

# **AIR EMISSIONS GUIDE FOR AIR FORCE MOBILE SOURCES**

## **METHODS FOR ESTIMATING EMISSIONS OF AIR POLLUTANTS FOR MOBILE SOURCES AT UNITED STATES AIR FORCE INSTALLATIONS**



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Compliance Technical Support Branch  
2261 Hughes Ave., Ste 155  
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## **METHODS FOR ESTIMATING EMISSIONS OF AIR POLLUTANTS FOR MOBILE SOURCES AT U.S. AIR FORCE INSTALLATIONS**

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Based on information and belief formed after reasonable inquiry, the statements and information in this document are true, accurate, and complete.

Signed: \_\_\_\_\_ Solutio Environmental Inc. \_\_\_\_\_

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## ACRONYMS

(Words formed from the initial letters of a name or parts of a series of words.)

AAFES	Army & Air Force Exchange Service
ACAM	Air Conformity Applicability Model
AFCEC	Air Force Civil Engineer Center
AFMAN	Air Force Manual
AGE	Aerospace Ground Equipment
ALAPCO	Association of Local Air Pollutant Control Officials
AMX	Aircraft Maintenance Squadron
APIMS	Air Program Information Management System
ARAR	Applicable or Relevant and Appropriate Requirements
BEE	Bioenvironmental Engineer
BOOS	Burners Out of Service
CAIR	Clean Air Interstate Rule
CALMIM	California Landfill Methane Inventory Model
CARB	California Air Resource Board
CAS	Chemical Abstracts Service
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CONUS	Continental United States
DAC	Defense Ammunition Center
DODIC	Department of Defense Identification Codes
ECOM	External Combustion Engine
EESOH-MIS	Enterprise Environmental, Safety and Occupational Health Management Information System
EIAP	Environmental Impact Analysis Process
EPAct	Energy Policy Act
EPCRA	Emergency Planning and Community Right-to-Know Act
FESOP	Federally Enforceable State Operating Permit
FIRE	Factor Information Retrieval System
HAP	Hazardous Air Pollutant
HAZMART	Hazardous Materials Pharmacy
HEPA	High Efficiency Particulate Air
HVAC	Heating, Ventilating, and Air Conditioning
ICAO	International Civil Aviation Organization
ICOM	Internal Combustion Engine
LAER	Lowest Achievable Emissions Rate
LandGEM	Landfill Gas Emissions Model
MAJCOM	Major Command
MEM	Mass of Energetic Material

MIDAS	Munitions Items Disposition Action System
NAAQS	National Ambient Air Quality Standards
NAICS	North American Industry Classification System
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NEW	Net Explosive Weight
OCONUS	Outside Continental United States
OTAQ	Office of Transportation and Air Quality
PEMS	Predictive Emissions Monitoring System
RCRA	Resource Conservation and Recovery Act
SAR	Second Assessment Report
SAW	Submerged Arc Welding
SIC	Standard Industrial Classification
SIP	State Implementation Plan
SMAW	Shielded Metal Arc Welding
SME	Subject Matter Expert
STAPPA	State and Territorial Air Pollution Program Administrators
TIM	Time in Mode
USAF	United States Air Force
VIN	Vehicle Identification Number

## **BREVITY CODES**

(Shortened form of a frequently used group of words, phrase, or sentence consisting of entirely upper-case letters. Each letter is spoken individually.)

AB	Afterburner
AEI	Air Emissions Inventory
AERR	Air Emissions Reporting Requirements
AFB	Air Force Base
AFI	Air Force Instruction
AFPMB	Armed Forces Post Management Board
AFRL	Air Force Research Laboratory
APU	Auxiliary Power Unit
BFB	Bubbling Fluidized Bed
BMP	Best Management Practices
BSFC	Brake-Specific Fuel Consumption
CAA	Clean Air Act
CAAA	Clean Air Act Amendments (of 1990)
CE	Civil Engineering
CEMS	Continuous Emission Monitoring System
CEV	Civil Engineering Environmental
CFB	Circulating Fluidized Bed
CFC	Chlorofluorocarbon
CFR	Code of Federal Regulations
CI	Compression Ignition
CNG	Compressed Natural Gas
DLA	Defense Logistics Agency
DoD	Department of Defense
DOE	Department of Energy
EA	Environmental Assessment
EDMS	Emissions and Dispersion Modeling System
EF	Emission Factor
EGBE	Ethylene Glycol Butyl Ether
EIIP	Emissions Inventory Improvement Program
EIP	Emissions Inventory Plan
EIR	Emissions Inventory Report
EIS	Environmental Impact Statement
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
ERP	Environmental Restoration Program
ESP	Electrostatic Precipitator

ESTCP	Environmental Security Technology Certification Program
FAA	Federal Aviation Administration
FBC	Fluidized Bed Combustor
FCAW	Flux-Cored Arc Welding
FF	Fabric Filter
FFR	Fuel Flow Rate
FFV	Flexible Fuel Vehicles
FGD	Flue Gas Desulphurization
FGR	Flue Gas Recirculation
GHG	Greenhouse Gas
GMAW	Gas Metal Arc Welding
GOV	Government Owned Vehicle
GSA	General Services Administration
GSE	Ground Support Equipment
GVW	Gross Vehicle Weight
GWP	Global Warming Potential
HBFC	Hydrobromofluorocarbon
HC	Hydrocarbon
HCFC	Hydrochlorofluorocarbon
HCP	Hard Chrome Plating
HEI	High Explosive Incendiary
HEV	Hybrid Electric Vehicle
HHV	High Heat Value
HMA	Hot Mix Asphalt
HVLP	High Volume Low Pressure
HVOF	High Velocity Oxy-Fuel
IC	Internal Combustion
IPCC	Intergovernmental Panel on Climate Change
IPCT	Industrial Process Cooling Towers
IRP	Installation Restoration Program
LDF	Liquid Drift Factors
LEL	Lower Explosive Limit
LFB	Low Flyby
LFP	Low Flight Pattern
LGRVM	Vehicle Management Flight Vehicle Maintenance
LNB	Low NOx Burner
LPG	Liquified Petroleum Gas
LTO	Landing and Takeoff
MEK	Methyl Ethyl Ketone
MM	Minutemen Missiles



MPF	Military Personnel Flight
MPO	Metropolitan Planning Office
MSDS	Material Safety Data Sheet
MSW	Municipal Solid Waste
NACAA	National Association of Clean Air Agencies
NC	Nameplate Capacity
NDI	Non-destructive Inspection
NEI	National Emission Inventory
NMHC	Non-Methane Hydrocarbon
NMOC	Non-Methane Organic Compound
NMTOC	Non-Methane Total Organic Compound
NSCR	Nonselective Catalytic Reduction
NSPS	New Source Performance Standards
NSR	New Source Review
OBOD	Open Burning/Open Detonation
OBODM	Open Burning/Open Detonation Model
OCA	Off-Site Consequences Analysis
ODC	Ozone Depleting Chemical
ODP	Ozone Depletion Potential
ODS	Ozone Depleting Substances
OIAI	Once In Always In
OLVIMS	On-line Vehicle Interactive Management System
P2	Pollution Prevention
PAH	Polycyclic Aromatic Hydrocarbon
PBT	Persistent Bioaccumulative and Toxic
PM	Particulate Matter – Aerodynamic diameter unspecified
PM10	Particulate Matter – Aerodynamic diameter < 10 micrometers
PM2.5	Particulate Matter – Aerodynamic diameter < 2.5 micrometers
POL	Petroleum, Oil, and Lubricant
POTW	Publicly Owned Treatment Works
POV	Privately Owned Vehicles
PSD	Prevention of Significant Deterioration
PTE	Potential to Emit
RMP	Risk Management Plan
RVP	Reid Vapor Pressure
SCC	Source Classification Code
SDS	Safety Data Sheet
SCR	Selective Catalytic Reduction
SF	Spillage Factor
SI	Spark Ignition

SNCR	Selective Non-Catalytic Reduction
TCLP	Toxicity Characteristic Leaching Procedure
TDS	Total Dissolved Solids
TGO	Touch-and-Go
THC	Total Hydrocarbons
TLG	Total Landfill Gas
TNMOC	Total Non-Methane Organic Compounds
TO	Technical Order
TOC	Total Organic Compounds
TOG	Total Organic Gases
TRI	Toxic Release Inventory
TSD	Treatment, Storage, & Disposal
TSP	Total Suspended Particulate
ULSD	Ultra-Low Sulfur Diesel
US	United States
USDA	United States Department of Agriculture
UST	Underground Storage Tanks
UV	Ultraviolet
VKT	Vehicle Kilometers Traveled
VMIF	Vehicle Maintenance Index File
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compound

## ABBREVIATIONS

(Shortened form of a word or phrase)

μg	Microgram(s)
A-hr	Ampere-hours
A/ft <sup>2</sup>	Ampere per square foot
Btu	British Thermal Unit
°C	Degrees Celsius
CH <sub>4</sub>	Methane
CO	Carbon Monoxide
CO <sub>2</sub>	Carbon Dioxide
Co	Cobalt
Cr	Chromium
Cr <sup>+6</sup>	Hexavalent Chromium
Cr <sub>2</sub> O <sub>3</sub>	Chromium Oxide
EtO	Ethylene Oxide
°F	Degrees Fahrenheit
ft	Foot (Feet)
g	Grams
g/L	Grams per Liter
gal	Gallon(s)
HCl	Hydrochloric Acid
hp	Horsepower
hr	Hour(s)
kg	Kilogram(s)
kW	Kilowatt(s)
L	Liter
lb	Pound(s)
Mg	Megagram(s) [i.e., metric ton]
mg	Milligram(s)
MMBtu	Million British Thermal Units
Mn	Manganese
NH <sub>3</sub>	Ammonia
Ni	Nickel
N <sub>2</sub> O	Nitrous Oxide
NO <sub>2</sub>	Nitrogen Dioxide
NO <sub>x</sub>	Nitrogen Oxides
O <sub>3</sub>	Ozone
Pb	Lead
PERC	Perchloroethylene

PFC	Perfluorocarbon
ppm	Parts per Million
ppmv	Parts per Million by Volume
ppmw	Parts per Million by Weight
psi	Pounds per Square Inch
psia	Pounds per Square Inch Absolute
°R	Degrees Rankin
scf	Standard Cubic Foot
SF <sub>6</sub>	Sulfur Hexafluoride
SO <sub>2</sub>	Sulfur Dioxide
SO <sub>x</sub>	Sulfur Oxides
TNT	Trinitrotoluene
tpy	Tons per Year
yr	Year(s)

## 1.0 INTRODUCTION

### 1.1 Background and Purpose

The Clean Air Act (CAA) established the requirements to quantify and report air pollutant emissions from mobile and stationary sources. The purpose of the CAA is to protect public health by addressing the risks posed by certain air pollutants. The United States Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) which require facility managers to always know if they comply with air regulations. The EPA regulates most mobile sources of air pollution (e.g., automobiles at 40 Code of Federal Regulations (CFR) 85-86, and airplanes at 40 CFR 87, etc.) under Title II of the CAA. Performance standards issued by the EPA limit the emission of certain pollutants from these sources. Fuel-related requirements under Title II at 40 CFR 79-80 are designed to further reduce emissions from mobile sources.

For an installation, such as an Air Force base, the total air pollutant emissions are determined by conducting an Air Emissions Inventory (AEI). An air emissions inventory is the sum of all air pollutant emissions from each source over a stated period of time, typically one year. Air quality regulations vary from region to region and the local regulatory agency should be consulted prior to conducting an AEI since some local agencies have specific data reporting requirements and/or protocols that the installation must obey. An AEI must be periodically updated as required by federal, state, and local regulations. **Each installation must calculate and record all collected data in the Air Program Information Management System (APIMS).** AEIs must be updated any time there is a change in mission, equipment, and/or operating procedures that result in a substantial change (approximately 5%) in air emissions.

**The purpose of this guide is to provide authoritative documentation for National Environmental Policy Act (NEPA) and General Conformity analyses, *not* for conducting AEIs comprised solely of mobile emissions sources (Mobile AEIs).** Mobile source AEIs are primarily conducted to provide data during the development of State Implementation Plan (SIP) budgets. However, since the SIP only accounts for criteria and precursor pollutants, it is unnecessary to calculate emissions for other pollutants though emission factors (EFs) may be provided in this guide. It is still imperative that the USAF adopts a uniform approach to calculating air pollutant emissions for the most common mobile sources found at USAF installations. This guide serves this purpose by being the USAF's single authoritative resource for mobile source emission estimating algorithms and EFs; no other algorithms or EFs shall be used unless mandated by a legally enforceable regulatory requirement (e.g., permit stipulates) or approved by Air Force Civil Engineer Center/Environmental Quality Technical Support Branch (AFCEC/CZTQ) that is reviewed on a case-by-case basis.

Any questions concerning this guide, or requests for additional information pertaining to Air Force AEIs, should be directed to the Air Quality Subject Matter Expert; AFCEC Compliance Technical Support Branch located at, 2261 Hughes Ave., Ste 155 JBSA Lackland TX 78236-9853.

## 1.2 Mobile Sources

This guide only addresses mobile emission sources typically found on USAF installations. A mobile source is defined as any type of non-stationary equipment that may emit an air pollutant subject to regulation by the CAA. These mobile sources include aircraft and aircraft support equipment, on-road vehicles, and non-road engines. The description of stationary sources contributing to air emissions and the methods for calculating these emissions may be found in the *Air Emissions Guide for Air Force Stationary Sources*. It should be noted that certain districts may classify non-road engines as a stationary source rather than a mobile source, therefore it is important to consult with the local air quality district for clarification as needed.

## 1.3 Air Emissions Inventories (AEIs)

AFMAN 32-7002, Environmental Compliance and Pollution Prevention, states the following regarding AEIs:

4.5.1. Air Emissions Inventory (AEI). The Installation Environmental Element must prepare and periodically update an AEI, using APIMS, for all installation stationary air emission sources in accordance with applicable state or local requirements promulgated per 40 CFR Part 51, Subpart A and current AF AEI guidance from AFCEC/CZ. **(T-0)**.

4.5.1.1. Regulatory-required stationary AEIs are completed at the frequency specified by federal, state, and local regulations.

4.5.1.2. Comprehensive stationary AEIs (applicable to all installations, including overseas) include all emissions sources (i.e., both permitted and non-permitted sources). The Installation Environmental Element will annually review/validate APIMS to ensure currency of the AEI (i.e., sources and consumption data is representative of the current base conditions). **(T-1)**. A comprehensive review of all sources and associated consumption data for the AEI will be conducted at least every three years (five years for overseas and remotely located facilities) to accurately reflect current emissions. **(T-1)**.

4.5.1.3. Stationary source AEIs include all criteria pollutants, Hazardous Air Pollutants, and greenhouse gases and reflect the installation's current actual and PTE emissions. Annual regulatory emissions reports, a subset of the comprehensive AEI, are provided to federal, state, and local (including Metropolitan Planning Organization or other regional) regulatory agencies as required. Greenhouse gas reporting mandated by E.O. 13834, is accomplished by SAF/IEE in conjunction with the Annual Energy Management and Resilience reporting process.

4.5.1.4. For installations that exceed the greenhouse gas reporting threshold, the Installation Environmental Element shall accomplish greenhouse gas reporting mandated by 40 CFR Part 98. **(T-0)**. Recommend other installations within 10% of the greenhouse gas reporting threshold accomplish greenhouse gas estimates in accordance with the nondirective Guide to the Mandatory Greenhouse Gas Reporting Rule and Greenhouse Gas Tailoring Rule, issued by AFCEC/CZ. Results will be reported to AFCEC/CZ via APIMS. **(T-1)**. Greenhouse gas reporting mandated by E.O. 13834 is accomplished by SAF/IEE in conjunction with the Annual Energy Management and Resilience reporting processes.

This guide describes the recommended methodologies for calculating actual emissions (i.e., from existing sources) and projected emissions (i.e., from projected federal actions). AEIs of these emissions may be required to fulfill a requirement for reporting for a certain period and frequency (e.g., reported for the previous calendar year on an annual basis). AEIs are usually accomplished to meet one or more regulatory requirement(s). The most common regulatory requirements for conducting a mobile source AEI are summarized below.

### **1.3.1 Title II – Emission Standards for Moving Sources**

The EPA regulates most mobile sources of air pollution under Title II of the CAA which sets the standards for motor vehicle and aircraft emissions. Under Title II, the standards are set to control emissions that may endanger public health and welfare. Title II goes on to state that for motor vehicles, it is the manufacturer's responsibility to establish and perform tests which evaluate the emissions from the device. All testing results are to be maintained/documented and must be made available to any agent of the enforcement authority when requested. Similarly, Title II of the CAA states that the Secretary of Transportation will work to ensure that all aircraft emissions comply with the established air pollution standards.

