	4.42	6.97	0.61	0.73	4.76	18.81 @100F
2000	50.0	50.0	50.0	35.99	22.97	13.70	6.06	5.43	59.12	33.59	18.98	9.05	8.36	0.93	1.11	4.76	
2000	20.6	27.3	20.6	17.95	11.42	6.97	3.61	4.10	28.53	16.93	10.06	5.50	7.14	0.64	0.75	4.76	

TABLE 11 : CO AT 50.0 MPH.

TABLE 12

LOW ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE) AT 55.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	-LDDV- 0-100F	-LDDT- 0-100F	-HDDV- 0-100F	----HDGV----
1980	0.0	0.0	0.0	19 15	17.19	15.61	14 34	29.26	28.78	26.00	23.74	21.90	40.07	0.49	0.81	7.37	131.34 @ OF
1980	0.0	100.0	0.0	13.69	14.16	14.72	15.36	28.69	21.53	22.20	22.93	23.73	42.90	0.83	1.40	7.37	119.71 @ 25F
1980	100.0	0.0	100.0	155.18	91.21	53.97	32.07	19.95	221.30	131.49	78.83	47 71	28.61	1.02	1.72	7.37	109.21 @ 50F
1980	50.0	0 0	50.0	71.61	45.67	30.31	21.07	25.17	103.20	66.73	44.94	31.75	35.07	0.69	1.14	7.37	99.73 @ 75F
1980	0.0	50.0	0.0	16.77	15.80	15 09	14 58	28.57	25.67	24.28	23.21	22.42	40 61	0.61	1.02	7.37	170.04 @100F
1980	50 0	50.0	50.0	84.43	52.69	34.34	23.72	24.32	121.41	76.85	50 88	35.72	35 75	0 93	1.56	7.37	
1980	20.6	27.3	20.6	39.28	28.07	21.32	17.21	27.20	57 48	41.69	32.11	26.20	38.30	0 64	1.06	7.37	
1985	0.0	0.0	0.0	12.30	10.00	8.31	7.04	17.37	19.86	16.92	14.58	12.71	28.84	0.51	0 59	6.26	105.52 @ OF
1985	0.0	100.0	0.0	8.58	8.10	7.81	7.67	15.00	13.23	13.23	13.33	13.49	26.69	0.79	1.03	6.26	96.30 @ 25F
1985	100.0	0.0	100.0	100.93	59.15	33.59	16.86	10.80	151.95	87.55	50.44	28.67	17.06	1.04	1.26	6.26	88.23 @ 50F
1985	50 0	0.0	50.0	46.06	28.65	17.84	10.68	14.43	69.65	43.46	27.98	18.59	23.79	0.70	0.83	6.26	81.12 @ 75F
1985	0.0	50.0	0.0	10.59	9.06	7.95	7.15	16.06	16 99	15.23	13.87	12.82	27 46	0.61	0.75	6.26	143.02 @100F
1985	50.0	50.0	50.0	54.76	33.63	20.70	12.27	12.90	82.59	50.39	31.88	21.08	21.87	0.92	1.14	6.26	
1985	20 6	27.3	20.6	25.15	17.10	12.00	8.58	15.45	38.62	26.83	19.66	15.16	26.01	0.64	0.77	6.26	
1988	0.0	0.0	0.0	10.25	7.60	5.77	4.50	11.28	16 31	13 08	10.67	8.83	22.31	0 51	0.57	5.71	70.00 @ OF
1988	0 0	100.0	0.0	7.72	6.62	5.82	5.26	9.76	10.97	10.32	9.88	9.59	19.72	0.80	1.00	5.71	63.08 @ 25F
1988	100.0	0 0	100.0	79.18	46.71	26.21	11.81	7.79	123.49	71.25	40.51	21.53	12.92	1.06	1.22	5.71	57.05 @ 50F
1988	50 0	0.0	50.0	36.33	22.35	13.43	7.19	9.64	56.37	34 76	21.72	13.46	18.25	0.71	0.81	5.71	51.79 @ 75F
1988	0.0	50.0	0.0	9.01	7.02	5.65	4.68	10.40	13.94	11.77	10 16	8.95	20.82	0.61	0.73	5.71	86 22 @100F
1988	50.0	50 0	50.0	43.45	26.66	16 02	8.54	8.77	67.23	40.79	25.19	15.56	16.32	0.93	1 11	5 71	
1988	20.6	27.3	20.6	20.22	13.30	8 83	5.69	10.12	31.37	21.21	14.90	10.78	19.83	0.65	0.75	5.71	
1990	0.0	0.0	0.0	9.46	6.61	4.71	3.44	8.12	14.92	11.40	8.89	7.06	18.26	0 51	0.57	5.45	52.55 @ OF
1990	0.0	100.0	0.0	7.54	6.12	5 07	4.29	7.37	10.36	9.26	8.45	7.88	15.97	0.80	1.00	5.45	46.93 @ 25F
1990	100.0	0.0	100.0	68.44	40.83	22.93	9.73	6.61	110.73	63.44	35.62	18.02	11.10	1.06	1.22	5.45	42.05 @ 50F
1990	50 0	0.0	50.0	31.71	19.48	11.53	5.75	7.31	50.65	30 75	18.77	11.04	15.13	0.71	0.81	5.45	37.81 @ 75F
1990	0.0	50.0	0.0	8.46	6 23	4.72	3.68	7.61	12.84	10 33	8.53	7.22	16.96	0.62	0.73	5.45	61.26 @100F
1990	50.0	50.0	50.0	37.99	23.47	14.00	7.01	6.99	60.54	36.35	22.04	12.95	13.54	0.93	1.11	5 45	
1990	20.6	27.3	20.6	18.00	11.66	7.50	4.51	7.50	28.36	18.71	12.72	8 76	16.26	0.65	0 75	5 45	
1995	0.0	0.0	0 0	8.56	5.44	3.47	2.23	3.74	12.98	8.79	6.05	4.23	9.92	0 52	0.58	5 12	31.40 @ OF
1995	0.0	100.0	0.0	7.42	5.58	4.21	3.19	4.38	10.12	8.04	6.49	5.33	9.32	0.81	1.02	5.12	27.55 @ 25F
1995	100.0	0.0	100.0	54.20	33.30	18.92	7.30	5.24	90.78	50.71	27.64	12 37	8.24	1 09	1.25	5.12	24 22 @ 50F
1995	50.0	0.0	50.0	25.70	15.90	9.26	4.10	4.20	41.98	24.37	14.04	7.18	9.04	0.73	0.82	5.12	21.35 @ 75F
1995	0 0	50.0	0.0	7.88	5.34	3.65	2.53	3.87	11.55	8.27	6.05	4 53	9.43	0.62	0.74	5.12	30.66 @100F
1995	50.0	50.0	50.0	30.81	19.44	11.56	5.25	4.81	50.45	29.38	17.07	8.85	8.78	0.95	1.13	5.12	
1995	20.6	27 3	20.6	15.18	9.65	5.93	3.15	4.00	24.03	14.86	9.31	5.59	9.28	0.66	0.77	5.12	
2000	0.0	0.0	0.0	8.29	5.18	3.23	2.02	2.86	12.51	7.89	4.99	3.16	5.41	0.52	0.59	4.95	24.30 @ OF
2000	0.0	100.0	0.0	7.25	5.38	3.99	2.96	3.77	10.37	7.76	5.82	4.38	6.18	0.82	1.04	4.95	21.10 @ 25F
2000	100.0	0.0	100.0	50.57	31.52	18.02	6.78	4.95	84.33	46.04	24.57	10.10	7 18	1.11	1.27	4.95	18.35 @ 50F
2000	50 0	0 0	50.0	24.17	15.07	8.78	3.78	3.57	39.43	22.16	12.28	5.71	5.94	0.74	0.84	4.95	15.98 @ 75F
2000	0.0	50.0	0.0	7.66	5.11	3.43	2.32	3.12	11.34	7.62	5.16	3.53	5.55	0.63	0.75	4.95	20.53 @100F
2000	50.0	50.0	50.0	28.91	18.45	11.00	4.87	4.36	47.35	26.90	15.20	7.24	6.68	0.97	1.16	4.95	
2000	20.6	27.3	20.6	14.42	9.17	5.60	2.90	3.29	22.85	13.56	8.06	4.40	5.70	0.67	0.78	4.95	

TABLE 12 : CO AT 55.0 MPH.

TABLE 13

LOW ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE) AT 5.0 MPH

Cal Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	-LDDV- 0-100F	-LDDT- 0-100F	-HDDV- 0-100F	----HDGV----
1980	0.0	0.0	0.0	3.44	2.98	2.60	2.27	1.68	4.37	3.83	3.37	2 97	2.29	2.09	2.81	38.90	7.01 @ OF
1980	0.0	100.0	0.0	4.79	4.23	3.75	3.33	2.35	6.18	5.50	4.91	4.40	3.18	2.44	3.36	38.90	6.53 @ 25F
1980	100.0	0.0	100.0	4.13	3.81	3.56	3.36	2.56	4.57	4.46	4.40	4.37	3.59	2.63	3.64	38.90	6.10 @ 50F
1980	50.0	0.0	50.0	3.83	3.45	3.13	2.87	2.18	4.52	4.21	3.96	3.76	3.02	2.34	3.18	38.90	5.72 @ 75F
1980	0.0	50.0	0.0	4.20	3.69	3.24	2.86	2.06	5.40	4.77	4.24	3.78	2.80	2.25	3.06	38.90	4.12 @100F
1980	50 0	50.0	50.0	4.46	4.02	3.65	3.34	2.45	5.37	4.98	4 65	4.38	3.38	2.54	3.50	38.90	
1980	20.6	27.3	20.6	4.02	3.56	3.17	2.84	2.10	5.00	4.50	4.09	3.74	2.87	2.28	3.10	38.90	
1985	0.0	0.0	0.0	2.59	2.24	1.94	1.68	1.05	4.21	3.64	3.16	2.75	1.91	2.14	2.35	32.53	5.79 @ OF
1985	0.0	100.0	0.0	3.84	3.32	2.88	2.50	1.55	6.20	5.49	4.88	4.34	2.83	2.18	2.80	32.53	5.43 @ 25F
1985	100.0	0.0	100.0	3.82	3.40	3.05	2.75	1.59	6.21	5.45	4.84	4.35	2.79	2.32	3.02	32.53	5.11 @ 50F
1985	50.0	0.0	50.0	3.20	2.82	2.49	2.22	1.33	5.21	4.56	4.02	3.58	2.38	2.22	2.65	32.53	4.83 @ 75F
1985	0.0	50.0	0.0	3.23	2.79	2.42	2 11	1.31	5.24	4.60	4.05	3.58	2.40	2.16	2.55	32.53	3.59 @100F
1985	50.0	50.0	50.0	3.83	3.36	2.96	2.63	1.57	6.20	5.47	4.86	4.34	2.81	2.25	2.91	32.53	
1985	20.6	27.3	20.6	3.19	2.78	2.43	2.14	1.31	5.19	4.55	4.00	3.54	2.37	2.18	2.59	32.53	
1988	0.0	0.0	0.0	2.40	2.05	1.76	1.52	0.82	4.23	3.63	3.12	2.69	1.77	1.81	2.06	27.71	5.46 @ OF
1988	0.0	100.0	0.0	3.75	3.16	2.67	2.27	1.28	6 22	5.47	4 82	4.25	2.65	1.81	2.45	27.71	5.16 @ 25F
1988	100.0	0.0	100.0	3.77	3.32	2.92	2.59	1.30	6.65	5.70	4.92	4.29	2.48	1.93	2.63	27.71	4.88 @ 50F
1988	50.0	0.0	50.0	3.06	2.66	2 32	2.04	1.06	5.42	4.66	4.02	3.50	2.14	1.86	2.32	27.71	4.63 @ 75F
1988	0.0	50.0	0.0	3.05	2.59	2.21	1.89	1.05	5.23	4.56	3.98	3.48	2.22	1.81	2.23	27.71	2.83 @100F
1988	50.0	50.0	50.0	3.76	3.24	2.80	2.43	1.29	6.43	5.59	4.87	4.27	2.57	1.87	2.54	27.71	
1988	20.6	27.3	20.6	3.02	2.60	2.24	1.93	1.04	5.27	4.56	3.96	3.46	2.17	1.83	2.26	27.71	
1990	0.0	0.0	0.0	2.37	2.02	1.73	1.48	0.73	4.12	3.53	3.03	2.60	1.60	1.70	1.83	23.77	5.47 @ OF
1990	0.0	100.0	0.0	3.83	3.18	2.64	2.21	1.18	6.16	5.34	4.65	4.05	2.43	1.69	2.17	23.77	5.19 @ 25F
1990	100.0	0.0	100.0	3.80	3.32	2.91	2.56	1.20	6.49	5.55	4.77	4.13	2.23	1.80	2.33	23.77	4.92 @ 50F
1990	50.0	0.0	50.0	3.04	2.64	2.29	1.99	0.96	5.27	4.52	3.88	3.35	1.92	1.74	2 05	23.77	4 67 @ 75F
1990	0.0	50.0	0.0	3.06	2.57	2.17	1.83	0.95	5.13	4.43	3.83	3.32	2.02	1.70	1.98	23.77	2.61 @100F
1990	50.0	50.0	50.0	3.81	3.25	2.78	2.38	1.19	6.32	5.45	4.71	4.09	2.33	1.74	2.25	23.77	
1990	20.6	27.3	20.6	3.02	2.57	2.20	1.88	0.94	5.14	4.43	3.82	3.30	1.96	1.72	2.00	23.77	
1995	0.0	0.0	0.0	2.35	2.00	1.70	1.44	0.61	3.89	3.31	2.81	2.39	1.24	1.61	1.67	19 93	5.52 @ OF
1995	0.0	100.0	0.0	4.02	3.26	2.65	2.15	1.07	6.05	5 07	4.26	3.59	1 96	1.59	1.97	19 93	5.25 @ 25F
1995	100.0	0.0	100.0	3.80	3.32	2.90	2.54	1.09	5.91	5.06	4 34	3.74	1.77	1.68	2.12	19.93	5.00 @ 50F
1995	50.0	0.0	50.0	3.02	2.61	2.26	1.95	0.83	4.85	4.14	3.54	3.03	1.50	1.64	1.87	19.93	4.76 @ 75F
1995	0.0	50.0	0.0	3.12	2.58	2.14	1.77	0.82	4.91	4.15	3.50	2.97	1.59	1.60	1.80	19.93	2.37 @100F
1995	50.0	50.0	50.0	3.91	3.29	2.78	2.35	1.08	5.98	5.07	4.30	3.66	1.87	1.63	2.04	19.93	
1995	20.6	27.3	20.6	3.04	2.57	2.16	1.83	0.82	4.84	4.11	3.49	2.97	1.53	1.62	1.82	19.93	
2000	0.0	0.0	0.0	2.35	2.00	1.70	1.44	0.59	3.61	3.06	2.60	2.20	0.99	1.60	1.65	18.80	5 47 @ OF
2000	0.0	100.0	0.0	4.09	3.31	2.67	2.15	1.05	5.82	4.76	3.90	3.19	1.62	1.57	1.95	18.80	5.21 @ 25F
2000	100.0	0.0	100.0	3.81	3.34	2.92	2.55	1.08	5.24	4.53	3.92	3.40	1.49	1.67	2.09	18.80	4.96 @ 50F
2000	50.0	0.0	50.0	3.02	2.61	2.26	1.95	0.81	4.36	3.74	3.21	2.76	1.22	1.63	1.85	18.80	4 72 @ 75F
2000	0.0	50.0	0.0	3.15	2.60	2.14	1.77	0.80	4.63	3.85	3.20	2.66	1.28	1.59	1.78	18.80	2.29 @100F
2000	50.0	50.0	50 0	3.95	3.32	2 79	2.35	1.06	5.53	4.64	3.91	3 29	1.56	1.62	2.02	18 80	
2000	20.6	27.3	20.6	3.06	2.58	2.17	1.83	0.80	4.47	3.77	3.18	2 68	1.24	1.61	1.80	18.80	

TABLE 14

LOW ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE) AT 10.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	-LDDV- 0-100F	-LDDT- 0-100F	-HDDV- 0-100F	----HDGV----
1980	0.0	0.0	0.0	3.26	2.84	2.48	2.17	1.61	4.17	3.67	3.25	2.88	2.22	1.74	2.33	32.27	7.36 @ 0F
1980	0.0	100.0	0.0	4.56	4.03	3.58	3.18	2.25	5.94	5.31	4.76	4.28	3.08	2.02	2.79	32.27	6.86 @ 25F
1980	100.0	0.0	100.0	3.92	3.63	3.39	3.21	2.43	4.38	4.29	4.25	4.24	3.44	2.19	3.02	32.27	6.41 @ 50F
1980	50.0	0.0	50.0	3.63	3.28	2.99	2.75	2.08	4.33	4.05	3.82	3.65	2.91	1.94	2.64	32.27	6.01 @ 75F
1980	0.0	50.0	0.0	3.99	3.51	3.10	2.74	1.97	5.17	4.59	4.10	3.67	2.72	1.86	2.54	32.27	4.33 @100F
1980	50.0	50.0	50.0	4.24	3.83	3.49	3.20	2.34	5.16	4.80	4.50	4.26	3.26	2.10	2.90	32.27	
1980	20.6	27.3	20.6	3.81	3.39	3.03	2.72	2.00	4.79	4.33	3.95	3.63	2.78	1.89	2.57	32.27	
1985	0.0	0.0	0.0	2.43	2.10	1.82	1.58	1.00	3.97	3.44	3.00	2.61	1.83	1.78	1.95	26 99	6.08 @ 0F
1985	0.0	100.0	0.0	3.59	3.11	2.70	2.36	1.47	5.86	5.21	4.63	4.13	2.71	1.81	2.33	26.99	5.70 @ 25F
1985	100.0	0.0	100.0	3.55	3.17	2.85	2.58	1.51	5.82	5.13	4.57	4.13	2.66	1.92	2.51	26.99	5.37 @ 50F
1985	50.0	0.0	50.0	2.99	2.64	2.34	2.09	1.26	4.90	4.30	3.81	3.40	2.28	1.84	2.20	26.99	5 07 @ 75F
1985	0.0	50.0	0.0	3.02	2.62	2.28	1.99	1.25	4.96	4.36	3.85	3.41	2.29	1.79	2.12	26.99	3.77 @100F
1985	50.0	50.0	50.0	3.57	3.14	2.78	2.47	1.49	5.84	5.17	4.60	4.13	2.68	1.87	2.42	26.99	
1985	20.6	27.3	20.6	2.98	2.60	2.28	2.01	1.24	4.89	4.30	3.80	3.37	2.27	1.81	2.15	26.99	
1988	0.0	0.0	0.0	2.21	1.90	1.63	1.41	0.77	3.95	3.40	2.93	2.53	1.67	1 50	1.71	22.99	5.74 @ 0F
1988	0.0	100.0	0.0	3.45	2.91	2.47	2.10	1.19	5.82	5.13	4.53	4.00	2.50	1.50	2.03	22.99	5.42 @ 25F
1988	100.0	0.0	100.0	3.46	3.05	2.69	2.39	1.21	6.17	5.31	4.60	4.03	2.34	1.60	2.18	22.99	5.13 @ 50F
1988	50.0	0.0	50.0	2.81	2.45	2.14	1.88	0.99	5.04	4.35	3.77	3.29	2 02	1.55	1.92	22.99	4.86 @ 75F
1988	0.0	50.0	0.0	2.81	2.39	2.04	1.75	0.98	4.90	4.28	3.74	3.28	2.10	1.50	1.85	22.99	2.97 @100F
1988	50.0	50.0	50.0	3.46	2.98	2.58	2.24	1.20	6.00	5.22	4.56	4.02	2.42	1.55	2.11	22.99	
1988	20.6	27.3	20.6	2.79	2.40	2.07	1.79	0.97	4.92	4.27	3.72	3.25	2.05	1.52	1.87	22.99	
1990	0.0	0.0	0.0	2.16	1.85	1.58	1.35	0.67	3.82	3.28	2.81	2.42	1.50	1.41	1.52	19.72	5.75 @ 0F
1990	0.0	100.0	0.0	3.49	2.90	2.42	2.02	1.09	5.71	4.96	4.33	3.78	2.27	1.40	1.80	19.72	5.45 @ 25F
1990	100.0	0.0	100.0	3.46	3.03	2.66	2.34	1.10	5.98	5.13	4.42	3.84	2.09	1.49	1.93	19.72	5 17 @ 50F
1990	50.0	0.0	50.0	2.77	2.41	2.09	1.82	0.88	4.88	4.18	3.61	3.13	1.80	1.45	1.70	19.72	4.91 @ 75F
1990	0.0	50.0	0.0	2.79	2.35	1.98	1.67	0.87	4.76	4.12	3.57	3.10	1.89	1.41	1.64	19.72	2.74 @100F
1990	50.0	50.0	50.0	3.47	2.96	2.54	2.18	1.10	5.85	5.05	4.38	3.81	2.18	1.45	1.87	19.72	
1990	20.6	27.3	20.6	2.76	2.35	2.01	1.72	0.87	4.77	4.11	3.55	3.08	1.84	1.42	1.66	19.72	
1995	0.0	0.0	0.0	2.12	1.80	1.53	1.30	0.55	3.54	3.01	2.57	2.18	1.14	1.34	1.38	16.54	5.80 @ 0F
1995	0.0	100.0	0.0	3.62	2.94	2.39	1.94	0.96	5.50	4.62	3.89	3.28	1.79	1.32	1.64	16.54	5.52 @ 25F
1995	100.0	0.0	100.0	3.43	2.99	2.62	2.29	0.99	5.38	4.61	3.96	3.41	1.62	1.40	1.76	16.54	5.25 @ 50F
1995	50.0	0.0	50.0	2.72	2.35	2.03	1.76	0.75	4.42	3.77	3.23	2.77	1.37	1.36	1.55	16.54	5.00 @ 75F
1995	0.0	50.0	0.0	2.81	2.33	1.92	1.59	0.74	4.47	3.78	3.20	2.71	1.45	1.33	1.50	16.54	2.49 @100F
1995	50.0	50.0	50.0	3.52	2.97	2.50	2.11	0.97	5.44	4.62	3.92	3.34	1.71	1.36	1.70	16.54	
1995	20.6	27.3	20.6	2.74	2.31	1.95	1.65	0.74	4.41	3.74	3.18	2.71	1.41	1.34	1.51	16.54	
2000	0.0	0.0	0.0	2.11	1.79	1.53	1.30	0.53	3.25	2.76	2.34	1.99	0.89	1.33	1.37	15.60	5.75 @ 0F
2000	0.0	100.0	0.0	3.68	2.97	2.40	1.94	0.94	5.25	4.29	3.52	2.88	1.46	1.31	1.62	15.60	5.47 @ 25F
2000	100.0	0.0	100.0	3.43	3.00	2.62	2.29	0.97	4.73	4.09	3.54	3.06	1.35	1.38	1.73	15.60	5.21 @ 50F
2000	50.0	0.0	50.0	2.72	2.35	2.03	1.76	0.73	3.94	3.38	2.90	2.49	1.10	1.35	1.53	15.60	4.96 @ 75F
2000	0.0	50.0	0.0	2.84	2.34	1.93	1.59	0.72	4.18	3.47	2.89	2.40	1.16	1.32	1.48	15.60	2.41 @100F
2000	50.0	50.0	50.0	3.56	2.99	2.51	2.11	0.96	4.99	4.19	3.53	2.97	1.41	1.34	1.67	15.60	
2000	20.6	27.3	20.6	2.75	2.32	1.95	1.64	0.72	4.04	3.40	2.87	2.42	1.12	1.33	1.49	15.60	

TABLE 14 : NOx AT 10.0 MPH.

TABLE 15

LOW ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE) AT 19.6 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	-LDDV- 0-100F	-LDDT- 0-100F	-HDDV- 0-100F	----HDGV----
1980	0.0	0.0	0.0	3.44	3.01	2.64	2.33	1.74	4.43	3.93	3.49	3.12	2.41	1.34	1.80	24.91	8.04 @ 0F
1980	0.0	100.0	0.0	4.78	4.25	3.78	3.38	2.40	6.31	5.67	5.10	4.61	3.34	1.56	2.15	24.91	7.49 @ 25F
1980	100.0	0.0	100.0	4.06	3.78	3.57	3.40	2.59	4.61	4.56	4.54	4.56	3.69	1.69	2.33	24.91	7.00 @ 50F
1980	50.0	0.0	50.0	3.80	3.45	3.17	2.93	2.23	4.58	4.32	4.10	3.94	3.14	1.50	2.04	24.91	6.56 @ 75F
1980	0.0	50.0	0.0	4.21	3.71	3.29	2.92	2.12	5.50	4.91	4.41	3.97	2.95	1.44	1.96	24.91	4.73 @100F
1980	50.0	50.0	50.0	4.42	4.01	3.67	3.39	2.50	5.46	5.11	4.82	4.59	3.51	1.62	2.24	24.91	
1980	20.6	27.3	20.6	4.01	3.58	3.21	2.90	2.15	5.08	4.63	4.25	3.92	3.01	1.46	1.98	24.91	
1985	0.0	0.0	0.0	2.39	2.07	1.81	1.58	1.02	3.89	3.40	2.97	2.61	1.85	1.37	1.51	20.83	6.65 @ 0F
1985	0.0	100.0	0.0	3.48	3.04	2.66	2.34	1.48	5.75	5.13	4.59	4.11	2.72	1.39	1.80	20.83	6.23 @ 25F
1985	100.0	0.0	100.0	3.39	3.05	2.76	2.52	1.51	5.56	4.96	4.47	4.09	2.69	1.49	1.94	20.83	5.87 @ 50F
1985	50.0	0.0	50.0	2.89	2.57	2.29	2.06	1.29	4.74	4.20	3.75	3.39	2.31	1.42	1.70	20.83	5.54 @ 75F
1985	0.0	50.0	0.0	2.96	2.58	2.26	1.98	1.27	4.87	4.31	3.82	3.40	2.32	1.38	1.64	20.83	4.12 @100F
1985	50.0	50.0	50.0	3.44	3.04	2.71	2.43	1.50	5.65	5.04	4.53	4.10	2.71	1.44	1.87	20.83	
1985	20.6	27.3	20.6	2.91	2.55	2.25	2.00	1.27	4.78	4.23	3.76	3.37	2.30	1.40	1.66	20.83	
1988	0.0	0.0	0.0	2.06	1.77	1.53	1.32	0.75	3.74	3.23	2.80	2.43	1.63	1.16	1.32	17.74	6.27 @ 0F
1988	0.0	100.0	0.0	3.17	2.69	2.30	1.97	1.14	5.51	4.88	4.32	3.84	2.43	1.16	1.57	17.74	5.92 @ 25F
1988	100.0	0.0	100.0	3.16	2.79	2.48	2.21	1.15	5.73	4.97	4.35	3.85	2.29	1.23	1.68	17.74	5.61 @ 50F
1988	50.0	0.0	50.0	2.59	2.27	1.99	1.76	0.95	4.72	4.10	3.58	3.15	1.98	1.19	1.48	17.74	5.31 @ 75F
1988	0.0	50.0	0.0	2.60	2.23	1.91	1.65	0.95	4.64	4.07	3.58	3.15	2.04	1.16	1.43	17.74	3.25 @100F
1988	50.0	50.0	50.0	3.16	2.74	2.39	2.09	1.15	5.62	4.92	4.33	3.84	2.36	1.20	1.63	17.74	
1988	20.6	27.3	20.6	2.58	2.23	1.93	1.68	0.94	4.64	4.05	3.55	3.12	2.00	1.17	1.45	17.74	
1990	0 0	0.0	0.0	1.95	1.67	1.43	1.23	0.63	3.54	3.04	2.62	2.27	1.43	1.09	1.17	15.22	6.29 @ 0F
1990	0.0	100.0	0.0	3.11	2.60	2.17	1.83	1.00	5.28	4.61	4.04	3.54	2.16	1.08	1.39	15.22	5.95 @ 25F
1990	100.0	0.0	100.0	3.08	2.70	2.37	2.09	1.01	5.46	4.71	4.09	3.58	1.99	1.15	1.49	15.22	5.65 @ 50F
1990	50.0	0.0	50.0	2.49	2.16	1.88	1.64	0.81	4.48	3.86	3.35	2.93	1.72	1.12	1.32	15.22	5.36 @ 75F
1990	0.0	50.0	0.0	2.50	2.11	1.79	1.52	0.81	4.41	3.83	3.33	2.91	1.80	1.09	1.27	15.22	3.00 @100F
1990	50.0	50.0	50.0	3.09	2.65	2.27	1.96	1.00	5.37	4.66	4.06	3.56	2.08	1.12	1.44	15.22	
1990	20.6	27.3	20.6	2.47	2.11	1.81	1.56	0.80	4.40	3.81	3.31	2.89	1.75	1.10	1.28	15.22	
1995	0.0	0.0	0.0	1.82	1.55	1.32	1.12	0.48	3.13	2.67	2.27	1.94	1.02	1.03	1.07	12.76	6.33 @ 0F
1995	0.0	100.0	0.0	3.11	2.53	2.05	1.67	0.83	4.85	4.08	3.45	2.92	1.61	1.02	1.26	12.76	6.03 @ 25F
1995	100.0	0.0	100.0	2.95	2.58	2.25	1.97	0.85	4.74	4.07	3.50	3.02	1.45	1.08	1.35	12.76	5.74 @ 50F
1995	50.0	0.0	50.0	2.34	2.03	1.75	1.51	0.65	3.90	3.33	2.86	2.45	1 23	1.05	1.20	12.76	5.46 @ 75F
1995	0.0	50.0	0.0	2.42	2.00	1.66	1.38	0.64	3.95	3.34	2.83	2.41	1.31	1.02	1.15	12.76	2.73 @100F
1995	50.0	50.0	50.0	3.03	2.55	2.15	1.82	0.84	4.80	4.08	3.47	2.97	1.53	1.05	1.31	12.76	
1995	20.6	27.3	20.6	2.36	1.99	1.68	1.42	0.64	3.89	3.31	2.82	2 41	1.26	1.03	1.17	12.76	
2000	0.0	0.0	0.0	1.80	1.53	1.30	1.11	0.45	2.81	2.38	2.02	1.71	0.77	1.03	1.05	12.04	6.28 @ 0F
2000	0.0	100.0	0.0	3.15	2.54	2.05	1.66	0.81	4.52	3.70	3.03	2.49	1.26	1.01	1.25	12.04	5.98 @ 25F
2000	100.0	0.0	100.0	2.93	2.56	2.24	1.96	0.83	4.08	3.53	3.05	2.64	1.16	1.07	1.34	12.04	5.69 @ 50F
2000	50.0	0.0	50.0	2.32	2.01	1.74	1.50	0.63	3.40	2.91	2.50	2.14	0.95	1.04	1.18	12.04	5.42 @ 75F
2000	0.0	50.0	0.0	2.42	2.00	1.65	1.36	0.61	3.60	2.99	2.49	2.07	1.00	1.02	1.14	12.04	2.63 @100F
2000	50.0	50.0	50.0	3.04	2.55	2.15	1.81	0.82	4.30	3.61	3.04	2.56	1.21	1.04	1.29	12.04	
2000	20.6	27.3	20.6	2.35	1.98	1.67	1.41	0.61	3.48	2.93	2.47	2.09	0.97	1.03	1.15	12.04	

TABLE 16

LOW ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE) AT 35.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	-LDDV- 0-100F	-LDDT- 0-100F	-HDDV- 0-100F	----HDGV----
1980	0.0	0.0	0.0	3.99	3.50	3.08	2.72	2.04	5.14	4.56	4.07	3.64	2.83	1 16	1.56	21.60	9.14 @ OF
1980	0.0	100.0	0.0	5.50	4.89	4.37	3.91	2.80	7.26	6.53	5.90	5.34	3.89	1.36	1.87	21.60	8.51 @ 25F
1980	100.0	0.0	100.0	4.60	4.32	4.09	3.92	3.03	5.27	5.24	5.25	5.29	4.31	1.46	2.02	21.60	7.95 @ 50F
1980	50.0	0.0	50.0	4.36	3.98	3.67	3.40	2.61	5.28	4.99	4.76	4.59	3.68	1.30	1.77	21.60	7.46 @ 75F
1980	0.0	50.0	0.0	4.86	4.30	3.82	3.40	2.48	6.35	5.69	5.11	4.61	3.44	1.25	1.70	21.60	5 37 @100F
1980	50.0	50.0	50.0	5.05	4.60	4.23	3.92	2.91	6.26	5.88	5.57	5 32	4.10	1.41	1.94	21.60	
1980	20.6	27.3	20.6	4.62	4.14	3.73	3.38	2.52	5.86	5.36	4.93	4.57	3.52	1.26	1.72	21.60	
1985	0.0	0.0	0.0	2.56	2.23	1.95	1.71	1.14	4.16	3.64	3 20	2.83	2.03	1.19	1.31	18.07	7.55 @ OF
1985	0.0	100.0	0.0	3.68	3.23	2.84	2.51	1.63	6.12	5.48	4.91	4.42	2.97	1.21	1.56	18.07	7.08 @ 25F
1985	100 0	0.0	100.0	3.51	3.18	2.90	2.66	1.66	5.78	5.20	4.75	4.40	2.95	1.29	1.68	18 07	6.66 @ 50F
1985	50.0	0.0	50.0	3.05	2.72	2.45	2.21	1.42	4.98	4.45	4.02	3.66	2.54	1.23	1.47	18.07	6.30 @ 75F
1985	0.0	50.0	0.0	3.15	2.76	2.43	2.15	1.41	5.20	4.62	4.11	3.68	2.54	1.20	1.42	18.07	4.68 @100F
1985	50.0	50.0	50.0	3.60	3.20	2.87	2.59	1.64	5.95	5.34	4.83	4.41	2.96	1.25	1.62	18.07	
1985	20.6	27.3	20.6	3.09	2.72	2.42	2.16	1.40	5.07	4.51	4.04	3.64	2.52	1.21	1.44	18.07	
1988	0.0	0.0	0.0	2.06	1.78	1.54	1.34	0.78	3.84	3.34	2.90	2.54	1.72	1.01	1.14	15.39	7.13 @ OF
1988	0.0	100.0	0.0	3.12	2.67	2 29	1.98	1.18	5.66	5.03	4.47	3.99	2.56	1.01	1.36	15.39	6.73 @ 25F
1988	100.0	0.0	100.0	3.09	2.74	2.44	2.19	1.18	5.78	5.05	4.46	3 98	2.42	1.07	1.46	15.39	6.37 @ 50F
1988	50.0	0.0	50.0	2.57	2.25	1.99	1.76	0.99	4.81	4.20	3.70	3 28	2.09	1.03	1.29	15.39	6.04 @ 75F
1988	0.0	50.0	0.0	2.59	2.23	1.93	1.67	0.99	4.78	4.21	3.72	3.29	2.16	1.01	1.24	15.39	3.69 @100F
1988	50.0	50.0	50.0	3.10	2.70	2.37	2.09	1.18	5.72	5.04	4.47	3.99	2.49	1.04	1.41	15.39	
1988	20.6	27.3	20.6	2.56	2.22	1.94	1.69	0.98	4.75	4.17	3.67	3.25	2.11	1.02	1.25	15.39	
1990	0.0	0.0	0.0	1.87	1 61	1.38	1.19	0.63	3.54	3 06	2.65	2.30	1.47	0.95	1.02	13.21	7.14 @ OF
1990	0.0	100.0	0.0	2.94	2.47	2.08	1.76	0.98	5.28	4 63	4.07	3.59	2.22	0.94	1 20	13.21	6.76 @ 25F
1990	100.0	0.0	100.0	2.91	2.55	2.25	1.99	0.99	5.39	4 68	4.09	3.61	2.05	1.00	1.29	13.21	6.41 @ 50F
1990	50.0	0.0	50.0	2.37	2.06	1.80	1.58	0.81	4.45	3.86	3.37	2.96	1.78	0.97	1 14	13.21	6.09 @ 75F
1990	0.0	50.0	0.0	2.39	2.03	1.73	1.47	0.81	4.41	3.85	3.37	2.96	1.86	0.94	1.10	13.21	3.41 @100F
1990	50.0	50.0	50.0	2.92	2.51	2.17	1.88	0.99	5.34	4.65	4.08	3.60	2.13	0.97	1.25	13.21	
1990	20.6	27.3	20.6	2.36	2.02	1.74	1.50	0.80	4.39	3.82	3.34	2.93	1.81	0.95	1.11	13.21	
1995	0.0	0.0	0.0	1.64	1.39	1.19	1.01	0.43	2.95	2.51	2.15	1.83	0.99	0.89	0.93	11.07	7.20 @ OF
1995	0.0	100.0	0.0	2.78	2.26	1.84	1.50	0.75	4.55	3.84	3.26	2.77	1.54	0.88	1.10	11.07	6.85 @ 25F
1995	100.0	0.0	100.0	2.64	2.31	2.02	1.77	0.77	4 45	3.82	3.29	2.85	1.39	0.93	1.18	11.07	6.52 @ 50F
1995	50.0	0.0	50.0	2.10	1.82	1.57	1.36	0.59	3.67	3.14	2.70	2.32	1.18	0.91	1.04	11.07	6.21 @ 75F
1995	0.0	50.0	0.0	2.17	1.80	1.49	1.24	0.58	3.71	3.15	2.68	2.29	1.26	0.89	1.00	11.07	3.10 @100F
1995	50.0	50.0	50.0	2.71	2.29	1.93	1.63	0.76	4.50	3.83	3.27	2.81	1.47	0.91	1.14	11.07	
1995	20.6	27.3	20.6	2.12	1.79	1.51	1.28	0.58	3.66	3.12	2.66	2.28	1.22	0.90	1.01	11.07	
2000	0.0	0.0	0.0	1.60	1.36	1.15	0.98	0.40	2.53	2.15	1.83	1.55	0.70	0.89	0.92	10.44	7.14 @ OF
2000	0.0	100.0	0.0	2.79	2.25	1.82	1.47	0.71	4.07	3.34	2.74	2.25	1.15	0.87	1.08	10.44	6.79 @ 25F
2000	100.0	0.0	100.0	2.60	2.27	1.98	1.74	0.73	3.69	3.18	2.75	2.38	1.05	0.93	1.16	10.44	6.47 @ 50F
2000	50.0	0.0	50.0	2.06	1.78	1.54	1.33	0.55	3.07	2.63	2.26	1.93	0.86	0.91	1.03	10.44	6.16 @ 75F
2000	0.0	50.0	0.0	2.15	1.77	1.46	1.20	0.54	3.25	2.70	2.25	1.87	0.91	0.88	0.99	10.44	2.99 @100F
2000	50.0	50.0	50.0	2.69	2.26	1.90	1.60	0.72	3.88	3.26	2.75	2.31	1.10	0.90	1.12	10.44	
2000	20.6	27.3	20.6	2.08	1.75	1.48	1.24	0.54	3.14	2.65	2.23	1.88	0.88	0.89	1.00	10.44	

TABLE 16 : NOx AT 35.0 MPH.

TABLE 17

LOW ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE) AT 50.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	-LDDV- 0-100F	-LDDT- 0-100F	-HDDV- 0-100F	----HDGV----
1980	0.0	0.0	0.0	4.42	3.88	3.41	3.01	2.26	5.64	5.01	4 47	4.01	3.11	1 40	1.88	26.00	10.20 @ OF
1980	0.0	100.0	0.0	6.09	5.42	4.84	4.34	3.10	7.97	7.17	6.48	5.88	4.27	1 63	2 25	26.00	9.50 @ 25F
1980	100.0	0.0	100.0	5.13	4.81	4.55	4.35	3.35	5.81	5.77	5.78	5.82	4 73	1.76	2.43	26.00	8.88 @ 50F
1980	50.0	0.0	50.0	4.85	4.42	4.07	3.78	2.89	5 81	5.49	5.24	5.05	4.04	1.56	2.13	26.00	8.33 @ 75F
1980	0.0	50.0	0.0	5.39	4.77	4.23	3.77	2.75	6.98	6.25	5.62	5.08	3.79	1 50	2.05	26.00	6.00 @100F
1980	50.0	50.0	50.0	5.61	5.11	4.70	4.34	3.23	6.89	6.47	6.13	5.85	4.50	1.70	2.34	26.00	
1980	20.6	27.3	20.6	5.13	4.59	4.13	3.75	2.79	6.45	5 89	5.42	5.02	3.87	1.52	2.07	26.00	
1985	0.0	0.0	0.0	2.84	2.48	2.17	1.90	1.27	4.68	4 10	3.61	3.18	2.28	1.43	1 57	21.74	8.43 @ OF
1985	0.0	100.0	0.0	4.07	3.57	3.15	2.79	1.81	6.89	6.16	5.53	4 98	3 33	1 46	1.87	21.74	7.91 @ 25F
1985	100.0	0.0	100.0	3.89	3.52	3.21	2.95	1.84	6 57	5.90	5 37	4.95	3.31	1.55	2.02	21.74	7.44 @ 50F
1985	50.0	0.0	50.0	3.38	3.02	2.71	2.45	1.58	5.64	5.03	4.53	4.12	2.84	1.48	1 77	21 74	7 03 @ 75F
1985	0.0	50 0	0.0	3.49	3.06	2.70	2.38	1.57	5.85	5.20	4.63	4 14	2.85	1.44	1.71	21.74	5.22 @100F
1985	50.0	50.0	50.0	3.98	3.55	3.18	2.87	1.83	6.73	6.03	5 45	4.96	3.32	1.50	1.95	21.74	
1985	20.6	27.3	20.6	3.42	3.02	2.68	2.39	1.56	5.72	5.09	4.55	4.09	2.82	1.46	1.73	21 74	
1988	0.0	0.0	0.0	2.26	1.95	1.69	1.47	0.87	4.39	3.81	3.31	2 89	1.96	1.21	1 38	18 52	7.96 @ OF
1988	0.0	100.0	0.0	3.40	2.91	2.51	2.17	1 30	6.46	5 74	5.10	4.55	2.91	1.21	1.63	18.52	7.51 @ 25F
1988	100.0	0.0	100.0	3.36	2.98	2.66	2.39	1.29	6.64	5.79	5.10	4.54	2.74	1.29	1.76	18.52	7 11 @ 50F
1988	50.0	0.0	50.0	2.80	2.46	2.17	1.93	1.09	5.51	4.81	4.22	3.74	2.38	1.25	1.55	18 52	6.74 @ 75F
1988	0.0	50.0	0.0	2.83	2.44	2.11	1.83	1.09	5.46	4 80	4.24	3.75	2.46	1.21	1.49	18.52	4.12 @100F
1988	50.0	50.0	50.0	3.38	2.95	2.58	2.28	1.30	6.55	5.76	5.10	4.54	2.83	1.25	1.70	18.52	
1988	20.6	27.3	20.6	2.79	2.43	2.12	1.86	1.08	5.44	4.76	4.19	3.71	2.40	1.22	1.51	18.52	
1990	0.0	0.0	0.0	2.02	1.74	1.49	1.29	0.69	4.02	3.47	3.01	2.61	1.68	1.14	1.22	15.89	7.97 @ OF
1990	0.0	100.0	0.0	3.16	2.66	2.25	1.91	1.07	5.98	5.25	4.62	4.07	2.52	1.13	1.45	15.89	7.55 @ 25F
1990	100 0	0.0	100.0	3.12	2.75	2.42	2.15	1.07	6.14	5.32	4 64	4.08	2.32	1.20	1.56	15.89	7.16 @ 50F
1990	50.0	0.0	50 0	2.55	2.22	1.94	1.70	0.88	5.07	4.39	3 82	3.35	2 01	1.17	1.37	15.89	6.80 @ 75F
1990	0.0	50 0	0.0	2.58	2.19	1.86	1.59	0.88	5.01	4.37	3.82	3.35	2.11	1.13	1.32	15.89	3.80 @100F
1990	50.0	50.0	50.0	3.14	2.70	2.34	2.03	1.07	6.06	5.28	4 63	4.08	2.42	1.17	1 50	15.89	
1990	20.6	27.3	20.6	2.54	2.18	1.88	1.63	0.87	4.99	4.34	3.79	3.32	2.05	1.15	1.34	15.89	
1995	0.0	0.0	0.0	1.72	1.46	1.24	1.06	0.46	3.26	2.78	2.37	2.02	1.10	1.08	1.11	13 33	8.03 @ OF
1995	0.0	100.0	0.0	2.91	2.37	1.93	1.57	0.79	5.00	4.24	3.60	3.06	1.72	1.06	1.32	13.33	7.65 @ 25F
1995	100.0	0.0	100.0	2.76	2.41	2.11	1.85	0.80	4.93	4.22	3.63	3.13	1 54	1.12	1.41	13.33	7.28 @ 50F
1995	50.0	0.0	50.0	2 20	1.90	1.64	1.42	0.62	4 05	3.47	2.98	2.56	1.32	1.10	1.25	13.33	6.93 @ 75F
1995	0.0	50.0	0.0	2.27	1.88	1.56	1.30	0.61	4.09	3.48	2.96	2.53	1.40	1.07	1.21	13.33	3.46 @100F
1995	50.0	50.0	50.0	2.83	2.39	2.02	1.71	0.80	4.96	4.23	3.61	3.10	1 63	1.09	1.37	13.33	
1995	20.6	27.3	20.6	2.22	1.87	1.58	1.34	0.61	4.04	3.44	2.94	2.52	1.35	1.08	1.22	13.33	
2000	0.0	0.0	0.0	1.65	1.41	1.20	1.02	0.41	2.70	2.29	1.95	1.65	0 76	1.07	1.10	12.57	7.97 @ OF
2000	0.0	100.0	0.0	2.89	2.33	1.88	1.52	0.74	4.33	3.55	2.92	2.40	1.23	1.05	1.30	12.57	7.59 @ 25F
2000	100.0	0.0	100.0	2 69	2.35	2.06	1.80	0.76	3.94	3.40	2.93	2.53	1.12	1.11	1.40	12.57	7.22 @ 50F
2000	50.0	0.0	50.0	2.13	1.84	1.59	1.38	0.57	3.28	2.81	2 40	2.06	0 93	1.09	1.23	12.57	6.88 @ 75F
2000	0.0	50.0	0.0	2.22	1.83	1.51	1.25	0.56	3.46	2.88	2.40	2.00	0 98	1.06	1.19	12.57	3.34 @100F
2000	50.0	50.0	50.0	2.79	2.34	1 97	1.66	0.75	4.13	3.48	2.93	2.47	1.18	1.08	1.35	12.57	
2000	20.6	27.3	20.6	2.16	1.82	1.53	1.29	0.56	3.35	2.82	2 38	2.01	0 95	1.07	1.20	12.57	

TABLE 17 : NOx AT 50.0 MPH.

TABLE 18

LOW ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE) AT 55.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	-LDDV- 0-100F	-LDDT- 0-100F	-HDDV- 0-100F	----HDGV----
1980	0.0	0.0	0.0	4.74	4.16	3.66	3.23	2.42	6.03	5.35	4.78	4.28	3.32	1.60	2.15	29.69	10.56 @ 0F
1980	0.0	100.0	0.0	6.53	5.81	5.19	4.65	3.32	8.51	7.66	6.92	6.27	4.56	1.86	2.57	29.69	9.83 @ 25F
1980	100.0	0.0	100.0	5.52	5.16	4.89	4.67	3.59	6.22	6.17	6.18	6.22	5.06	2.01	2.78	29.69	9.19 @ 50F
1980	50.0	0.0	50.0	5.21	4.75	4.37	4.05	3.10	6.21	5.87	5.60	5.39	4.31	1.78	2.43	29.69	8.62 @ 75F
1980	0.0	50.0	0.0	5.78	5.11	4.54	4.05	2.95	7.45	6.67	6.00	5.42	4.04	1.72	2.34	29.69	6.21 @100F
1980	50.0	50.0	50.0	6.02	5.49	5.04	4.66	3.46	7.36	6.91	6.55	6.25	4.81	1.94	2.67	29.69	
1980	20.6	27.3	20.6	5.51	4.93	4.44	4.02	2.99	6.89	6.29	5.79	5.37	4.13	1.74	2.37	29.69	
1985	0.0	0.0	0.0	3.05	2.66	2.33	2.04	1.36	5.05	4.43	3.89	3.43	2.45	1.63	1.80	24.83	8.72 @ 0F
1985	0.0	100.0	0.0	4.37	3.84	3.39	3.00	1.95	7.43	6.65	5.96	5.36	3.59	1.66	2.14	24.83	8.18 @ 25F
1985	100.0	0.0	100.0	4.18	3.78	3.44	3.16	1.98	7.11	6.38	5.80	5.34	3.56	1.77	2.31	24.83	7.70 @ 50F
1985	50.0	0.0	50.0	3.64	3.24	2.91	2.63	1.70	6.10	5.44	4.89	4.44	3.06	1.69	2.03	24.83	7.27 @ 75F
1985	0.0	50.0	0.0	3.75	3.29	2.90	2.56	1.68	6.32	5.60	4.99	4.46	3.06	1.65	1.95	24.83	5.41 @100F
1985	50.0	50.0	50.0	4.27	3.81	3.41	3.08	1.96	7.27	6.51	5.88	5.35	3.57	1.72	2.22	24.83	
1985	20.6	27.3	20.6	3.68	3.25	2.88	2.57	1.68	6.18	5.49	4.91	4.41	3.04	1.66	1.97	24.83	
1988	0.0	0.0	0.0	2.41	2.09	1.81	1.57	0.93	4.77	4.14	3.60	3.14	2.12	1.38	1.57	21.15	8.23 @ 0F
1988	0.0	100.0	0.0	3.62	3.11	2.68	2.32	1.39	7.02	6.23	5.54	4.94	3.15	1.38	1.87	21.15	7.78 @ 25F
1988	100.0	0.0	100.0	3.58	3.18	2.84	2.55	1.39	7.23	6.30	5.54	4.92	2.97	1.47	2.01	21.15	7.36 @ 50F
1988	50.0	0.0	50.0	2.99	2.63	2.32	2.06	1.16	6.00	5.23	4.59	4.06	2.57	1.42	1.77	21.15	6.97 @ 75F
1988	0.0	50.0	0.0	3.02	2.60	2.25	1.96	1.17	5.93	5.21	4.60	4.07	2.66	1.38	1.70	21.15	4.26 @100F
1988	50.0	50.0	50.0	3.60	3.15	2.76	2.44	1.39	7.12	6.26	5.54	4.93	3.06	1.43	1.94	21.15	
1988	20.6	27.3	20.6	2.98	2.59	2.26	1.98	1.16	5.91	5.17	4.55	4.02	2.61	1.40	1.72	21.15	
1990	0.0	0.0	0.0	2.16	1.85	1.59	1.37	0.73	4.36	3.77	3.26	2.83	1.82	1.30	1.40	18.15	8.25 @ 0F
1990	0.0	100.0	0.0	3.36	2.83	2.39	2.03	1.14	6.48	5.68	5.00	4.42	2.73	1.29	1.66	18.15	7.82 @ 25F
1990	100.0	0.0	100.0	3.32	2.92	2.57	2.28	1.14	6.67	5.77	5.03	4.42	2.51	1.37	1.78	18.15	7.41 @ 50F
1990	50.0	0.0	50.0	2.71	2.37	2.07	1.81	0.94	5.50	4.76	4.14	3.63	2.18	1.33	1.57	18.15	7.04 @ 75F
1990	0.0	50.0	0.0	2.74	2.33	1.98	1.70	0.94	5.43	4.74	4.14	3.63	2.29	1.30	1.51	18.15	3.94 @100F
1990	50.0	50.0	50.0	3.34	2.87	2.48	2.15	1.14	6.57	5.73	5.02	4.42	2.62	1.33	1.72	18.15	
1990	20.6	27.3	20.6	2.70	2.32	2.00	1.73	0.93	5.41	4.70	4.11	3.60	2.22	1.31	1.53	18.15	
1995	0.0	0.0	0.0	1.80	1.53	1.30	1.11	0.48	3.50	2.98	2.54	2.17	1.19	1.23	1.27	15.22	8.31 @ 0F
1995	0.0	100.0	0.0	3.06	2.49	2.03	1.65	0.83	5.36	4.54	3.86	3.29	1.85	1.21	1.51	15.22	7.91 @ 25F
1995	100.0	0.0	100.0	2.90	2.53	2.22	1.94	0.84	5.29	4.53	3.90	3.36	1.66	1.28	1.62	15.22	7.53 @ 50F
1995	50.0	0.0	50.0	2.31	2.00	1.73	1.50	0.65	4.36	3.73	3.19	2.75	1.42	1.25	1.43	15.22	7.17 @ 75F
1995	0.0	50.0	0.0	2.38	1.98	1.64	1.36	0.64	4.39	3.73	3.18	2.72	1.51	1.22	1.38	15.22	3.58 @100F
1995	50.0	50.0	50.0	2.98	2.51	2.12	1.80	0.84	5.33	4.54	3.88	3.33	1.75	1.25	1.56	15.22	
1995	20.6	27.3	20.6	2.33	1.97	1.66	1.41	0.64	4.34	3.70	3.16	2.70	1.46	1.23	1.39	15.22	
2000	0.0	0.0	0.0	1.73	1.47	1.25	1.06	0.43	2.86	2.43	2.06	1.75	0.81	1.22	1.26	14.35	8.25 @ 0F
2000	0.0	100.0	0.0	3.02	2.44	1.97	1.59	0.77	4.58	3.76	3.09	2.55	1.31	1.20	1.49	14.35	7.85 @ 25F
2000	100.0	0.0	100.0	2.81	2.46	2.15	1.88	0.80	4.17	3.60	3.10	2.68	1.19	1.27	1.59	14.35	7.47 @ 50F
2000	50.0	0.0	50.0	2.23	1.93	1.67	1.44	0.60	3.47	2.97	2.55	2.18	0.99	1.25	1.41	14.35	7.12 @ 75F
2000	0.0	50.0	0.0	2.33	1.92	1.58	1.30	0.59	3.66	3.05	2.54	2.12	1.04	1.21	1.36	14.35	3.45 @100F
2000	50.0	50.0	50.0	2.92	2.45	2.06	1.73	0.78	4.38	3.68	3.10	2.61	1.25	1.24	1.54	14.35	
2000	20.6	27.3	20.6	2.26	1.90	1.60	1.35	0.59	3.55	2.99	2.52	2.13	1.01	1.23	1.38	14.35	

TABLE 18 : NOx AT 55.0 MPH.

TABLE 19

HIGH ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE) AT 5.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	-LDDV- 0-100F	-LDDT- 0-100F	-HDDV- 0-100F	----HDGV----
1980	0.0	0.0	0.0	19.09	17.32	15.86	14.64	18.52	29.55	27.27	25.34	23.71	28.07	1.74	3.72	19.81	67.74 @ 0F
1980	0.0	100.0	0.0	17.49	17.45	17.48	17.57	24.26	28.14	27.99	27.88	27.82	35.97	1.79	3.78	19.81	60.32 @ 25F
1980	100.0	0.0	100.0	138.95	80.27	47.01	28.13	21.70	202.24	117.64	69.41	41.89	32.11	2.93	6.12	19.81	53.90 @ 50F
1980	50.0	0.0	50.0	68.04	42.98	28.49	20.04	19.69	101.15	64.68	43.51	31.11	29.61	2.19	4.63	19.81	48.33 @ 75F
1980	0.0	50.0	0.0	18.26	17.22	16.39	15.73	20.70	28.79	27.41	26.25	25.28	31.14	1.73	3.68	19.81	53.53 @100F
1980	50.0	50.0	50.0	78.22	48.86	32.24	22.85	22.98	115.19	72.82	48.65	34.85	34.04	2.36	4.95	19.81	
1980	20.6	27.3	20.6	38.67	27.76	21.31	17.44	20.18	58 44	42.65	33.27	27.58	30.36	1.92	4.07	19.81	
1985	0.0	0.0	0.0	13.07	11.23	9.77	8.59	12.01	24.45	21.35	18.83	16.78	23.48	0.97	1.83	17.65	41.93 @ 0F
1985	0.0	100.0	0.0	12.57	11.88	11.33	10.90	16.10	21.98	21.40	20.90	20.47	30.15	1 12	1.98	17.65	38.17 @ 25F
1985	100.0	0.0	100.0	126.95	65.53	34.79	19.13	16.74	170.09	95.33	54.29	31.62	24.35	1.67	3.05	17.65	34.90 @ 50F
1985	50.0	0.0	50.0	57.92	32.60	19.57	12.66	13.71	82.84	50.94	32.93	22.58	23.59	1.24	2.29	17.65	32.05 @ 75F
1985	0.0	50.0	0.0	12.66	11.32	10.25	9.40	13.47	23.15	21.11	19.44	18.07	25.84	1.02	1.86	17.65	37.75 @100F
1985	50.0	50.0	50.0	69.76	38.71	23.06	15.02	16.42	96.04	58.37	37.59	26.04	27.25	1.40	2.51	17.65	
1985	20.6	27.3	20.6	31.18	20.01	14.03	10.69	13.49	47.62	33.31	24.92	19.85	24.80	1.10	2.03	17.65	
1988	0.0	0.0	0.0	10.49	8.73	7.33	6.23	9.68	20.89	17.76	15.24	13.23	20.70	0.80	1.43	15.02	32.00 @ 0F
1988	0.0	100.0	0.0	10.72	9.70	8.86	8.18	13.22	19.38	18.27	17.34	16.56	26.82	0.92	1.57	15.02	28.07 @ 25F
1988	100.0	0.0	100.0	127.53	61.31	30.28	15.52	15.70	166.76	88.32	47.81	26.62	22.42	1 35	2.39	15 02	24.81 @ 50F
1988	50.0	0.0	50.0	56.06	29.16	16.20	9.77	11.88	78.43	45.53	27.98	18.37	21.11	1.01	1.79	15.02	22.09 @ 75F
1988	0.0	50.0	0.0	10.39	8.95	7.81	6.90	10.92	19.96	17.69	15.85	14.36	22.82	0.84	1.46	15 02	29.89 @100F
1988	50.0	50.0	50.0	69.13	35.50	19.57	11.85	14.46	93.07	53.30	32.58	21.59	24.62	1.14	1 98	15.02	
1988	20.6	27.3	20.6	29.06	17.20	11.21	8.04	11.25	43.90	29.07	20.77	15.94	22.01	0.91	1.60	15.02	
1990	0.0	0.0	0.0	9.20	7.52	6.20	5.16	6.90	18.83	15.75	13.30	11.35	16.64	0.74	1 35	13.62	27.05 @ 0F
1990	0.0	100.0	0.0	9.87	8.69	7.71	6.92	9.82	17.91	16.52	15.36	14.39	21.90	0.85	1.49	13.62	23.27 @ 25F
1990	100.0	0.0	100.0	128.86	59 64	28.25	13.84	14.94	167.64	85.16	44.36	23.84	20.86	1.25	2.26	13.62	20.19 @ 50F
1990	50.0	0.0	50.0	55.62	27.69	14.69	8.46	9.91	77.06	42.85	25.35	16.11	18.03	0.93	1 69	13.62	17 67 @ 75F
1990	0.0	50.0	0.0	9.28	7.83	6.68	5.76	7.92	18.14	15.79	13.90	12.37	18.43	0.78	1.38	13.62	21.10 @100F
1990	50.0	50.0	50.0	69.37	34.16	17.98	10.38	12.38	92.78	50.84	29.86	19.12	21.38	1.05	1.87	13.62	
1990	20.6	27.3	20.6	28.21	15.93	9.92	6.83	8.67	42.25	26.84	18.54	13.84	18.17	0.84	1.51	13.62	
1995	0.0	0.0	0.0	7.12	5.69	4.57	3.70	4.08	14.59	11 81	9.62	7.90	10 78	0.71	1.34	11.97	22.24 @ 0F
1995	0.0	100.0	0.0	8.45	7.09	5.98	5.07	6.38	15.04	13.14	11.56	10.26	14.80	0.81	1.49	11.97	18.57 @ 25F
1995	100.0	0.0	100.0	127.60	55.79	24.67	11.15	14.13	166.45	77.58	36.97	18.19	19.08	1.16	2.24	11.97	15.63 @ 50F
1995	50.0	0.0	50.0	53.77	25.03	12.29	6.52	7.90	73.41	37.20	20.10	11.77	13.80	0.88	1.68	11.97	13.27 @ 75F
1995	0.0	50.0	0.0	7.50	6.12	5.03	4.16	4.89	14.47	12.09	10.20	8.68	12.14	0.74	1.38	11.97	15.78 @100F
1995	50.0	50.0	50.0	68.02	31.44	15.33	8.11	10.25	90.75	45.36	24.27	14.22	16.94	0.99	1.87	11.97	
1995	20.6	27.3	20.6	26.38	13.82	7.97	5.10	6.08	38.55	22.33	14.21	9.90	12.75	0.79	1.50	11.97	
2000	0.0	0.0	0.0	6.49	5.16	4.12	3.32	3.32	11.59	9.23	7.39	5.95	6.74	0.72	1.37	11.39	20.63 @ 0F
2000	0.0	100.0	0.0	7.90	6.55	5.45	4.56	5.43	13.01	10.91	9.19	7.78	9.98	0.82	1.55	11.39	17.00 @ 25F
2000	100.0	0.0	100.0	122.55	52.84	22.95	10.14	13.49	161.83	71.28	31.81	14.55	17.94	1.17	2.30	11.39	14.11 @ 50F
2000	50.0	0.0	50.0	51.43	23.57	11.36	5.91	7.21	69.70	33.14	16.73	9.18	10.96	0.89	1.72	11.39	11.82 @ 75F
2000	0.0	50.0	0.0	6.90	5.60	4.56	3.74	4.08	11.90	9.69	7.94	6.55	7.87	0.75	1.42	11.39	14.03 @100F
2000	50.0	50.0	50.0	65.22	29.70	14.20	7.35	9.46	87.42	41.09	20.50	11.16	13.96	0.99	1.93	11.39	
2000	20.6	27.3	20.6	25.07	12.92	7.31	4.60	5.32	35.50	19.25	11.50	7.59	9.07	0.80	1.54	11.39	

TABLE 19 : THC AT 5.0 MPH.

