# APPENDIX C – Methane and Nitrous Oxide Emissions from Mobile Combustion

**INPUT Data from State Inventory Tool:**

***Highway Vehicles***

***Table C-1*** *State Total Vehicle Miles Traveled (VMT x $10^6$)*

| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Heavy-Duty Diesel Vehicles | 2,610 | 2,683 | 2,853 | 3,121 | 3,296 | 3,491 | 3,677 | 3,870 | 4,000 | 4,047 | 4,146 |
| Heavy-Duty Gasoline Vehicles | 666 | 714 | 706 | 696 | 707 | 703 | 707 | 705 | 721 | 707 | 671 |
| Light-Duty Diesel Trucks | 332 | 369 | 414 | 451 | 464 | 479 | 499 | 532 | 548 | 565 | 573 |
| Light-Duty Diesel Vehicles | 280 | 257 | 258 | 256 | 248 | 235 | 227 | 225 | 219 | 207 | 196 |
| Light-Duty Gasoline Trucks | 11,557 | 13,231 | 14,562 | 15,475 | 15,798 | 16,250 | 16,825 | 17,558 | 18,163 | 18,536 | 18,680 |
| Light-Duty Gasoline Vehicles | 28,652 | 28,020 | 28,643 | 28,961 | 29,510 | 30,027 | 30,720 | 31,340 | 32,891 | 32,695 | 32,779 |
| Motorcycles | 179 | 184 | 193 | 199 | 203 | 209 | 212 | 215 | 223 | 225 | 220 |

| Abbreviation | Category |
|---|---|
| LDGV | Light-Duty Gasoline Vehicles |
| LDGT | Light-Duty Gasoline Trucks |
| HDGV | Heavy-Duty Gasoline Vehicles |
| LDDV | Light-Duty Diesel Vehicles |
| LDDT | Light-Duty Diesel Trucks |
| HDDV | Heavy-Duty Diesel Vehicles |
| MC | Motorcycles |

***Table C-2*** *$N_2O$ Emission Factors (g/km traveled)*

| Control Technology | Symbol | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|---|
| Three-way Catalyst | T1 | 0.0288 | 0.0361 | | | | | |
| Early 3-way Catalyst | T0 | 0.0507 | 0.0635 | 0.1467 | | | | |
| Oxidation Catalyst | O | 0.0322 | 0.0403 | 0.0932 | | | | |
| Non-Catalyst | N | 0.0103 | 0.0129 | 0.0298 | | | | 0.0045 |
| Low Emission Vehicle | L | 0.0176 | 0.0220 | | | | | |
| Advanced | A | | | | 0.0100 | 0.0200 | 0.0300 | |
| Moderate | M | | | | 0.0100 | 0.0200 | 0.0300 | |
| Uncontrolled | U | 0.0103 | 0.0129 | 0.0298 | 0.0100 | 0.0200 | 0.0300 | 0.0045 |

***Table C-3*** *$CH_4$ Emission Factors (g/km traveled)*

| Control Technology | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| Three-way Catalyst | 0.0300 | 0.0350 | | | | | |
| Early 3-way Catalyst | 0.0400 | 0.0700 | 0.0750 | | | | |
| Oxidation Catalyst | 0.0700 | 0.0900 | 0.0900 | | | | |
| Non-Catalyst | 0.1200 | 0.1400 | 0.1250 | | | | 0.1300 |
| Low Emission Vehicle | 0.0250 | 0.0300 | | | | | |
| Advanced | | | | 0.0100 | 0.0100 | 0.0400 | |
| Moderate | | | | 0.0100 | 0.0100 | 0.0500 | |
| Uncontrolled | 0.1350 | 0.1350 | 0.2700 | 0.0100 | 0.0100 | 0.0600 | 0.2600 |