### 1.3.2 Implementation Plans

As specified under Section 110 of the Clean Air Act, all States are required to submit a SIP to the EPA which provides for the protection and enhancement of air quality to promote public health and welfare. The SIP provides details for implementation, maintenance, and enforcement of the National Ambient Air Quality Standards (NAAQS). For areas in the State that are classified as nonattainment with any NAAQS, the SIP must provide strategies for obtaining attainment. For areas in the State that are already classified as being in attainment, the SIP must provide strategies for maintaining attainment status. All SIPs and SIP revisions must be reviewed and approved by the EPA. If the EPA considers a SIP to be incomplete or inadequate, they may issue their own plan called a Federal Implementation Plan (FIP).

Historically, most control strategies incorporated into implementation plans have targeted stationary sources. However, due to the constant increase in the number of air pollution sources, the issuance of new ambient air quality standards, and the fact that mobile sources emit most of the overall emissions, more control strategies targeting mobile sources are now being incorporated into implementation plans. Since AEIs are typically used to assess the effect of control strategies, an increase in the number of control strategies pertaining to mobile sources will result in an increase in requirements to conduct mobile source AEIs.

### 1.3.3 General Conformity

Section 176(c) of the CAA prohibits federal activities from taking various actions in nonattainment or maintenance areas unless they first demonstrate conformance with their respective State Implementation Plan (SIP). “A Federal Agency must make a determination that a Federal action conforms to the applicable implementation plan in accordance with the requirements of this Subpart **before the action is taken**” (40 CFR 93.150(b)). A conformity review is a multi-step process used to determine and document whether a proposed action meets the conformity rule. There are two main components to this process: an **applicability analysis** first establishes if a full-scale conformity determination is required and, if it is, a **conformity determination** assesses whether the action conforms to the SIP. The general conformity program requires all federal actions in nonattainment and maintenance areas to comply with the appropriate SIP. An emissions inventory is usually required as part of the conformity determination to identify/quantify air emissions from the proposed federal actions.

### 1.3.4 National Environmental Policy Act (NEPA)

The National Environmental Policy Act (NEPA) requires Federal agencies to evaluate the environmental impacts associated with major actions that they either fund, support, permit, or implement. There are as many as three levels of analysis:



- **Categorical Exclusion Determination** – A proposed action may be categorically excluded from a detailed environmental analysis if the action meets certain criteria which a previous agency has determined to have no significant environmental impact.
- **Environmental Assessment (EA)** – An EA is an evaluation to determine if a proposed action that was not categorically excluded would significantly affect the environment. If effects are not significant, the agency issues a Finding of No Significant Impact (FONSI). If the EA concludes the action results in a significant environmental impact, an Environmental Impact Statement must be prepared.
- **Environmental Impact Statement (EIS)** – An EIS is a detailed evaluation of the proposed action, and its alternatives. A draft EIS is filed with the EPA and the EPA publishes a “Notice of Availability” in the Federal Register. Publication of the “Notice of Availability” begins a 45-day public comment period and mandatory 30-day waiting period before the agency can decide on the proposed action.

### 1.3.5 Other Inventory Uses

Complying with environmental regulations is not the only reason AEIs are conducted. An AEI can be a useful tool in helping industrial facilities implement various environmental programs. The most common program that may involve mobile source emission inventories is summarized below.

#### 1.3.5.1 Pollution Prevention (P2) Opportunities

An AEI can be a useful tool in identifying air related P2 opportunities on military installations. The inventory identifies the types of air pollution sources on base and their accompanying emissions. Due to the large amount of emissions produced from mobile sources, as well as emerging technologies/strategies for reducing mobile source emissions, implementing P2 opportunities for mobile sources is becoming more commonplace.

## 1.4 Emissions Inventory Methodologies

When conducting an AEI, the quantity of regulated pollutants emitted from all emission sources located on an Air Force installation (except those sources that are specifically exempt) must be determined. Several methods can be used to quantify air pollutants from emission sources. Data from source-specific emission tests or continuous emission monitoring systems (CEMS) are usually preferred for estimating a source’s emissions. The CEMS data provides the best representation of the tested source’s emissions. However, source-specific emission tests or continuous emission monitoring of mobile sources at a large installation, such as an Air Force

base, may be impractical. Therefore, EFs and/or mass balance calculations are frequently the best or only method available for estimating emissions, despite their limitations.

An EF is a representative value that attempts to relate the quantity of a pollutant emitted with an activity. These factors are usually expressed as the mass of pollutant released per a unit weight, volume, distance, or duration of the activity emitting the pollutant (e.g., pounds of a pollutant emitted per 1,000 pounds of fuel burned). In most cases, these factors are simply an average of all available data of acceptable quality and are generally assumed to be representative of long-term averages for all processes in the source category (i.e., a population average).

The general equation for emission estimation using an EF is:

$$E = A \times EF \times N$$

**Equation 1-1**

Where,

- $E$  = Total emissions
- $A$  = Activity rate
- $EF$  = Emission factor
- $N$  = Number of engines/aircraft/equipment

For some sources, a mass balance approach may provide a better, more accurate estimate of emissions than emission tests would. In general, mass balances are appropriate for use in situations where a high percentage of material is lost to the atmosphere (e.g., sulfur in fuel). As the term implies, all the materials going into and coming out of the process must be considered to allow an emission estimation to be credible.

## 1.5 Pollutants

Although there are several types (groups/classes) of federal and state regulated pollutants which may be addressed in an AEI, this guide focuses on criteria pollutants, Hazardous Air Pollutants (HAPs), Volatile Organic Compounds (VOCs), and Greenhouse Gases (GHGs).

### 1.5.1 Criteria Pollutants

In 1971, the EPA established National Ambient Air Quality Standards (NAAQS) for six pollutants which are termed criteria pollutants. These include particulate matter (PM), ozone (O<sub>3</sub>), carbon monoxide (CO), sulfur oxides (SO<sub>x</sub>), nitrogen oxides (NO<sub>x</sub>), and lead (Pb). The NAAQS were established to regulate the emissions of the criteria pollutants using human health-

based and/or environmentally based criteria for setting permissible levels. The criteria pollutants are described in more detail below:

### **Particle Pollution – often referred to as Particulate Matter (PM):**

- PM includes the very-fine dust, soot, smoke, and droplets formed from chemical reactions and incomplete burning of fuels.
- The fine particles of PM can get deep into the lungs, causing increased respiratory illnesses and tens of thousands of deaths each year.
- PM is defined as any particle with an equivalent aerodynamic diameter of less than or equal to 10 microns (**PM<sub>10</sub>**) and is further subdivided to include a separate standard for particles with an equivalent aerodynamic diameter of less than or equal to 2.5 microns (**PM<sub>2.5</sub>**).

### **Ground-Level Ozone (O<sub>3</sub>):**

- O<sub>3</sub> is a primary component of smog that causes human health problems and damage to forests and agricultural crops.
- Repeated exposure to O<sub>3</sub> can make people more susceptible to respiratory infections and lung inflammation.
- Though there is a NAAQS, **O<sub>3</sub> is not emitted directly into the air.**
- Two types of compounds that are the main ingredients (precursors) in forming ground-level O<sub>3</sub> in the presence of ultraviolet (UV) light include:
  - **Volatile Organic Compounds (VOCs):** Defined as “any compound of carbon, excluding carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participates in atmospheric photochemical reactions” (40 CFR 51.100). Note that 40 CFR 51.100 also exempts compounds based on their negligible photochemical reactivity. Examples of these exempt compounds include methane, ethane, acetone, et al. Common sources of VOCs include gas and diesel-fueled automobiles, fuel storage containers, and solvents used in paints and degreasers.
  - **Nitrogen oxides (NO<sub>x</sub>):** Provides the reddish-brown tint in smog. These are produced from the burning of fossil fuels (e.g., gasoline, coal, or oil).

### **Carbon Monoxide (CO):**

- CO is produced when fossil fuel burns incompletely because of insufficient oxygen (O<sub>2</sub>).
- Wood, coal, and charcoal fires and gasoline engines always produce CO.
- In the United States, particularly in urban areas, most CO air emissions are from mobile sources.

- CO can cause harmful health effects by reducing O<sub>2</sub> delivery to the body's organs (like the heart and brain) and tissues.

**Sulfur Oxides (SO<sub>x</sub>):**

- Sulfur Oxides are a group of molecules made of sulfur and oxygen atoms, such as Sulfur Dioxide (SO<sub>2</sub>), and Sulfur Trioxide (SO<sub>3</sub>).
- Since SO<sub>2</sub> is the most common form of the sulfur oxides, the EPA uses it as an indicator for the larger group of SO<sub>x</sub>.
- SO<sub>2</sub> in the ambient air is just one of several sulfur oxides that contribute to air quality issues.
- SO<sub>x</sub> emissions are produced from fossil fuel combustion at power plants (73 percent) and other industrial facilities (20 percent)
- SO<sub>x</sub> is linked to several adverse effects on the respiratory system.

**Nitrogen Oxides (NO<sub>x</sub>):**

- Nitric Oxide (NO), Nitrogen Dioxide (NO<sub>2</sub>), and nitrate radicals (NO<sub>3</sub>) are collectively called Nitrogen Oxides (NO<sub>x</sub>)
- NO<sub>2</sub> is a subgroup of nitrogen oxides and is the most environmentally concerning component. It also acts as an indicator for the presence of the larger group of NO<sub>x</sub>.
- NO<sub>x</sub> forms quickly from vehicle, power plant, and off-road equipment emissions.
- NO<sub>x</sub> contributes to the formation of ground-level O<sub>3</sub> and fine particle pollution.
- NO<sub>x</sub> causes airway inflammation and can increase breathing problems for people with compromised respiratory systems (e.g., asthma).

**Lead (Pb):**

- Pb is a metal found naturally in the environment as well as in manufactured products.
- Prior to 1980, the major sources of Pb were on-road vehicles. As a result, the EPA removed Pb from motor vehicle gasoline, resulting in a 95% decline in Pb emissions between 1980 and 1999.
- Today, the major sources of Pb are ore and metals processing (e.g., lead smelters).
- Depending on the level of exposure, Pb can adversely affect the nervous system, kidney function, immune system, reproductive and developmental systems, and the cardiovascular system.

### 1.5.2 Hazardous Air Pollutants (HAPs)

According to the EPA (USEPA 2016), “Hazardous air pollutants, also known as toxic air pollutants or air toxics, are those pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects.” HAPs include the toxic compounds regulated under Section 112(b) of the CAA. The EPA has been charged with continually analyzing available data on HAPs and revising the regulated list of HAPs. The EPA has also established procedures for both “listing” and “delisting” HAPs. A total of 189 compounds were on the original HAP list, though four compounds have since been removed from this list. These compounds include hydrogen sulfide, in December 1991, caprolactam in June 1996 (61FR30816), ethylene glycol monobutyl ether (EGBE) in November 2004 (69FR69320), and methyl ethyl ketone (MEK) in December 2005 (70FR75047). Changes to the HAPs list are found in 40 CFR Part 63, Subpart C. Since the information contained within this document is for NEPA and General Conformity, the inclusion of HAP emissions is purely informational.

### 1.5.3 Greenhouse Gases (GHGs)

The emissions of GHGs have garnered more attention in recent years as their potential impact on global climate change has been explored in greater detail. Consequently, the world population’s contribution to GHG emission has been under increased scrutiny. Some GHGs, such as carbon dioxide (CO<sub>2</sub>), occur naturally and are emitted into the atmosphere through natural processes as well as human activities. Other GHGs (e.g., fluorinated gases) are created and emitted solely through human activities. The principal GHGs that enter the atmosphere because of human activities are CO<sub>2</sub>, methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), and fluorinated gases.

- CO<sub>2</sub> enters the atmosphere through the burning of fossil fuels, (which include oil, natural gas, and coal), solid waste, trees and wood products, and through other chemical reactions (e.g., cement manufacturing). CO<sub>2</sub> is removed (or sequestered) from the atmosphere when it is absorbed by plants and the ocean as part of the global carbon cycle.
- CH<sub>4</sub> is emitted during the production and transport of coal, natural gas, and oil. CH<sub>4</sub> emissions also result from livestock and other agricultural practices and by the decay of organic waste in municipal solid waste landfills.
- N<sub>2</sub>O is emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste.
- Hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride are powerful, synthetic GHGs that are emitted from a variety of industrial processes. Fluorinated gases are sometimes used as substitutes for ozone-depleting chemicals (i.e., CFCs, HCFCs, and halons).

GHGs are assigned a Global Warming Potential (GWP), a measurement of how much heat the gas traps in the atmosphere calculated over a specific time interval, typically 100 years. The higher the GWP, the greater the potential for the gas to trap heat, and the more harmful the gas is regarded. CO<sub>2</sub> is used as the baseline gas and is assigned a GWP of 1. GHG emissions are converted into equivalent CO<sub>2</sub> (CO<sub>2</sub>e) by taking the product of the emissions of each GHG and its respective GWP. Table A-1 of 40 CFR 98 provides the GWPs for several GHGs and is shown in Table 1-1. The GWP values used to calculate GHG emissions throughout this document are subject to change due to new data becoming available but are considered current as of May 2021. The total GHG emissions are calculated by summing all emissions from each gas and are generally derived using the following equation:

$$E(\text{CO}_2\text{e}) = \sum_{i=1}^n [E(\text{GHG})_i \times \text{GWP}(\text{GHG})_i]$$

**Equation 1-2**

Where,

<b>E(CO<sub>2</sub>e)</b>	=	Greenhouse gas emissions expressed as CO <sub>2</sub> equivalent (CO <sub>2</sub> e)
<b>E(GHG)<sub>i</sub></b>	=	Emissions of individual GHG species i
<b>GWP(GHG)<sub>i</sub></b>	=	Global warming potential for GHG species i
<b>i</b>	=	GHG species, most commonly CO <sub>2</sub> , CH <sub>4</sub> , and N <sub>2</sub> O