TABLE 20

HIGH ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE) AT 10.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	-LDDV- 0-100F	-LDDT- 0-100F	-HDDV- 0-100F	----HDGV----
1980	0.0	0.0	0.0	11.85	10.90	10.11	9.46	11.54	18.43	17.20	16.16	15.28	17.62	1.37	2.92	15.55	47.87 @ OF
1980	0.0	100.0	0.0	10.98	10.97	10.99	11.05	14.67	17.68	17.61	17.55	17.53	21.96	1.41	2.97	15.55	43.01 @ 25F
1980	100.0	0.0	100.0	77.15	45.19	27.07	16.79	13.30	113.07	66.73	40.31	25.23	19.88	2.30	4.80	15.55	38.80 @ 50F
1980	50.0	0.0	50.0	38.54	24.89	17.00	12.39	12.19	57.71	37.72	26.13	19.33	18.49	1.72	3.63	15.55	35.15 @ 75F
1980	0.0	50.0	0.0	11.40	10.85	10.40	10.05	12.73	18.03	17.28	16.66	16.14	19.31	1.36	2.89	15.55	38.56 @100F
1980	50.0	50.0	50.0	44.06	28.08	19.03	13.92	13.98	65.38	42.17	28.93	21.38	20.92	1.85	3.89	15.55	
1980	20.6	27.3	20.6	22.53	16.59	13.08	10.98	12.45	34.29	25.64	20.51	17.40	18.89	1.51	3.19	15.55	
1985	0.0	0.0	0.0	7.90	6.92	6.13	5.50	7.33	14.65	12 99	11.64	10.54	14.12	0.76	1.44	13.85	30 88 @ OF
1985	0.0	100.0	0.0	7.63	7.26	6.97	6.75	9.55	13.33	13.02	12.75	12.53	17.74	0.88	1.55	13.85	28.41 @ 25F
1985	100.0	0.0	100.0	69.22	36.18	19.62	11.18	9.89	93.67	53.15	30.88	18.58	14.64	1.31	2.39	13.85	26.27 @ 50F
1985	50.0	0.0	50.0	32.07	18.44	11.42	7.70	8.25	46.36	29.07	19.30	13.68	14.20	0.97	1.80	13.85	24.40 @ 75F
1985	0.0	50.0	0.0	7.68	6.96	6.39	5.94	8.12	13.95	12.86	11.96	11.23	15.41	0.80	1.46	13.85	28.14 @100F
1985	50.0	50.0	50.0	38.42	21.72	13.30	8.97	9.72	53.50	33.08	21.82	15.55	16.19	1.10	1.97	13.85	
1985	20.6	27.3	20.6	17.66	11.65	8.43	6.64	8.13	27.24	19.49	14.94	12.20	14.85	0.87	1.60	13.85	
1988	0.0	0.0	0.0	6.21	5.27	4.52	3.93	5.87	12.29	10.61	9.26	8.18	12.31	0.63	1.13	11.79	22.99 @ OF
1988	0.0	100.0	0.0	6.33	5.78	5.34	4.98	7.77	11.48	10.89	10.39	9.97	15.62	0.72	1.23	11.79	20.42 @ 25F
1988	100.0	0.0	100.0	68.96	33.47	16.83	8.91	9.10	90.97	48.70	26.85	15.41	13.27	1.06	1.88	11.79	18.28 @ 50F
1988	50.0	0.0	50.0	30.65	16.23	9.28	5.83	7.05	43.35	25.61	16.15	10.96	12.54	0.79	1.41	11.79	16.49 @ 75F
1988	0.0	50.0	0.0	6.15	5.39	4.78	4.29	6.54	11.79	10.57	9.59	8.79	13.46	0.66	1.15	11.79	21.95 @100F
1988	50.0	50.0	50.0	37.64	19.63	11.09	6.95	8.43	51.22	29.79	18.62	12.69	14.44	0.89	1.55	11.79	
1988	20.6	27.3	20.6	16.16	9.81	6.60	4.90	6.71	24.71	16.72	12.25	9.65	13.02	0.71	1.25	11.79	
1990	0.0	0.0	0.0	5.38	4.48	3.78	3.22	4.15	10.97	9.32	8.01	6.96	9.80	0.58	1.06	10.69	19.29 @ OF
1990	0.0	100.0	0.0	5.74	5.11	4.59	4.16	5.72	10.48	9.73	9 11	8.60	12.63	0.67	1.17	10 69	16.81 @ 25F
1990	100.0	0.0	100.0	69.44	32.39	15.59	7.87	8.46	91.01	46.68	24.73	13.69	12 07	0.98	1.77	10.69	14.79 @ 50F
1990	50.0	0.0	50.0	30.23	15.29	8.32	4 99	5.76	42.31	23.92	14.50	9.53	10.55	0.73	1.33	10.69	13.14 @ 75F
1990	0.0	50.0	0.0	5.42	4.65	4.03	3.54	4.70	10.60	9.34	8.33	7.52	10.76	0.61	1.09	10.69	15.39 @100F
1990	50.0	50.0	50.0	37.59	18.75	10.09	6.02	7.09	50.74	28.21	16.92	11.14	12.35	0.83	1.47	10.69	
1990	20.6	27.3	20.6	15.56	8.99	5.77	4.12	5.10	23.57	15.29	10.83	8.31	10.62	0.66	1.18	10.69	
1995	0.0	0.0	0.0	4.10	3.33	2.73	2.27	2.47	8.35	6.86	5.69	4.77	6.31	0.55	1.05	9.40	15.65 @ OF
1995	0.0	100.0	0.0	4.81	4.08	3.49	3.00	3.70	8.59	7.57	6.73	6.03	8.47	0.63	1.17	9.40	13.24 @ 25F
1995	100.0	0.0	100.0	68.52	30.12	13.48	6.25	7.85	89.64	42.08	20.34	10.29	10.76	0.91	1.76	9 40	11.31 @ 50F
1995	50.0	0.0	50.0	29.04	13.68	6.86	3.78	4.52	39.84	20.46	11.31	6.85	7.93	0.69	1.32	9.40	9.77 @ 75F
1995	0.0	50.0	0.0	4.30	3.56	2.98	2.52	2.91	8.29	7.02	6.00	5.19	7.04	0.58	1.08	9.40	11.41 @100F
1995	50.0	50.0	50.0	36.66	17.10	8.49	4.63	5.77	49.12	24.83	13.54	8.16	9.61	0.77	1.46	9.40	
1995	20.6	27.3	20.6	14.40	7.68	4.55	3.02	3.54	21.18	12.50	8.15	5.84	7.37	0.62	1.17	9.40	
2000	0.0	0.0	0.0	3.72	3.01	2.45	2.02	2.02	6.61	5.35	4.36	3.60	4.02	0.57	1.07	8.94	14.46 @ OF
2000	0.0	100.0	0.0	4.47	3.75	3.16	2.68	3.15	7.37	6.25	5.33	4.57	5.75	0.64	1.22	8.94	12.08 @ 25F
2000	100.0	0.0	100.0	65.78	28.50	12.52	5.67	7.46	86.94	38.53	17.42	8.19	10.01	0.92	1.81	8.94	10.18 @ 50F
2000	50.0	0.0	50.0	27.75	12.85	6.32	3.41	4.10	37.68	18.13	9.36	5.32	6.28	0.70	1.35	8.94	8.68 @ 75F
2000	0.0	50.0	0.0	3.94	3.24	2.69	2.25	2.43	6.78	5.60	4.66	3.92	4.62	0.59	1.11	8.94	10.13 @100F
2000	50.0	50.0	50.0	35.12	16.13	7.84	4.18	5.31	47.16	22.39	11.38	6.38	7.88	0.78	1.51	8.94	
2000	20.6	27.3	20.6	13.65	7.15	4.16	2.71	3.09	19.39	10.71	6.56	4.47	5.27	0.63	1.21	8.94	

TABLE 20 : THC AT 10.0 MPH.

TABLE 21

HIGH ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE) AT 19.6 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	-LDDV- 0-100F	-LDDT- 0-100F	-HDDV- 0-100F	----HDGV----
1980	0 0	0.0	0.0	8.42	7.86	7.39	7.00	8.23	13.15	12.42	11.81	11.28	12.66	0.91	1.95	10.39	28.94 @ 0F
1980	0.0	100.0	0.0	7.89	7.90	7.92	7.96	10.12	12.72	12.68	12.65	12 65	15.31	0.94	1 98	10.39	26.52 @ 25F
1980	100.0	0.0	100.0	47.87	28.57	17.63	11.42	9.32	70.77	42.58	26.51	17.33	14.08	1.53	3.21	10.39	24.41 @ 50F
1980	50 0	0.0	50.0	24.57	16.32	11.56	8.78	8.64	37.10	24.94	17.88	13.75	13.21	1.15	2.43	10.39	22.59 @ 75F
1980	0.0	50.0	0.0	8.15	7.82	7.57	7.36	8.95	12.92	12.48	12.11	11.80	13.69	0.91	1.93	10.39	24.30 @100F
1980	50.0	50.0	50.0	27.88	18.23	12.77	9.69	9.72	41.74	27.63	19.58	14.99	14.69	1.24	2.60	10.39	
1980	20.6	27.3	20.6	14.88	11.30	9.19	7.92	8.79	22.82	17.57	14.46	12.57	13.44	1.01	2.13	10.39	
1985	0.0	0.0	0.0	5.44	4.87	4.41	4.04	5.11	9 99	9.01	8.22	7.57	9.67	0.51	0.96	9.26	20.35 @ 0F
1985	0 0	100.0	0.0	5.28	5.07	4.90	4.77	6.43	9.21	9.03	8.88	8.75	11.84	0.59	1.04	9.26	19.12 @ 25F
1985	100.0	0.0	100.0	41.78	22.23	12.41	7.41	6.63	57.35	33.10	19.76	12.39	10.02	0.88	1.60	9.26	18.05 @ 50F
1985	50.0	0.0	50.0	19.78	11.71	7.55	5.34	5.66	29.03	18.67	12.82	9.46	9.74	0.65	1.20	9.26	17.12 @ 75F
1985	0.0	50.0	0.0	5.31	4.89	4.56	4.30	5.58	9.58	8.94	8.41	7.99	10.45	0.53	0.98	9.26	18.98 @100F
1985	50 0	50.0	50.0	23.53	13.65	8.66	6.09	6.53	33.28	21.07	14.32	10.57	10.93	0.73	1.32	9.26	
1985	20.6	27.3	20.6	11.23	7.68	5.77	4.71	5.59	17.55	12.92	10.21	8.57	10.12	0.58	1.07	9.26	
1988	0.0	0.0	0.0	4.17	3.62	3.18	2.84	4.05	8.19	7.21	6.42	5.78	8.32	0.42	0 75	7.88	14 41 @ 0F
1988	0.0	100.0	0.0	4.24	3.92	3.66	3.45	5.18	7.72	7.37	7.09	6.84	10.30	0.48	0.82	7.88	13.13 @ 25F
1988	100.0	0.0	100.0	41.07	20.22	10.43	5.77	5.96	54.91	29.85	16.88	10.08	8.91	0.71	1.25	7.88	12.06 @ 50F
1988	50.0	0.0	50.0	18.55	10.08	5 99	3.96	4.75	26.66	16.14	10.52	7.44	8.47	0.53	0.94	7.88	11.17 @ 75F
1988	0.0	50.0	0.0	4.14	3.69	3.33	3.05	4.45	7.90	7.19	6.61	6.15	9.01	0.44	0.77	7.88	14.38 @100F
1988	50.0	50.0	50.0	22.66	12.07	7.05	4.61	5.57	31.31	18.61	11.98	8.46	9.60	0.60	1.04	7.88	
1988	20.6	27.3	20.6	10.03	6.29	4.41	3.41	4.55	15.58	10.85	8.20	6.66	8.75	0.47	0.84	7.88	
1990	0.0	0.0	0.0	3.56	3.04	2.62	2.30	2 84	7.23	6 26	5.49	4.88	6.54	0.39	0.71	7.15	11.90 @ 0F
1990	0.0	100.0	0.0	3.77	3.40	3.10	2.85	3.76	6.94	6.50	6.14	5.84	8.21	0.45	0.78	7.15	10.66 @ 25F
1990	100.0	0.0	100.0	41.14	19.42	9.56	5.03	5.37	54.53	28.37	15.40	8.86	7.89	0.65	1.18	7.15	9.65 @ 50F
1990	50.0	0.0	50.0	18.15	9.38	5.29	3.34	3.79	25.76	14.91	9.34	6.40	6.99	0.49	0.89	7.15	8.83 @ 75F
1990	0.0	50.0	0.0	3.59	3.14	2.77	2.49	3.16	7.01	6.27	5.68	5.20	7.11	0.41	0 73	7.15	9.95 @100F
1990	50.0	50.0	50.0	22.46	11.41	6.33	3.94	4.57	30.73	17.44	10.77	7.35	8.05	0.55	0.98	7.15	
1990	20.6	27.3	20.6	9.53	5.68	3.80	2.82	3.40	14.68	9.80	7.17	5.67	7.03	0.44	0.79	7.15	
1995	0.0	0.0	0.0	2.66	2.21	1.86	1.59	1.70	5.38	4.51	3.82	3.29	4.19	0.37	0.70	6.28	9.36 @ 0F
1995	0.0	100.0	0.0	3.07	2.65	2.30	2.02	2.42	5.52	4.93	4.43	4.02	5.45	0.42	0.78	6.28	8.16 @ 25F
1995	100.0	0.0	100.0	40.37	17.89	8.15	3.92	4.85	53.06	25.17	12.42	6.52	6.79	0.61	1.17	6.28	7.20 @ 50F
1995	50.0	0.0	50.0	17.26	8.27	4.28	2.47	2.90	23.85	12.49	7.12	4.50	5.14	0.46	0.88	6.28	6.43 @ 75F
1995	0.0	50.0	0.0	2.78	2.35	2 00	1.73	1.96	5.34	4 60	4.00	3.53	4.62	0.39	0.72	6.28	7.25 @100F
1995	50.0	50.0	50.0	21.72	10.27	5.23	2.97	3.64	29.29	15.05	8.43	5.27	6.12	0.52	0.98	6.28	
1995	20.6	27.3	20.6	8.69	4.76	2.92	2.03	2.33	12.91	7.82	5.27	3.91	4.80	0.42	0.79	6.28	
2000	0.0	0.0	0.0	2.40	1.98	1.66	1.41	1.40	4.24	3.50	2.92	2.48	2.72	0.38	0.72	5.98	8.57 @ 0F
2000	0.0	100.0	0.0	2.84	2.42	2.07	1.79	2.07	4.68	4.03	3.49	3.05	3.74	0.43	0.81	5.98	7.39 @ 25F
2000	100.0	0.0	100.0	38.73	16.91	7.55	3.54	4.59	51.27	22.93	10.57	5.17	6.23	0.61	1.21	5 98	6.44 @ 50F
2000	50.0	0.0	50.0	16.47	7.74	3.92	2.21	2.62	22.43	10.99	5.85	3.49	4.04	0.47	0.90	5.98	5.69 @ 75F
2000	0.0	50.0	0.0	2.53	2.12	1.79	1.54	1.64	4.34	3.65	3.10	2.66	3.08	0.39	0.74	5.98	6.42 @100F
2000	50.0	50.0	50.0	20.78	9.66	4.81	2.67	3.33	27.98	13.48	7.03	4.11	4.98	0.52	1.01	5.98	
2000	20.6	27.3	20.6	8.21	4.41	2.65	1.81	2.03	11.72	6.64	4.21	2.99	3.45	0.42	0 81	5.98	

TABLE 22

HIGH ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE) AT 35.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	-LDDV- 0-100F	-LDDT- 0-100F	-HDDV- 0-100F	----HDGV----
1980	0.0	0.0	0.0	6.52	6.20	5.93	5.70	6.39	10.35	9.92	9.55	9.23	10.01	0.57	1.21	6.45	18.60 @ OF
1980	0.0	100.0	0.0	6.20	6.22	6.25	6.29	7.59	10.12	10.10	10.10	10.11	11.74	0.58	1.23	6.45	17.50 @ 25F
1980	100.0	0.0	100.0	31.58	19.36	12.42	8.46	7.14	48.38	29.83	19.24	13.18	11 05	0.95	1.99	6.45	16.56 @ 50F
1980	50.0	0.0	50.0	16.86	11.62	8.59	6.82	6.68	26.24	18.23	13.58	10.85	10.42	0.71	1.51	6.45	15.73 @ 75F
1980	0.0	50.0	0.0	6.36	6.18	6.04	5.93	6.85	10.22	9.97	9.75	9.57	10.69	0.56	1.20	6.45	16.50 @100F
1980	50.0	50.0	50.0	18.89	12.79	9.33	7.38	7.37	29.25	19.97	14.67	11 64	11.39	0.77	1.61	6.45	
1980	20.6	27.3	20.6	10.66	8.41	7.08	6.28	6.76	16.79	13.35	11.31	10.08	10.55	0.62	1.32	6.45	
1985	0.0	0.0	0.0	3.94	3.63	3.38	3.17	3.76	7.23	6.68	6.24	5 88	7.03	0.32	0.60	5.75	14.59 @ OF
1985	0.0	100.0	0.0	3.83	3.73	3.65	3.59	4.53	6.80	6.71	6.63	6.57	8.33	0.36	0.64	5.75	14.04 @ 25F
1985	100.0	0.0	100.0	24.76	13.63	8.01	5.11	4.64	35.95	21.34	13.27	8.78	7.34	0.54	0.99	5.75	13.56 @ 50F
1985	50.0	0.0	50.0	12.20	7.60	5.21	3.93	4.08	18.86	12.61	9.07	7.03	7.11	0.40	0.75	5.75	13.14 @ 75F
1985	0.0	50.0	0.0	3.86	3.64	3.46	3.32	4.04	7.00	6.65	6.36	6.13	7.50	0.33	0.61	5.75	13.98 @100F
1985	50.0	50.0	50.0	14.30	8.68	5.83	4.35	4.59	21.37	14.02	9.95	7.68	7.84	0.45	0.82	5.75	
1985	20.6	27.3	20.6	7.27	5.26	4.17	3.56	4.04	11.86	9.09	7.46	6.48	7.32	0.36	0.66	5.75	
1988	0.0	0.0	0.0	2.88	2.58	2.35	2.16	2.92	5.68	5.14	4.70	4.35	5.89	0.26	0 47	4.89	9.72 @ OF
1988	0.0	100.0	0.0	2.91	2.74	2.61	2 50	3.56	5.41	5.23	5.08	4.96	7.05	0.30	0.51	4.89	9.14 @ 25F
1988	100.0	0.0	100.0	23.25	11.78	6.37	3.79	3.98	32 69	18.30	10.80	6.85	6.30	0.44	0.78	4.89	8.66 @ 50F
1988	50.0	0.0	50.0	10.84	6.17	3.91	2.78	3 31	16.42	10.36	7.11	5.32	6.01	0.33	0.58	4.89	8.26 @ 75F
1988	0.0	50.0	0.0	2.86	2.62	2.43	2.27	3.15	5.51	5.13	4.82	4.56	6 30	0.27	0.48	4 89	10.24 @100F
1988	50.0	50.0	50.0	13.08	7.26	4.49	3.14	3.77	19.05	11.77	7.94	5.90	6.68	0.37	0.64	4.89	
1988	20.6	27.3	20.6	6.12	4.07	3.03	2.48	3.20	9.98	7.27	5.75	4.86	6.16	0.29	0.52	4.89	
1990	0.0	0.0	0.0	2.39	2.11	1 89	1.71	2.01	4.88	4.35	3.94	3.60	4.50	0.24	0.44	4.44	7.86 @ OF
1990	0.0	100.0	0.0	2.50	2.30	2.14	2.01	2.51	4.72	4.49	4.30	4.14	5.46	0.28	0.48	4.44	7.30 @ 25F
1990	100.0	0.0	100.0	22.86	11.05	5.68	3.20	3.38	31.55	16 88	9.57	5.86	5.28	0.41	0.73	4.44	6.84 @ 50F
1990	50.0	0.0	50.0	10.34	5.57	3.35	2.28	2.52	15.37	9.28	6.14	4.47	4.76	0.30	0.55	4.44	6.47 @ 75F
1990	0.0	50.0	0.0	2.41	2.16	1.97	1.81	2.18	4.76	4.36	4.04	3 78	4.83	0.25	0.45	4.44	6.98 @100F
1990	50.0	50.0	50.0	12.68	6.68	3.91	2.61	2.95	18.13	10.68	6.93	5.00	5.37	0.34	0.61	4.44	
1990	20.6	27.3	20.6	5.65	3.55	2.53	2.00	2.31	9.10	6.37	4.89	4.05	4.79	0.27	0.49	4.44	
1995	0.0	0.0	0.0	1.72	1.48	1.29	1.14	1.21	3.46	2.99	2.62	2.33	2.82	0.23	0.43	3.90	5.93 @ OF
1995	0.0	100.0	0.0	1.95	1.72	1 53	1.37	1.60	3.54	3.22	2.95	2.73	3.51	0.26	0.49	3.90	5.39 @ 25F
1995	100.0	0.0	100.0	22.07	9.94	4.69	2.40	2.91	29.40	14.25	7.32	4.10	4.23	0.38	0.73	3.90	4.96 @ 50F
1995	50.0	0.0	50.0	9.60	4.75	2.59	1.62	1.85	13.52	7.35	4.42	3.00	3.33	0.29	0.55	3.90	4.61 @ 75F
1995	0.0	50.0	0.0	1.78	1.55	1.37	1.22	1.35	3.44	3.04	2.72	2.46	3.05	0.24	0 45	3.90	4.98 @100F
1995	50.0	50.0	50.0	12.01	5.83	3.11	1.89	2.25	16.47	8.74	5.13	3.42	3.87	0.32	0.61	3.90	
1995	20.6	27.3	20.6	4.98	2.85	1.87	1.38	1.55	7.56	4.80	3.41	2.67	3.16	0.26	0.49	3.90	
2000	0.0	0.0	0.0	1.54	1.31	1.14	1.00	1.00	2.70	2.30	1.99	1.75	1.88	0.23	0.45	3.71	5.36 @ OF
2000	0.0	100.0	0.0	1.78	1.55	1.36	1.21	1.36	2.94	2.58	2.29	2.05	2.43	0.27	0.51	3.71	4.82 @ 25F
2000	100.0	0.0	100.0	21.14	9.37	4.32	2.16	2.72	28.08	12.78	6.11	3.20	3.77	0.38	0.75	3.71	4.40 @ 50F
2000	50.0	0.0	50.0	9.13	4.42	2.36	1.44	1.66	12.51	6.34	3.57	2.29	2.59	0.29	0.56	3.71	4.06 @ 75F
2000	0.0	50.0	0.0	1.61	1.39	1.21	1.07	1.13	2.75	2.38	2.08	1.85	2.07	0.24	0.46	3.71	4.39 @100F
2000	50.0	50.0	50.0	11.46	5.46	2.84	1.68	2.04	15.51	7.68	4.20	2.63	3.10	0.32	0.63	3.71	
2000	20.6	27.3	20.6	4.68	2.62	1.68	1.22	1.34	6.74	3.99	2.68	2.02	2.27	0.26	0.50	3.71	

TABLE 22 : THC AT 35.0 MPH.

TABLE 23

HIGH ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE) AT 50.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	-LDDV- 0-100F	-LDDT- 0-100F	-HDDV- 0-100F	----HDGV----
1980	0.0	0.0	0.0	5.98	5.73	5.51	5.33	5.87	9.56	9.21	8.91	8.65	9.26	0.44	0.93	4.95	15.81 @ 0F
1980	0.0	100.0	0.0	5.72	5.74	5.78	5.82	6.88	9.38	9.37	9.38	9.39	10.74	0.45	0.95	4.95	15.08 @ 25F
1980	100.0	0.0	100.0	27.02	16.78	10.95	7.63	6.53	42.05	26.22	17.18	12.00	10.19	0.73	1.53	4.95	14.44 @ 50F
1980	50.0	0.0	50.0	14.70	10.30	7.75	6.27	6.13	23.17	16.33	12.36	10.03	9.63	0.55	1.16	4.95	13.89 @ 75F
1980	0.0	50.0	0.0	5.85	5.71	5.60	5.52	6.27	9.46	9.25	9.08	8.94	9.85	0.43	0.92	4.95	14.40 @100F
1980	50.0	50.0	50.0	16.37	11.26	8.36	6.73	6.71	25.71	17.80	13.28	10.69	10.46	0.59	1.24	4.95	
1980	20.6	27.3	20.6	9.48	7.59	6.48	5.82	6.19	15.08	12.15	10.41	9.37	9.73	0.48	1.02	4.95	
1985	0.0	0.0	0.0	3.53	3.29	3.09	2.93	3.39	6 47	6.04	5.69	5 41	6.30	0.24	0.46	4.41	13.05 @ 0F
1985	0.0	100.0	0.0	3.44	3.36	3.30	3.27	4.01	6 13	6.06	6.01	5.97	7.37	0.28	0.49	4.41	12.67 @ 25F
1985	100.0	0.0	100.0	20.10	11.28	6.80	4.48	4.09	30.06	18.10	11.48	7.79	6.60	0.42	0.76	4.41	12.35 @ 50F
1985	50.0	0.0	50.0	10.12	6.47	4.56	3.54	3.65	16.06	10.94	8.03	6 35	6.39	0.31	0.57	4.41	12.07 @ 75F
1985	0.0	50.0	0.0	3.47	3.29	3.16	3.05	3.62	6.29	6.02	5.79	5.61	6.69	0.25	0.47	4.41	12.63 @100F
1985	50.0	50.0	50.0	11.77	7.32	5.05	3.87	4.05	18.09	12.08	8.74	6.88	6.99	0.35	0.63	4.41	
1985	20.6	27.3	20.6	6.19	4.59	3.73	3.25	3.62	10.29	8.03	6.70	5.90	6.55	0.28	0.51	4.41	
1988	0.0	0.0	0.0	2.53	2.30	2.12	1.97	2.61	4.99	4 57	4.23	3.96	5.23	0.20	0.36	3.76	8.46 @ 0F
1988	0.0	100.0	0.0	2.55	2.42	2.32	2.24	3.12	4.78	4.64	4.53	4.44	6.17	0.23	0.39	3.76	8.07 @ 25F
1988	100.0	0.0	100.0	18.39	9.48	5.27	3.24	3.44	26.62	15.14	9.14	5.96	5.59	0.34	0.60	3.76	7.75 @ 50F
1988	50.0	0.0	50.0	8.73	5.10	3.34	2.46	2.92	13.62	8.78	6.18	4.74	5.34	0.25	0.45	3.76	7.48 @ 75F
1988	0.0	50.0	0.0	2.51	2.33	2.18	2.06	2.79	4.86	4.56	4.32	4.13	5.56	0.21	0.37	3.76	9.13 @100F
1988	50.0	50.0	50.0	10.47	5.95	3.79	2.74	3.28	15.70	9.89	6.84	5.20	5.88	0.28	0.50	3.76	
1988	20.6	27.3	20.6	5.05	3 46	2.65	2.22	2.84	8.45	6.29	5.08	4.37	5.45	0.23	0.40	3.76	
1990	0.0	0.0	0.0	2.08	1.86	1.69	1.55	1.78	4.24	3.83	3.51	3.25	3.94	0.19	0.34	3.41	6.77 @ 0F
1990	0.0	100.0	0.0	2.16	2.01	1.88	1.78	2.17	4.11	3.94	3.79	3 67	4.70	0 21	0.37	3.41	6.39 @ 25F
1990	100.0	0.0	100.0	17.88	8.77	4.62	2.71	2.84	25.28	13.75	7.98	5.04	4.57	0.31	0.56	3.41	6.09 @ 50F
1990	50.0	0.0	50.0	8.22	4.54	2.82	1.99	2.17	12.54	7.74	5.26	3.94	4.16	0.23	0.42	3.41	5.84 @ 75F
1990	0.0	50.0	0.0	2.08	1.90	1.75	1.63	1.92	4.14	3.84	3.59	3.40	4.21	0.19	0.35	3.41	6.18 @100F
1990	50.0	50.0	50.0	10.02	5.39	3.25	2.24	2.50	14.70	8.84	5.89	4.36	4.64	0.26	0.47	3.41	
1990	20.6	27.3	20.6	4.59	2.97	2.18	1.77	2.01	7.58	5.43	4.27	3.61	4.17	0.21	0.38	3.41	
1995	0.0	0.0	0.0	1.47	1.28	1.14	1.02	1.07	2.94	2.58	2.30	2.07	2.45	0.18	0.33	2.99	5.01 @ 0F
1995	0.0	100.0	0.0	1.64	1.46	1.32	1.20	1.37	3.00	2.75	2.55	2.38	2.98	0.20	0.37	2.99	4.64 @ 25F
1995	100.0	0.0	100.0	17.09	7.78	3.74	1.99	2.38	22.96	11.28	5.93	3.44	3.54	0.29	0 56	2.99	4.35 @ 50F
1995	50.0	0.0	50.0	7.52	3.79	2.14	1.39	1.57	10.71	5.95	3.69	2.59	2.84	0.22	0.42	2.99	4.12 @ 75F
1995	0.0	50.0	0.0	1.52	1.34	1.20	1.08	1.18	2.93	2.62	2.37	2.17	2.63	0.18	0.34	2.99	4.37 @100F
1995	50.0	50.0	50.0	9.37	4.62	2.53	1 60	1.87	12.98	7.02	4.24	2.91	3.26	0.25	0.47	2.99	
1995	20.6	27.3	20.6	3.97	2.34	1.58	1.21	1.33	6.11	3.98	2.91	2.34	2.71	0.20	0.37	2.99	
2000	0.0	0.0	0.0	1.30	1.13	1.00	0.89	0.89	2.28	1.97	1.73	1.55	1.65	0.18	0.34	2.85	4.50 @ 0F
2000	0.0	100.0	0.0	1.49	1.31	1.17	1.05	1.17	2.46	2.19	1.97	1.78	2.07	0.20	0.39	2.85	4.14 @ 25F
2000	100.0	0.0	100.0	16.36	7.32	3.44	1.78	2.21	21.77	10.02	4.90	2.66	3.10	0.29	0.58	2.85	3.85 @ 50F
2000	50 0	0.0	50.0	7.13	3.52	1.94	1.23	1.40	9.82	5.07	2.95	1.97	2.20	0.22	0.43	2.85	3.62 @ 75F
2000	0.0	50.0	0 0	1.36	1.19	1.05	0.95	0.99	2.32	2.03	1.81	1.63	1.80	0.19	0.36	2.85	3.84 @100F
2000	50.0	50.0	50.0	8.92	4.31	2.31	1.42	1.69	12.12	6.11	3.43	2.22	2.59	0.25	0.48	2.85	
2000	20.6	27.3	20.6	3.72	2.14	1.41	1.06	1.15	5.38	3.27	2.27	1.76	1.95	0.20	0.38	2.85	

TABLE 23 : THC AT 50.0 MPH.

TABLE 24

HIGH ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE) AT 55.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	-LDDV- 0-100F	-LDDT- 0-100F	-HDDV- 0-100F	----HDGV----
1980	0.0	0.0	0.0	5.85	5.62	5.42	5.25	5.74	9.38	9.05	8.77	8.53	9.09	0.42	0.89	4.74	15.54 @ 0F
1980	0.0	100.0	0.0	5.61	5.63	5.67	5.71	6.70	9.22	9.22	9.22	9.24	10.51	0.43	0.90	4.74	14.84 @ 25F
1980	100.0	0.0	100.0	25.89	16.14	10.59	7.43	6.39	40.66	25.44	16.73	11.75	10.01	0.70	1.46	4.74	14.23 @ 50F
1980	50.0	0.0	50.0	14.17	9.98	7.56	6.14	6.00	22.51	15.92	12.10	9.86	9.46	0.52	1.11	4.74	13.71 @ 75F
1980	0.0	50.0	0.0	5.73	5.60	5.51	5.43	6.12	9.29	9.10	8.94	8.81	9 66	0.41	0.88	4.74	14.20 @100F
1980	50.0	50.0	50.0	15.75	10.89	8.13	6.57	6.54	24.94	17.33	12.98	10.49	10.26	0.56	1.18	4.74	
1980	20.6	27.3	20.6	9.19	7.40	6.34	5.71	6.05	14.71	11.89	10.23	9.22	9.55	0.46	0.97	4.74	
1985	0.0	0.0	0.0	3.41	3.19	3.01	2.87	3.28	6.25	5.87	5.55	5.29	6.09	0.23	0.44	4.22	12.89 @ 0F
1985	0.0	100.0	0.0	3.32	3.25	3.20	3.17	3.86	5.94	5.89	5.84	5.81	7.10	0.27	0.47	4.22	12.54 @ 25F
1985	100.0	0.0	100.0	18.68	10.57	6.44	4.30	3.93	28.42	17.21	10.99	7.52	6.40	0.40	0.73	4.22	12.23 @ 50F
1985	50.0	0.0	50.0	9.50	6.13	4.37	3.43	3.52	15.29	10.48	7.75	6.18	6.19	0.30	0.55	4.22	11.96 @ 75F
1985	0.0	50.0	0.0	3.35	3.19	3.07	2.98	3.49	6.09	5.84	5.64	5.48	6.46	0.24	0.45	4.22	12.50 @100F
1985	50.0	50.0	50.0	11.00	6.91	4.82	3.73	3.89	17.18	11.55	8.41	6.66	6.75	0.33	0.60	4.22	
1985	20.6	27.3	20.6	5.86	4.39	3.60	3.16	3.49	9.86	7.74	6.50	5.75	6.33	0.26	0.49	4.22	
1988	0.0	0.0	0.0	2.42	2.21	2.05	1.92	2.52	4.78	4.40	4.10	3.85	5.03	0.19	0.34	3.60	8.34 @ 0F
1988	0.0	100.0	0.0	2.43	2.32	2.23	2.16	2.99	4.59	4.47	4.37	4.29	5.90	0.22	0.38	3.60	7.97 @ 25F
1988	100.0	0.0	100.0	16.84	8.75	4.92	3.07	3.28	24.79	14.20	8.65	5.70	5.38	0.32	0.57	3.60	7.66 @ 50F
1988	50.0	0.0	50.0	8.07	4.77	3.16	2.66	2.80	12.78	8.32	5.91	5.04	5.14	0.24	0.43	3.60	8.58 @ 75F
1988	0.0	50.0	0.0	2.40	2.23	2.10	2.27	2.69	4.67	4.40	4.18	4.43	5.34	0.20	0.35	3.60	9.02 @100F
1988	50.0	50.0	50.0	9.64	5.53	3.57	2.93	3.13	14.69	9.34	6.51	5.48	5.64	0.27	0.47	3.60	
1988	20.6	27.3	20.6	4.72	3.27	2.53	2.43	2.72	7.99	6.00	4.88	4.67	5.24	0.22	0.38	3.60	
1990	0.0	0.0	0.0	1.97	1.78	1.62	1.50	1.71	4.04	3.68	3.38	3.15	3.77	0.18	0.32	3.26	6.66 @ 0F
1990	0.0	100.0	0.0	2.05	1.91	1 80	1.71	2.06	3.92	3.77	3.64	3.53	4.47	0.20	0 36	3.26	6.30 @ 25F
1990	100 0	0.0	100.0	16.27	8.03	4.28	2.55	2.66	23.33	12.78	7.49	4.79	4.35	0.30	0.54	3.26	6.01 @ 50F
1990	50.0	0.0	50.0	7.53	4.20	2.65	1.90	2.06	11.66	7.27	5.00	3.78	3.97	0.22	0.41	3.26	5.78 @ 75F
1990	0.0	50.0	0.0	1.98	1.81	1.68	1.57	1.83	3.96	3.68	3.46	3 28	4.02	0.19	0.33	3.26	6.10 @100F
1990	50.0	50.0	50.0	9.16	4.97	3.04	2.13	2.36	13.63	8.28	5.57	4.16	4.41	0.25	0.45	3.26	
1990	20.6	27.3	20.6	4.25	2.79	2.07	1.70	1.92	7.11	5.15	4.08	3.48	3.99	0.20	0.36	3.26	
1995	0.0	0.0	0.0	1.38	1.22	1.09	0.98	1.03	2.77	2.45	2.19	1.99	2.33	0.17	0.32	2.87	4.92 @ 0F
1995	0.0	100.0	0.0	1.54	1.38	1.25	1.14	1.30	2.83	2.60	2.42	2.27	2.81	0.19	0.36	2.87	4.57 @ 25F
1995	100.0	0.0	100.0	15.47	7.07	3.44	1.85	2.20	20.87	10.32	5.48	3.23	3.31	0.28	0.54	2.87	4.29 @ 50F
1995	50.0	0.0	50.0	6.84	3.48	1.99	1.31	1.48	9.80	5.49	3.45	2.46	2.69	0.21	0.40	2.87	4.07 @ 75F
1995	0.0	50.0	0.0	1.43	1.27	1.14	1.04	1.12	2.76	2.48	2.26	2.08	2.49	0.18	0.33	2.87	4.31 @100F
1995	50.0	50.0	50.0	8.50	4.23	2.34	1.50	1.75	11.85	6.46	3.95	2.75	3.06	0.24	0.45	2.87	
1995	20.6	27.3	20.6	3.64	2.17	1.48	1.15	1.26	5.64	3.71	2.74	2.23	2.56	0.19	0.36	2.87	
2000	0.0	0.0	0.0	1.23	1.07	0.95	0.86	0.86	2.14	1.87	1.65	1.48	1.58	0.17	0.33	2.73	4.41 @ 0F
2000	0.0	100.0	0.0	1.39	1.24	1.11	1.00	1.10	2.31	2.06	1.86	1.70	1.95	0.20	0.37	2.73	4.07 @ 25F
2000	100.0	0.0	100.0	14.80	6.65	3.15	1.66	2.05	19.71	9.12	4.51	2.49	2.88	0.28	0.55	2.73	3.79 @ 50F
2000	50.0	0.0	50.0	6.48	3.23	1.80	1.16	1.31	8.94	4.66	2.74	1.86	2.07	0.21	0.41	2.73	3.58 @ 75F
2000	0.0	50.0	0.0	1.28	1.12	1.00	0.91	0.95	2.18	1.92	1.72	1.55	1.71	0.18	0.34	2.73	3.79 @100F
2000	50.0	50.0	50.0	8.10	3.94	2.13	1.33	1.58	11.01	5 59	3.18	2.09	2.42	0.24	0.46	2.73	
2000	20.6	27.3	20.6	3.40	1.98	1.32	1.01	1.09	4.94	3.04	2.13	1.67	1.85	0.19	0.37	2.73	

TABLE 24 : THC AT 55.0 MPH.

TABLE 25

HIGH ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE) AT 5.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	-LDDV- 0-100F	-LDDT- 0-100F	-HDDV- 0-100F	----HDGV----
1980	0.0	0.0	0.0	243.53	212.24	187.19	167.07	382.28	329.13	291.67	260.81	235.39	464.91	4.37	7.23	61.34	1062.42 @ OF
1980	0.0	100.0	0.0	144.69	147.10	150.48	154.87	304.48	197.31	202.42	208.13	214.50	407.16	7.38	12.54	61.34	968.94 @ 25F
1980	100.0	0.0	100.0	1783.15	1024.21	592.11	343.80	214.49	2265.40	1316.78	770.88	454.83	269.86	9.11	15.37	61.34	884.48 @ 50F
1980	50.0	0.0	50.0	875.42	544.71	351.77	237.34	305.26	1139.05	719.72	472.47	324.68	375.17	6.11	10.23	61.34	808.14 @ 75F
1980	0.0	50.0	0.0	197.40	180.76	168.10	158.69	342.90	267.89	249.11	234.33	222.91	434.06	5.46	9.17	61.34	1380.90 @100F
1980	50.0	50.0	50.0	963.92	585.65	371.30	249.34	259.49	1231.35	759.60	489.51	334.67	338.51	8.25	13.95	61.34	
1980	20.6	27.3	20.6	477.17	331.22	244.15	191.22	329.17	627.60	443.85	333.07	265.12	411.21	5.67	9.49	61.34	
1985	0.0	0.0	0.0	203.74	156.45	123.20	99.43	250.95	292.95	243.03	203.83	172.79	429.23	3.92	6.46	52.21	849.95 @ OF
1985	0.0	100.0	0.0	141.53	124.39	112.08	103.51	197.92	166.26	162.58	160.30	159.20	323.93	6.14	11.30	52.21	774.69 @ 25F
1985	100.0	0.0	100.0	1287.93	768.56	451.60	243.34	158.48	2014.05	1134.09	639.71	356.39	214.63	8.05	13.83	52.21	708.89 @ 50F
1985	50.0	0.0	50.0	637.46	400.25	252.97	155.20	206.88	991.28	603.14	378.35	244.48	331.35	5.44	9.18	52.21	651.17 @ 75F
1985	0.0	50.0	0.0	172.87	139.12	115.33	98.46	223.15	233.84	204.16	181.15	163.26	376.89	4.72	8.23	52.21	1150.36 @100F
1985	50.0	50.0	50.0	714.73	446.47	281.84	173.43	178.20	1090.16	648.33	400.01	257.79	269.28	7.09	12.56	52.21	
1985	20.6	27.3	20.6	364.39	246.73	171.96	121.66	217.66	546.64	369.25	262.87	196.88	360.49	4.97	8.52	52.21	
1988	0.0	0.0	0.0	199.11	140.34	101.24	74.89	201.15	260.03	204.10	162.84	131.92	373.02	3.24	5.54	47.90	558.24 @ OF
1988	0.0	100.0	0.0	149.59	121.83	101.29	86.17	164.26	157.17	143.97	134.23	127.16	278.63	5.08	9.72	47.90	501.89 @ 25F
1988	100.0	0.0	100.0	1081.19	658.48	391.50	203.26	142.41	1770.35	997.43	559.09	296.27	192.34	6.76	11.89	47.90	452.93 @ 50F
1988	50.0	0 0	50.0	547.06	343.99	214.64	124.22	171.82	865.82	520.84	319.59	195.42	290.06	4.53	7.88	47.90	410.29 @ 75F
1988	0.0	50 0	0.0	173.39	128.76	98.27	77.24	180.85	211.19	174.16	146.89	126.58	325.87	3.90	7.07	47.90	815.24 @100F
1988	50 0	50.0	50.0	615.39	390.15	246.39	144.71	153.33	963.75	570.70	346.66	211.71	235.48	5.92	10.81	47.90	
1988	20.6	27.3	20.6	327.40	217.29	145.96	96.29	177.98	481.34	317.38	218.25	154.93	313.23	4.12	7.32	47.90	
1990	0.0	0.0	0.0	200.14	134.76	92.31	64.50	141.09	247.09	185.83	142.44	111.19	289.86	3.01	5.30	45.94	425.30 @ OF
1990	0.0	100.0	0.0	156.27	122.70	97.75	79.23	127.52	157.90	137.96	123.08	112.03	219.76	4.72	9.31	45.94	378.66 @ 25F
1990	100.0	0.0	100.0	973.70	603.43	363.69	186.85	129.03	1637.92	919.86	512.98	263.30	166.98	6.31	11.39	45.94	338.25 @ 50F
1990	50.0	0.0	50.0	502.83	317.71	197.79	111 39	132.05	800.92	476.76	288.03	169.63	232.23	4.23	7.55	45.94	303.17 @ 75F
1990	0.0	50.0	0.0	176.63	125.89	91.70	68.45	131.54	204.04	161.20	130.61	108.47	254.01	3.63	6.77	45.94	483.13 @100F
1990	50.0	50.0	50.0	564.99	363.06	230.72	133.04	128.28	897.91	528.91	318.03	187.66	193.37	5.51	10.35	45.94	
1990	20.6	27.3	20.6	311.08	204.70	135.07	85.78	132.09	450.24	291.41	195.51	133.56	246.61	3.84	7.01	45.94	
1995	0.0	0.0	0.0	199.70	126.28	80.10	51.01	82.17	230.80	156.21	107.31	74.91	172.41	2.81	5.13	43.44	268.83 @ OF
1995	0.0	100.0	0.0	163.48	122.39	91.87	69.19	93.30	166.97	132.23	106.24	86.76	145.82	4.40	9.05	43.44	235.14 @ 25F
1995	100.0	0.0	100.0	800.19	515.52	320.03	162.52	117.09	1383.03	768.60	424.72	203.92	138.43	5.94	11.06	43.44	206.06 @ 50F
1995	50.0	0.0	50.0	432.26	277.12	173.01	93.77	93.56	683.23	395.69	230.65	124.14	153.64	3.96	7.32	43.44	180.95 @ 75F
1995	0.0	50.0	0.0	179.26	120.91	82.35	56.69	84.10	198.38	141.92	103.64	77.39	156.74	3.39	6.56	43.44	253.75 @100F
1995	50.0	50.0	50.0	481.84	318.96	205.95	115.86	105.19	775.00	450.41	265.48	145.34	142.13	5.17	10.06	43.44	
1995	20.6	27.3	20.6	283.60	184.98	119.27	71.54	87.81	398.16	246.33	155.70	96.34	156.09	3.59	6.79	43.44	
2000	0.0	0.0	0.0	193.96	121.19	75.72	47.31	66.90	222.93	141.28	89.84	57.37	97.17	2.79	5.12	42.13	215.91 @ OF
2000	0.0	100.0	0.0	159.68	118.44	87.85	65.16	83.03	172.45	129.43	97.44	73.64	102.29	4.38	9.06	42.13	187.16 @ 25F
2000	100.0	0.0	100.0	743.18	486.35	304.36	152.81	111.53	1225.89	676.79	372.86	171.32	122.50	5.94	11.06	42.13	162.42 @ 50F
2000	50.0	0.0	50.0	406.32	262.62	164.28	87.80	82.61	614.71	349.79	199.58	100.91	104.29	3.95	7.31	42.13	141.12 @ 75F
2000	0.0	50.0	0.0	174.46	116.42	78.24	52.97	71.28	196.12	132.29	90.14	62.10	96.26	3.36	6.56	42.13	178.88 @100F
2000	50.0	50.0	50.0	451.43	302.39	196.11	108.98	97.28	699.17	403.11	235.15	122.48	112.40	5.16	10.06	42.13	
2000	20.6	27.3	20.6	270.11	176.37	113.26	66.90	75.65	368.51	221.60	134.83	77.70	99.51	3.57	6.79	42.13	

TABLE 25 : CO AT 5.0 MPH.

TABLE 26

HIGH ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE) AT 10.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	-LDDV- 0-100F	-LDDT- 0-100F	-HDDV- 0-100F	----HDGV----
1980	0.0	0.0	0.0	134.65	117.84	104.36	93.54	209.74	183.01	162.72	146.01	132.24	256.88	3.01	4.99	42.29	706.84 @ OF
1980	0.0	100 0	0.0	80.43	81.91	83.93	86.51	168.90	110.55	113.52	116.81	120.48	26.90	5.09	8.65	42.29	644.65 @ 25F
1980	100.0	0.0	100.0	979.99	564.65	327.53	190.88	118.86	1248.24	728.10	427.89	253.51	150.75	6.28	10.60	42.29	588.46 @ 50F
1980	50.0	0.0	50.0	482.37	301.22	195.29	132.34	167.99	629.35	399.22	263.20	181.68	208.01	4.22	7.05	42.29	537.66 @ 75F
1980	0.0	50.0	0.0	109.34	100.49	93.77	88.80	188.97	149.33	139.26	131.34	125.26	240.71	3.77	6.32	42.29	918.73 @100F
1980	50.0	50.0	50.0	530.21	323.28	205.73	138.69	143.88	679.39	420.81	272.35	187.00	188.83	5.69	9.62	42.29	
1980	20.6	27.3	20.6	263.27	183.48	135.81	106.82	181.26	347.55	246.83	186.02	148.67	227.98	3.91	6.55	42.29	
1985	0.0	0.0	0.0	109.43	84.32	66.64	54.00	135.03	158.82	132 10	111.09	94.45	231.80	2.70	4.46	36.00	565.48 @ OF
1985	0.0	100.0	0.0	75.79	66.79	60.36	55.91	106 82	90.14	88.30	87.21	86.74	175.83	4.23	7.79	36.00	515.41 @ 25F
1985	100.0	0.0	100.0	691.70	412.92	242.80	131.13	85.30	1085.89	612.55	346.23	193.41	116.48	5.55	9.54	36.00	471.64 @ 50F
1985	50.0	0.0	50.0	342.66	215.37	136.33	83.92	111.34	535.49	326.55	205.38	133.15	179.18	3.75	6.33	36.00	433.23 @ 75F
1985	0.0	50.0	0.0	92.77	74.89	62.29	53.36	120.23	126.78	110.95	98.69	89.15	203.94	3.26	5.67	36 00	765.34 @100F
1985	50.0	50.0	50.0	383.74	239.86	151.58	93.52	96.06	588 02	350 42	216 72	140.08	146.16	4.89	8.66	36.00	
1985	20.6	27.3	20.6	195.79	132.79	92.76	65.86	117.21	295.58	200.17	142.91	107.37	195.00	3.43	5.87	36.00	
1988	0.0	0.0	0.0	105.91	74.78	54.06	40 10	107.58	139.65	109.85	87.84	71.32	200.50	2.23	3 82	33.03	371 40 @ OF
1988	0.0	100.0	0.0	79 42	64.76	53.92	45.96	87.94	84.14	77.21	72.12	68 44	150.24	3.50	6.70	33.03	333.91 @ 25F
1988	100.0	0.0	100.0	575.60	350.54	208 44	108.33	76.03	947.27	534.13	299.69	159.11	103.53	4.66	8.20	33.03	301.34 @ 50F
1988	50.0	0.0	50.0	291.31	183.24	114.41	66.33	91.85	463.90	279.42	171.72	105.27	155.97	3.13	5.43	33.03	272.97 @ 75F
1988	0.0	50.0	0.0	92.16	68.55	52.41	41.29	96.77	113.31	93.63	79.12	68.32	175.38	2.69	4.87	33.03	542.39 @100F
1988	50.0	50.0	50.0	327.51	207.65	131.18	77.14	81.99	515 70	305.67	185.90	113.77	126.88	4.08	7.45	33.03	
1988	20 6	27.3	20.6	174.25	115.73	77.82	51.45	95.20	258.00	170.39	117.39	83.54	168.51	2.84	5.05	33.03	
1990	0.0	0.0	0.0	106.11	71.51	49.03	34.31	74.98	132 02	99.45	76.37	59.72	154.95	2.08	3.66	31.68	282.96 @ OF
1990	0.0	100.0	0.0	82.77	65.03	51.84	42.05	67.74	84.07	73.55	65.71	59.90	117.54	3.25	6.42	31.68	251.93 @ 25F
1990	100 0	0.0	100.0	516.47	320.06	192.90	99.16	68.46	872.72	490.35	273.60	140.62	89.14	4.35	7.85	31.68	225.04 @ 50F
1990	50.0	0.0	50.0	266.72	168.55	104.97	59.17	70.14	427.16	254.48	153.91	90.81	124.09	2.91	5.20	31.68	201.71 @ 75F
1990	0.0	50.0	0.0	93.61	66.77	48.68	36.37	69.89	108.89	86.16	69.92	58.16	135.83	2.50	4.67	31.68	321.43 @100F
1990	50.0	50.0	50.0	299.62	192.54	122.37	70.60	68.10	478.39	281.95	169.66	100.26	103.34	3.80	7.14	31.68	
1990	20.6	27.3	20.6	164.97	108.59	71.69	45.57	70.18	240.18	155.63	104.55	71.56	131.83	2.65	4.83	31.68	
1995	0.0	0.0	0.0	105.64	66.81	42.38	26.98	43.47	122.41	82.91	57.00	39.83	91.57	1.94	3.54	29.95	178.86 @ OF
1995	0.0	100.0	0.0	86.49	64.75	48.60	36.61	49.36	88.45	70.07	56.33	46.03	77.42	3.04	6.24	29 95	156.44 @ 25F
1995	100.0	0.0	100.0	423.32	272.72	169.30	85.98	61.94	732.94	407.37	225.14	108.15	73.39	4.10	7.63	29.95	137.10 @ 50F
1995	50.0	0.0	50.0	228.67	146.60	91.53	49.61	49.49	362.19	209.82	122.35	65.90	81.55	2.73	5.05	29.95	120.39 @ 75F
1995	0.0	50.0	0.0	94.83	63.97	43.57	29.99	44.49	105.17	75.28	55.01	41.11	83.24	2.34	4.53	29.95	168.83 @100F
1995	50.0	50.0	50.0	254.90	168.74	108.95	61.29	55.65	410.69	238.72	140.74	77.09	75.40	3.57	6.93	29.95	
1995	20.6	27.3	20.6	150.03	97.86	63.10	37.85	46.45	211.07	130.63	82.62	51.16	82.88	2.48	4.68	29.95	
2000	0.0	0.0	0.0	102.61	64.11	40.06	25.03	35.39	117.94	74.74	47.53	30.35	51.40	1.92	3.53	29.05	143.65 @ OF
2000	0.0	100.0	0.0	84.47	62.66	46.47	34.47	43.92	91.23	68.47	51.55	38.96	54.11	3.02	6.25	29.05	124.52 @ 25F
2000	100.0	0.0	100.0	393.16	257.29	161.02	80.84	59.00	648.52	358.04	197.25	90.63	64.81	4.10	7.63	29.05	108.06 @ 50F
2000	50.0	0.0	50.0	214.95	138.93	86.91	46.45	43.70	325.20	185.05	105.58	53.39	55.17	2.72	5.04	29.05	93.89 @ 75F
2000	0.0	50.0	0.0	92.30	61.59	41.39	28.02	37.71	103.75	69.99	47.68	32.85	50.92	2.32	4.52	29.05	119.01 @100F
2000	50.0	50.0	50.0	238.81	159.97	103.74	57.65	51.46	369.88	213.25	124.40	64.80	59.46	3.56	6.94	29.05	
2000	20.6	27.3	20.6	142.90	93.30	59.92	35.39	40.02	194.95	117.23	71.33	41.10	52.64	2.46	4.68	29.05	

TABLE 26 : CO AT 10.0 MPH.

TABLE 27

HIGH ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE) AT 19.6 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	-LDDV- 0-100F	-LDDT- 0-100F	-HDDV- 0-100F	----HDGV----
1980	0.0	0.0	0.0	88.45	77.68	69.04	62.09	137.18	121.53	108.28	97.35	88.34	169.65	1.67	2.77	23.53	377.13 @ 0F
1980	0.0	100.0	0.0	52.94	54.02	55.46	57.26	111.35	73.48	75.54	77.81	80.34	150.81	2.83	4.81	23.53	343.95 @ 25F
1980	100.0	0.0	100.0	641.34	370.41	215.38	125.85	78.28	822.81	481.08	283.39	168.31	100.13	3.50	5.90	23.53	313.97 @ 50F
1980	50.0	0.0	50.0	316.35	198.08	128.80	87.57	110.10	415.91	264.51	174.84	121.00	137.62	2.35	3.92	23.53	286.86 @ 75F
1980	0.0	50.0	0.0	71.88	66.27	62.02	58.90	124.00	99.20	92.67	87.56	83.63	159.41	2.10	3.52	23.53	490.18 @100F
1980	50.0	50.0	50.0	347.14	212.21	135.42	91.56	94.82	448.15	278.31	180.60	124.32	125.47	3.16	5.35	23.53	
1980	20.6	27.3	20.6	172.76	120.77	89.68	70.77	118.87	229.99	163.79	123.75	99.14	150.90	2.18	3.64	23.53	
1985	0.0	0.0	0.0	70.30	54.36	43.13	35.09	87.00	103.31	86.14	72.63	61.90	150.17	1.50	2.48	20.03	301.71 @ 0F
1985	0.0	100.0	0.0	48.52	42.88	38.86	36.12	68.97	58.49	57.40	56.80	56.60	114.44	2.36	4.33	20.03	274.99 @ 25F
1985	100.0	0.0	100.0	444.31	265.34	156.12	84.50	54.94	702.04	396.67	224.61	125.77	75.71	3.09	5.31	20.03	251.64 @ 50F
1985	50.0	0.0	50.0	220.31	138.61	87.89	54.28	71.73	346.97	212.04	133.68	86.92	116.18	2.09	3.52	20.03	231.15 @ 75F
1985	0.0	50.0	0.0	59.53	48.21	40.24	34.60	77.54	82.41	72.29	64.44	58.34	132.37	1.81	3.16	20.03	408.34 @100F
1985	50.0	50.0	50.0	246.41	154.11	97.49	60.31	61.96	380.26	227.04	140.71	91.18	95.07	2.72	4.82	20.03	
1985	20 6	27.3	20.6	125.82	85.47	59.85	42.66	75.56	191.69	130.13	93.15	70.18	126.51	1.91	3.27	20.03	
1988	0.0	0.0	0.0	67.42	47.70	34.58	25.73	68.95	90.06	71.02	56.94	46.35	129.38	1.24	2.13	18.38	198.16 @ 0F
1988	0.0	100.0	0.0	50.45	41.19	34.36	29.35	56.39	54.01	49.67	46.50	44.23	97.27	1.95	3.73	18.38	178.16 @ 25F
1988	100.0	0.0	100.0	366.75	223.35	132.83	69.12	48.62	607.99	343.14	192.73	102.55	66.85	2.59	4.56	18.38	160.78 @ 50F
1988	50.0	0.0	50.0	185.67	116.84	73.01	42.42	58.83	298.27	179.92	110.78	68.11	100.66	1.74	3.02	18.38	145.64 @ 75F
1988	0.0	50.0	0.0	58.63	43.68	33.48	26.44	62.05	72.97	60.44	51.20	44.31	113.33	1 50	2.71	18.38	289.39 @100F
1988	50.0	50.0	50.0	208.60	132.27	83.60	49.24	52.51	331.00	196.41	119.62	73.39	82.06	2.27	4.15	18.38	
1988	20.6	27.3	20.6	110.99	73.78	49.68	32.93	61.01	165.96	109.81	75.83	54.12	108.83	1.58	2.81	18.38	
1990	0.0	0.0	0.0	67.30	45.40	31.17	21.85	47.71	84.68	63.94	49.21	38.58	99.46	1.16	2.03	17.63	150.97 @ 0F
1990	0.0	100.0	0.0	52.45	41.23	32.89	26.71	43.06	53.66	47.04	42.11	38.47	75.51	1.81	3.57	17.63	134.41 @ 25F
1990	100.0	0.0	100.0	327.77	203.11	122.42	62.96	43.47	557.63	313.51	175.06	90.14	57.10	2.42	4.37	17.63	120.07 @ 50F
1990	50.0	0.0	50.0	169.28	106.99	66.66	37.61	44.59	273.30	163.00	98.73	58.41	79.60	1.62	2.90	17.63	107.62 @ 75F
1990	0.0	50.0	0.0	59.36	42.37	30.92	23.14	44.46	69.73	55.29	44.96	37.48	87.22	1.39	2.60	17.63	171.50 @100F
1990	50.0	50.0	50.0	190.11	122.17	77.66	44.84	43.27	305.65	180.27	108.59	64.31	66.30	2.12	3.97	17.63	
1990	20.6	27.3	20.6	104.67	68.92	45.53	28.98	44.63	153.71	99.75	67.14	46.07	84.62	1.47	2.69	17.63	
1995	0.0	0.0	0.0	66.84	42.27	26.81	17.07	27.50	77.74	52.70	36.28	25.38	58.26	1.08	1.97	16.67	95.43 @ 0F
1995	0.0	100.0	0.0	54.72	40.97	30.75	23.16	31.23	56.07	44.45	35.76	29.25	49.24	1.69	3.47	16.67	83.47 @ 25F
1995	100.0	0.0	100.0	267.84	172.56	107.12	54.40	39.19	464.92	258.45	142.87	68.67	46.58	2.28	4.24	16.67	73.15 @ 50F
1995	50.0	0.0	50.0	144.69	92.76	57.91	31.39	31.32	229.84	133.20	77.71	41.91	51.84	1.52	2.81	16.67	64.23 @ 75F
1995	0.0	50.0	0.0	60.00	40.47	27.57	18.98	28.15	66.75	47.82	34.98	26.17	52.96	1.30	2.52	16.67	90.08 @100F
1995	50.0	50.0	50.0	161.28	106.76	68.94	38.78	35.21	260.50	151.45	89.31	48.96	47.91	1.99	3.86	16.67	
1995	20.6	27.3	20.6	94.93	61.92	39.92	23.95	29.39	133.95	82.95	52.50	32.55	52.71	1.38	2.61	16.67	
2000	0.0	0.0	0.0	64.92	40.56	25.34	15.84	22.39	74.62	47.29	30.07	19.20	32.52	1.07	1.97	16.17	76.64 @ 0F
2000	0.0	100.0	0.0	53.45	39.64	29.40	21.81	27.79	57.72	43.32	32.61	24.65	34.24	1.68	3.48	16.17	66.44 @ 25F
2000	100.0	0.0	100.0	248.76	162.79	101.88	51.15	37.33	410.34	226.54	124.81	57.35	41.01	2.28	4.24	16.17	57.66 @ 50F
2000	50.0	0.0	50.0	136.01	87.90	54.99	29.39	27.65	205.76	117.08	66.80	33.78	34.91	1.52	2.81	16.17	50.09 @ 75F
2000	0.0	50.0	0.0	58.40	38.97	26.19	17.73	23.86	65.65	44.28	30.17	20.79	32.22	1.29	2.52	16.17	63.50 @100F
2000	50.0	50.0	50.0	151.10	101.22	65.64	36.48	32.56	234.03	134.93	78.71	41.00	37.62	1.98	3.86	16.17	
2000	20.6	27.3	20.6	90.41	59.03	37.91	22.39	25.32	123.35	74.18	45.13	26.01	33.31	1.37	2.61	16.17	

TABLE 27 : CO AT 19.6 MPH.