***Table C-4*** *Age Distribution by Vehicle/Fuel Type for Highway Vehicles*

| Vehicle Age | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| 1 | 5.3% | 5.8% | 4.9% | 5.3% | 5.9% | 4.2% | 14.4% |
| 2 | 7.1% | 7.6% | 8.9% | 7.1% | 7.4% | 7.8% | 16.8% |
| 3 | 7.1% | 7.5% | 8.1% | 7.1% | 6.9% | 7.2% | 13.5% |
| 4 | 7.1% | 7.3% | 7.4% | 7.1% | 6.4% | 6.7% | 10.9% |
| 5 | 7.0% | 7.1% | 6.8% | 7.0% | 6.0% | 6.2% | 8.8% |
| 6 | 7.0% | 6.8% | 6.2% | 7.0% | 5.6% | 5.8% | 7.0% |
| 7 | 6.9% | 6.5% | 5.6% | 6.9% | 5.2% | 5.3% | 5.6% |
| 8 | 6.8% | 6.1% | 5.1% | 6.8% | 4.8% | 5.0% | 4.5% |
| 9 | 6.6% | 5.7% | 4.7% | 6.6% | 4.5% | 4.6% | 3.6% |
| 10 | 6.3% | 5.2% | 4.3% | 6.3% | 4.2% | 4.3% | 2.9% |
| 11 | 5.9% | 4.7% | 3.9% | 5.9% | 3.9% | 4.0% | 2.3% |
| 12 | 5.4% | 4.2% | 3.6% | 5.4% | 3.6% | 3.7% | 9.7% |
| 13 | 4.6% | 3.6% | 3.3% | 4.6% | 3.4% | 3.4% | 0.0% |
| 14 | 3.6% | 3.1% | 3.0% | 3.6% | 3.2% | 3.2% | 0.0% |
| 15 | 2.9% | 2.6% | 2.7% | 2.9% | 2.9% | 2.9% | 0.0% |
| 16 | 2.3% | 2.2% | 2.5% | 2.3% | 2.7% | 2.7% | 0.0% |
| 17 | 1.8% | 1.8% | 2.3% | 1.8% | 2.5% | 2.5% | 0.0% |
| 18 | 1.4% | 1.4% | 2.1% | 1.4% | 2.4% | 2.4% | 0.0% |
| 19 | 1.1% | 1.2% | 1.9% | 1.1% | 2.2% | 2.2% | 0.0% |
| 20 | 0.9% | 1.1% | 1.7% | 0.9% | 2.1% | 2.0% | 0.0% |
| 21 | 0.7% | 1.1% | 1.6% | 0.7% | 1.9% | 1.9% | 0.0% |
| 22 | 0.6% | 1.0% | 1.5% | 0.6% | 1.8% | 1.8% | 0.0% |
| 23 | 0.4% | 1.0% | 1.3% | 0.4% | 1.7% | 1.6% | 0.0% |
| 24 | 0.4% | 0.9% | 1.2% | 0.4% | 1.6% | 1.5% | 0.0% |
| 25 | 1.0% | 4.6% | 5.4% | 1.0% | 7.3% | 7.2% | 0.0% |
| Total | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

**_Table C-5_**

*Annual Age-Specific Vehicle Mileage Accumulation of U.S. Vehicles (miles)*

| Vehicle Age | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| 1 | 14,910 | 19,906 | 20,218 | 14,910 | 26,371 | 28,787 | 4,786 |
| 2 | 14,174 | 18,707 | 18,935 | 14,174 | 24,137 | 26,304 | 4,475 |
| 3 | 13,475 | 17,559 | 17,100 | 13,475 | 22,095 | 24,038 | 4,164 |
| 4 | 12,810 | 16,462 | 16,611 | 12,810 | 20,228 | 21,968 | 3,853 |
| 5 | 12,178 | 15,413 | 15,560 | 12,178 | 18,521 | 20,078 | 3,543 |
| 6 | 11,577 | 14,411 | 14,576 | 11,577 | 16,960 | 18,351 | 3,232 |
| 7 | 11,006 | 13,454 | 13,655 | 11,006 | 15,533 | 16,775 | 2,921 |
| 8 | 10,463 | 12,541 | 12,793 | 10,463 | 14,227 | 15,334 | 2,611 |
| 9 | 9,947 | 11,671 | 11,987 | 9,947 | 13,032 | 14,019 | 2,300 |
| 10 | 9,456 | 10,843 | 11,231 | 9,456 | 11,939 | 12,817 | 1,989 |
| 11 | 8,989 | 10,055 | 10,524 | 8,989 | 10,939 | 11,719 | 1,678 |
| 12 | 8,546 | 9,306 | 9,863 | 8,546 | 10,024 | 10,716 | 1,368 |
| 13 | 8,124 | 8,597 | 9,243 | 8,124 | 9,186 | 9,799 | 1,368 |
| 14 | 7,723 | 7,925 | 8,662 | 7,723 | 8,420 | 8,962 | 1,368 |
| 15 | 7,342 | 7,290 | 8,028 | 7,342 | 7,718 | 8,196 | 1,368 |
| 16 | 6,980 | 6,690 | 7,610 | 6,980 | 7,075 | 7,497 | 1,368 |
| 17 | 6,636 | 6,127 | 7,133 | 6,636 | 6,487 | 6,857 | 1,368 |
| 18 | 6,308 | 5,598 | 6,687 | 6,308 | 5,948 | 6,273 | 1,368 |
| 19 | 5,997 | 5,103 | 6,269 | 5,997 | 5,454 | 5,739 | 1,368 |
| 20 | 5,701 | 4,642 | 5,877 | 5,701 | 5,002 | 5,250 | 1,368 |
| 21 | 5,420 | 4,214 | 5,510 | 5,420 | 4,588 | 4,804 | 1,368 |
| 22 | 5,152 | 3,818 | 5,166 | 5,152 | 4,209 | 4,396 | 1,368 |
| 23 | 4,898 | 3,455 | 4,844 | 4,898 | 3,861 | 4,023 | 1,368 |
| 24 | 4,656 | 3,123 | 4,542 | 4,656 | 3,542 | 3,681 | 1,368 |
| 25 | 4,427 | 2,822 | 4,259 | 4,427 | 3,250 | 3,369 | 1,368 |
| | 216,896 | 239,730 | 256,884 | 216,896 | 278,748 | 299,752 | 54,704 |