Table 1-1. Global Warming Potentials

Name	Chemical Formula	Global Warming Potential (100 yr.)	Name	Chemical Formula	Global Warming Potential (100 yr.)
Carbon dioxide	CO <sub>2</sub>	1	HFE-43-10pecc (H-Galden 1040x, HG-11)	CHF <sub>2</sub> OCF <sub>2</sub> OC <sub>2</sub> F <sub>4</sub> OCHF <sub>2</sub>	1,870
Methane	CH <sub>4</sub>	25	HFE-125	CHF <sub>2</sub> OCF <sub>3</sub>	14,900
Nitrous oxide	N <sub>2</sub> O	298	HFE-134 (HG-00)	CHF <sub>2</sub> OCHF <sub>2</sub>	6,320
HFC-23	CHF <sub>3</sub>	14,800	HFE-143a	CH <sub>3</sub> OCF <sub>3</sub>	756
HFC-32	CH <sub>2</sub> F <sub>2</sub>	675	HFE-227ea	CF <sub>3</sub> CHFOCF <sub>3</sub>	1,540
HFC-41	CH <sub>3</sub> F	92	HFE-236ca12 (HG-10)	CHF <sub>2</sub> OCF <sub>2</sub> OCHF <sub>2</sub>	2,800
HFC-125	C <sub>2</sub> HF <sub>5</sub>	3,500	HFE-236ca2 (Desflurane)	CHF <sub>2</sub> OCHF <sub>2</sub> CF <sub>3</sub>	989
HFC-134	C <sub>2</sub> H <sub>2</sub> F <sub>4</sub>	1,100	HFE-236fa	CF <sub>3</sub> CH <sub>2</sub> OCF <sub>3</sub>	487
HFC-134a	CH <sub>2</sub> FCF <sub>3</sub>	1,430	HFE-245cb2	CH <sub>3</sub> OCF <sub>2</sub> CF <sub>3</sub>	708
HFC-143	C <sub>2</sub> H <sub>3</sub> F <sub>3</sub>	353	HFE-245fa1	CHF <sub>2</sub> CH <sub>2</sub> OCF <sub>3</sub>	286
HFC-143a	C <sub>2</sub> H <sub>3</sub> F <sub>3</sub>	4,470	HFE-245fa2	CHF <sub>2</sub> OCH <sub>2</sub> CF <sub>3</sub>	659
HFC-152	CH <sub>2</sub> FCH <sub>2</sub> F	53	HFE-254cb2	CH <sub>3</sub> OCF <sub>2</sub> CHF <sub>2</sub>	359
HFC-152a	CH <sub>3</sub> CHF <sub>2</sub>	124	HFE-263fb2	CF <sub>3</sub> CH <sub>2</sub> OCF <sub>3</sub>	11
HFC-161	CH <sub>3</sub> CH <sub>2</sub> F	12	HFE-329mcc2	CF <sub>3</sub> CF <sub>2</sub> OCF <sub>2</sub> CHF <sub>2</sub>	919
HFC-227ea	C <sub>3</sub> HF <sub>7</sub>	3,220	HFE-338mcf2	CF <sub>3</sub> CF <sub>2</sub> OCH <sub>2</sub> CF <sub>3</sub>	552
HFC-236cb	CH <sub>2</sub> FCF <sub>2</sub> CF <sub>3</sub>	1,340	HFE-338pec13 (HG-01)	CHF <sub>2</sub> OCF <sub>2</sub> CF <sub>2</sub> OCHF <sub>2</sub>	1,500
HFC-236ea	CHF <sub>2</sub> CHF <sub>2</sub> CF <sub>3</sub>	1,370	HFE-347mcc3 (HFE-7000)	CH <sub>3</sub> OCF <sub>2</sub> CF <sub>2</sub> CF <sub>3</sub>	575
HFC-236fa	C <sub>3</sub> H <sub>2</sub> F <sub>6</sub>	9,810	HFE-347mcf2	CF <sub>3</sub> CF <sub>2</sub> OCH <sub>2</sub> CHF <sub>2</sub>	374
HFC-245ca	C <sub>3</sub> H <sub>3</sub> F <sub>5</sub>	693	HFE-347pcf2	CHF <sub>2</sub> CF <sub>2</sub> OCH <sub>2</sub> CF <sub>3</sub>	580
HFC-245fa	CHF <sub>2</sub> CH <sub>2</sub> CF <sub>3</sub>	1,030	HFE-356mcc3	CH <sub>3</sub> OCF <sub>2</sub> CHF <sub>2</sub> CF <sub>3</sub>	101
HFC-365mfc	CH <sub>3</sub> CF <sub>2</sub> CH <sub>2</sub> CF <sub>3</sub>	794	HFE-356pec3	CH <sub>3</sub> OCF <sub>2</sub> CF <sub>2</sub> CHF <sub>2</sub>	110
HFC-43-10mee	CF <sub>3</sub> CFHCFHCF <sub>2</sub> CF <sub>3</sub>	1,640	HFE-356pcf2	CHF <sub>2</sub> CH <sub>2</sub> OCF <sub>2</sub> CHF <sub>2</sub>	265
Sulfur hexafluoride	SF <sub>6</sub>	22,800	HFE-356pcf3	CHF <sub>2</sub> OCH <sub>2</sub> CF <sub>2</sub> CHF <sub>2</sub>	502
Trifluoromethyl sulphur pentafluoride	SF <sub>5</sub> CF <sub>3</sub>	17,700	HFE-365mcf3	CF <sub>3</sub> CF <sub>2</sub> CH <sub>2</sub> OCH <sub>3</sub>	11
Nitrogen trifluoride	NF <sub>3</sub>	17,200	HFE-374pc2	CH <sub>3</sub> CH <sub>2</sub> OCF <sub>2</sub> CHF <sub>2</sub>	557
PFC-14 (Perfluoromethane)	CF <sub>4</sub>	7,390	HFE-449s1 (HFE-7100)	C <sub>4</sub> F <sub>9</sub> OCH <sub>3</sub>	297
PFC-116 (Perfluoroethane)	C <sub>2</sub> F <sub>6</sub>	12,200	HFE-569s12 (HFE-7200)	C <sub>4</sub> F <sub>9</sub> OC <sub>2</sub> H <sub>5</sub>	59
PFC-218 (Perfluoropropane)	C <sub>3</sub> F <sub>8</sub>	8,830	Sevoflurane (HFE-347mmz1)	CH <sub>2</sub> FOCH(CF <sub>3</sub> ) <sub>2</sub>	216
Perfluorocyclopropane	C-C <sub>3</sub> F <sub>6</sub>	17,340	HFE-356mmz1	(CF <sub>3</sub> ) <sub>2</sub> CHOCH <sub>3</sub>	27
PFC-3-1-10 (Perfluorobutane)	C <sub>4</sub> F <sub>10</sub>	8,860	HFE-338mmz1	CHF <sub>2</sub> OCH(CF <sub>3</sub> ) <sub>2</sub>	380
PFC-318 (Perfluorocyclobutane)	C-C <sub>4</sub> F <sub>8</sub>	10,300	(Octafluorotetramethyl-ene) hydroxymethyl group	X-(CF <sub>2</sub> ) <sub>4</sub> CH(OH)-X	73
PFC-4-1-12 (Perfluoropentane)	C <sub>5</sub> F <sub>12</sub>	9,160	HFE-347mmy1	CH <sub>3</sub> OCF(CF <sub>3</sub> ) <sub>2</sub>	343
PFC-5-1-14 (Perfluorohexane, FC-72)	C <sub>6</sub> F <sub>14</sub>	9,300	Bis(trifluoromethyl)-methanol	(CF <sub>3</sub> ) <sub>2</sub> CHOH	195
PFC-9-1-18	C <sub>10</sub> F <sub>18</sub>	7,500	2,2,3,3,3-pentafluoropropanol	CF <sub>3</sub> CF <sub>2</sub> CH <sub>2</sub> OH	42
HCFE-235da2 (Isoflurane)	CHF <sub>2</sub> OCHClCF <sub>3</sub>	350	PPPMIE (HT-70)	CF <sub>3</sub> OCF(CF <sub>3</sub> )CF <sub>2</sub> OCF <sub>2</sub> OCF <sub>3</sub>	10,300

SOURCE: Table A-1 to Subpart A of Part 98 of Title 40 in Code of Federal Regulations

## 1.6 Document Organization

This document is organized into chapters which are specifically related to facilities or processes typically found at Air Force installations. Chapter topics may or may not correspond directly to source types identified in EPA, State, or local guidance documents, but the intent is to consider sources usually associated with a process. This document specifically addresses mobile sources of air emissions. Guidance for addressing stationary or transitory sources of air pollutants may be found in the *Air Emissions Guide for Air Force Stationary Sources* or *Air Emissions Guide for Air Force Transitory Sources*.

## 1.7 References

40 CFR 63, "Title 40-Protection of the Environment, Chapter I-Environmental Protection Agency, Subchapter C-Air Programs, Part 63-Standards for Hazardous Air Pollutants," U.S. Environmental Protection Agency

40 CFR 98, "Title 40-Protection of the Environment, Chapter I-Environmental Protection Agency, Subchapter C-Air Programs, Part 98-Mandatory Greenhouse Gas Reporting," U.S. Environmental Protection Agency

40 CFR 85, "Title 40-Protection of the Environment, Chapter I-Environmental Protection Agency, Subchapter C-Air Programs, Part 85-Control of Air Pollution from Mobile Sources," U.S. Environmental Protection Agency

40 CFR 86, "Title 40-Protection of the Environment, Chapter I-Environmental Protection Agency, Subchapter C-Air Programs, Part 86-Control of Emissions from New and In-Use Highway Vehicles and Engines," U.S. Environmental Protection Agency,

40 CFR 87, "Title 40-Protection of the Environment, Chapter I-Environmental Protection Agency, Subchapter C-Air Programs, Part 87-Control of Air Pollution from Aircraft and Aircraft Engines," U.S. Environmental Protection Agency,

40 CFR 79, "Title 40-Protection of the Environment, Chapter I-Environmental Protection Agency, Subchapter C-Air Programs, Part 79-Registration of Fuel and Fuel additives," U.S. Environmental Protection Agency

40 CFR 80, "Title 40-Protection of the Environment, Chapter I-Environmental Protection Agency, Subchapter C-Air Programs, Part 80-Regulation of Fuel and Fuel Additives," U.S. Environmental Protection Agency

AFMAN 2020, Air Force Manual 32-7002, "Environmental Compliance and Pollution Prevention," Current 4 February 2020

CAA 1990, "List of Hazardous Air Pollutants," Clean Air Act Section 112 (b), 1990

CAA 2005, "Transformation and Conformity Regulations," Clean Air Act Section 176 (c), August 2005

E.O. 2009, "Federal Leadership in Environmental, Energy, and Economic Performance," Executive Order 13514, October 2009



FR 2004, “List of Hazardous Air Pollutants, Petition Process, Lesser Quantity Designations, Source Category List; Petition To Delist of Ethylene Glycol Monobutyl Ether: Final Rule,” 69 FR 69320, November 2004

FR 1996, “Deletion of Caprolactam From the List of Hazardous Air Pollutants: Final Rule,” 61 FR 30816, June 1996

FR 2005, “List of Hazardous Air Pollutants, Petition Process, Lesser Quantity Designations, Source Category List-methyl ethyl ketone: Final Rule,” 70 FR 75047, December 2005

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## 2.0 AIRCRAFT FLIGHT OPERATIONS (AOPS)

### 2.1 Introduction

Generally speaking, there are two types of aircraft: fixed-wing or rotary. A fixed-wing aircraft, also known as planes, are heavier-than-air flying machines that are capable of flight by using wings to generate lift via the aircraft's forward airspeed and the shape of the wings. Rotary aircraft, also known as helicopters, are heavier-than-air flying machines that use rotary wings or blades to generate lift. These wings or blades are mounted on a mast, known as a rotor, which they revolve around. Rotorcraft generally include aircraft where one or more motors provide lift throughout the entire flight.

Emissions from stationed aircraft and transient aircraft operations typically account for the bulk of the mobile source emissions associated with an Air Force Base. Emissions from aircraft flight operations include emissions from aircraft training and mission flight operations, engine testing, and emissions from each aircraft's associated Auxiliary Power Units (APUs). Aircraft flight operations result in the release of criteria pollutants, GHGs, and HAPs to the atmosphere.

Aircraft engine emissions can be classified as either stationary or mobile in nature depending upon whether the engine is physically attached to the aircraft (mobile) or removed from the aircraft and secured to a stationary device such as a test stand (stationary). Emissions from USAF aircraft training and mission flight operations, as well as trim pad and on-wing engine testing, are considered mobile in nature because the engine is secured to the aircraft (which is considered a mobile source). Operations in which the engine is removed from the aircraft and secured to a non-mobile device (i.e., in engine test cells or on outdoor test pads) result in emissions that are considered stationary. Calculations of these stationary emissions are described in the *Air Emissions Guide for Air Force Stationary Sources*.

Additionally, some aircraft are outfitted with small turbine engines known as APUs that provide auxiliary power to the aircraft while on the ground, and occasionally through takeoff and climb out modes. APUs are sources of air pollution and, similarly to aircraft engines, are regarded as mobile sources unless operating after being removed from the aircraft and secured to a stationary stand.

Finally, it is important to note that the modelling input parameters (e.g., power settings, EFs, and fuel flow rates) are derived from engine testing on the ground and intended for aircraft engine test cells (a stationary source that is regulated) and are indirectly applied to in-flight and ground operations. Therefore, be aware of the relatively poor resulting data quality of any estimate of any aircraft flight operation.

## 2.2 Mixing Zone Height and Region of Influence

### 2.2.1 Mixing Height

Under the EPA procedures, an emissions inventory for aircraft operations focuses only on pollutants emitted in the vertical column of air (generally bound by the perimeter of the base) referred to as the “mixing zone.” The mixing zone is the lower layer of atmosphere where air pollutant mixing occurs (and, therefore, chemical reactions occur) and above which there is a negligible effect on ground-level air pollutant concentrations. This mixing zone portion of the atmosphere begins at the earth's surface and ranges from several hundred to several thousand feet in altitude. The default mixing zone height (mixing height) defined by the EPA is 3,000 feet (ft) Above Ground Level (AGL) [see 40 CFR 93.153 (c) (2) (xxii)] which shall be used for air quality models. However, for proposed actions in nonattainment/maintenance areas where the default mixing height results in total net emissions above the de minimis thresholds, a lower location-specific mixing height can be used if the location-specific mixing height will result in de minimis emissions (i.e., the location-specific mixing height must be less than the 3,000 ft AGL default). Generally, the default mixing zone height of 3,000 feet AGL should be used unless a specific height is prescribed in an applicable State Implementation Plan (SIP).

#### 2.2.1.1 Air Impact Assessments Mixing Height for Criteria Pollutants

For air impact assessments under NEPA and General Conformity, a locally calculated mixing height may be used to demonstrate insignificant (de minimis) air quality impacts associated with a proposed action. In accordance with General Conformity, 40 CFR 93.153(c)(2)(xxii), a “Federal agency can use 3,000 feet above ground level as a default mixing height, unless the agency demonstrates that use of a different mixing height is appropriate because the change in emissions at and above that height caused by the Federal action is de minimis.” Additionally, in accordance with the 40 CFR 93 Preamble, EPA “added regulatory language to sub-paragraph (xxii) to allow federal agencies to use a different mixing height if they can demonstrate that emissions at and above that height are de minimis.” Therefore, a calculated local mixing height would only be used for air impact assessments (NEPA and General Conformity assessments) and only if it would result in a de minimis level of emissions. In other words, the default 3,000 feet mixing height will always be used initially and, if an action’s emissions are not de minimis, the calculated local average mixing height may be used if (and only if) the adjustment in emission would result in the action being de minimis. Therefore, the local average mixing height should never be used in areas where the average calculated local average mixing height is greater than 3,000 ft.

The *USAF Air Quality Environmental Impact Analysis Processes (EIAP) Guide* should be consulted for more details on the specific use of local average mixing height. Additionally, to ensure proper use and to refine emissions estimates, contact the AFCEC Air Quality Subject

Matter Expert to obtain approval and location-specific data for seasonal or annual average mixing heights.

### 2.2.1.2 Air Impact Assessments Mixing Height for Greenhouse Gasses (GHGs)

Unlike criteria pollutants, the impact of GHGs is at a global-scale and therefore the impact of GHGs at the microscale (local area) is scientifically incalculable. Both the current EPA method for estimating aircraft flight operations emissions (EPA 420-R-92-009) and the General Conformity Rule (40 CFR 93 Subpart B) call for only including criteria pollutant emissions below the mixing height. Given, the mixing height is only associated with microscale air quality criteria pollutant modeling, use of the mixing height for GHG emissions modeling could be considered inadequate. Therefore, logically, if flight-specific fuel consumption data can be reasonably foreseeably predicted, aircraft flight operations GHG emissions used for the “relative comparison analysis” should be calculated using the flight-specific fuel consumption data.

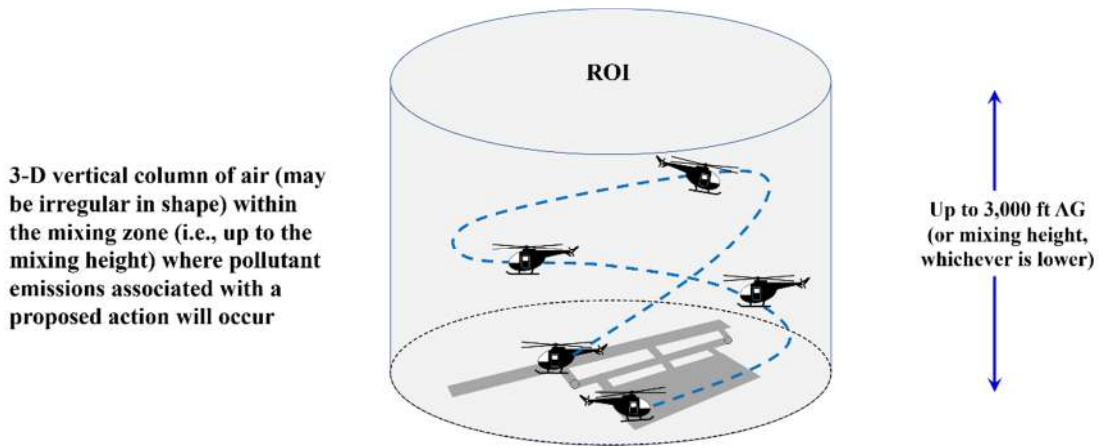
As a result, the Air Force methodology for estimating criteria pollutants, emissions below the mixing height, should NOT be used as a standardized methodology for performing a relative comparison analysis for GHGs. GHG emissions should be estimated for the full extent of aircraft movements as part of the projected net change in GHG emissions and with no altitude restriction (not constrained by the mixing height). Therefore, flight-specific fuel consumption data will be derived from site-specific representative GHG TIMs or TIPs must be used for all impact assessments or emission inventories (default TIMs may only be used for planning purposes).