TABLE 28

HIGH ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE) AT 35.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	-LDDV- 0-100F	-LDDT- 0-100F	-HDDV- 0-100F	----HDGV----
1980	0.0	0.0	0.0	56.69	50.46	45.45	41.41	87.07	82.27	73.90	66.98	61.25	112.68	0.93	1.54	13.04	210.25 @ 0F
1980	0.0	100.0	0.0	34.15	35.12	36.33	37.79	72.45	50.02	51.63	53.40	55.35	102.79	1.57	2.67	13.04	191.75 @ 25F
1980	100.0	0.0	100.0	405.50	236.30	138.66	81.80	50.92	544.93	321.28	190.83	114.26	67.79	1 94	3.27	13.04	175.04 @ 50F
1980	50.0	0.0	50.0	201.54	127.48	83.82	57.68	70.42	277.86	178.31	118 94	83.07	91.96	1.30	2.18	13.04	159.93 @ 75F
1980	0.0	50.0	0.0	46.18	43.09	40.79	39.16	79.53	67.29	63.32	60.23	57.89	107.09	1.16	1.95	13.04	273.28 @100F
1980	50.0	50.0	50.0	219.83	135.71	87 50	59.80	61.69	297.48	186.46	122.12	84.81	85.29	1.75	2.97	13.04	
1980	20.6	27.3	20.6	110.30	77.99	58.62	46.84	76.12	154.27	110.92	84.59	68.35	101.12	1.21	2.02	13.04	
1985	0.0	0.0	0.0	41.63	32.66	26.33	21.79	52.30	64.73	54 55	46.49	40.06	92.61	0.83	1.37	11.10	168.20 @ 0F
1985	0.0	100.0	0.0	28.33	25.33	23.25	21.89	41.73	36.37	35.98	35.88	36.02	72.12	1.31	2.40	11.10	153.31 @ 25F
1985	100.0	0.0	100.0	262.97	157.33	92.84	50.70	32.96	430.68	244.99	139.74	78.98	47.30	1.71	2.94	11.10	140.29 @ 50F
1985	50.0	0.0	50.0	130.89	82.71	52.81	33.07	43.11	214.70	132.32	84.23	55.42	71.91	1.16	1.95	11.10	128.87 @ 75F
1985	0.0	50.0	0.0	35.09	28.80	24.39	21 29	46.76	51.53	45.65	41.09	37.55	82.36	1.00	1.75	11.10	227.65 @100F
1985	50.0	50.0	50.0	145.65	91.33	58.04	36.30	37.35	233.52	140.49	87.81	57.50	59.71	1.51	2.67	11.10	
1985	20.6	27.3	20.6	74.60	51.04	36.10	26.12	45.50	118.95	81.54	58.99	44.97	78.52	1.06	1.81	11.10	
1988	0.0	0.0	0.0	38.50	27.49	20.15	15.20	40.58	54.48	43.46	35.25	29.03	78.50	0.69	1.18	10.19	110.47 @ 0F
1988	0.0	100.0	0.0	28.55	23.46	19.72	17.00	33.22	32.12	29.83	28.20	27.08	59.97	1.08	2.07	10.19	99.32 @ 25F
1988	100.0	0.0	100.0	210.15	128.00	76.18	39.85	28.35	361.50	204.85	115.60	62.08	40.68	1.44	2.53	10.19	89.64 @ 50F
1988	50.0	0.0	50.0	106.53	67.17	42.13	24.70	34.52	178.60	108.41	67.29	41.90	61.13	0.96	1.68	10.19	81.20 @ 75F
1988	0.0	50.0	0.0	33.37	25.06	19.39	15.49	36.55	43.92	36.76	31.47	27.53	69.22	0.83	1.50	10.19	161.34 @100F
1988	50.0	50.0	50.0	119.35	75.73	47.95	28.42	30.78	196.81	117.34	71.90	44.58	50 33	1.26	2.30	10.19	
1988	20.6	27.3	20.6	63.53	42.39	28.72	19.23	35.89	99.53	66.39	46.30	33.46	66.31	0.88	1.56	10.19	
1990	0.0	0.0	0.0	37.86	25.65	17.72	12.52	27.21	50.05	38.19	29.72	23.56	58.99	0.64	1.13	9.77	84.17 @ 0F
1990	0 0	100.0	0.0	29.38	23.15	18.54	15.13	24.47	31.14	27.53	24.88	22.94	45.07	1.00	1.98	9.77	74.94 @ 25F
1990	100.0	0.0	100 0	184.77	114.48	69.02	35.59	24.57	325.04	183.26	102.67	53.30	33.58	1.34	2.42	9.77	66.94 @ 50F
1990	50.0	0.0	50.0	95.46	60.39	37.69	21.37	25.35	160.18	96.02	58.54	35 04	47.09	0.90	1.61	9.77	60.00 @ 75F
1990	0.0	50.0	0.0	33.34	23.88	17.52	13.19	25.33	40.98	32.80	26.94	22.69	51.88	0.77	1.44	9.77	95.61 @100F
1990	50.0	50.0	50.0	107.07	68.82	43.78	25.36	24.52	178.09	105.40	63.78	38.12	39.32	1.17	2.20	9.77	
1990	20.6	27 3	20.6	58.95	38.89	25 77	16.49	25.41	90.18	58.91	39.99	27.77	50.22	0.82	1.49	9.77	
1995	0.0	0.0	0.0	37.22	23.53	14.93	9.51	15.31	43.96	29.93	20.70	14.56	33.22	0.60	1.09	9.24	53.20 @ 0F
1995	0.0	100.0	0.0	30.47	22.81	17.12	12.90	17.39	31.47	25.02	20.19	16.58	28.01	0.94	1.93	9.24	46.53 @ 25F
1995	100.0	0.0	100.0	149.13	96.07	59.64	30.29	21.82	261.64	145.55	80.53	38.82	26.28	1.26	2.35	9.24	40.78 @ 50F
1995	50.0	0.0	50.0	80.56	51.65	32.24	17.48	17.44	129.57	75.21	43.98	23.83	29.44	0.84	1.56	9.24	35.81 @ 75F
1995	0.0	50.0	0.0	33.41	22.53	15.35	10.56	15.67	37.65	27.06	19.87	14.94	30.18	0.72	1.40	9.24	50.22 @100F
1995	50.0	50.0	50.0	89.80	59.44	38.38	21.59	19.60	146.56	85.28	50.36	27.70	27.14	1.10	2.14	9.24	
1995	20.6	27.3	20.6	52.85	34.47	22.23	13.33	16.36	75.53	46.88	29.76	18.54	30.00	0.76	1.44	9.24	
2000	0.0	0.0	0.0	36.15	22.58	14.11	8.82	12.47	41.55	26.33	16.74	10.69	18.11	0.59	1.09	8.96	42.73 @ 0F
2000	0.0	100.0	0.0	29.76	22.07	16.37	12.14	15.47	32.14	24.12	18.16	13.72	19.06	0.93	1.93	8.96	37.04 @ 25F
2000	100.0	0.0	100.0	138.50	90.64	56.72	28.48	20.78	228.46	126.13	69.49	31.93	22.83	1.26	2.35	8.96	32.14 @ 50F
2000	50.0	0.0	50.0	75.72	48.94	30.62	16.36	15.40	114.56	65.19	37.19	18.81	19.44	0.84	1.56	8.96	27.93 @ 75F
2000	0.0	50.0	0.0	32.51	21.70	14.58	9.87	13.28	36.55	24.65	16.80	11.57	17.94	0.72	1.40	8.96	35.40 @100F
2000	50.0	50.0	50.0	84.13	56.35	36.55	20.31	18.13	130.30	75.12	43.82	22.83	20.95	1.10	2.14	8.96	
2000	20.6	27.3	20.6	50.34	32.87	21.11	12.47	14.10	68.68	41.30	25.13	14.48	18.54	0.76	1.44	8.96	

TABLE 28 : CO AT 35.0 MPH.

TABLE 29

HIGH ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE) AT 50.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	-LDDV- 0-100F	-LDDT- 0-100F	-HDDV- 0-100F	----HDGV----
1980	0.0	0.0	0.0	50.37	44.98	40.64	37.14	77.19	73.99	66.56	60.41	55.32	100.93	0.79	1.31	11.12	196.53 @ 0F
1980	0.0	100.0	0.0	30.40	31.31	32.45	33.81	64.63	44.99	46.48	48.12	49.91	92.55	1.34	2.27	11.12	179.24 @ 25F
1980	100.0	0.0	100.0	359.53	209.91	123.41	72.95	45.36	487.81	288.07	171.37	102.75	60.91	1.65	2.79	11.12	163.61 @ 50F
1980	50.0	0.0	50.0	179.00	113.47	74.78	51.59	62.52	249.22	160.20	107.04	74.88	82.45	1.11	1.85	11.12	149.49 @ 75F
1980	0.0	50.0	0.0	41.06	38.41	36.47	35.10	70.70	60.52	57.02	54.31	52.26	96.14	0.99	1.66	11.12	255.44 @100F
1980	50.0	50.0	50.0	194.96	120.61	77.93	53.38	55.00	266.40	167.27	109.74	76.33	76 73	1.50	2.53	11.12	
1980	20.6	27.3	20.6	97.99	69.46	52.35	41.94	67.62	138.47	99.74	76.19	61.66	90.72	1.03	1.72	11.12	
1985	0.0	0.0	0.0	36.30	28.59	23.14	19.23	45.78	57.27	48.38	41.33	35 70	81.63	0.71	1.17	9.46	157.23 @ 0F
1985	0.0	100.0	0.0	24.63	22.08	20.33	19.21	36.60	32.11	31.82	31.79	31.97	63.88	1.11	2.05	9.46	143.30 @ 25F
1985	100.0	0.0	100.0	229.38	137.29	81.07	44.37	28.84	379.05	215.96	123.38	69.88	41.80	1.46	2.51	9.46	131.13 @ 50F
1985	50.0	0.0	50.0	114.28	72.29	46.24	29.05	37.73	189.37	116.94	74.60	49.22	63.43	0.99	1.66	9.46	120.46 @ 75F
1985	0.0	50.0	0.0	30.57	25.18	21.40	18.75	40.97	45.56	40.45	36.49	33.42	72.74	0.86	1.49	9.46	212.79 @100F
1985	50.0	50.0	50.0	127.00	79.68	50.70	31.79	32.72	205.58	123.89	77.58	50.93	52.84	1.29	2.28	9.46	
1985	20.6	27.3	20.6	65.09	44.61	31.64	22.97	39.85	104.99	72.13	52.31	39.98	69.31	0.90	1.54	9.46	
1988	0.0	0.0	0.0	33.28	23.83	17.52	13.26	35.36	47.83	38.26	31.11	25.70	68.95	0 59	1.00	8.68	103.26 @ 0F
1988	0.0	100.0	0.0	24.63	20.27	17.07	14.76	28.96	28.07	26.13	24.76	23.84	52.87	0.92	1.76	8.68	92.84 @ 25F
1988	100.0	0.0	100.0	181.90	110.79	65.96	34.55	24.64	315.88	179.18	101.23	54.49	35.74	1.22	2.16	8.68	83.78 @ 50F
1988	50.0	0.0	50.0	92.24	58.19	36.53	21.47	30.05	156.35	95.06	59.11	36.92	53.69	0.82	1.43	8.68	75.90 @ 75F
1988	0.0	50.0	0.0	28.83	21.70	16.83	13.49	31.86	38.50	32.31	27.73	24.32	60.89	0.71	1.28	8.68	150.80 @100F
1988	50.0	50.0	50.0	103.27	65.53	41.52	24.65	26.80	171.98	102.66	63.00	39.16	44.31	1.07	1.96	8.68	
1988	20.6	27.3	20.6	54.98	36.72	24.92	16.74	31.26	87.17	58.26	40.73	29.53	58.29	0.75	1.33	8.68	
1990	0.0	0.0	0.0	32.59	22.11	15.29	10.83	23.51	43.66	33.40	26.06	20.72	51.51	0.55	0.96	8.33	78.67 @ 0F
1990	0.0	100.0	0.0	25.26	19.92	15.97	13.05	21.12	27.04	23.96	21.69	20.06	39.40	0.86	1.69	8.33	70.04 @ 25F
1990	100.0	0.0	100.0	159.12	98.60	59.45	30.67	21.18	282.46	159.36	89.36	46.48	29.25	1.14	2.06	8.33	62.57 @ 50F
1990	50.0	0.0	50.0	82.22	52.03	32.49	18.44	21.88	139.40	83.67	51.10	30.67	41.10	0.77	1.37	8.33	56.08 @ 75F
1990	0.0	50.0	0.0	28.69	20.57	15.10	11.39	21.87	35.70	28.64	23.58	19.91	45.33	0.66	1.23	8.33	89.37 @100F
1990	50.0	50.0	50.0	92.19	59.26	37.71	21.86	21.15	154.75	91.66	55.53	33.27	34.33	1.00	1.88	8.33	
1990	20.6	27.3	20.6	50.76	33.50	22.21	14.24	21.94	78.50	51.37	34.95	24.34	43.86	0.70	1.27	8.33	
1995	0.0	0.0	0.0	31.96	20.21	12.82	8.16	13.15	37.92	25.84	17.90	12.61	28.72	0.51	0.93	7.87	49.73 @ 0F
1995	0.0	100.0	0.0	26.16	19.59	14.70	11.07	14.93	27.09	21.55	17.41	14.31	24.20	0.80	1.64	7.87	43.50 @ 25F
1995	100.0	0.0	100.0	128.05	82.49	51.21	26.01	18.74	225.37	125.40	69.39	33.48	22.65	1.08	2.00	7.87	38.12 @ 50F
1995	50.0	0.0	50.0	69.17	44.35	27.69	15.01	14.97	111.67	64.85	37.94	20.58	25.43	0.72	1.33	7.87	33.47 @ 75F
1995	0.0	50.0	0.0	28.68	19.35	13.18	9.07	13.46	32.45	23.35	17.17	12.92	26.09	0.61	1.19	7.87	46.94 @100F
1995	50.0	50.0	50.0	77.10	51.04	32.96	18.54	16.83	126.23	73.47	43.40	23.90	23.43	0.94	1.82	7.87	
1995	20.6	27.3	20.6	45.38	29.60	19.09	11.45	14.05	65.10	40.43	25.69	16.03	25.92	0.65	1.23	7.87	
2000	0.0	0.0	0.0	31.04	19.39	12.12	7.57	10.71	35.67	22.61	14.38	9.18	15.55	0.50	0.93	7.64	39.94 @ 0F
2000	0.0	100.0	0.0	25.55	18.95	14.06	10.43	13.29	27.60	20.71	15.59	11.78	16.37	0.79	1.64	7.64	34.62 @ 25F
2000	100.0	0.0	100.0	118.92	77.83	48.70	24.45	17.85	196.17	108.30	59.67	27.42	19.60	1.08	2.01	7.64	30.05 @ 50F
2000	50.0	0.0	50.0	65.02	42.02	26.29	14.05	13.22	98.37	55.97	31.94	16.15	16.69	0.72	1.33	7.64	26.10 @ 75F
2000	0.0	50.0	0.0	27.92	18.63	12.52	8.48	11.41	31.38	21.17	14.42	9.94	15.40	0.61	1.19	7.64	33.09 @100F
2000	50.0	50.0	50.0	72.24	48.39	31.38	17.44	15.57	111.88	64.51	37.63	19.60	17.99	0.94	1.82	7.64	
2000	20.6	27.3	20.6	43.22	28.22	18.12	10.71	12.10	58.97	35.46	21.57	12.43	15.92	0.65	1.23	7.64	

TABLE 29 : CO AT 50.0 MPH.

TABLE 30

HIGH ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE) AT 55.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	-LDDV- 0-100F	-LDDT- 0-100F	-HDDV- 0-100F	----HDGV----
1980	0.0	0.0	0.0	47.62	42.67	38.68	35.46	72.76	70.76	63.80	58.02	53.22	96.09	0.82	1.36	11.55	214.50 @ OF
1980	0.0	100 0	0.0	28.80	29.72	30.85	32.21	61.35	43.12	44.59	46.20	47.97	88.69	1.39	2.36	11.55	195.63 @ 25F
1980	100.0	0.0	100.0	338.79	198.26	116.83	69.22	43.02	464.39	274.79	163.79	98.40	58.26	1.72	2.89	11.55	178.57 @ 50F
1980	50.0	0.0	50.0	169.01	107.42	70.99	49.12	59.05	237.72	153.14	102.55	71.89	78.62	1.15	1.93	11.55	163.16 @ 75F
1980	0.0	50.0	0.0	38.85	36.46	34.71	33.49	66.83	57.92	54.68	52.16	50.27	91.80	1.03	1.73	11.55	278.80 @100F
1980	50.0	50.0	50.0	183.80	113.99	73.84	50.72	52.18	253.76	159.69	105.00	73.18	73.48	1.55	2.63	11.55	
1980	20.6	27.3	20.6	92.57	65.81	49.75	39.98	63.89	132 20	95.45	73.07	59.26	86.57	1.07	1.79	11.55	
1985	0.0	0.0	0.0	33.55	26.54	21.58	18.01	42.49	53.72	45.51	38.99	33.77	76.25	0.74	1.22	9.83	171.60 @ OF
1985	0.0	100 0	0.0	22.67	20.39	18.85	17.88	34.03	30.08	29.87	29.90	30.12	60.03	1.16	2 13	9.83	156.41 @ 25F
1985	100.0	0.0	100.0	212.00	126.95	75.03	41.17	26.75	353.74	201.91	115.58	65.63	39.18	1.52	2.60	9.83	143.12 @ 50F
1985	50.0	0.0	50.0	105.74	66.97	42.92	27 07	35.01	177.12	109.62	70.11	46.40	59.31	1.02	1.73	9.83	131.47 @ 75F
1985	0.0	50.0	0.0	28.22	23.33	19.91	17.51	38.06	42.72	38.03	34.39	31.57	68.12	0.89	1.55	9.83	232.25 @100F
1985	50.0	50.0	50.0	117.34	73 67	46.94	29.52	30.39	191.91	115.89	72.74	47.87	49.61	1.34	2.36	9.83	
1985	20.6	27.3	20.6	60.19	41.34	29.40	21.44	37.00	98.27	67.69	49.22	37.73	64.86	0.94	1.60	9.83	
1988	0.0	0.0	0.0	30.43	21.84	16.12	12.25	32.61	44.44	35.66	29.09	24.10	64 11	0.61	1.04	9.02	112.71 @ OF
1988	0.0	100.0	0.0	22.46	18.51	15.63	13.55	26.72	25.97	24.24	23.03	22.23	49.39	0.96	1.83	9.02	101.33 @ 25F
1988	100.0	0.0	100.0	166.49	101.41	60.38	31.68	22.66	292.21	165.94	93.87	50.66	33.27	1.27	2.24	9.02	91.45 @ 50F
1988	50.0	0.0	50.0	84.46	53.31	33.51	21.72	27.69	144.91	88.26	55.00	38.06	49.94	0.85	1.48	9.02	97.86 @ 75F
1988	0.0	50.0	0.0	26.33	19.87	15.46	13.79	29.40	35.73	30.07	25.89	25.35	56.73	0.73	1.33	9.02	164.59 @100F
1988	50.0	50.0	50.0	94.47	59.96	38.01	24.45	24 69	159.09	95.09	58.45	39.83	41.33	1.11	2.03	9.02	
1988	20.6	27.3	20.6	50.30	33.63	22.86	17.03	28.83	80.82	54.14	37.95	30.62	54.27	0.78	1.38	9.02	
1990	0.0	0.0	0.0	29.65	20.14	13.95	9.90	21.47	40.29	30.91	24.19	19.29	47.57	0.57	1.00	8.65	85.87 @ OF
1990	0.0	100.0	0.0	22.95	18.11	14.53	11 89	19.27	24.82	22.05	20.02	18.56	36.46	0.89	1.75	8.65	76.45 @ 25F
1990	100.0	0.0	100.0	144.84	89.74	54.12	27.94	19.29	259.67	146.62	82.30	42.91	26.96	1.19	2.14	8.65	68.29 @ 50F
1990	50.0	0.0	50.0	74.85	47.38	29.60	16.82	19.96	128.35	77.15	47.20	28.42	37.93	0.80	1 42	8.65	61.21 @ 75F
1990	0.0	50.0	0.0	26.08	18.72	13.77	10.41	19.97	32.89	26.46	21.84	18.49	41.91	0.68	1.27	8.65	97.54 @100F
1990	50.0	50.0	50.0	83.89	53.93	34.32	19.92	19.28	142.25	84.34	51.16	30.73	31.71	1.04	1.95	8 65	
1990	20.6	27.3	20.6	46.19	30.50	20.24	13.00	20.03	72.30	47.40	32.32	22.58	40.52	0.72	1.32	8.65	
1995	0.0	0.0	0.0	28.98	18.32	11.62	7.40	11.92	34.54	23.57	16.35	11.54	26.23	0.53	0.97	8.18	54.28 @ OF
1995	0.0	100.0	0.0	23.72	17.76	13.33	10.04	13.54	24.63	19.60	15.85	13.05	22.09	0.83	1.70	8.18	47.47 @ 25F
1995	100.0	0.0	100.0	116.12	74.81	46.44	23.58	16.99	205.03	114.11	63.16	30.50	20.62	1.12	2.08	8.18	41.60 @ 50F
1995	50.0	0.0	50.0	62.73	40.21	25.11	13.61	13.58	101.64	59.06	34.57	18.78	23.20	0.75	1.38	8.18	36.53 @ 75F
1995	0.0	50.0	0.0	26.01	17.55	11.95	8.23	12.20	29.54	21.28	15.66	11.80	23.82	0.64	1.24	8.18	51.23 @100F
1995	50.0	50.0	50.0	69.92	46.28	29.89	16.81	15.26	114.83	66.85	39.51	21.77	21.36	0.97	1.89	8.18	
1995	20.6	27.3	20.6	41.15	26.84	17.31	10.38	12.74	59.26	36.83	23.42	14.64	23.66	0.68	1.28	8.18	
2000	0.0	0.0	0.0	28.15	17.59	10.99	6.87	9.71	32.35	20.50	13.04	8.33	14.10	0.52	0.96	7.93	43.59 @ OF
2000	0.0	100.0	0.0	23.17	17.19	12.75	9.46	12.05	25.02	18.78	14.14	10.69	14.84	0.82	1.71	7.93	37.79 @ 25F
2000	100.0	0.0	100.0	107.84	70.58	44.17	22.17	16.18	177.89	98.21	54.11	24.86	17.78	1.12	2.08	7.93	32.79 @ 50F
2000	50.0	0.0	50.0	58.96	38.11	23.84	12.74	11.99	89.20	50.76	28.96	14.64	15.13	0.74	1.38	7.93	28.49 @ 75F
2000	0.0	50.0	0.0	25.32	16.89	11.35	7.69	10.34	28.46	19.20	13.08	9.01	13.97	0.63	1.24	7.93	36.12 @100F
2000	50.0	50.0	50.0	65.51	43.88	28.46	15.81	14.12	101.46	58.50	34.12	17.77	16.31	0.97	1.89	7.93	
2000	20.6	27.3	20.6	39.20	25.59	16.44	9.71	10.98	53.47	32.16	19.56	11.28	14.44	0.67	1.28	7.93	

TABLE 30 : CO AT 55.0 MPH.

TABLE 31

HIGH ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE) AT 5.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	-LDDV- 0-100F	-LDDT- 0-100F	-HDDV- 0-100F	----HDGV----
1980	0.0	0.0	0.0	2.50	2.18	1.91	1.68	1.26	3.35	2.95	2.62	2.33	1.81	2.09	2.76	38.90	4.74 @ 0F
1980	0.0	100.0	0.0	3.11	2.75	2.45	2.18	1.57	4.17	3.74	3.37	3.04	2.21	2.44	3.30	38.90	4.42 @ 25F
1980	100.0	0.0	100.0	2.48	2.34	2.24	2.16	1.71	2.94	2.94	2.96	3.00	2.47	2.63	3.57	38.90	4.13 @ 50F
1980	50.0	0.0	50.0	2.58	2.36	2.18	2.02	1.57	3.26	3.07	2.93	2.82	2.27	2.34	3.12	38.90	3.87 @ 75F
1980	0.0	50.0	0.0	2.95	2.60	2.30	2.04	1.49	3.98	3.55	3.17	2.85	2.12	2.25	3.00	38.90	2.79 @100F
1980	50.0	50.0	50.0	2.79	2.55	2.34	2.17	1.64	3.55	3.34	3.16	3.02	2.34	2.54	3.43	38.90	
1980	20.6	27.3	20.6	2.79	2.49	2.24	2.02	1.52	3.66	3.33	3.06	2.82	2.18	2.28	3.04	38.90	
1985	0.0	0.0	0.0	1.82	1.57	1.37	1.19	0.76	3.10	2.69	2.35	2.06	1.45	2.14	2.33	32.53	3.96 @ 0F
1985	0.0	100.0	0.0	2.19	1.91	1.67	1.47	0.94	3.72	3.32	2.98	2.67	1.78	2.18	2.78	32.53	3.71 @ 25F
1985	100.0	0.0	100.0	2.08	1.88	1.71	1.57	0.96	3.54	3.17	2.88	2.66	1.76	2.32	2.99	32.53	3.50 @ 50F
1985	50.0	0 0	50.0	2.02	1.80	1.61	1.45	0.90	3.45	3.06	2.74	2.47	1.68	2.22	2.63	32.53	3.31 @ 75F
1985	0.0	50.0	0.0	2.09	1.82	1.59	1.39	0.89	3.56	3.15	2.79	2.48	1.69	2.16	2.53	32.53	2.46 @100F
1985	50.0	50.0	50.0	2.14	1.89	1.69	1.52	0.95	3.63	3.25	2.93	2.66	1.77	2.25	2.88	32.53	
1985	20.6	27.3	20.6	2.05	1.80	1.59	1.41	0.89	3.50	3.10	2.76	2.47	1.68	2.18	2.56	32.53	
1988	0.0	0.0	0.0	1.68	1.45	1.25	1.08	0.63	3.12	2.69	2.33	2.01	1.41	1.81	2.05	27.71	3.89 @ 0F
1988	0.0	100.0	0.0	2.02	1.71	1.46	1.25	0.79	3.62	3.21	2.85	2.53	1.70	1.81	2.43	27.71	3.68 @ 25F
1988	100.0	0.0	100.0	2.00	1.77	1.57	1.41	0.80	3.75	3.26	2.86	2.54	1.62	1.93	2.62	27.71	3.48 @ 50F
1988	50.0	0.0	50.0	1.91	1.67	1.47	1.30	0.75	3.57	3.10	2.70	2.38	1.57	1.86	2.30	27.71	3.30 @ 75F
1988	0.0	50.0	0.0	1.92	1.64	1.41	1.21	0.74	3.51	3.07	2.70	2.37	1.62	1.81	2.22	27.71	2.08 @100F
1988	50.0	50.0	50.0	2.01	1.74	1.52	1.33	0.79	3.68	3.23	2.85	2.53	1.66	1.87	2.52	27.71	
1988	20.6	27.3	20.6	1.91	1.65	1.43	1.24	0.74	3.52	3.07	2.69	2.36	1.60	1.83	2.25	27.71	
1990	0.0	0.0	0.0	1.67	1.43	1.22	1.05	0.52	3.03	2.60	2.24	1.93	1.20	1.70	1.82	23.77	4.14 @ 0F
1990	0.0	100.0	0.0	2.01	1.67	1.40	1.17	0.64	3.49	3.05	2.67	2.34	1.43	1.69	2.16	23.77	3.92 @ 25F
1990	100.0	0.0	100.0	1.98	1.74	1.53	1.35	0.65	3.60	3.11	2.70	2.37	1.32	1.80	2.32	23.77	3.72 @ 50F
1990	50.0	0.0	50.0	1.89	1.64	1.43	1.25	0.61	3.44	2.97	2.57	2.24	1.31	1.74	2.05	23.77	3.54 @ 75F
1990	0.0	50.0	0.0	1.91	1.61	1.36	1.15	0.60	3.38	2.93	2.55	2.22	1.37	1.70	1.97	23.77	1.96 @100F
1990	50.0	50.0	50.0	1.99	1.70	1.46	1.26	0.64	3.54	3.08	2.69	2.36	1.37	1.74	2.24	23.77	
1990	20.6	27.3	20.6	1.90	1.62	1.38	1.19	0.60	3.40	2.94	2.55	2.22	1.34	1.72	2.00	23.77	
1995	0.0	0.0	0.0	1.68	1.43	1.22	1.03	0.44	2.83	2.40	2.05	1.74	0.91	1.61	1.66	19.93	4.48 @ 0F
1995	0.0	100.0	0.0	2.06	1.67	1.36	1.10	0.55	3.22	2.71	2.29	1.94	1.07	1.59	1.97	19.93	4.26 @ 25F
1995	100.0	0.0	100.0	1.95	1.71	1.49	1.30	0.56	3.15	2.70	2.33	2.01	0.97	1.68	2.11	19.93	4.06 @ 50F
1995	50.0	0.0	50.0	1.88	1.63	1.41	1.22	0.52	3.09	2.64	2.26	1.94	0.97	1.64	1.87	19.93	3.86 @ 75F
1995	0.0	50.0	0.0	1.94	1.61	1.33	1.10	0.51	3.13	2.65	2.24	1.90	1.03	1.60	1.80	19.93	1.92 @100F
1995	50.0	50.0	50.0	2.01	1.69	1.43	1.20	0.56	3.19	2.71	2.31	1.97	1.02	1.63	2.04	19.93	
1995	20.6	27.3	20.6	1.91	1.61	1.36	1.15	0.51	3.10	2.64	2.25	1.92	1.00	1.62	1.82	19.93	
2000	0.0	0.0	0.0	1.70	1.44	1.23	1.04	0.43	2.60	2.21	1.88	1.59	0.71	1.60	1.65	18.80	4.53 @ 0F
2000	0.0	100.0	0.0	2.10	1.70	1.37	1.11	0.54	3.01	2.46	2.02	1.66	0.84	1.57	1.95	18.80	4.31 @ 25F
2000	100.0	0.0	100.0	1.96	1.72	1.50	1.31	0.55	2.72	2.35	2.03	1.76	0.77	1.67	2.09	18.80	4.10 @ 50F
2000	50.0	0.0	50.0	1.89	1.64	1.42	1.22	0.51	2.74	2.35	2.01	1.73	0.77	1.63	1.85	18.80	3.91 @ 75F
2000	0.0	50.0	0.0	1.98	1.63	1.34	1.11	0.50	2.91	2.41	2.01	1.67	0.81	1.59	1.78	18.80	1.89 @100F
2000	50.0	50.0	50.0	2.03	1.71	1.44	1.21	0.55	2.86	2.41	2.02	1.71	0.81	1.62	2.02	18.80	
2000	20.6	27.3	20.6	1.93	1.63	1.37	1.15	0.50	2.83	2.38	2.01	1.69	0.79	1.61	1.80	18.80	

TABLE 31 : NOx AT 5.0 MPH.

TABLE 32

HIGH ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE) AT 10.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	-LDDV- 0-100F	-LDDT- 0-100F	-HDDV- 0-100F	----HDGV----
1980	0.0	0.0	0.0	2.19	1.92	1.68	1.48	1.11	2.82	2.50	2.23	1.99	1.54	1.74	2.29	32.27	4.98 @ OF
1980	0.0	100.0	0.0	2.71	2.41	2.15	1.92	1.37	3.52	3 17	2.87	2.60	1.89	2.02	2.74	32.27	4.64 @ 25F
1980	100.0	0.0	100.0	2.25	2.11	2.00	1.92	1.48	2.54	2.54	2.54	2.57	2.09	2.19	2 96	32.27	4.34 @ 50F
1980	50 0	0.0	50.0	2.30	2.10	1.93	1.79	1.37	2.78	2.63	2.50	2.41	1.93	1.94	2.59	32.27	4.07 @ 75F
1980	0 0	50.0	0.0	2.58	2.28	2.02	1.79	1.30	3.36	3.00	2.70	2.43	1.81	1.86	2.49	32.27	2.93 @100F
1980	50 0	50.0	50.0	2.48	2.26	2.07	1.92	1.43	3.03	2.85	2.71	2.59	1.99	2.10	2.85	32.27	
1980	20 6	27 3	20.6	2.45	2.19	1.97	1.78	1.32	3.10	2.83	2.60	2.41	1.85	1.89	2.52	32.27	
1985	0.0	0.0	0.0	1.74	1.51	1.31	1.14	0.71	2.90	2.53	2.20	1.93	1.35	1.78	1.93	26.99	4.16 @ OF
1985	0.0	100 0	0.0	2.08	1.81	1.59	1.39	0.88	3.47	3.10	2.77	2.49	1.65	1.81	2.30	26.99	3.90 @ 25F
1985	100.0	0.0	100.0	2.02	1.82	1.65	1.50	0.90	3.39	3.02	2.72	2.48	1.62	1.92	2 48	26.99	3.68 @ 50F
1985	50 0	0.0	50.0	1.95	1.73	1.54	1.38	0.85	3.28	2 89	2.57	2.31	1.55	1.84	2.18	26.99	3.48 @ 75F
1985	0.0	50.0	0.0	1.99	1.73	1.51	1.32	0.83	3 33	2.94	2.61	2 32	1.57	1.79	2.10	26.99	2.58 @100F
1985	50 0	50.0	50.0	2.05	1.82	1.62	1.45	0.89	3.43	3.06	2.75	2 49	1.64	1.87	2.39	26.99	
1985	20.6	27.3	20.6	1.97	1.72	1.52	1.34	0.84	3.29	2.91	2.58	2.30	1.56	1.81	2.12	26.99	
1988	0.0	0.0	0.0	1.66	1.43	1.23	1.06	0.61	3.04	2.61	2.26	1.95	1.34	1.50	1.70	22 99	4.09 @ OF
1988	0.0	100.0	0.0	1.99	1.69	1.43	1.23	0.76	3.50	3.09	2.74	2 44	1.62	1.50	2.02	22.99	3 86 @ 25F
1988	100 0	0.0	100.0	1.98	1.75	1.55	1.39	0.77	3.68	3 18	2.78	2.45	1.53	1.60	2.17	22.99	3.66 @ 50F
1988	50.0	0 0	50.0	1.89	1.65	1.45	1.28	0.72	3 49	3 02	2.62	2.30	1.49	1.55	1.91	22.99	3 47 @ 75F
1988	0.0	50 0	0.0	1.90	1.62	1.38	1.19	0.71	3.39	2.97	2.60	2.29	1.54	1.50	1.84	22.99	2.18 @100F
1988	50.0	50.0	50.0	1.99	1.72	1.49	1.31	0.76	3.59	3 14	2.76	2 44	1 57	1 55	2.09	22.99	
1988	20.6	27.3	20.6	1.89	1.63	1.41	1.22	0.71	3.42	2.98	2.60	2.28	1.52	1.52	1.86	22.99	
1990	0 0	0 0	0.0	1.67	1.42	1.22	1.04	0.51	2.99	2.56	2.20	1 89	1.17	1.41	1.51	19.72	4.35 @ OF
1990	0 0	100.0	0.0	2 00	1.66	1.39	1.17	0.63	3.42	2.98	2.61	2.29	1.39	1.40	1.79	19 72	4.12 @ 25F
1990	100.0	0.0	100.0	1.98	1.73	1.52	1.34	0.64	3.56	3.07	2.66	2.32	1.28	1.49	1.93	19.72	3.91 @ 50F
1990	50.0	0 0	50.0	1.89	1.64	1.43	1.24	0.60	3.40	2.92	2.53	2.19	1.27	1.45	1.70	19.72	3.72 @ 75F
1990	0.0	50.0	0.0	1.90	1.60	1.35	1.14	0.60	3.32	2.88	2.50	2.18	1.33	1.41	1.64	19.72	2.06 @100F
1990	50.0	50.0	50.0	1.99	1.70	1.46	1.26	0.64	3.49	3.02	2 63	2.30	1.34	1.45	1.86	19.72	
1990	20.6	27.3	20.6	1.89	1.61	1.38	1.18	0.60	3.34	2.89	2.50	2.17	1.30	1.42	1.66	19.72	
1995	0.0	0.0	0.0	1.69	1.44	1.22	1.04	0.44	2.83	2.40	2.05	1.74	0.91	1.34	1.38	16 54	4.70 @ OF
1995	0.0	100.0	0.0	2.07	1.68	1.36	1.11	0.55	3.22	2.71	2.29	1.93	1.07	1.32	1.63	16.54	4.48 @ 25F
1995	100.0	0.0	100.0	1.96	1.71	1.50	1.31	0.56	3.15	2.70	2.32	2.00	0.96	1.40	1.75	16.54	4.26 @ 50F
1995	50.0	0.0	50.0	1.89	1.63	1.41	1.22	0.52	3.09	2.64	2.26	1.94	0.96	1.36	1.55	16.54	4.06 @ 75F
1995	0.0	50.0	0.0	1.95	1.61	1.34	1.11	0.51	3.13	2.64	2.24	1.90	1.02	1.33	1.49	16.54	2.01 @100F
1995	50.0	50.0	50.0	2.01	1.70	1.43	1.21	0.56	3.19	2.71	2.30	1.97	1.01	1.36	1.69	16.54	
1995	20.6	27.3	20.6	1.92	1.62	1.36	1.15	0.52	3.10	2.64	2.24	1.91	1.00	1.34	1.51	16.54	
2000	0.0	0.0	0.0	1.70	1.45	1.23	1.05	0.43	2.61	2.22	1.88	1.60	0.72	1.33	1.37	15.60	4.76 @ OF
2000	0.0	100 0	0.0	2.11	1.70	1.38	1.11	0.54	3.02	2.47	2.03	1.66	0.85	1.31	1.62	15.60	4.53 @ 25F
2000	100.0	0.0	100.0	1.97	1.72	1.51	1.32	0.56	2.73	2.36	2.04	1.76	0.78	1.38	1.73	15.60	4.31 @ 50F
2000	50.0	0.0	50.0	1.90	1.64	1.42	1.23	0.51	2.75	2.36	2.02	1.74	0.77	1.35	1.53	15.60	4.10 @ 75F
2000	0.0	50.0	0.0	1.98	1.63	1.35	1.11	0.50	2.92	2.42	2.02	1.68	0.81	1.32	1.48	15.60	1.99 @100F
2000	50.0	50.0	50.0	2.04	1.71	1.44	1.21	0.55	2.87	2.41	2.03	1.71	0.81	1.34	1.67	15.60	
2000	20.6	27.3	20.6	1.94	1.63	1.37	1.16	0.50	2.84	2.39	2.01	1.70	0.79	1.33	1.49	15.60	

TABLE 32 : NOx AT 10.0 MPH.

TABLE 33

HIGH ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE) AT 19.6 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	-LDDV- 0-100F	-LDDT- 0-100F	-HDDV- 0-100F	----HDGV----
1980	0.0	0.0	0.0	2.46	2.16	1.90	1.67	1.24	3.11	2.77	2.48	2.22	1.72	1.34	1.77	24.91	5.44 @ 0F
1980	0.0	100.0	0.0	3.03	2.70	2.41	2.17	1.54	3.90	3.52	3.19	2.91	2.11	1.56	2.11	24.91	5.07 @ 25F
1980	100.0	0.0	100.0	2.58	2.41	2.27	2.17	1.65	2.86	2.84	2.85	2.87	2.31	1.69	2.28	24.91	4.74 @ 50F
1980	50.0	0.0	50.0	2.62	2.38	2.18	2.02	1.53	3.10	2.93	2.79	2.69	2.14	1.50	2.00	24.91	4.45 @ 75F
1980	0.0	50.0	0.0	2.88	2.55	2.27	2.02	1.46	3.71	3.33	3.00	2.71	2.02	1.44	1.92	24.91	3.20 @100F
1980	50.0	50.0	50.0	2.80	2.55	2.34	2.17	1.60	3.38	3.18	3.02	2.89	2.21	1.62	2.20	24.91	
1980	20.6	27.3	20.6	2.76	2.47	2.22	2.01	1.48	3.44	3.15	2.90	2.69	2.06	1.46	1.95	24.91	
1985	0.0	0.0	0.0	2.07	1.79	1.56	1.36	0.84	3.43	2.98	2.60	2.27	1.58	1.37	1.49	20.83	4.54 @ 0F
1985	0.0	100.0	0.0	2.47	2.15	1.88	1.65	1.04	4.07	3.64	3.26	2.93	1.93	1.39	1.78	20.83	4.26 @ 25F
1985	100.0	0.0	100.0	2.43	2.18	1.96	1.79	1.06	4.05	3.59	3.22	2.93	1.89	1.49	1.92	20.83	4.02 @ 50F
1985	50.0	0.0	50.0	2.33	2.06	1.84	1.64	1.00	3.89	3.42	3.04	2.72	1.82	1.42	1.68	20.83	3.80 @ 75F
1985	0.0	50.0	0.0	2.36	2.05	1.79	1.57	0.98	3.91	3.46	3.07	2.73	1.84	1.38	1.62	20.83	2.82 @100F
1985	50.0	50.0	50.0	2.45	2.16	1.92	1.72	1.05	4.06	3.62	3.24	2.93	1.91	1.44	1.85	20.83	
1985	20.6	27.3	20.6	2.34	2.05	1.80	1.59	0.98	3.89	3.43	3.04	2.71	1.82	1.40	1.64	20.83	
1988	0.0	0.0	0.0	2.01	1.73	1.49	1.28	0.73	3.65	3.14	2.71	2.34	1.60	1.16	1.31	17.74	4.47 @ 0F
1988	0.0	100.0	0.0	2.40	2.04	1.73	1.48	0.91	4.19	3.71	3.28	2.92	1.92	1.16	1.56	17.74	4.22 @ 25F
1988	100.0	0.0	100.0	2.41	2.12	1.88	1.68	0.92	4.45	3.84	3.34	2.94	1.81	1.23	1.68	17.74	4.00 @ 50F
1988	50.0	0.0	50.0	2.30	2.00	1.76	1.54	0.86	4.21	3.63	3.15	2.75	1.77	1.19	1.48	17.74	3.79 @ 75F
1988	0.0	50.0	0.0	2.29	1.95	1.67	1.43	0.86	4.07	3.56	3.12	2.74	1.83	1.16	1.42	17.74	2.38 @100F
1988	50.0	50.0	50.0	2.41	2.08	1.81	1.58	0.91	4.32	3.77	3.31	2.93	1.87	1.20	1.62	17.74	
1988	20.6	27.3	20.6	2.29	1.97	1.70	1.47	0.85	4.12	3.58	3.12	2.73	1.80	1.17	1.44	17.74	
1990	0.0	0.0	0.0	2.03	1.73	1.48	1.27	0.62	3.62	3.10	2.66	2.29	1.41	1.09	1.17	15.22	4.75 @ 0F
1990	0.0	100.0	0.0	2.43	2.02	1.69	1.42	0.77	4.13	3.60	3.15	2.76	1.67	1.08	1.38	15.22	4.51 @ 25F
1990	100.0	0.0	100.0	2.41	2.11	1.86	1.64	0.78	4.32	3.71	3.21	2.80	1.54	1.15	1.49	15.22	4.28 @ 50F
1990	50.0	0.0	50.0	2.30	2.00	1.74	1.51	0.73	4.12	3.54	3.05	2.65	1.53	1.12	1.31	15.22	4.06 @ 75F
1990	0.0	50.0	0.0	2.31	1.95	1.64	1.39	0.72	4.01	3.48	3.02	2.62	1.60	1.09	1.26	15.22	2.25 @100F
1990	50.0	50.0	50.0	2.42	2.07	1.77	1.53	0.78	4.22	3.66	3.18	2.78	1.61	1.12	1.44	15.22	
1990	20.6	27.3	20.6	2.30	1.96	1.68	1.44	0.72	4.05	3.49	3.02	2.62	1.57	1.10	1.28	15.22	
1995	0.0	0.0	0.0	2.06	1.75	1.49	1.27	0.54	3.45	2.93	2.49	2.12	1.10	1.03	1.07	12.76	5.14 @ 0F
1995	0.0	100.0	0.0	2.53	2.05	1.67	1.35	0.67	3.93	3.30	2.78	2.35	1.30	1.02	1.26	12.76	4.89 @ 25F
1995	100.0	0.0	100.0	2.39	2.09	1.83	1.60	0.69	3.84	3.29	2.83	2.44	1.17	1.08	1.35	12.76	4.66 @ 50F
1995	50.0	0.0	50.0	2.31	1.99	1.72	1.49	0.64	3.77	3.22	2.75	2.36	1.17	1.05	1.20	12.76	4.43 @ 75F
1995	0.0	50.0	0.0	2.38	1.97	1.63	1.35	0.63	3.81	3.22	2.73	2.31	1.24	1.02	1.15	12.76	2.20 @100F
1995	50.0	50.0	50.0	2.46	2.07	1.75	1.48	0.68	3.88	3.30	2.81	2.40	1.23	1.05	1.31	12.76	
1995	20.6	27.3	20.6	2.34	1.97	1.67	1.41	0.63	3.78	3.21	2.73	2.33	1.21	1.03	1.17	12.76	
2000	0.0	0.0	0.0	2.08	1.77	1.50	1.28	0.52	3.19	2.71	2.30	1.95	0.88	1.03	1.05	12.04	5.20 @ 0F
2000	0.0	100.0	0.0	2.58	2.08	1.68	1.36	0.66	3.69	3.02	2.48	2.03	1.03	1.01	1.25	12.04	4.95 @ 25F
2000	100.0	0.0	100.0	2.41	2.10	1.84	1.61	0.68	3.33	2.88	2.49	2.15	0.95	1.07	1.34	12.04	4.71 @ 50F
2000	50.0	0.0	50.0	2.32	2.01	1.74	1.50	0.63	3.36	2.88	2.47	2.12	0.94	1.04	1.18	12.04	4.48 @ 75F
2000	0.0	50.0	0.0	2.42	2.00	1.65	1.36	0.61	3.56	2.96	2.46	2.05	0.99	1.02	1.14	12.04	2.17 @100F
2000	50.0	50.0	50.0	2.49	2.09	1.76	1.48	0.67	3.51	2.95	2.48	2.09	0.99	1.04	1.29	12.04	
2000	20.6	27.3	20.6	2.37	1.99	1.68	1.42	0.62	3.47	2.92	2.46	2.08	0.97	1.03	1.15	12.04	

TABLE 33 : NOx AT 19.6 MPH.

TABLE 34

HIGH ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE) AT 35.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	-LDDV- 0-100F	-LDDT- 0-100F	-HDDV- 0-100F	----HDGV----
1980	0.0	0.0	0.0	3.30	2.89	2.54	2.24	1.67	4.28	3.80	3.39	3.04	2.35	1.16	1.53	21.60	6.18 @ 0F
1980	0.0	100.0	0.0	4.06	3.62	3.23	2.90	2.07	5.36	4.83	4.38	3.98	2.89	1.36	1.83	21.60	5.76 @ 25F
1980	100.0	0.0	100.0	3.42	3.20	3.03	2.90	2.22	3.89	3.87	3.88	3.92	3.17	1.46	1.98	21.60	5.38 @ 50F
1980	50.0	0.0	50.0	3.49	3.18	2.92	2.71	2.05	4.23	4.00	3.82	3.68	2.93	1.30	1 73	21.60	5.05 @ 75F
1980	0.0	50.0	0.0	3.87	3.42	3.04	2.71	1.96	5.10	4.57	4.11	3.72	2.77	1.25	1.67	21.60	3.63 @100F
1980	50.0	50.0	50.0	3.74	3.41	3.13	2.90	2.14	4.62	4.35	4.13	3.95	3.03	1.41	1.91	21.60	
1980	20.6	27.3	20.6	3.69	3.30	2.97	2.69	1.99	4.72	4.31	3.97	3.68	2.82	1.26	1.69	21.60	
1985	0.0	0.0	0.0	2.71	2.35	2.04	1.78	1.11	4.54	3.95	3.44	3.01	2.10	1.19	1.29	18.07	5.16 @ 0F
1985	0.0	100.0	0.0	3.24	2.82	2.47	2.17	1.37	5.41	4.83	4.33	3.89	2.57	1.21	1.54	18.07	4.84 @ 25F
1985	100.0	0.0	100.0	3.17	2.84	2.57	2.34	1.40	5.32	4.73	4.25	3.88	2.52	1.29	1.66	18.07	4.56 @ 50F
1985	50.0	0.0	50.0	3.05	2.70	2.41	2.16	1.31	5.13	4.52	4.02	3.61	2.42	1.23	1.46	18.07	4.31 @ 75F
1985	0.0	50.0	0.0	3.10	2.69	2.35	2.06	1.30	5.19	4.59	4.07	3.62	2.45	1.20	1.40	18.07	3.21 @100F
1985	50.0	50.0	50.0	3.20	2.83	2.52	2.26	1.39	5.36	4.78	4.29	3.88	2.55	1.25	1.60	18.07	
1985	20.6	27.3	20.6	3.07	2.69	2.36	2.09	1.30	5.15	4.54	4.03	3.60	2.42	1.21	1.42	18.07	
1988	0.0	0.0	0.0	2.62	2.25	1.94	1.67	0.96	4.78	4.11	3.55	3.07	2.10	1.01	1.14	15.39	5.08 @ 0F
1988	0.0	100.0	0.0	3.13	2.65	2.25	1.93	1.19	5.50	4.86	4.31	3.83	2.54	1.01	1.35	15.39	4.80 @ 25F
1988	100.0	0.0	100.0	3.13	2.76	2.45	2.18	1.20	5.80	5.01	4.37	3.85	2.39	1.07	1.45	15.39	4.54 @ 50F
1988	50.0	0.0	50.0	2.98	2.60	2.28	2.01	1.13	5.50	4.75	4.13	3.61	2.34	1.03	1.28	15.39	4.31 @ 75F
1988	0.0	50.0	0.0	2.98	2.54	2.17	1.86	1.12	5.34	4.67	4.09	3.60	2.42	1.01	1.23	15.39	2.71 @100F
1988	50.0	50.0	50.0	3.13	2.70	2.35	2.05	1.19	5.65	4.94	4.34	3.84	2.46	1.04	1.40	15.39	
1988	20.6	27.3	20.6	2.97	2.56	2.21	1.92	1.12	5.39	4.69	4.09	3.59	2.38	1.02	1.25	15.39	
1990	0.0	0.0	0.0	2.63	2.25	1.92	1.64	0.81	4.71	4.04	3.47	2.99	1 85	0.95	1.01	13.21	5.40 @ 0F
1990	0.0	100.0	0.0	3.15	2.63	2.19	1.84	1.00	5.39	4.70	4.11	3.61	2.19	0.94	1.20	13.21	5.12 @ 25F
1990	100.0	0.0	100.0	3.12	2.74	2.41	2.12	1.01	5.62	4.84	4.19	3.66	2.02	1.00	1.29	13.21	4.86 @ 50F
1990	50.0	0.0	50.0	2.98	2.59	2.25	1.96	0.95	5.36	4.61	3.98	3.46	2.00	0.97	1.14	13.21	4.61 @ 75F
1990	0.0	50.0	0.0	3.00	2.53	2.13	1.80	0.94	5.24	4.54	3.94	3.43	2.10	0.94	1.10	13.21	2.55 @100F
1990	50.0	50.0	50.0	3.14	2.68	2.30	1.98	1.01	5.50	4.77	4.15	3.63	2.11	0.97	1.24	13.21	
1990	20.6	27.3	20.6	2.98	2.54	2.17	1.86	0.94	5.28	4.55	3.94	3.43	2.05	0.95	1.11	13.21	
1995	0.0	0.0	0.0	2.67	2.27	1.93	1.64	0.69	4.47	3.80	3.23	2.75	1.43	0.89	0.92	11.07	5.84 @ 0F
1995	0.0	100.0	0.0	3.27	2.65	2.16	1.75	0.87	5.09	4.28	3.61	3.05	1.68	0.88	1.09	11.07	5.56 @ 25F
1995	100.0	0.0	100.0	3.10	2.71	2.37	2.07	0.89	4.98	4.27	3.67	3.16	1.52	0.93	1.17	11.07	5.29 @ 50F
1995	50.0	0.0	50.0	2.99	2.58	2.23	1.93	0.83	4.88	4.17	3.57	3.06	1.52	0.91	1.04	11.07	5.04 @ 75F
1995	0.0	50.0	0.0	3.08	2.55	2.11	1.75	0.81	4.94	4.18	3.54	3.00	1.61	0.89	1.00	11.07	2.50 @100F
1995	50.0	50.0	50.0	3.18	2.68	2.26	1.91	0.88	5.03	4.27	3.64	3.11	1.60	0.91	1.13	11.07	
1995	20.6	27.3	20.6	3.03	2.55	2.16	1.82	0.81	4.90	4.16	3.54	3.02	1.57	0.90	1.01	11.07	
2000	0.0	0.0	0.0	2.69	2.29	1.95	1.65	0.67	4.13	3.50	2.97	2.52	1.13	0.89	0.92	10.44	5.90 @ 0F
2000	0.0	100.0	0.0	3.34	2.69	2.17	1.76	0.85	4.77	3.91	3.20	2.63	1.34	0.87	1.08	10.44	5.62 @ 25F
2000	100.0	0.0	100.0	3.11	2.72	2.38	2.08	0.88	4.31	3.72	3.22	2.79	1.23	0.93	1.16	10.44	5.35 @ 50F
2000	50.0	0.0	50.0	3.01	2.60	2.25	1.94	0.81	4.34	3.72	3.20	2.74	1.22	0.91	1.03	10.44	5.09 @ 75F
2000	0.0	50.0	0.0	3.13	2.58	2.13	1.76	0.79	4.61	3.83	3.19	2.65	1.28	0.88	0.99	10.44	2.47 @100F
2000	50.0	50.0	50.0	3.22	2.71	2.28	1.92	0.87	4.54	3.82	3.21	2.71	1.28	0.90	1.12	10.44	
2000	20.6	27.3	20.6	3.07	2.58	2.17	1.83	0.80	4.48	3.78	3.18	2.69	1.25	0.89	1.00	10.44	

TABLE 34 : NOx AT 35.0 MPH.

TABLE 35

HIGH ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE) AT 50.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	-LDDV- 0-100F	-LDDT- 0-100F	-HDDV- 0-100F	----HDGV----
1980	0.0	0.0	0.0	3.71	3.25	2.85	2.52	1.87	4.83	4.29	3.83	3.43	2.65	1.40	1.84	26.00	6.90 @ OF
1980	0.0	100.0	0.0	4.56	4.06	3.63	3.26	2.32	6.05	5.45	4.94	4.49	3.26	1.63	2.21	26.00	6.43 @ 25F
1980	100.0	0.0	100.0	3.84	3.59	3.40	3.26	2.49	4.39	4.37	4.38	4.42	3.57	1.76	2.38	26.00	6.01 @ 50F
1980	50.0	0.0	50.0	3.92	3.57	3.28	3.04	2.30	4.77	4.51	4.31	4.15	3.30	1.56	2.09	26.00	5.64 @ 75F
1980	0.0	50.0	0.0	4.34	3.84	3.41	3.04	2.20	5.75	5.16	4.64	4.19	3.12	1.50	2.01	26.00	4.06 @100F
1980	50.0	50.0	50.0	4.20	3.83	3.52	3.26	2.41	5.22	4.91	4.66	4.45	3.42	1.70	2.29	26.00	
1980	20.6	27.3	20.6	4.15	3.71	3.34	3.02	2.24	5.32	4.86	4.48	4.15	3.18	1.52	2.03	26.00	
1985	0.0	0.0	0.0	3.03	2.63	2.29	1.99	1.25	5.09	4.43	3.86	3.38	2.36	1.43	1.56	21.74	5.76 @ OF
1985	0.0	100.0	0.0	3.63	3.16	2.76	2.43	1.54	6.07	5.43	4.86	4.36	2.89	1.46	1.86	21.74	5.41 @ 25F
1985	100.0	0.0	100.0	3.55	3.18	2.88	2.63	1.57	5.96	5.30	4.77	4.35	2.83	1.55	2.00	21.74	5.10 @ 50F
1985	50.0	0.0	50.0	3.42	3.03	2.70	2.42	1.47	5.75	5.07	4.51	4.05	2.72	1.48	1.76	21.74	4.82 @ 75F
1985	0.0	50.0	0.0	3.47	3.02	2.63	2.30	1.45	5.83	5.15	4 57	4 06	2.75	1.44	1.69	21.74	3.58 @100F
1985	50.0	50.0	50.0	3.59	3.17	2.82	2.53	1 55	6.02	5.36	4.82	4.36	2.86	1.50	1.93	21.74	
1985	20.6	27.3	20.6	3.44	3.01	2.65	2.34	1.45	5.78	5.10	4.52	4.04	2.72	1.46	1.71	21.74	
1988	0.0	0.0	0.0	2.93	2.52	2.16	1.87	1.08	5.35	4.61	3.98	3.44	2.36	1.21	1.37	18.52	5.67 @ OF
1988	0.0	100.0	0.0	3.50	2.96	2.52	2.16	1.33	6.16	5.45	4.83	4.29	2.84	1.21	1.63	18.52	5.35 @ 25F
1988	100.0	0.0	100.0	3.49	3.08	2.74	2.44	1.35	6.49	5.61	4.89	4.31	2.69	1.29	1.75	18.52	5.07 @ 50F
1988	50.0	0.0	50.0	3.33	2.91	2.55	2.25	1.26	6.16	5.32	4.62	4.04	2.62	1.25	1.54	18.52	4.81 @ 75F
1988	0.0	50.0	0.0	3.34	2.84	2.43	2.08	1.25	5.98	5.23	4.59	4.03	2.71	1.21	1.48	18.52	3.03 @100F
1988	50.0	50.0	50.0	3.50	3.02	2.63	2.30	1.34	6.32	5.53	4.86	4.30	2.77	1.25	1.69	18.52	
1988	20.6	27.3	20.6	3.32	2.86	2.47	2.15	1.25	6.04	5.25	4.58	4.02	2.67	1.22	1.50	18.52	
1990	0.0	0.0	0.0	2.94	2.51	2.15	1.84	0.91	5.28	4.52	3.89	3.34	2.07	1.14	1.22	15.89	6.03 @ OF
1990	0.0	100.0	0.0	3.52	2.94	2.45	2.06	1.12	6.03	5.26	4.60	4.04	2.46	1.13	1.44	15.89	5.71 @ 25F
1990	100.0	0.0	100.0	3.49	3.06	2.69	2.37	1.13	6.29	5.41	4.69	4.10	2.26	1.20	1.55	15.89	5.42 @ 50F
1990	50.0	0.0	50.0	3.33	2.89	2.52	2.19	1.06	6.00	5.16	4.46	3.87	2.24	1.17	1.37	15.89	5.15 @ 75F
1990	0.0	50.0	0.0	3.35	2.82	2.38	2.01	1.05	5.86	5.08	4.41	3.84	2.35	1.13	1.32	15.89	2.85 @100F
1990	50.0	50.0	50.0	3.51	3 00	2.57	2.21	1.13	6.16	5.34	4.65	4.07	2.36	1.17	1.50	15.89	
1990	20.6	27.3	20.6	3.33	2.84	2.43	2.08	1.05	5.90	5.10	4.41	3.84	2.30	1.15	1.33	15.89	
1995	0.0	0.0	0.0	2.98	2.54	2.16	1.83	0.78	4.99	4.24	3.61	3.07	1.60	1.08	1.11	13.33	6.52 @ OF
1995	0.0	100.0	0.0	3.65	2.97	2.41	1.96	0.97	5.69	4.78	4.03	3.41	1.88	1.06	1.32	13.33	6.20 @ 25F
1995	100.0	0.0	100.0	3.46	3.03	2.64	2.31	1.00	5.56	4.77	4.10	3.53	1.70	1.12	1.41	13.33	5.91 @ 50F
1995	50.0	0.0	50.0	3.34	2.88	2.49	2.16	0.92	5.45	4.66	3.99	3.42	1.70	1.10	1.25	13.33	5.62 @ 75F
1995	0.0	50.0	0.0	3.45	2.85	2.36	1.95	0.91	5.52	4.67	3.95	3.35	1.80	1.07	1.20	13.33	2.79 @100F
1995	50.0	50.0	50.0	3.56	3.00	2.53	2.14	0.98	5.62	4.78	4.07	3.47	1.79	1.09	1.36	13.33	
1995	20.6	27.3	20.6	3.39	2.85	2.41	2.03	0.91	5.48	4.65	3.96	3.37	1.76	1.08	1.22	13.33	
2000	0.0	0.0	0.0	3.01	2.56	2.17	1.85	0.75	4.61	3.92	3.32	2.82	1.27	1.07	1.10	12.57	6.59 @ OF
2000	0.0	100.0	0.0	3.73	3.01	2.43	1.96	0.95	5.33	4.37	3.58	2.94	1.49	1.05	1.30	12.57	6.28 @ 25F
2000	100.0	0.0	100.0	3.48	3.04	2.66	2.32	0.98	4.81	4.16	3.60	3.11	1.37	1.11	1.40	12.57	5.97 @ 50F
2000	50.0	0.0	50.0	3.36	2.90	2.51	2.17	0.90	4.85	4.16	3.57	3.06	1.36	1.09	1.23	12.57	5.69 @ 75F
2000	0.0	50.0	0.0	3.50	2.88	2.38	1.96	0.89	5.15	4.28	3.56	2.96	1.43	1.06	1.19	12.57	2.75 @100F
2000	50.0	50.0	50.0	3.60	3.03	2.54	2.14	0.97	5.07	4.26	3.59	3.03	1.43	1.08	1.35	12.57	
2000	20.6	27.3	20.6	3.43	2.88	2.43	2.05	0.89	5.01	4.22	3.56	3.00	1.40	1.07	1.20	12.57	

TABLE 35 : NOx AT 50.0 MPH.

TABLE 36

HIGH ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE) AT 55.0 MPH

Cal. Year	Cold/Hot Start VMT Percentages PCCN	PCHC	PCCC	LDGV 0°F	25°F	50°F	75°F	100°F	LDGT 0°F	25°F	50°F	75°F	100°F	LDDV- 0-100F	LDDT- 0-100F	HDDV- 0-100F	HDGV
1980	0.0	0.0	0.0	4.00	3.51	3.08	2.72	2.02	5.23	4.64	4.14	3.71	2.87	1.60	2.11	29.69	7.14 @ 0F
1980	0.0	100.0	0.0	4.93	4.39	3.92	3.52	2.51	6.54	5.90	5.34	4.85	3.53	1.86	2.52	29.69	6.65 @ 25F
1980	100.0	0.0	100.0	4.15	3.88	3.68	3.52	2.69	4.74	4.72	4.74	4.78	3.86	2.01	2.72	29.69	6.22 @ 50F
1980	50.0	0.0	50.0	4.23	3.85	3.54	3.28	2.49	5.16	4.88	4.66	4.49	3.57	1.78	2.38	29.69	5.84 @ 75F
1980	0.0	50.0	0.0	4.69	4.15	3.69	3.28	2.38	6.23	5.58	5.02	4.53	3.37	1.72	2 29	29.69	4.20 @100F
1980	50.0	50.0	50.0	4.54	4.14	3.80	3.52	2.60	5.64	5.31	5.04	4.82	3.70	1.94	2.62	29.69	
1980	20.6	27.3	20.6	4.48	4.01	3.61	3.27	2.42	5.76	5.26	4.84	4.49	3.44	1.74	2.32	29.69	
1985	0.0	0.0	0.0	3.28	2.84	2.47	2.15	1.34	5 50	4.78	4.17	3.65	2.55	1.63	1.78	24.83	5.96 @ 0F
1985	0.0	100.0	0.0	3.92	3.41	2.98	2 62	1.66	6.56	5.86	5.25	4.71	3.12	1.66	2.12	24.83	5.60 @ 25F
1985	100.0	0.0	100.0	3.83	3.44	3.11	2.84	1.69	6.43	5.72	5.15	4.70	3.06	1.77	2.28	24.83	5.27 @ 50F
1985	50.0	0.0	50.0	3.69	3.27	2.91	2.61	1.59	6.21	5.48	4.87	4.38	2.93	1.69	2.01	24.83	4.98 @ 75F
1985	0.0	50.0	0.0	3.75	3.26	2.84	2.49	1.57	6.30	5.57	4.93	4.39	2.97	1.65	1.93	24.83	3.70 @100F
1985	50.0	50.0	50.0	3.87	3.42	3.05	2.73	1.68	6.50	5.79	5.20	4.71	3.09	1.72	2.20	24.83	
1985	20.6	27.3	20.6	3.71	3.25	2.86	2.53	1.57	6.24	5.51	4.88	4.36	2.94	1.66	1.95	24.83	
1988	0.0	0.0	0.0	3.16	2.72	2.34	2.01	1.16	5.78	4.97	4.29	3.71	2.55	1.38	1.56	21.15	5.86 @ 0F
1988	0.0	100.0	0.0	3.77	3.20	2.72	2.33	1.43	6.65	5.88	5.21	4.63	3.07	1.38	1.86	21.15	5.54 @ 25F
1988	100.0	0.0	100.0	3.77	3.33	2.95	2.63	1.45	7.00	6.05	5.28	4.66	2.90	1.47	2.00	21.15	5.25 @ 50F
1988	50.0	0.0	50.0	3.60	3.14	2.75	2.47	1.36	6.64	5.74	4.99	4.46	2.83	1.42	1.76	21.15	4.82 @ 75F
1988	0.0	50.0	0.0	3.60	3.07	2.62	2.31	1.35	6.45	5.65	4.95	4.47	2.93	1.38	1.69	21.15	3.13 @100F
1988	50.0	50.0	50.0	3.77	3.26	2.84	2.55	1.44	6.83	5.97	5.25	4.78	2.99	1.43	1.93	21.15	
1988	20.6	27.3	20.6	3.59	3.09	2.67	2.37	1.35	6.51	5.67	4.95	4.45	2.88	1.40	1.71	21.15	
1990	0.0	0.0	0.0	3.17	2.71	2.32	1.98	0.98	5.69	4.88	4.19	3.61	2.23	1.30	1.39	18.15	6.24 @ 0F
1990	0.0	100.0	0.0	3.80	3.17	2.65	2.22	1.21	6.51	5.68	4.97	4.36	2.65	1.29	1.65	18.15	5.91 @ 25F
1990	100.0	0.0	100.0	3.76	3.30	2.90	2.56	1.22	6.78	5.84	5.06	4.42	2.44	1.37	1.77	18.15	5.61 @ 50F
1990	50.0	0.0	50.0	3.60	3.12	2.71	2.37	1.15	6.48	5.57	4.81	4.18	2.42	1.33	1.56	18.15	5.33 @ 75F
1990	0.0	50.0	0.0	3.62	3.05	2.57	2.17	1.14	6.33	5.48	4.76	4.14	2.54	1.30	1.51	18.15	2.95 @100F
1990	50.0	50.0	50.0	3.78	3.23	2.77	2.39	1.22	6.65	5.76	5.01	4.39	2.55	1.33	1.71	18.15	
1990	20.6	27.3	20.6	3.60	3.07	2.62	2.25	1.13	6.37	5.50	4.76	4.14	2.48	1.31	1.52	18.15	
1995	0.0	0.0	0.0	3.22	2.74	2.33	1.98	0.84	5.38	4.58	3.90	3.32	1.73	1.23	1.27	15.22	6.75 @ 0F
1995	0.0	100.0	0.0	3.94	3 20	2.60	2.11	1.05	6.14	5.16	4.35	3.68	2.03	1.21	1.50	15.22	6.42 @ 25F
1995	100.0	0.0	100.0	3.73	3.26	2.85	2.50	1.08	6.00	5.15	4.42	3.81	1.84	1.28	1.61	15.22	6.11 @ 50F
1995	50.0	0.0	50.0	3.60	3.11	2.69	2.33	1.00	5.88	5.03	4.30	3.69	1.84	1.25	1.43	15.22	5.82 @ 75F
1995	0.0	50.0	0.0	3.72	3.07	2.54	2.11	0.98	5.96	5.04	4.26	3.62	1.95	1.22	1.38	15.22	2.89 @100F
1995	50.0	50.0	50.0	3.84	3.23	2.73	2.30	1.06	6.07	5.15	4.39	3.75	1.93	1.25	1.56	15.22	
1995	20.6	27.3	20.6	3.65	3.08	2.60	2.20	0.98	5.91	5.02	4.27	3.64	1.90	1.23	1.39	15.22	
2000	0.0	0.0	0.0	3.25	2.76	2.35	1.99	0.81	4.98	4.23	3.59	3.04	1.37	1.22	1.26	14.35	6.82 @ 0F
2000	0.0	100.0	0.0	4.02	3.25	2.62	2.12	1.03	5.76	4.71	3.86	3.17	1.61	1.20	1.49	14.35	6.49 @ 25F
2000	100.0	0.0	100.0	3.75	3.28	2.87	2.51	1.06	5.19	4.49	3.88	3.36	1.48	1.27	1.59	14.35	6.18 @ 50F
2000	50.0	0.0	50.0	3.62	3 13	2.71	2.34	0.98	5.24	4.49	3.85	3.31	1.47	1.25	1.41	14.35	5.89 @ 75F
2000	0.0	50.0	0.0	3.78	3.11	2.57	2.12	0.96	5.56	4.62	3.84	3.20	1.54	1.21	1.36	14.35	2.85 @100F
2000	50.0	50.0	50.0	3.89	3.26	2.75	2.31	1.05	5.47	4.60	3.87	3.26	1.55	1.24	1.54	14.35	
2000	20 6	27.3	20.6	3.70	3.11	2.62	2.21	0.96	5.41	4.55	3.84	3.24	1.51	1.23	1.38	14.35	

TABLE 36 : NOx AT 55.0 MPH.