***Table C-6*** *VMT Distribution by Vehicle Age and Vehicle/Fuel Type*

| *Vehicle Age* | *LDGV* | *LDGT* | *HDGV* | *LDDV* | *LDDT* | *HDDV* | *MC* |
|---|---|---|---|---|---|---|---|
| 1 | 7.5% | 9.4% | 7.9% | 7.5% | 11.5% | 8.3% | 19.4% |
| 2 | 9.5% | 11.6% | 13.5% | 9.5% | 13.1% | 14.0% | 21.2% |
| 3 | 9.0% | 10.6% | 11.1% | 9.0% | 11.1% | 11.9% | 15.8% |
| 4 | 8.6% | 9.7% | 9.9% | 8.6% | 9.5% | 10.1% | 11.8% |
| 5 | 8.1% | 8.8% | 8.4% | 8.1% | 8.1% | 8.5% | 8.8% |
| 6 | 7.7% | 7.9% | 7.2% | 7.7% | 6.9% | 7.2% | 6.4% |
| 7 | 7.2% | 7.0% | 6.2% | 7.2% | 5.9% | 6.1% | 4.6% |
| 8 | 6.7% | 6.2% | 5.3% | 6.7% | 5.0% | 5.2% | 3.3% |
| 9 | 6.2% | 5.4% | 4.5% | 6.2% | 4.3% | 4.4% | 2.3% |
| 10 | 5.6% | 4.6% | 3.9% | 5.6% | 3.7% | 3.7% | 1.6% |
| 11 | 5.0% | 3.8% | 3.3% | 5.0% | 3.1% | 3.2% | 1.1% |
| 12 | 4.4% | 3.1% | 2.8% | 4.4% | 2.7% | 2.7% | 3.7% |
| 13 | 3.5% | 2.5% | 2.4% | 3.5% | 2.3% | 2.3% | 0.0% |
| 14 | 2.7% | 2.0% | 2.1% | 2.7% | 1.9% | 1.9% | 0.0% |
| 15 | 2.0% | 1.5% | 1.8% | 2.0% | 1.7% | 1.7% | 0.0% |
| 16 | 1.5% | 1.2% | 1.5% | 1.5% | 1.4% | 1.4% | 0.0% |
| 17 | 1.1% | 0.9% | 1.3% | 1.1% | 1.2% | 1.2% | 0.0% |
| 18 | 0.9% | 0.6% | 1.1% | 0.9% | 1.0% | 1.0% | 0.0% |
| 19 | 0.6% | 0.5% | 1.0% | 0.6% | 0.9% | 0.9% | 0.0% |
| 20 | 0.5% | 0.4% | 0.8% | 0.5% | 0.8% | 0.7% | 0.0% |
| 21 | 0.4% | 0.4% | 0.7% | 0.4% | 0.6% | 0.6% | 0.0% |
| 22 | 0.3% | 0.3% | 0.6% | 0.3% | 0.6% | 0.5% | 0.0% |
| 23 | 0.2% | 0.3% | 0.5% | 0.2% | 0.5% | 0.5% | 0.0% |
| 24 | 0.2% | 0.2% | 0.4% | 0.2% | 0.4% | 0.4% | 0.0% |
| 25 | 0.4% | 1.0% | 1.8% | 0.4% | 1.7% | 1.7% | 0.0% |
| | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

*Estimated by weighting age distribution data by annual age-specific vehicle mileage accumulation data

## Table C-7

## Control Technology Assignments for Gasoline Passenger Cars (percent of VMT)

| Model Years | Non-Catalyst | Oxidation | Tier 0 | Tier 1 |
|---|---|---|---|---|
| 1973-1974 | 100% | - | - | - |
| 1975 | 20% | 80% | - | - |
| 1976-1977 | 15% | 85% | - | - |
| 1978-1979 | 10% | 90% | - | - |
| 1980 | 5% | 88% | 7% | - |
| 1981 | - | 15% | 85% | - |
| 1982 | - | 14% | 86% | - |
| 1983 | - | 12% | 88% | - |
| 1984-1993 | - | - | 100% | - |
| 1994 | - | - | 60% | 40% |
| 1995 | - | - | 20% | 80% |
| 1996-2000 | - | - | - | 100% |

- Not applicable

Source: U.S. EPA 2002.