**Note: Due to the complexity and highly technical nature of the methodology of deriving TIMs/TIPs and the need for standardization across the Air Force, only AFCEC/CZTQ may derive site-specific representative GHG TIMs or TIPs.**

### 2.2.2 Region of Influence (ROI)

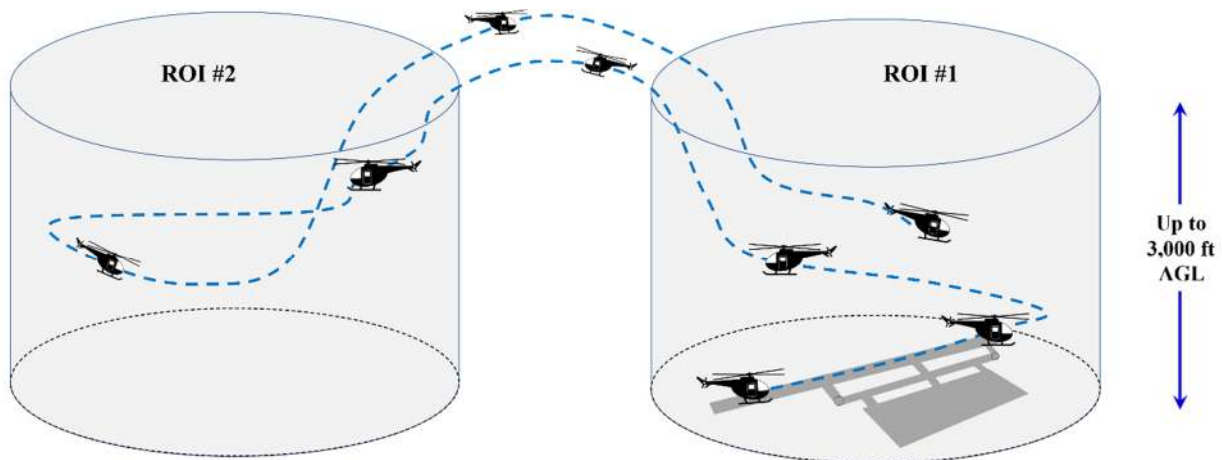
For air quality impacts assessments, a Region of Influence (ROI) for an action is a three-dimensional vertical column of air within the mixing zone (i.e., up to the mixing height) where pollutant emissions associated with a proposed action will occur. There may be more than one ROI due to the physical and spatial distribution of the emissions sources associated with the proposed action. Each non-contiguous area, nonattainment area, and maintenance area must be considered as a separate ROI. Each ROI requires a separate air quality EIAP assessment which must have a conclusion of air quality impacts for the ROI.

**Note: Due to the complex nature, ROI determination must be established by AFCEC/CZTQ for all assessments involving flight operations within any nonattainment or maintenance area.**



**Figure 2-1. ROI**

Additionally, for ROIs within areas that are classified as nonattainment or maintenance for any National Ambient Air Quality Standard (NAAQS), a separate General Conformity assessment for each nonattainment or maintenance area must be performed in tandem with the ROI's overall air quality EIAP assessment (this is generally automated in the Air Conformity Applicability Model [ACAM] if the nonattainment and maintenance areas are selected).



**Figure 2-2. Multiple ROIs**

All emissions from new aircraft operations associated with a proposed action within the mixing zone must be included in a ROI's air quality EIAP assessment. The mixing zone is the lower layer of atmosphere where air pollutant chemical reactions occur and above which there is a

negligible effect on ground-level air pollutant concentrations. This mixing zone portion of the atmosphere begins at the earth's surface and ranges from several hundred to several thousand feet in altitude. The default mixing zone height (mixing height) defined by the EPA is 3,000 feet (ft) Above Ground Level (AGL) [see 40 CFR 93.153 (c) (2) (xxii)] which shall be used for air quality models. However, for proposed actions in nonattainment/maintenance areas where the default mixing height results in total net emissions above the de minimis thresholds, a lower location-specific mixing height can be used if the location-specific mixing height will result in de minimis emissions (i.e., the location-specific mixing height must be less than the 3,000 ft AGL default). Therefore, initially only air emissions produced below the default 3,000 ft AGL mixing height are considered when assessing ROIs heights and air quality impacts. There are three aircraft operations that will potentially occur below the mixing height: Landing and Takeoff cycles, Closed Pattern cycles (Touch and Goes) and Low Flight Patterns. For estimating the total emissions associated with each type of aircraft operation, a reasonably foreseeable typical flight pattern [in terms of Time-in-Mode (TIM) for fixed-wing or Time-in-Phase (TIP) for rotary] for a specific aircraft operation is multiplied by the reasonably foreseeable worst-case number of the specific aircraft operation per year. Additionally, any reasonably foreseeable Trim Tests and Engine Test Cell activities associated with the proposed action (preferred action and alternatives) must be included in the air quality EIAP assessment.

## 2.3 Aircraft Flight Operations

Fixed-wing aircraft and rotary aircraft are both heavier-than-air flying machines that are capable of flight by using mechanical powered engines. A fixed-wing aircraft (planes) fly using wings to generate lift via forward airspeed; while a rotary aircraft (helicopters) fly using rotary wings or blades to generate lift. Fixed-wing aircraft require runways to take off, while rotary-wing aircraft can take off from any level surface. Therefore, aircraft flight operations for both are quite different.

Flight operations for aircraft are broken down into “flight cycles” for estimating air emissions. A “flight cycle” is one complete repetitive sequence of flight operations which consists of various “flight modes” (and their corresponding engine “power settings”) for fixed-wing aircraft or “flight phases” (idle, taxi, takeoff, flight, and landing phases) for rotary aircraft.

There are three basic flight cycles:

- **Landing and Takeoff (LTO) Cycle:** A flight operation consisting of one complete repetitive takeoff and landing cycle.
- **Closed Pattern (CP) Cycle:** A flight operation consisting of one complete repetitive flight maneuver that involves practice landing on a runway by briefly touching the landing gear to the runway, or coming very close, and transitioning immediately into climb out and associated flying to maneuver into another practice landing.
- **Low Flight Pattern (LFP) Cycle:** A flight operation consisting of one complete repetitive flight cycle below the mixing height that does not include any part of a LTO or CP cycle.

### 2.3.1 Fixed-Wing Aircraft Flight Operations

#### 2.3.1.1 Fixed-Wing LTO Cycle

The EPA has established formal procedures for calculating exhaust emissions associated with fixed-wing aircraft operations based on a Landing and Takeoff (LTO) cycle (USEPA 1992). Under the EPA procedures, an emissions inventory for aircraft operations focuses only on pollutants emitted in the vertical column of air (generally bound by the perimeter of the base) referred to as the “mixing zone.” Exhaust emissions occurring within this area are calculated for one complete LTO cycle for each aircraft type by applying aircraft engine-specific emission factors.

A sortie may include any number of aircraft flight patterns but only one takeoff and only one return landing. Given this, the number of sorties equates to the number of LTO cycles. Since an LTO cycle is only a fraction of a sortie (that only includes the very short beginning and very



short ending) an LTO cycle corresponds to two aircraft operations – one arrival and one departure. Therefore, one LTO cycle represents a pair of arrival and departure operations.

Each LTO cycle for fixed-wing aircraft is comprised of four flight modes: taxi/idle, takeoff, climb out, and approach. Each of these modes has a corresponding engine power setting/mode. Engine power modes are aircraft engine operational settings defined by the percent of total engine thrust. The engine power modes for a specific engine are defined by the percent of total thrust the engine was tested at as required by 40 CFR 87, *Control of Air Pollution from Aircraft and Aircraft Engines*. Engine power modes are considered interchangeable with aircraft flight modes because during each aircraft flight mode of operation, the aircraft engines operate at a standard power setting for a given aircraft category. The four flight modes and corresponding engine power settings are:

- **Idle (Taxi) Mode:** The engine idle portion of an LTO Cycle which includes all on-ground idle portions of a flight cycle which includes both the engine startup/warmup time before taxiing for departure and the engine cooldown/shutdown time period. The Taxi Mode portion of an LTO Cycle also includes the total time the plane spends taxiing. Taxi time includes taxiing times from the parking area to the takeoff/landing area (Taxi Out) and, upon landing, taxiing from the takeoff/landing area to the parking area (Taxi In). The Idle flight mode is performed in the “Idle” engine power setting.
- **Takeoff Mode:** Characterized by full engine thrust, the time it takes the aircraft to reach 500 feet Above Ground Level (AGL). Equates to both the “Military” and/or “Afterburner” engine power setting, dependent on engine capability and local flight requirement.
- **Climb Out Mode:** Starts with the initial aircraft ascent from 500 ft AGL through the aircraft exiting the mixing zone (default is 3,000 ft). The Climb Out flight mode is performed in the “Climb Out” (also known as “Intermediate”) engine power settings.
- **Approach Mode:** Commences with the aircraft return and descent, starting when the aircraft enters the mixing zone to 0 ft AGL (touchdown). The Approach flight mode is performed in the “Approach” engine power setting.

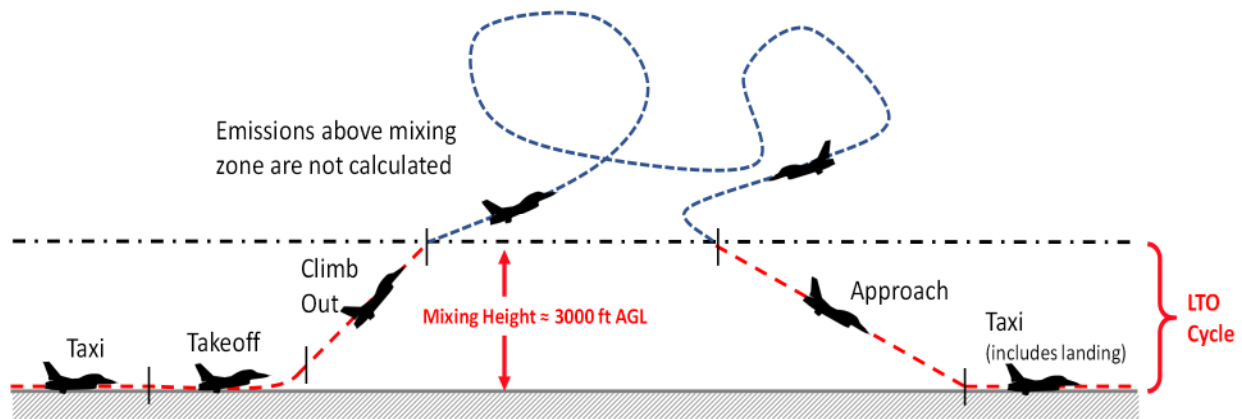


Figure 2-3. Fixed-Wing LTO Cycle

### 2.3.1.2 Fixed-Wing CP Cycle

A Fixed-Wing CP cycle, also known as a Touch and Go (TGO), is a flight maneuver that involves practice landing on a runway by briefly touching the landing gear to the runway, or coming very close, and transitioning immediately into climb out and associated flying to maneuver into another practice landing (See Table 2-9). A CP cycle is effectively a combination of one LTO cycle (specific to the CP cycle) and one LFP for the portion of the return flight below the mixing height.

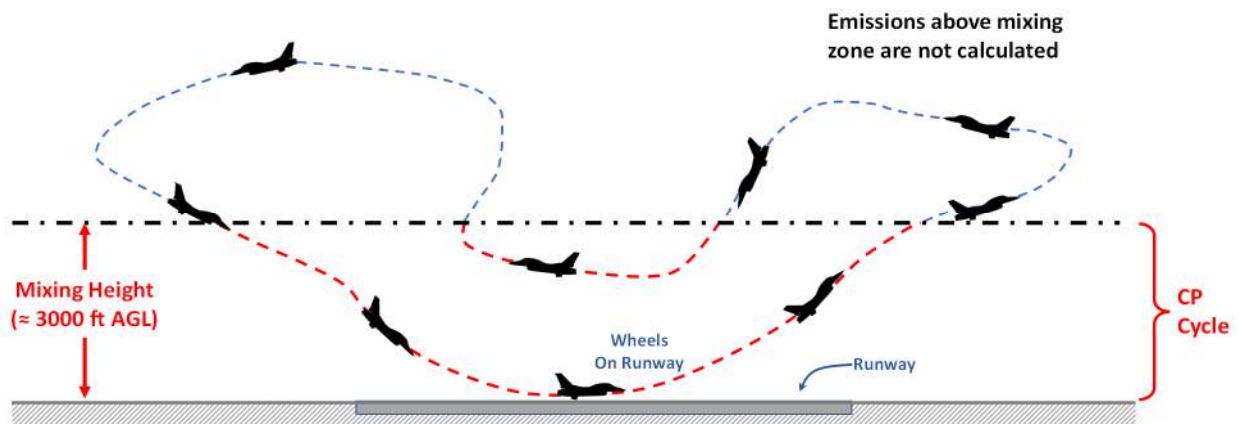


Figure 2-4. Fixed-Wing CP Cycle

### 2.3.1.3 Fixed-Wing LFP Cycle

A Fixed-Wing LFP cycle is a flight maneuver that occurs below the mixing height (EPA default = 3,000 ft AGL) that is not part of an LTO or CP cycle. Generally, LFPs are flown only in the “Intermediate” and/or “Approach” engine power modes. If the aircraft is level or ascending the aircraft is generally flying in the “Intermediate” engine power setting and if the aircraft is descending the aircraft is generally flying in the “Approach” engine power setting.

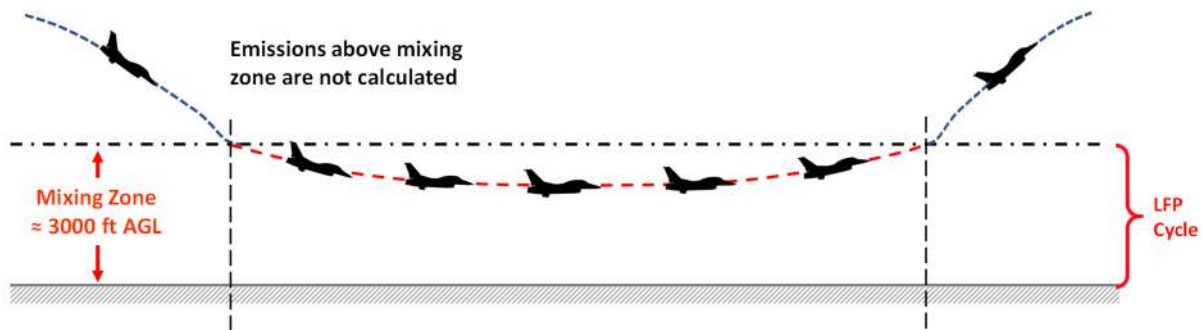


Figure 2-5. Fixed-Wing LFP Cycle

### 2.3.2 Rotary (Helicopter) Aircraft Flight Operations

Fixed-wing aircraft and rotary aircraft are both heavier-than-air flying machines that are capable of flight by using mechanical powered engines; however, the difference in means of flight also dictates different flight operations. A fixed-wing aircraft generally uses runways to take off and land, while rotary-wing aircraft can take off from any level surface and flies at much lower altitudes. Therefore, rotary aircraft flight patterns are described in terms of “flying phases” rather than “flight modes” (as with fixed-wing aircraft). As with flight modes, flying phases correspond to specific engine power thrust settings:

- **Idle Phase:** Is the flying phase portion of an LTO Cycle which includes all on-ground idle portions of a flight cycle. The Idle Phase is performed in the “Idle” engine power setting.
- **Taxi Phase:** Is the flying phase portion of an LTO Cycle which includes the total time the helicopter spends taxiing. The Taxi Phase is performed in the “Taxi” engine power setting.
- **Takeoff Phase:** Is the flying phase portion of an LTO Cycle which includes the vertical and horizontal ascent from a specified takeoff point. The Takeoff Phase is performed in the “Takeoff” engine power setting.
- **Landing Phase:** Is the flying phase portion of an LTO Cycle which includes the vertical and horizontal descent to a specified landing point. The Landing Phase is performed in the “Landing” engine power setting.
- **Flight Phase:** Is the flying phase portion of a LFP or CP, which includes the portions of flying between 1,000 ft AGL and the mixing height. The Flight Phase excludes all portions of an LTO Cycle. The Flight Phase is performed in the “Flight” engine power setting.

### 2.3.2.1 Rotary LTO Cycle

Because rotary aircraft fly at lower altitudes, the LTO cycle only accounts for takeoff and landings below 1,000 ft AGL. Therefore, rotary aircraft do not follow a Fixed-Wing LTO Cycle and have an independent LTO Cycle (a Rotary LTO Cycle, which reflects only flight below 1,000 ft AGL).

A Rotary LTO Cycle is one complete takeoff and landing cycle, consisting of the time duration in four of the five flying phases (i.e., Time In Phase or TIP). “Time In Phase” or “TIP” is the time spent, during a representative flight cycle, in each of the flying phases: idle, taxi, takeoff, and landing phases:

- **Idle Phase:** Is the flying phase portion of an LTO Cycle which includes all on-ground idle portions of a flight cycle which includes both the engine startup/warmup time before taxiing for departure and the engine cooldown/shutdown time period.
- **Taxi Phase:** Is the flying phase portion of an LTO Cycle which includes the total time the helicopter spends taxiing. Taxi time includes taxiing times from the parking area to the takeoff area and, upon landing, taxiing from the landing area to the parking area.
- **Takeoff Phase:** Is the flying phase portion of an LTO Cycle which includes the vertical and horizontal ascent from a specified takeoff point. It is assumed the takeoff phase starts on the ground and ends at 1,000 ft AGL.
- **Landing Phase:** Is the flying phase portion of an LTO Cycle which includes the vertical and horizontal descent to a specified landing point. It is assumed the landing phase starts at 1,000 ft AGL and time is in general equal to the takeoff TIP. Therefore, TIP for landing ( $TIP_{Landing}$ ) is equal to the TIP for takeoff ( $TIP_{Takeoff}$ ).