Appendix K

EMISSION SENSITIVITY TABLES A/C AND LOAD

The following tables show the sensitivity of the MOBILE3 emission factors to variations in air conditioner usage, extra vehicle loads, and the percentage of vehicles towing trailers. The LDGT category is a weighted average of LDGT1s and LDGT2s. The following conditions are included:

Altitudes: Low, High

Air Conditioner Usage: 0%, 50%, 100%

Extra Load Percentage: 0%, 5%, 10%, 15%

Trailer Towing Percentage: 0%, 5%, 10%

TABLE 1

LOW ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 0 %

WET BULB TEMPERATURE = 66 F
DRY BULB TEMPERATURE = 71 F

CAL. YEAR	EXTRA LOAD PERCENTAGE	LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE 0%	5%	10%
1985	0 %	3.58	3.66	3.73	6.80	6.94	7.07	4.66	4.73	4.81
1985	5 %	3.59	3.66	3.73	6.82	6.95	7.08	4.66	4.74	4.81
1985	10 %	3.60	3.67	3.74	6.83	6.96	7.10	4.67	4.75	4.82
1985	15 %	3.60	3.68	3.75	6.84	6.98	7.11	4.68	4.75	4.83
1988	0 %	2.76	2.81	2.87	5.53	5.64	5.76	3.55	3.61	3.67
1988	5 %	2.76	2.82	2.87	5.54	5.65	5.77	3.55	3.61	3.67
1988	10 %	2.76	2.82	2.88	5.55	5.66	5.78	3.56	3.62	3.68
1988	15 %	2.77	2.83	2.88	5.56	5.67	5.79	3.56	3.62	3.68
1990	0 %	2.38	2.43	2.48	4.84	4.94	5.05	3.02	3.07	3.12
1990	5 %	2.38	2.43	2.48	4.85	4.95	5.06	3.02	3.07	3.13
1990	10 %	2.39	2.44	2.49	4.85	4.96	5.07	3.03	3.08	3.13
1990	15 %	2.39	2.44	2.49	4.86	4.97	5.08	3.03	3.08	3.14
1995	0 %	1.84	1.88	1.92	3.53	3.61	3.69	2.24	2.28	2.32
1995	5 %	1.85	1.88	1.92	3.54	3.62	3.70	2.25	2.28	2.32
1995	10 %	1.85	1.89	1.92	3.55	3.63	3.71	2.25	2.29	2.33
1995	15 %	1.85	1.89	1.93	3.55	3.63	3.71	2.25	2.29	2.33

*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 71 F AMBIENT TEMPERATURE, AND 19.6 MPH AVERAGE SPEED.

TABLE 1 : THC @ 0 % A/C USAGE

TABLE 2

LOW ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 50 %

WET BULB TEMPERATURE = 71 F
DRY BULB TEMPERATURE = 79 F

CAL. YEAR	EXTRA LOAD PERCENTAGE	LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE 0%	5%	10%
1985	0 %	3.57	3.65	3.72	6.79	6.93	7.06	4.65	4.73	4.80
1985	5 %	3.58	3.65	3.72	6.81	6.94	7.08	4.66	4.73	4.81
1985	10 %	3.59	3.66	3.73	6.82	6.95	7.09	4.66	4.74	4.82
1985	15 %	3.59	3.67	3.74	6.83	6.97	7.10	4.67	4.75	4.82
1988	0 %	2.74	2.79	2.85	5.53	5.65	5.76	3.53	3.60	3.66
1988	5 %	2.74	2.80	2.85	5.54	5.66	5.78	3.54	3.60	3.66
1988	10 %	2.74	2.80	2.86	5.55	5.67	5.79	3.54	3.61	3.67
1988	15 %	2.75	2.81	2.86	5.56	5.68	5.80	3.55	3.61	3.67
1990	0 %	2.35	2.40	2.44	4.83	4.94	5.05	3.00	3.05	3.10
1990	5 %	2.35	2.40	2.45	4.84	4.95	5.05	3.00	3.05	3.11
1990	10 %	2.36	2.40	2.45	4.85	4.96	5.06	3.01	3.06	3.11
1990	15 %	2.36	2.41	2.46	4.86	4.96	5.07	3.01	3.06	3.12
1995	0 %	1.79	1.83	1.87	3.49	3.57	3.65	2.21	2.24	2.28
1995	5 %	1.80	1.83	1.87	3.50	3.58	3.66	2.21	2.25	2.28
1995	10 %	1.80	1.84	1.87	3.51	3.58	3.66	2.21	2.25	2.29
1995	15 %	1.80	1.84	1.88	3.51	3.59	3.67	2.21	2.25	2.29

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*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 79 F AMBIENT TEMPERATURE, AND 19.6 MPH AVERAGE SPEED.

TABLE 3

LOW ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 100 %

WET BULB TEMPERATURE = 79 F
DRY BULB TEMPERATURE = 86 F

CAL. YEAR	EXTRA LOAD PERCENTAGE	LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE 0%	5%	10%
1985	0 %	3.80	3.88	3.96	7.18	7.33	7.47	4.90	4.98	5.06
1985	5 %	3.81	3.89	3.97	7.19	7.34	7.49	4.91	4.99	5.07
1985	10 %	3.82	3.90	3.97	7.21	7.35	7.50	4.91	5.00	5.08
1985	15 %	3.82	3.90	3.98	7.22	7.37	7.51	4.92	5.00	5.09
1988	0 %	2.93	2.99	3.05	5.92	6.05	6.18	3.75	3.82	3.88
1988	5 %	2.93	2.99	3.06	5.93	6.06	6.19	3.76	3.82	3.89
1988	10 %	2.94	3.00	3.06	5.94	6.07	6.20	3.76	3.83	3.89
1988	15 %	2.94	3.00	3.07	5.95	6.08	6.21	3.77	3.83	3.90
1990	0 %	2.51	2.56	2.61	5.19	5.31	5.43	3.18	3.24	3.30
1990	5 %	2.51	2.56	2.62	5.20	5.32	5.44	3.19	3.24	3.30
1990	10 %	2.52	2.57	2.62	5.21	5.33	5.45	3.19	3.25	3.31
1990	15 %	2.52	2.57	2.63	5.22	5.34	5.46	3.19	3.25	3.31
1995	0 %	1.89	1.93	1.97	3.74	3.83	3.91	2.32	2.36	2.40
1995	5 %	1.89	1.93	1.97	3.75	3.83	3.92	2.32	2.36	2.40
1995	10 %	1.90	1.93	1.97	3.76	3.84	3.93	2.32	2.36	2.41
1995	15 %	1.90	1.94	1.98	3.76	3.85	3.94	2.33	2.37	2.41

*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 86 F AMBIENT TEMPERATURE, AND 19.6 MPH AVERAGE SPEED.

TABLE 3 : THC @ 100 % A/C USAGE

TABLE 4

LOW ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 0 %

WET BULB TEMPERATURE = 66 F
DRY BULB TEMPERATURE = 71 F

CAL. YEAR	EXTRA LOAD PERCENTAGE	LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE 0%	5%	10%
1985	0 %	29.30	32.76	36.21	52.46	58.01	63.56	37.11	40.56	44.01
1985	5 %	29.69	33.19	36.69	53.09	58.72	64.35	37.50	41.00	44.49
1985	10 %	30.07	33.62	37.17	53.73	59.43	65.14	37.88	41.43	44.97
1985	15 %	30.45	34.05	37.65	54.36	60.14	65.92	38.27	41.86	45.46
1988	0 %	23.07	26.16	29.25	43.35	48.54	53.72	28.40	31.47	34.54
1988	5 %	23.39	26.53	29.67	43.91	49.17	54.43	28.73	31.84	34.95
1988	10 %	23.72	26.90	30.09	44.47	49.80	55.14	29.05	32.21	35.37
1988	15 %	24.04	27.27	30.50	45.02	50.43	55.84	29.38	32.58	35.78
1990	0 %	20.33	23.21	26.10	38.33	43.23	48.13	24.17	26.99	29.81
1990	5 %	20.63	23.56	26.48	38.85	43.82	48.79	24.46	27.32	30.18
1990	10 %	20.93	23.90	26.87	39.36	44.41	49.45	24.76	27.66	30.56
1990	15 %	21.23	24.24	27.25	39.88	44.99	50.11	25.05	28.00	30.94
1995	0 %	16.58	19.04	21.51	29.16	33.35	37.53	18.04	20.35	22.66
1995	5 %	16.83	19.33	21.83	29.60	33.84	38.09	18.28	20.62	22.97
1995	10 %	17.09	19.62	22.16	30.03	34.34	38.65	18.52	20.90	23.27
1995	15 %	17.34	19.92	22.49	30.46	34.83	39.21	18.76	21.17	23.58

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*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 71 F AMBIENT TEMPERATURE, AND 19.6 MPH AVERAGE SPEED.

TABLE 5

LOW ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 50 %

WET BULB TEMPERATURE = 71 F
DRY BULB TEMPERATURE = 79 F

CAL. YEAR	EXTRA LOAD PERCENTAGE	LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE 0%	5%	10%
1985	0 %	31.00	34.64	38.27	55.51	61.42	67.34	39.35	42.99	46.63
1985	5 %	31.40	35.09	38.78	56.19	62.18	68.17	39.75	43.45	47.14
1985	10 %	31.81	35.54	39.28	56.86	62.94	69.01	40.16	43.90	47.65
1985	15 %	32.21	36.00	39.79	57.53	63.69	69.85	40.57	44.36	48.16
1988	0 %	23.70	26.86	30.02	45.59	51.05	56.51	29.53	32.69	35.86
1988	5 %	24.04	27.24	30.44	46.18	51.72	57.25	29.86	33.07	36.28
1988	10 %	24.37	27.62	30.87	46.76	52.38	58.00	30.20	33.45	36.71
1988	15 %	24.70	27.99	31.29	47.35	53.05	58.74	30.53	33.84	37.14
1990	0 %	20.39	23.27	26.15	39.90	44.99	50.08	24.69	27.54	30.40
1990	5 %	20.69	23.61	26.53	40.43	45.60	50.76	24.99	27.88	30.78
1990	10 %	20.99	23.95	26.92	40.97	46.21	51.45	25.29	28.22	31.16
1990	15 %	21.29	24.30	27.30	41.51	46.82	52.13	25.58	28.56	31.54
1995	0 %	15.78	18.13	20.48	29.10	33.26	37.43	17.60	19.83	22.06
1995	5 %	16.03	18.41	20.79	29.53	33.75	37.98	17.83	20.09	22.36
1995	10 %	16.27	18.68	21.10	29.96	34.25	38.54	18.06	20.36	22.66
1995	15 %	16.51	18.96	21.41	30.39	34.74	39.09	18.29	20.62	22.95

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*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 79 F AMBIENT TEMPERATURE, AND 19.6 MPH AVERAGE SPEED.

TABLE 5 : CO @ 50 % A/C USAGE

TABLE 6

LOW ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 100 %

WET BULB TEMPERATURE = 79 F
DRY BULB TEMPERATURE = 86 F

CAL. YEAR	EXTRA LOAD PERCENTAGE	LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE 0%	5%	10%
1985	0 %	37.91	42.42	46.92	66.62	73.91	81.20	47.34	51.84	56.35
1985	5 %	38.41	42.97	47.54	67.44	74.83	82.22	47.84	52.41	56.97
1985	10 %	38.90	43.53	48.16	68.26	75.75	83.24	48.34	52.97	57.60
1985	15 %	39.40	44.09	48.79	69.09	76.68	84.27	48.83	53.53	58.23
1988	0 %	28.59	32.41	36.22	55.45	62.20	68.95	35.34	39.20	43.05
1988	5 %	28.99	32.86	36.74	56.17	63.02	69.87	35.75	39.66	43.58
1988	10 %	29.39	33.32	37.25	56.89	63.84	70.79	36.15	40.13	44.10
1988	15 %	29.79	33.78	37.76	57.62	64.66	71.70	36.56	40.59	44.62
1990	0 %	24.09	27.49	30.89	48.41	54.64	60.87	29.19	32.60	36.01
1990	5 %	24.45	27.90	31.34	49.06	55.39	61.71	29.54	33.01	36.47
1990	10 %	24.80	28.30	31.80	49.72	56.13	62.55	29.90	33.41	36.93
1990	15 %	25.15	28.70	32.25	50.37	56.88	63.39	30.26	33.82	37.39
1995	0 %	17.54	20.14	22.75	34.06	38.94	43.81	19.80	22.32	24.85
1995	5 %	17.80	20.45	23.10	34.57	39.52	44.46	20.06	22.62	25.18
1995	10 %	18.07	20.76	23.44	35.07	40.09	45.11	20.32	22.92	25.52
1995	15 %	18.34	21.07	23.79	35.57	40.67	45.76	20.58	23.22	25.86

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*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 86 F AMBIENT TEMPERATURE, AND 19.6 MPH AVERAGE SPEED.

TABLE 6 : CO @ 100 % A/C USAGE

TABLE 7

LOW ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 0 %

WET BULB TEMPERATURE = 66 F
DRY BULB TEMPERATURE = 71 F

CAL. YEAR	EXTRA LOAD PERCENTAGE	LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE 0%	5%	10%
1985	0 %	2.04	2.07	2.10	3.42	3.48	3.53	3.47	3.50	3.53
1985	5 %	2.04	2.08	2.11	3.44	3.49	3.54	3.47	3.51	3.54
1985	10 %	2.05	2.08	2.12	3.45	3.50	3.55	3.48	3.51	3.55
1985	15 %	2.06	2.09	2.13	3.46	3.51	3.56	3.49	3.52	3.56
1988	0 %	1.72	1.75	1.78	3.19	3.24	3.30	2.95	2.98	3.01
1988	5 %	1.72	1.75	1.79	3.20	3.25	3.31	2.95	2.98	3.02
1988	10 %	1.73	1.76	1.79	3.21	3.26	3.32	2.96	2.99	3.02
1988	15 %	1.73	1.77	1.80	3.22	3.27	3.33	2.97	3.00	3.03
1990	0 %	1.59	1.62	1.66	2.95	3.01	3.06	2.65	2.68	2.71
1990	5 %	1.60	1.63	1.66	2.96	3.02	3.07	2.66	2.69	2.72
1990	10 %	1.61	1.64	1.67	2.97	3.03	3.08	2.66	2.69	2.72
1990	15 %	1.61	1.64	1.67	2.98	3.04	3.09	2.67	2.70	2.73
1995	0 %	1.46	1.49	1.52	2.47	2.52	2.56	2.28	2.31	2.34
1995	5 %	1.47	1.49	1.52	2.48	2.52	2.57	2.29	2.32	2.34
1995	10 %	1.47	1.50	1.53	2.49	2.53	2.58	2.29	2.32	2.35
1995	15 %	1.48	1.50	1.53	2.49	2.54	2.59	2.30	2.33	2.35

*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 71 F AMBIENT TEMPERATURE, 19.6 MPH AVERAGE SPEED, AND 75 GRAINS WATER/LB OF DRY AIR HUMIDITY.

TABLE 8

LOW ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 50 %

WET BULB TEMPERATURE = 71 F
DRY BULB TEMPERATURE = 79 F

CAL. YEAR	EXTRA LOAD PERCENTAGE	LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE 0%	5%	10%
1985	0 %	2.00	2.03	2.06	3.31	3.36	3.41	3.40	3.44	3.47
1985	5 %	2.00	2.04	2.07	3.32	3.37	3.42	3.41	3.44	3.47
1985	10 %	2.01	2.04	2.08	3.33	3.38	3.43	3.42	3.45	3.48
1985	15 %	2.02	2.05	2.08	3.34	3.39	3.44	3.42	3.46	3.49
1988	0 %	1.65	1.67	1.70	3.03	3.09	3.14	2.85	2.88	2.91
1988	5 %	1.65	1.68	1.71	3.04	3.10	3.15	2.86	2.89	2.92
1988	10 %	1.66	1.69	1.72	3.06	3.11	3.16	2.86	2.89	2.92
1988	15 %	1.66	1.69	1.72	3.07	3.12	3.17	2.87	2.90	2.93
1990	0 %	1.51	1.54	1.56	2.78	2.83	2.88	2.54	2.57	2.59
1990	5 %	1.51	1.54	1.57	2.79	2.84	2.89	2.54	2.57	2.60
1990	10 %	1.52	1.55	1.57	2.80	2.85	2.90	2.55	2.58	2.60
1990	15 %	1.52	1.55	1.58	2.81	2.86	2.91	2.55	2.58	2.61
1995	0 %	1.35	1.38	1.40	2.26	2.30	2.35	2.15	2.18	2.20
1995	5 %	1.35	1.38	1.41	2.27	2.31	2.36	2.16	2.18	2.20
1995	10 %	1.36	1.39	1.41	2.28	2.32	2.36	2.16	2.19	2.21
1995	15 %	1.36	1.39	1.42	2.29	2.33	2.37	2.17	2.19	2.21

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*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 79 F AMBIENT TEMPERATURE, 19.6 MPH AVERAGE SPEED, AND 75 GRAINS WATER/LB OF DRY AIR HUMIDITY.

TABLE 9

LOW ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 100 %

WET BULB TEMPERATURE = 79 F
DRY BULB TEMPERATURE = 86 F

CAL. YEAR	EXTRA LOAD PERCENTAGE	LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE 0%	5%	10%
1985	0 %	1.88	1.91	1.94	3.10	3.15	3.20	3.27	3.30	3.33
1985	5 %	1.89	1.92	1.95	3.11	3.16	3.21	3.27	3.30	3.33
1985	10 %	1.89	1.92	1.96	3.12	3.17	3.22	3.28	3.31	3.34
1985	15 %	1.90	1.93	1.96	3.13	3.18	3.23	3.28	3.31	3.35
1988	0 %	1.50	1.53	1.55	2.79	2.84	2.89	2.68	2.71	2.73
1988	5 %	1.50	1.53	1.56	2.80	2.85	2.90	2.68	2.71	2.74
1988	10 %	1.51	1.54	1.56	2.81	2.86	2.91	2.69	2.72	2.74
1988	15 %	1.51	1.54	1.57	2.82	2.87	2.92	2.70	2.72	2.75
1990	0 %	1.34	1.37	1.39	2.52	2.56	2.61	2.35	2.37	2.40
1990	5 %	1.35	1.37	1.40	2.53	2.57	2.62	2.35	2.38	2.40
1990	10 %	1.35	1.38	1.40	2.54	2.58	2.63	2.36	2.38	2.41
1990	15 %	1.36	1.38	1.41	2.55	2.59	2.64	2.36	2.39	2.41
1995	0 %	1.16	1.18	1.20	1.96	2.00	2.04	1.94	1.96	1.99
1995	5 %	1.16	1.19	1.21	1.97	2.01	2.05	1.95	1.97	1.99
1995	10 %	1.17	1.19	1.21	1.98	2.02	2.05	1.95	1.97	1.99
1995	15 %	1.17	1.19	1.22	1.99	2.02	2.06	1.96	1.98	2.00

*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 86 F AMBIENT TEMPERATURE, 19.6 MPH AVERAGE SPEED, AND 75 GRAINS WATER/LB OF DRY AIR HUMIDITY.

TABLE 9 : NOx @ 100 % A/C USAGE

TABLE 10

HIGH ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 0 %

WET BULB TEMPERATURE = 66 F
DRY BULB TEMPERATURE = 71 F

CAL. YEAR	EXTRA LOAD PERCENTAGE	LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE 0%	5%	10%
1985	0 %	4.84	4.93	5.02	8.78	8.94	9.10	6.33	6.42	6.51
1985	5 %	4.85	4.94	5.03	8.79	8.95	9.12	6.33	6.43	6.52
1985	10 %	4.86	4.95	5.03	8.81	8.97	9.13	6.34	6.43	6.53
1985	15 %	4.87	4.95	5.04	8.82	8.99	9.15	6.35	6.44	6.54
1988	0 %	3.53	3.60	3.67	6.85	6.99	7.13	4.64	4.71	4.78
1988	5 %	3.54	3.60	3.67	6.86	7.00	7.14	4.65	4.72	4.79
1988	10 %	3.54	3.61	3.68	6.88	7.01	7.15	4.65	4.72	4.80
1988	15 %	3.55	3.62	3.68	6.89	7.02	7.16	4.66	4.73	4.80
1990	0 %	2.94	3.00	3.06	5.86	5.98	6.11	3.86	3.92	3.98
1990	5 %	2.95	3.01	3.06	5.87	5.99	6.12	3.86	3.92	3.99
1990	10 %	2.95	3.01	3.07	5.88	6.00	6.13	3.87	3.93	3.99
1990	15 %	2.96	3.01	3.07	5.89	6.01	6.14	3.87	3.93	4.00
1995	0 %	2.13	2.18	2.22	4.08	4.17	4.25	2.75	2.79	2.84
1995	5 %	2.14	2.18	2.23	4.09	4.17	4.26	2.75	2.80	2.84
1995	10 %	2.14	2.18	2.23	4.09	4.18	4.27	2.76	2.80	2.85
1995	15 %	2.14	2.19	2.23	4.10	4.19	4.28	2.76	2.80	2.85

*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 71 F AMBIENT TEMPERATURE, AND 19.6 MPH AVERAGE SPEED.

TABLE 10 : THC @ 0 % A/C USAGE

TABLE 11

HIGH ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 50 %

WET BULB TEMPERATURE = 71 F
DRY BULB TEMPERATURE = 79 F

CAL. YEAR	EXTRA LOAD PERCENTAGE	LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE 0%	5%	10%
1985	0 %	4.83	4.91	5.00	8.76	8.92	9.08	6.31	6.41	6.50
1985	5 %	4.83	4.92	5.01	8.77	8.93	9.09	6.32	6.41	6.51
1985	10 %	4.84	4.93	5.02	8.79	8.95	9.11	6.33	6.42	6.51
1985	15 %	4.85	4.94	5.03	8.80	8.96	9.13	6.34	6.43	6.52
1988	0 %	3.50	3.57	3.64	6.84	6.97	7.11	4.62	4.69	4.76
1988	5 %	3.51	3.58	3.64	6.85	6.99	7.12	4.63	4.70	4.77
1988	10 %	3.51	3.58	3.65	6.86	7.00	7.13	4.63	4.70	4.78
1988	15 %	3.52	3.59	3.65	6.87	7.01	7.15	4.64	4.71	4.78
1990	0 %	2.90	2.96	3.02	5.84	5.96	6.08	3.83	3.89	3.95
1990	5 %	2.91	2.97	3.02	5.85	5.97	6.09	3.83	3.89	3.96
1990	10 %	2.91	2.97	3.03	5.86	5.98	6.10	3.84	3.90	3.96
1990	15 %	2.92	2.97	3.03	5.87	5.99	6.11	3.84	3.90	3.97
1995	0 %	2.07	2.12	2.16	4.03	4.11	4.20	2.70	2.75	2.79
1995	5 %	2.08	2.12	2.16	4.03	4.12	4.21	2.71	2.75	2.79
1995	10 %	2.08	2.12	2.17	4.04	4.13	4.21	2.71	2.75	2.80
1995	15 %	2.08	2.13	2.17	4.05	4.13	4.22	2.71	2.76	2.80

*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 79 F AMBIENT TEMPERATURE, AND 19.6 MPH AVERAGE SPEED.

TABLE 11 : THC @ 50 % A/C USAGE

TABLE 12

HIGH ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 100 %

WET BULB TEMPERATURE = 79 F
DRY BULB TEMPERATURE = 86 F

CAL. YEAR	EXTRA LOAD PERCENTAGE	LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE 0%	5%	10%
1985	0 %	5.10	5.20	5.30	9.20	9.37	9.54	6.61	6.71	6.81
1985	5 %	5.11	5.21	5.30	9.21	9.39	9.56	6.62	6.72	6.82
1985	10 %	5.12	5.22	5.31	9.23	9.40	9.58	6.63	6.73	6.83
1985	15 %	5.13	5.23	5.32	9.24	9.42	9.59	6.64	6.74	6.84
1988	0 %	3.73	3.80	3.88	7.25	7.40	7.55	4.87	4.94	5.02
1988	5 %	3.73	3.81	3.88	7.27	7.41	7.56	4.87	4.95	5.03
1988	10 %	3.74	3.81	3.89	7.28	7.43	7.58	4.88	4.96	5.04
1988	15 %	3.75	3.82	3.90	7.29	7.44	7.59	4.88	4.96	5.04
1990	0 %	3.09	3.15	3.22	6.22	6.35	6.48	4.04	4.10	4.17
1990	5 %	3.10	3.16	3.22	6.23	6.36	6.49	4.04	4.11	4.17
1990	10 %	3.10	3.16	3.23	6.24	6.37	6.50	4.05	4.11	4.18
1990	15 %	3.11	3.17	3.23	6.25	6.38	6.51	4.05	4.12	4.19
1995	0 %	2.19	2.23	2.28	4.28	4.37	4.47	2.83	2.88	2.92
1995	5 %	2.19	2.24	2.28	4.29	4.38	4.48	2.83	2.88	2.93
1995	10 %	2.19	2.24	2.29	4.29	4.39	4.48	2.84	2.88	2.93
1995	15 %	2.20	2.24	2.29	4.30	4.40	4.49	2.84	2.89	2.93

*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 86 F AMBIENT TEMPERATURE, AND 19.6 MPH AVERAGE SPEED.

TABLE 12 : THC @ 100 % A/C USAGE

TABLE 13

HIGH ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 0 %

WET BULB TEMPERATURE = 66 F
DRY BULB TEMPERATURE = 71 F

CAL. YEAR	EXTRA LOAD PERCENTAGE	LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE 0%	5%	10%
1985	0 %	45.01	50.39	55.77	73.19	80.81	88.43	55.98	61.13	66.28
1985	5 %	45.60	51.06	56.51	74.07	81.79	89.51	56.55	61.77	66.99
1985	10 %	46.19	51.72	57.26	74.94	82.76	90.59	57.13	62.42	67.71
1985	15 %	46.78	52.39	58.00	75.81	83.74	91.67	57.70	63.06	68.43
1988	0 %	35.26	40.02	44.78	57.03	63.68	70.34	41.83	46.27	50.72
1988	5 %	35.76	40.59	45.42	57.75	64.50	71.25	42.30	46.81	51.32
1988	10 %	36.26	41.16	46.06	58.47	65.31	72.16	42.77	47.34	51.92
1988	15 %	36.76	41.73	46.70	59.19	66.12	73.06	43.24	47.88	52.52
1990	0 %	31.31	35.76	40.22	48.92	55.03	61.14	35.45	39.51	43.57
1990	5 %	31.77	36.29	40.81	49.56	55.76	61.96	35.88	40.00	44.12
1990	10 %	32.24	36.82	41.41	50.21	56.49	62.78	36.30	40.48	44.66
1990	15 %	32.70	37.35	42.00	50.85	57.23	63.60	36.72	40.96	45.20
1995	0 %	26.22	30.12	34.02	35.27	40.30	45.32	26.71	30.05	33.40
1995	5 %	26.62	30.58	34.54	35.79	40.89	45.99	27.05	30.45	33.85
1995	10 %	27.03	31.04	35.06	36.31	41.49	46.66	27.40	30.85	34.30
1995	15 %	27.43	31.50	35.58	36.83	42.08	47.33	27.74	31.24	34.75

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*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 71 F AMBIENT TEMPERATURE, AND 19.6 MPH AVERAGE SPEED.

TABLE 14

HIGH ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 50 %

WET BULB TEMPERATURE = 71 F
DRY BULB TEMPERATURE = 79 F

CAL. YEAR	EXTRA LOAD PERCENTAGE	LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE 0%	5%	10%
1985	0 %	47.86	53.56	59.25	77.40	85.50	93.60	59.50	64.96	70.42
1985	5 %	48.48	54.26	60.04	78.32	86.53	94.74	60.11	65.64	71.18
1985	10 %	49.11	54.97	60.83	79.25	87.57	95.89	60.72	66.33	71.94
1985	15 %	49.74	55.67	61.61	80.17	88.60	97.03	61.32	67.01	72.70
1988	0 %	36.60	41.51	46.42	59.87	66.86	73.86	43.67	48.28	52.89
1988	5 %	37.11	42.09	47.08	60.63	67.72	74.81	44.15	48.83	53.51
1988	10 %	37.63	42.68	47.74	61.38	68.57	75.76	44.64	49.39	54.14
1988	15 %	38.14	43.27	48.40	62.14	69.43	76.71	45.13	49.95	54.76
1990	0 %	31.87	36.38	40.89	50.87	57.21	63.55	36.45	40.60	44.74
1990	5 %	32.34	36.92	41.50	51.54	57.97	64.40	36.88	41.09	45.30
1990	10 %	32.80	37.45	42.10	52.21	58.74	65.26	37.32	41.59	45.85
1990	15 %	33.27	37.99	42.71	52.89	59.50	66.11	37.75	42.08	46.41
1995	0 %	25.66	29.48	33.29	35.27	40.28	45.28	26.44	29.74	33.03
1995	5 %	26.05	29.93	33.80	35.79	40.87	45.95	26.78	30.13	33.47
1995	10 %	26.45	30.38	34.31	36.30	41.46	46.62	27.12	30.52	33.91
1995	15 %	26.84	30.83	34.82	36.82	42.05	47.29	27.46	30.91	34.35

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*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 79 F AMBIENT TEMPERATURE, AND 19.6 MPH AVERAGE SPEED.

TABLE 14 : CO @ 50 % A/C USAGE

TABLE 15

HIGH ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 100 %

WET BULB TEMPERATURE = 79 F
DRY BULB TEMPERATURE = 86 F

CAL. YEAR	EXTRA LOAD PERCENTAGE	LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE 0%	5%	10%
1985	0 %	58.08	65.06	72.04	92.44	102.37	112.29	71.19	77.88	84.57
1985	5 %	58.84	65.92	73.00	93.56	103.62	113.69	71.92	78.71	85.49
1985	10 %	59.60	66.78	73.96	94.68	104.88	115.08	72.66	79.54	86.42
1985	15 %	60.36	67.64	74.92	95.80	106.14	116.47	73.40	80.37	87.35
1988	0 %	43.64	49.50	55.36	72.00	80.54	89.09	51.70	57.24	62.79
1988	5 %	44.25	50.20	56.15	72.92	81.58	90.25	52.28	57.91	63.54
1988	10 %	44.87	50.90	56.94	73.84	82.62	91.41	52.87	58.58	64.28
1988	15 %	45.48	51.61	57.73	74.76	83.66	92.57	53.46	59.24	65.03
1990	0 %	37.20	42.47	47.73	60.99	68.65	76.32	42.55	47.44	52.33
1990	5 %	37.75	43.09	48.44	61.80	69.57	77.35	43.06	48.02	52.99
1990	10 %	38.30	43.72	49.14	62.61	70.49	78.38	43.57	48.61	53.64
1990	15 %	38.84	44.35	49.85	63.42	71.41	79.41	44.08	49.19	54.30
1995	0 %	28.36	32.57	36.79	40.80	46.59	52.38	29.44	33.13	36.82
1995	5 %	28.79	33.07	37.35	41.40	47.27	53.15	29.82	33.57	37.32
1995	10 %	29.23	33.57	37.91	42.00	47.96	53.93	30.20	34.01	37.81
1995	15 %	29.66	34.07	38.48	42.59	48.65	54.70	30.58	34.44	38.30

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*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 86 F AMBIENT TEMPERATURE, AND 19.6 MPH AVERAGE SPEED.

TABLE 15 : CO @ 100 % A/C USAGE

TABLE 16

HIGH ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 0 %

WET BULB TEMPERATURE = 66 F
DRY BULB TEMPERATURE = 71 F

CAL. YEAR	EXTRA LOAD PERCENTAGE	LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE 0%	5%	10%
1985	0 %	1.62	1.65	1.68	2.76	2.80	2.85	2.98	3.01	3.04
1985	5 %	1.63	1.66	1.68	2.77	2.81	2.86	2.99	3.01	3.04
1985	10 %	1.63	1.66	1.69	2.78	2.82	2.87	2.99	3.02	3.05
1985	15 %	1.64	1.67	1.70	2.79	2.83	2.88	3.00	3.03	3.05
1988	0 %	1.51	1.54	1.56	2.79	2.84	2.89	2.67	2.69	2.72
1988	5 %	1.51	1.54	1.57	2.80	2.85	2.90	2.67	2.70	2.73
1988	10 %	1.52	1.55	1.57	2.81	2.86	2.91	2.68	2.71	2.73
1988	15 %	1.52	1.55	1.58	2.82	2.87	2.92	2.68	2.71	2.74
1990	0 %	1.47	1.50	1.53	2.68	2.73	2.78	2.46	2.49	2.52
1990	5 %	1.48	1.51	1.53	2.69	2.74	2.79	2.47	2.50	2.52
1990	10 %	1.48	1.51	1.54	2.70	2.75	2.80	2.47	2.50	2.53
1990	15 %	1.49	1.52	1.54	2.71	2.76	2.81	2.48	2.51	2.53
1995	0 %	1.45	1.47	1.50	2.39	2.43	2.48	2.22	2.24	2.27
1995	5 %	1.45	1.48	1.51	2.40	2.44	2.49	2.22	2.25	2.27
1995	10 %	1.46	1.48	1.51	2.41	2.45	2.50	2.23	2.25	2.28
1995	15 %	1.46	1.49	1.52	2.41	2.46	2.51	2.23	2.26	2.28

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*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 71 F AMBIENT TEMPERATURE, 19.6 MPH AVERAGE SPEED, AND 75 GRAINS WATER/LB OF DRY AIR HUMIDITY.

TABLE 17

HIGH ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 50 %

WET BULB TEMPERATURE = 71 F
DRY BULB TEMPERATURE = 79 F

CAL. YEAR	EXTRA LOAD PERCENTAGE	LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE 0%	5%	10%
1985	0 %	1.58	1.61	1.64	2.66	2.70	2.74	2.92	2.95	2.98
1985	5 %	1.59	1.62	1.64	2.66	2.71	2.75	2.93	2.96	2.98
1985	10 %	1.59	1.62	1.65	2.67	2.72	2.76	2.94	2.96	2.99
1985	15 %	1.60	1.63	1.65	2.68	2.73	2.77	2.94	2.97	2.99
1988	0 %	1.44	1.46	1.49	2.65	2.70	2.74	2.58	2.60	2.63
1988	5 %	1.44	1.47	1.50	2.66	2.71	2.75	2.58	2.61	2.64
1988	10 %	1.45	1.47	1.50	2.67	2.71	2.76	2.59	2.62	2.64
1988	15 %	1.45	1.48	1.51	2.68	2.72	2.77	2.59	2.62	2.65
1990	0 %	1.39	1.41	1.44	2.52	2.56	2.61	2.36	2.38	2.41
1990	5 %	1.39	1.42	1.44	2.53	2.57	2.62	2.36	2.39	2.41
1990	10 %	1.40	1.42	1.45	2.54	2.58	2.63	2.37	2.39	2.42
1990	15 %	1.40	1.43	1.45	2.55	2.59	2.64	2.37	2.40	2.42
1995	0 %	1.34	1.36	1.39	2.18	2.23	2.27	2.09	2.11	2.14
1995	5 %	1.34	1.37	1.39	2.19	2.23	2.28	2.09	2.12	2.14
1995	10 %	1.34	1.37	1.40	2.20	2.24	2.28	2.10	2.12	2.15
1995	15 %	1.35	1.38	1.40	2.21	2.25	2.29	2.10	2.13	2.15

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*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 79 F AMBIENT TEMPERATURE, 19.6 MPH AVERAGE SPEED, AND 75 GRAINS WATER/LB OF DRY AIR HUMIDITY.

TABLE 18

HIGH ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 100 %

WET BULB TEMPERATURE = 79 F
DRY BULB TEMPERATURE = 86 F

CAL. YEAR	EXTRA LOAD PERCENTAGE	LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0%	5%	10%	EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE 0%	5%	10%
1985	0 %	1.48	1.51	1.53	2.48	2.52	2.56	2.81	2.83	2.86
1985	5 %	1.49	1.51	1.54	2.49	2.53	2.57	2.81	2.84	2.86
1985	10 %	1.49	1.52	1.54	2.50	2.54	2.58	2.82	2.84	2.87
1985	15 %	1.50	1.52	1.55	2.50	2.54	2.58	2.82	2.85	2.87
1988	0 %	1.30	1.32	1.35	2.43	2.47	2.51	2.42	2.45	2.47
1988	5 %	1.30	1.33	1.35	2.44	2.48	2.52	2.43	2.45	2.48
1988	10 %	1.31	1.33	1.36	2.44	2.49	2.53	2.43	2.46	2.48
1988	15 %	1.31	1.34	1.36	2.45	2.50	2.54	2.44	2.46	2.49
1990	0 %	1.23	1.25	1.27	2.27	2.31	2.35	2.18	2.21	2.23
1990	5 %	1.23	1.25	1.28	2.28	2.32	2.36	2.19	2.21	2.23
1990	10 %	1.24	1.26	1.28	2.29	2.33	2.37	2.19	2.21	2.24
1990	15 %	1.24	1.26	1.29	2.30	2.34	2.38	2.20	2.22	2.24
1995	0 %	1.15	1.17	1.19	1.89	1.93	1.97	1.89	1.91	1.93
1995	5 %	1.15	1.17	1.19	1.90	1.94	1.97	1.89	1.91	1.93
1995	10 %	1.15	1.18	1.20	1.91	1.94	1.98	1.90	1.92	1.94
1995	15 %	1.16	1.18	1.20	1.91	1.95	1.99	1.90	1.92	1.94

*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 86 F AMBIENT TEMPERATURE, 19.6 MPH AVERAGE SPEED, AND 75 GRAINS WATER/LB OF DRY AIR HUMIDITY.

APPENDIX L

SIZE SPECIFIC TOTAL PARTICULATE EMISSION FACTORS FOR MOBILE SOURCES

Final Report

EPA Contract No. 68-03-1865
Work Assignment No. 1

DRAFT

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1. INTRODUCTION

The following material was developed to predict total particulate emission factors for gasoline and diesel fueled on-road vehicles, trucks and motorcycles at various vehicle speeds for particles in the respirable size range (less than 10 microns). Particulate emissions from these vehicles may also be determined at other size intervals less than 10 microns (e.g., less than 7.5, 5, or 2.5 microns).

User inputs to the equations to determine these emission factors include area travel fractions by vehicle class, vehicle miles traveled, vehicle speed, particle size limits of interest and calendar year.

This report presents particulate emission factor equations as the sum of individual masses of lead salt, organic and sulfate components for leaded and unleaded gasoline fueled vehicles. Composite (i.e., total particulate mass) equations are presented for diesel fueled vehicles and motorcycles, and tire and brake wear particulate. These equations are subsequently accompanied by tabulated emission factors which may be inserted into the appropriate particulate component equations. Fleet sales fractions and travel fractions by model year are included for each vehicle class. The fractions within each vehicle class that are equipped with different emission control systems also are provided. Cumulative distributions of particle size for leaded and unleaded gasoline and diesel fuel are presented both graphically and tabularly. Also, for the benefit of the user, an example calculation of particulate emissions from light-duty vehicles is provided.

The procedure herein can be used to project automotive particulate emissions by those agencies developing State Implementation Plans for particulate matter or by other interested parties within or outside the EPA concerned with size specific particulate emission factor projections for mobile sources.

This document is an updated version of an April 1984 report prepared by the Environmental Protection Agency, Office of Mobile Sources. It has been revised to include estimates of travel fractions and fleet characteristics from the June 1984 EPA report, User's Guide to MOBILE3 (Mobile Source Emissions Model), EPA 460/3-84-002.[44/] Revised estimates of emission control technology fractions also have been included. The methodology presented in this document is consistent with the procedure outlined in the April 15, 1983 EPA report, Supplementary Guidelines for Lead Implementation Plans -- Updated Projections for Motor Vehicle Lead Emissions[1/] which also was recently updated by Energy and Environmental Analysis, Inc.[45/] That report can be used to project the lead component of total particulate emissions for vehicles using leaded and unleaded gasoline. In addition to the lead component, the methodology outlined in this document can be used to develop estimates of three other components of particulate emission factors. Emission factors for organics, sulfates on the Federal Test Procedure (FTP) cycle, and heavy-duty gasoline trucks came from the Draft Study of Particulate Emissions From Motor Vehicles (for Section 214 of the Clean Air Act), by the Environmental Sciences Research Laboratory, Office of Research and Development, U.S. EPA, July 1983.[8/] Sulfates on the Sulfate Emission Test (SET) cycle and motorcycle emission factors came from the March 1981 EPA report, Compilation of Air Pollutant Emission Factors: Highway Mobile Sources EPA-460-3-81-005.[2/] Light- and heavy-duty diesel particulate emission factors are referenced

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*/ = Reference at end of text.

from the Draft Diesel Particulate Study, Emission Control Technology Division, Office of Mobile Sources, Office of Air and Radiation, U.S. EPA, October 1983.[4/] Emission factor estimate updating is an ongoing process and, in many cases, these values are based on testing of only a few vehicles.

This document has been revised to reflect changes in the lead content of gasoline. On March 7, 1985, EPA issued regulations which require petroleum refiners to drop the average lead content of leaded gasoline to 0.5 g/gallon by July 31, 1985 and 0.1 g/gallon by January 1, 1986 to: 1) reduce the health hazards associated with lead, and 2) to discourage the practice of misfueling which deteriorates the efficiency of vehicle emission control systems. (See Federal Register, Volume 50, No. 45, March 7, 1985.)

2. PROJECTING SIZE SPECIFIC TOTAL PARTICULATE EMISSION FACTORS

This report provides a methodology to project areawide total particulate emissions from mobile sources in a given calendar year. Particulate emissions can consist of lead salts, organics and sulfate emissions. The relative amounts vary for different vehicle types, emission control strategies and vehicle operating modes. Analysis of lead particulate indicates that most of the exhausted lead appears as salts, PbClBr. Therefore, estimates of the mass of lead particulate will be considerably larger than those predicted by the lead document, which predicts the mass of lead alone. Organic emissions include both soluble organics and elemental carbon and are important contributors to total particulate emissions from all vehicles, especially diesels. Sulfate emissions, mostly from unleaded gasoline-fueled vehicles equipped with catalysts, also are important contributors to total vehicular particulate emissions.

Section 2.1 provides an overview of: 1) the methodology used to calculate total areawide particulate emissions, and 2) the computations required to estimate the individual emission factor components by vehicle category and type of particulate. The detailed emission factor component equations for light-duty vehicles and light-duty trucks are discussed in Section 2.2. Equations for heavy-duty vehicles are described in Section 2.3. Section 2.4 presents the calculations required for motorcycles and Section 2.5 provides brake and tire wear particulate emission factor components.

2.1 OVERVIEW OF METHODOLOGY

Areawide particulate emissions (shown in Equation (2-1)) are a function of calendar year, average vehicle speed, vehicle class travel fractions, the particle size range of interest and the vehicle class emissions

associated with the calendar year and vehicle speed. With the exceptions of the vehicle class emission factors, all of the above parameters are inputs selected by the user on an areawide basis to obtain the desired output of mobile source particulate emissions for the area of interest.

$$EF_{pm,n,s} = \sum_{i=1}^{6} t_{i,n} EF_{i,n,s} + EF_{brakes} (M_B) + EF_{tires} \qquad (2\text{-}1)$$

where $EF_{pm,n,s}$ = size specific all-vehicle class total particulate emission factor on January 1 of calendar year n at vehicle speed s (g/mile)

i = vehicle class designator; 1 = light-duty vehicles (LDV), 2 = light-duty trucks I (LDT1), 3 = light-duty trucks II (LDT2), 4 = heavy-duty gas vehicles (HDGV), 5 = heavy-duty diesel vehicles (HDDV), 6 = motorcycles (MC)

s = vehicle speed; avg. Federal Test Procedure (FTP) = 19.6, avg. Sulfate Emissions Test (SET) = 34.8 (miles/hr); (Note: The FTP and SET are driving cycles used for the determination of emission factors.)

$t_{i,n}$ = area travel fraction of vehicle class i in calendar year n

$EF_{i,n,s}$ = particulate emission factor for vehicle class i in calendar year n at vehicle speed s (g/mile)

EF_{brakes} = airborne brake wear particulate emission factor component = 0.0128 grams/mile; this emission factor component is assumed to be the same for all vehicle classes, vehicle speeds and calendar years (all i, s, and n) due to lack of separate information for each i, s, and n

EF_{tires} = airborne tire wear particulate emission factor component = 0.002 grams/mile; this emission factor component is assumed to be the same for all vehicle classes, vehicle speeds and calendar years (all i, s, and n) due to lack of separate information for each i, s, and n

M_B = fraction of airborne particles less than a user-specified size cutoff (0.1-10 μ) that are attributable to vehicle brake wear, from Table 2-20 or Figure 2-4

The vehicle classes for which emission factor estimates may be obtained include: 1) light-duty vehicles (passenger cars), 2) light-duty trucks I (0-6000 lbs. GVWR), 3) light-duty trucks II (6001-8500 lbs. GVWR), 4) heavy-duty gas vehicles (greater than 8,501 lbs. GVWR), 5) heavy-duty diesel vehicles (greater than 8,501 lbs. GVWR), and 6) motorcycles.

The exhaust emission factors for each vehicle class for a given calendar year ($EF_{i,n,s}$) are broken down into component emission factors in Equation (2-2). The components represent the masses of lead salt, organic and sulfate emissions from both leaded and unleaded gasoline fueled vehicles and total particulate mass from diesel vehicles--all of which are multiplied by the fraction of total vehicles of a given model year designed for use on these three fuel types. The sum of these components for each model year is also multiplied by the fraction of the vehicle class travel (disaggregated by gasoline and diesel fuel types for all vehicle categories except light-duty vehicles) that is attributable to that model year in the calendar year of interest. For example, the component ($EF_{i,j,k,n,L}$) represents the emissions in grams per mile of lead salts (k=1) from vehicle class i emitted from model year j gasoline vehicles that are on the road in calendar year n and are designed for use on leaded fuel. These emission components must be summed up over the twenty model years prior to the calendar year of interest to include all the contributing fractions of emissions from vehicles on the road.

$$EF_{i,n,s} = \sum_{j=n-19}^{n} \Big[(EF_{i,j,k_1,n,L} + EF_{i,j,k_2,L} + EF_{i,j,k_3,L})(F_{L,i,j}) + (EF_{i,j,k_1,n,NL} + EF_{i,j,k_2,NL} + EF_{i,j,k_3,NL})(F_{NL,i,j}) \Big] m_{i,j,G} + (EF_{i,j,D})(F_{D,i,j})\, m_{i,j,D} \qquad (2\text{-}2)$$

where j = model year j = n-19, n-18, . . ., n-2, n-1, n

L = vehicles designed for use on leaded fuel

NL = vehicles designed for use on unleaded fuel

k = component of total particulate emission factor (k_1 = lead, k_2 = organic, k_3 = sulfate) expressed individually for gasoline vehicles and trucks (except motorcycles) and cumulatively for diesel vehicles and trucks and motorcycles

$F_{L,i,j}$ = fraction of the vehicle class i fleet designed for use on leaded gasoline in model year j

$F_{NL,i,j}$ = fraction of the vehicle class i fleet designed for use on unleaded gasoline in model year j

$F_{D,i,j}$ = fraction of the vehicle class i fleet designed for use on diesel fuel in model year j

$m_{i,j,G}$ = travel fraction for all gasoline vehicles in class i in model year j

$m_{i,j,D}$ = travel fraction for all diesel vehicles in class i in model year j

Component emission factors are derived for each vehicle class over different model years at average speeds of 19.6 mph (cyclic driving comparable to average speed of the Federal Test Procedure) and 34.8 mph (cruising conditions comparable to the average speed of the Sulfate Emissions Test). Emission factors for speeds between 19.6 mph and 34.8 mph can be linearly interpolated.

As the reader will note in the following sections, the calculation of these component emission factors is highly dependent on the assumptions made concerning particle size distribution. Distributions of particle size are different for leaded gasoline, unleaded gasoline and diesel fueled vehicles as well as brake and tire wear particles. They are also

different for various conditions of vehicle driving cycle (speed) and load. For the purposes of this report, however, typical or average conditions are presented to facilitate the determination of vehicle particulate emissions versus particle size.

Particle size distributions for leaded, unleaded and diesel fueled vehicles and brake wear particles are contained in Table 2-20 and also in Figures 2-1, 2-2, 2-3, and 2-4 (no distributions are available for tire wear particulate). Typically, the average diameter of particles emitted from vehicles fueled with leaded gasoline are the largest, particles emitted from vehicles fueled with unleaded gasoline are somewhat smaller and particles emitted from diesel fueled vehicles are smaller yet. Some of the data for the size distribution of lead particles are conflicting (e.g., Moran et al, 1971 which shows a larger fraction of the lead in smaller size ranges than the other leaded gasoline references). Thus, these data are less certain than those for unleaded and diesel particles. References for those reports used in the determination of particle size distributions of leaded, unleaded and diesel fueled vehicle emissions and brake wear emissions are listed in Table 2-20.

Values for M_L, $M_{NL,C}$, $M_{NL,NC}$, M_D, and M_B should be expressed as dimensionless fractions of total particulate by weight emitted below a given size cutoff. Values may be read directly from Table 2-20 for the data points listed therein, or may be read off the graphs of continuous cumulative particle size distributions in Figures 2-1, 2-2, 2-3, and 2-4 for interpolated size cutoffs (e.g., 6.5 μ, 2.5μ).

2.2 LIGHT-DUTY VEHICLES AND LIGHT-DUTY TRUCKS I AND II

This section presents the lead, sulfate and organic emission factor equations for gasoline-fueled light-duty vehicles and light-duty trucks I and II. In addition, composite particulate emission factors are

presented for light-duty diesel vehicles and light-duty diesel trucks. The fractions of light-duty vehicles and light-duty trucks by model year which operate on leaded or unleaded gasoline or diesel fuel are presented in Tables 2-4, 2-9, and 2-12. Tables 2-5, 2-10, 2-13, and 2-14 contain information on light-duty vehicle and light-duty truck travel fractions from model years n to n-19. To remain consistent with the data used in MOBILE3, travel fractions are assumed to be identical for gas and diesel light-duty vehicles; but separate travel fractions are used to characterize gasoline versus diesel light-duty trucks I and light-duty trucks II.

2.2.1 Lead Emission Factors

Lead emission factors are calculated in the same manner as in the recent report entitled, Supplementary Guidelines for Lead Implementation Plans -- Updated Projections for Motor Vehicle Lead Emissions, hereinafter referred to as the "lead document."[1/] These lead emission estimates are multipled by a factor of 1.557 to account for the halogens, typically bromine and chlorine, which combine with lead to form total lead salt particulate emissions. This factor was obtained from a report by the Ethyl Corporation entitled Composition, Size, and Control of Automotive Exhaust Particulates, and is the ratio of PbClBr mass to Pb mass based on FTP results of 16 test vehicles.[22/]

LDV (Pre-1971) and LDT (Pre-1971): Leaded Fuel

For $i=1,2,3$ $j=n-19,\ldots,1970$ $k=1$ C_s=from Table 2-7 $a_{s1,j}=(0.75)$:

$$EF_{i,j,k_1,n,L} = \left[Pb_{L,n}(0.887)(M_L) + Pb_{NL,n}(0.113)(M_{NL,NC}) \right] \frac{(0.75)(1.557)}{(E_{c,i,j})(C_s)} \quad (2\text{-}3a)$$

where a_s = fraction of lead burned that is exhausted; for all non-catalyst vehicles and for catalyst vehicles using unleaded gasoline $a_{s1,j}$ = 0.75 (i.e., 75 percent); for catalyst vehicles using unleaded gasoline in 1975-1980, $a_{s2,j}$ = 0.40; for catalyst vehicles using leaded gasoline in 1981 and later, $a_{s2,j}$ = 0.44 (see Table 2-22)

C_s = speed-dependent fuel economy correction factor based on steady cruise or cyclic driving; available from Table 2-7 (nondimensional)

$Pb_{NL,n}$ = lead content of unleaded gasoline in calendar year n from Table 2-2 (g/gal)

$Pb_{L,n}$ = average lead content of leaded gasoline in calendar year n from Table 2-2 (g/gal)

$E_{c,i,j}$ = city/highway combined on-road fuel economy for model year j and vehicle class i from Table 2-6 (miles/gallon)

M_L = fraction of particles less than a user specifie size cutoff (0.1-10 μ) that are emitted from vehicles that are fueled with leaded gasoline, from Table 2-20 or Figure 2-1

$M_{NL,C}$ = fraction of particles less than a user specified size cutoff (0.1-10 μ) that are emitted from catalyst vehicles that are fueled with unleaded gasoline, from Table 2-20 or Figure 2-2

$M_{NL,NC}$ = fraction of particles less than a user specified size cutoff (0.1-10 μ) that are emitted from non-catalyst vehicles that are fueled with unleaded gasoline, from Table 2-19 or Figure 2-2

<u>LDV (MY 1971-1974) and LDT (MY 1971-1978): Leaded Fuel</u>

For i=1,2 j=1971,...,1974 k=1 C_s=from Table 2-7 $a_{s1,j}$=0.75:
and For i = 3 j=1971,...,1978

$$EF_{i,j,k_1n,L} = \left[Pb_{L,n}(.916)(ML) + Pb_{NL,n}(0.084)(M_{NL,NC})\right] \frac{(0.75)(1.557)}{(E_{c,i,m})(C_s)} \quad (2\text{-}3b)$$

LDV (MY 1975+) and LDT (MY 1979+): Leaded Fuel

For $i=1,2$ $j=1975,\ldots,n$ $k=1$ C_s=from Table 2-7 $a_{s1,j}=0.75$:
and For $i=3$ $j=1979,\ldots,n$

$$EF_{i,j,k_1n,L} = \left[Pb_{L,n}(0.724)(M_L) + Pb_{NL,n}(0.276)(M_{NL,NC})\right] \frac{(a_{s1,j})(1.5557)}{(E_{c,i,j})(C_s)} \quad (2\text{-}4)$$

LDV (MY 1975+) and LDT (MY 1975+): Unleaded Fuel

For $i=1,2,3$ $j=1975,\ldots,n$ $k=1$ C_s=from Table 2-7 a_s=from Table 2-22:

$$EF_{i,j,k_1,n,NL} = \left[(Pb_{NL,n})(1-r_i)(M_{NL,C})(a_{s1,j}) + \left(Pb_{L,n}(r_i)(M_L)(F_{i,j,NL,NOCAT}) + P_i(F_{i,j,NL,CAT})(a_{s1,j})\right) + Pb_{L,n}(r_i)(M_L)(1-P_i)(F_{i,j,NL,CAT})(a_{s,2,j})\right] \frac{1.557}{E_{c,i,j}(C_s)} \quad (2\text{-}5)$$

where r_i = misfueling rate for vehicle class i from Table 2-19

P_i = fraction of catalyst equipped vehicles with catalysts removed from Table 2-23

The calculation of area lead particulate emissions necessitates the determination of the percentage of burned lead exhausted (a_s). A value for a_s of 0.75 (i.e., 75 percent of the lead burned is exhausted) should be used for non-catalyst equipped, gasoline-powered vehicles. The 0.75 value is based on tests which measured exhaust emissions under cyclic driving conditions and found that 17 percent of the lead is retained by the engine (in the oil and combustion chamber) and 8 percent is retained by the muffler and exhaust pipes.[31/] For gasoline powered vehicles equipped with catalysts, a value of a_s=0.40 for 1975 to 1980 and a_s=0.44

for 1981 and later model year vehicles that have been misfueled, should be used. (For properly fueled catalyst vehicles the values of a_s for all model years is 0.75.) The value of a_s was computed from lead retention of monolithic and pelleted catalysts, respectively, and weighted for the sales mix of these catalysts in each time frame. The values of a_s are not assumed to vary with speed, since a_s is more correlated with driving mode, e.g., acceleration, cruise or deceleration, rather than speed alone, and little data is available to make a_s sensitive to all of these variables.

Combined city/highway fuel economy ($E_{c,i,j}$) is yet another factor affecting area lead particulate emissions. Fuel economy versus model year is provided in Table 2-6.

Lead particulate emissions can be determined at any speed by using Equations (2-3), (2-4), and (2-5) (for light-duty vehicles and trucks) and the appropriate value of the speed dependent fuel economy correction factor (C_s) for the vehicle speed of interest. Values of C_s at various speeds are provided in Table 2-7. It should be noted that average vehicle speed and C_s can be determined for an area by either of two approaches. One approach is to base C_s on the average vehicle speed for the area of concern. The average area vehicle speed should be a weighted average based on average speeds and VMT data for the various roadway classifications, such as limited access (greater than 5 mph), suburban roads (35 mph) and urban streets (25 mph or less). The other approach, which is considered more accurate, is to determine C_s and area emissions separately for each roadway classification (and average speed).

Area lead particulate emissions also are dependent upon the lead content of gasoline in a given calendar year. Values for the lead content of leaded ($Pb_{L,n}$) and unleaded gasoline ($Pb_{NL,n}$) are contained in Table 2-2. Values for future years will be updated as new information becomes available.

2.2.1.1 Misfueling and Fuel Switching

EPA has observed that misfueling rates (i.e., percentage of vehicles designed for use on unleaded gasoline that use leaded gasoline) are dependent on vehicle mileage and increase with vehicle mileage accumulation. Strictly speaking, this dependence on mileage should be reflected in the calculation of particulate emissions, with each model year receiving its own misfueling rate. However, this further complicates an already complex calculation. To give the user a choice, this report offers both the option of using a single average misfueling rate for all model years of a given vehicle class and exact misfueling rates for each vehicle class by vehicle age. The single average rates are determined for the weighted average mileage accumulated for each vehicle class and are listed in Table 2-19 for inspection and maintenance (I/M) and non-I/M areas. In other words, in the calculation of emission factors from 1975 on, the misfueling rate (r_i) depends only on which vehicle class (i) is being considered and whether the area of interest has an I/M program. As a result, misfueling rates and particulate emissions will be slightly overestimated, with the degree of overestimation declining with later evaluation years and essentially disappearing in 1995. For users who desire more accuracy, Table 2-19a gives exact misfueling rates for different vehicle ages and classes affected by misfueling.

The use of leaded gasoline on vehicles designed for unleaded fuel results in lead salt emissions. Since most of these vehicles have catalysts, the lead results in poisoning of the catalyst so that organic particulate emissions can be assumed to increase to the levels found with non-catalyst vehicles. Also, catalyst poisoning should result in no sulfur dioxide oxidation to sulfates. Sulfate levels are therefore assumed to be the same as those from non-catalyst vehicles.

Discretionary fuel switching (i.e., percentage of vehicles designed for use on leaded gasoline that use unleaded gasoline) is assumed to equal 11.3 percent of the leaded fleet prior to 1971, and 8.4 percent from 1971 to 1974 for the LDV and LDT I categories. The discretionary rate for the LDT II class is 8.4 percent from 1971 to 1978, and 27.6 percent thereafter. For the LDV and LDT1 classes, discretionary switching is assumed to be 27.6 percent after 1974. These discretionary rates apply only to the lead salt component of light-duty vehicle and light-duty truck I and II emissions. The misfueling rates employed here were used in the December 1983 EPA report, Anti-Tampering and Anti-Misfueling Programs to Reduce In-Use Emissions from Motor Vehicles, EPA-AA-TSS-83-10.[3/] The discretionary fuel switching rates were obtained from Energy and Environmental Analysis, Inc., Assessment of Current and Projected Trends in Light-Duty Vehicle Fuel Switching, June 1984.[7/]

2.2.2 Organic and Sulfate Emission Factors

2.2.2.1 Control System Fractions

Organic and sulfate emissions of gasoline-fueled vehicles depend on the type of vehicle emission control system in addition to the vehicle model year. The fraction of vehicles with different emission control systems to which different emission factors are applied are handled similarly to the fleet sales fractions for leaded, unleaded and diesel vehicles versus model year. The main difference is that these are fractions of the total number of vehicles designed for use of unleaded fuel and not the total number of vehicles in each vehicle class. These fractions are listed in Tables 2-3, 2-8, and 2-11 for light-duty vehicles and light-duty trucks I and II, respectively. These vehicle classes have a relatively wide range of control technology and, as a result, have a wide range of emission factor estimates. It should be noted that a small number of non-catalyst equipped vehicles have been certified for use on unleaded gasoline since 1975. These vehicles constitute a very

small percentage of the total non-catalyst fleet, but are nonetheless considered in this report and have been given their own control system fraction category ($F_{i,j,NL,NOCAT}$).