## Table C-8

## Control Technology Assignments for Gasoline Light-Duty Trucks (percent of VMT)

| Model Years | Non-Catalyst | Oxidation | Tier 0 | Tier 1 |
|---|---|---|---|---|
| 1973-1974 | 100% | - | - | - |
| 1975 | 30% | 70% | - | - |
| 1976 | 20% | 80% | - | - |
| 1977-1978 | 25% | 75% | - | - |
| 1979-1980 | 20% | 80% | - | - |
| 1981 | - | 95% | 5% | - |
| 1982 | - | 90% | 10% | - |
| 1983 | - | 80% | 20% | - |
| 1984 | - | 70% | 30% | - |
| 1985 | - | 60% | 40% | - |
| 1986 | - | 50% | 50% | - |
| 1987-1993 | - | 5% | 95% | - |
| 1994 | - | - | 60% | 40% |
| 1995 | - | - | 20% | 80% |
| 1996-2000 | - | - | - | 100% |

- Not applicable

Source: U.S. EPA 2002.

## Table C-9

## Technology Assignments for Gasoline Heavy-Duty Vehicles (percent of VMT)*

| Model Years | Uncontrolled | Non-Catalyst | Oxidation | Tier 0 |
|---|---|---|---|---|
| ≤1981 | 100% | - | - | - |
| 1982-1984 | 95% | - | 5% | - |
| 1985-1986 | - | 95% | 5% | - |
| 1987 | - | 70% | 15% | 15% |
| 1988-1989 | - | 60% | 25% | 15% |
| 1990-2000 | - | 45% | 30% | 25% |

* Excluding California VMT
- Not applicable

Source: U.S. EPA 2002.

## Table C-10

## Control Technology Assignments for Diesel Highway and Motorcycle VMT

| Vehicle Type/Control Technology | Model Years |
|---|---|
| **Diesel Passenger Cars and Light-Duty Trucks** | |
| Uncontrolled | 1966-1982 |
| Moderate control | 1983-1995 |
| Advanced control | 1996-2000 |
| **Heavy-Duty Diesel Vehicles** | |
| Uncontrolled | 1966-1972 |
| Moderate control | 1983-1995 |
| Advanced control | 1996-2000 |
| **Motorcycles** | |
| Uncontrolled | 1966-1995 |
| Non-catalyst controls | 1996-2000 |

Source: U.S. EPA 2002

## *Table C-11 Aviation*

### *Energy Contents (kg/Million Btu)*

| | |
|---|---|
| Jet Fuel, Kerosene Type | 22.24 |
| Jet Fuel, Naptha Type | 23.55 |
| Aviation Gasoline | 22.26 |

### *$N_2O$ Emission Factors (g/kg fuel)*

| | |
|---|---|
| Jet Fuel, Kerosene Type | 0.10 |
| Jet Fuel, Naptha Type | 0.10 |
| Aviation Gasoline | 0.04 |

### *$CH_4$ Emission Factors (g/kg fuel)*

| | |
|---|---|
| Jet Fuel, Kerosene Type | 0.09 |
| Jet Fuel, Naptha Type | 0.09 |
| Aviation Gasoline | 2.64 |

### *Aviation Fuel Consumption (Million BTU)*

| **Fuel Type (Mbtu)** | **1990** | **1991** | **1992** | **1993** | **1994** | **1995** | **1996** | **1997** | **1998** | **1999** | **2000** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Jet Fuel, Kerosene | 6,736,855 | 5,920,067 | 8,522,404 | 9,595,270 | 10,057,862 | 11,543,634 | 8,661,051 | 11,046,482 | 10,570,624 | 19,316,176 | 17,797,763 |
| Jet Fuel, Naptha | 1,263,632 | 1,650,972 | 1,166,858 | 1,178,297 | 1,074,896 | 45,049 | 12,589 | 4,867 | - | - | - |
| Aviation Gasoline | 587,130 | 515,858 | 615,856 | 642,418 | 1,651,057 | 2,102,732 | 2,048,767 | 2,486,140 | 2,723,276 | 666,817 | 554,679 |

## *Table C-12 Locomotion*

### *Density Factors (kg/gal or ton)*

| | |
|---|---|
| Residual Fuel (kg/gal) | 3.58 |
| Diesel Fuel (kg/gal) | 3.18 |
| Coal (kg/short ton) | 907.19 |