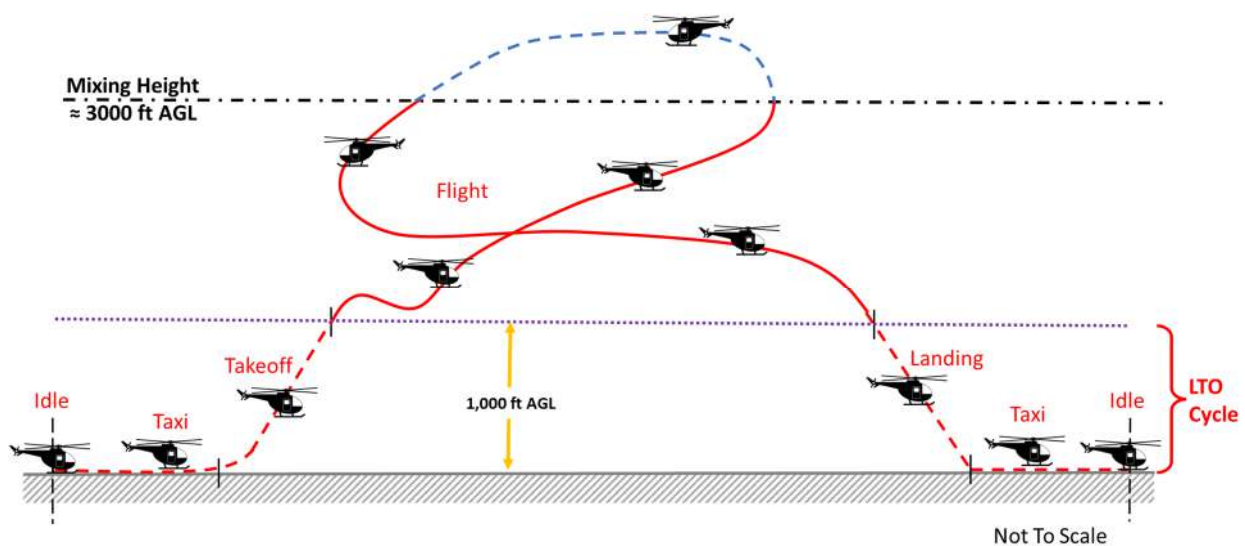


Figure 2-6. Rotary LTO Cycle

A Rotary LTO does not include any flight time above the 1,000 feet AGL. A “representative Rotary LTO Cycle” is a single departure and arrival cycle that is statistically characteristic of all Rotary LTO cycles flown in an average calendar year. A representative Rotary LTO Cycle is derived through frequency weighted averaging all significant departure and arrival cycles within an average calendar year.

### 2.3.2.2 Rotary CP Cycle

A Rotary CP cycle (also known as a Touch and Go [TGO] cycle) is a flight maneuver that involves practice landing on a runway by briefly touching the landing gear to the runway, or coming very close, and transitioning immediately into climb out and associated flying to maneuver into another practice landing (See Figure 2-7. Rotary CP Cycle). A CP cycle is simply a combination of one LTO cycle (specific to the CP cycle) and one LFP for the portion of the return flight below the mixing height.

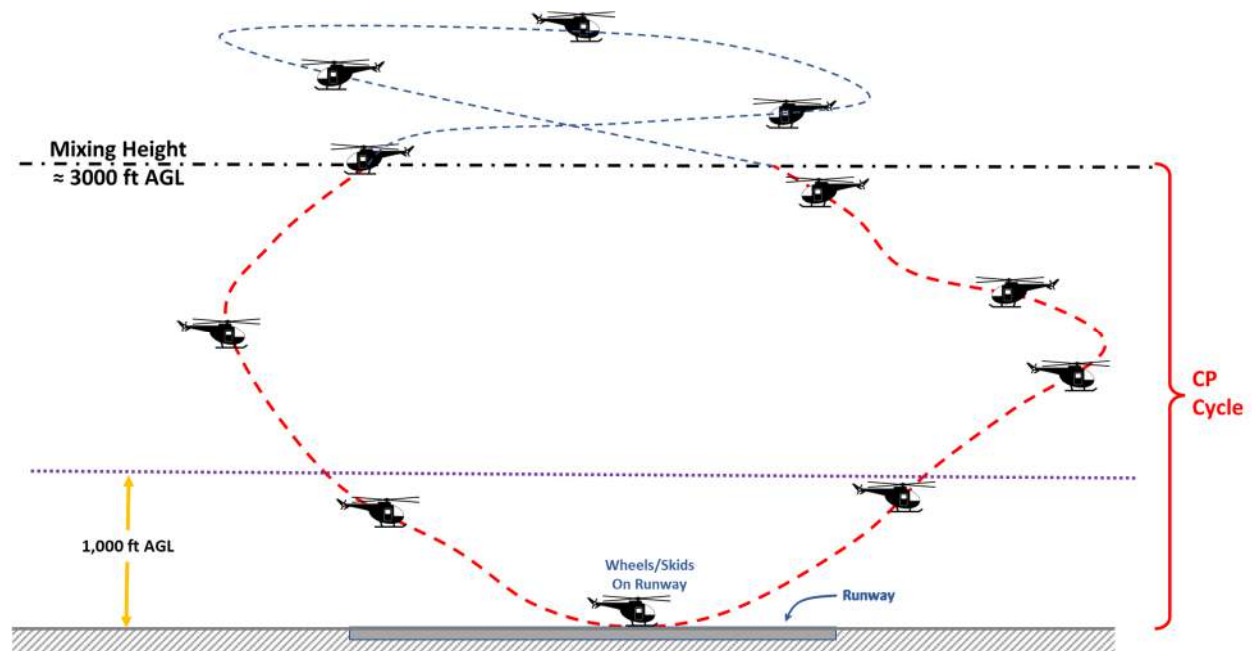


Figure 2-7. Rotary CP Cycle

### 2.3.2.3 Rotary LFP Cycle

A LFP flying cycle only occurs below the mixing height (EPA default = 3,000 ft AGL) and does not include any part of an LTO or CP cycles. Generally, LFPs are flown only in the “Flight Phase” engine power mode. Rotary LFP are often attributed to trips to and from mission destinations.

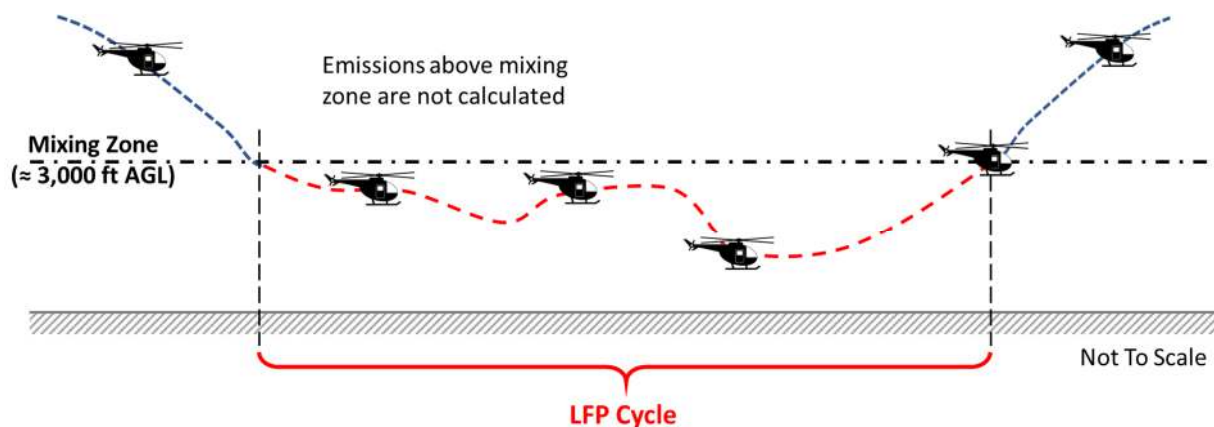


Figure 2-8. Rotary LFP Cycle

## 2.4 Jet Fuel

Both military aircraft engines (either fixed-wing or rotary) and APUs consume JP-8 fuel, while their commercial counterparts consume a nearly identical fuel known as Jet-A. While most aircraft operations involve engines that use either JP-8 or Jet-A fuel, small, piston engine-driven aircraft that consume aviation grade gasoline, or AVGAS, may periodically operate on a USAF installation. Additionally, recent Air Force and commercial initiatives are expected to result in the increased use of so-called synthetic aviation fuel or “synfuel” over the next several years. These “synfuels” are derived from either coal or natural gas using the Fischer-Tropsch (FT) process and burn much cleaner than fuels produced from crude oil. Regardless of fuel type, emissions of concern from aircraft operations and engine testing include the criteria pollutants (VOC, CO, NO<sub>2</sub>, PM<sub>2.5</sub>, PM<sub>10</sub>, and SO<sub>2</sub>), and HAPs (including, but not limited to benzene, naphthalene, and 1,3-butadiene) that are commonly associated with fuel combustion processes.

### 2.4.1 Synthetic Aviation Fuel

Currently, there are on-going Department of Defense (DoD) and USAF initiatives to reduce dependency on foreign petroleum sources. This includes development of battlefield fuels with essentially no sulfur and reduced aromatic content using FT gasification technology on domestic energy sources such as coal and natural gas. These “synthetic” fuels will increasingly be used to offset conventional JP-8 and diesel fuels in Air Force equipment, particularly aircraft. Testing and certification of 50-50 blends of petroleum- and FT-based JP-8 in B-52s has already been completed by the Air Force Research Laboratory (AFRL). The data indicates that the 50-50 blend reduces SO<sub>2</sub>, CO<sub>2</sub>, and PM emissions considerably (USAF 2007). When estimating emissions from aircraft operations in which a synthetic fuel blended with petroleum JP-8 was used, the following emission reduction factors should be applied:

**Table 2-1. Fuel Emission Reduction Factors (FERFs) for JP-8/Synthetic Fuel Blends**

<b>Pollutant</b>	<b>Reduction Factor (%)</b>
PM	35
SO <sub>2</sub>	50
CO <sub>2</sub>	1.8

SOURCE: USAF Alternative Fuels Program, AFRL/WS//06-0078. 22nd Annual UC Symposium on Aviation Noise and Air Quality. March 2007.

## 2.5 Emission Factors

Air pollutant EFs for aircraft operations include emissions from aircraft engines (either fixed-wing or rotary) and APUs used on the airframe. The EFs have been developed through testing by either the manufacturers themselves or another party. Though the EFs were developed for stationary jet engine testing and are most suited for this application, it is considered acceptable to use them for estimating emissions from aircraft flight operations. Criteria pollutant and GHG EFs for each engine are provided in Table 2-9 while speciated VOC and HAP EFs for select engines and APUs are provided in Table 2-10. Criteria pollutants for some APUs are provided in Table 2-12. The aircraft engine EFs presented in Table 2-9 are provided for each power setting which correspond to the flight operating cycle in an LTO cycle. Note that, in several instances, a surrogate engine may have been used to fill data gaps.

## 2.6 Emissions Calculations

Emissions calculation procedures for aircraft operations under various operational cycles are described in the following paragraphs. EFs and power settings for specific aircraft engines are provided in Table 2-9. For engine models not listed in Table 2-9, contact the Air Quality SME for assistance in selecting a representative surrogate engine.

### 2.6.1 Fixed-Wing Aircraft Emissions

The EFs listed have been determined through testing and may be found in a variety of sources. It is important to note that some sources, such as the Airport Air Quality Manual and International Civil Aviation Organization (ICAO), do not provide PM<sub>10</sub> and PM<sub>2.5</sub> EFs directly (ICAO 2011). For those sources, the total PM was calculated and was conservatively assumed to be equal to PM<sub>10</sub>. A similarly conservative estimate was made for PM<sub>2.5</sub> by assuming that 90% of the total PM<sub>10</sub> value is composed of PM<sub>2.5</sub>. These assumptions are noted in the appropriate tables. Additionally, there are several engines for which some EF data may have been missing. For these engines, either the EFs from a surrogate were used or the missing data was interpolated or

extrapolated. These values are clearly marked in the tables with an (S) for EFs in which a surrogate was used, or a (C) when the values were calculated. The engines used as surrogates are provided in the notes. Common airframe/engine combinations for military fixed-wing, rotary, and commercial aircraft are provided in Table 2-6, Table 2-7, and Table 2-8.

### 2.6.1.1 LTO Emissions

LTO emissions are calculated based on the type of aircraft, the engine model and number per airframe, the operational mode and TIM for each mode, and the power setting associated with each operational mode. The fuel flow rate associated with each power setting, engine specific EFs, the mixing zone height, and the number of LTO cycles conducted during the year are also considered in the LTO emissions calculation. As TIM and fuel flow rate for each power setting vary among aircraft engines and airframes, the calculation procedure will need to be repeated for individual aircraft types. A description of the operating modes for commercial and military aircraft and the default TIMs are provided in Table 2-4 and Table 2-5 respectively.

Aircraft engine emissions per airframe based on an LTO cycle account only for those emissions occurring below the mixing height and are calculated as follows:

$$E(\text{Pol})_{\text{Aircraft}} = \sum_{i=1}^n \left[ \frac{\text{TIM}_i}{60} \times \frac{\text{FFR}_i}{1,000} \times \text{EF}(\text{Pol})_i \times \frac{\text{FERF}(\text{Pol})}{100} \right] \times N \times C$$

Equation 2-1

Where,

<b>E(Pol)<sub>Aircraft</sub></b>	=	Annual pollutant emissions per engine on airframe being evaluated (lb/yr)
<b>N</b>	=	Number of units (engines) per airframe being evaluated
<b>60</b>	=	Factor to convert minutes to hours
<b>1000</b>	=	Factor to convert lb fuel burned to 10 <sup>3</sup> lb fuel burned (lb/10 <sup>3</sup> lb)
<b>i</b>	=	Mode identifier. 1 = Idle in/out, 2 = Takeoff, 3 = Afterburner Takeoff, 4 = Climb out, and 5 = Approach.
<b>TIM<sub>i</sub></b>	=	Time spent in each mode per LTO cycle (min/cycle)
<b>FFR<sub>i</sub></b>	=	Fuel flow rate during operational mode per aircraft engine (lb/hr)
<b>EF(Pol)<sub>i</sub></b>	=	Pollutant emission factor for specified mode (lb/10 <sup>3</sup> lb fuel burned)
<b>FERF(Pol)</b>	=	Fuel emission reduction factor, if applicable (%). In cases where alternative fuel is not used, then a value of 100% must be used.
<b>100</b>	=	Factor to convert percent to a fraction (%)
<b>C</b>	=	Number of annual LTO Cycles (cycle/yr)

**Default TIMs may only be used for planning purposes. Site-specific TIMs must be used for all impact assessments and emissions inventories. Due to the complexity and highly technical nature of the methodology of deriving site-specific TIMs and the need for standardization across the Air Force, only AFCEC/CZTQ may derive site-specific TIMs.**



Note that when calculating the emissions for each LTO, the pollutant EF for the appropriate power setting must be selected from Table 2-9. For engines equipped with afterburner, 50% of the total time in “takeoff” is assumed to be in the “military” power setting and 50% in the “afterburner” power setting. Also, some aircraft may utilize a different power setting during a flight mode than what is given in Table 2-4 (e.g., an engine may be in the “military” power setting during the “climb out” phase of the LTO). Typically, however, the engine power settings correspond to the flight modes and should be selected when calculating emissions for an LTO.

Some of the data required to calculate aircraft emissions per LTO cycle may be found in the following tables:

- FERF, if synthetic fuel blends are used, are provided in Table 2-1
- Regional sulfur content of JP-8, if required for enhanced accuracy, is provided in Table 2-2
- TIM spent in each LTO cycle mode is found in Table 2-5
- Power settings and fuel flow rates for each LTO cycle mode and associated engine specific EFs are found in Table 2-9 and Table 2-10

### **2.6.1.2 CP Emissions**

Used primarily for NEPA/General Conformity air impact studies under EIAP assessments, Touch and Go (TGO) and Low Fly By (LFB) training operations may dictate the need to conduct aircraft operations that deviate from a standard LTO cycle. A TGO cycle is a common flight maneuver that involves practice landing on a runway by briefly touching (or simulating the touching of) the landing gear to the runway and transitioning immediately into climb out. During an LFB, the aircraft generally drops below the mixing height and returns to a higher altitude without touching (or simulating the touching of) the landing gear to the runway. TGO and LFB emissions are calculated in essentially the same manner as LTO emissions; however, only some modes of a complete LTO are considered. For TGO emissions estimating, generally only the default TIMs for approach, takeoff, and climb out are used. For LFB emissions estimating, one half of the default TIMs for approach and climb out are used.

### **2.6.1.3 LFP Emissions**

Another training operation primarily used for NEPA/General Conformity air impact studies under EIAP is a Low Flight Pattern (LFP), which is any aircraft maneuver below the mixing zone height and not associated with an LTO, TGO, or LFB. When calculating emissions in this manner, one must know both the number of LFPs per year and the average time of the LFP. Generally, for LFP emissions estimating, use only the intermediate power setting for the entire time of the LFP.