The light-duty vehicle and truck emission control system fractions were obtained from the "sales-weighted" EPA emission factor in-use vehicle test data base. This data base contains gasoline-fueled vehicle mixes approximating the sales mixes for the 1975 through 1982 model years. All vehicles and trucks prior to 1975 models are assumed to be designed for use on leaded fuel (i.e., no diesel or catalyst vehicles). Emission control system fractions for 1983 and later LDVs are determined from recent projections by Energy and Environmental Analysis, Inc. in a report entitled, Forecasts of Emission Control Technology 1983-1990.[38/]

Data for 1975 through 1978 light-duty truck I technology fractions were obtained by combining EPA fuel economy data base sales figures by engine displacement and model type and Federal Certification Test Results for these years from the Federal Register, Volume 40, No. 48, March 11, 1975;[9/] Volume 41, No. 46, March 8, 1976;[10/] Volume 42, No. 110, June 8, 1977;[11/] and Volume 43, No. 181, September 18, 1978.[12/] The certification data provided emission control systems by model type and engine displacement which were matched with fuel economy sales fractions. These two data sources also served as the basis for deriving the 1979-1981 light-duty truck technology fractions.

Data for 1982 through 1984 light-duty trucks I and II technology fractions were obtained by subtracting California sales figures by engine family from Federal sales figures given in the EPA Certification data base for those years. Forecasts of post-1984 light-duty truck I and II technology fractions were developed internally and are consistent with data used for EPA emission factor projections.

2.2.2.2 Organic and Sulfate Emission Factor Components

Organic and sulfate emission factors for light-duty vehicles and light-duty trucks vary by model year, control system, vehicle speed and fuel type (leaded versus unleaded). These emission factors are derived from emission test data and are listed in Table 2-1 in terms of grams per mile. This table of emission factors is used in the following sets of equations to calculate LDV and LDT organic and sulfate emission factor components. (Table 2-1 also refers the user to the proper equation(s) listed below to which each emission factor should be applied.)

Organic Emission Factor Components

LDV and LDT (Pre-1970): Leaded Fuel, Avg. Speed = All

For $i=1,2,3$ $j=n-19,\ldots,1969$ $k=2$:

$$EF_{i,j,k_2,L} = 0.193\ M_L\ \text{(g/mile)} \qquad (2\text{-}6)$$

LDV AND LDT (1971-1974): Leaded Fuel, Avg. Speed = All

For $i=1,2,3$ $j=1970,\ldots,1974$ $k=2$:

$$EF_{i,j,k_2,L} = 0.068\ M_L\ \text{(g/mile)} \qquad (2\text{-}7)$$

LDV and LDT (1975+): Leaded Fuel, Avg. Speed = All

$$EF_{i,j,k_2,L} = 0.030\ M_L\ \text{(g/mile)} \qquad (2\text{-}8)$$

LDV and LDT (1975+): Unleaded Fuel, Avg. Speed = All

$$EF_{i,j,k_2,NL} = (1-r_i)(F_{i,j,CAT})(0.017)(M_{NL,C}) \quad (2\text{-}9)$$

$$+ (r_i)(F_{i,j,CAT})(0.068)(M_L) + (F_{i,j,NL,NOCAT})(0.030)(M_{NL,NC})$$

where $F_{i,j,CAT}$ = fraction of the unleaded vehicle class i fleet equipped with a catalyst in model year j

$F_{i,j,NL,NOCAT}$ = fraction of the unleaded vehicle class i fleet without a catalyst in model year j

---

Sulfate Emission Factor Components

LDV and LDT (All Model Years): Leaded Fuel, Avg. Speed = 19.6 mph

For $i=1,2,3$ $j=n-19,\ldots,n$ $k=3$ $s=19.6$:

$$EF_{i,j,k_3,L} = 0.002\ M_L\ \text{(g/mile)} \quad (2\text{-}10)$$

LDV and LDT (All Model Years): Leaded Fuel, Avg. Speed = 34.8 mph

For $i=1,2,3$ $j=n-19,\ldots,n$ $k=3$ $s=34.8$

$$EF_{i,j,k_3,L} = 0.001\ M_L\ \text{(g/mile)} \quad (2\text{-}11)$$

LDV and LDT (1975+): Unleaded Fuel, Avg. Speed = 19.6

For $i=1,2,3$ $j=1975,\ldots,n$ $k=3$ $s=19.6$

$$EF_{i,j,k_3,NL} = (1-r_i)\Big[(F_{i,j,CAT/NOAIR})(0.005)(M_{NL,C}) \quad (2\text{-}12)$$

$$+ (F_{i,j,CAT/AIR})(0.016)(M_{NL,C})$$

$$+ (F_{i,j,\ NL,NOCAT})(0.002)(M_{NL,NC})\Big]$$

$$+ (r_i)(0.002)(M_L)$$

where $F_{i,j,CAT/NOAIR}$ = fraction of the unleaded vehicle class i fleet equipped with a catalyst but no air pump in model year j; this includes oxidation catalyst ($F_{i,j,OXCAT}$) and three way catalyst ($F_{i,j,3WCAT}$) vehicles with no air pump

$F_{i,j,CAT/AIR}$ = fraction of the unleaded vehicle class i fleet equipped with a catalyst and an air pump in model year j; this includes oxidation catalyst ($F_{i,j,OCAT/AIR}$) and three-way plus oxidation catalyst ($F_{i,j,3WCAT/OXCAT}$) vehicles with air pumps

---

LDV and LDT (1975+): Unleaded Fuel Avg. Speed = 34.8 mph

For $i=1,2,3$ $j=1975,\ldots,n$ $k=3$ $s=34.8$ r_i = from Table 2-19:

$$EF_{i,j,k_3NL} = (1-r_i)\Big[(F_{i,j,NL,NOCAT})(0.001)(M_{NL,NC}) \quad (2\text{-}13)$$

$$+ (F_{i,j,OXCAT})(0.005)(M_{NL,C}) + (F_{i,j,3WCAT})(0.001)(M_{NL,C})$$

$$+ (F_{i,j,OXCAT/AIR})(0.020)(M_{NL,C}) + (F_{i,j,3WCAT/OXCAT})$$

$$(0.025)(M_{NL,C})\Big] + (r_i)(0.001)(M_L)$$

where $F_{i,j,OXCAT}$ = fraction of the unleaded vehicle class i equpped with an oxidation catalyst but no air pump in model year j

$F_{i,j,3WCAT}$ = fraction of the unleaded vehicle class i equipped with a three-way catalyst in model year j; note these vehicles are sometimes equipped with air pumps that are usually only used during vehicle start-up; therefore, the vehicle category as a whole is assumed to emit sulfates at the same rate as non-air pump-equipped vehicles for emission factor consideration

$F_{i,j,OXCAT/AIR}$ = fraction of the unleaded vehicle class i equipped with an oxidation catalyst and an air pump in model year j

2.2.3 Diesel Emission Factors (Light-Duty)

Diesel particulate emission factors for different model years are listed separately for light-duty vehicles and light-duty trucks in Table 2-1. These emission factors are derived from test data and are used in the equations below to calculate total diesel particulate emission factor components for LDVs and LDTs. (Table 2-1 also refers the user to the proper equation below to which each emission factor should be applied.)

LDV (Pre-1981): Diesel Fuel

For i=1 j=n-19,...,1980:

$$EF_{i,j,D} = 0.700\ M_D\ (g/mile) \qquad (2\text{-}14)$$

where M_D = fraction of particles less than a user-specified size cutoff (0.1-10 μ) that are emitted from vehicles that are fueled with diesel fuel, from Table 2-20 or Figure 2-3

LDV (1981-1986): Diesel Fuel

For i=1 j=1981,...,1986:

$$EF_{i,j,D} = 0.300\ M_D\ (g/mile) \qquad (2\text{-}15)$$

LDV (1987+): Diesel Fuel

For i=1 j=1987,...,n:

$$EF_{i,j,D} = 0.200\ M_D\ (g/mile) \qquad (2\text{-}16)$$

LDT (Pre-1981): Diesel Fuel

For i=1,2,3 j=n-19,...,1980:

$$EF_{i,j,D} = 0.800\ M_D\ (g/mile) \qquad (2\text{-}17)$$

LDT (1981-1986): Diesel Fuel

For i=1,2,3 j=1981,...,1986:

$$EF_{i,j,D} = 0.300\ M_D\ (g/mile) \qquad (2\text{-}18)$$

LDT (1987+): Diesel Fuel

For i=2,3 j=1987,...,n:

$$EF_{i,j,D} = 0.260\ M_D\ (g/mile) \qquad (2\text{-}19)$$

2.3 HEAVY-DUTY VEHICLES

This section presents the lead, sulfate and organic emission factor component equations for gasoline-fueled heavy-duty vehicles. Composite particulate emission factor components for heavy-duty diesel vehicles also are provided. These emission factor components are then used in conjunction with estimates of sales fractions of heavy-duty vehicles by model year and fuel type (Table 2-15) and travel fractions by vintage (Tables 2-16 and 2-17) to calculate total emission factors. As shown in Table 2-15, heavy-duty gasoline vehicles use leaded gasoline prior to 1987. The fraction of unleaded vehicles from 1987 on represents the

8,501-14,000 lbs percentage of heavy-duty gasoline vehicles, and is based on the assumption that the more stringent emission standards currently proposed for 1987 and later heavy-duty gasoline vehicles in the 8,501 to 14,000 lbs range will require the use of oxidation catalysts and air injection. Heavy-duty gasoline vehicles above 14,000 lbs are assumed to consist entirely of leaded gasoline vehicles for all model years. The reader also should note that the travel fractions for heavy-duty diesel trucks in Table 2-17 are specific to calendar year 1987 and are therefore presented for example only. These fractions shift from one calendar year to the next due to the increasing penetration of diesels in the lower mileage, lighter weight categories of heavy-duty trucks (which consists of all vehicles over 8,500 lbs. GVW). To calculate heavy-duty diesel travel fractions in a particular year of interest other than 1987, the reader needs to use the projections of diesel heavy-duty vehicles in-use by GVW category and the estimates of diesel heavy-duty vehicle mileage accumulation by GVW category which are contained in Appendix A.

Table 2-6 presents data on heavy-duty truck fuel economy. Estimates of misfueling for heavy-duty gas vehicles under 14,000 lbs GVW (after model year 1986) are contained in Tables 2-19 and 2-19a. The effect of discretionary fuel switching has not been incorporated in the heavy-duty vehicle emission factor equations due to the lack of data on the current fuel purchase behavior of owners of heavy-duty vehicles. However, as new data become available these equations will be revised accordingly.

2.3.1 Lead Emission Factor Components

The following equations are used to derive lead emission factor components for heavy-duty gas vehicles operated on leaded and unleaded gasoline:

HDGV (Pre-1987): Leaded Fuel

For $i=4$ $j=n-19,\ldots,1986$ $k=1$ a_s = from Table 2-22:

$$EF_{i,j,k_1 n,L} = \frac{(a_{s1,j})(Pb_{L,n})(1.557)}{E_{c,4,j}} (M_L) \qquad (2\text{-}20)$$

HDGV (1987+): Unleaded Fuel

For $i=4$ $j=1987,\ldots,n$ $k=1$ a_s = from Table 2-2 r_4 = from Table 2-19:

$$EF_{i,j,k_1,n,NL} = \frac{(1-r_4)(a_{s1,j})(Pb_{NL,n})(1.557)}{(E_{c,4a,j})^*} (M_{NL,C}) \qquad (2\text{-}21)$$

$$+ \frac{(r_4)(a_{s2,j})(Pb_{L,n})(1.557)}{E_{c,4a,j}} (M_L)$$

HDGV (1987+): Leaded Fuel

For $i=4$ $j=1987,\ldots,n$ $k=1$ a_s = from Table 2-22:

$$EF_{i,j,k_1,n,L} = \frac{(a_{s1,j})(Pb_{L,n})(1.557)}{(E_{c,4b,j})^{**}} (M_L) \qquad (2\text{-}22)$$

---

*4a represents the fuel economy for HDGV1 after 1986.

**4b represents the fuel economy for HDGV2 after 1986.

2.3.2 Organic Emission Factor Components

Organic emission factors for heavy-duty gasoline vehicles are listed in Table 2-1 in g/mile. These factors are used in the equations below to calculate the total HDG organic emission factor component. The reader should note that the HDG organic emission factors listed in Table 2-1 were derived assuming a constant 5.0 mpg for HDG vehicles of all model years. Therefore, the equations below have been adjusted by the factor $(5.0/E_{c,4,j})$ to account for the HDG fuel economy values currently used in MOBILE3.

HDGV (Pre-1987): Leaded Fuel

For i=4 j=n-19,...,1986 k=2:

$$EF_{i,j,k_2,L} = 0.370\ (M_L)\ (\frac{5.0}{E_{c,4,j}}) \qquad (2\text{-}23)$$

HDGV (1987+): Unleaded Fuel

For i=4 j=1987,...,n k=2 r_4 = from Table 2-19:

$$EF_{i,j,k_2,NL} = \left[(1-r_4)(0.054)(M_{NL,C}) + (r_4)(0.163)(M_L)\right] (\frac{5.0}{E_{c,4a,j}}) \qquad (2\text{-}24)$$

HDGV (1987+): Leaded Fuel

For i=4 j=1987,...,n k=2:

$$EF_{i,j,k_2,L} = 0.370\ (M_L)\ (\frac{5.0}{E_{c,4b,j}}) \qquad (2\text{-}25)$$

2.3.3 Sulfate Emission Factor Components

Sulfate emission factors for HDG vehicles also are listed in Table 2-1 and are used in the following equations to produce HDG sulfate emission factor components. As with the HDG organic emisison factor components, the equations below contain the adjustment factor ($5.0/E_{c,4,j}$) to reflect the HDG fuel economy values currently used in MOBILE3.

HDGV (Pre-1987): Leaded Fuel

For i=4 j=n-19,...,1986 k=3:

$$EF_{i,j,k_3,L} = 0.006\ (M_L)\ (\frac{5.0}{E_{c,4,j}}) \qquad (2\text{-}26)$$

HDGV (1987+): Unleaded Fuel

For i=4 j=1987,...,n k=3 r_4 = from Table 2-19:

$$EF_{i,j,k_3,L}\ \left[(1-r_4)(0.048)\ (M_{NL,C}) + (r_4)(0.006)(M_L)\right] (\frac{5.0}{E_{c,4a,j}}) \qquad (2\text{-}27)$$

HDGV (1987+): Leaded Fuel

For i=4 j=1987,...,n k=3:

$$EF_{i,j,k_3,L} = 0.006\ (M_L)\ \left(\frac{5.0}{E_{c,4b,j}}\right) \qquad (2\text{-}28)$$

2.3.4 Diesel Particulate Emission Factors

Diesel particulate emission factors (measured in g/mile) for heavy-duty diesel vehicles are derived with the following equations:

HDDV (All Model Years): Diesel Fuel

For i=5 j=n-19,...,n:

$$EF_{5,j,D} = 0.7\ M_D\ (CF_{D,j}) \qquad (2\text{-}29)$$

where $CF_{D,j}$ = factor for converting gm/bhp-hr to gm/mi, from Table 2-21

2.4 MOTORCYCLE EMISSION FACTORS

This section presents the emission factors for motorcycles. Table 2-18 contains travel fractions for the motor vehicle fleet. Motorcycle sales are assumed to consist entirely of leaded gasoline vehicles for all model years. Therefore, misfueling rates for motorcycles are zero. Discretionary fuel switching rates are not incorporated into the equations due to the lack of data on the fuel purchasing habits of motorcycle owners.

Motorcycle fractions are based on 2-stroke versus 4-stroke emission factor estimates (see Table 2-1). Before 1978, most on-road motorcycle travel was done by 2-stroke vehicles (53.4 percent) and slightly less (46.6 percent) by 4-stroke vehicles according to sales figures in the 1983 Motorcycle Statistical Annual published by the Motorcycle Industry

Council, Inc.[13/] In 1978, more stringent control of motorcycle emissions caused nearly all motorcycle manufacturers to build 4-stroke vehicles for on-road usage. Therefore, it is assumed that all motorcycles from 1978 on are 4-stroke vehicles since nearly all 2-stroke mileage is accumulated off-road.

The equations below present the lead emission factor component calculations for motorcycles. Due to the absence of catalyst emission controls on motorcycles, organic and sulfate emission factor components are not calculated.

MC (Pre-1978): Leaded Fuel

For i=6 j=n-19,...,1977:

$$EF_{6,j,L} = \left[(0.466)(0.046) + (0.534)(0.330)\right] (M_L) \qquad (2\text{-}30)$$

$$= 0.198\ M_L\ (g/mile)$$

MC (1978+): Leaded Fuel

For i=6 j=1978,...,n:

$$EF_{6,j,L} = 0.046\ M_L\ (g/mile) \qquad (2\text{-}31)$$

2.5 BRAKE AND TIRE WEAR PARTICULATE EMISSION FACTOR COMPONENTS

Additional sources of motor vehicle particulate emissions include brake and tire wear emission components. Limited testing has been performed to estimate the contributions of brake and tire wear emissions to the total light-duty vehicle particulate emission rate. No data exist on the rate at which light-duty trucks, heavy-duty vehicles, or motorcycles emit brake and tire wear emissions. The user should be aware that brake and tire wear particulates are emitted from these vehicle classes at different rates than the light-duty vehicle rate, but since no data exists, the light-duty vehicle rate is used to estimate their contribution to total particulate emission rates.

Brake wear emissions from light-duty vehicles have been measured in a recent study and have been found to consist of significant quantities of particulate in the airborne particle size range. Airborne particulate emission rates for brake wear particles as measured on braking cycles representative of urban driving averaged 0.0128 grams per mile for light-duty gasoline vehicles.[40/] Particle size distribution for brake wear particulate (M_B) is included in this reference and is summarized in Table 2-20. The rate of 0.0128 g/mile times the appropriate fraction of M_B for the particle size cutoff of interest should be added to any calculation of particulate emissions less than 10 microns for all classes of vehicles. In the example calculation in Section 3-0 of this report, for example, M_B = 0.98, the brake wear particulate emission rate is therefore 0.0125 g/mile and the total light-duty vehicle particulate emission rate is 0.0726 g/mile. In this particular example, therefore, brake wear emissions account for 17 percent of the total particulate emission rate.

Tire wear particulate is generally larger in size than brake wear particulate and therefore consists of fewer particles in the airborne size range. Emission rates for airborne tire wear particulate for light-duty vehicles has been estimated at 0.002 g/mile.[41/ 42/] This rate should be added to calculations of particulate emissions less than 10 microns for all classes of vehicles. The addition of 0.002 g/mile in the example calculation in Section 3-0 indicates that airborne tire wear particulate accounts for about 3 percent of the total light-duty particulate emission rate.

No data on airborne particle size distribution are available for analyses of tire wear particulate emission rates at smaller particle size cutoffs (i.e., 2.5 microns or 7 microns). The user should either interpolate between zero and 10 microns to determine the appropriate emission rate for the distribution of tire wear particles below the desired size cutoff (e.g., at 7 microns tire wear emissions = 0.0014 g/mile and at 2.5 microns tire wear emissions = 0.0005 g/mile) or simply neglect tire wear particulate since it is likely to be negligible in these smaller particle size ranges.

Another source of particulate emissions for which emission factors could be developed is reentrained particulate from particles that have been deposited on road surfaces or possibly road material itself. While information is available on these reentrained particulates,[46/ 47/] they are not considered to be directly emitted by mobile sources and therefore are not included in this report.

TABLE 2-1

EMISSION FACTORS OF MOTOR VEHICLE ENGINE TOTAL PARTICULATE EMISSIONS

Applicable Model Year(s)	Particulate Component	Control System	Type of Fuel Used	Vehicle Speed (MPH)	Emission Factor (grams/mile)	Equation Used In	Emission Factor Source Reference Number
Light-Duty Gasoline Vehicles and Trucks:							
Pre-1970	Organic	NOCAT	Leaded	All	0.193	(2-6)	8
1970-1974	Organic	NOCAT	Leaded	All	0.068	(2-7)	8
1975+	Organic	NOCAT	Leaded	All	0.030	(2-8)	8(a)
1975+	Organic	CAT	Unleaded	All	0.017	(2-9)	8(b)
1975+	Organic	CAT	Leaded	All	0.068	(2-9)	8(c)
1975+	Organic	NOCAT	Unleaded	All	0.030	(2-9)	8(a)(h)
All	Sulfate	NOCAT	Leaded	19.6	0.002	(2-10)(2-12)	8
1975+	Sulfate	CAT	Leaded	19.6	0.002	(2-12)	8(d)
Pre-1975	Sulfate	NOCAT	Leaded	34.8	0.001	(2-11)	2
1975+	Sulfate	CAT/NOAIR(f)	Unleaded	19.6	0.005	(2-12)	8
1975+	Sulfate	CAT/AIR(g)	Unleaded	19.6	0.016	(2-12)	8
1975+	Sulfate	NOCAT	Unleaded	19.6	0.002	(2-12)	8(e)
1975+	Sulfate	NOCAT	Leaded	34.8	0.001	(2-11)	2
1975+	Sulfate	NOCAT	Unleaded	34.8	0.001	(2-13)	2
1975+	Sulfate	OXCAT/NOAIR	Unleaded	34.8	0.005	(2-13)	2
1975+	Sulfate	3WCAT	Unleaded	34.8	0.001	(2-13)	2
1975+	Sulfate	OXCAT/AIR	Unleaded	34.8	0.020	(2-13)	2
1975+	Sulfate	3WCAT/AIR	Unleaded	34.8	0.025	(2-13)	2
1975+	Sulfate	CAT	Leaded	34.8	0.001	(2-13)	2(d)
Light-Duty Diesel Vehicles and Trucks:							
Pre-1981	All LDDV	-	Diesel	All	0.700	(2-14)	4
1981-1986	All LDDV	-	Diesel	All	0.300	(2-15)	4
1987+	All LDDV	-	Diesel	All	0.200	(2-16)	4
Pre-1981	All LDDV	-	Diesel	All	0.800	(2-17)	4
1981-1986	All LDDV	-	Diesel	All	0.300	(2-18)	4
1987+	All LDDV	-	Diesel	All	0.260	(2-19)	4

TABLE 2-1 (cont'd)

EMISSION FACTORS OF MOTOR VEHICLE ENGINE TOTAL PARTICULATE EMISSIONS

Applicable Model Year(s)	Particulate Component	Control System	Type of Fuel Used	Vehicle Speed (MPH)	Emission Factor (grams/mile)	Equation Used In	Emission Factor Source Reference Number
Heavy-Duty Gasoline Trucks:							
Pre-1987	Organic	NOCAT	Leaded	All	0.370	(2-23)	8
1987+	Organic	CAT/AIR	Unleaded	All	0.054	(2-24)	8
1987+	Organic	CAT/AIR	Leaded	All	0.163	(2-24)	(i)
1987+	Organic	NOCAT	Leaded	All	0.370	(2-25)	
Pre-1987	Sulfate	NOCAT	Leaded	All	0.006	(2-26)	8
1987+	Sulfate	CAT/AIR	Unleaded	All	0.048	(2-27)	8
1987+	Sulfate	NOCAT	Leaded	All	0.006	(2-27)	8
Heavy-Duty Diesel Trucks:							
All	All HDDT@	-	Diesel	All	0.700*	(2-29)	8
Motorcycles:							
All	4-Stroke	-	Leaded	All	0.046	(2-30)(2-31)	2
All	2-Stroke	-	Leaded	All	0.330	(2-30)	2

(a) Ratio 1.5/3.4 of 1970-74 organic value.
(b) Combined value of organic from catalyst/no air and catalyst/air vehicles.
(c) Same as 1970-74 no catalyst leaded organic value.
(d) Misfueled vehicles.
(e) Same as no catalyst leaded value.
(f) Includes oxidation catalyst vehicles and three-way catalyst vehicles without air pumpts.
(g) Includes oxidation catalyst vehicles and three-way plus oxidation catalyst vehicles with air pumps.
(h) Value should actually be higher for the light-duty truck II class (much like the 1970-74 organic value) but no data exist.
(i) Letter from Phil Lorang, July 12, 1984.

*g/Bhp-hr

TABLE 2-2

LEAD CONTENT OF GASOLINE

Year	Leaded Gasoline* (g/gal)	Unleaded Gasoline (g/gal)
1974	1.79	0.014
1975	1.82	0.014
1976	2.02	0.014
1977	2.03	0.014
1978	1.94	0.014
1979	1.85	0.014
1980	1.38	0.014
1981	1.15	0.014
1982	1.24	0.014
1983	1.14	0.014
1984	1.10	0.014
1985	0.50	0.014
1986	0.10	0.014
1987	0.10	0.014
1988	0.10	0.014
1989	0.10	0.014
1990	0.10	0.014

*1974-1982: Lead content based upon data submitted to EPA on historical sales data for leaded gasoline and data indicating the actual pooled average lead content. The value for unleaded gasoline is based on recent MVMA fuel surveys.

1983-1990: Lead content based upon requirements for average lead content of leaded gasoline. During the first half of 1983, small refineries were subject to a pooled average lead standard. Recent EPA regulations require refiners to reduce the lead content of leaded gasoline to 0.5 g/gal by July 31, 1985 and to 0.1 g/gal by January 1, 1986 and thereafter. (See Federal Register, Vol. 50, No. 45, March 7, 1985.)

TABLE 2-3

FRACTION OF LIGHT-DUTY VEHICLE MODEL YEAR SALES EQUIPPED WITH DIFFERENT EMISSION CONTROL SYSTEMS (Low-Altitude Non-California)

System	Pre-1975	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988+
$F_{L,l,j}$	1.000	.128	.134	.158	.126	.097	0	0	0	0	0	0	0	0	0
$F_{l,j,NL,NOCAT}$	0	.081	.020	0	0	0	0	0	0	0	0	0	0	0	0
$F_{l,j,OXCAT/NOAIR}$	0	.597	.637	.650	.650	.640	.421	.033	0	0	0	0	0	0	0
$F_{l,j,OXCAT/AIR}$	0	.322	.343	.350	.350	.345	.514	.099	.142	.109	0	0	0	0	0
$F_{l,j,3WCAT}$	0	0	0	0	0	.015	.053	.263	.313	.244	.396	.532	.587	.641	.704
$F_{l,j,3WCAT/OXCAT}$	0	0	0	0	0	0	.012	.605	.545	.647	.604	.468	.414	.359	.296
$F_{D,l,j}$	0	.003	.003	.004	.009	.028	.034	.061	.046	.053	.060	.066	.073	.080	.090
$F_{l,j,CAT}$	0	.919	.980	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
$F_{l,j,CAT/NOAIR}$	0	.597	.637	.650	.650	.655	.474	.296	.149	.194	.237	.381	.450	.518	.554
$F_{l,CAT/AIR}$	0	.322	.343	.350	.350	.345	.526	.704	.851	.806	.763	.691	.587	.482	.446

SOURCES: U.S. EPA Emission Factor In-Use Test Vehicle Data Base.
EEA Forecasts of Emission Control Technology 1982-1990 (used for years 1982-1988+).
U.S. EPA Fuel Economy Data Base.

NOTES: Model year columns do not add up to 1.000. Only $F_{L,l,j}$ and $F_{D,l,j}$ are fractions of all LDVs. All other systems are fractions of all unleaded LDVs.

TABLE 2-4

FLEET SALES FRACTIONS
Light-Duty Vehicles

Model Years	Nonleaded Gasoline Fraction of LDV Fleet, $F_{NL,l,j}$*	Leaded Gasoline Fraction of LDV Fleet, $F_{L,l,j}$	Diesel Fraction of LDV Fleet, $F_{D,l,j}$**
Pre-1975	0.000	1.000	0.000
1975	0.869	0.128	0.003
1976	0.863	0.134	0.003
1977	0.838	0.158	0.004
1978	0.865	0.126	0.009
1979	0.875	0.097	0.028
1980	0.966	0.000	0.034
1981	0.939	0.000	0.061
1982	0.954	0.000	0.046
1983	0.947	0.000	0.053
1984	0.940	0.000	0.060
1985	0.934	0.000	0.066
1986	0.927	0.000	0.073
1987	0.920	0.000	0.080
1988	0.910	0.000	0.090
1989	0.900	0.000	0.100
1990	0.887	0.000	0.113
1991	0.887	0.000	0.113
1992	0.886	0.000	0.114
1993	0.886	0.000	0.114
1994	0.885	0.000	0.115
1995+	0.885	0.000	0.115

Where $F_{NL,l}$ = Estimated fraction of the LDV model year fleet which use nonleaded gasoline

$F_{L,l}$ = Estimated fraction of the LDV model year fleet which use leaded gasoline

$F_{D,l}$ = Estimated fraction of the LDV model year fleet which use diesel fuel

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*Percentages of gasoline vehicles requiring leaded and nonleaded fuel obtained from Energy and Environmental Analysis, Inc., "The Highway Fuel Consumption Model: Tenth Quarterly Report," November 1983.

**Diesel and gasoline sales projections were made by EPA based on data obtained from Energy and Environmental Analysis, Inc., "The Highway Fuel Consumption Model: Tenth Quarterly Report," November 1983.

TABLE 2-5

TRAVEL WEIGHTING FACTOR CALCULATION*
Light-Duty Vehicles

Vehicle Age	(a) January 1 Fraction Total Registration	(b) Annual Mileage Accumulation Rate	(a)(b)	[(a)(b)/(SUM)] Fraction of LDV Travel by Model Year $m_{1,j,G}$ and $m_{1,j,D}$**
1	0.028	12,818	358.9	0.038
2	0.107	12,639	1,352.4	0.142
3	0.100	11,933	1,193.3	0.125
4	0.094	11,268	1,059.2	0.111
5	0.088	10,639	936.2	0.098
6	0.080	10,045	803.6	0.084
7	0.075	9,485	711.4	0.075
8	0.069	8,955	617.9	0.065
9	0.062	8,455	524.2	0.055
10	0.056	7,983	447.0	0.047
11	0.050	7,538	376.9	0.040
12	0.043	7,117	306.0	0.032
13	0.037	6,720	248.6	0.026
14	0.031	6,345	196.7	0.021
15	0.024	5,991	143.8	0.015
16	0.018	5,657	101.8	0.011
17	0.012	5,341	64.1	0.007
18	0.008	4,043	32.3	0.003
19	0.006	4,762	28.6	0.003
20+	0.008	4,496	36.0	0.004
		SUM:	9,538.9	

*Data derived from MOBILE3.

**Travel fractions are the same for diesel and gasoline fueled LDVs.

TABLE 2-6

CITY/HIGHWAY COMBINED ON-ROAD FUEL ECONOMY
(miles/gallon)

Model Year	Fuel Economy, $E_{c,i,j}$					
	LDV*	LDT1**	LDT2	HDGV1+	HDGV2	HDGV++
Pre-1970	13.9	10.6	7.9	-	-	6.5
1970	13.9	10.6	7.9	-	-	6.4
1971	13.2	10.4	7.7	-	-	6.4
1972	13.1	10.2	7.4	-	-	6.4
1973	12.9	9.9	7.0	-	-	6.5
1974	12.6	9.6	6.9	-	-	6.7
1975	13.5	11.6	8.8	-	-	6.8
1976	14.8	12.3	9.7	-	-	7.3
1977	15.5	13.0	9.4	-	-	7.7
1978	16.8	13.4	9.6	-	-	8.0
1979	17.2	14.2	9.8	-	-	8.2
1980	20.0	16.1	11.5	-	-	8.4
1981	21.4	17.7	13.3	-	-	8.6
1982	22.2	18.6	13.6	-	-	8.8
1983	22.2	19.2	13.7	-	-	8.9
1984	22.8	19.9	13.9	-	-	8.9
1985	23.2	20.7	14.0	-	-	9.0
1986	23.8	21.4	14.3	-	-	9.0
1987	24.3	23.0	14.5	9.5	5.6	9.0
1988	24.8	23.3	14.7	9.5	5.6	9.1
1989	25.2	23.1	14.9	9.6	5.6	9.2
1990	25.7	24.0	15.2	9.7	5.6	9.2
1991	26.2	24.5	15.4	9.7	5.7	9.3
1992	26.6	24.4	15.7	9.8	5.7	9.4
1993	27.2	25.3	15.9	9.8	5.7	9.4
1994	27.6	25.8	16.2	9.9	5.7	9.5
1995+	29.0	26.2	16.4	10.1	5.8	9.6

*Fuel economies for LDV's based on EPA memo from Karl H. Hellman to Ralph C. Stahman regarding Light-Duty MPG, June 15, 1984.

**Fuel economies for LDT's drawn from the input data used to generate "The Highway Fuel Consumption Model: Tenth Quarterly Report," prepared by Energy and Environmental Analysis, Inc.

+Fuel economies for Heavy-duty gasoline vehicles (HDGV) were derived from figure presented in an EPA memo to Mark Wolcott from Cooper Smith, dated July 2, 1984.

++Pre-1986 fuel economies are composites of HDGV1 and HDGV2.

TABLE 2-7

FUEL ECONOMY CORRECTION FACTORS AT VARIOUS SPEEDS, C_s
(Normalized to 32.7 miles/hour-cyclic driving)

	Speed (mph)	C_s Cyclic Driving	C_s Steady Cruise
	5	0.323	0.467
	10	0.553	0.709
	15	0.692	0.997
(FTP)	20	0.790	1.153
	25	0.885	1.248
	30	0.963	1.294
	32.7	1.000	1.303
(SET)	35	1.022	1.303
	40	1.053	1.288
	45	1.073	1.256
	50	1.078	1.210
	55	1.063	1.159
	60	1.023	1.104

TABLE 2-8

FRACTION OF LIGHT-DUTY TRUCK I MODEL YEAR SALES EQUIPPED WITH DIFFERENT EMISSION CONTROL SYSTEMS (LOW-ALTITUDE NON-CALIFORNIA)

System	Pre-1975	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988+
$F_{L,2,j}$	1.000	.188	.088	.038	.027	.03	.021	.026	.021	.022	0	0	0	0	0
$F_{2,j,NL,NOCAT}$	0	.123	.225	.083	.069	.034	.027	.011	0	0	0	0	0	0	0
$F_{2,j,OXCAT/NOAIR}$	0	.570	.504	.596	.605	.561	.564	.574	.066	.092	.003	0	0	0	0
$F_{2,j,OXCAT/AIR}$	0	.307	.271	.321	.325	.405	.409	.415	.887	.687	.595	.550	.550	.150	.150
$F_{2,j,3WCAT}$	0	0	0	0	0	0	0	0	.027	.054	.126	.150	.150	.350	.350
$F_{2,j,3WCAT/OXCAT}$	0	0	0	0	0	0	0	0	.021	.167	.276	.300	.300	.500	.500
$F_{D,2,j}$	0	.002	.003	.005	.009	.028	.034	.060	.080	.100	.130	.160	.180	.210	.240
$F_{2,j,CAT}$	0	.877	.775	.917	.930	.966	.973	.989	1.000	1.000	1.000	1.000	1.000	1.000	1.000
$F_{2,j,CAT/NOAIR}$	0	.570	.504	.596	.605	.561	.564	.574	.069	.073	.056	.080	.080	.200	.200
$F_{2,CAT/AIR}$	0	.307	.271	.321	.325	.405	.409	.415	.931	.927	.944	.920	.920	.800	.800

Sources: U.S. EPA Emission Factor In-Use Test Vehicle Data Base.
U.S. EPA Fuel Economy Data Base.
U.S. EPA Federal Register: Federal Certification Test Results 1975-78 and 1982-84.
EEA Estimates of Emission Control Systems Projections.

Note: Model year columns do not add up to 1.000. Only $F_{L,2,j}$ and $F_{D,2,j}$ are fractions of all LDTls. All other systems are fractions of all unleaded LDTls.

TABLE 2-9

FLEET SALES FRACTIONS
Light-Duty Trucks I

Model Years	Unleaded Gasoline Fraction of LDT1 Fleet, $F_{NL,2,j}$*	Leaded Gasoline Fraction of LDT1 Fleet, $F_{L,2,j}$	Diesel Fraction of LDT1 Fleet, $F_{D,2,j}$**
Pre-1975	0.000	1.000	0.000
1975	0.810	0.188	0.002
1976	0.909	0.088	0.003
1977	0.957	0.038	0.005
1978	0.964	0.027	0.009
1979	0.942	0.030	0.028
1980	0.945	0.021	0.034
1981	0.914	0.026	0.060
1982	0.899	0.021	0.080
1983	0.878	0.022	0.100
1984	0.870	0.000	0.130
1985	0.840	0.000	0.160
1986	0.820	0.000	0.180
1987	0.790	0.000	0.210
1988	0.760	0.000	0.240
1989	0.730	0.000	0.270
1990	0.706	0.000	0.294
1991	0.697	0.000	0.303
1992	0.688	0.000	0.312
1993	0.679	0.000	0.321
1994	0.670	0.000	0.330
1995+	0.661	0.000	0.339

Where $F_{NL,2}$ = Estimated fraction of the LDT1 model year fleet which use nonleaded gasoline.

$F_{L,2}$ = Estimated fraction of the LDT1 model year fleet which use leaded gasoline.

$F_{D,2}$ = Estimated fraction of the LDT1 model year fleet which use diesel fuel.

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*Percentages of gasoline vehicles requiring leaded and unleaded fuel obtained from Energy and Environmental Analysis, Inc., "The Highway Fuel Consumption Model: Tenth Quarterly Report," November 1983.

**Diesel and gasoline sales projections were derived from MOBILE3.

TABLE 2-10

TRAVEL WEIGHTING FACTOR CALCULATION*
Light-Duty Gas Trucks I**

Vehicle Age	(a) January 1 Fraction Total Registration	(b) Annual Mileage Accumulation Rate	(a)(b)	[(a)(b)/(SUM)] Fraction of LDV Travel by Model Year, $m_{2,j,G}$
1	0.023	17,394	400.1	0.036
2	0.089	17,079	1,520.0	0.135
3	0.085	15,839	1,346.3	0.120
4	0.081	14,690	1,189.9	0.106
5	0.076	13,624	1,035.4	0.092
6	0.072	12,636	909.8	0.081
7	0.068	11,719	796.9	0.071
8	0.064	10,868	695.6	0.062
9	0.060	10,080	604.8	0.054
10	0.055	9,348	514.1	0.046
11	0.050	8,670	433.5	0.039
12	0.046	8,041	369.9	0.033
13	0.042	7,457	313.2	0.028
14	0.038	6,916	262.8	0.023
15	0.034	6,415	218.1	0.019
16	0.029	5,949	172.5	0.015
17	0.025	5,517	137.9	0.012
18	0.021	5,117	107.5	0.009
19	0.017	4,746	80.7	0.007
20	0.025	4,402	110.1	0.010
		SUM:	11,219.1	

*Data derived from MOBILE3.
**Light-duty trucks I have a gross vehicle weight (GVW) rating of 6,000 pounds or less.

TABLE 2-11

FRACTION OF MODEL YEAR SALE OF LIGHT-DUTY TRUCKS II
BY EMISSION CONTROL SYSTEMS

System	Pre-1975	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
$F_{L,3,j}$	1.000	1.000	1.000	1.000	.988	0	0	0	0	0	0	0	0	0	0
$F_{3,j,NL,NOCAT}$	0	0	0	0	0	.008	0	0	0	0	0	0	0	0	0
$F_{3,j,OXCAT}$	0	0	0	0	0	.496	.500	.500	.222	.284	0	0	0	0	0
$F_{3,j,OXCAT/AIR}$	0	0	0	0	0	.496	.500	.500	.704	.577	.823	.800	.800	0	0
$F_{3,j,3WCAT}$	0	0	0	0	0	0	0	0	0	.012	.003	0	0	.020	.020
$F_{3,j,3WCAT/OXCAT}$	0	0	0	0	0	0	0	0	.074	.127	.174	.200	.200	.980	.980
$F_{D,3,j}$	0	0	0	0	.012	.025	.050	.050	.080	.113	.147	.180	.194	.208	.222
$F_{3,j,CAT}$	0	0	0	0	0	.992	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
$F_{3,j,CAT/NOAIR}$	0	0	0	0	0	.496	.500	.500	.222	.293	0	0	0	.020	.020
$F_{3,CAT/AIR}$	0	0	0	0	0	.496	.500	.500	.778	.707	1.000	1.000	1.000	.980	.980

Sources: U.S. EPA Emission Factor In-Use Test Vehicle Data Base.
U.S. EPA *Federal Register: Federal Certification Test Results 1982-84.*
EEA Estimates of Emission Control Systems Projections.

Note: Model year columns do not add up to 1.000. Only $F_{L,3,j}$ and $F_{D,3,j}$ are fractions of all LDT2s. All other systems are fractions of all unleaded LDT2s.

TABLE 2-12

FLEET SALES FRACTIONS
Light-Duty Trucks II

Model Years	Unleaded Gasoline Fraction of LDT2 Fleet, $F_{NL,3,j}$*	Leaded Gasoline Fraction of LDT2 Fleet, $F_{L,3,j}$**	Diesel Fraction of LDT2 Fleet, $F_{D,3,j}$**
Pre-1975	0.000	1.000	0.000
1975	0.000	0.998	0.002
1976	0.000	0.997	0.003
1977	0.000	0.995	0.005
1978	0.000	0.991	0.009
1979	0.972	0.000	0.028
1980	0.966	0.000	0.034
1981	0.940	0.000	0.060
1982	0.920	0.000	0.080
1983	0.900	0.000	0.100
1984	0.870	0.000	0.130
1985	0.840	0.000	0.160
1986	0.820	0.000	0.180
1987	0.790	0.000	0.210
1988	0.760	0.000	0.240
1989	0.730	0.000	0.270
1990	0.706	0.000	0.294
1991	0.697	0.000	0.303
1992	0.688	0.000	0.312
1993	0.679	0.000	0.321
1994	0.670	0.000	0.330
1995+	0.661	0.000	0.339

WHERE $F_{NL,3}$ = Estimated fraction of the LDT2 model year fleet which use nonleaded gasoline.

$F_{L,3}$ = Estimated fraction of the LDT2 model year fleet which use leaded gasoline.

$F_{D,3}$ = Estimated fraction of the LDT2 model year fleet which use diesel fuel.

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*Percentages of gasoline vehicles requiring leaded and nonleaded fuel obtained from Energy and Environmental Analysis, Inc., "The Highway Fuel Consumption Model: Tenth Quarterly Report," November 1983.

**Diesel and gasoline sales projections were derived from MOBILE3.

TABLE 2-13

TRAVEL WEIGHTING FACTOR CALCULATION*
Light-Duty Gas Trucks II**

Vehicle Age	(a) January 1 Fraction Total Registration	(b) Annual Mileage Accumulation Rate	(a)(b)	[(a)(b)/(SUM)] Fraction of LDT2 Travel by Model Year, $m_{3,j,G}$
1	0.023	18,352	422.1	0.036
2	0.089	18,001	1,602.1	0.138
3	0.085	16,622	1,412.9	0.122
4	0.081	15,348	1,243.2	0.107
5	0.076	14,172	1,077.1	0.093
6	0.072	13,087	942.3	0.081
7	0.068	12,084	821.7	0.071
8	0.064	11,158	714.1	0.062
9	0.060	10,303	618.2	0.053
10	0.055	9,514	523.3	0.045
11	0.050	8,785	439.3	0.038
12	0.046	8,112	373.2	0.032
13	0.042	7,491	314.6	0.027
14	0.038	6,917	262.8	0.023
15	0.034	6,386	217.1	0.019
16	0.029	5,897	171.0	0.015
17	0.025	5,446	136.2	0.012
18	0.021	5,028	105.6	0.009
19	0.017	4,643	78.9	0.007
20+	0.025	4,287	107.2	0.009
		SUM:	11,582.9	

*Data derived from MOBILE3.

**Light-duty trucks II have a gross vehicle weight (GVW) rating of 6,001 to 8,500 pounds.

TABLE 2-14

TRAVEL WEIGHTING FACTOR CALCULATION*
Light-Duty Diesel Trucks I and II**

Vehicle Age	(a) January 1 Fraction Total Registration	(b) Annual Mileage Accumulation Rate	(a)(b)	[(a)(b)/(SUM)] Fraction of LDDT I & II Travel by Model Year, $m_{i,j,D}$
1	0.023	17,552	403.7	0.035
2	0.087	17,230	1,499.0	0.129
3	0.083	15,964	1,325.0	0.114
4	0.079	14,791	1,168.5	0.101
5	0.075	13,705	1,027.9	0.088
6	0.071	12,699	901.6	0.078
7	0.066	11,766	776.6	0.067
8	0.062	10,901	675.9	0.058
9	0.058	10,101	585.9	0.050
10	0.054	9,359	505.4	0.043
11	0.049	8,671	424.9	0.037
12	0.045	8,035	361.6	0.031
13	0.041	7,444	305.2	0.026
14	0.037	6,897	255.2	0.022
15	0.033	6,391	210.9	0.018
16	0.029	5,921	171.7	0.015
17	0.025	5,487	137.2	0.012
18	0.020	5,084	101.7	0.009
19	0.016	4,710	75.4	0.006
20+	0.025	4,364	109.1	0.009
		SUM:	11,622.4	

*Data derived from MOBILE3.

**Light-duty trucks I and II have a gross vehicle weight (GVW) rating of 0-8,500 pounds.

TABLE 2-15

FLEET SALES FRACTIONS
Heavy-Duty Gasoline Vehicles (HDGV)*

Model Years	Unleaded Fraction of HDGV Fleet $F_{NL,4,j}$**	Leaded Fraction of HDGV Fleet $F_{L,4,j}$
Pre-1977	0.000	1.000
1977	0.000	1.000
1978	0.000	1.000
1979	0.000	1.000
1980	0.000	1.000
1981	0.000	1.000
1982	0.000	1.000
1983	0.000	1.000
1984	0.000	1.000
1985	0.000	1.000
1986	0.000	1.000
1987	0.823	0.177
1988	0.824	0.176
1989	0.825	0.175
1990	0.826	0.174
1991	0.828	0.172
1992	0.829	0.171
1993	0.833	0.167
1994	0.837	0.163
1995	0.840	0.160

*Heavy-duty gasoline vehicles have a gross vehicle weight (GVW) rating greater than 8,501 pounds.

*The estimated fractions of the HDGV model year fleets which are gasoline-powered are consistent with figures from M.C. Smith, "Heavy-Duty Vehicle Emission Conversion Factors: 1962-1997," EPA-AA/SDSB-84-1, Office of Mobile Sources, August 1984.

TABLE 2-16

TRAVEL WEIGHTING FACTOR CALCULATION*
Heavy-Duty Gasoline Vehicle (HDGV)**

Vehicle Age	(a) January 1 Fraction Total Registration	(b) Annual Mileage Accumulation Rate	(a)(b)	[(a)(b)/(SUM)] Fraction of HDGT Travel by Model Year, $m_{4,j,G}$
1	0.000	0	0.0	0.000
2	0.148	19,967	2,955.1	0.227
3	0.126	18,077	2,277.7	0.175
4	0.107	16,365	1,751.1	0.134
5	0.092	14,815	1,363.0	0.105
6	0.078	13,413	1,046.2	0.080
7	0.067	12,143	813.6	0.062
8	0.058	10,993	637.6	0.049
9	0.049	9,952	487.6	0.037
10	0.041	9,010	369.4	0.028
11	0.036	8,156	293.6	0.023
12	0.030	7,384	221.5	0.017
13	0.026	6,685	173.8	0.013
14	0.022	6,052	133.1	0.010
15	0.020	5,479	121.0	0.009
16	0.016	4,960	79.4	0.006
17	0.014	4,490	62.9	0.005
18	0.012	4,065	48.8	0.004
19	0.010	3,680	36.8	0.003
20+	0.049	3,332	163.3	0.013
		SUM:	13,035.5	

*Data derived from MOBILE3.

**Heavy-duty gasoline vehicles have a gross vehicle weight (GVW) rating greater than 8,500 pounds.

TABLE 2-17

TRAVEL WEIGHTING FACTOR CALCULATION*
For Heavy-Duty Diesel Vehicles in Calendar Year 1987

Vehicle Age	(a) January 1 Fraction Total Registration	(b)** Annual Mileage Accumulation Rate	(a)(b)	[(a)(b)/(SUM)] Fraction of HDTT 1 Travel by Model Year, $m_{5,j,D}$
1	0.000	0	0.0	0.000
2	0.166	67,910	11,273.1	0.241
3	0.13	61,749	8,521.4	0.182
4	0.115	56,155	6,457.8	0.138
5	0.097	51,073	4,954.1	0.106
6	0.080	46,457	3,716.6	0.079
7	0.067	42,260	2,831.4	0.060
8	0.056	38,447	2,153.0	0.046
9	0.047	34,982	1,644.2	0.035
10	0.040	31,832	1,273.3	0.027
11	0.033	28,968	955.9	0.020
12	0.027	26,363	711.8	0.015
13	0.023	23,995	551.9	0.012
14	0.019	21,43	415.0	0.009
15	0.015	19,883	298.2	0.006
16	0.013	18,101	235.3	0.005
17	0.011	16,41	181.3	0.004
18	0.009	15,007	135.1	0.003
19	0.008	13,665	109.3	0.002
20+	0.034	12,444	423.1	0.009
		SUM:	46,841.8	

*Data derived from MOBILE3.

**The tabulated annual mileage accumulation rate is specific to CY 1987 only. The rate shifts from one year to the next due to the increasing penetration of diesels in the lower mileage, lighter weight classes of the heavy-duty truck category (which contains all vehicles with a GVW rating over 8,500 pounds).

TABLE 2-18

TRAVEL WEIGHTING FACTOR CALCULATION*
Motorcycles

Vehicle Age	(a) January 1 Fraction Total Registration	(b) Annual Mileage Accumulation Rate	(a)(b)	[(a)(b)/(SUM)] Fraction of MC Travel by Model Year, $m_{6,j,G}$
1	0.000	0	0.0	0.000
2	0.167	4,100	685.7	0.356
3	0.159	2,800	445.7	0.232
4	0.134	2,100	281.0	0.146
5	0.142	1,600	227.0	0.118
6	0.131	1,200	157.8	0.082
7	0.080	800	63.7	0.033
8	0.051	600	30.4	0.016
9	0.028	400	11.1	0.001
10	0.010	200	2.1	0.010
11	0.098	200	19.6	0.000
12	0.000	200	0.0	0.000
13	0.000	0	0.0	0.000
14	0.000	0	0.0	0.000
15	0.000	0	0.0	0.000
16	0.000	0	0.0	0.000
17	0.000	0	0.0	0.000
18	0.000	0	0.0	0.000
19	0.000	0	0.0	0.000
20+	0.000	0	0.0	0.000
		SUM:	1,924.0	

*Data derived from MOBILE3.

TABLE 2-19

RATES OF MISFUELING (r_i)

FOR DIFFERENT VEHICLE CLASSES*

	I/M	Non-I/M
Light-Duty Vehicles (i=1)	0.09	0.20
Light-Duty Trucks I (i=2)	0.20	0.46
Light-Duty Trucks II (i=3)	0.21	0.47
Heavy-Duty Gasoline Vehicles (i=4)**	0.19	0.40
Motorcycles (i=6)	0	0

*Values in this table are expressed as fractions of the total number of vehicles in each class. Misfueling rates are determined for the weighted average mileage accumulated for each vehicle class.

**Misfueling rates for Heavy-Duty Gasoline Vehicles pertain only to heavy-duty gasoline vehicles 1 made after model year 1986.

SOURCES: The equations used to estimate misfueling as a function of mileage for I/M and non-I/M areas are drawn from "Anti-Tampering and Anti-Misfueling Programs to Reduce In-Use Emissions from Motor Vehicles," EPA-AA-TSS-83-10, Office of Mobile Sources, December 31, 1983.

Weighted average mileages by vehicle category are calculated from data contained in MOBILE3.

TABLE 2-19a

RATES OF MISFUELING (r_i) FOR DIFFERENT VEHICLE AGES AND CLASSES*

Vehicle Age	LDV		LDTI		LDTII		HDGV1	
	Non-I/M	I/M	Non-I/M	I/M	Non-I/M	I/M	Non-I/M	I/M
1	.04	.04	.22	.13	.23	.13	.18	.12
2	.07	.05	.27	.14	.27	.15	.23	.13
3	.10	.06	.31	.16	.32	.16	.28	.15
4	.13	.07	.35	.17	.36	.17	.32	.16
5	.16	.08	.38	.18	.39	.18	.36	.17
6	.18	.09	.42	.19	.43	.19	.39	.18
7	.21	.09	.45	.20	.46	.20	.42	.19
8	.23	.10	.47	.21	.49	.21	.45	.20
9	.25	.11	.50	.21	.51	.22	.48	.21
10	.27	.11	.52	.22	.54	.23	.50	.22
11	.29	.12	.55	.23	.56	.23	.52	.22
12	.31	.12	.57	.24	.58	.24	.54	.23
13	.33	.13	.59	.24	.60	.25	.56	.23
14	.34	.13	.60	.25	.62	.25	.57	.24
15	.36	.14	.62	.25	.63	.26	.59	.24
16	.37	.14	.64	.26	.65	.26	.60	.25
17	.39	.15	.65	.26	.66	.26	.61	.25
18	.40	.15	.66	.26	.68	.27	.62	.25
19	.41	.15	.68	.27	.69	.27	.63	.25
20+	.42	.16	.69	.27	.70	.28	.64	.26

*Values in this table are expressed as fractions of the total number of vehicles in each class. Misfueling rates are determined for the average mileage in each class. Misfueling rates are determined for the average mileage accumulated by each vehicle class of each vehicle age group.

**Misfueling rates for Heavy-Duty Gasoline Vehicles 1 (HDGV1) are estimates for 1987 and later calendar years. Currently all HDGV1s use leaded fuel. (For example, for the year 1990, use the first three values in either the non-I/M or I/M HDGV1 column. All HDGV1s greater than 3 years old in this case (i.e., pre-1987 vehicles) would have a misfueling rate of zero since they do not require use of unleaded fuel.

SOURCES: The equations used to estimate misfueling as a function of mileage for I/M and non-I/M areas are drawn from "Anti-Tampering and Anti-Misfueling Programs to Reduce In-Use Emissions from Motor Vehicles," EPA-AA-TSS-83-10, Office of Mobile Sources, December 31, 1983.

Weighted average mileages by vehicle category are calculated from data contained in MOBILE3.

TABLE 2-20

AVERAGE DATA ON PARTICLE SIZE DISTRIBUTION

Leaded Fuel, M_L	Cumulative Fraction of Particulate Mass Smaller Than Diameter		
	0.2 μ	2 μ	10 μ
Median Particle Fractions, M_L	0.23	0.43	0.64
Ranges of M_L Values*	0.18-0.28	0.28-0.58	0.45-0.84

References: (author summary of) Ninomiya et al, 1970; Moran et al, 1971; Gental et al, 1973; Cantwell et al, 1972; Boyer and Laitiner, 1975; Habibi et al, 1970; Hirschler and Gilbert, 1964.

Unleaded Fuel, M_{NL}	Cumulative Fraction of Particulate Mass Smaller Than Diameter		
	0.2 μ	2 μ	10 μ
$M_{NL,C}$	0.87	0.89	0.97
Ranges of $M_{NL,C}$ Valves**	0.86-0.88	0.84-0.94	0.84-1.00
$M_{NL,NC}$	0.42	0.66	0.90
Ranges of $M_{NL,C}$ Valves	0.29-0.55	0.52-0.80	0.63-1.00

References: (author summary of) Foster et al, 1976; Trayser et al, 1976; Foster et al, 1974; Melton et al, 1973; Habibi, 1973; Gental et al, 1973.

*95 percent confidence intervals on mean of data.

**95 percent confidence intervals by "t" statistics.

TABLE 2-20

AVERAGE DATA ON PARTICLE SIZE DISTRIBUTION (cont'd)

Diesel Fuel, M_D	Cumulative Fraction of Particulate Mass Smaller Than Diameter				
	0.2 μ	1.0 μ	2.0 μ	2.5 μ	10 μ
M_D	0.73	0.86	0.90	0.92	1.00
Ranges of M_D Values+	0.69-0.75	0.76-0.93	0.86-0.95	0.88-0.95	0.97-1.00

References: Breslin, et al, 1976; Hare, 1979, Bykowski, 1981; Bykowski, 1983; McCain and Faulkner, 1979; Vuk, et al, 1976; Begeman, 1979; Carpenter and Johnson, 1979; Verrant and Kittelson, 1977.

Brake Wear Particulate, M_B	Cumulative Fraction of Particulate Mass Smaller Than Diameter				
	0.43 μ	1.1 μ	4.7 μ	7 μ	10 μ
Median Particle Fractions, M_B++	0.09	0.16	0.82	0.90	0.98
Ranges of M_B Values	Not available				

Reference: Cha et al, 1983.

+Intermediate speed, no load, prechamber engine, 2D fuel.

++Samples for determining particle size distribution were collected by running about 20 braking cycles weighted to be representative of urban driving conditions.

TABLE 2-21

LOW ALTITUDE HDDV CONVERSTION FACTORS*

Model Year	Conversion Factor (CF_j)
1951-1962	2.7420
1963-1965	2.7307
1966-1968	2.8267
1969-1971	3.0080
1972-1974	3.1917
1975-1979	3.1420
1980-1981	2.7780
1982-1984	2.5580
1985	2.4700
1986	2.4260
1987-1992	2.3600
1993-1996	2.3175
1997-2000	2.3100

*These factors are used to convert emissions in g/Bhp-hr to g/mile. They are consistent with those contained in M.C. Smith, "Heavy-Duty Vehicle Emission Conversion Factors: 1962-1977," EPA-AA-SDSB-84-1, Office of Mobile Sourcs, August 1984.

TABLE 2-22

FRACTION OF LEAD BURNED THAT IS EMITTED, a_s

	$a_{s1,j}$*		$a_{s2,j}$**
All years	.75	1975-1980	.40
		1981+	.44

*$a_{s1,j}$ is used for all vehicles using unleaded gasoline and for vehicles without catalysts using leaded gasoline.

**$a_{s2,j}$ is used for catalyst equipped vehicles using leaded gasoline.

TABLE 2-23

FRACTION OF CATALYST EQUIPPED VEHICLES WITH CATALYST REMOVED, P_i*

	P_1	P_2 and P_3
I/M	.017	.050
Non-I/M	.045	.195

*Fractions obtained from "Anti-Tampering and Anti-Misfueling Programs to Reduce In-Use Emissions From Motor Vehicles," U.S. EPA, December 1983.