### *$N_2O$ Emission Factors (g/kg fuel)*

| | |
|---|---|
| Residual Fuel | 0.08 |
| Diesel Fuel | 0.08 |
| Coal | 0.08 |

### *$CH_4$ Emission Factors (g/kg fuel)*

| | |
|---|---|
| Residual Fuel | 0.25 |
| Diesel Fuel | 0.25 |
| Coal | 0.25 |

### *Locomotive Fuel Consumption (Gallons)*

| **Fuel Type** | **1990** | **1991** | **1992** | **1993** | **1994** | **1995** | **1996** | **1997** | **1998** | **1999** | **2000** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Residual Fuel Oil | - | - | - | - | - | - | - | - | - | - | - |
| Diesel Fuel | 97,788,000 | 37,622,000 | 22,194,000 | 19,977,000 | 50,477,000 | 53,984,000 | 55,149,000 | 41,363,000 | 30,224,000 | 47,573,000 | 53,877,000 |
| Coal (Short Tons) | - | - | - | - | - | - | - | - | - | - | - |

***Table C-13 Marine***

*Density Factors (kg/gal)*

| | |
|---|---|
| Residual Fuel | 3.575 |
| Distillate Fuel | 3.192 |
| Motor Gasoline | 2.801 |

*$N_2O$ Emission Factors (g/kg fuel)*

| | |
|---|---|
| Residual Fuel | 0.08 |
| Distillate Fuel | 0.08 |
| Motor Gasoline | 0.08 |

*$CH_4$ Emission Factors (g/kg fuel)*

| | |
|---|---|
| Residual Fuel | 0.23 |
| Distillate Fuel | 0.23 |
| Motor Gasoline | 0.23 |

*Marine Fuel Consumption (Gallons)*

| **Fuel Type** | **1990** | **1991** | **1992** | **1993** | **1994** | **1995** | **1996** | **1997** | **1998** | **1999** | **2000** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Residual Fuel Oil | 69,591 | 11,861 | 340,564 | 451,551 | 482,323 | 934,614 | 1,346,739 | 518,950 | 611,279 | 328,851 | 342,604 |
| Distillate Fuel Oil | 22,215 | 3,730 | 101,850 | 151,246 | 163,330 | 299,282 | 507,075 | 225,354 | 271,506 | 127,208 | 128,195 |
| Gasoline | 35,566,000 | 47,861,000 | 37,014,000 | 22,440,000 | 22,971,000 | 26,683,000 | 24,311,000 | 24,121,000 | 23,863,000 | 26,074,000 | 26,516,000 |

## *Table C-14 Farm Equipment*

*Density Factors (kg/gal)*

| | |
|---|---|
| Gasoline Tractor | 2.80 |
| Diesel Tractor | 3.18 |

*$N_2O$ Emission Factors (g/kg fuel)*

| | |
|---|---|
| Gasoline Tractor | 0.08 |
| Diesel Tractor | 0.08 |

*$CH_4$ Emission Factors (g/kg fuel)*

| | |
|---|---|
| Gasoline Tractor | 0.45 |
| Diesel Tractor | 0.45 |

*Farm Equipment Fuel Consumption (Gallons)*

| **Fuel Type** | **1990** | **1991** | **1992** | **1993** | **1994** | **1995** | **1996** | **1997** | **1998** | **1999** | **2000** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Gasoline Tractor | 24,039,000 | 33,629,000 | 26,175,000 | 24,081,000 | 26,413,000 | 26,532,000 | 27,398,000 | 25,435,000 | 21,642,000 | 27,311,000 | 25,391,000 |
| Diesel Tractor | 87,393,703 | 82,382,000 | 90,830,000 | 91,471,000 | 102,518,000 | 88,935,000 | 80,616,000 | 85,113,000 | 77,240,000 | 156,067,000 | 235,175,000 |

## *Table C-15 Construction*

### *Density Factors (kg/gal)*

| | |
|---|---|
| Gasoline Construction | 2.80 |
| Diesel Construction | 3.18 |

### *$N_2O$ Emission Factors (g/kg fuel)*

| | |
|---|---|
| Gasoline Construction | 0.08 |
| Diesel Construction | 0.08 |

### *$CH_4$ Emission Factors (g/kg fuel)*

| | |
|---|---|
| Gasoline Construction | 0.18 |
| Diesel Construction | 0.18 |

### *Construction Fuel Consumption (Gallons)*

| **Fuel Type** | **1990** | **1991** | **1992** | **1993** | **1994** | **1995** | **1996** | **1997** | **1998** | **1999** | **2000** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Gasoline Construction | 5,431,000 | 4,946,000 | 4,958,000 | 4,363,000 | 5,340,000 | 5,224,000 | 3,899,000 | 5,168,000 | 4,085,000 | 563,000 | 3,077,000 |
| Diesel Construction | 26,994,212 | 26,522,109 | 27,509,411 | 27,142,897 | 30,676,553 | 27,474,230 | 22,599,961 | 28,867,404 | 30,446,560 | 5,459,024 | 30,523,812 |