## 2.6.2 Auxiliary Power Unit Emissions

APU emissions are based on the APU model associated with each aircraft type, EFs, and the length of time the APU was operating during an LTO cycle. The EFs for APUs are presented in units of lb/hr, so the operating time for each APU must be known or approximated. Common aircraft/APU combinations and typical APU operating times are found in Table 2-6, Table 2-7, and Table 2-8. Criteria pollutant and GHG EFs for APUs can be found in Table 2-12.

APU emissions are calculated using a two-step approach that consists of the following:

- 1) Calculate pollutant emissions for each APU per LTO; and
- 2) Multiply the emissions per LTO by the total number of LTO cycles per year.

These steps are simplified by the following equation:

$$E(\text{Pol})_{\text{APU}} = L \times N \times \frac{OT}{60} \times EF(\text{Pol}) \times \frac{FERF(\text{Pol})}{100}$$

**Equation 2-2**

Where,

<b>E(Pol)<sub>APU</sub></b>	=	Annual pollutant emissions produced by the APU for the aircraft being evaluated (lb/yr)
<b>L</b>	=	Number of LTO cycles per year (cycle/yr)
<b>N</b>	=	Number of units (APUs) per airframe being evaluated
<b>OT</b>	=	Operating time per LTO cycle (min/cycle)
<b>60</b>	=	Factor to convert minutes to hours (min/hr)
<b>EF(Pol)</b>	=	APU-specific emission factor for each pollutant (lb/hr)
<b>FERF(Pol)</b>	=	Fuel emission reduction factor, if applicable (%). In cases where alternative fuel is not used, then a value of 100% must be used.
<b>100</b>	=	Factor to convert percent to a fraction (%)

Some of the data required to calculate emissions from APU operations may be found in the following tables:

- Typical airframe/APU combinations and operating times are provided for military fixed-wing, rotary, and commercial aircraft in Table 2-6, Table 2-7, and Table 2-8, respectively.
- Criteria and GHG EFs are provided in Table 2-12
- Speciated VOC and HAP EFs for select APUs are provided in Table 2-10

### 2.6.3 Trim Pad and On-Wing Testing

Emissions associated with trim pad and on-wing testing are based on the type of aircraft, engine model, testing times, the power settings and associated fuel flow rates, and engine-specific EFs. Estimating emissions from aircraft engine testing may be challenging since the data required for calculations may be difficult to obtain. Emissions are calculated by multiplying the fuel flow rate at the selected power setting by the amount of time the engine is operated at that power setting and applying pollutant specific EFs. After the emissions are calculated for a pollutant at each power setting, the values are summed to obtain the total annual emissions of that pollutant. Aircraft engine emissions from trim pad and on-wing testing may be calculated using a three-step approach that consists of the following:

- 1) Determine the engine operating mode based on the aircraft fuel flow rate at each test setting.
- 2) Calculating pollutant emissions using the appropriate EF and total time spent within each operating mode.
- 3) Summing emissions from each mode to obtain annual emissions for that engine.

These steps are simplified by the following equation:

$$E(\text{Pol})_{\text{Testing}} = \sum_{i=1}^n \left[ \frac{\text{TIM}_i}{60} \times \frac{\text{FFR}_i}{1000} \times \text{EF}(\text{Pol})_i \times \frac{\text{FERF}(\text{Pol})}{100} \right]$$

**Equation 2-3**

Where,

<b>E(Pol)<sub>Testing</sub></b>	= Annual pollutant emissions produced by the engine being evaluated (lb/yr)
<b>60</b>	= Factor to convert minutes to hours
<b>1000</b>	= Factor to convert lb fuel burned to 10 <sup>3</sup> lb fuel burned (lb/10 <sup>3</sup> lb)
<b>i</b>	= Mode identifier. 1 = Idle in/out, 2 = Takeoff, 3 = Afterburner Takeoff, 4 = Climb out, and 5 = Approach.
<b>TIM<sub>i</sub></b>	= Time spent in the fuel flow rate range specified for the entire year (min/yr)
<b>FFR<sub>i</sub></b>	= Fuel flow rate during operational mode (lb/hr)
<b>EF(Pol)<sub>i</sub></b>	= Pollutant emission factor for specified mode (lb/10 <sup>3</sup> lb fuel burned)
<b>FERF(Pol)</b>	= Fuel emission reduction factor, if applicable (%). In cases where alternative fuel is not used, then a value of 100% must be used.
<b>100</b>	= Factor to convert percent to a fraction (%)

**Note that the TIM<sub>i</sub> refers to the total time spent within the fuel flow rate range corresponding to an operating mode, and not the aircraft default TIMs as these apply to aircraft flight patterns.**

The fuel flow rate and engine specific EFs required to calculate emissions using Equation 2-3 may be found in Table 2-9 and Table 2-10. The appropriate EF is determined by the engine's fuel flow rate and, ideally, the fuel flow rates and operating times for each test profile are recorded by a data logger. Since the fuel flow rate will vary from each test and operating mode, the EFs developed for each mode on each aircraft engine are deemed suitable across a range of fuel flow rates. This means that while the following tables provide an EF for a specific engine at a precise fuel flow rate, that EF is valid for a range of fuel flow rates and should be used for emissions calculations. The tables in this guide only provide the specific fuel flow rates and corresponding EF at which the engine was tested. To find the range of fuel flow rates and appropriate EF, refer to the "Aircraft Engine Testing" section of the *Air Emissions Guide for Air Force Stationary Sources* since off-wing engine testing is more common and a stationary source of emissions (and therefore subject to more regulation).

The fuel flow rate ranges provided in the *Air Emissions Guide for Air Force Stationary Sources* for most power settings were determined by taking the midpoint of the fuel flow rates between power settings at which the engine was tested. The exception to this method is for the afterburner (AB) setting since the AB setting uses more fuel and combustion efficiency is drastically different from the other operating modes. For those engines equipped with AB, the engine is assumed to operate at 100% power when in the military setting, so any fuel flow rate greater than that of the military operating mode for which the engine was tested is assumed to be in AB and the appropriate AB EF should be selected. Refer to the tables in the *Air Emissions Guide for Air Force Stationary Sources* for additional information.

#### 2.6.4 Rotary Aircraft Emissions

Rotary aircraft (helicopter) flight operations emissions are estimated based on multiplying the emissions from a single representative flying phase cycle with the average number of annual flight operations. The annual flight operations emissions are calculated in a three-step approach that consists of the following:

1. Calculate pollutant emissions for each flight phase of the representative flight cycle,
2. Sum the emissions for each phase to obtain the flying phase cycle emission values, and
3. Multiply the flying phase cycle emission values by the number of annual Flight Cycles.

These steps are simplified by the following equation:

$$E(Pol) = \sum_{i=1}^n \left[ \frac{TIP_i}{60} \times \frac{FFR_i}{1000} \times EF(Pol)_i \right] \times N \times C$$

Equation 2-4

Where,

<b>E(Pol)</b>	=	Annual pollutant emissions from flight operations (ton/yr)
<b>TIP<sub>Phase</sub></b>	=	Time In Phase or time spent in “i” flight phase (min/cycle)
<b>i</b>	=	Phase identifier (1 = idle, 2 = taxi, 3 = takeoff, 4 = flight, and 5 = landing)
<b>60</b>	=	Factor for converting minutes into hours (min/hr)
<b>FFR<sub>Phase</sub></b>	=	Fuel flow rate per engine for the flight phase (lb fuel/hr)
<b>1000</b>	=	Factor for converting lb fuel to 1,000 lb fuel
<b>EF(Pol)<sub>Phase</sub></b>	=	Pollutant-specific emission factor for flight phase (lb/1,000 lb fuel)
<b>N</b>	=	Number of engines the aircraft has
<b>C</b>	=	Number of annual Flight Cycles (cycle/yr)

**Site-specific TIPs must always be used. Due to the complexity and highly technical nature of the methodology of deriving site-specific TIPs and the need for standardization across the Air Force, only AFCEC/CZTQ may derive site-specific TIPs.**

### 2.6.5 Calculating SO<sub>2</sub> Emissions

SO<sub>2</sub> emissions are created when sulfur in the fuel reacts and combines with oxygen during the combustion process. Fuels with higher sulfur content will produce higher amounts of SO<sub>2</sub> than low-sulfur fuels. It is generally assumed that during combustion, all sulfur in the fuel reacts to form SO<sub>2</sub> or sulfates. The sulfur content in commercial jet fuel is limited to 0.3 weight percent (wt. %); however, the sulfur content for most in-use fuel is significantly less than this limit. For air impact assessments under NEPA and General Conformity, the use of a national average sulfur content is appropriate for estimating sulfur emissions from aircraft operations. For JP-8 fuel, the weighted national average was calculated using data obtained from the Defense Logistics Agency (DLA), Defense Energy Support Center, *Petroleum Quality Information System Fuels Data* (1997-2013). **Using this national weighted average, a national EF was derived and should be used as the default value for all aircraft engines within the continental United States when estimating SO<sub>x</sub> emissions.** For enhanced accuracy, regional averages have also been calculated. The default national average and regional averages are provided in Table 2-2.

The sulfur content in fuel varies significantly by the region in which the fuel is obtained. For a more accurate accounting of SO<sub>x</sub> emissions from aircraft flight operations, a base-specific SO<sub>x</sub> EF may be estimated using the weight percent sulfur content of the fuel as provided by the fuel supplier. Assuming all the sulfur in the fuel is converted to SO<sub>2</sub> during the combustion process, a base-specific SO<sub>x</sub> EF may be calculated according to the following equation:

$$EF(SO_x) = S \times 20$$

**Equation 2-5**


Where,

**EF(SO<sub>x</sub>)** = SO<sub>x</sub> emission factor (lb SO<sub>2</sub>/10<sup>3</sup> lb fuel burned)

**S** = Weight percent sulfur content of the fuel

**20** = Conversion factor derived by converting the weight percent of sulfur to a weight fraction, converting this into units of lb/1,000 lb, and then multiplying by the ratio of the molecular weight of SO<sub>2</sub> to the molecular weight of sulfur

**Table 2-2. Average Sulfur Content of JP-8**

<b>Geographic Region</b>	<b>States or Countries</b>	<b>Weighted-Average Sulfur Content (Weight %)</b>	<b>Emission Factor (lb/10<sup>3</sup> lb fuel)</b>
<b>National Average</b>		<b>0.054</b>	<b>1.07</b>
1. East Coast U.S.	ME, VT, NH, MA, RI, CT, NY, PA, NJ, DE, MD, VA, WV, NC, SC, GA, FL	0.110	2.19
2. East Central U.S.	ND, SD, MN, IA, NE, WI, MI, OH, KY, TN, IN, IL, MO, KS, OK	0.067	1.35
3. Gulf Coast U.S.	AL, MS, AR, LA, TX, NM	0.053	1.05
4. West Central U.S.	MT, ID, WY, UT, CO	0.028	0.56
5. West Coast U.S.	WA, OR, CA, NV, AZ	0.053	1.07
Middle East	Kuwait, Bahrain, Pakistan, United Arab Emirates	0.069	1.39
European	Europe, Israel, Turkey	0.118	2.37
Pacific	Korea, Japan, HI, AK, Australia, Russia, Singapore	0.096	1.91
Caribbean	Coastal Aruba	0.045	0.89

Source: *Petroleum Quality Information System Fuels Data*. Defense Logistics Agency, Defense Energy Support Center, 1997-2013. Values were calculated using the weight percent sulfur for years 1997 – 2013. Emission factors were calculated using Equation 2-5, through note that the values may not be exactly 20 times the weighted average due to rounding.

## 2.6.6 Calculating HAP Emissions

Since the information contained within this document is for NEPA and General Conformity, the inclusion of HAP emissions is purely for informational purposes. Despite the limited information available, there are aircraft engine-specific and APU-specific HAP EFs provided in Table 2-10.

## 2.6.7 Lead (Pb) Emissions

Prolonged exposure to high levels of Pb may result in harmful health effects, especially in young children. Though Pb is a criteria pollutant, this document does not provide any Pb EFs for aircraft and APUs because of the transition to unleaded aviation fuel.

## 2.6.8 Greenhouse Gas (GHG) Emissions

Since GHG emissions are becoming increasingly more important, it is common to record the carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O) emissions produced when measuring emissions from mobile and stationary sources. It is also common practice to report GHG emissions in terms of equivalent CO<sub>2</sub> (CO<sub>2</sub>e). This document provides a total GHG composite EF consisting of CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O presented in CO<sub>2</sub>e for aircraft in Table 2-3 and Table 2-12 for select APUs. For more guidance on the calculation of GHG emissions, refer to the *USAF Guide to the Mandatory Greenhouse Gas Reporting Rule*.

**Table 2-3. GHG Emission Factors for Aircraft Engines**

Vehicle Type	Fuel Type	Emission Factors (lb/1000lb fuel)			
		Greenhouse Gas Species			
		CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e <sup>b</sup>
Aircraft	Jet Fuel <sup>a</sup>	0.1347	0.02628	3203.44	3214.64
	AVGAS	0.1323	0.02572	3053.40	3064.37

Notes for Table 2-3:

Emission Factors calculated and verified 05/2023

- JP-8 emission factors were used as representative Jet Fuel.
- Equivalent CO<sub>2</sub> (CO<sub>2</sub>e) emission factors are the total of the product of CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O and their respective Global Warming Potentials (GWP). GWP used are 1 for CO<sub>2</sub>, 25 for CH<sub>4</sub>, and 298 for N<sub>2</sub>O. JP-8 with a density of 6.71 lb/gal was used for unit conversion. AVGAS with a density of 6 lb/gal was used for unit conversion.



### 2.6.9 HAP Speciation

Though HAP emissions have been speciated for some engines, there is little data available for most aircraft engines likely found at USAF installations. If speciated HAP data for an engine is unavailable, it is recommended that a surrogate engine is used. If there is no suitable surrogate data available, speciated HAP emissions may be estimated using the total VOC emissions and mass fraction of the speciated HAP. The mass fractions for several HAPs are provided in Table 2-11 and those recommended by the EPA as stated in the document *Recommended Best Practice for Quantifying Speciated Organic Gas Emissions from Aircraft Equipped with Turbofan, Turbojet, and Turboprop Engines*. Emissions of a speciated HAP are calculated by first converting the total VOC emissions to Total Organic Gases (TOG) and multiplying this by the mass fraction of the speciated HAP of interest. This calculation is shown in the following equation:

$$E(\text{Pol}) = \frac{E(\text{VOC})}{0.99} \times \text{MF}(\text{Pol})$$

**Equation 2-6**

Where,

- E(Pol)** = Emissions of speciated HAP (lb/yr)
- E(VOC)** = Emissions of total VOC (lb/yr)
- 0.99** = Factor converting VOC to TOG
- MF(Pol)** = Mass fraction of the HAP of interest as provided in Table 2-11

### 2.6.10 International Civil Aviation Organization (ICAO) Emission Factors

The ICAO is a United Nations specialized agency that was created in 1944 with the goal of encouraging the safe and orderly development of international civil aviation. The organization develops and maintains safety standards, practices, and procedures for a safe and efficient air transport network that supports global, social, and economic priorities. As the need to develop aviation security policies and measures arose in the late 1960's, ICAO developed enhanced, uniform security measures, policies, and guidelines to address any acts of unlawful interference within the aviation system. All security initiatives placed by ICAO rely on the cooperation and commitment among member states.

To make advances in environmental stewardship, ICAO has developed additional standards, policies, and guidance material to specifically address aircraft noise and engine emissions. Most of ICAO's work within the environmental field is undertaken by the ICAO Committee on Aviation Environmental Protection (CAEP), including the collection of aircraft exhaust data from engine manufacturers for engines that have entered production. Many of these engines are used on military aircraft found at USAF bases and are often given a military designation to differentiate them from their civilian engine counterparts. Military-sponsored emissions tests have not been conducted on these engines and EFs have not been developed for them. The data

collected by CAEP may be utilized to assist in the calculation of aircraft engine emissions. This document includes EFs that have been developed from various studies as well as those provided by ICAO. This section of the document serves to briefly describe how the ICAO EFs were calculated so they may be used to calculate emissions from aircraft flight operations.

The aircraft exhaust data gathered by CAEP has been standardized per engine based on percent engine thrust. These values are used with the emission data sheets provided by ICAO to calculate aircraft engine emissions. ICAO emissions data sheets provide NO<sub>x</sub> and CO emission indices, but do not provide VOC or PM emission indices directly. ICAO provides hydrocarbon (HC) emission indices which are multiplied by a scaling factor of 1.15 to estimate VOCs. This scaling factor is provided by a combined FAA and EPA report titled *Recommended Best Practice for Quantifying Speciated Organic Gas Emissions from Aircraft Equipped with Turbofan, Turbojet, and Turboprop Engines (May 2009)*.