Figure 2-1

LEADED GASOLINE PARTICULATE SIZE DISTRIBUTION

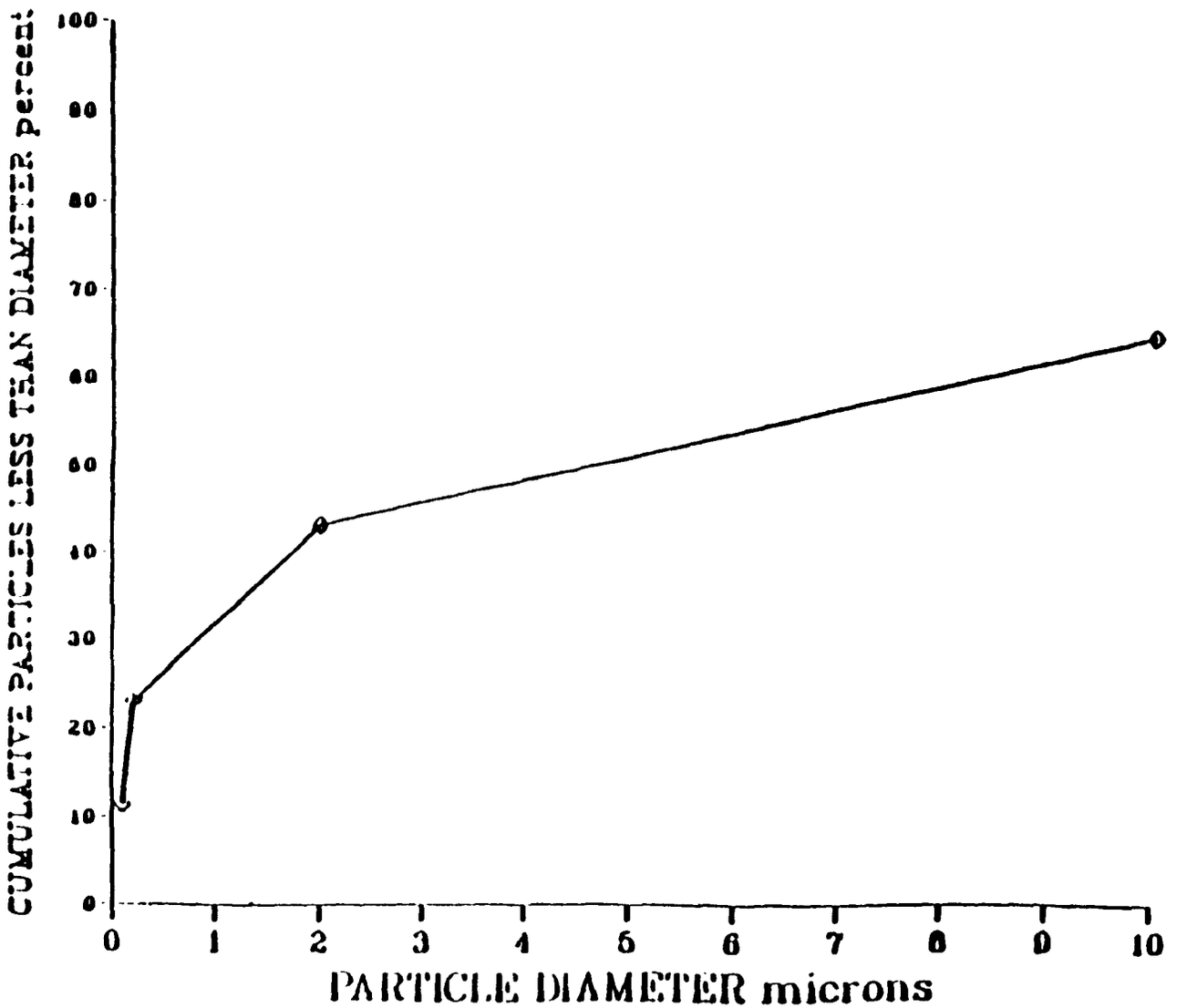


Figure 2-2

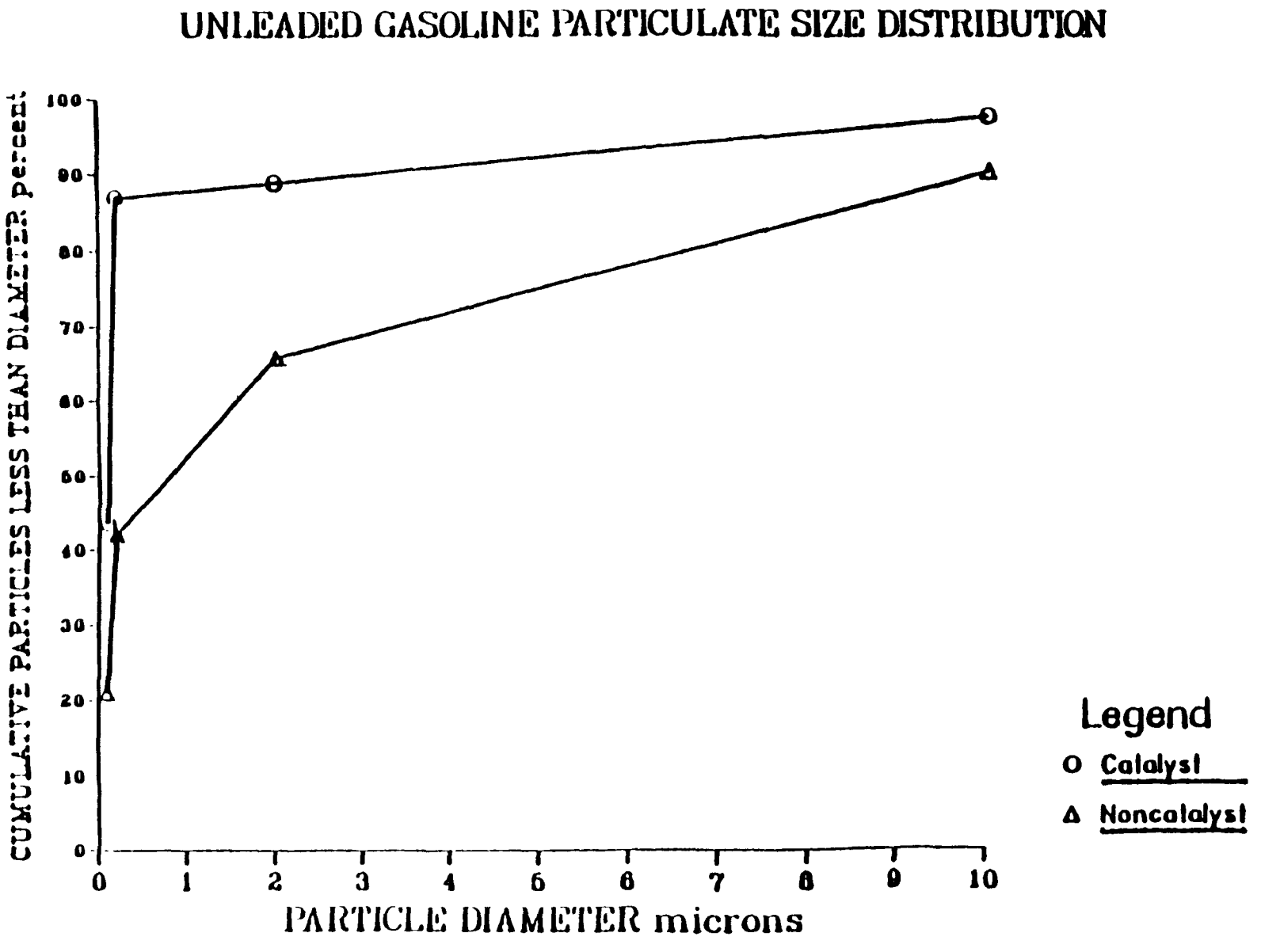

UNLEADED GASOLINE PARTICULATE SIZE DISTRIBUTION
CUMULATIVE PARTICLES LESS THAN DIAMETER percent
100
90
80
70
60
50
40
30
20
10
0
0
1
2
3
4
5
6
7
8
9
10
PARTICLE DIAMETER microns
Legend
Catalyst
Noncatalyst

Figure 2-3

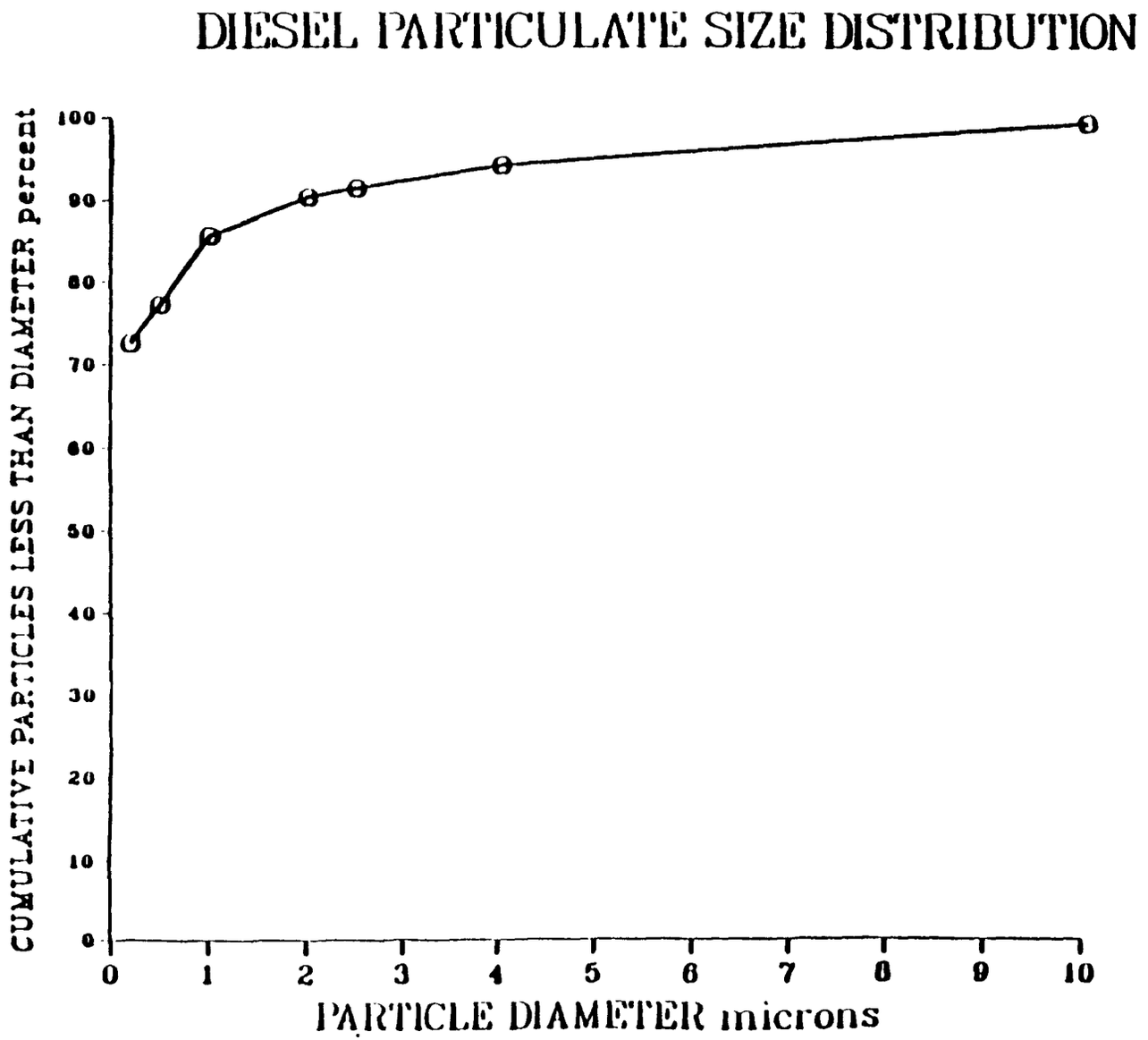
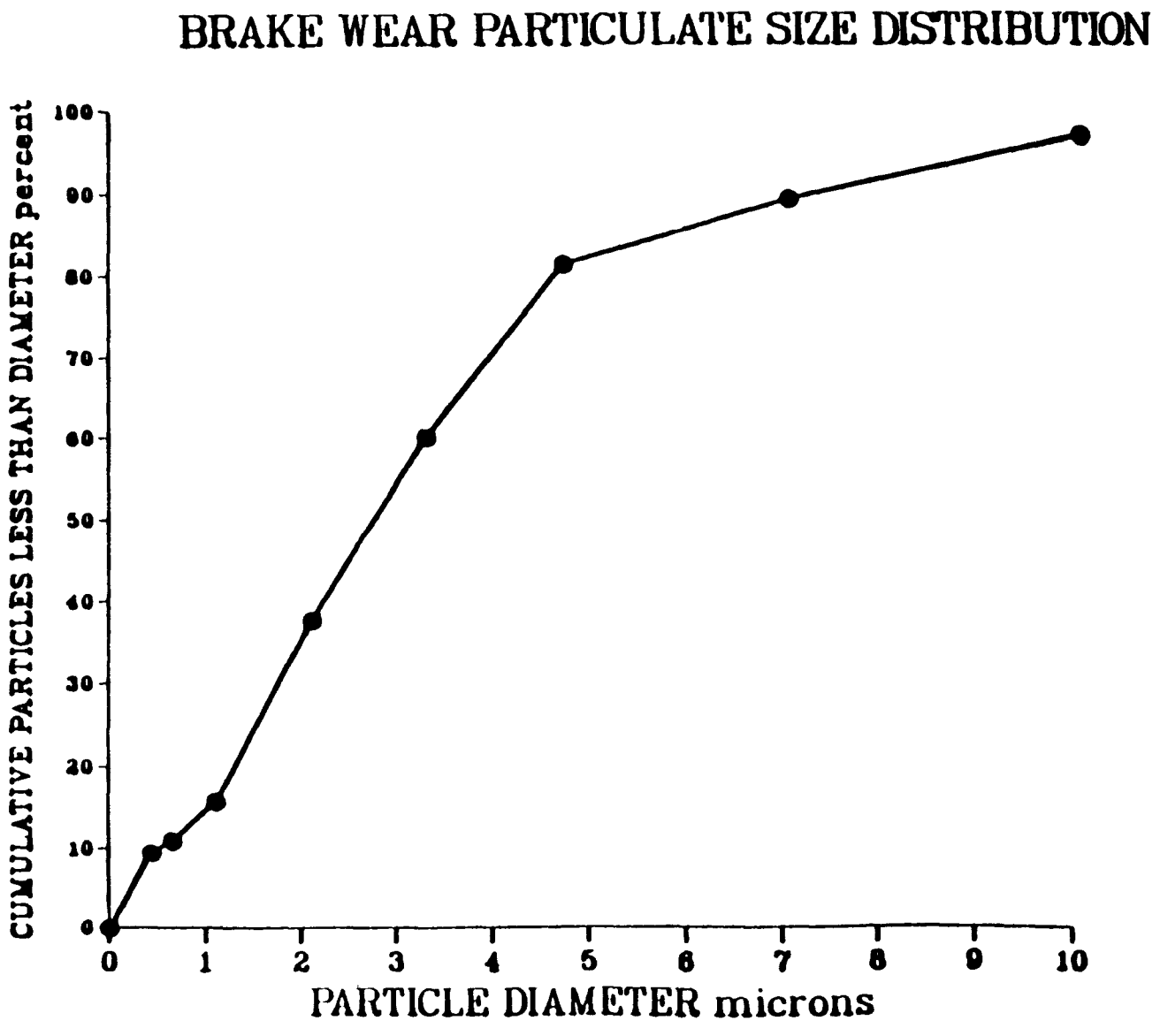

DIESEL PARTICULATE SIZE DISTRIBUTION
CUMULATIVE PARTICLES LESS THAN DIAMETER percent
100
90
80
70
60
50
40
30
20
10
0
0
1
2
3
4
5
6
7
8
9
10
PARTICLE DIAMETER microns

Figure 2-4


BRAKE WEAR PARTICULATE SIZE DISTRIBUTION
CUMULATIVE PARTICLES LESS THAN DIAMETER percent
100
90
80
70
60
50
40
30
20
10
0
0
1
2
3
4
5
6
7
8
9
10
PARTICLE DIAMETER microns

3. EXAMPLE CALCULATION OF AUTOMOBILE PARTICULATE EMISSIONS LESS THAN 10 MICRONS

PROBLEM

For an area characterized by light-duty vehicles driving under cyclic conditions with an average speed of 19.6 miles per hour, calculate the particulate emission rate of particles less than 10 μ in diameter for the year 1985. Assume an inspection and maintenance program has been implemented in this area. The simplified misfueling rates from Table 2-19 will be used.

SOLUTION

Use equations (2-1), (2-2), (2-3), (2-4), (2-5), (2-6), (2-7), (2-8), (2-9), (2-10), (2-12), (2-14), and (2-15).

Particulate Matter Size Cutoff = 10 μ

$n=1985 \quad i=1=LDV \quad s=19.6 \text{ mph} \quad M_B=0.98$

$t_{1,1985} = 1.0 \quad r_i$ (from Table 2-19) = 0.09

Base Equation (2-1): Total Particulate Emission Factors Vehicle Exhaust Particulate Component and Airborne Brake Wear Component and Airborne Tire Wear Component

$$EF_{PM10,1985,19.6} = (1.0)(EF_{1,1985,19.6}) + (0.0128)(0.98) + (0.002)$$

Total Vehicle Exhaust Particulate Emission Component (2-2)*:

$$EF_{1,1985,19.6} = \sum_{j=1966}^{1985} \Big[(EF_{1,1985,19.6}) + EF_{1,j,k_2,L} + EF_{1,j,k_3,L})$$

$$\times (F_{L,1,j}) + (EF_{1,j,k_1,1985,NL} + EF_{1,j,k_2,NL} + EF_{1,j,k_3,NL})$$

$$\times (F_{NL,1,j}) \Big] M_{i,j,G} + (EF_{1,j,D})(F_{D,1,j})\ m_{1,j,D}$$

where $Pb_{L,1985} = 1.1$ (g/gal)

$Pb_{NL,1985} = 0.014$ (g/gal)

$M_{L,10} = 0.64$

$M_{NL,C,10} = 0.97$

$M_{NL,C,10} = 0.90$

$M_D = 1.00$

a_s = from Table 2-22

$C_s = 0.79$

$P_i = 0.017$

Using the following equations to plug into Equation (2-2) and sum over the appropriate model years:

Lead Emission Factor Component (2-3a): Leaded Fuel

For j=1966-1970 k=1

$$EF_{1,j,k_1,1985,L} = \Big[(1.1)(.887)(0.64) + (0.014)(0.113)(0.90) \Big]$$

$$\times \frac{(0.75)(1.557)}{(E_{c1,j})(0.79)} = \frac{.925}{E_{c,i,j}}$$

---

*The numbers in ( ) in equation titles refer to the equations presented in Section 2.

Lead Emission Factor Component (2-3b): Leaded Fuel

For j=1971-1974 k=1

$$EF_{1,j,k_1,1985,L} = \left[(1.1)(.916)(0.64) + (0.014)(0.084)(0.90)\right] \times \frac{(0.75)(1.557)}{(E_{c,i,j})(0.79)} = \frac{.955}{E_{c,i,j}}$$

Lead Emission Factor Component (2-4): Leaded Fuel

For j=1975-1985 k=1

$$EF_{1,j,k_1,1985,L} = \left[(1.1)(0.724)(0.64) + (0.014)(0.276)(0.90)\right] \times \frac{(0.75)(1.557)}{(E_{c,i,j})(0.79)} = \frac{.7586}{E_{c,i,j}}$$

Lead Emission Factor Component (2-5): Unleaded Fuel

For j=1975-1985 k=1

$$EF_{1,j,k_1,1985,NL} = \Big[(0.014)(0.91)(0.97)(0.75) + (1.1)(0.09)(0.64)\left(F_{i,j,NL,NOCAT} + (0.17)(F_{i,j,NL,CAT})\right)(0.75) + (1.1)(0.09)(0.64)(.983)(F_{i,j,NL,CAT})(a_{s2,j})\Big] \times \frac{1.557}{E_{c,1,j}(0.79)}$$

$$= 1.557\left[\frac{(.009) + F_{i,j,NL,NOCAT} + (.017)(F_{i,j,NL,CAT})(.048) + (.062)F_{i,j,NL,CAT}(a_{s2,j})}{E_{c,1,j}(0.79)}\right]$$

$$= \frac{X,j}{E_{c,i,j}}$$

	$X_{,j}$
1985	.0731
1984	.0731
1983	.0731
1982	.0731
1981	.0731
1980	.0682
1979	.0682
1978	.0682
1977	.0682
1976	.0694
1975	.0717

Organic Emission Factor Component (2-6): Leaded Fuel

For j=1966-1969 k=2

$$EF_{1,j,k_2,L} = (0.193)(0.64) = 0.124 \text{ (g/mile)}$$

Organic Emission Factor Components (2-7): Leaded Fuel

For j=1970-1974 k=2

$$EF_{1,j,k_2,L} = (0.068)(0.64) = 0.044 \text{ (g/mile)}$$

Organic Emission Factor Component (2-8): Leaded Fuel

For j=1975-1985 k=2

$$EF_{1,j,k_2L} = (0.030)(0.64) = 0.019 \text{ (g/mile)}$$

Organic Emission Factor Component (2-9): Unleaded Fuel

For j=1975-1985 k=2

$$EF_{1,j,k_2,NL} = (0.91)(F_{i,j,CAT})(0.017)(0.97)$$

$$+ (0.09)(F_{1,j,CAT})(0.068)(0.64)$$

$$+ (F_{1,j,NL,NOCAT})(0.030)(0.90)$$

$$= (0.019)(F_{1,j,CAT}) + (0.027)(F_{1,j,NL,NOCAT})$$

Sulfate Emission Factor Component (2-10): Leaded Fuel

For j=1966-1985 k=3

$$EF_{1,j,k_3,L} = (0.002)(0.64) = 0.001 \text{ (g/mile)}$$

Sulfate Emission Factor Component (2-12): Unleaded Fuel

For j=1975-1985 k=3

$$EF_{1,j,k_3,NL} = (0.91)\Big[(F_{1,j,CAT/NOAIR})(0.005)(0.97)$$

$$+ (F_{1,j,CAT/AIR})(0.016)(0.97)$$

$$+ (F_{1,j,NL,NOCAT})(0.002)(0.90)\Big] + (0.09)(0.002)(0.64)$$

$$= \Big[(F_{1,j,CAT/NOAIR})(0.004) +)F_{1,j,CAT/AIR})(0.016)$$

$$+ (F_{1,j,NL,NOCAT})(0.002)\Big] + 0.0001$$

Diesel Particulate Emission Factor Component (2-14)

For j=1966-1980

$$EF_{1,j,D} = (0.700)(1.00) = 0.700 \text{ (g/mile)}$$

Diesel Particulate Emission Factor Component (2-15)

For j=1981-1985

$$EF_{1,j,D} = (0.300)(1.00) = 0.300 \text{ (g/mile)}$$

Table 3-1 presents the inputs and the sequence of calculations necessary to derive the LDV exhaust particulate emission factor components (using the above equations) and the total LDV exhaust particulate emission rate, $EF_{1,1985,19.6}$. This estimate is then combined with the airborne brake wear and airborne tire wear particulate components to obtain the total LDV particulate emission rate:

$$EF_{PM10,1985,19.6} = (1.0)(0.0581) + 0.0125 + 0.002 = 0.0726 \text{ (g/mile)}$$

This example is an estimate of particulate emissions from light-duty vehicles only. Therefore, the total emission rate from all vehicle classes for an area in calendar year 1985 can be expected to be considerably higher.

TABLE 3-1

EXAMPLE CALCULATIONS
LIGHT-DUTY VEHICLE PARTICULATE EMISSION RATE
LESS THAN 10 MICRONS FOR THE YEAR 1985

A. Emission Factor Component Calculation Inputs

Model Year $_j$	Age	$m_{l,j}$	$F_{NL,l,j}$	$F_{L,l,j}$	$E_{cl,j}$	$F_{D,l,j}$	$F_{l,j,CAT}$	$F_{l,j,NL,NOCAT}$	$F_{l,j,CAT/NOAIR}$	$F_{l,j,CAT/AIR}$
1985	1	0.038	0.934	-	24.6	0.066	1.000	-	0.381	0.691
1984	2	0.142	0.940	-	23.8	0.060	1.000	-	0.237	0.763
1983	3	0.125	0.947	-	23.2	0.053	1.000	-	0.194	0.806
1982	4	0.111	0.954	-	22.9	0.046	1.000	-	0.149	0.851
1981	5	0.098	0.939	-	21.5	0.061	1.000	-	0.296	0.704
1980	6	0.084	0.966	0.000	19.6	0.034	1.000	-	0.474	0.526
1979	7	0.075	0.875	0.097	17.8	0.028	1.000	-	0.655	0.345
1978	8	0.065	0.865	0.126	16.6	0.009	1.000	-	0.650	0.350
1977	9	0.055	0.838	0.158	15.5	0.004	1.000	-	0.650	0.350
1976	10	0.047	0.863	0.134	14.8	0.003	0.980	0.020	0.637	0.343
1975	11	0.040	0.869	0.128	13.8	0.003	0.919	0.081	0.597	0.322
1974	12	0.032	-	1.000	12.6	-	-	-	-	-
1973	13	0.026	-	1.000	12.9	-	-	-	-	-
1972	14	0.021	-	1.000	13.1	-	-	-	-	-
1971	15	0.015	-	1.000	13.2	-	-	-	-	-
1970	16	0.011	-	1.000	13.9	-	-	-	-	-
1969	17	0.007	-	1.000	13.9	-	-	-	-	-
1968	18	0.003	-	1.000	13.9	-	-	-	-	-
1967	19	0.003	-	1.000	13.9	-	-	-	-	-
1966-	20+	0.004	-	1.000	13.9	-	-	-	-	-

TABLE 3-1 (cont'd)

EXAMPLE CALCULATIONS
LIGHT-DUTY VEHICLE PARTICULATE EMISSION RATE
LESS THAN 10 MICRONS FOR THE YEAR 1985

B. Emission Factor Component Summation Descriptions

Summation (1) calculates the emission factor component in Equations (2-3a), (2-3b), and (2-4) that are used in Equation (2-2).

Summation (2) calculates the emission factor component in Equation (2-5) that is used in Equation (2-2).

Summation (3) calculates the emission factor component in Equations (2-6), (2-7), and (2-8) that are used in Equation (2-2).

Summation (4) calculates the emission factor component in Equation (2-9) that is used in Equation (2-2).

Summation (5) calculates the emission factor component in Equation (2-10) that is used in Equation (2-2).

Summation (6) calculates the emission factor component in Equation (2-12) that is used in Equation (2-2).

Summation (7) calculates the emission factor component in Equations (2-14) and (2-15) that are used in Equation (2-2).

TABLE 3-1

EXAMPLE CALCULATIONS
LIGHT-DUTY VEHICLE PARTICULATE EMISSION RATE
LESS THAN 10 MICRONS FOR THE YEAR 1985 (cont'd)

C. Emission Factor Component Calculations

Model Year, j	(1) $(EF_{1,j,k_1,1985,L})$ $(F_{L,1,j})(m_{1,j})$	(2) $(EF_{1,j,k_1,1985,NL})$ $(F_{NL,1,j})(m_{1,j})$	(3) $(EF_{1,j,k_2,L})$ $(F_{L,1,j})(m_{1,j})$	(4) $(EF_{1,j,k_2,NL})$ $(F_{NL,1,j})(m_{1,j})$	(5) $(EF_{1,j,k_3,L})$ $(F_{L,1,j})(m_{1,j})$	(6) $(EF_{1,j,k_3,NL})$ $(F_{NL,1,j})(m_{1,j})$	(7) $(EF_{1,j,D})$ $(F_{D,1,j})(m_{1,j})$
1985	-	0.0001	-	0.0007	-	0.0004	0.0008
1984	-	0.0004	-	0.0025	-	0.0017	0.0026
1983	-	0.0004	-	0.0022	-	0.0016	0.0020
1982	-	0.0003	-	0.0020	-	0.0015	0.0015
1981	-	0.0003	-	0.0017	-	0.0011	0.0018
1980	-	0.0003	-	0.0015	-	0.0008	0.0020
1979	0.0003	0.0003	0.0001	0.0012	0.00001	0.0005	0.0015
1978	0.0004	0.0002	0.0002	0.0011	0.00001	0.0005	0.0004
1977	0.0004	0.0002	0.0002	0.0009	0.00001	0.0004	0.0001
1976	0.0003	0.0002	0.0001	0.0008	0.00001	0.0003	0.0001
1975	0.0003	0.0002	0.0001	0.0007	0.00001	0.0003	0.0001
1974	0.0024	-	0.0014	-	0.00003	-	-
1973	0.0019	-	0.0011	-	0.00003	-	-
1972	0.0015	-	0.0009	-	0.00002	-	-
1971	0.0010	-	0.0007	-	0.00002	-	-
1970	0.0007	-	0.0004	-	0.00001	-	-
1969	0.0005	-	0.0009	-	0.00001	-	-
1968	0.0002	-	0.0004	-	0.00000	-	-
1967	0.0002	-	0.0004	-	0.00000	-	-
1966-	0.0003	-	0.0005	-	0.00000	-	-
SUM:	0.0104 +	0.0029 +	0.0074 +	0.0153 +	0.00017 +	0.0091 +	0.0129

.0581 (g/mile) = $EF_{1,1985,19.6}$

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APPENDIX A

TABLE A-1

AVERAGE ANNUAL MILEAGE BY VINTAGE FOR HEAVY-DUTY TRUCKS

Age	Class 2-B	Light HDDV	Medium HDDV	Heavy HDDV
1	18,352	45,544	53,370	82,288
2	16,946	39,671	46,901	74,984
3	15,648	34,558	41,190	68,328
4	14,449	30,092	36,206	62,263
5	13,342	26,213	31,812	56,737
6	12,320	22,834	27,948	51,700
7	11,376	19,898	24,556	47,111
8	10,504	17,332	21,575	42,930
9	9,700	15,098	18,956	39,119
10	8,956	13,152	16,655	35,647
11	8,270	11,456	14,632	32,483
12	7,637	9,979	12,856	29,599
13	7,052	8,693	11,296	26,972
14	6,511	7,572	9,925	24,578
15	6,012	6,596	8,719	22,396
16	5,552	5,746	7,661	20,408
17	5,126	5,005	6,728	18,597
18	4,734	4,360	5,913	16,946
19	4,371	3,798	5,196	15,442
20+	4,036	3,308	4,565	14,071

Source: MOBILE3.

TABLE A-2

PROJECTIONS OF HEAVY-DUTY VEHICLES IN OPERATION

Year	Class 2-B	Light HDDV	Medium HDDV	Heavy HDDV
1980	0.000	0.006	0.112	1.521
1981	0.000	0.006	0.124	1.581
1982	0.049	0.009	0.135	1.599
1983	0.014	0.013	0.141	1.592
1984	0.185	0.022	0.153	1.641
1985	0.274	0.037	0.166	1.719
1986	0.370	0.053	0.177	1.816
1987	0.475	0.071	0.185	1.927
1988	0.588	0.089	0.193	2.041
1989	0.707	0.106	0.201	2.151
1990	0.831	0.122	0.208	2.258
1991	0.960	0.137	0.215	2.362
1992	1.092	0.151	0.222	2.471
1993	1.225	0.165	0.229	2.581
1994	1.354	0.178	0.237	2.693
1995	1.480	0.190	0.245	2.807
1996	1.600	0.202	0.253	2.914
1997	1.712	0.212	0.261	3.015
1998	1.816	0.222	0.269	3.108
1999	1.912	0.230	0.276	3.194
2000	1.999	0.238	0.283	3.273

Source: MOBILE3.

APPENDIX M

SUPPLEMENTARY GUIDELINES FOR LEAD IMPLEMENTATION PLANS

Updated Projections for Motor Vehicle Lead Emissions

Final Report

DRAFT

EPA Contract No. 68-03-1865
Work Assignment No. 1

Prepared for:

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Mobile Source Air Pollution Control
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August 1985

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1. INTRODUCTION

The following material was developed to predict lead emission factors for gasoline fueled on-road vehicles and trucks at various vehicle speeds. User inputs to the equations to determine these emission factors include area travel fractions by vehicle class, vehicle miles traveled and vehicle speed. Fleet sales fractions and travel fractions by model year are included for each vehicle class. The fractions within each vehicle class that are equipped with catalysts also are provided. For the benefit of the user, an example calculation of lead emissions from light-duty vehicles is provided.

This document is an update to "Supplementary Guidelines for Lead Implementation Plans Updated Projections For Motor Vehicle Lead Emissions," U.S. EPA, EPA-450/2-83-002, Research Triangle Park, North Carolina, March 1983. This document provides updated projections for automotive lead emissions to be used by those agencies developing State Implementation Plans for lead. It has been revised to include estimates of travel fractions and fleet characterizations from the June 1984 EPA report, "User's Guide to MOBILE3 (Mobile Source Emissions Model)," EPA 460/3-84-002. It also reflects the final rulemaking recently issued by EPA which requires refiners to lower the lead content of leaded gasoline to 0.5 g/gallon on July 1, 1985 and 0.1 g/gallon by January 1, 1986 (Federal Register, Vol. 50, No. 45, March 7, 1985).

2. PROJECTING MOTOR VEHICLE LEAD EMISSIONS

Lead emissions from mobile sources are calculated based on the percentage of burned lead exhausted at different speeds, the lead content of gasoline, vehicle fuel economy and the model year mix of vehicles on the road. The lead content of gasoline and the model year vehicle mix are a function of the calendar year of interest. Fuel economy is averaged for all vehicles of the same model year in a given vehicle category.

2.1 OVERVIEW OF LEAD EMISSION CALCULATIONS

2.1.1 Individual Roadways or Areawide

For any given year subsequent to 1974, the total population of automobiles on the road consists of vehicles using either leaded or "non-leaded" (i.e., required to contain less than 0.050 gram/gallon lead) gasoline or diesel fuel. Diesel fuel is assumed to contain quantities of lead that are insignificant compared to gasoline fuel; therefore, only emissions from gasoline-powered vehicles are considered. The emission rate from automotive sources from an individual roadway (line source) is calculated by the following equation:

$$EF_{n,s} = \sum_{i=1}^{4} T(EF_{i,n,s}) \qquad (2\text{-}1)$$

where: $EF_{n,s}$ = total lead emission factor for calendar year n and speed s (g/road mile-day)

$EF_{i,n,s}$ = lead emission factor for vehicle class i in calendar year n and vehicle speed s (g/mi)

i = vehicle class designator; 1 = light-duty vehicles (LDV), 2 = light-duty trucks I (LDT1), 3 = light-duty trucks II (LDT2), and 4 = heavy-duty gas vehicles (HDGV)

s = vehicle speed; avg. Federal Test Procedure (FTP) = 19.6, avg. Sulfate Emissions Test (SET) = 34.8 (miles/hr); (Note: The FTP and SET are driving cycles used for the determination of emission factors.)

T = average daily traffic (vehicles/day)

To calculate the emission rate in units of grams/meter-second, $EF_{n,s}$ can be corrected by dividing by 1.39×10^8.

Equation (2-1) can be modified to calculate light-duty vehicle emissions as an area source rather than as specific line sources. The emission rate from automotive sources from an area source is calculated by the following equation:

$$EF_{n,s} = \sum_{i=1}^{4} V(EF_{i,n,s}) \qquad (2\text{-}2)$$

In equation (2-2), the term "T" was replaced by the term "V", the vehicle miles traveled in the area on a daily, monthly, or greater time basis. When VMT data are used, the emission rate, $EF_{n,s}$, will be expressed in grams per day, month, etc.

For both roadway and areawide emission calculations, the following generalized equation is used to compute emission factors for individual vehicle classes.

$$EF_{i,n,s} = \sum_{j=n-19}^{n} \left[(EF_{i,j,n,L})(F_{L,i,j}) + (EF_{i,j,n,NL})(F_{NL,i,j}) \right] m_{i,j} \qquad (2\text{-}3)$$

where: j = model year j = n-19, n-18,...,n-2, n-1, n

L = vehicles designed for use on leaded fuel

NL = vehicles designed for use on unleaded fuel

$F_{L,i,j}$ = fraction of the vehicle class i fleet designed for use on leaded gasoline in model year j

$F_{NL,i,j}$ = fraction of the vehicle class i fleet designed for use on unleaded gasoline in model year j

$m_{i,j}$ = travel fraction for all gasoline vehicles in class i in model year j

In the discussion which follows, specific emission component ($EF_{i,j,n,L}$ and $EF_{i,j,n,NL}$) factor equations are presented for each vehicle category.

2.2 EMISSION FACTORS FOR LIGHT-DUTY VEHICLES AND LIGHT-DUTY TRUCKS I AND II

To compute emission factors for leaded vehicles ($EF_{i,j,n,L}$) use equations (2-4), (2-5), and (2-6). For unleaded vehicles ($EF_{i,j,n,NL}$) use equation (2-7).

LDV (Pre MY 1971) and LDT (Pre MY 1971): Leaded Fuel

For i=1,2,3 j=n-19,...1970 C_s=from Table 2-1 $a_{s1,j}$=0.75

$$EF_{i,j,n,L} = \left[Pb_{L,n}(0.887) + Pb_{NL,n}(0.113)\right] \frac{0.75}{(E_{c,i,j})(C_s)} \qquad (2\text{-}4)$$

where: a_s = fraction of lead burned that is exhausted:

- for all non-catalyst vehicles and for catalyst vehicles using unleaded gasoline a_s = 0.75
- for catalyst vehicles using leaded gasoline in 1975-1980, $a_{s2,j}$ = .40
- for catalyst vehicles using leaded gasoline in 1981 and later, $a_{s2,j}$ = .44

C_s = speed-dependent fuel economy correction factor based on steady cruise or cyclic driving; available from Table 2-1 (nondimensional)

$Pb_{NL,n}$ = lead content of unleaded gasoline in calendar year n from Table 2-2 (g/gal)

$Pb_{L,n}$ = average lead content of leaded gasoline in calendar year n from Table 2-2 (g/gal)

$E_{c,i,j}$ = city/highway combined on-road fuel economy for model year j and vehicle class i from Table 2-9 (miles/gallon)

LDV (MY 1971-1974) and LDT (MY 1971): Leaded Fuel

For i=1,2 j=1971,...,1974 C_s=from Table 2-1 $a_{s1,j}$=0.75
and For i=3 j=1971,...,1978

$$EF_{i,j,n,L} = \left[Pb_{L,n}(.916) + Pb_{NL,n}(0.084)\right] \frac{0.75}{(E_{c,i,j})(C_s)} \qquad (2\text{-}5)$$

LDV (MY 1975+) and LDT (MY 1979+): Leaded Fuel

For i=1,2 j=1975,...,n C_s=from Table 2-1 $a_{s1,j}$=0.75
and For i=3 j=1979,...,n

$$EF_{i,j,n,L} = \left[Pb_{L,n}(0.724) + Pb_{NL,n}(0.276)\right] \frac{0.75}{(E_{c,i,j})(C_s)} \qquad (2\text{-}6)$$

LDV (MY 1975+) and LDT (MY 1979+): Unleaded Fuel

For i=1,2 j=1975,...,n C_s=from Table 2-1 a_s=from Table 2-13
and For i=3 j=1979,...,n

$$EF_{i,j,n,NL} = \left[Pb_{NL,n}(1-r_i)(a_{s1,j}) + Pb_{L,n}(r_i)\left(F_{i,j,NL,NOCAT} + (P_i)(F_{i,j,CAT})\right)(a_{s1,j}) + Pb_{L,n}(r_i)(1-P_i)F_{i,j,CAT})(a_{s2,j})\right] \frac{1}{(E_{c,i,j})(C_s)} \qquad (2\text{-}7)$$

where: r_i = misfueling rate for vehicle class i from Table 2-12

P_i = fraction of catalyst equipped vehicle in class i with their catalysts removed, from Table 2-14

$F_{i,j,CAT}$ = fraction of the unleaded vehicle class i fleet equipped with a catalyst in model year j

$F_{i,j,NL,NOCAT}$ = fraction of the unleaded vehicle class i fleet without a catalyst in model year j

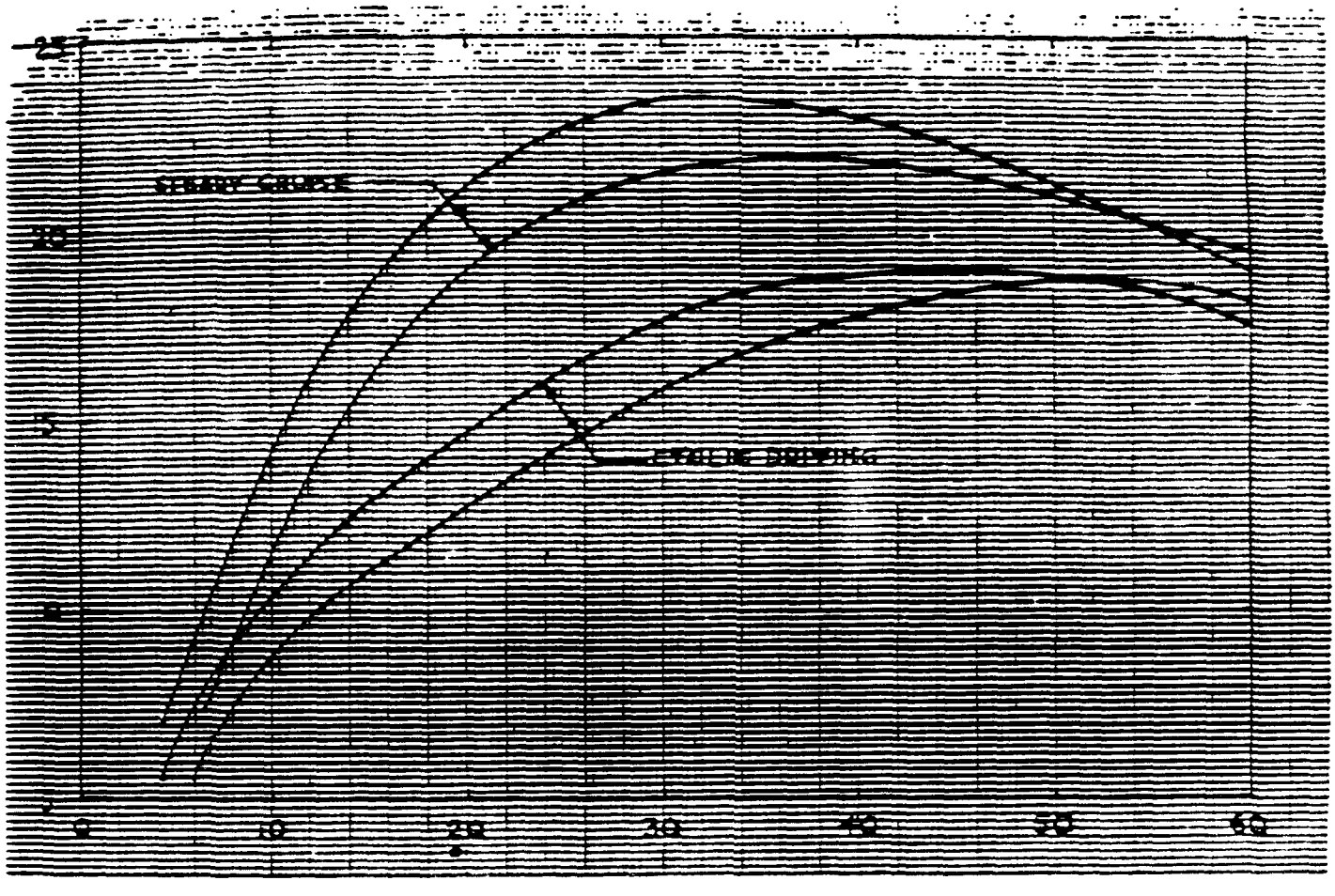
Equations (2-4), (2-5), and (2-6) collectively give the g lead/vehicle-road mile emitted by light-duty non-catalyst-equipped vehicles whereas equation (2-7) gives the g lead/vehicle-road mile emitted by catalyst-equipped vehicles. It should be noted that since 1975 a small number of non-catalyst-equipped vehicles ($F_{i,j,NL,NOCAT}$ from Table 2-15) have been certified for use on unleaded gasoline. Since these vehicles constitute such a small percentage of the total non-catalyst fleet, it will be assumed that the misfueling rate for these vehicles will be the same as that for catalyst equipped vehicles. Further discussion of selected variables used in the equations follows.

2.2.1 Speed Correction Factor

Figure 2-1 compares steady cruise fuel economy and generalized cyclic driving fuel economy to vehicle speed. Figure 2-1 was generated using data from 1973, 1974, and 1975 model year vehicles. Using the cyclic driving fuel economy at 32.7 miles per hour as the basis for comparison (since this speed is the average speed for the EPA combined city/highway fuel economy), fuel economy correction factors (C_s) for both steady cruise and cyclic driving can be calculated at various speeds. These calculations have been made and are presented in Table 2-1. Table 2-1 should be used to interpolate C_s for those speeds not listed in Table 2-1. The fuel economy correction factor for cyclic driving should be used for roadways that do not have steady speed. (The determination of how much variation in speed constitutes cyclic driving is judgmental. Questionable cases should be analyzed both ways.) Likewise, the fuel economy correction factor for steady cruise driving should be used if

Figure 2-1

FUEL ECONOMY AT VARIOUS SPEEDS*



SPEED, MPH

* Passenger Car Fuel Economy: EPA and Road, September 1980, [EPA-460/3-80-010].

free-flow, steady speed driving is indicated (e.g., along a highway at a relatively constant speed). The correction factors for cyclic and steady cruise driving become similar at high speeds as the number of stops, accelerations, and decelerations during cyclic driving decrease.

2.2.2 Fleet Travel and Fleet Sales Fractions

The fraction of annual travel by model year j ($m_{i,j}$) can be found in the last column of Tables 2-3, 2-5, and 2-7 for light-duty vehicles, light-duty trucks I, and light-duty trucks II. These values for ($m_{i,j}$) are EPA's estimates of the national values. Local values should be used where available. The term, "$m_{i,j}$" accounts for all light-duty vehicles in a given model year. The travel weighting fractions were taken from EPA's Mobile Sources Inventory Model, MOBILE3. (It should be noted that the travel weighting fractions reflect a January 1 evaluation date.)

The fractions of the model year j fleet using unleaded and leaded gasoline, $F_{NL,i,j}$ and $F_{L,i,j}$, respectively, are given in Table 2-4. Values for $F_{NL,i,j}$ and $F_{L,i,j}$ account for the increasing dieselization of the light-duty vehicle fleet. Diesel-powered vehicles are assumed to emit quantities of lead that are insignificant compared to gasoline-powered vehicles; therefore, sales fractions for diesel-powered vehicles are not included. Latest sales projections for diesel-powered vehicles were derived from MOBILE3 data. Estimates of the percentages of gasoline vehicles requiring leaded and unleaded fuel were obtained from Energy and Environmental Analysis, Inc., "The Highway Fuel Consumption Model: Tenth Quarterly Report," November 1983.

2.2.3 Misfueling and Fuel Switching

EPA has observed that misfueling rates (i.e., percentage of vehicles designed for use on unleaded gasoline that use leaded gasoline) are dependent on vehicle mileage and increase with vehicle mileage accumulation. Strictly speaking, this dependence on mileage should be

reflected in the calculation of lead emissions, with each model year receiving its own misfueling rate. However, this further complicates an already complex calculation. To give the user a choice, this report offers both the option of using a single average misfueling rate for all model years of a given vehicle class and exact misfueling rates for each vehicle class by vehicle age. The single average rates are determined for the weighted average mileage accumulated for each vehicle class and are listed in Table 2-12 for inspection and maintenance (I/M) and non-I/M areas. In other words, in the calculation of emission factors from 1975 on, the misfueling rate (r_i) depends only on which vehicle class (i) is being considered and whether the area of interest has an I/M program. As a result, misfueling rates and lead emissions will be slightly overestimated, with the degree of overestimation declining with later evaluation years and essentially disappearing in 1995. For users who desire more accuracy, Table 2-12a gives exact misfueling rates for different vehicle ages and classes affected by misfueling. For misfueled vehicles with their catalysts removed, the fraction (P_i) in Table 2-14 is applied to the fraction of vehicles with catalysts ($F_{1,j,CAT}$) in Table 2-15. These misfueling rates have been derived from the December 1983 EPA Report, Anti-Tampering and Anti-Misfueling Programs to Reduce In-Use Emissions From Motor-Vehicles, EPA-AA-TSS-83-10.

Discretionary fuel switching (i.e., percentage of vehicles designed for use on leaded gasoline that use unleaded gasoline) is assumed to equal 11.3 percent of the leaded fleet prior to 1971, and 8.4 percent from 1971 to 1974 for the LDV and LDT I categories. The discretionary rate for the LDT II class is 8.4 percent from 1971 to 1978, and 27.6 percent thereafter. For the LDV and LDT1 classes, discretionary switching is assumed to be 27.6 percent after 1974. The discretionary fuel switching rates were obtained from Energy and Environmental Analysis, Inc., Assessment of Current and Projected Trends in Light-Duty Vehicle Fuel Switching, June 1984.

The effect of discretionary fuel switching for vehicles designed for use on leaded fuel has been incorporated into equations (2-4), (2-5), and (2-6).

2.2.4 Fuel Economy and Fuel Lead Content

Fuel economy is yet another factor affecting lead emission levels. The city/highway combined on-road fuel economies, $E_{c,i,j}$ for model years 1970 to 1988 are given in Table 2-9. LDV fuel economy estimates were taken from an internal EPA memorandum by Karl Hellman to Ralph Stahman dated June 5, 1984. LDT fuel economies were obtained from Energy and Environmental Analysis, (EEA) Inc., "The Highway Fuel Consumption Model - Tenth Quarterly Report," November 1983. HDGV mpg estimates were drawn from an EPA memo to Mark Wolcott from Cooper Smith dated July 2, 1984.

Area lead particulate emissions also are dependent upon the lead content of gasoline in a given calendar year. Values for the lead content of leaded ($Pb_{L,n}$) and unleaded gasoline ($Pb_{NL,n}$) are contained in Table 2-2. Values for future years will be updated as new information becomes available.

2.2.5 Percent of Fuel Burned That is Exhausted (a_s)

A value for a_s of 0.75 (i.e., 75 percent of the lead burned is exhausted) should be used for non-catalyst-equipped, gasoline-powered vehicles operating on leaded fuel, and for all vehicles using unleaded fuel. For gasoline powered vehicles equipped with catalysts, a value of $a_s = 0.40$ for 1975 to 1980 and $a_s = 0.44$ for 1981 and later model year vehicles that have been misfueled, should be used. The value of a_s was computed from lead retention of monolithic and pelleted catalysts, respectively, and weighted for the sales mix of these catalysts in each

time frame. These values of a_s do not vary with speed, since a_s is more correlated with driving mode, e.g., acceleration, cruise or deceleration, rather than speed alone.

2.3 LEAD EMISSIONS FROM OTHER GASOLINE-POWERED VEHICLES

In addition to light-duty gasoline-powered vehicles, other vehicles to consider include heavy-duty gasoline-powered trucks. (Motorcycles are assumed to emit quantities of lead that are insignificant compared to other gasoline-powered vehicles.)

Heavy-duty gasoline-powered trucks are assumed to burn leaded gasoline until 1987. It is assumed that emission standards effective in 1987 will require all new heavy-duty gasoline-powered trucks under 14,001 lbs GVW to use catalytic converters and thereby burn unleaded fuel. The emission rate for heavy-duty gasoline powered trucks prior to 1987 is calculated by using the following modification of equation (2-4):

HDGV (Pre MY 1987): Leaded Fuel

For $i=4$ $j=n-19,\ldots,1986$ C_s=from Table 2-1 $a_{s1,j}=0.75$

$$EF_{i,n,s} = \frac{a_{s1,j}\ Pb_{L,n}}{E_{c,i,j}\ C_s} \qquad (2\text{-}8)$$

HDGV (Post MY 1986): Leaded Fuel

For $i=4$ $j=1987,\ldots,n$ C_s=from Table 2-1 a_s=from Table 2-13

$$EF_{i,n,s} = \frac{Pb_{NL,n}\, m_{i,j}(1-r_i)(a_{s1,j})}{E_{c,4a,i}{}^{*}\ (C_s)} + \frac{Pb_{L,n}\, m_{i,j}(r_i)(a_{s2,j})}{E_{c,4b,i}{}^{**}\ (C_s)} \qquad (2\text{-}9)$$

---

*4a represents the fuel economy for HDGV1 after 1986.

**4b represents the fuel economy for HDGV2 after 1986.

Values for the variables used in equations (2-8) and (2-9) are given in the following tables/figures:

Variable	HDGV
a_s	Table 2-13
C_s	Table 2-1
$Pb_{NL,n}$; $Pb_{L,n}$	Table 2-2
$m_{i,j}$	Table 2-10
$E_{c,i,j}$	Table 2-9
R_i	Table 2-12

Fleet sales fractions for heavy-duty gasoline vehicles projected to 1995, are given in Table 2-11. Heavy-duty gasoline vehicles have a gross vehicle weight (GVW) rating of greater than 8,500 lbs GVW. The fleet sales fractions are decreasing with model year, reflecting the increasing dieselization of the heavy-duty fleet. These estimated fleet sales fractions can be used when projecting T, the average daily traffic (heavy-duty gasoline trucks/day), for future years.

TABLE 2-1

FUEL ECONOMY CORRECTION FACTORS AT VARIOUS SPEEDS, C_s
(Normalized to 32.7 miles/hour-cyclic driving)

	Speed (mph)	C_s Cyclic Driving	C_s Steady Cruise
	5	0.323	0.467
	10	0.553	0.709
	15	0.692	0.997
(FTP)	20	0.790	1.153
	25	0.885	1.248
	30	0.963	1.294
	32.7	1.000	1.303
(SET)	35	1.022	1.303
	40	1.053	1.288
	45	1.073	1.256
	50	1.078	1.210
	55	1.063	1.159
	60	1.023	1.104

TABLE 2-2

LEAD CONTENT OF GASOLINE

Year	Leaded Gasoline* (g/gal) Pb_L	Unleaded Gasoline (g/gal) Pb_{NL}
1974	1.79	0.014
1975	1.82	0.014
1976	2.02	0.014
1977	2.03	0.014
1978	1.94	0.014
1979	1.85	0.014
1980	1.38	0.014
1981	1.15	0.014
1982	1.24	0.014
1983	1.14	0.014
1984	1.10	0.014
1985	0.50	0.014
1986	0.10	0.014
1987	0.10	0.014
1988	0.10	0.014
1989	0.10	0.014
1990	0.10	0.014

*1974-1982: Lead content based upon data submitted to EPA on historical sales data for leaded gasoline and data indicating the actual pooled average lead content. The value for unleaded gasoline is based on recent MVMA fuel surveys.

1983-1990: Lead content based upon requirements for average lead content of leaded gasoline which were recently revised by EPA for 1985 and beyond and published in the Federal Register (Federal Register, Vol. 50, No. 45, March 7, 1985).

TABLE 2-3

TRAVEL WEIGHTING FACTOR CALCULATION*
Light-Duty Vehicles

Vehicle Age	(a) January 1 Fraction Total Registration	(b) Annual Mileage Accumulation Rate	(a)(b)	[(a)(b)/(SUM)] Fraction of LDV Travel by Model Year, $m_{1,j}$
1	0.028	12,818	358.9	0.038
2	0.107	12,639	1,352.4	0.142
3	0.100	11,933	1,193.3	0.125
4	0.094	11,268	1,059.2	0.111
5	0.088	10,639	936.2	0.098
6	0.080	10,045	803.6	0.084
7	0.075	9,485	711.4	0.075
8	0.069	8,955	617.9	0.065
9	0.062	8,455	524.2	0.055
10	0.056	7,983	447.0	0.047
11	0.050	7,538	376.9	0.040
12	0.043	7,117	306.0	0.032
13	0.037	6,720	248.6	0.026
14	0.031	6,345	196.7	0.021
15	0.024	5,991	143.8	0.015
16	0.018	5,657	101.8	0.011
17	0.012	5,341	64.1	0.007
18	0.008	4,043	32.3	0.003
19	0.006	4,762	28.6	0.003
20+	0.008	4,496	36.0	0.004
		SUM:	9,538.9	

*Data derived from MOBILE3.

TABLE 2-4

FLEET SALES FRACTIONS
Light-Duty Vehicles*

Model Years	Nonleaded Gasoline Fraction of LDV Fleet, $F_{NL,l,j}$**	Leaded Gasoline Fraction of LDV Fleet, $F_{L,l,j}$
Pre-1975	0.000	1.000
1975	0.869	0.128
1976	0.863	0.134
1977	0.838	0.158
1978	0.865	0.126
1979	0.875	0.097
1980	0.966	0.000
1981	0.939	0.000
1982	0.954	0.000
1983	0.947	0.000
1984	0.940	0.000
1985	0.934	0.000
1986	0.927	0.000
1987	0.920	0.000
1988	0.910	0.000
1989	0.900	0.000
1990	0.887	0.000
1991	0.887	0.000
1992	0.886	0.000
1993	0.886	0.000
1994	0.885	0.000
1995+	0.885	0.000

Where $F_{NL,l}$ = Estimated fraction of the LDV model year fleet which use nonleaded gasoline

$F_{L,l}$ = Estimated fraction of the LDV model year fleet which use leaded gasoline

*Percentages of gasoline vehicles requiring leaded and nonleaded fuel obtained from EPA Certification Data Base.

**Diesel and gasoline sales projections were derived from MOBILE3.

TABLE 2-5

TRAVEL WEIGHTING FACTOR CALCULATION*
Light-Duty Gas Trucks I**

Vehicle Age	(a) January 1 Fraction Total Registration	(b) Annual Mileage Accumulation Rate	(a)(b)	[(a)(b)/(SUM)] Fraction of LDV Travel by Model Year, $m_{2,j}$
1	0.023	17,394	400.1	0.036
2	0.089	17,079	1,520.0	0.135
3	0.085	15,839	1,346.3	0.120
4	0.081	14,690	1,189.9	0.106
5	0.076	13,624	1,035.4	0.092
6	0.072	12,636	909.8	0.081
7	0.068	11,719	796.9	0.071
8	0.064	10,868	695.6	0.062
9	0.060	10,080	604.8	0.054
10	0.055	9,348	514.1	0.046
11	0.050	8,670	433.5	0.039
12	0.046	8,041	369.9	0.033
13	0.042	7,457	313.2	0.028
14	0.038	6,916	262.8	0.023
15	0.034	6,415	218.1	0.019
16	0.029	5,949	172.5	0.015
17	0.025	5,517	137.9	0.012
18	0.021	5,117	107.5	0.009
19	0.017	4,746	80.7	0.007
20	0.025	4,402	110.1	0.010
		SUM:	11,219.1	

*Data derived from MOBILE3.
**Light-duty trucks I have a gross vehicle weight (GVW) rating of 6,000 pounds or less.

TABLE 2-6

FLEET SALES FRACTIONS
Light-Duty Trucks I*

Model Years	Unleaded Gasoline Fraction of LDT1 Fleet, $F_{NL,2}$**	Leaded Gasoline Fraction of LDT1 Fleet, $F_{L,2}$
Pre-1975	0.000	1.000
1975	0.810	0.188
1976	0.909	0.088
1977	0.957	0.038
1978	0.964	0.027
1979	0.942	0.030
1980	0.945	0.021
1981	0.914	0.026
1982	0.899	0.021
1983	0.878	0.022
1984	0.870	0.000
1985	0.840	0.000
1986	0.820	0.000
1987	0.790	0.000
1988	0.760	0.000
1989	0.730	0.000
1990	0.706	0.000
1991	0.697	0.000
1992	0.688	0.000
1993	0.679	0.000
1994	0.670	0.000
1995+	0.661	0.000

Where $F_{NL,2}$ = Estimated fraction of the LDT1 model year fleet which use nonleaded gasoline.

$F_{L,2}$ = Estimated fraction of the LDT1 model year fleet which use leaded gasoline.

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*Percentages of gasoline vehicles requiring leaded and unleaded fuel obtained from Energy and Environmental Analysis, Inc., "The Highway Fuel Consumption Model: Tenth Quarterly Report," November 1983.

**Diesel and gasoline sales projections were derived from MOBILE3.

TABLE 2-7

TRAVEL WEIGHTING FACTOR CALCULATION*
Light-Duty Gas Trucks II**

Vehicle Age	(a) January 1 Fraction Total Registration	(b) Annual Mileage Accumulation Rate	(a)(b)	[(a)(b)/(SUM)] Fraction of LDT2 Travel by Model Year, $m_{3,j}$
1	0.023	18,352	422.1	0.036
2	0.089	18,001	1,602.1	0.138
3	0.085	16,622	1,412.9	0.122
4	0.081	15,348	1,243.2	0.107
5	0.076	14,172	1,077.1	0.093
6	0.072	13,087	942.3	0.081
7	0.068	12,084	821.7	0.071
8	0.064	11,158	714.1	0.062
9	0.060	10,303	618.2	0.053
10	0.055	9,514	523.3	0.045
11	0.050	8,785	439.3	0.038
12	0.046	8,112	373.2	0.032
13	0.042	7,491	314.6	0.027
14	0.038	6,917	262.8	0.023
15	0.034	6,386	217.1	0.019
16	0.029	5,897	171.0	0.015
17	0.025	5,446	136.2	0.012
18	0.021	5,028	105.6	0.009
19	0.017	4,643	78.9	0.007
20+	0.025	4,287	107.2	0.009
		SUM:	11,582.9	

*Data derived from MOBILE3.

**Light-duty trucks II have a gross vehicle weight (GVW) rating of 6,001 to 8,500 pounds.

TABLE 2-8

FLEET SALES FRACTIONS
Light-Duty Trucks II*

Model Years	Unleaded Gasoline Fraction of LDT2 Fleet, $F_{NL,3}$**	Leaded Gasoline Fraction of LDT2 Fleet, $F_{L,3}$
Pre-1975	0.000	1.000
1975	0.000	0.998
1976	0.000	0.997
1977	0.000	0.995
1978	0.000	0.991
1979	0.972	0.000
1980	0.966	0.000
1981	0.940	0.000
1982	0.920	0.000
1983	0.900	0.000
1984	0.870	0.000
1985	0.840	0.000
1986	0.820	0.000
1987	0.790	0.000
1988	0.760	0.000
1989	0.730	0.000
1990	0.706	0.000
1991	0.697	0.000
1992	0.688	0.000
1993	0.679	0.000
1994	0.670	0.000
1995+	0.661	0.000

WHERE $F_{NL,3}$ = Estimated fraction of the LDT2 model year fleet which use nonleaded gasoline.

$F_{L,3}$ = Estimated fraction of the LDT2 model year fleet which use leaded gasoline.

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*Percentages of gasoline vehicles requiring leaded and nonleaded fuel obtained from Energy and Environmental Analysis, Inc., "The Highway Fuel Consumption Model: Tenth Quarterly Report," November 1983.

**Diesel and gasoline sales projections were derived from MOBILE3.

TABLE 2-9

CITY/HIGHWAY COMBINED ON-ROAD FUEL ECONOMY
(miles/gallon)

Model Year	Fuel Economy, $E_{c,i,j}$					
	LDV*	LDT1**	LDT2	HDGV1+	HDGV2	HDGV++
Pre-1970	13.9	10.6	7.9	-	-	6.5
1970	13.9	10.6	7.9	-	-	6.4
1971	13.2	10.4	7.7	-	-	6.4
1972	13.1	10.2	7.4	-	-	6.4
1973	12.9	9.9	7.0	-	-	6.5
1974	12.6	9.6	6.9	-	-	6.7
1975	13.5	11.6	8.8	-	-	6.8
1976	14.8	12.3	9.7	-	-	7.3
1977	15.5	13.0	9.4	-	-	7.7
1978	16.8	13.4	9.6	-	-	8.0
1979	17.2	14.2	9.8	-	-	8.2
1980	20.0	16.1	11.5	-	-	8.4
1981	21.4	17.7	13.3	-	-	8.6
1982	22.2	18.6	13.6	-	-	8.8
1983	22.2	19.2	13.7	-	-	8.9
1984	22.8	19.9	13.9	-	-	8.9
1985	23.2	20.7	14.0	-	-	9.0
1986	23.8	21.4	14.3	-	-	9.0
1987	24.3	23.0	14.5	9.5	5.6	9.0
1988	24.8	23.3	14.7	9.5	5.6	9.1
1989	25.2	23.1	14.9	9.6	5.6	9.2
1990	25.7	24.0	15.2	9.7	5.6	9.2
1991	26.2	24.5	15.4	9.7	5.7	9.3
1992	26.6	24.4	15.7	9.8	5.7	9.4
1993	27.2	25.3	15.9	9.8	5.7	9.4
1994	27.6	25.8	16.2	9.9	5.7	9.5
1995 and later	29.0	26.2	16.4	10.1	5.8	9.6

*Fuel economies for LDV's from MOBILE3 data based on EPA memo from Karl H. Hellman to Ralph C. Stahman regarding Light-Duty MPG, June 15, 1984.

**Fuel economies for LDT's drawn from the input data used to generate "The Highway Fuel Consumption Model: Tenth Quarterly Report," prepared by Energy and Environmental Analysis, Inc.

+Fuel economies for Heavy-duty gasoline vehicles (HDGV) were derived from figure presented in an EPA memo to Mark Wolcott from Cooper Smith, dated July 2, 1984.

++Pre-1986 fuel economies are composites of HDGV1 and HDGV2.

TABLE 2-10

TRAVEL WEIGHTING FACTOR CALCULATION*
Heavy-Duty Gasoline Vehicle (HDGV)**

Vehicle Age	(a) January 1 Fraction Total Registration	(b) Annual Mileage Accumulation Rate	(a)(b)	[(a)(b)/(SUM)] Fraction of HDGT Travel by Model Year, $m_{4,j}$
1	0.000	0	0.0	0.000
2	0.148	19,967	2,955.1	0.227
3	0.126	18,077	2,277.7	0.175
4	0.107	16,365	1,751.1	0.134
5	0.092	14,815	1,363.0	0.105
6	0.078	13,413	1,046.2	0.080
7	0.067	12,143	813.6	0.062
8	0.058	10,993	637.6	0.049
9	0.049	9,952	487.6	0.037
10	0.041	9,010	369.4	0.028
11	0.036	8,156	293.6	0.023
12	0.030	7,384	221.5	0.017
13	0.026	6,685	173.8	0.013
14	0.022	6,052	133.1	0.010
15	0.020	5,479	121.0	0.009
16	0.016	4,960	79.4	0.006
17	0.014	4,490	62.9	0.005
18	0.012	4,065	48.8	0.004
19	0.010	3,680	36.8	0.003
20+	0.049	3,332	163.3	0.013
		SUM:	13,035.5	

*Data derived from MOBILE3.

**Heavy-duty gasoline vehicles have a gross vehicle weight (GVW) rating greater than 8,500 pounds.

TABLE 2-11

FLEET SALES FRACTIONS
Heavy-Duty Gasoline Vehicles (HDGV)*

Model Years	Unleaded Fraction of HDGV Fleet $F_{L,4,j}$**	Leaded Fraction of HDGV Fleet $F_{L,4,j}$**
Pre-1977	0.000	1.000
1977	0.000	1.000
1978	0.000	1.000
1979	0.000	1.000
1980	0.000	1.000
1981	0.000	1.000
1982	0.000	1.000
1983	0.000	1.000
1984	0.000	1.000
1985	0.000	1.000
1986	0.000	1.000
1987	0.823	0.177
1988	0.824	0.176
1989	0.825	0.175
1990	0.826	0.174
1991	0.828	0.172
1992	0.829	0.171
1993	0.833	0.167
1994	0.837	0.163
1995	0.840	0.159

*Heavy-duty gasoline vehicles have a gross vehicle weight (GVW) rating greater than 8,500 pounds.

**The estimated fractions of the HDGV model year fleets which are unleaded are based on figures from "Historical and Projected Emissions Conversion Factor and Fuel Economy for Heavy-Duty Trucks 1962-2002," prepared for MVMA by Energy and Environmental Analysis, Inc., December 1983. These estimates are consistent with the data presented in "Heavy-Duty Vehicle Emission Conversion Factors: 1962-1997 prepared by M.C. Smith IV, U.S. Environmental Protection Agency, August, 1984.