## *Table C-16 Non-Highway Vehicles*

### *Density Factors (kg/gal)*

| | |
|---|---|
| Gasoline Small Utility | 2.80 |
| Gasoline HD Utility | 2.80 |
| Diesel HD Utility | 2.80 |

### *$N_2O$ Emission Factors (g/kg fuel)*

| | |
|---|---|
| Gasoline Small Utility | 0.08 |
| Gasoline HD Utility | 0.08 |
| Diesel HD Utility | 0.08 |

### *$CH_4$ Emission Factors (g/kg fuel)*

| | |
|---|---|
| Gasoline Small Utility | 0.18 |
| Gasoline HD Utility | 0.18 |
| Diesel HD Utility | 0.18 |

### *Non-Highway Vehicle Fuel Consumption (Gallons)*

| **Fuel Type** | **1990** | **1991** | **1992** | **1993** | **1994** | **1995** | **1996** | **1997** | **1998** | **1999** | **2000** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Gasoline HD Utility | 3,969,000 | 3,935,000 | 4,008,000 | 6,694,000 | 7,248,000 | 7,621,000 | 7,702,000 | 8,115,000 | 2,603,000 | 4,259,000 | 4,655,000 |
| Gasoline Small Utility | 4,972,002 | 4,072,115 | 4,766,943 | 10,922,448 | 11,382,779 | 11,029,330 | 10,873,986 | 11,054,772 | 3,235,308 | 7,011,800 | 7,294,615 |
| Diesel HD Utility | 7,175,415 | 7,299,247 | 6,033,268 | 14,622,494 | 17,316,798 | 14,824,765 | 13,538,323 | 13,121,544 | 3,710,371 | 8,073,999 | 7,474,026 |

**OUTPUT:**

***Table C-17*** *Total $CH_4$ and $N_20$ Emissions from Mobile Sources (MTCE)*

| Fuel Type/Vehicle Type | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Gasoline Highway** | 290,482.4 | 307,808.1 | 329,445.2 | 344,578.1 | 350,258.6 | 349,224.6 | 345,621.8 | 341,541.9 | 342,189.7 | 330,906.2 | 319,401.2 |
| Passenger Cars | 186,904.6 | 187,158.3 | 195,127.0 | 200,419.0 | 203,957.8 | 203,194.0 | 200,976.6 | 197,557.0 | 199,675.7 | 191,306.2 | 184,634.8 |
| Light-Duty Trucks | 97,827.3 | 114,124.9 | 127,510.5 | 137,136.9 | 138,926.8 | 138,471.3 | 136,913.5 | 136,166.3 | 134,417.7 | 131,567.5 | 127,056.8 |
| Heavy-Duty Vehicles | 5,211.1 | 5,971.1 | 6,227.5 | 6,423.2 | 6,762.1 | 6,929.1 | 7,143.5 | 7,275.0 | 7,575.9 | 7,538.9 | 7,249.0 |
| Motorcycles | 539.4 | 553.8 | 580.3 | 598.9 | 611.9 | 630.3 | 588.2 | 543.5 | 520.4 | 493.5 | 460.6 |
| **Diesel Highway** | 13,266.7 | 13,658.9 | 14,554.5 | 15,871.1 | 16,684.1 | 17,588.8 | 18,445.8 | 19,358.4 | 19,930.5 | 20,132.5 | 20,550.6 |
| Passenger Cars | 407.0 | 373.8 | 375.0 | 372.6 | 360.1 | 341.2 | 329.7 | 327.5 | 318.0 | 300.5 | 285.0 |
| Light-Duty Trucks | 933.6 | 1,038.2 | 1,164.9 | 1,269.4 | 1,306.6 | 1,347.9 | 1,404.2 | 1,496.6 | 1,541.9 | 1,588.8 | 1,612.4 |
| Heavy-Duty Vehicles | 11,926.1 | 12,247.0 | 13,014.6 | 14,229.1 | 15,017.4 | 15,899.7 | 16,712.0 | 17,534.3 | 18,070.5 | 18,243.2 | 18,653.2 |
| **Non-Highway** | 9,886.0 | 8,351.1 | 8,192.6 | 8,352.0 | 10,323.4 | 10,255.3 | 9,246.2 | 9,729.3 | 8,588.8 | 12,036.8 | 14,860.4 |
| Boats | 807.6 | 1,083.7 | 850.2 | 524.8 | 538.1 | 638.7 | 602.2 | 566.8 | 564.8 | 602.9 | 613.4 |
| Locomotives | 2,865.1 | 1,102.3 | 650.3 | 585.3 | 1,478.9 | 1,581.7 | 1,615.8 | 1,211.9 | 885.5 | 1,393.8 | 1,578.5 |
| Farm Equipment | 3,224.4 | 3,326.5 | 3,382.3 | 3,346.6 | 3,735.7 | 3,335.4 | 3,111.0 | 3,193.2 | 2,860.1 | 5,349.5 | 7,648.6 |
| Construction Equipment | 787.5 | 765.3 | 790.0 | 767.9 | 876.8 | 794.9 | 645.2 | 828.2 | 843.7 | 147.6 | 823.6 |
| Aircraft | 1,849.6 | 1,739.3 | 2,196.5 | 2,423.5 | 2,909.2 | 3,173.9 | 2,570.9 | 3,224.3 | 3,226.2 | 4,120.7 | 3,772.1 |
| Other* | 351.8 | 334.2 | 323.3 | 703.8 | 784.8 | 730.8 | 701.1 | 705.0 | 208.5 | 422.3 | 424.1 |
| **Total** | **313,635.2** | **329,818.2** | **352,192.3** | **368,801.2** | **377,266.1** | **377,068.8** | **373,313.8** | **370,629.7** | **370,709.0** | **363,075.4** | **354,812.2** |