ICAO does not directly provide PM emissions, but describes three types of PM, and outlines a method to calculate each. The first type of PM consists mainly of black carbon and is designated as non-volatile (EI(PM)<sub>nv</sub>). The second type of PM is designated volatile sulfate (EI(PM)<sub>vol-FSC</sub>) and is dependent on the sulfur content of the fuel burned in the engine. The last type of PM is designated organic volatiles (EI(PM)<sub>vol-FuelOrganics</sub>) and results from the incomplete combustion of fuel. The sum of these three values is assumed to represent PM<sub>10</sub>, with PM<sub>2.5</sub> assumed to equal 90% of the PM<sub>10</sub> total.

When calculating the non-volatile portion of the PM emissions indices, the first step is to verify that a smoke number (SN), which acts as a surrogate or indicator of plume opacity, has been provided for each mode. If not, the *ICAO Airport Air Quality Manual* may be consulted to estimate those SNs that are missing. Next, calculate the carbon index, which is “a measure of the black carbon mass per standard volume of flow” (ICAO 2011). Depending on the value of the SN, two different equations are used to calculate Carbon Index. For those SNs less than or equal to 30, the first equation is used, while the second is used for those SNs greater than 30.

$$CI = 0.06949(SN)^{1.234} \quad SN \leq 30$$

$$CI = 0.0297(SN)^2 - 1.803(SN) + 31.94 \quad SN > 30$$

Where,

CI = Carbon Index (mg/m<sup>3</sup>)

SN = Smoke Number

The volumetric flow rate (Q<sub>Core</sub> or Q<sub>Mixed</sub>) is calculated according to the engine type reported on the ICAO data sheet, or in the database. For engines listed as turbofan (TF), Q<sub>Core</sub> is calculated using the first equation below. For those listed as mixed turbofan (MTF), Q<sub>Mixed</sub> may be calculated using the second equation. The Air-Fuel Ratio (AFR) used in calculations is usually

proprietary information, but ICAO has developed average AFR values that may be used, which are provided in the *ICAO Airport Air Quality Manual* (ICAO 2011).

$$Q_{Core} = 0.776(AFR) + 0.877 \quad \text{For Turbofan Engines}$$

$$Q_{Mixed} = 0.7769(AFR)(1 + BPR) + 0.877 \quad \text{For Mixed Turbofan Engines}$$

Where,

<b>Q<sub>Core</sub></b>	=	Volumetric flow rate for TF engine (m <sup>3</sup> /kg)
<b>Q<sub>Mixed</sub></b>	=	Volumetric flow rate for MTF engine (m <sup>3</sup> /kg)
<b>AFR</b>	=	Air-fuel ratio as given in ICAO
<b>BPR</b>	=	Bypass Ratio as provided on ICAO datasheet or in ICAO database

Finally, the emission index (EI) for non-volatile PM (EI(PM)<sub>nvoll</sub>) is calculated by multiplying the Carbon Index by the volumetric flow rate as shown below.

$$EI(PM)_{nvoll} = CI \times Q$$

Where,

<b>EI(PM)<sub>nvoll</sub></b>	=	Emission Index for non-volatile PM (mg/kg)
<b>Q</b>	=	Volumetric flow rate; either Q <sub>Core</sub> or Q <sub>Mixed</sub>

The volatile PM sulfate portion of the PM emission index (EI(PM)<sub>vol-FSC</sub>) is a function of the fuel sulfur content and the fuel sulfur conversion efficiency. If the sulfur content is unknown, the national average weight percent as given in Table 2-2 may be used in the calculations. Similarly, if the fuel sulfur conversion efficiency is unknown, ICAO recommends that a median value of 2.4 wt.% be used. The following equation is used to determine EI(PM)<sub>vol-FSC</sub>.

$$EI(PM)_{vol-FSC} = (10)^6 \times \left[ \frac{(FSC/100) \times (\epsilon/100) \times 96}{32} \right]$$

Where,

<b>EI(PM)<sub>vol-FSC</sub></b>	=	Emission index for volatile sulfate PM (mg/kg)
<b>FSC</b>	=	Fuel sulfur content. <b>Use Table 2-2 if unknown (%)</b>
<b>(10)<sup>6</sup></b>	=	Factor for converting units to mg/kg
<b>100</b>	=	Factor converting percent to a fraction (%)
<b>ε</b>	=	Fuel sulfur conversion efficiency. <b>Use 2.4 if unknown (%)</b>
<b>96</b>	=	Molecular weight of sulfate (g/mol)
<b>32</b>	=	Molecular weight of sulfur (g/mol)

Finally, the organic volatiles (EI(PM)<sub>vol-FuelOrganics</sub>) portion of the PM EI is calculated by taking the product of the HC EI and the ratio of EI(PM)<sub>vol-FuelOrganics</sub> to the HC EI of a reference engine. ICAO uses the CFM56-2-C1 as the reference engine for this ratio. The calculation of EI(PM)<sub>vol-FuelOrganics</sub> is shown in the following equation:

$$EI(\text{PM})_{\text{vol-FuelOrganics}} = \delta \times EI_{\text{HC}}$$

Where,

$EI(\text{PM})_{\text{vol-FuelOrganics}}$	=	Emission index for PM from fuel organics (mg/kg)
$\delta$	=	Ratio of $EI_{\text{PMvol-FuelOrganics}}$ to $EI_{\text{HC}}$ for the CFM56-2-C1 engine
$EI_{\text{HC}}$	=	Hydrocarbon emission index of the engine

After  $EI(\text{PM})_{\text{nvool}}$ ,  $EI(\text{PM})_{\text{vol-FSC}}$ , and  $EI(\text{PM})_{\text{vol-FuelOrganics}}$  are calculated, the emission index for  $\text{PM}_{10}$  is estimated by summing these values and converting into the correct units as shown:

$$EI(\text{PM}_{10}) = \frac{[EI(\text{PM})_{\text{nvool}} + EI(\text{PM})_{\text{vol-FSC}} + EI(\text{PM})_{\text{vol-FuelOrganics}}]}{1000}$$

Where,

$EI(\text{PM}_{10})$	=	Emission index for $\text{PM}_{10}$ (g/kg)
$EI(\text{PM})_{\text{nvool}}$	=	Emission index for non-volatile PM (mg/kg)
$EI(\text{PM})_{\text{vol-FSC}}$	=	Emission index for volatile sulfate PM (mg/kg)
$EI(\text{PM})_{\text{vol-FuelOrganics}}$	=	Emission index for volatile fuel organic PM (mg/kg)
<b>1000</b>	=	Factor to convert units from mg to g (mg/g)

$\text{PM}_{2.5}$  may then be determined from  $\text{PM}_{10}$  by assuming  $\text{PM}_{2.5}$  is equal to 90% of the  $\text{PM}_{10}$  value.

$$EI(\text{PM}_{2.5}) = EI(\text{PM}_{10}) \times 0.90$$

Where,

$EI(\text{PM}_{2.5})$	=	Emission index for $\text{PM}_{2.5}$ (g/kg)
$EI(\text{PM}_{10})$	=	Emission index for $\text{PM}_{10}$ (g/kg)
<b>0.90</b>	=	Fraction of total $\text{PM}_{2.5}$ to $\text{PM}_{10}$

EFs have been calculated using ICAO data for engines that are most likely to be found at USAF installations. These have been added to EFs that have already been developed from government-subsidized studies. For any engine without a listed EF, if ICAO emissions data is available, the EFs may be calculated as described in this section as needed.

## 2.7 Information Resources

The Flightline Operations Group and aircraft pilots should be contacted to obtain the information required to calculate emissions from aircraft flying operations (i.e., the number of LTOs, TGOs, LFBs, TIM, etc.). The Aircraft Maintenance Squadron (AMX) should be contacted to obtain the information needed to calculate emissions from on-wing engine testing operations. This includes the types of engines tested, the number of tests conducted during the year on each engine type, the average time spent at each power setting during a typical test, and the associated fuel flow rate at each power setting. Additionally, the base's Weather Department should be contacted to

obtain the average mixing zone height for the base.

## 2.8 Example Calculations

The following section provides example calculations for aircraft operations.

### 2.8.1 Problem 1 – Landing and Takeoff Cycle Emissions

For planning purposes, a USAF installation needs to calculate the annual CO emissions from LTO operations associated with their F-15D aircraft. The following information was obtained from the base:

Aircraft Model: F-15D  
 Engine Model: F100-PW-220  
 Number of Engines: 2  
 Number of Annual LTOs: 2,500

Given this is only for planning purposes, the TIM data from Table 2-5 and the mode-specific fuel flow rates and EFs from Table 2-9 for the F100-PW-220 engine are presented in the following table:

LTO Mode	Average TIM (min.)	Typical Power Setting	Average Fuel Flow Rate (lb/hr)	CO Emission Factor (lb/1000 lb <sub>fuel</sub> )
Taxi/Idle-out	18.50	Idle	2,084	35.32
Takeoff	0.40*	Military	9,679	0.86
		Afterburner	41,682	11.87
Climb out	0.80	Intermediate	5,770	0.86
Approach	3.50	Approach	3,837	1.92
Taxi/Idle-in	11.30	Idle	2,084	35.32

\* Since this engine has afterburner capability, it is assumed that the duration of the Takeoff mode is 50% Afterburner and 50% Military.

The annual CO emissions from F-15D LTO cycles are calculated using Equation 2-1 as shown:

$$E(Pol)_{Aircraft} = \sum_{i=1}^n \left[ \frac{TIM_i}{60} \times \frac{FFR_i}{1,000} \times EF(Pol)_i \times \frac{FERF(Pol)}{100} \right] \times N$$

**Step 1** – Calculate CO pollutant emissions for each engine in each mode in the LTO cycle.

$$E(Pol)_{mode} = \frac{TIM_i}{60} \times \frac{FFR_i}{1,000} \times EF(Pol)_i \times \frac{FERF(Pol)}{100}$$

$$E(CO)_{Idle-Out} = \frac{18.50 \frac{min}{cycle}}{60} \times \frac{2084 \frac{lb}{hr}}{1,000 \frac{lb}{10^3 lb}} \times 35.32 \frac{lb}{10^3 lb fuel} = 22.7 \frac{lb}{cycle}$$

$$E(CO)_{Approach} = \frac{3.50 \frac{min}{cycle}}{60} \times \frac{3837 \frac{lb}{hr}}{1,000 \frac{lb}{10^3 lb}} \times 1.92 \frac{lb}{10^3 lb fuel} = 0.43 \frac{lb}{cycle}$$

$$E(CO)_{Takeoff(Mil)} = \frac{0.20 \frac{min}{cycle}}{60} \times \frac{9679 \frac{lb}{hr}}{1,000 \frac{lb}{10^3 lb}} \times 0.86 \frac{lb}{10^3 lb fuel} = 0.03 \frac{lb}{cycle}$$

$$E(CO)_{Takeoff(AB)} = \frac{0.20 \frac{min}{cycle}}{60} \times \frac{41682 \frac{lb}{hr}}{1,000 \frac{lb}{10^3 lb}} \times 11.87 \frac{lb}{10^3 lb fuel} = 1.65 \frac{lb}{cycle}$$

$$E(CO)_{Climb out} = \frac{0.80 \frac{min}{cycle}}{60} \times \frac{5770 \frac{lb}{hr}}{1,000 \frac{lb}{10^3 lb}} \times 0.86 \frac{lb}{10^3 lb fuel} = 0.07 \frac{lb}{cycle}$$

$$E(CO)_{Idle-in} = \frac{11.30 \frac{min}{cycle}}{60} \times \frac{2084 \frac{lb}{hr}}{1,000 \frac{lb}{10^3 lb}} \times 35.32 \frac{lb}{10^3 lb fuel} = 13.86 \frac{lb}{cycle}$$

**Step 2** – Calculate the total CO emissions for a single F-15D LTO.

$$E(Pol)_{LTO} = \sum_{i=1}^n [E(Pol)_{Mode_i} + \dots + E(Pol)_{Mode_n}] \times 2$$

$$E(CO)_{LTO} = (22.7 + 0.43 + 0.03 + 1.65 + 0.07 + 13.86) \frac{lb}{cycle} \times 2 = 77.48 \frac{lb}{cycle}$$

**Step 3** – Determine the total CO emissions from annual F-15D operations.

$$E(CO)_{Aircraft} = 77.48 \frac{lb}{cycle} \times 2500 \frac{cycle}{yr}$$

$$\boxed{E(CO)_{Total} = 193,700 \frac{lb}{yr}}$$

### 2.8.2 Problem 2 – Auxiliary Power Unit Emissions

For planning purposes, a USAF installation also needs to calculate the annual NO<sub>x</sub> emissions associated with the operation of the APUs on their aircraft. The following information was obtained:

APU Model	GTCP165-1
# APU per aircraft	1
Power Setting	Constant
Operating Time per LTO	15 minutes
Total LTO per year	1300

The annual NO<sub>x</sub> emissions from APU use is calculated using Equation 2-2 as shown:

$$E(Pol)_{APU} = L \times N \times \frac{OT}{60} \times EF(Pol) \times \frac{FERF}{100}$$

**Step 1 – Calculate the NO<sub>x</sub> emissions for a single LTO cycle.** Note that Table 2-12 lists the NO<sub>x</sub> EF for the GTCP165-1 as **1.22lb/hr**.

$$E(NO_X)_{LTO} = \frac{15(\frac{min}{cycle})}{60(\frac{min}{hr})} \times 1.22 \left(\frac{lb}{hr}\right) = 0.305 \frac{lb}{cycle}$$

**Step 2 – Calculate the NO<sub>x</sub> pollutant emissions from annual APU operations.**

$$E(Pol)_{APU} = L \times N \times E(Pol)_{LTO}$$

$$E(NO_X)_{APU} = 1300 \left(\frac{cycle}{yr}\right) \times 1 \times 0.305 \left(\frac{lb}{cycle}\right)$$

$$E(NO_X)_{APU} = 396.5 \frac{lb}{yr}$$

### 2.8.3 Problem 3 – On-Wing Engine Testing

A USAF installation performs on-wing evaluations of the F110-GE-100 engines used on their F-16D aircraft. The base must calculate CO and SO<sub>x</sub> emissions from on-wing testing operations. The base and the fuel supplier are in Louisiana, and the base wants the SO<sub>x</sub> emissions specific for Louisiana sulfur content. Approximately 30 on-wing engine tests following similar procedures were conducted during the year. For these similar on-wing tests, the procedure, average fuel flow rate (FFR), and average operating times are summarized as follows:

Procedure	Avg FFR (lb/hr)	Avg Operating Time (min)
Stabilize at Idle	809.33	5
Accelerate and Hold	4,147.78	5
Stabilize at Idle	981.21	1

Accelerate and Hold	8,170.88	5
Decelerate and Hold	1,232.67	5
Accelerate and Hold	12,223.02	2
Decelerate and Hold	1,187.40	2
Accelerate and Hold	17,959.14	0.25
Decelerate and Hold	2,201.55	2
Stabilize at Idle	1,205.45	5
Shut down engine	---	---

**Step 1 – Determine the engine power mode for each test setting.** The operating mode encompasses a range of fuel flow rates. Select the operating mode by finding where the average fuel flow rate in the table above falls within the fuel flow rate range for the operating mode. Typically, this is simply by finding the numerically closest fuel flow rate in Table 2-9 to the average rates recorded in the table above, however, refer to the appropriate tables for the latest version of the *Air Emissions Guide for Air Force Stationary Sources* for assistance as needed. The operating modes are as follows:

Procedure	Avg FFR (lb/hr)	Avg Operating Time (min)	Engine Power Mode
Stabilize at Idle	809.33	5	Idle
Accelerate and Hold	4,147.78	5	Approach
Stabilize at Idle	981.21	1	Idle
Accelerate and Hold	8,170.88	5	Intermediate
Decelerate and Hold	1,232.67	5	Idle
Accelerate and Hold	12,223.02	2	Military
Decelerate and Hold	1,187.40	2	Idle
Accelerate and Hold	17,959.14	0.25	Afterburner
Decelerate and Hold	2,201.55	2	Idle
Stabilize at Idle	1,205.45	5	Idle

**Step 2 – Calculate CO and SO<sub>x</sub> emissions for each operating mode.** In this example, calculating the emissions while operating in the “idle” modes is the most complicated since the engine is tested in that mode at several points and at different fuel flow rates. Note also that this example states that the base conducted 30 “similar” tests, and without calculating emissions using data from each test, the following method is an approximation. It is up to the base to determine the level of precision required when estimating emissions from on-wing engine testing. The emission factors for CO and SO<sub>x</sub> for fuel flow rates corresponding to a flight mode are provided in Table 2-9.