TABLE 2-12

RATES OF MISFUELING (r_i)

FOR DIFFERENT VEHICLE CLASSES*

	I/M	Non-I/M
Light-Duty Vehicles (i=1)	0.09	0.20
Light-Duty Trucks I (i=2)	0.20	0.46
Light-Duty Trucks II (i=3)	0.21	0.47
Heavy-Duty Gasoline Vehicles I (i=4)**	0.19	0.40

*Values in this table are expressed as fractions of the total number of vehicles in each class. Misfueling rates are determined for the weighted average mileage accumulated for each vehicle class.

**Misfueling rates for Heavy-Duty Gasoline Vehicles pertain only to those trucks made after model year 1986.

SOURCES: The equations used to estimate misfueling as a function of mileage for I/M and non-I/M areas are drawn from "Anti-Tampering and Anti-Misfueling Programs to Reduce In-Use Emissions from Motor Vehicles," EPA-AA-TSS-83-10, Office of Mobile Sources, December 31, 1983.

Weighted average mileages by vehicle category are calculated from data contained in MOBILE3.

TABLE 2-12a

RATES OF MISFUELING (r_i) FOR DIFFERENT VEHICLE AGES AND CLASSES*

Vehicle Age	LDV		LDTI		LDTII		HDGV1 **	
	Non-I/M	I/M	Non-I/M	I/M	Non-I/M	I/M	Non-I/M	I/M
1	.04	.04	.22	.13	.23	.13	.18	.12
2	.07	.05	.27	.14	.27	.15	.23	.13
3	.10	.06	.31	.16	.32	.16	.28	.15
4	.13	.07	.35	.17	.36	.17	.32	.16
5	.16	.08	.38	.18	.39	.18	.36	.17
6	.18	.09	.42	.19	.43	.19	.39	.18
7	.21	.09	.45	.20	.46	.20	.42	.19
8	.23	.10	.47	.21	.49	.21	.45	.20
9	.25	.11	.50	.21	.51	.22	.48	.21
10	.27	.11	.52	.22	.54	.23	.50	.22
11	.29	.12	.55	.23	.56	.23	.52	.22
12	.31	.12	.57	.24	.58	.24	.54	.23
13	.33	.13	.59	.24	.60	.25	.56	.23
14	.34	.13	.60	.25	.62	.25	.57	.24
15	.36	.14	.62	.25	.63	.26	.59	.24
16	.37	.14	.64	.26	.65	.26	.60	.25
17	.39	.15	.65	.26	.66	.26	.61	.25
18	.40	.15	.66	.26	.68	.27	.62	.25
19	.41	.15	.68	.27	.69	.27	.63	.25
20+	.42	.16	.69	.27	.70	.28	.64	.26

*Values in this table are expressed as fractions of the total number of vehicles in each class. Misfueling rates are determined for the average mileage in each class. Misfueling rates are determined for the average mileage accumulated by each vehicle class of each vehicle age group.

**Misfueling rates for Heavy-Duty Gasoline Vehicles 1 (HDGV1) are estimates for 1987 and later calendar years. Currently all HDGV1s use leaded fuel. (For example, for the year 1990, use the first three values in either the non-I/M or I/M HDGV1 column. All HDGV1s greater than 3 years old in this case (i.e., pre-1987 vehicles) would have a misfueling rate of zero since they do not require use of unleaded fuel.

SOURCES: The equations used to estimate misfueling as a function of mileage for I/M and non-I/M areas are drawn from "Anti-Tampering and Anti-Misfueling Programs to Reduce In-Use Emissions from Motor Vehicles," EPA-AA-TSS-83-10, Office of Mobile Sources, December 31, 1983.

Weighted average mileages by vehicle category are calculated from data contained in MOBILE3.

TABLE 2-13

FRACTION OF LEAD BURNED THAT IS EXHAUSTED, a_s

	$a_{s1,j}$*		$a_{s2,j}$**
All years	.75	1975-1980	.40
		1981+	.44

---

*$a_{s1,j}$ is used for all vehicles using unleaded gasoline and for vehicles without catalysts using leaded gasoline.

**$a_{s2,j}$ is used for catalyst equipped vehicles using leaded gasoline.

TABLE 2-14

FRACTION OF CATALYST EQUIPPED VEHICLES WITH CATALYST REMOVED, P_i*

	P_1	P_2 and P_3
I/M	.017	.050
Non-I/M	.045	.195

*Fractions obtained from "Anti-Tampering and Anti-Misfueling Programs to Reduce In-Use Emissions From Motor Vehicles," U.S. EPA, December 1983.

TABLE 2-15

FRACTION OF CATALYST AND NON-CATALYST VEHICLES BUILT TO USE UNLEADED FUEL

	LDV		LDTI		LDTII	
	$F_{1,i,CAT}$	$F_{1,i,NL,NOCAT}$	$F_{2,i,CAT}$	$F_{2,i,NL,NOCAT}$	$F_{3,i,CAT}$	$F_{3,i,NL,NOCAT}$
1975	0.919	0.081	0.877	0.123	-	-
1976	0.980	0.020	0.775	0.225	-	-
1977	1.000	-	0.917	0.083	-	-
1978	1.000	-	0.930	0.069	-	-
1979	1.000	-	0.966	0.034	0.992	0.008
1980	1.000	-	0.973	0.027	1.000	-
1981	1.000	-	0.989	0.011	1.000	-
1982	1.000	-	1.000	-	1.000	-
1983	1.000	-	1.000	-	1.000	-
1984	1.000	-	1.000	-	1.000	-
1985	1.000	-	1.000	-	1.000	-
1986	1.000	-	1.000	-	1.000	-
1987	1.000	-	1.000	-	1.000	-
1988+	1.000	-	1.000	-	1.000	-

Sources: U.S. EPA Federal Register: Federal Certification Test Results 1975-78 and 1982-84.
EEA Estimates of Emission Control Systems Projections.

3. EXAMPLE CALCULATION OF LIGHT-DUTY VEHICLE LEAD EMISSIONS

PROBLEM

For an area characterized by light-duty vehicles driving under cyclic conditions with an average speed of 19.6 miles per hour, calculate the areawide lead emission rate for the year 1985. Assume an inspection and maintenance program has been implemented in this area. The simplified misfueling rates from Table 2-12 will be used.

SOLUTION

Use equations (2-4), (2-5), (2-6), and (2-7) to plug into equation (2-3) to get emission factors by vehicle class. Use individual class factors to plug into equation (2-2) for total areawide lead emissions in 1985.

$T1,1985$	= 1.0	
n	= 1985	
i	= 1 = LDV	
s	= 19.6 mph	
$Pb_{L,1985}$	= 1.1 g/gal	(Table 2-2)
$Pb_{NL,1985}$	= 0.014 g/gal	(Table 2-2)
$a_{s1,1966-1985}$	= 0.75	(Table 2-13)
$a_{s2,1975-1980}$	= 0.40	(Table 2-13)
$a_{s2,1981-1985}$	= 0.44	(Table 2-13)
C_s	= 0.79	(Table 2-1)
P_1	= 0.017	(Table 2-14)
r_1	= 0.09	(Table 2-12)

$$EF_{n,s} = \sum_{i=1}^{4} T\,(EF_{i,n,s}) \qquad (3\text{-}1)$$

$$EF_{1,1985,19.6} = \sum_{j=1966}^{1985} \Big[(EF_{1,j,1985,L}) \times (F_{L,1,j}) + (EF_{1,j,1985,NL}) \times (F_{NL,1,j}) \Big] \times m_{1,j} \qquad (3\text{-}2)$$

Use the following equations to plug into equation (3-2) and sum over the appropriate model years.

For j=1966-1970

$$EF_{1,j,1985,L} = \Big(1.1(0.887) + 0.014(0.113)\Big) \times \frac{.75}{E_{c,1,j}^{(0.79)}} = \frac{.928}{E_{c,1,j}} \qquad (3\text{-}3)$$

For j=1971-1974

$$EF_{1,j,1985,L} = \Big(1.1(0.916) + 0.014(0.084)\Big) \times \frac{.75}{E_{c,i}^{(0.79)}} = \frac{.958}{E_{c,i}} \qquad (3\text{-}4)$$

For j=1975-1985

$$EF_{1,j,1985,L} = \Big(1.1(0.724) + 0.014(0.276)\Big) \times \frac{.75}{E_{c,1,j}^{(0.79)}} = \frac{.776}{E_{c,1,j}} \qquad (3\text{-}5)$$

For j=1975-1985

$$EF_{1,j,1985,NL} = \Big[0.014(0.91)(0.75) + 1.1(0.09)(F_{1,j,NL,NOCAT} + (0.017)(F_{1,j,CAT})(0.75) + 1.1(0.09)(0.983)(F_{1,j,CAT})(a_{s,1,j})\Big] \times \frac{1}{E_{c,1,j}^{(0.79)}} = \frac{X_{1,j}}{E_{c,1,j}} \quad (3\text{-}6)$$

	$X_{1,j}$
1975	.0665
1976	.06389
1977	.06303
1978	.06303
1979	.06303
1980	.06303
1981	.06795
1982	.06795
1983	.06795
1984	.06795
1985	.06795

Plugging the appropriate values into equation (3-1), we arrive at the values shown in Section C of Table 3-1. Adding summation (1) and summation (2) we get: $EF_{1,85,19.6} = 0.0132$ (g/mi).

Note: This example is an estimate of lead emissions from light-duty vehicles only. Therefore, the total emission rate from all vehicle classes for an area in calendar year 1985 can be expected to be considerably higher.

TABLE 3-1

EXAMPLE CALCULATIONS
LIGHT-DUTY VEHICLE PARTICULATE EMISSION RATE
LESS THAN 10 MICRONS FOR THE YEAR 1985

A. Emission Factor Component Calculation Inputs

Model Year $_j$	Age	$m_{1,j}$	$F_{NL,1,j}$	$F_{L,1,j}$	$E_{c,1,j}$	$F_{1,j,CAT}$	$F_{1,j,NL,NOCAT}$	$\frac{(F_{NL,1,j})(m_{1,j})}{E_{c1,j}}$	$\frac{(F_{L,1,j})(m_{1,j})}{E_{c1,j}}$
1985	1	0.038	0.934	-	24.6	1.000	-	.00144	-
1984	2	0.142	0.940	-	23.8	1.000	-	.00561	-
1983	3	0.125	0.947	-	23.2	1.000	-	.00510	-
1982	4	0.111	0.954	-	22.9	1.000	-	.00462	-
1981	5	0.098	0.939	-	21.5	1.000	-	.00428	-
1980	6	0.084	0.966	0.000	19.6	1.000	-	.00414	-
1979	7	0.075	0.875	0.097	17.8	1.000	-	.00369	.00041
1978	8	0.065	0.865	0.126	16.6	1.000	-	.00339	.00049
1977	9	0.055	0.838	0.158	15.5	1.000	-	.00297	.00056
1976	10	0.047	0.863	0.134	14.8	0.980	0.020	.00274	.00043
1975	11	0.040	0.869	0.128	13.8	0.919	0.081	.00252	.00037
1974	12	0.032	-	1.000	12.6	-	-	-	.00254
1973	13	0.026	-	1.000	12.9	-	-	-	.00202
1972	14	0.021	-	1.000	13.1	-	-	-	.00160
1971	15	0.015	-	1.000	13.2	-	-	-	.00114
1970	16	0.011	-	1.000	13.9	-	-	-	.00079
1969	17	0.007	-	1.000	13.9	-	-	-	.00050
1968	18	0.003	-	1.000	13.9	-	-	-	.00022
1967	19	0.003	-	1.000	13.9	-	-	-	.00022
1966-	20+	0.004	-	1,000	13.9	-	-	-	.00029

TABLE 3-1

EXAMPLE CALCULATIONS
LIGHT-DUTY VEHICLE PARTICULATE EMISSION RATE
LESS THAN 10 MICRONS FOR THE YEAR 1985 (cont'd)

B. Emission Factor Summation Description

Summation (1) calculates the emission factor component in Equations (3-2), (3-3), and (3-4) that are used in Equation (3-1).

Summation (2) calculates the emission factor component in Equation (3-5) that is used in Equation (3-1).

TABLE 3-1

EXAMPLE CALCULATIONS
LIGHT-DUTY VEHICLE PARTICULATE EMISSION RATE
LESS THAN 10 MICRONS FOR THE YEAR 1985 (cont'd)

C. Emission Factor Calculations

	1	2
Year, $_j$	$(EF_{1,j,1985,L})$ $(F_{L,1,j})(m_{1,j})$	$(EF_{1,j,1985,NL})$ $(F_{NL,1,j})(m_{1,j})$
1985	-	0.0001
1984	-	0.0004
1983	-	0.0003
1982	-	0.0003
1981	-	0.0003
1980	-	0.0003
1979	0.0003	0.0002
1978	0.0004	0.0002
1977	0.0004	0.0002
1976	0.0003	0.0002
1975	0.0003	0.0002
1974	0.0024	-
1973	0.0019	-
1972	0.0015	-
1971	0.0011	-
1970	0.0007	-
1969	0.0005	-
1968	0.0002	-
1967	0.0002	-
1966-	0.0003	-
SUM:	0.0105	0.0027

$EF_{1,1985,19.6}$ = 0.0132 (g/mi)

APPENDIX N

DIESEL POWERED TRANSIT BUSES

INTRODUCTION

This appendix presents an alternative methodology for calculating emission factors for full-size diesel powered transit buses. Because of the similarities between buses and trucks in terms of inertia weight and engine type, EPA combines buses and trucks in the heavy duty vehicle class. Chapter 7 describes the standard procedure for determining emission factors for diesel powered heavy duty vehicles. Both the certification and emission factor test procedures for bus engines involve the use of the EPA engine transient test which is described in Chapter 7. The resultant engine emission data can then be converted to gram per mile values through the use of conversion factors as discussed in the EPA report "Heavy Duty Vehicle Emission Conversion Factors, 1962-1997," EPA-AA-SDSB-84-1. This has been the standard methodology for calculating transit bus emission factors in previous AP-42 documents and can continue to be used if desired.

Based on recent research and analysis, EPA believes that the application of the standard heavy-duty vehicle emission factor methodology for diesel powered transit buses is not completely accurate. Because transit buses operate exclusively in urban areas, typically on the most populated corridors, and emit pollution at ground level, public exposure to transit bus emissions is relatively high and EPA has begun to analyze the issue in greater depth. EPA has recently completed two test programs to identify the actual emissions from in-use transit buses. These programs involved buses which were temporarily removed from operating service and which were tested as-is (i.e., without additional maintenance) in their chassis configurations over test cycles designed specifically to simulate transit bus operation. The gram per mile emission factors obtained directly from these chassis test programs differ significantly from the emission factors which would be calculated indirectly from engine test data and conversion factors.

It must be stressed that EPA's analysis of transit bus emissions is ongoing. The data base currently includes just 2 bus engine designs and a total of 7 transit buses. Transit bus emissions can be affected by many parameters such as engine type, design, age, and state of maintenance; vehicle size and transmission; type of test cycle utilized; whether No. 1 diesel fuel or No. 2 diesel fuel is used; etc. EPA is not now able to identify the exact contributions of the various parameters to the overall emission factor offsets, but is continuing to investigate these relationships. Despite the limited data base, EPA believes that, for buses, in-use chassis emissions data provide a more accurate estimate of actual emission factors than does the general heavy-duty methodology based on engine emission data and conversion factors. EPA will update AP-42 as more information becomes available on this issue.

TEST PROCEDURES

The EPA heavy-duty engine transient test procedure is used for certification purposes as well as for general emissions testing. This involves operating an engine over a test cycle that consists of engine speed and load transients. There are two primary issues with respect to the representativeness of the EPA engine transient test in characterizing transit bus emissions. One, recent analysis shows that generating emission factors from engine data and conversion factors is not as straightforward for transit buses as it is for heavy-duty trucks. This has encouraged EPA to utilize bus chassis emission testing which generates gram per mile values directly. Two, since the design of the EPA engine transient test was based on truck operation, it does not represent typical transit bus operation. Transit buses are known for their low average speed, stop-and-go operation and high acceleration and deceleration rates.

Accordingly, in recent transit bus test programs EPA has utilized two chassis test cycles which simulate transit bus operation: 1) an EPA bus driving cycle generated at the same time and from a similar data base as the official certification engine test, and 2) the central business district phase of the SAE Type II Fuel Consumption Test Procedure for buses. Both of these are chassis transient cycles with low average speeds and high acceleration rates. Both cycles have yielded dynamometer fuel economies which are very near to in-use fuel economies, and EPA believes that these cycles yield emissions which are representative of actual emissions.

EMISSIONS

There are many different diesel engines which have been utilized in transit buses, but two engines designed and built by Detroit Diesel Allison (DDA) Division of General Motors have dominated the transit bus market. Until recently the standard bus engine was the DDA 71-series engine, typified by the DDA 6V-71N, a naturally-aspirated, two-stroke, six-cylinder diesel engine, and its eight-cylinder counterpart, the DDA 8V-71N. It has been estimated that the 71-series engines are installed in over 80 percent of the transit buses currently operating in the U.S. Recently, the 71-series engines have been replaced in most new bus applications by the DDA 6V-92TA, a turbocharged, two-stroke, six-cylinder diesel with lower fuel consumption and emissions. EPA bus testing programs have focused on these two engine designs and the first two subsections will give emission factors for exhaust hydrocarbons, carbon monoxide, nitrogen oxide, and particulate matter from buses equipped with these two engines. The third subsection will give guidance for buses with engines other than DDA designs.

As discussed in Chapter 7, diesel powered heavy duty vehicles are considered to have insignificant crankcase and evaporative hydrocarbon emissions and thus no such emission factors are given. It is not possible at this time to disaggregate transit bus emission factors into zero mile emission levels and emission deterioration rates as is done throughout the rest of AP-42. This is because of the limited transit bus data base as well as the complications due to the fact that transit bus engines are typically rebuilt 2 or 3 times during the lifetime of the bus. The best indicator of expected emissions deterioration is engine mileage since the last rebuild rather than total bus mileage. Accordingly, aggregate emission factors are given below, for each major pollutant from individual engine designs, which EPA believes are representative of the average emissions from transit buses over their lifetimes. Finally, there are no speed or temperature correction factors available at this time for transit bus emissions.

Buses with DDA 71-Series Engines

EPA's Office of Research and Development has performed emission testing of four buses with 71-series engines as part of a larger overall test program described in the EPA report "Characterization of Heavy-Duty Motor Vehicle Emissions Under Transient Driving Conditions," (full report, dated October 1984, available as NTIS PB85-124154; project summary, dated December 1984, EPA-600/S3-84-104). All four buses are GMC RTS II buses and are part of the San Antonio, Texas transit fleet. Three of the engines were sold in 1980 and the fourth was sold in 1978. The engines had accumulated between 137,000 and 247,000 miles prior to testing. Each of the buses was tested two times over the EPA bus cycle as received, without maintenance being performed, with No. 1 diesel fuel. No idle testing was performed. Table N-1 gives the average emissions for these four buses equipped with DDA 71-series engines.

Buses with DDA 6V-92TA Engines

EPA's Office of Mobile Sources has tested three buses with 6V-92TA engines as one task of a contract described in the EPA report "Emissions Characterization of Heavy-Duty Diesel and Gasoline Engines and Vehicles" (EPA 460/3-85-001, March 1985). All three buses are GMC RTS II buses and were tested as received from the Houston, Texas bus fleet. Two of the engines were sold in 1983 while the third had been produced in 1982. Engine mileage ranged from 55,000 to 139,000 miles. Two of the buses were tested with No. 1 diesel fuel, while the third bus utilized No. 2 diesel fuel. One bus was tested twice over the EPA bus cycle only, the second bus was tested twice over both the EPA bus cycle and the SAE central business district cycle, and the third bus was tested once over both cycles. Emissions data for both the EPA and SAE cycles were similar and have been aggregated for the latter two buses, while only EPA bus cycle data are available for the first bus. Hot stabilized idle tests

were performed on each bus with the transmission in drive and the air conditioning off. It should be noted that both the EPA bus and SAE central business district cycles include a fraction of time at idle. Thus, the idle emission factors need only be used in situations where idle is the only operating mode. Table N-1 gives the average emissions for these three buses equipped with DDA 6V-92TA engines.

Buses with Other Engines

EPA has no bus chassis data on full-size buses with engines other than the DDA 71-series and 6V-92TA engines. The EPA recommendation is to use an average of the emission factors for the 71-series and 6V-92TA engines. These average values are also shown in Table N-1.

SAMPLE CALCULATION

Given the transit bus emission factors in Table N-1, the only other data needed to calculate aggregate annual transit bus emissions are a breakdown of the engines used in a particular transit fleet and associated annual mileage accumulation. According to the American Public Transit Association, there were 62,000 transit buses in the U.S. in 1982 which traveled approximately 1.67 billion miles. Thus, on average, transit buses accumulate 27,000 miles per year. In reality, newer buses typically have higher annual mileages while older buses, some of which are only used as substitutes, usually accumulate fewer miles. Annual vehicle miles traveled data are available from individual transit authorities.

As an example, assume that an urban area has a transit fleet of 500 buses and that 300 of the buses utilize DDA 71-series engines and accumulate on average 25,000 miles per year, 100 of the buses utilize DDA 6V-92TA engines and average 35,000 miles per year, and the remaining 100 buses utilize other engines and average 28,000 miles per year. The total annual particulate emission loading from these buses, based on the emission factors in Table N-1, would be (300 x 25,000 x 6.27) + (100 x 35,000 x 4.77) + (100 x 28,000 x 5.52) = 79,200,000 grams per year or 87.2 standard tons per year.

Table N-1

Diesel Powered Transit Bus Emission Factors
(grams per mile, except for idle)

Bus Engines	HC	CO	NOx	PM
DDA 6V-71N, 8V-71N	3.59	77.5	24.4	6.27
DDA 6V-92TA	3.10	26.2	27.7	4.77
Other engines(average)	3.35	51.9	26.1	5.52
All engines at idle (grams per minute)	0.46	0.40	2.84	0.10

Part II - OFF-HIGHWAY MOBILE SOURCES

INTRODUCTION

This section contains emission rates for eight types of off-highway mobile sources. The emissions of six of these types of sources are unchanged from the previous edition and supplements. Changes have been made inboard powered vessels and diesel powered heavy-duty construction equipment. The changes for these two sources are summarized below.

Inboard Powered Vessels - Only one item has been changed since the previous edition. This change was the deletion of the 1550 horsepower diesel emission factors from Table II-3.3 because they were for a 1550 horsepower steam engine and not a diesel engine.

Construction Equipment - The emission factors for heavy-duty diesel construction equipment are based on a recent study by Environmental Research and Technology, Inc. Some of the categories of construction equipment have changed. The emission factors for heavy-duty gas powered construction equipment are the same as in the previous edition.

Comments on Other Studies - Recently there have been two studies undertaken for off-highway mobile sources. The first one deals strictly with inboard powered vessels, and is entitled "Emission Factor Documentation for AP-42: Section 3.2.3 Inboard Powered Vessels" (EPA 450/4-84-001). The second report discusses locomotives, construction equipment and inboard powered vessels, and is entitled "Recommended Revisions to Gaseous Emission Factors for Several Classes of Off-Highway Vehicles - Final Report" (EPA 460/3-85-004, March 1985). The following are EPA's comments on material presented in these reports relative to AP-42.

Locomotives - The current emission factors for locomotives are based on tests of three in-use locomotives. The second report located data on at least fifteen new locomotives, and recommended updating the emissions to this new data set. The report also suggested that the duty cycle for locomotives include some engine shut-down in place of some engine idle, mostly based on the fact that fuel costs are higher and companies would encourage engine shut-down as a cost saving measure. The previous emission factors do not assume any engine shut-down during the duty cycle. EPA has not adopted the new emission factors, and instead has retained the previous emission factors for two reasons. First, there does not appear to be any verifiable basis for picking the percent of engine shut-down time during the duty cycle. Second, EPA has become aware of a larger data set of in-use locomotives with emission data. EPA intends to analyze these data in the near future, and feels it would be inappropriate to update the locomotive emission factors with the fifteen locomotives on an interim basis, only to change them at a later date.

Inboard Powered Vessels - The first report compiled available data on inboard powered vessels and attempted to estimate the emission factors.

The second report critiqued the first report, and found some inconsistencies in the manner in which the emission factors were estimated. The second report recommended only two changes to the existing emission factors -- one was the removal of the 1550 horsepower emission rates from Table II-3.3. (This engine was a steam boiler, and not diesel powered as presented.) This we have done. The second was the addition of some new emission rates for diesel engines above 3000 horsepower, but at only one load setting and in units which were inconsistent with those in Table II-3.2. EPA investigated the possibility of converting the new data into the old units but had no basis for estimating the appropriate conversion factor. Therefore, the previous emission factors (at 3600 horsepower) are retained.

Future Work - Beside locomotives, EPA may also soon undertake a study of emissions from new aircraft. Emission standards for new aircraft took effect in 1984; therefore, all 1984 and newer aircraft should have lower emissions than the rates presented herein. However, the present emission rates for aircraft are sufficient for now, since the majority of aircraft in use are pre-1984 uncontrolled technology.

II-1 AIRCRAFT

II-1.1 General

Aircraft engines are of two major categories, reciprocating piston and gas turbine.

In the piston engine, the basic element is the combustion chamber, or cylinder, in which mixtures of fuel and air are burned and from which energy is extracted by a piston and crank mechanism driving a propeller. The majority of aircraft piston engines have two or more cylinders and are generally classified according to their cylinder arrangement - either "opposed" or "radial". Opposed engines are installed in most light or utility aircraft, and radial engines are used mainly in large transport aircraft. Almost no singlerow inline or V-engines are used in current aircraft.

The gas turbine engine usually consists of a compressor, a combustion chamber and a turbine. Air entering the forward end of the engine is compressed and then heated by burning fuel in the combustion chamber. The major portion of the energy in the heated air stream is used for aircraft propulsion. Part of the energy is expended in driving the turbine, which in turn drives the compressor. Turbofan and turboprop (or turboshaft) engines use energy from the turbine for propulsion, and turbojet engines use only the expanding exhaust stream for propulsion. The terms "propjet" and "fanjet" are sometimes used for turboprop and turbofan, respectively.

The aircraft in the following tables include only those believed to be significant at present or over the next few years.

Few piston engine aircraft data appear here. Military fixed wing piston aircraft, even trainers, are being phased out. One piston engine helicopter, the TH-55A "Osage", sees extensive use at one training base at Ft. Rucker, AL (EPA Region IV), but engine emissions data are not available. Most civil piston engine aircraft are in general aviation service.

The fact that a particular aircraft brand is not listed in the following tables does not mean the emission factors cannot be calculated. It is the engine emissions and the time-in-mode (TIM) category which

determine emissions. If these are known, emission factors can be calculated in the same way that the following tables are developed.

The civil and military aircraft classification system used is shown in Tables II-1-1 and II-1-2. Aircraft have been classified by kind of aircraft and the most commonly used engine for that kind. Jumbo jets normally have a miximum of about 40,000 pounds thrust per engine, and medium range jets about 14,000 pounds thrust per engine. Small piston engines develop less than 500 horsepower.

II-1.2 The Landing/Takeoff Cycle and Times-in-Mode

A landing/takeoff (LTO) cycle incorporates all of the normal flight and ground operation modes (at their respective times-in-mode), including: descent/approach from approximately 3000 feet (915 m) above ground level (AGL), touchdown, landing run, taxi in, idle and shutdown, startup and idle, checkout, taxi out, takeoff, and climbout to 3000 feet (915m) AGL.

In order to make the available data manageable, and to facilitate comparisons, all of these operations are conventionally grouped into five standard modes: approach, taxi/idle in, taxi/idle out, takeoff and climbout. There are exceptions. The supersonic transport (SST) has a descent mode preceding approach. Helicopters omit the takeoff mode. Training exercises involve "touch and go" practice. These omit the taxi/idle modes, and the maximum altitude reached is much lower. Hence, the duration (TIM) of the approach and climbout modes will be shorter.

Each class of aircraft has its own typical LTO cycle (set of TIMs). For major classes of aircraft, these are shown in Tables II-1-3 and II-1-4. The TIM data appearing in these tables should be used for guidance only and in the absence of specific observations. The military data are inappropriate to primary training. The civil data apply to large, congested fields at times of heavy activity.

All of the data assume a 3000 foot AGL inversion height and an average U.S. mixing depth. This may be inappropriate at specific localities and times, for which specific site and time inversion height data should be sought. Aircraft emissions of concern here are those released to the atmosphere below the inversion. If local conditions suggest higher or lower inversions, the duration (TIM) of the approach and climbout modes must be adjusted correspondingly.

A more detailed discussion of the assumptions and limitations implicit in these data appears in Reference 1.

Emission factors in Tables II-1-9 and II-1-10 were determined using the times-in-mode presented in Tables II-1-3 and II-1-4, and generally for the engine power settings given in Tables II-1-5 and II-1-6.

Table II-1-1. CIVIL AIRCRAFT CLASSIFICATION[a]

Aircraft	Engine[b]			
	No.	Mfg.	Type	Model/Series
Supersonic transport				
BAC/Aerospatiale Concorde	4	RR	TF	Olymp. 593-610
Short, medium, long range and jumbo jets				
BAC 111-400	2	RR	TF	Spey 511
Boeing 707-320B	4	P&W	TF	JT3D-7
Boeing 727-200	3	P&W	TF	JT8D-17
Boeing 737-200	2	P&W	TF	JT8D-17
Boeing 747-200B	4	P&W	TF	JT9D-7
Boeing 747-200B	4	P&W	TF	JT9D-70
Boeing 747-200B	4	RR	TF	RB211-524
Lockheed L1011-200	3	RR	TF	RB211-524
Lockheed L1011-100	3	RR	TF	RB211-22B
McDonnell-Douglas DC8-63	4	P&W	TF	JT3D-7
McDonnell-Douglas DC9-50	2	P&W	TF	JT8D-17
McDonnell-Douglas DC10-30	3	GE	TF	CF6-50C
Air carrier turboprops - commuter, feeder line and freighters				
Beech 99	2	PWC	TP	PT6A-28
GD/Convair 580	2	All	TP	501
DeHavilland Twin Otter	2	PWC	TP	PT6A-27
Fairchild F27 and FH227	2	RR	TP	R. Da. 7
Grumman Goose	2	PWC	TP	PT6A-27
Lockheed L188 Electra	4	All	TP	501
Lockhead L100 Hercules	4	All	TP	501
Swearingen Metro-2	2	GA	TP	TPE 331-3
Business jets				
Cessna Citation	2	P&W	TF	JT15D-1
Dassault Falcon 20	2	GE	TF	CF700-2D
Gates Learjet 24D	2	GE	TJ	CJ610-6
Gates Learjet 35, 36	2	GE	TF	TPE 731-2
Rockwell International Shoreliner 75A	2	GE	TF	CF 700
Business turboprops (EPA Class P2)				
Beech B99 Airliner	2	PWC	TP	PT6A-27
DeHavilland Twin Otter	2	PWC	TP	PT6A-27
Shorts Skyvan-3	2	GA	TP	TPE-331-2
Swearingen Merlin IIIA	2	GA	TP	TPE-331-3
General aviation piston (EPA Class P1)				
Cessna 150	1	Con	O	O-200
Piper Warrior	1	Lyc	O	O-320
Cessna Pressurized Skymaster	2	Con	O	TS10-360C
Piper Navajo Chieftain	2	Lyn	O	T10-540

[a]References 1 and 2.
[b]Abbreviations: TJ - tubojet, TF - turbofan, TP - turboprop, R - reciprocating piston, O - opposed piston. All - Detroit Diesel Allison Division of General Motors, Con - Teledyne/Continental, GA - Garrett AiResearch, GE - General Electric, Lyc - Avco/Lycoming, P&W - Pratt & Whitney, PWC - Pratt & Whitney Aircraft of Canada, RR - Rolls Royce.

Table II-1-2. MILITARY AIRCRAFT CLASSIFICATION[a]

Aircraft mission (Class)	DOD Designation	Popular name	Manufacturer[b]	Service	Power plant No. & Type[c]		Power plant Mfg.[b]	Power plant Designation
Combat	A-4	Skyhawk	McD-Doug	USN, USMC	1	TJ	P&W	J52, J65
	A-7	Corsair 2	Vought	USN	1	TF	All, P&W	TF41, TF30
	F-4	Phantom 2	McD-Doug	USAF, USN	2	TJ	GE	J79
	F-5	Freedom Fighter/ Tiger 2	Northrop	USAF	2	TJ	GE	J85
	F-14	Tomcat	Grumman	USN	2	TF	P&W	TF30, F401
	F-15A	Eagle	McD-Doug	USAF	2	TF	P&W	F100
	F-16	-	GD/FW	USAF	1	TF	P&W	F100
Bomber	B-52	Stratofortress	Boeing	USAF	8	TJ, TF	P&W	J57, TF33
Transport Patrol/Antisub	C-5A	Galaxy	GELAC	USAF	4	TF	GE	TF39
	C-130	Hercules	GELAC	USAF, USN, USCG	4	TP	All	T56
	KC-135	Stratotanker	Boeing	USAF	4	TJ	P&W	J57
	C-141	Starlifter	GELAC	USAF	4	TF	P&W	TF33
	P-3C	Orion	CALAC	USN	4	TP	All	T56
	S-3A	Viking	CALAC	USN	2	TF	GE	TF34
Trainer	T-34C	Turbo Mentor	Beech	USN	1	TP	PWC	PT6A
	T-38	Talon	Northrop	USAF	2	TJ	GE	J85
Helicopter	UH-1H	Iroquois/Huey	Bell	USA, USN	1	TS	Lyc, GE	T53, T58
	HH-3	Sea King/Jolly Green Giant	Sikorsky	USAF, USN, USCG	2	TS	GE	T58
	CH-47	Chinook	Boeing Vertol	USA	2	TS	Lyc	T55

[a]Reference 1. USN - U.S. Navy, USMC - U.S. Marine Corps, USAF - U.S. Air Force, USCG - U.S. Coast Guard, USA - U.S. Army.
[b]Abbreviations: All - Detroit Diesel Allison Division of General Motors, CALAC - Lockheed - California, GD/FW - General Dynamics, Ft. Worth, GE - General Electric, GELAC - Lockheed-Georgia, Lyc - Lycoming, McD-Doug - McDonnell Douglas, P&W - Pratt & Whitney, PWC - Pratt & Whitney Aircraft of Canada.
[c]TJ - Turbojet, TF - Turbofan, TP - Turboprop, TS - Turboshaft.

Table II-1-3. TYPICAL DURATION FOR CIVIL LTO CYCLES AT LARGE CONGESTED METROPOLITAN AIRPORTS[a]

Aircraft	Mode					
	Taxi/ Idle out	Takeoff	Climbout	Approach	Taxi/ Idle in	Total
Commercial carrier						
Jumbo, long and medium range jet[b]	19.0	0.7	2.2	4.0	7.0	32.9
Turboprop[c]	19.0	0.5	2.5	4.5	7.0	33.5
Transport-piston	6.5	0.6	5.0	4.6	6.5	23.2
General aviation						
Business jet	6.5	0.4	0.5	1.6	6.5	15.5
Turboprop[c]	19.0	0.5	2.5	4.5	7.0	33.5
Piston[d]	12.0	0.3	5.0	6.0	4.0	27.3
Helicopter	3.5	-	6.5	6.5	3.5	20.0

[a]Reference 3. Data given in minutes.
[b]Same times as EPA Classes T2, T3 and T4 (Note b, Table II-1-5).
[c]Same times as EPA Classes T1 and P2 (Note b, Table II-1-5).
[d]Same times as EPA Class P1 (Note b, Table II-1-5).

Table II-1-4. TYPICAL DURATION FOR MILITARY LTO CYCLES[a]

Aircraft	TIM[b] Code	Mode					
		Taxi/ Idle out	Takeoff	Climbout	Approach	Taxi/ Idle in	Total
Combat[c]							
USAF	1	18.5	0.4	0.8	3.5	11.3	34.5
USN[d]	2	6.5	0.4	0.5	1.6	6.5	15.5
Trainer - Turbine							
USAF T-38	3	12.8	0.4	0.9	3.8	6.4	24.3
USAF general	4	6.8	0.5	1.4	4.0	4.4	17.1
USN[d]	2	6.5	0.4	0.5	1.6	6.5	15.5
Transport - Turbine[e]							
USAF general	5	9.2	0.4	1.2	5.1	6.7	22.6
USN[f]	6	19.0	0.5	2.5	4.5	7.0	33.5
USAF B-52 and KC-135	7	32.8	0.7	1.6	5.2	14.9	55.2
Military - Piston	8	6.5	0.6	5.0	4.6	6.5	23.2
Military - Helicopter	9	8.0	-	6.8	6.8	7.0	28.6

[a]Reference 1. Data given in minutes. USAF - U.S. Air Force, USN - U.S. Navy.
[b]TIM Code defined in Table II-1-5.
[c]Fighters and attack craft only.
[d]Time-in-mode is highly variable. Taxi/idle out and in times as high as 25 and 17 minutes, respectively, have been noted. Use local data base if possible.
[e]Includes all turbine craft not specified elsewhere (i.e., transport, cargo, observation, patrol, antisubmarine, early warning, and utility).
[f]Same as EPA Class P2 for civil turboprops.

Table II-1-5. ENGINE POWER SETTINGS FOR TYPICAL EPA LTO COMMERCIAL CYCLES[a]

Mode	Power setting (% thrust or horsepower)			
	Class T1, P2[b]	Class T2,T3, T4[b]	Class P1[b]	Helicopter
Taxi/Idle (out)	Idle	Idle	Idle	
Takeoff	100	100	100	
Climbout	90	85	75 - 100	Undefined
Approach	30	30	40	
Taxi/Idle (in)	Idle	Idle	Idle	

[a]References 1 and 3.
[b]As defined by EPA (Reference 3):

Class T1 is all aircraft turbofan or turbojet engines except Class T5 of rated power less than 8000 lbs thrust.

Class T2 is all turbofan or turbojet aircraft engines except Classes T3, T4 and T5 of rated power of 8000 lbs thrust or greater.

Class T3 is all aircraft gas turbine engines of the JT3D model family.

Class T4 is all aircraft gas turbine engines of the JT8D model family.

Class T5 is all aircraft gas turbine engines on aircraft designed to operate at supersonic speeds.

Class P1 is all aircraft piston engines, except radial.

Class P2 is all aircraft turboprop engines.

Table II-1-6. ENGINE POWER SETTINGS FOR A TYPICAL LTO MILITARY CYCLE[a]

Mode	Power setting (% thrust or horsepower)			
	Military transport	Military jet	Military piston	Military helicopter
Taxi/Idle (out)	Idle	Idle	5 - 10	Idle
Takeoff	Military	Military or Afterburner	100	-
Climbout	90 - 100	Military	75	60 - 75
Approach	30	84 - 86	30	45 - 50
Taxi/Idle (in)	Idle	Idle	5 - 10	Idle

[a] Reference 1.

TABLE II-1-7. MODAL EMISSION RATES–CIVIL AIRCRAFT ENGINES[a]

Model-Series Mfg.[b] Type[b]	Mode	Fuel Rate lb/hr	Fuel Rate kg/hr	CO lb/hr	CO kg/hr	NO_x[c] lb/hr	NO_x[c] kg/hr	Total HC[d] lb/hr	Total HC[d] kg/hr	SO_x[e] lb/hr	SO_x[e] kg/hr	Particulates[f] lb/hr	Particulates[f] kg/hr
250B17B All. TP	Idle	63	28.58	6.13	2.78	0 09	0.041	1.27	0.576	0.06	0.03		
	Takeoff	265	120.2	2.07	0.939	1.75	0.794	0.07	0.032	0.27	0.12		
	Climbout	245	111 1	2.21	1.00	1.46	0.662	0.09	0.041	0.25	0.11		
	Approach	85	38.56	4.13	1.87	0.19	0.086	0.44	0.200	0.09	0.04		
501D22A All. TP	Idle	610	276.7	26.60	12 07	2.15	0.975	10.74	4.87	0.61	0 28		
	Takeoff	2376	1078	4 85	2.20	21.10	9.57	0 67	0.304	2.38	1.08		
	Climbout	2198	997	4.53	2.05	20.27	9.19	1.96	0.889	2.20	1.00		
	Approach	1140	517 1	5.81	2.64	8.54	3.87	2 23	1.01	1.14	0.52		
TPE 331-3 GA TP	Idle	112 0	50.8	6.89	3 12	0.320	0.145	8 86	4.02	0.11	0.05	0.3[g]	0.14[g]
	Takeoff	458.0	207.7	0.350	0.159	5.66	2.57	0.050	0.023	0.46	0.21	0 8	0.36
	Climbout	409.0	185.5	0.400	0.181	4 85	2.20	0.060	0.027	0.41	0.19	0.6	0.27
	Approach	250.0	113.4	1 74	0.789	2.48	1.12	0.160	0.073	0.25	0.11	0.6	0.27
TPE331-2 GA TP	Idle	105 0	47.6	6.73	3.05	0 27	0.22	9 58	4.34	0.11	0.05	(Assume 331-3 data)	
	Takeoff	405.0	183.7	0 38	0 172	4.14	1 88	0.16	0.072	0.41	0.18		
	Climbout	372 0	168.7	0.51	0.231	3.69	1.67	0.15	0.068	0.37	0 17		
	Approach	220.0	99.8	3 65	1.66	1.82	0.826	0.59	0.268	0.22	0.10		
TPE 731-2 GA TF	Idle	181 0	82 1	11.11	5.04	0.54	0.245	4.05	1.84	0.18	0.08		
	Takeoff	1552.0	704 0	1.86	0.844	29.8	13.52	0.14	0.064	1.55	0.70		
	Climbout	1385.0	628.2	1.80	0.816	23.68	10.74	0.12	0.054	1.39	0.63		
	Approach	521.0	236.3	9.53	4.32	3.59	1.63	1.51	0.685	0.52	0.24		
CJ 610-2C GE TJ	Idle	510.0	231.3	79 05	35.86	0.46	0.209	9.18	4.16	0.51	0.23		
	Takeoff	2780 0	1261.0	75.06	34.05	11.68	5.30	0.28	0.127	2.78	1.26		
	Climbout	2430.0	1102.0	65.61	29.76	8.99	4.08	0.49	0.222	2.43	1.10		
	Approach	1025.0	464.9	90.20	40.91	1 54	0.698	2.77	1.26	1.03	0.46		
CF700-2D GE TF	Idle	460	208.7	71.30	32.34	0.41	0.186	8.28	3.76	0.46	0.21		
	Takeoff	2607	1182	57.35	26.01	14.60	6.62	0.26	0.118	2.61	1.18		
	Climbout	2322	1053	58.05	26.33	9.98	4.53	0.23	0.104	2.32	1.05		
	Approach	919	416.9	56.98	25 85	1.65	0.748	1.29	0.585	0.92	0.42		
CF6-6D GE TF	Idle	1063	482 2	65.06	29.51	4.88	2.21	21.79	9.88	1.06	0.48	0.04[g]	0.02[g]
	Takeoff	13750	6237	8.25	3.74	467.5	212.1	8.25	3.74	13.75	6.24	0.54	0.24
	Climbout	11329	5139	6.80	3.03	309.2	140.2	6.80	3.08	11.33	5.14	0.54	0.24
	Approach	3864	1753	23.18	10.51	41.54	18.84	6.96	3.16	3.86	1.75	0.44	0.20
CF6-50C GE TF	Idle	1206	547	88.04	39.93	3.02	1.37	36.18	16.41	1.21	0.55	(Assume CF6-6D data)	
	Takeoff	18900	8573	0.38	0.172	670.95	304.3	0.19	0.086	18.90	8.57		
	Climbout	15622	7104	4.70	2.13	462.0	209.6	0.16	0.073	15.62	7.10		
	Approach	5280	2395	22.70	10.30	52.8	23.95	0.05	0.023	5.28	2.40		

TABLE II-1-7 (CONTINUED)

Model-Series Mfg.[b] Type[b]	Mode	Fuel Rate		CO		NO_x[c]		Total HC[d]		SO_x[e]		Particulates[f]	
		lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr
JT3D-7 P&W TF	Idle	1013	459.5	140.8	63.87	2.23	1.01	124.6	56.52	1.01	0.46	0.45[g]	0.20[g]
	Takeoff	9956	4516	8.96	4.06	126.4	57.34	4.98	2.26	9.96	4.52	8.25	3.7
	Climbout	8188	3714	15.56	7.06	78.6	35.65	3.28	1.49	8.19	3.71	8.5	3.9
	Approach	3084	1399	60.14	27.28	16.35	7.42	6.48	2.94	3.08	1.40	8.0	3.6
JT8D-17 P&W TF	Idle	1150	521.6	39.10	17.74	3.91	1.77	10.10	4.58	1.15	0.52	0.36[g,h]	0.16[g,h]
	Takeoff	9980	4527	6.99	3.17	202.6	91.90	.50	0.227	9.98	4.53	3.7	1.7
	Climbout	7910	3588	7.91	3.59	123.4	55.97	.40	0.181	7.91	3.59	2.6	1.2
	Approach	2810	1275	20.23	9.18	19.39	8.80	1.41	0.640	2.81	1.28	1.5	0.68
JT9D-7 P&W TF	Idle	1849	838.7	142.4	64.59	5.73	2.60	55.10	24.99	1.85	0.84	2.2[f]	1.0
	Takeoff	16142	7322	3.23	1.47	474.6	215.3	0.81	0.367	16.14	7.32	3.75	1.7
	Climbout	13193	5984	6.60	2.99	282.3	128.0	1.32	0.599	13.19	5.98	4.0	1.8
	Approach	4648	2108	44.62	20.24	36.25	16.44	4.65	2.11	4.65	2.11	2.3	1.0
JT9D-70 P&W TF	Idle	1800	816.5	61.20	27.76	5.76	2.61	12.24	0.55	1.80	0.82	(assume JT9D-7 data)	
	Takeoff	19380	8791	3.88	1.76	600.8	272.5	2.91	1.32	19.38	8.79		
	Climbout	15980	7248	4.79	2.17	386.7	175.4	2.40	1.09	15.98	7.25		
	Approach	5850	2654	7.61	3.45	47.39	21.50	2.63	1.19	5.85	2.65		
JT15D-1 PWC TF	Idle	215	97.52	19.46	8.83	0.54	0.245	7.48	3.39	0.22	0.10		
	Takeoff	1405	637.3	1.41	0.640	14.19	6.44	0	0	1.41	0.64		
	Climbout	1247	565.6	1.25	0.567	11.35	5.15	0	0	1.25	0.57		
	Approach	481	218.2	11.45	5.19	2.45	1.11	1.59	0.721	0.48	0.22		
PT6A-27 PWC TP	Idle	115	52.16	7.36	3.34	0.28	0.127	5.77	2.62	0.12	0.05		
	Takeoff	425	192.8	0.43	0.195	3.32	1.51	0	0	0.43	0.19		
	Climbout	400	181.4	0.48	0.218	2.80	1.27	0	0	0.40	0.18		
	Approach	215	97.52	4.95	2.24	1.80	0.816	0.47	0.213	0.22	0.10		
PT6A-41 PWC TP	Idle	147	66.63	16.95	7.69	0.29	0.132	14.94	6.78	0.15	0.07		
	Takeoff	510	231.3	2.60	1.18	4.07	1.85	0.89	0.404	0.51	0.23		
	Climbout	473	214.6	3.07	1.39	3.58	1.62	0.96	0.435	0.47	0.21		
	Approach	273	123.8	9.50	4.31	1.27	0.576	6.20	2.81	0.27	0.12		
Spey 555-15[i] RR TF	Idle	915	415	83.2	37.7	1.6	0.7	86.0	43.5	0.92	0.42		
	Takeoff	5734	2600	6.5	3.0	109.2	49.5	29.5	13.4	5.73	2.60		
	Climbout	4677	2121	0.0	0.0	68.7	31.2	2.5	1.1	4.68	2.12		
	Approach	1744	791	34.8	15.8	10.2	4.6	14.3	6.5	1.74	0.79		
Spey MK511[g,i] RR TF	Idle	946	429.1	104.4	47.36	0.785	0.356	80.03	36.30	0.95	0.43	0.17	0.077
	Takeoff	7057	3201	16.16	7.33	156.7	71.08	13.97	6.34	7.06	3.20	16.0	7.3
	Climbout	5752	2609	0.0	0.0	116.8	52.98	0.0	0.0	5.75	2.61	10.0	4.5
	Approach	2204	999.7	48.71	22.09	16.00	7.26	20.56	9.33	2.20	1.00	1.5	0.68
M45H-01[i] RR (Bristol) TF	Idle	366	166.0	55.63	25.23	0.622	0.282	11.53	5.23	0.37	0.17		
	Takeoff	3590	1628	7.18	3.26	32.31	14.66	0.718	0.326	3.59	1.62		
	Climbout	3160	1433	9.48	4.30	25.28	11.47	0.632	0.287	3.16	1.43		
	Approach	1067	484.0	53.56	24.29	3.57	1.62	6.61	3.00	1.07	0.48		

TABLE II-1-7 (CONTINUED)

Model-Series Mfg.[b] Type[b]	Mode	Fuel Rate lb/hr	Fuel Rate kg/hr	CO lb/hr	CO kg/hr	NO_x[c] lb/hr	NO_x[c] kg/hr	Total HC[d] lb/hr	Total HC[d] kg/hr	SO_x[e] lb/hr	SO_x[e] kg/hr	Particulates[f] lb/hr	Particulates[f] kg/hr
RB-211-22B[i] RR TF	Idle	1718	779.3	137.6	64.42	5.31	2.41	100.1	45.36	1.72	0.78		
	Takeoff	14791	6709	5.62	2.55	504.1	228.7	29.14	13.22	14.79	6.71		
	Climbout	12205	5536	14.89	6.75	301.9	136.9	8.30	3.76	12.21	5.54		
	Approach	4376	1985	93.78	42.54	32.26	14.63	32.16	14.59	4.38	1.99		
RB-211-524[i] RR TF	Idle	1769	802.4	35.91	16.29	4.74	2.15	5.43	2.46	1.77	0.80		
	Takeoff	17849	8096	7.32	3.32	660.4	299.6	1.96	0.889	17.85	8.10		
	Climbout	14688	6662	7.34	3.33	470.0	213.2	2.50	1.13	14.69	6.67		
	Approach	5450	2472	11.72	5.32	62.89	28.53	0.545	0.247	5.45	2.47		
RB-401-06[i] RR TF	Idle	330	149.7	10.07	4.57	0.825	0.374	0.924	0.419	0.33	0.15		
	Takeoff	2400	1089	2.40	1.09	30.0	13.61	0.120	0.054	2.40	1.09		
	Climbout	2130	966.2	2.77	1.26	24.07	10.92	0.107	0.049	2.13	0.97		
	Approach	775	351.5	5.04	2.29	3.88	1.76	0.155	0.070	0.78	0.35		
Dart RDa7[i] RR TP	Idle	411	186.4	37.61	17.06	0.292	0.132	25.52	11.58	0.41	0.19		
	Takeoff	1409	639.1	4.79	2.17	8.51	3.86	8.75	3.97	1.41	0.64		
	Climbout	1248	566.1	4.26	1.93	5.55	2.52	2.15	0.975	1.25	0.57		
	Approach	645	292.6	21.48	9.74	0.568	0.258	0.0	0.0	0.65	0.29		
Tyne[g,i] RR TP	Idle	619	280.8	40.79	18.50	0.477	0.216	6.63	3.01	0.62	0.28		
	Takeoff	2372	1076	1.21	0.549	27.11	12.30	2.87	1.31	2.37	1.08		
	Climbout	2188	922.5	1.29	0.585	25.23	11.44	2.63	1.19	2.19	0.99		
	Approach	1095	496.7	11.30	5.13	9.00	4.08	2.68	1.22	1.10	0.50		
Olympus 593[i] MK610 RR (Bristol) TJ	Idle	3060	1388	342.7	155.4	9.72	4.41	119.3	54.11	3.06	1.39		
	Takeoff	52200	23673	1513.8	686.5	542.9	246.2	151.4	68.7	52.2	23.7		
	Climbout	19700	8936	275.8	125.1	169.4	76.84	31.52	14.30	19.70	8.94		
	Descent	5400	2449	426.6	193.5	18.9	8.6	132.3	60.0	5.4	2.4		
	Approach	9821	4455	451.8	204.9	41.25	18.71	93.30	42.32	9.82	4.46		
O-200 Con. O	Idle	8.24	3.75	5.31	2.42	0.013	0.006	0.239	0.107	0.0	0		
	Takeoff	45.17	20.53	44.0	20.0	0.220	0.100	0.940	0.427	0.01	0		
	Climbout	45.17	20.53	44.0	20.0	0.220	0.100	0.940	0.427	0.01	0		
	Approach	25.50	11.59	30.29	13.75	0.029	0.013	0.847	0.385	0.01	0		
TSIO-360C Con. O	Idle	11.5	5.21	6.81	3.09	0.022	0.009	1.59	0.723	0.0	0.0		
	Takeoff	133.	60.3	143.9	65.3	0.36	0.16	1.22	0.55	0.03	0.01		
	Climbout	99.5	45.1	95.6	43.4	0.43	0.20	0.95	0.43	0.02	0.01		
	Approach	61.0	27.7	60.7	27.5	0.23	0.10	0.69	0.31	0.01	0.01		
6-285-B (Tiara) Con. O	Idle	72.12	10.03	26.23	11.90	0.0334	0.0152	0.773	0.350	0.0	0.0		
	Takeoff	153.0	69.39	152.7	69.3	0.899	0.408	1.78	0.806	0.03	0.01		
	Climbout	166.0	52.61	110.9	50.3	0.913	0.414	1.39	0.632	0.02	0.01		
	Approach	83.5	37.88	85.39	38.77	0.394	0.179	1.343	0.609	0.02	0.01		

TABLE II-1-7 (CONCLUDED)

Model-Series Mfg.[b] Type[b]	Mode	Fuel Rate lb/hr	Fuel Rate kg/hr	CO lb/hr	CO kg/hr	NO_x[c] lb/hr	NO_x[c] kg/hr	Total HC[d] lb/hr	Total HC[d] kg/hr	SO_x[e] lb/hr	SO_x[e] kg/hr	Particulate[f] lb/hr	Particulate[f] kg/hr
O-320 Lyc. O	Idle	9.48	4.30	10.21	4.63	0.0049	0.0022	0.350	0.159	0.0	0.0		
	Takeoff	89.1	40.4	96.0	43.5	0.195	0.088	1.05	0.475	0.02	0.01		
	Climbout	66.7	30.3	66.0	29.9	0.265	0.120	0.826	0.375	0.01	0.01		
	Approach	46.5	21.1	56.8	25.8	0.044	0.020	0.895	0.406	0.01	0.0		
IO-320-DIAD Lyc. O	Idle	7.84	3.56	4.86	2.20	0.009	0.0041	0.283	0.128	0.0	0.0		
	Takeoff	91.67	41.57	109.3	49.55	0.167	0.0756	1.047	0.475	0.02	0.01		
	Climbout	61.42	27.85	54.55	24.74	0.344	0.156	0.588	0.267	0.01	0.01		
	Approach	37.67	17.08	35.57	16.13	0.128	0.058	0.460	0.208	0.01	0.0		
IO-360-B Lyc. O	Idle	8.09	3.68	7.26	3.29	0.0094	0.0042	0.398	0.180	0.0	0.0		
	Takeoff	103.0	46.7	123.5	56.0	0.205	0.093	1.03	0.469	0.02	0.01		
	Climbout	71.7	32.5	70.5	32.0	0.329	0.149	0.585	0.265	0.01	0.01		
	Approach	36.6	16.6	25.3	11.5	0.372	0.169	0.355	0.161	0.01	0.0		
TIO-540-J2B2 Lyc. O	Idle	25.06	11.36	32.42	14.70	0.0097	0.0044	1.706	0.774	0.01	0.0		
	Takeoff	259.7	117.8	374.5	169.8	0.094	0.043	3.21	1.46	0.05	0.02		
	Climbout	204.5	92.7	300.8	136.4	0.0481	0.0218	3.40	1.54	0.04	0.02		
	Approach	99.4	45.1	125.4	56.9	0.138	0.0623	1.33	0.604	0.02	0.01		

[a] References 1,2.

[b] Abbreviations: All – Detroit Diesel Allison Division of General Motors; Con – Teledyne/Continental; GA – Garrett AiResearch; GE – General Electric; Lyc – Avco/Lycoming, P&W – Pratt & Whitney, PWC – Pratt & Whitney Aircraft of Canada; RR – Rolls Royce; TJ – Turbojet; TF – Turbofan; TP – Turboprop; O – Reciprocating (Piston) Opposed.

[c] Nitrogen oxides reported as NO_2.

[d] Total hydrocarbons. Volatile organics, including unburned hydrocarbons and organic pyrolysis products.

[e] Sulfur oxides and sulfuric acid reported as SO_2. Calculated from fuel rate and 0.05 wt% sulfur in Jet A and Jet B fuel, or 0.01 wt% sulfur in aviation gasoline. For turbine engines, the conversion is therefore SO_x (lb/hr) = 10^{-3} (fuel rate), and for piston engines, the conversion is SO_x (lb/hr) = 2×10^{-4} (fuel rate).

[f] All particulate data are from Reference 4. Does not include condensible compounds.

[g] The indicated reference does not specify series number for this model engine.

[h] "Diluted smokeless" JT 8D. Note: JT8D is a turbofan engine and is not equivalent to the JT8 (Military J52) turbojet engine.

[i] All Rolls Royce data are based upon an arbitrary 7% idle, which does not reflect the actual situation. In reality, Rolls Royce engines will idle at 5-6% with correspondingly higher emissions (Reference 2).

[j] The Olympus 593 engine used in the Concorde SST has a unique 6-mode LTO cycle.

TABLE II-1-8. MODAL EMISSION RATES – MILITARY AIRCRAFT ENGINES[a]

Model-Series (Civil Version) Mfgr Type[h]	Mode	Fuel Rate		CO		NO_x[b]		Total HC[c]		SO_x[d]		Particulates[e,f]	
		lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr
J57-P-22	Idle	1087	493	64.4	29.2	2.7	1.2	55.8	25.3	1.1	0.5	8.3	3.8
(JT3C)	Takeoff	8358	3791	14.9	6.8	93.3	42.3	5.4	2.4	8.4	3.8	12.0	5.4
P&W TJ	Climbout	8358	3791	14.9	6.8	93.3	42.3	5.4	2.4	8.4	3.8	12.0	5.4
	Approach	1693	768	39.8	18.1	5.0	2.3	21.0	9.5	1.7	0.8		
J65-W-20	Idle	1333	605	66.9	30.3	3.7	1.7	5.0	2.3	1.3	0.6		
Wr. TJ	Takeoff	6421	2913	49.6	22.5	48.5	22.0	0.2	0.1	6.4	2.9		
	Climbout	6421	2913	49.6	22.5	48.5	22.0	0.2	0.1	6.4	2.9		
	Approach	3260	1479	52.6	23.9	23.7	10.8	0.9	0.4	3.3	1.5		
J79-GE-10	Idle	1100	499	48.0	21.8	3.2	1.5	9.8	4.4	1.1	0.5	57.8	26.2
GE TJ	Takeoff	35390	16053	611.9	277.6	241.3	109.5	17.2	7.8	35.4	16.1	299.7	135.9
	Climbout	9880	4482	52.0	23.6	151.8	68.9	16.0	7.3	9.9	4.5	77.7	35.2
	Approach	6190	2808	45.6	20.7	69.9	31.7	4.1	1.9	6.2	2.8	67.0 (nom)	30.4
J85-GE-5F	Idle	524	328	93.3	42.3	0.7	0.3	15.7	7.1	0.5	0.2		
GE TJ for T38	Takeoff	8470	3942	245.6	111.4	22.0	10.0	6.8	3.1	8.5	3.9		
	Climbout	1297	588	55.8	25.3	3.0	1.4	4.5	2.0	1.3	0.6		
	Approach	1098	498	63.7	28.9	3.0	1.4	1.3	0.6	1.1	0.5		
J85-GE-21	Idle	400	181	63.6	28.4	0.5	0.2	9.7	4.4	0.4	0.2		
GE TJ for F-5	Takeoff	10650	4831	387.7	175.8	59.6	27.0	1.1	0.5	10.7	4.9		
	Climbout	3200	1452	69.0	31.3	16.0	7.3	0.8	0.4	3.2	1.5		
	Approach	1200	544	55.5	25.1	3.5	1.6	3.1	1.4	1.2	0.5		
TF30-P-6B	Idle	689	313	47.0	21.3	0.9	0.4	12.9	5.9	0.7	0.3		
(JFT 10)	Takeoff	6835	3100	21.1	9.6	82.3	37.3	6.9	3.1	6.8	3.1		
P&W TF	Climbout	6835	3100	21.1	9.6	82.3	37.3	6.9	3.1	6.8	3.1		
for A-7	Approach	3550	1610	22.4	10.2	23.7	10.8	10.5	4.8	3.6	1.6		
TF30-P-412A	Idle	999	453	68.1	30.9	2.4	1.1	38.4	17.4	1.0	0.5	26.5	12.0
(JFT 10A)	Takeoff	40500	18144	600.0	272.2	270.0	122.5	40.0	18.1	40.0	18.1	693.2	314.4
P&W TJ	Climbout	7394	3354	15.7	7.1	123.2	55.9	0.7	0.3	7.4	3.4	61.7	29.0
for F-14	Approach	2598	1178	39.5	17.9	18.4	8.3	2.9	1.3	2.6	1.2	46.6 (nom)	21.2
TF33-P-3/5/7	Idle	846	384	74.9	34.0	1.5	0.7	77.8	35.3	0.8	0.4	4.4	2.0
(JT3D)	Takeoff	9979	4526	13.0	5.9	109.8	49.8	3.0	1.4	10.0	4.5	79.8	36.2
P&W TJ	Climbout	7323	3322	13.2	6.0	65.9	29.9	2.9	1.3	7.3	3.3	102.5	46.5
	Approach	3797	1722	34.2	15.5	27.7	12.6	14.4	6.5	3.8	1.7	53.1	24.1
TF34-GE-400	Idle	457	207	35.0	15.9	0.6	0.3	7.1	3.2	0.5	0.2		
GE TJ	Takeoff	3796	1722	9.3	4.2	20.9	9.5	1.6	0.7	3.8	1.7		
	Climbout	3796	1722	9.3	4.2	20.9	9.5	1.6	0.7	3.8	1.7		
	Approach	1296	588	19.4	8.8	10.0	4.5	0.8	0.4	1.3	0.6		

TABLE II-1-8 (CONCLUDED)

Model-Series (Civil-Version) Mfg.[h] Type[h]	Mode	Fuel Rate		CO		NO[b]		Total HC[c]		SO_x[d]		Particulates[e,f]	
		lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr
TF39-GE-1	Idle	1130	513	75.7	34.3	3.4	1.5	26.0	11.8	1.1	0.5	0.3[g]	0.1
(JT4A)	Takeoff	11410	5176	8.0	3.6	319.5	144.9	2.3	1.0	11.4	5.2	17.1[g]	7.8
GE TJ	Climbout	5740	2604	4.0	1.8	160.7	72.9	1.1	0.5	5.7	2.6	8.0[g]	3.6
	Approach	5740	2604	4.0	1.8	160.7	72.9	1.1	0.5	5.7	2.6	8.0[g]	3.6
TF41-A-2	Idle	1070	485	114.6	52.0	1.4	0.6	70.8	32.1	1.1	0.5		
All. TF	Takeoff	9040	4101	14.4	6.5	201.4	91.4	5.3	2.4	9.0	4.1		
	Climbout	9040	4101	14.4	6.5	201.4	91.4	5.3	2.4	9.0	4.1		
	Approach	5314	2410	27.5	12.5	56.6	25.7	12.9	5.9	5.3	2.4		
F100-PW-100	Idle	1060	481	20.5	9.3	4.2	1.9	2.4	1.1	1.1	0.5	0.1[g]	0.05
(JTF 22)	Takeoff	44200	20049	2435.4	1104.7	729.3	330.8	4.4	2.0	44.2	20.0	0.0[g]	0.0
P&W TF	Climbout	10400	4717	18.7	8.5	457.6	207.6	0.5	0.2	10.4	4.7	8.6[g]	3.9
	Approach	3000	1361	9.0	4.1	33.0	15.0	1.8	0.8	3.0	1.4	1.0[g]	0.5
PT6A-27	Idle	115	52	7.36	3.34	0.28	0.13	5.77	2.62	0.12	0.05		
PWC TP	Takeoff	425	193	0.43	0.20	3.32	1.51	0	0	0.43	0.20		
	Climbout	400	181	0.48	0.22	2.80	1.27	0	0	0.40	0.18		
	Approach	215	98	5.0	2.24	1.80	0.82	0.47	0.21	0.22	0.10		
T56-A7	Idle	548	249	17.5	7.9	2.1	1.0	11.5	5.2	0.5	0.2	1.6	0.7
All TP	Takeoff	2079	943	4.4	2.0	19.3	8.8	0.8	0.4	2.1	1.0	3.7	1.7
	Climbout	1908	865	4.6	2.1	17.6	8.0	0.9	0.4	0.9	0.4	3.0	1.4
	Approach	1053	478	3.7	1.7	7.8	3.5	0.5	0.2	1.1	0.5	3.0	1.4
T53-L-11D	Idle	142	64	4.2	1.9	0.2	0.1	9.0	4.1	0.14	0.06		
(LTC1)	Climbout[i]	679	308	2.0	0.9	5.0	2.3	0.2	0.1	0.68	0.31		
Lyc TS	Approach	679	308	2.0	0.9	5.0	2.3	0.2	0.1	0.68	0.31		
T55-L-11A	Idle			29.5	13.4	0.8	4.0	4.0	1.8				
(LTC4)	Climbout[i]			14.5	6.6	18.6	8.4	0.2	0.1				
Lyc TS	Approach			12.9	5.9	9.1	4.1	0.3	0.1				
T58-GE-5	Idle	133	60	22.5	10.2	0.2	0.1	12.9	5.9	0.1	0.05	0.1	0.05
GE TS	Climbout[i]	886	402	5.0	2.3	6.4	2.9	0.7	0.3	0.9	0.4	0.8	0.4
	Approach	886	402	5.0	2.3	6.4	2.9	0.7	0.3	0.9	0.4	0.8	0.4

[a] Reference 1.