* "Other" includes snowmobiles, small gasoline powered utility equipment, heavy-duty gasoline powered utility equipment, and heavy-duty diesel powered utility equipment.

*Table C-18 $CH_4$ Emissions from Mobile Sources (MTCE)*

| Fuel Type/Vehicle Type | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Gasoline Highway** | 23,322.7 | 23,423.3 | 23,885.1 | 24,029.8 | 23,730.4 | 23,220.6 | 22,657.8 | 22,164.2 | 22,031.7 | 21,104.9 | 20,332.2 |
| Passenger Cars | 13,594.1 | 12,659.3 | 12,394.8 | 12,089.6 | 11,887.7 | 11,633.6 | 11,435.6 | 11,229.4 | 11,401.7 | 10,959.2 | 10,695.2 |
| Light-Duty Trucks | 8,211.4 | 9,230.5 | 10,009.2 | 10,509.6 | 10,432.3 | 10,205.5 | 9,912.3 | 9,702.1 | 9,430.6 | 9,011.0 | 8,588.6 |
| Heavy-Duty Vehicles | 1,088.1 | 1,092.9 | 1,019.5 | 954.2 | 923.7 | 880.2 | 852.1 | 821.7 | 816.1 | 779.7 | 723.6 |
| Motorcycles | 429.1 | 440.5 | 461.6 | 476.4 | 486.7 | 501.3 | 457.8 | 410.9 | 383.2 | 355.0 | 324.8 |
| **Diesel Highway** | 1,328.5 | 1,354.3 | 1,431.0 | 1,553.8 | 1,629.4 | 1,714.8 | 1,769.1 | 1,805.6 | 1,815.5 | 1,794.7 | 1,800.3 |
| Passenger Cars | 25.8 | 23.7 | 23.8 | 23.6 | 22.8 | 21.6 | 20.9 | 20.8 | 20.2 | 19.1 | 18.1 |
| Light-Duty Trucks | 30.6 | 34.0 | 38.2 | 41.6 | 42.8 | 44.2 | 46.0 | 49.0 | 50.5 | 52.0 | 52.8 |
| Heavy-Duty Vehicles | 1,272.0 | 1,296.5 | 1,369.0 | 1,488.6 | 1,563.7 | 1,649.0 | 1,702.2 | 1,735.8 | 1,744.8 | 1,723.6 | 1,729.4 |
| **Non-Highway** | 1,959.6 | 1,691.0 | 1,648.1 | 1,642.2 | 2,276.3 | 2,338.6 | 2,202.5 | 2,347.1 | 2,208.7 | 2,331.6 | 3,035.0 |
| Boats | 131.6 | 176.7 | 138.6 | 85.6 | 87.7 | 104.1 | 98.2 | 92.4 | 92.1 | 98.3 | 100.0 |
| Locomotives | 500.6 | 192.6 | 113.6 | 102.3 | 258.4 | 276.3 | 282.3 | 211.7 | 154.7 | 243.5 | 275.8 |
| Farm Equipment | 889.6 | 917.8 | 933.2 | 923.4 | 1,030.7 | 920.3 | 858.4 | 881.0 | 789.1 | 1,476.0 | 2,110.4 |
| Construction Equipment | 104.2 | 101.2 | 104.5 | 101.6 | 116.0 | 105.1 | 85.3 | 109.5 | 111.6 | 19.5 | 108.9 |
| Aircraft | 287.1 | 258.6 | 315.4 | 336.4 | 679.7 | 836.1 | 785.6 | 959.2 | 1,033.6 | 438.5 | 383.9 |
| Other* | 46.5 | 44.2 | 42.8 | 93.1 | 103.8 | 96.7 | 92.7 | 93.2 | 27.6 | 55.9 | 56.1 |
| **Total** | **26,610.8** | **26,468.5** | **26,964.1** | **27,225.8** | **27,636.1** | **27,274.0** | **26,629.4** | **26,316.9** | **26,055.9** | **25,231.2** | **25,167.5** |

* "Other" includes snowmobiles, small gasoline powered utility equipment, heavy-duty gasoline powered utility equipment, and heavy-duty diesel powered utility equipment.

*Table C-19 $N_2O$ Emissions from Mobile Sources (MTCE)*

| Fuel Type/Vehicle Type | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Gasoline Highway** | 267,159.7 | 284,384.9 | 305,560.1 | 320,548.3 | 326,528.2 | 326,004.0 | 322,964.1 | 319,377.7 | 320,158.0 | 309,801.3 | 299,069.0 |
| Passenger Cars | 173,310.5 | 174,499.0 | 182,732.1 | 188,329.4 | 192,070.1 | 191,560.4 | 189,541.0 | 186,327.6 | 188,274.0 | 180,347.0 | 173,939.6 |
| Light-Duty Trucks | 89,615.9 | 104,894.4 | 117,501.3 | 126,627.4 | 128,494.5 | 128,265.8 | 127,001.2 | 126,464.2 | 124,987.0 | 122,556.5 | 118,468.2 |
| Heavy-Duty Vehicles | 4,123.0 | 4,878.2 | 5,208.0 | 5,469.0 | 5,838.3 | 6,048.8 | 6,291.4 | 6,453.3 | 6,759.7 | 6,759.2 | 6,525.4 |
| Motorcycles | 110.4 | 113.3 | 118.7 | 122.5 | 125.2 | 128.9 | 130.4 | 132.6 | 137.2 | 138.5 | 135.8 |
| **Diesel Highway** | 11,938.3 | 12,304.7 | 13,123.5 | 14,317.3 | 15,054.7 | 15,874.0 | 16,676.7 | 17,552.8 | 18,115.0 | 18,337.7 | 18,750.4 |
| Passenger Cars | 381.2 | 350.1 | 351.2 | 349.0 | 337.2 | 319.6 | 308.8 | 306.7 | 297.8 | 281.5 | 267.0 |
| Light-Duty Trucks | 903.0 | 1,004.2 | 1,126.7 | 1,227.8 | 1,263.8 | 1,303.8 | 1,358.2 | 1,447.6 | 1,491.4 | 1,536.7 | 1,559.5 |
| Heavy-Duty Vehicles | 10,654.1 | 10,950.4 | 11,645.6 | 12,740.5 | 13,453.7 | 14,250.7 | 15,009.8 | 15,798.5 | 16,325.7 | 16,519.6 | 16,923.9 |
| **Non-Highway** | 7,926.4 | 6,660.1 | 6,544.6 | 6,709.8 | 8,047.2 | 7,916.7 | 7,043.7 | 7,382.2 | 6,380.1 | 9,705.2 | 11,825.3 |
| Boats | 675.9 | 907.1 | 711.6 | 439.3 | 450.4 | 534.5 | 504.1 | 474.4 | 472.7 | 504.7 | 513.4 |
| Locomotives | 2,364.5 | 909.7 | 536.7 | 483.0 | 1,220.5 | 1,305.3 | 1,333.5 | 1,000.2 | 730.8 | 1,150.3 | 1,302.7 |
| Farm Equipment | 2,334.7 | 2,408.6 | 2,449.1 | 2,423.2 | 2,705.0 | 2,415.1 | 2,252.6 | 2,312.1 | 2,071.0 | 3,873.5 | 5,538.3 |
| Construction Equipment | 683.4 | 664.0 | 685.5 | 666.3 | 760.8 | 689.8 | 559.9 | 718.7 | 732.1 | 128.1 | 714.7 |
| Aircraft | 1,562.5 | 1,480.7 | 1,881.1 | 2,087.2 | 2,229.5 | 2,337.8 | 1,785.3 | 2,265.2 | 2,192.6 | 3,682.2 | 3,388.2 |
| Other* | 305.3 | 290.0 | 280.5 | 610.7 | 681.0 | 634.2 | 608.4 | 611.7 | 180.9 | 366.5 | 368.0 |
| **Total** | **287,024.4** | **303,349.6** | **325,228.2** | **341,575.3** | **349,630.0** | **349,794.8** | **346,684.4** | **344,312.8** | **344,653.1** | **337,844.2** | **329,644.6** |

* "Other" includes snowmobiles, small gasoline powered utility equipment, heavy-duty gasoline powered utility equipment, and heavy-duty diesel powered utility equipment.

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