[b] Nitrogen oxides reported as NO_2.

[c] Total hydrocarbons. Volatile organics, including unburned hydrocarbons and organic pyrolysis products.

[d] Sulfur oxides and sulfuric acid reported as SO_2. Calculated from fuel rate and 0.05 wt% sulfur in JP-4 or JP-5 fuel, or 0.01 wt% sulfur in aviation gasoline. For turbine engines, the conversion is therefore SO_x (lb/hr) = 10^{-3} (fuel rate), and for piston engines, the conversion is SO_x (lb/hr) = 2×10^{-4} (fuel rate).

[e] Includes all "condensible particulates," and thus may be much higher than solid particulates alone (except as noted in g below).

[f] "Nom." data are interpolated values assumed for calculational purposes, in the absence of experimental data.

[g] Dry particles only.

[h] For abbreviations, see footnote, Table II-1-2.

[i] "Takeoff" mode is undefined for helicopters.

TABLE II-1-9. EMISSION FACTORS PER AIRCRAFT PER LANDING/TAKEOFF CYCLE—CIVIL AIRCRAFT[a]

Commercial Carrier Aircraft	Power Plant[b]			CO		NO_x[c]		Total HC[d]		SO_x[e]		Particulates	
	No.	Mfg.	Model-Series	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
Short, Medium, Long Range and Jumbo Jets													
BAC/Aerospatiale Concorde	4	RR	Olymp 593	847.0	384.0	91.0	41.0	246.0	112.0	14.1	6.4		
BAC 111-400	2	RR	Spey 511	103.36	46 88	15.04	6.82	72.42	32.85	1.70	0 77	1 46	0 66
Boeing 707-320B	4	P&W	JT3D-7	262.64	119.12	25.68	11 64	218.24	99.00	4.28	1 94	4.52	2 05
Boeing 727-200	3	P&W	JT8D-17	55.95	25.38	29 64	13.44	13.44	6.09	3.27	1 48	1.17	0.53
Boeing 737-200	2	P&W	JT8D-17	37 30	16 92	19.76	8 96	8.96	4.06	2.18	0 99	0 78	0.35
Boeing 747-200B	4	P&W	JT9D-7	259.64	117 76	83 24	37.76	96 92	43.96	7.16	3.25	5.20	2 36
Boeing 747-200B	4	P&W	JT9D-70	108.92	49 40	107 48	48 76	22.40	10.16	7.96	3 61	5.20	2.36
Boeing 747-200B	4	RR	RB211-524	66.76	30.28	124 9	56 65	10 00	4.54	7.52	3 41		
Lockheed L1011-200	3	RR	RB211-524	50.07	27 71	93 66	42.48	7.50	3.40	5.64	2 56		
Lockheed L1011-100	3	RR	RB211-22B	199 4	90 44	64.29	29 16	138.4	62.77	4 95	2 24		
McDonnell-Douglas DC8-63	4	P&W	JT3D-7	262.64	119 12	25 68	11 64	218 24	99.00	3 27	1 48	1 17	0 53
McDonnell-Douglas DC9-50	2	P&W	JT8D-17	37.30	16.92	19 76	8 96	8.96	4.06	2 18	0 99	0.76	0.35
McDonnell-Douglas DC10-30	3	GE	CF6-50C	116.88	53.01	49.59	22 17	47.10	21.36	4.98	2.26	0.21	0 10
Air Carrier Turboprops — Commuter, Feeder Line and Freighters													
Beech 99	2	PWC	PT6A-28	7.16	3.25	0.82	0.37	5.08	2.30	0.18	0.08		
GD/Convair 580	2	All	501	24.38	11.06	21.66	9.82	9.82	4.45	0.92	0.42		
DeHavilland Twin Otter	2	PWC	PT6A-27	7 16	3 25	0.82	0.37	5.08	2.30	0.18	0.08		
Fairchild F27 and FH227	2	RR	R.Da.7	36.26	16 45	0.92	0.42	22.42	10.17	0.58	0 26		
Grumman Goose	2	PWC	PT6A-27	7.16	3 25	0.82	0.37	5.08	2.30	0.18	0.08		
Lockheed L188 Electra	4	All	501	48.76	22.12	43.32	19.65	19.64	8.91	1.84	0.83		
Lockheed L100 Hercules	4	All	501	48.76	22.12	43.32	19.65	19.64	8.91	1.84	0.83		
Swearingen Metro-2	2	GA	TPE 331-3	6.26	2.84	1.16	0.53	7.68	3.48	0.16	0.07	0.46	0.21

TABLE II-1-9 (CONCLUDED)

General Aviation Aircraft	Power Plant[b]			CO		NO_x[c]		Total HC[d]		SO_x[e]		Particulates	
	No.	Mfg.	Model-Series	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
Business Jets													
Cessna Citation	2	P&W	JT15D-1	19.50	8.85	2.00	0.91	6.72	3.05	0.40	0.18		
Dassault Falcon 20	2	GE	CF700-2D	76.14	34.54	1.68	0.76	7.40	3.36	0.78	0.35		
Gates Learjet 24D	2	GE	CJ610-6	88.76	40.26	1.58	0.72	8.42	3.82	0.84	0.38		
Gates Learjet 35, 36	2	GE	TPE 731-2	11.26	5.11	3.74	1.58	3.74	1.70	0.92	0.42		
Rockwell International Shoreliner 75A	2	GE	CF 700	76.14	34.54	1.08	0.76	7.40	3.36	0.78	0.35		
Business Turboprops (EPA Class P2)													
Beech B99 Airliner	2	PWC	PT6A-27	7.16	3.25	0.82	0.37	5.08	2.30	0.18	0.08		
DeHavilland Twin Otter	2	PWC	PT6A-27	7.16	3.25	0.82	0.37	5.08	2.30	0.18	0.08		
Shorts Skyvan-3	2	GA	TPE-331-2	6.44	2.92	0.883	0.400	8.40	3.81	0.16	0.07	0.46	0.21
Swearingen Merlin IIIA	2	GA	TPE-331-3	6.28	2.85	1.15	0.522	7.71	3.50	0.16	0.07	0.46	0.21
General Aviation Piston (EPA Class P1)													
Cessna 150	1	Con	0-200	8.32	3.77	0.02	0.01	0.23	0.10	0.0	0.0		
Piper Warrior	1	Lyc	0-320	14.37	6.52	0.02	0.01	0.26	0.12	0.0	0.0		
Cessna Pressurized Skymaster	2	Con	TS10-360C	33.10	15.01	0.13	0.06	1.15	0.52	0.0	0.0		
Piper Navajo Chieftain	2	Lyc	T10-540	96.24	43.65	0.02	0.01	1.76	0.80	0.0	0.0		

[a]Reference 2.

[b]Abbreviations: All – Detroit Diesel Allison Division of General Motors; Con – Teledyne/Continental; GA – Garrett AiResearch; GE – General Electric; Lyc – Avco/Lycoming; P&W – Pratt & Whitney; PWC – Pratt & Whitney Aircraft of Canada; RR – Rolls Royce.

[c]Nitrogen oxides reported as NO_2.

[d]Total hydrocarbons. Volatile organics, including unburned hydrocarbons and organic pyrolysis products.

[e]Sulfur oxides and sulfuric acid reported as SO_2.

Table II-1-10. EMISSIONS FOR MILITARY AIRCRAFT LANDING/TAKEOFF CYCLES[a]

Aircraft		Power plant No.	Model/Series	TIM[b] code	CO lb	CO kg	NO_x[c] lb	NO_x[c] kg	Total HC[d] lb	Total HC[d] kg	SO_x[e] lb	SO_x[e] kg	Particulates lb	Particulates kg
Fixed Wing - Turbine														
A-4C	Skyhawk	1	J65-W-20	2	16.62	7.54	2.15	0.98	1.10	0.50	0.46	0.21		
A-7	Corsair 2	1	TP30-P-68	2	11.10	5.03	2.05	0.93	3.18	1.44	0.35	0.16		
A-7	Corsair 2	1	TF41-A-2	2	25.79	11.70	4.83	2.19	15.76	7.15	0.52	0.24		
B-52H	Stratofortress	8	TF-33-P-3/5/8	7	504.08	228.65	53.04	24.06	505.76	229.41	10.24	4.64	94.08	42.67
F-4	Phantom 2	2	J79-GE-10	2	32.24	14.62	10.88	4.94	4.94	2.24	1.46	0.66	33.92	15.39
F-5	Freedom Fighter/Tiger	2	J85-GE-21	1	76.64	34.76	2.10	0.95	10.04	4.55	0.76	0.34		
F-14	Tomcat	2	TF30-P-412A	2	39.88	18.09	7.62	3.46	17.36	7.87	1.24	0.56	24.24	11.00
F-15A	Eagle	2	F100-PW-100	1	54.40	24.68	29.96	13.58	2.68	1.22	2.32	1.06	0.44	0.20
F-16	-	1	F100-PW-100	1	27.20	12.34	14.98	6.79	1.34	0.61	1.16	0.53	0.22	0.10
C-5A	Galaxy	4	TF39-GE-1	5	82.12	37.25	79.60	36.11	28.08	12.74	3.84	1.74	4.12	1.87
C-130	Hercules	4	T56-A-7	6	32.36	14.68	9.60	4.35	20.28	9.20	1.60	0.73	4.36	1.98
KC-135	Stratotanker	4	J57-P-22	7	220.92	100.21	24.64	11.18	185.56	84.17	5.36	2.43	31.36	14.22
C-141	Starlifter	4	TF33-P-3/5/7	5	92.40	41.91	19.20	8.71	87.68	39.77	3.00	1.36	33.00	14.97
T-34C	Turbo Mentor	1	PT6A-27	2	1.73	0.73	0.15	0.07	1.27	0.58	0.03	0.01		
T-38	Talon	2	J85-GE-5F	3	82.72	32.99	1.22	0.55	10.42	4.73	0.62	0.28		
P-3C	Orion	4	T56-A-7	6	32.36	14.68	9.60	4.35	20.28	9.20	1.60	0.73	4.36	1.98
S3A	Viking	2	TF34-GE-400	6	34.18	15.50	4.04	1.83	6.44	2.92	1.02	0.46		
Helicopters - Turbine														
UH-1H	Iroquois/Huey	1	T53-L-11D	9	1.55	0.70	1.19	0.54	2.53	1.15	0.20	0.09		
HH-3	Sea King/Jolly Green Giant	2	T58-GE-5	9	13.54	6.14	3.02	1.37	6.78	3.08	0.44	0.20	0.40	0.18
CH-47	Chinook	2	T55-L-11A	9	20.94	9.50	6.68	3.03	2.10	0.95				

[a] Reference 1.
[b] Defined in Table II-1-5.
[c] Nitrogen oxides reported as NO_2.
[d] Total hydrocarbons. Volatile organics, including unburned hydrocarbons and organic pyrolysis products.
[e] Sulfur oxides and sulfuric acid reported as SO_2.

II-1.3 Modal Emission Rates and Emission Factors per LTO Cycle

The first step in the calculation of aircraft emission factors is the development of a set of modal emission rates. These represent the quantity of pollutant released per unit time in each of the standard modes. Each mode is characterized by an engine power setting (given in Tables II-1-5 and II-1-6) and a fuel rate (the quantity of fuel consumed per unit time).

The following procedure is for calculation of aircraft emission factors per LTO cycle, starting with engine modal emission rates:

1) For a specific aircraft, determine the number and model of engines, using for example, Tables II-1-1 or II-1-2.

2) Using Table II-1-7 or II-1-8, locate the appropriate engine data, and prepare a list of modal emission rates for each mode m and pollutant p:

$$\left(\frac{\Delta e}{\Delta t}\right)_{m,p}$$

3) Using known military assignment and mission, or civil aircraft type and application, use Table II-1-3 or II-1-4 to select an appropriate set of times-in-mode $(TIM)_m$.

4) For each mode m and pollutant p, multiply the modal emission rate and TIM data for each mode and the sum over all modes. This will yield an emission factor <u>per engine</u>, which must be multiplied by the number of engines, N, to produce the emission factor per LTO cycle, E_p, for an aircraft:

$$E_p = N \Sigma \left(\frac{\Delta e}{\Delta t}\right)_{m,p} .(TIM)_m$$

On a conveniently laid out work sheet, this calculation can be set up easily on a hand calculator with one storage location.

Emission factors calculated in exactly this way are presented in Tables II-1-9 and II-1-10.

References for Section II-1

1. D. R. Sears, <u>Air Pollutant Emission Factors for Military and Civil Aircraft</u>, EPA-450/3-78-117, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina, October 1978.

2. R. G. Pace, "Technical Support Report - Aircraft Emission Factors", Office of Mobile Source Air Pollution Control, U.S. Environmental Protection Agency, Ann Arbor, MI, March 1977.

3. Control of Air Pollution for Aircraft and Aircraft Engines, 38 FR 19088, July 17, 1973.

4. M. Platt, et al., The Potential Impact of Aircraft Emissions upon Air Quality, APTD-1085, U.S. Environmental Protection Agency, Research Triangle Park, NC, December 1971.

II-2 Locomotives

II-2.1 General – Railroad locomotives generally follow one of two use patterns: railyard switching or road-haul service. Locomotives can be classified on the basis of engine configuration and use pattern into five categories: 2-stroke switch locomotive (supercharged), 4-stroke switch locomotive, 2-stroke road service locomotive (supercharged), 2-stroke road service locomotive (turbocharged), and 4-stroke road service locomotive.

The engine duty cycle of locomotives is much simpler than many other applications involving diesel internal combustion engines because locomotives usually have only eight throttle positions in addition to idle and dynamic brake. Emission testing is made easier and the results are probably quite accurate because of the simplicity of the locomotive duty cycle.

II-2.2 Emissions – Emissions from railroad locomotives are presented two ways in this section. Table II-2-1 contains average factors based on the nationwide locomotive population breakdown by category. Table II-2-2 gives emission factors by locomotive category on the basis of fuel consumption and on the basis of work output (horsepower hour).

The calculation of emissions using fuel-based emission factors is straightforward. Emissions are simply the product of the fuel usage and the emission factor. In order to apply the work output emission factor, however, an

Table II-2-1. AVERAGE LOCOMOTIVE EMISSION FACTORS BASED ON NATIONWIDE STATISTICS[a]

Pollutant	Average emissions[b]	
	lb/10^3 gal	kg/10^3 liter
Particulates[c]	25	3.0
Sulfur oxides[d] (SO_x as SO_2)	57	6.8
Carbon monoxide	130	16
Hydrocarbons	94	11
Nitrogen oxides (NO_x as NO_2)	370	44
Aldehydes (as HCHO)	5.5	0.66
Organic acids[c]	7	0.84

[a] Reference 1.
[b] Based on emission data contained in Table II-2-2 and the breakdown of locomotive use by engine category in the United States in Reference 1
[c] Data based on highway diesel data from Reference 2 No actual locomotive particulate test data are available.
[d] Based on a fuel sulfur content of 0.4 percent from Reference 3.

Table II-2-2. EMISSION FACTORS BY LOCOMOTIVE ENGINE CATEGORY[a]
EMISSION FACTOR RATING: B

Pollutant	Engine category				
	2-Stroke supercharged switch	4-Stroke switch	2-Stroke supercharged road	2-Stroke turbocharged road	4-Stroke road
Carbon monoxide					
lb/10^3 gal	84	380	66	160	180
kg/10^3 liter	10	46	7.9	19	22
g/hphr	3.9	13	1.8	4.0	4.1
g/metric hphr	3.9	13	1.8	4.0	4.1
Hydrocarbon					
lb/10^3 gal	190	146	148	28	99
kg/10^3 liter	23	17	18	3.4	12
g/hphr	8.9	5.0	4.0	0.70	2.2
g/metric hphr	8.9	5.0	4.0	0.70	2.2
Nitrogen oxides (NO_x as NO_2)					
lb/10^3 gal	250	490	350	330	470
kg/10^3 liter	30	59	42	40	56
g/hphr	11	17	9.4	8.2	10
g/metric hphr	11	17	9.4	8.2	10

[a] *Use average factors (Table II-2-1) for pollutants not listed in this table.*

additional calculation is necessary. Horsepower hours can be obtained using the following equation:

$$w = l\,p\,h$$

where: w = Work output (horsepower hour)

l = Load factor (average power produced during operation divided by available power)

p = Available horsepower

h = Hours of usage at load factor (l)

After the work output has been determined, emissions are simply the product of the work output and the emission factor. An approximate load factor for a line-haul locomotive (road service) is 0.4; a typical switch engine load factor is approximately 0.06.[1]

References for Section II-2

1. Hare, C.T. and K.J. Springer. Exhaust Emissions from Uncontrolled Vehicles and Related Equipment Using Internal Combustion Engines. Part 1. Locomotive Diesel Engines and Marine Counterparts. Final Report. Southwest Research Institute. San Antonio, Texas. Prepared for the Environmental Protection Agency, Research Triangle Park, N.C., under Contract Number EHA 70-108. October 1972.

2. Young, T.C. Unpublished Data from the Engine Manufacturers Association. Chicago, Ill. May 1970.

3. Hanley, G.P. Exhaust Emission Information on Electro-Motive Railroad Locomotives and Diesel Engines. General Motors Corp. Warren, Mich. October 1971.

II-3 Inboard-Powered Vessels

II-3.1 General – Vessels classified on the basis of use will generally fall into one of three categories: commercial, pleasure, or military. Although usage and population data on vessels are, as a rule, relatively scarce, information on commercial and military vessels is more readily available than data on pleasure craft. Information on military vessels is available in several study reports,[1-5] but data on pleasure craft are limited to sales-related facts and figures.[6-10]

Commercial vessel population and usage data have been further subdivided by a number of industrial and governmental researchers into waterway classifications[11-16] (for example, Great Lakes vessels, river vessels, and coastal vessels). The vessels operating in each of these waterway classes have similar characteristics such as size, weight, speed, commodities transported, engine design (external or internal combustion), fuel used, and distance traveled. The wide variation between classes, however, necessitates the separate assessment of each of the waterway classes with respect to air pollution.

Information on military vessels is available from both the U.S. Navy and the U.S. Coast Guard as a result of studies completed recently. The U.S. Navy has released several reports that summarize its air pollution assessment work.[3-5] Emission data have been collected in addition to vessel population and usage information. Extensive study of the air pollutant emissions from U.S. Coast Guard watercraft has been completed by the U.S. Department of Transportation. The results of this study are summarized in two reports.[1-2] The first report takes an in-depth look at population/usage of Coast Guard vessels. The second report, dealing with emission test results, forms the basis for the emission factors presented in this section for Coast Guard vessels as well as for non-military diesel vessels.

Although a large portion of the pleasure craft in the U.S. are powered by gasoline outboard motors (see section II-4 of this document), there are numerous larger pleasure craft that use inboard power either with or without "out-drive" (an outboard-like lower unit). Vessels falling into the inboard pleasure craft category utilize either Otto cycle (gasoline) or diesel cycle internal combustion engines. Engine horsepower varies appreciably from the small "auxiliary" engine used in sailboats to the larger diesels used in yachts.

II-3.2 Emissions

Commercial vessels. Commercial vessels may emit air pollutants under two major modes of operation: underway and at dockside (auxiliary power).

Emissions underway are influenced by a great variety of factors including power source (steam or diesel), engine size (in kilowatts or horsepower), fuel used (coal, residual oil, or diesel oil), and operating speed and load. Commercial vessels operating within or near the geographic boundaries of the United States fall into one of the three categories of use discussed above (Great Lakes, rivers, coastline). Tables II-3-1 and II-3-2 contain emission information on commercial vessels falling into these three categories. Table II-3-3 presents emission factors for diesel marine engines at various operating modes on the basis of horsepower. These data are applicable to any vessel having a similar size engine, not just to commercial vessels.

Unless a ship receives auxiliary steam from dockside facilities, goes immediately into drydock, or is out of operation after arrival in port, she continues her emissions at dockside. Power must be made available for the ship's lighting, heating, pumps, refrigeration, ventilation, etc. A few steam ships use auxiliary engines (diesel) to supply power, but they generally operate one or more main boilers under reduced draft and lowered fuel rates—a very inefficient process. Motorships (ships powered by internal combustion engines) normally use diesel-powered generators to furnish auxiliary power.[17] Emissions from these diesel-powered generators may also be a source of underway emissions if they are used away from port. Emissions from auxiliary power systems, in terms of the

Table II-3-1. AVERAGE EMISSION FACTORS FOR COMMERCIAL MOTORSHIPS BY WATERWAY CLASSIFICATION
EMISSION FACTOR RATING: C

Emissions[a]	Class[c]		
	River	Great Lakes	Coastal
Sulfur oxides[b] (SO_x as SO_2)			
kg/10^3 liter	3.2	3.2	3.2
lb/10^3 gal	27	27	27
Carbon monoxide			
kg/10^3 liter	12	13	13
lb/10^3 gal	100	110	110
Hydrocarbons			
kg/10^3 liter	6.0	7.0	6.0
lb/10^3 gal	50	59	50
Nitrogen oxides (NO_x as NO_2)			
kg/10^3 liter	33	31	32
lb/10^3 gal	280	260	270

[a]Expressed as function of fuel consumed (based on emission data from Reference 2 and population/usage data from References 11 through 16.

[b]Calculated, not measured. Based on 0.20 percent sulfur content fuel and density of 0.854 kg/liter (7.12 lb/gal) from Reference 17.

[c]Very approximate particulate emission factors from Reference 2 are 470 g/hr (1.04 lb/hr). The reference does not contain sufficient information to calculate fuel-based factors.

quantity of fuel consumed, are presented in Table II-3-4. In some instances, fuel quantities used may not be available, so calculation of emissions based on kilowatt hours (kWh) produced may be necessary. For operating loads in excess of zero percent, the mass emissions (e_1) in kilograms per hour (pounds per hour) are given by:

$$e_1 = kle_f \qquad (1)$$

where: k = a constant that relates fuel consumption to kilowatt hours,[2]

that is, 3.63×10^{-4} 1000 liters fuel/kWh

or

9.59×10^{-5} 1000 gal fuel/kWh

l = the load, kW

e_f = the fuel-specific emission factor from Table 3.2.3-4, kg/10^3 liter (lb/10^3 gal)

Table II-3-2. EMISSION FACTORS FOR COMMERCIAL STEAMSHIPS–ALL GEOGRAPHIC AREAS
EMISSION FACTOR RATING: D

Pollutant	Fuel and operating mode[a]											
	Residual oil[b]						Distillate oil[b]					
	Hoteling		Cruise		Full		Hoteling		Cruise		Full	
	kg/10^3 liter	lb/10^3 gal	kg/10^3 liter	lb/10^3 gal	kg/10^3 liter	lb/10^3 gal	kg/10^3 liter	lb/10^3 gal	kg/10^3 liter	lb/10^3 gal	kg/10^3 liter	lb/10^3 gal
Particulates[c]	1.20[d]	10.0[d]	2.40	20.0	6.78	56.5	1.8	15	1.78	15	1.78	15
Sulfur oxides (SO_x as SO_2)[e]	19.1S	159S	19.1S	159S	19.1S	159S	17.0S	142S	17.0S	142S	17.0S	142S
Carbon monoxide[c]	Neg[d]	Neg[d]	0.414	3.45	0.872	7.27	0.5	4	0.5	4	0.5	4
Hydrocarbons[c]	0.38[d]	3.2[d]	0.082	0.682	0.206	1.72	0.4	3	0.4	3	0.4	3
Nitrogen oxides (NO_x as NO_2)	4.37	36.4	6.70	55.8	7.63	63.6	2.66	22.2	2.83	23.6	5.34	44.5

[a]The operating modes are based on the percentage of maximum available power: "hoteling" is 10 to 11 percent of available power, "full" is 100 percent of available power, and "cruise" is an intermediate power (35 to 75 percent, depending on the test organization and vessel tested).
[b]Test organizations used "Navy Special" fuel oil, which is not a true residual oil. No vessel test data were available for residual oil combustion. "Residual" oil results are from References 2, 3, and 5. "Distillate" oil results are from References 3 and 5 only. Exceptions are noted. "Navy Distillate" was used as distillate test fuel.
[c]Particulate, carbon monoxide, and hydrocarbon emission factors for distillate oil combustion are based on stationary boilers (see Section 1.3 of this document).
[d]Reference 18 indicates that carbon monoxide emitted during hoteling is small enough to be considered negligible. This reference also places hydrocarbons at 0.38 kg/10^3 liter (3.2 lb/10^3 gal) and particulate at 1.20 kg/10^3 liter (10.0 lb/10^3 gal). These data are included for completeness only and are not necessarily comparable with other tabulated data.
[e]Emission factors listed are theoretical in that they are based on all the sulfur in the fuel converting to sulfur dioxide. Actual test data from References 3 and 5 confirm the validity of these theoretical factors. "S" is fuel sulfur content in percent.

Table II-3-3. DIESEL VESSEL EMISSION FACTORS BY OPERATING MODE[a]
EMISSION FACTOR RATING: C

Horsepower	Mode	Emissions[b]					
		Carbon monoxide		Hydrocarbons		Nitrogen oxides (NO_x as NO_2)	
		lb/10^3 gal	kg/10^3 liter	lb/10^3 gal	kg/10^3 liter	lb/10^3 gal	kg/10^3 liter
200	Idle	210.3	25.2	391.2	46.9	6.4	0.8
	Slow	145.4	17.4	103.2	12.4	207.8	25.0
	Cruise	126.3	15.1	170.2	20.4	422.9	50.7
	Full	142.1	17.0	60.0	7.2	255.0	30.6
300	Slow	59.0	7.1	56.7	6.8	337.5	40.4
	Cruise	47.3	5.7	51.1	6.1	389.3	46.7
	Full	58.5	7.0	21.0	2.5	275.1	33.0
500	Idle	282.5	33.8	118.1	14.1	99.4	11.9
	Cruise	99.7	11.9	44.5	5.3	338.6	40.6
	Full	84.2	10.1	22.8	2.7	269.2	32.3
600	Idle	171.7	20.6	68.0	8.2	307.1	36.8
	Slow	50.8	6.1	16.6	2.0	251.5	30.1
	Cruise	77.6	9.3	24.1	2.9	349.2	41.8
700	Idle	293.2	35.1	95.8	11.5	246.0	29.5
	Cruise	36.0	4.3	8.8	1.1	452.8	54.2
900	Idle	223.7	26.8	249.1	29.8	107.5	12.9
	2/3	62.2	7.5	16.8	2.0	167.2	20.0
	Cruise	80.9	9.7	17.1	2.1	360.0	43.1
1580	Slow	122.4	14.7	–	–	371.3	44.5
	Cruise	44.6	5.3	–	–	623.1	74.6
	Full	237.7	28.5	16.8	2.0	472.0	5.7
2500	Slow	59.8	7.2	22.6	2.7	419.6	50.3
	2/3	126.5	15.2	14.7	1.8	326.2	39.1
	Cruise	78.3	9.4	16.8	2.0	391.7	46.9
	Full	95.9	11.5	21.3	2.6	399.6	47.9
3600	Slow	148.5	17.8	60.0	7.2	367.0	44.0
	2/3	28.1	3.4	25.4	3.0	358.6	43.0
	Cruise	41.4	5.0	32.8	4.0	339.6	40.7
	Full	62.4	7.5	29.5	3.5	307.0	36.8

[a]Reference 2
[b]Particulate and sulfur oxides data are not available

Table II-3-4. AVERAGE EMISSION FACTORS FOR DIESEL-POWERED ELECTRICAL GENERATORS IN VESSELS[a]
EMISSION FACTOR RATING: C

Rated output,[b] kW	Load,[c] % rated output	Emissions							
		Sulfur oxides (SO_x as SO_2)[d]		Carbon monoxide		Hydro-carbons		Nitrogen oxides (NO_x as NO_2)	
		lb/10^3 gal	kg/10^3 liter	lb/10^3 gal	kg/10^3 liter	lb/10^3 gal	kg/10^3 liter	lb/10^3 gal	kg/10^3 liter
20	0	27	3.2	150	18.0	263	31.5	434	52.0
	25	27	3.2	79.7	9.55	204	24.4	444	53.2
	50	27	3.2	53.4	6.40	144	17.3	477	57.2
	75	27	3.2	28.5	3.42	84.7	10.2	495	59.3
40	0	27	3.2	153	18.3	584	70.0	214	25.6
	25	27	3.2	89.0	10.7	370	44.3	219	26.2
	50	27	3.2	67.6	8.10	285	34.2	226	27.1
	75	27	3.2	64.1	7.68	231	27.7	233	27.9
200	0	27	3.2	134	16.1	135	16.2	142	17.0
	25	27	3.2	97.9	11.7	33.5	4.01	141	16.9
	50	27	3.2	62.3	7.47	17.8	2.13	140	16.8
	75	27	3.2	26.7	3.20	17.5	2.10	137	16.4
500	0	27	3.2	58.4	7.00	209	25.0	153	18.3
	25	27	3.2	53.4	6.40	109	13.0	222	26.6
	50	27	3.2	48.1	5.76	81.9	9.8	293	35.1
	75	27	3.2	43.7	5.24	59.1	7.08	364	43.6

[a]Reference 2.

[b]Maximum rated output of the diesel-powered generator.

[c]Generator electrical output (for example, a 20 kW generator at 50 percent load equals 10 kW output).

[d]*Calculated, not measured, based on 0.20 percent fuel sulfur content and density of 0.854 kg/liter (7.12 lb/gal) from Reference 17.*

At zero load conditions, mass emission rates (e_l) may be approximated in terms of kg/hr (lb/hr) using the following relationship:

$$e_l = k l_{rated} e_f \qquad (2)$$

where, k = a constant that relates rated output and fuel consumption,

that is, 6.93×10^{-5} 1000 liters fuel/kW

or

1.83×10^{-5} 1000 gal fuel/kW

l_{rated} = the rated output, kW

e_f = the fuel-specific emission factor from Table II-3-4, kg/10^3 liter (lb/10^3 gal)

Pleasure craft. Many of the engine designs used in inboard pleasure craft are also used either in military vessels (diesel) or in highway vehicles (gasoline). Out of a total of 700,000 inboard pleasure craft registered in the United States in 1972, nearly 300,000 were inboard/outdrive. According to sales data, 60 to 70 percent of these

inboard/outdrive craft used gasoline-powered automotive engines rated at more than 130 horsepower.[6] The remaining 400,000 pleasure craft used conventional inboard drives that were powered by a variety of powerplants, both gasoline and diesel. Because emission data are not available for pleasure craft, Coast Guard and automotive data[2,19] are used to characterize emission factors for this class of vessels in Table II-3-5.

Military vessels. Military vessels are powered by a wide variety of both diesel and steam power plants. Many of the emission data used in this section are the result of emission testing programs conducted by the U.S. Navy and the U.S. Coast Guard.[1-3,5] A separate table containing data on military vessels is not provided here, but the included tables should be sufficient to calculate approximate military vessel emissions.

TABLE II-3.-5. AVERAGE EMISSION FACTORS FOR INBOARD PLEASURE CRAFT[a]

EMISSION FACTOR RATING: D

	Based on fuel consumption				Based on operating time			
	Diesel engine[b]		Gasoline engine[c]		Diesel engine[b]		Gasoline engine[c]	
Pollutant	$kg/10^3$ liter	$lb/10^3$ gal	$kg/10^3$ liter	$lb/10^3$ gal	kg/hr	lb/hr	kg/hr	lb/hr
Sulfur oxides[d] (SO_x as SO_2)	3.2	27	0.77	6.4	–	–	0.008	0.019
Carbon monoxide	17	140	149	1240	–	–	1.69	3.73
Hydrocarbons	22	180	10.3	86	–	–	0.117	0.258
Nitrogen oxides (NO_x as NO_2)	41	340	15.7	131	–	–	0.179	0.394

[a]Average emission factors are based on the duty cycle developed for large outboards ($\geq$ 48 kilowatts or $\geq$ 65 horsepower) from Reference 7. The above factors take into account the impact of water scrubbing of underwater gasoline engine exhaust, also from Reference 7. All values given are for single engine craft and must be modified for multiple engine vessels.

[b]Based on tests of diesel engines in Coast Guard vessels, Reference 2.

[c]Based on tests of automotive engines, Reference 19. Fuel consumption of 11.4 liter/hr (3 gal/hr) assumed. The resulting factors are only *rough* estimates.

[d]Based on fuel sulfur content of 0.20 percent for diesel fuel and 0.043 percent for gasoline from References 7 and 17. Calculated using fuel density of 0.740 kg/liter (6.17 lb/gal) for gasoline and 0.854 kg/liter (7.12 lb/gal) for diesel fuel.

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II-4 Outboard-Powered Vessels

II-4.1 General – Most of the approximately 7 million outboard motors in use in the United States are 2-stroke engines with an average available horsepower of about 25. Because of the predominately leisure-time use of outboard motors, emissions related to their operation occur primarily during nonworking hours, in rural areas, and during the three summer months. Nearly 40 percent of the outboards are operated in the states of New York, Texas, Florida, Michigan, California, and Minnesota. This distribution results in the concentration of a large portion of total nationwide outboard emissions in these states.[1]

II-4.2 Emissions – Because the vast majority of outboards have underwater exhaust, emission measurement is very difficult. The values presented in Table II-4-1 are the approximate atmospheric emissions from outboards. These data are based on tests of four outboard motors ranging from 4 to 65 horsepower.[1] The emission results from these motors are a composite based on the nationwide breakdown of outboards by horsepower. Emission factors are presented two ways in this section: in terms of fuel use and in terms of work output (horsepower hour). The selection of the factor used depends on the source inventory data available. Work output factors are used when the number of outboards in use is available. Fuel-specific emission factors are used when fuel consumption data are obtainable.

Table II-4-1. AVERAGE EMISSION FACTORS FOR OUTBOARD MOTORS[a]
EMISSION FACTOR RATING: B

	Based on fuel consumption		Based on work output[c]	
Pollutant[b]	lb/10^3 gal	kg/10^3 liter	g/hphr	g/metric hphr
Sulfur oxides[d] (SO_x as SO_2)	6.4	0.77	0.49	0.49
Carbon monoxide	3300	400	250	250
Hydrocarbons[e]	1100	130	85	85
Nitrogen oxides (NO_x as NO_2)	6.6	0.79	0.50	0.50

[a] Reference 1. Data in this table are emissions to the atmosphere. A portion of the exhaust remains behind in the water.
[b] Particulate emission factors are not available because of the problems involved with measurement from an underwater exhaust system but are considered negligible.
[c] Horsepower hours are calculated by multiplying the average power produced during the hours of usage by the population of outboards in a given area. In the absence of data specific to a given geographic area, the hphr value can be estimated using average nationwide values from Reference 1. Reference 1 reports the average power produced (not the available power) as 9.1 hp and the average annual usage per engine as 50 hours. Thus, hphr = (number of outboards) (9.1 hp) (50 hours/outboard-year) Metric hphr = 0.9863 hphr.
[d] Based on fuel sulfur content of 0.043 percent from Reference 2 and on a density of 6.17 lb/gal.
[e] Includes exhaust hydrocarbons only. No crankcase emissions occur because the majority of outboards are 2-stroke engines that use crankcase induction. Evaporative emissions are limited by the widespread use of unvented tanks.

References for sections II-4

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2. Hare, C.T. and K.J. Springer. Study of Exhaust Emissions from Uncontrolled Vehicles and Related Equipment Using Internal Combustion Engines. Emission Factors and Impact Estimates for Light-Duty Air-Cooled Utility Engines and Motorcycles. Southwest Research Institute. San Antonio, Texas. Prepared for the Environmental Protection Agency, Research Triangle Park, N.C., under Contract Number EHS 70-108. January 1972.

II-5 Small, General Utility Engines

II-5.1 General—This category of engines comprises small 2-stroke and 4-stroke, air-cooled, gasoline-powered motors. Examples of the uses of these engines are: lawnmowers, small electric generators, compressors, pumps, minibikes, snowthrowers, and garden tractors. This category does *not* include motorcycles, outboard motors, chain saws, and snowmobiles, which are either included in other parts of this chapter or are not included because of the lack of emission data.

Approximately 89 percent of the more than 44 million engines of this category in service in the United States are used in lawn and garden applications.[1]

II-5.2 Emissions—Emissions from these engines are reported in Table II-5-1. For the purpose of emission estimation, engines in this category have been divided into lawn and garden (2-stroke), lawn and garden (4-stroke), and miscellaneous (4-stroke). Emission factors are presented in terms of horsepower hours, annual usage, and fuel consumption.

References for Section II-5

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Table II-5-1. EMISSION FACTORS FOR SMALL, GENERAL UTILITY ENGINES[a,b]
EMISSION FACTOR RATING: B

Engine	Sulfur oxides[c] (SO_x as SO_2)	Particulate	Carbon monoxide	Hydrocarbons		Nitrogen oxides (NO_x as NO_2)	Aldehydes (HCHO)
				Exhaust	Evaporative[d]		
2-Stroke, lawn and garden							
g/hphr	0.54	7.1	486	214	–	1.58	2.04
g/metric hphr	0.54	7.1	486	214	–	1.58	2.04
g/gal of fuel	1.80	23.6	1,618	713	–	5.26	6.79
g/unit-year	38	470	33,400	14,700	113	108	140
4-Stroke, lawn and garden							
g/hphr	0.37	0.44	279	23.2	–	3.17	0.49
g/metric hphr	0.37	0.44	279	23.2	–	3.17	0.49
g/gal of fuel	2.37	2.82	1,790	149	–	20.3	3.14
g/unit-year	26	31	19,100	1,590	113	217	34
4-Stroke miscellaneous							
g/hphr	0.39	0.44	250	15.2	–	4.97	0.47
g/metric hphr	0.39	0.44	250	15.2	–	4.97	0.47
g/gal of fuel	2.45	2.77	1,571	95.5	–	31.2	2.95
g/unit-year	30	34	19,300	1,170	290	384	36

[a]Reference 2.

[b]Values for g/unit-year were calculated assuming an annual usage of 50 hours and a 40 percent load factor. Factors for g/hphr can be used in instances where annual usages, load factors, and rated horsepower are known. Horsepower hours are the product of the usage in hours, the load factor, and the rated horsepower.

[c]Values calculated, not measured, based on the use of 0.043 percent sulfur content fuel.

[d]Values calculated from annual fuel consumption. Evaporative losses from storage and filling operations are not included (see Chapter 4).

II-6 Agricultural Equipment

II-6.1 General – Farm equipment can be separated into two major categories: wheeled tractors and other farm machinery. In 1972, the wheeled tractor population on farms consisted of 4.5 million units with an average power of approximately 34 kilowatts (45 horsepower). Approximately 30 percent of the total population of these tractors is powered by diesel engines. The average diesel tractor is more powerful than the average gasoline tractor, that is, 52 kW (70 hp) versus 27 kW (36 hp).[1] A considerable amount of population and usage data is available for farm tractors. For example, the Census of Agriculture reports the number of tractors in use for each county in the U.S.[2] Few data are available on the usage and numbers of non-tractor farm equipment, however. Self-propelled combines, forage harvesters, irrigation pumps, and auxiliary engines on pull-type combines and balers are examples of non-tractor agricultural uses of internal combustion engines. Table II-6-1 presents data on this equipment for the U.S.

II-6.2 Emissions – Emission factors for wheeled tractors and other farm machinery are presented in Table II-6-2. Estimating emissions from the time-based emission factors–grams per hour (g/hr) and pounds per hour (lb/hr)–requires an average usage value in hours. An approximate figure of 550 hours per year may be used or, on the basis of power, the relationship, usage in hours = 450 + 5.24 (kW - 37.2) or usage in hours = 450 + 3.89 (hp - 50) may be employed.[1]

The best emissions estimates result from the use of "brake specific" emission factors (g/kWh or g/hphr). Emissions are the product of the brake specific emission factor, the usage in hours, the power available, and the load factor (power used divided by power available). Emissions are also reported in terms of fuel consumed.

Table II-6-1. SERVICE CHARACTERISTICS OF FARM EQUIPMENT (OTHER THAN TRACTORS)[a]

Machine	Units in service, x10^3	Typical size	Typical power		Percent gasoline	Percent diesel
			kW	hp		
Combine, self-propelled	434	4.3 m (14 ft)	82	110	50	50
Combine, pull type	289	2.4 m (8 ft)	19	25	100	0
Corn pickers and picker-shellers	687	2-row	–[b]	–	–	–
Pick-up balers	655	5400 kg/hr (6 ton/hr)	30	40	100	0
Forage harvesters	295	3.7 m (12 ft) or 3-row	104	140	0	100
Miscellaneous	1205	–	22	30	50	50

[a]Reference 1.
[b]Unpowered.

Table II-6-2. EMISSION FACTORS FOR WHEELED FARM TRACTORS AND NON-TRACTOR AGRICULTURAL EQUIPMENT[a]
EMISSION FACTOR RATING: C

Pollutant	Diesel farm tractor	Gasoline farm tractor	Diesel farm equipment (non-tractor)	Gasoline farm equipment (non-tractor)
Carbon monoxide				
g/hr	161	3,380	95.2	4,360
lb/hr	0.355	7.46	0.210	9.62
g/kWh	4.48	192	5.47	292
g/hphr	3.34	143	4.08	218
kg/10^3 liter	14.3	391	16.7	492
lb/10^3 gal	119	3,260	139	4,100
Exhaust hydrocarbons				
g/hr	77.8	128	38.6	143
lb/hr	0.172	0.282	0.085	0.315
g/kWh	2.28	7.36	2.25	9.63
g/hphr	1.70	5.49	1.68	7.18
kg/10^3 liter	7.28	15.0	6.85	16.2
lb/10^3 gal	60.7	125	57.1	135
Crankcase hydrocarbons[b]				
g/hr	–	26.0	–	28.6
lb/hr	–	0.057	–	0.063
g/kWh	–	1.47	–	1.93
g/hphr	–	1.10	–	1.44
kg/10^3 liter	–	3.01	–	3.25
lb/10^3 gal	–	25.1	–	27.1
Evaporative hydrocarbons[b]				
g/unit-year	–	15,600	–	1,600
lb/unit-year	–	34.4	–	3.53
Nitrogen oxides (NO_x as NO_2)				
g/hr	452	157	210	105
lb/hr	0.996	0.346	0.463	0.231
g/kWh	12.6	8.88	12.11	7.03
g/hphr	9.39	6.62	9.03	5.24
kg/10^3 liter	40.2	18.1	36.8	11.8
lb/10^3 gal	335	151	307	98.5
Aldehydes (RCHO as HCHO)				
g/hr	16.3	7.07	7.23	4.76
lb/hr	0.036	0.016	0.016	0.010
g/kWh	0.456	0.402	0.402	0.295
g/hphr	0.340	0.300	0.30	0.220
kg/10^3 liter	1.45	0.821	1.22	0.497
lb/10^3 gal	12.1	6.84	10.2	4.14
Sulfur oxides[c] (SO_x as SO_2)				
g/hr	42.2	5.56	21.7	6.34
lb/hr	0.093	0.012	0.048	0.014

Table II-6-2. (continued). EMISSION FACTORS FOR WHEELED FARM TRACTORS AND NON-TRACTOR AGRICULTURAL EQUIPMENT[a]
EMISSION FACTOR RATING: C

Pollutant	Diesel farm tractor	Gasoline farm tractor	Diesel farm equipment (non-tractor)	Gasoline farm equipment (non-tractor)
g/kWh	1.17	0.312	1.23	0.377
g/hphr	0.874	0.233	0.916	0.281
kg/10^3 liter	3.74	0.637	3.73	0.634
lb/10^3 gal	31.2	5.31	31.1	5.28
Particulate				
g/hr	61.8	8.33	34.9	7.94
lb/hr	0.136	0.018	0.077	0.017
g/kWh	1.72	0.471	2.02	0.489
g/hphr	1.28	0.361	1.51	0.365
kg/10^3 liter	5.48	0.960	6.16	0.823
lb/10^3 gal	45.7	8.00	51.3	6.86

[a]Reference 1.

[b]Crankcase and evaporative emissions from diesel engines are considered negligible.

[c]Not measured. Calculated from fuel sulfur content of 0.043 percent and 0.22 percent for gasoline-powered and diesel-powered equipment, respectively.

References for Section II-6

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2. County Farm Reports. U.S. Census of Agriculture. U.S. Department of Agriculture. Washington, D.C.

II-7 Heavy-Duty Construction Equipment

II-7.1 General - The useful life of construction equipment is fairly short because of the frequent and severe usage it must endure. The annual usage of the various categories of equipment considered here ranges from 740 hours (wheeled tractors and rollers) to 2000 hours (scrapers and off-highway trucks). This high level of use results in average vehicle lifetimes of only 6 to 16 years. The equipment categories in this section include: track type tractors, track type loaders, motor graders, wheel tractor scrapers, off-highway trucks (includes pavement cold planers and wheel dozers), wheeled loaders, wheeled tractors, rollers (static and vibratory), and miscellaneous machines. The latter category contains an array of less numerous mobile and semi-mobile machines used in construction such as log skidders, hydraulic excavators/crawlers, trenchers, concrete pavers, compact loaders, crane lattice booms, cranes, hydraulic excavator wheels, and bituminous pavers. Some of these categories are different from the Third Edition.

II-7.2 Emissions - Recently, Environmental Research and Technology, Inc. prepared a report[3] under the sponsorship of a consortium of industry groups. This report, referred to as the CAL/ERT report, provided a very comprehensive investigation of farm construction and industrial equipment emissions. The emissions of twenty different types of construction equipments are grouped roughly according to the categories in the Third Edition by their populations in California (based on a report prepared by the California Air Resources Board[4]). The updated emission factors on $HC/CO/NO_x$ for heavy-duty construction equipment for diesel engines are reported in Table II-7.1. No update has been done on other emissions (aldehydes, sulfur oxides, and particulates), and their values are carried over from the Third Edition. Less than five percent of the sales use gasoline engines, and the trend is toward complete dieselization. No update has been done on the gasoline engine construction equipment emissions. Therefore, the emission factors for gasoline engines from the Third Edition are reprinted in Table II-7.2. The factors are reported in three different forms-on the basis of running time, fuel consumed, and power consumed.

In order to estimate emissions from time-based emission factors, annual equipment usage in hours must be estimated. The following estimates of use for the equipment listed in the tables should permit reasonable emission calculations.

Category	Annual operation, hours/year
Tracklaying tractors	1050
Tracklaying shovel loaders	1100
Motor graders	830
Scrapers	2000
Off-highway trucks	4000
(including wheeled dozers)	2000
Wheeled loaders	1140
Wheeled tractors	740
Rollers	740
Miscellaneous	1000

The best method for calculating emissions, however, is on the basis of "brake specific" emission factors (g/kWh or g/hphr). Emissions are calculated by taking the product of the brake specific emission factor, the usage in hours, the power available (that is, rated power), and the load factor (the power actually used divided by the power available).

References for Section II-7

1. Hare, C.T. and K.J. Springer. Exhaust Emissions from Uncontrolled Vehicles and Related Equipment Using Internal Combustion Engines-Final Report. Part 5: Heavy-Duty Farm, Construction, and Industrial Engines. Southwest Research Institute, San Antonio, Tex. Prepared for Environmental Protection Agency, Research Triangle Park, N.C., under Contract No. EHS 70-108. October 1973. 105p.

2. Hare, C.T. Letter to C.C. Masser of Environmental Protection Agency, Research Triangle Park, N.C., concerning fuel-based emission rates for farm, construction, and industrial engines. San Antonio, Tex. January 14, 1974. 4p.

3. Ingalls, Melvin N. Recommended Revisions to Gaseous Emission Factors from Several Classes of Off-Highway Mobile Sources--Final Report. Southwest Research Institute, San Antonio, Texas. Prepared for Environmental Protection Agency, Office of Mobile Source Air Pollution Control, Ann Arbor, MI., under Contract NO. 68-03-3162 September 1984.

4. State of California Air Resources Board. Status Report: Emissions Inventory on Non-Farm (MS-1), Farm (MS-2), and Lawn and Garden (Utility) (MS-3) Equipment. July 1983. 87p.

Table II-7.1 Emission Factors for Heavy-Duty, Diesel-Powered Construction Equipment[a]
Emission Factor Rating: C

Pollutant	Track-type tractor	Wheeled tractor	Wheeled dozer[b]	Scraper	Motor grader
CARBON MONOXIDE					
g/hr	157.01	1622.77		568.19	68.46
lb/hr	0.346	3.59		1.257	0.151
g/kWh	2.88	9.84		3.28	2.06
g/hphr	2.15	7.34		2.45	1.54
kg/10^3 liter	9.4	32.19		10.16	6.55
lb/10^3 gal	78.5	268.5		84.6	54.65
EXHAUST HYDROCARBONS					
g/hr	55.06	85.26		128.15	18.07
lb/hr	0.121	0.188		0.282	0.040
g/kWh	1.01	2.36		0.74	0.48
g/hphr	0.75	1.76		0.55	0.36
kg/10^3 liter	3.31	7.74		2.28	1.53
lb/10^3 gal	27.6	64.6		19.0	12.73
NITROGEN OXIDES (NO_x as NO_2)					
g/hr	570.70	575.84		1740.74	324.43
lb/hr	1.26	1.269		3.840	0.713
g/kWh	10.47	15.96		10.00	9.57
g/hphr	7.81	11.91		7.46	7.14
kg/10^3 liter	34.16	52.35		30.99	30.41
lb/10^3 gal	284.92	436.67		258.6	253.84
ALDEHYDES (RCHO as HCHO)					
g/hr	12.4	13.5	29.5	65.	5.54
lb/hr	0.027	0.030	0.065	0.143	0.012
g/kWh	0.228	0.378	0.215	0.375	0.162
g/hphr	0.170	0.282	0.160	0.280	0.121
kg/10^3 liter	0.745	1.23	0.690	1.16	0.517
lb/10^3 gal	6.22	10.3	5.76	9.69	4.31
SULFUR OXIDES (SO_x as SO_2)					
g/hr	62.3	40.9	158.	210.	39.0
lb/hr	0.137	0.090	0.348	0.463	0.086
g/kWh	1.14	1.14	1.16	1.21	1.17
g/hphr	0.851	0.851	0.867	0.901	0.874
kg/10^3 liter	3.73	3.73	3.74	3.74	3.73
lb/10^3 gal	31.1	31.1	31.2	31.2	31.1
PARTICULATE					
g/hr	50.7	61.5	75.	184.	27.7
lb/hr	0.112	0.136	0.165	0.406	0.061
g/kWh	0.928	1.70	0.551	1.06	0.838
g/hphr	0.692	1.27	0.411	0.789	0.625
kg/10^3 liter	3.03	5.57	1.77	3.27	2.66
lb/10^3 gal	25.3	46.5	14.8	27.3	22.2

[a] References 3 and 4 for the HC/CO/NO_x emissions, and references 1 and 2 for other emissions.

[b] The wheeled dozer HC/CO/NO_x emissions are included in the off-highway truck category.

Table II-7.1 (cont'd) Emission Factors for Heavy-Duty Diesel-Powered Construction Equipment[a]
Emission Factor Rating: C

Pollutant	Wheeled loader	Tracktype loader	Off-Highway truck[b]	Roller	Miscel-laneous
CARBON MONOXIDE					
g/hr	259.58	91.15	816.81	137.97	306.37
lb/hr	0.572	0.201	1.794	0.304	0.675
g/kWh	3.63	3.03	4.70	8.08	6.16
g/hphr	2.71	2.26	2.28	6.03	4.60
kg/10^3 liter	11.79	9.93	14.73	22.64	18.41
lb/10^3 gal	98.66	82.85	123.46	188.37	153.51
EXHAUST HYDROCARBONS					
g/hr	113.17	44.55	86.84	30.58	69.35
lb/hr	0.25	0.098	0.192	0.067	0.152
g/kWh	1.59	1.49	0.50	1.30	1.35
g/hphr	0.97	1.11	0.37	0.97	1.01
kg/10^3 liter	5.17	4.85	1.58	3.60	4.04
lb/10^3 gal	43.16	40.55	13.16	30.09	33.70
NITROGEN OXIDES (NO_x as NO_2)					
g/hr	858.19	375.22	1889.16	392.90	767.30
lb/hr	1.89	0.827	4.166	0.862	1.691
g/kWh	11.81	12.46	10.92	17.49	14.75
g/hphr	8.81	9.30	8.15	13.05	11.01
kg/10^3 liter	38.5	40.78	34.29	48.49	44.10
lb/10^3 gal	321.23	339.82	286.10	404.51	368.01
ALDEHYDES (RCHO as HCHO)					
g/hr	18.8	4.00	51.0	7.43	13.9
lb/hr	0.041	0.009	0.112	0.016	0.031
g/kWh	0.264	0.134	0.295	0.263	0.272
g/hphr	0.197	0.100	0.220	0.196	0.203
kg/10^3 liter	0.859	0.439	0.928	0.731	0.813
lb/10^3 gal	7.17	3.66	7.74	6.10	6.78
SULFUR OXIDES (SO_x as SO_2)					
g/hr	82.5	34.4	206.	30.5	64.7
lb/hr	0.182	0.076	0.454	0.067	0.143
g/kWh	1.15	1.14	1.19	1.34	1.25
g/hphr	0.857	0.853	0.887	1.00	0.932
kg/10^3 liter	3.74	3.74	3.74	3.73	3.73
lb/10^3 gal	31.2	31.2	31.2	31.1	31.1
PARTICULATE					
g/hr	77.9	26.4	116.	22.7	63.2
lb/hr	0.172	0.058	0.256	0.050	0.139
g/kWh	1.08	0.878	0.673	1.04	1.21
g/hphr	0.805	0.655	0.502	0.778	0.902
kg/10^3 liter	3.51	2.88	2.12	2.90	3.61
lb/10^3 gal	29.3	24.0	17.7	24.2	30.1

[a] References 3 and 4 for the HC/CO/NO_x emissions and references 1 and 2 for other emissions.

[b] The off-highway truck category incudes HC/CO/NO_x emissions from the wheeled dozer.

Table II-7.2 Emission Factors for Heavy-Duty, Gasoline-Powered Construction Equipment[a]
Emission Factor Rating: C

Pollutant	Wheeled tractor	Motor grader	Wheeled loader	Roller	Miscel-laneous
CARBON MONOXIDE					
g/hr	4320.	5490.	7060.	6080.	7720.
lb/hr	9.52	12.1	15.6	13.4	17.0
g/kWh	190.	251.	219.	271.	266.
g/hphr	142.	187.	163.	202	198.
kg/10^3 liter	389.	469.	435.	460.	475.
lb/10^3 gal	3250.	3910.	3630.	3840.	3960.
EXHAUST HYDROCARBONS					
g/hr	164.	186.	241.	277.	254.
lb/hr	0.362	0.410	0.531	0.611	0.560
g/kWh	7.16	8.48	7.46	12.40	8.70
g/hphr	5.34	6.32	5.56	9.25	6.49
kg/10^3 liter	14.6	15.8	14.9	21.1	15.6
lb/10^3 gal	122.	132.	124.	176.	130.
EVAPORATIVE HYDROCARBONS[b]					
g/hr	30.9	30.0	29.7	28.2	25.4
lb/hr	0.0681	0.0661	0.0655	0.0622	0.0560
CRANKCASE HYDROCARBONS[b]					
g/hr	32.6	37.1	48.2	55.5	50.7
lb/hr	0.0719	0.0818	0.106	0.122	0.112
NITROGEN OXIDES (NO_x as NO_2)					
g/hr	195.	145.	235.	164.	187.
lb/hr	0.430	0.320	0.518	0.362	0.412
g/kWh	8.54	6.57	7.27	7.08	6.48
g/hphr	6.37	4.90	5.42	5.28	4.79
kg/10^3 liter	17.5	12.2	14.5	12.0	11.5
lb/10^3 gal	146.	102.	121.	100.	95.8
ALDEHYDES (RCHO as HCHO)					
g/hr	7.97	8.80	9.65	7.57	9.00
lb/hr	0.0176	0.0194	0.0213	0.0167	0.0198
0.0198					
g/kWh	0.341	0.386	0.298	0.343	0.298
g/hphr	0.254	0.288	0.222	0.256	0.222
kg/10^3 liter	0.697	0.721	0.593	0.582	0.532
lb/10^3 gal	5.82	6.02	4.95	4.86	4.44
SULFUR OXIDES (SO_x as SO_2)					
g/hr	7.03	7.59	10.6	8.38	10.6
lb/hr	0.0155	0.0167	0.0234	0.0185	0.0234
g/kWh	0.304	0.341	0.319	0.373	0.354
g/hphr	0.227	0.254	0.238	0.278	0.264
kg/10^3 liter	0.623	0.636	0.636	0.633	0.633
lb/10^3 gal	5.20	5.31	5.31	5.28	5.28

Table II-7.2 (cont'd) Emission Factors for Heavy-Duty, Gasoline-Powered Construction Equipment[a]
Emission Factor Rating: C

Pollutant	Wheeled tractor	Motor grader	Wheeled loader	Roller	Miscel-laneous
PARTICULATE					
g/hr	10.9	9.40	13.5	11.8	11.7
lb/hr	0.0240	0.0207	0.0298	0.0260	0.0258
g/kWh	0.484	0.440	0.421	0.527	0.406
g/hphr	0.361	0.328	0.314	0.393	0.303
kg/10^3 liter	0.991	0.822	0.839	0.895	0.726
lb/10^3 gal	8.27	6.86	7.00	7.47	6.06

[a] References 1 and 2.

[b] Evaporative and crankcase hydrocarbons based on operating time only (Reference 1).

II-8 Snowmobiles

II-8.1 General – In order to develop emission factors for snowmobiles, mass emission rates must be known, and operating cycles representative of usage in the field must be either known or assumed. Extending the applicability of data from tests of a few vehicles to the total snowmobile population requires additional information on the composition of the vehicle population by engine size and type. In addition, data on annual usage and total machine population are necessary when the effect of this source on national emission levels is estimated.

An accurate determination of the number of snowmobiles in use is quite easily obtained because most states require registration of the vehicles. The most notable features of these registration data are that almost 1.5 million sleds are operated in the United States, that more than 70 percent of the snowmobiles are registered in just four states (Michigan, Minnesota, Wisconsin, and New York), and that only about 12 percent of all snowmobiles are found in areas outside the northeast and northern midwest.

II-8.2 Emissions – Operating data on snowmobiles are somewhat limited, but enough are available so that an attempt can be made to construct a representative operating cycle. The required end products of this effort are time-based weighting factors for the speed/load conditions at which the test engines were operated; use of these factors will permit computation of "cycle composite" mass emissions, power consumption, fuel consumption, and specific pollutant emissions.

Emission factors for snowmobiles were obtained through an EPA-contracted study[1] in which a variety of snowmobile engines were tested to obtain exhaust emissions data. These emissions data along with annual usage data were used by the contractor to estimate emission factors and the nationwide emission impact of this pollutant source.

To arrive at average emission factors for snowmobiles, a reasonable estimate of average engine size was necessary. Weighting the size of the engine to the degree to which each engine is assumed to be representative of the total population of engines in service resulted in an estimated average displacement of 362 cubic centimeters (cm^3).

The speed/load conditions at which the test engines were operated represented, as closely as possible, the normal operation of snowmobiles in the field. Calculations using the fuel consumption data obtained during the tests and the previously approximated average displacement of 362 cm^3 resulted in an estimated average fuel consumption of 0.94 gal/hr.

To compute snowmobile emission factors on a gram per unit year basis, it is necessary to know not only the emission factors but also the annual operating time. Estimates of this usage are discussed in Reference 1. On a national basis, however, average snowmobile usage can be assumed to be 60 hours per year. Emission factors for snowmobiles are presented in Table II-8-1.

References for Section II-8

1. Hare, C. T. and K. J. Springer. Study of Exhaust Emissions from Uncontrolled Vehicles and Related Equipment Using Internal Combustion Engines. Final Report. Part 7: Snowmobiles. Southwest Research Institute, San Antonio, Tex. Prepared for Environmental Protection Agency, Research Triangle Park, N.C., under Contract No. EHS 70-108. April 1974.

Table II-8-1. EMISSION FACTORS FOR SNOWMOBILES
EMISSION FACTOR RATING: B

Pollutant	Emissions			
	g/unit-year[a]	g/gal[b]	g/liter[b]	g/hr[b]
Carbon monoxide	58,700	1,040.	275.	978.
Hydrocarbons	37,800	670.	177.	630.
Nitrogen oxides	600	10.6	2.8	10.0
Sulfur oxides[c]	51	0.90	0.24	0.85
Solid particulate	1,670	29.7	7.85	27.9
Aldehydes (RCHO)	552	9.8	2.6	9.2

[a]Based on 60 hours of operation per year and 362 cm^3 displacement.

[b]Based on 362 cm^3 displacement and average fuel consumption of 0.94 gal/hr.

[c]Based on sulfur content of 0.043 percent by weight.

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