$$E(Pol)_{mode} = \sum_{i=1}^n \left[ \frac{TIM_i}{60} \times \frac{FFR_i}{1000} \times EF(Pol)_i \times \frac{FERF(Pol)}{100} \right]$$

$$E(CO)_{Idle} = \left[ \left( \frac{5 \text{ min/test}}{60 \text{ min/hr}} \times \frac{809.33 \text{ lb/hr}}{1000 \text{ lb}/10^3 \text{ lb}} \right) + \left( \frac{1 \text{ min/test}}{60 \text{ min/hr}} \times \frac{981.21 \text{ lb/hr}}{1000 \text{ lb}/10^3 \text{ lb}} \right) + \left( \frac{5 \text{ min/test}}{60 \text{ min/hr}} \times \frac{1232.67 \text{ lb/hr}}{1000 \text{ lb}/10^3 \text{ lb}} \right) + \left( \frac{2 \text{ min/test}}{60 \text{ min/hr}} \times \frac{1187.40 \text{ lb/hr}}{1000 \text{ lb}/10^3 \text{ lb}} \right) + \left( \frac{2 \text{ min/test}}{60 \text{ min/hr}} \times \frac{2201.55 \text{ lb/hr}}{1000 \text{ lb}/10^3 \text{ lb}} \right) + \left( \frac{5 \text{ min/test}}{60 \text{ min/hr}} \times \frac{1205.45 \text{ lb/hr}}{1000 \text{ lb}/10^3 \text{ lb}} \right) \right] \times 24.11 \frac{\text{lb}}{10^3 \text{ lb fuel}} \times 30 \frac{\text{tests}}{\text{yr}} = \mathbf{289.28} \frac{\text{lb}}{\text{yr}}$$

$$E(SO_x)_{Idle} = \left[ \left( \frac{5 \text{ min/test}}{60 \text{ min/hr}} \times \frac{809.33 \text{ lb/hr}}{1000 \text{ lb}/10^3 \text{ lb}} \right) + \left( \frac{1 \text{ min/test}}{60 \text{ min/hr}} \times \frac{981.21 \text{ lb/hr}}{1000 \text{ lb}/10^3 \text{ lb}} \right) + \left( \frac{5 \text{ min/test}}{60 \text{ min/hr}} \times \frac{1232.67 \text{ lb/hr}}{1000 \text{ lb}/10^3 \text{ lb}} \right) + \left( \frac{2 \text{ min/test}}{60 \text{ min/hr}} \times \frac{1187.40 \text{ lb/hr}}{1000 \text{ lb}/10^3 \text{ lb}} \right) + \left( \frac{2 \text{ min/test}}{60 \text{ min/hr}} \times \frac{2201.55 \text{ lb/hr}}{1000 \text{ lb}/10^3 \text{ lb}} \right) + \left( \frac{5 \text{ min/test}}{60 \text{ min/hr}} \times \frac{1205.45 \text{ lb/hr}}{1000 \text{ lb}/10^3 \text{ lb}} \right) \right] \times 1.07 \frac{\text{lb}}{10^3 \text{ lb fuel}} \times 30 \frac{\text{tests}}{\text{yr}} = \mathbf{12.84} \frac{\text{lb}}{\text{yr}}$$

CO and SO<sub>x</sub> emissions for other modes are similarly calculated and is summarized as follows:

Mode	CO Emissions (min lb fuel lb/hr 10 <sup>3</sup> lb fuel yr)	SO <sub>x</sub> Emissions (min lb fuel lb/hr 10 <sup>3</sup> lb fuel yr)
Idle	289.28	12.84
Approach	59.83	11.10
Intermediate	70.88	21.86
Military	41.31	13.08
Afterburner	151.33	2.40

### Step 3 – Determine the total CO and SO<sub>x</sub> emissions.

$$E(Pol)_{Aircraft} = \sum_{i=1}^n E(POL)_{Mode}$$

$$E(CO)_{Aircraft} = (289.28 + 59.83 + 70.88 + 41.31 + 151.33) \left( \frac{\text{lb}}{\text{yr}} \right)$$

$$\boxed{E(CO)_{Aircraft} = \mathbf{612.63} \frac{\text{lb}}{\text{yr}}}$$

$$E(SO_x)_{Aircraft} = (12.84 + 11.10 + 21.86 + 13.08 + 2.40) \left( \frac{\text{lb}}{\text{yr}} \right)$$

$$E(SO_x)_{Aircraft} = 61.27 \frac{lb}{yr}$$

Note that the *Air Emissions Guide for Air Force Stationary Sources* provides an example of how to estimate emissions for jet engine testing. The two examples show a slightly different but virtually identical method for estimating emissions from both processes.

### 2.8.4 Problem 4 – Flight Cycle Emissions

For planning purposes, an AFB is receiving ten new Sikorsky Black Hawks (UH-60) that will perform 1,000 flight cycles annually. The UH-60 is equipped with two T700-GE-700 Engines. Given the time spent in each phase given below, determine the total annual NO<sub>x</sub> emissions from this action.

Idle TIP (TIP<sub>Idle</sub>) = 5.5 min

Site-specific taxi time (TIP<sub>Taxi</sub>) = 7.6 min

Takeoff TIP (TIP<sub>Takeoff</sub>) = Landing TIP (TIP<sub>Landing</sub>) = 0.68 min

Flight TIP (TIP<sub>Flight</sub>) = 7.45 min

**Step 1 – Determine the FFR and NO<sub>x</sub> EF for each flight phase.** This data is provided in Table 2-7 and provided in the table below:

Flight Phase	Fuel Flow (lb/hr)	Emission Factor (lb/1,000 lb fuel)						
		NO <sub>x</sub>	SO <sub>x</sub>	CO	VOC	HAPs	PM <sub>10</sub>	PM <sub>2.5</sub>
Idle	134	3.36	1.07	46.24	0.50	0.33	1.48	1.33
Taxi	469	10.95	1.07	5.12	0.02	0.01	1.26	1.13
Takeoff or Landing	626	11.87	1.07	3.51	0.01	0.00	2.22	2.00
Flight	725	11.43	1.07	2.81	0.01	0.01	2.61	2.33

**Step 2 – Calculate the total NO<sub>x</sub> emissions.** Using Equation 2-4 and the data provided above, the total NO<sub>x</sub> emissions are calculated as follows:

$$E(Pol) = \sum_{i=1}^n \left[ \frac{TIP_i}{60} \times \frac{FFR_i}{1000} \times EF(Pol)_i \right] \times N \times C$$

$$E(NO_x) = \sum \left[ \left( \frac{5.5 \text{ min}}{60 \text{ min/hr}} \times \frac{134 \text{ lb/hr}}{1000 \text{ lb}/10^3 \text{ lb}} \times 3.36 \frac{\text{lb}}{10^3 \text{ lb}} \right) + \left( \frac{7.6 \text{ min}}{60 \text{ min/hr}} \times \frac{469 \text{ lb/hr}}{1000 \text{ lb}/10^3 \text{ lb}} \times 10.95 \frac{\text{lb}}{10^3 \text{ lb}} \right) + \left( \frac{0.68 \text{ min}}{60 \text{ min/hr}} \times \frac{626 \text{ lb/hr}}{1000 \text{ lb}/10^3 \text{ lb}} \times 11.87 \frac{\text{lb}}{10^3 \text{ lb}} \right) + \left( \frac{0.68 \text{ min}}{60 \text{ min/hr}} \times \frac{626 \text{ lb/hr}}{1000 \text{ lb}/10^3 \text{ lb}} \times 11.87 \frac{\text{lb}}{10^3 \text{ lb}} \right) + \left( \frac{7.45 \text{ min}}{60 \text{ min/hr}} \times \frac{725 \text{ lb/hr}}{1000 \text{ lb}/10^3 \text{ lb}} \times 11.43 \frac{\text{lb}}{10^3 \text{ lb}} \right) \right] \times 2 \times \frac{1000}{yr}$$

$$E(NO_x) = \sum[(0.04 \text{ lb}) + (0.65 \text{ lb}) + (0.08 \text{ lb}) + (0.08 \text{ lb}) + (1.03 \text{ lb})] \times 2 \times \frac{1000}{\text{yr}}$$

$$E(NO_x) = 3,760 \frac{\text{lb}}{\text{yr}}$$

**Table 2-4. Comparison of Commercial and Military LTO Cycle Modes**

Engine Type	Commercial LTO Cycle Modes	Military LTO Cycle Modes	Typical Engine Power Setting(%)
Turbofan	Taxi/Idle-out	Idle	7
	Takeoff	Military or Afterburner (AB)	100 or 110-150 <sup>a</sup>
	Climb out	Intermediate	70-85 <sup>a</sup>
	Approach	Approach	30
	Taxi/Idle-in	Idle	7
Turboprop	Taxi/Idle-out	Idle	7
	Takeoff	Military	90
	Climb out	Intermediate	70-85 <sup>a</sup>
	Approach	Approach	30
	Taxi/Idle-in	Idle	7

SOURCE (unless otherwise noted): *Airport Air Quality Manual*, International Civil Aviation Organization, 2011.

- a. Power setting percentage from *Air Emissions Factor Guide to Air Force Mobile Sources*, 2009 which cites Emissions and Dispersion Modeling System (EDMS) as the original source. For military aircraft equipped with afterburner (AB), it should be generally assumed that the duration of Takeoff mode is 50% AB and 50% military.

**Table 2-5. Default Time-in-Mode for Various Aircraft Categories**

Aircraft Type	Typical Duration by Mode (Minutes)				
	Taxi-in/Taxi-out	Takeoff <sup>a</sup>	Climb out	Approach	Total
<b>Military Aircraft</b>					
<b>Combat:</b>					
USAF	29.80	0.40	0.80	3.50	34.50
USAF F-35 <sup>b</sup>	29.80	1.065 (Military) 0.013 (AB)	0.012	2.501	33.391
USN	13.00	0.40	0.50	1.60	15.50
<b>Trainer - Turbine: <sup>c</sup></b>					
USAF T-7	9.74	0.43 (Military) 0.37 (AB)	0.95	1.67	13.16
USAF T-38	19.20	0.40	0.90	3.80	24.30
USAF General	11.20	0.50	1.40	4.00	17.10
USN	13.00	0.40	0.50	1.60	15.50
<b>Transport - Turbine: <sup>c</sup></b>					
USAF general	15.90	0.40	1.20	5.10	22.60
USN	26.00	0.50	2.50	4.50	33.50
USAF B-52 and KC-135	47.70	0.70	1.60	5.20	55.20
<b>Military - Piston</b>	13.00	0.60	5.00	4.60	23.20
<b>Civilian Aircraft</b>					
<b>Commercial Carrier:</b>					
Jumbo, Long and Medium range jet	26.00	0.70	2.20	4.00	32.90
<b>General Aviation:</b>					
Business Jet	13.00	0.40	0.50	1.60	15.50
Turboprop	26.00	0.50	2.50	4.50	33.50
Piston	16.00	0.30	5.00	6.00	27.30

SOURCE (unless otherwise noted): *Procedures for Emission Inventory Preparation Volume IV: Mobile Sources*, EPA420-R-92-009, December 1992. USAF – United States Air Force. USN – United States Navy

- For military aircraft equipped with afterburner (AB), it should be generally assumed that the duration of Takeoff mode is 50% AB and 50% military.
- SOURCE: *F-35A/B/C Flight Profiles (Karnes 3.2) for US Air Force, US Navy, and US Marine Corps Airfield Noise and Air Studies*, June 2015. Note that the duration of “Takeoff” mode is the total of the TIM in military and AB for each takeoff.
- Turbines include both turbofan and turboprop engines.
- SOURCE: *Air Emissions Factor Guide to Air Force Mobile Sources*, December 2009. This document cites Emissions and Dispersion Modeling System (EDMS) as the original source.

**Table 2-6. Military Airframe/Engine/APU Combinations**

Aircraft Model(s)	Time-In-Mode Category <sup>a</sup>	Engine Model(s) (Number of Engines)	APU Model(s) (Number of APUs)	APU Hours of Operation Per LTO <sup>b</sup>	Notes:
A-3A	Combat: USN	J57-P-6B (2)	---	---	c, h(1)
A-3B	Combat: USN	J57-P-10 (2)	---	---	h(1)
A-4	Combat: USN	J52-P-2 (1)	---	---	c, h(4)
		J52-P-8 (1)	---	---	c, h(4)
		J65-W-2 (1)	---	---	c, h(4)
		J65-W-4 (1)	---	---	c, h(4)
A-4C	Combat: USN	J65-W-16A (1)	---	---	c, h(1)
		J65-W-20 (1)	---	---	h(3)
A-4E	Combat: USN	J52-P-6A (1)	---	---	c, h(1)
		J52-P-8A, -8B (1)	---	---	c, h(1)
A-4F	Combat: USN	J52-P-8A, -8B (1)	---	---	c, h(1)
A-4L	Combat: USN	J65-W-20 (1)	---	---	h(1)
A-4M	Combat: USN	J52-P-408 (1)	---	---	h(1)
A-6A	Combat: USN	J52-P-6A, -6B (2)	---	---	c, h(1), h(3)
		J52-P-8A, -8B (2)	---	---	c, h(1)
A-6B	Combat: USN	J52-P-6A (2)	---	---	c, h(1)
		J52-P-8A (2)	---	---	c, h(1)
A-6C	Combat: USN	J52-P-8A (2)	---	---	c, h(1)
A-6E	Combat: USN	J52-P-8A, -8B (2)	---	---	c, h(1)
A-6F	Combat: USN	F404-GE-400D (2)	---	---	c, h(1)
A-7A	Combat: USN	TF30-P-6B (1)	---	---	h(3)
A-7B, -7C	Combat: USN	TF30-P-8 (1)	---	---	c, h(1)
		TF30-P-408 (1)	---	---	c, h(1)
A-7D, -7K	Combat: USAF	TF41-A-1 (1)	---	---	h(1), h(5)
A-7E	Combat: USN	TF41-A-2 (1)	---	---	h(1)
A-10	Combat: USAF	TF34-GE-100A (2)	---	---	h(2)
		TF34-GE-400 (2)	---	---	h(3)
A-10A	Combat: USAF	TF34-GE-100 (2)	GTCP 36-50 (1)	1.00	b, c, h(1)
A-10C	Combat: USAF	TF34-GE-100 (2)	---	---	h(6)
A-29	Combat: USAF	PT6A-68C (1)	---	---	h(17)
A-37	Combat: USAF	J69-T-25 (2)	---	---	h(3)
A-37A, -37B	Combat: USAF	J85-GE-17A (2)	---	---	h(4)
AC-130A	Transport - Turbine: USAF general	T56-A-1A (4)	---	---	h(1)
		T56-A-9 (4)	---	---	h(1)
AC-130H	Transport - Turbine: USAF general	T56-A-15 (4)	GTCP 85-180L (1)	1.00	c, e, h(1), i(1)
AC-130J	Transport - Turbine: USAF general	AE2100D3 (4)	---	---	c, h(6)
AC-130U, -130W	Transport - Turbine: USAF general	T56-A-15 (4)	---	---	h(1), h(6)
AT-6B	Trainer - Turbine: USAF General	PT6A-68D (1)	---	---	h(14)
AT-38B	Trainer - Turbine: USAF T-38	J85-GE-5, -5A, -5G, -5J (2)	---	---	c, h(1)
AU-24	Combat: USAF	PT6A-27 (1)	---	---	h(3)
AV-8B	Combat: USN	F402-RR-406 (1)	---	---	h(7)
		F402-RR-408A (1)	---	---	h(7)
BAMS-D	Combat: USN	AE3700N (1)	---	---	c, h(7)
B-1A	Combat: USAF	F101-GE-100 (4)	---	---	h(5)
B-1B	Combat: USAF	F101-GE-102 (4)	GTCP 165-9 (1)	2.00	b, c, h(1)
B-2A	Combat: USAF	F118-GE-100 (4)	131-3A (2)	4.00	b, c, h(1)

**Table 2-6. Military Airframe/Engine/APU Combinations (cont.)**

Aircraft Model(s)	Time-In-Mode Category <sup>a</sup>	Engine Model(s) (Number of Engines)	APU Model(s) (Number of APUs)	APU Hours of Operation Per LTO <sup>b</sup>	Notes:
B-52D	Transport - Turbine: USAF B-52	J57-P-19W (8)	---	---	h(5)
		J57-P/F-43WB (8)	---	---	h(5)
B-52G	Transport - Turbine: USAF B-52	J57-P-22 (8)	---	---	h(3)
B-52H	Transport - Turbine: USAF B-52	TF33-P-3 (8)	---	---	h(3)
		TF33-P-5 (8)	---	---	h(3)
		TF33-P-7 (8)	---	---	h(3)
		TF33-P-103 (8)	---	---	h(6)
C-1	General Aviation: Piston	R-1820-82 (2)	---	---	h(3)
C-1A	General Aviation: Piston	R-1820-82, -82A (2)	---	---	c, h(1)
C-2	Transport - Turbine: USN	T56-A-7 (2)	---	---	h(3)
C-2A	Transport - Turbine: USN	T56-A-8, -8A, -8B (2)	---	---	c, h(1)
		T56-A-425 (2)	---	---	c, h(7)
C-5A	Transport - Turbine: USAF general	TF39-GE-1, -1A, -1C (4)	GTCP 85-98d (1)	8.00	c, e, h(1), h(3), h(9), i(1)
C-5B, -5C	Transport - Turbine: USAF general	TF39-GE-1C (4)	GTCP 85-98d (1)	8.00	e, h(1), i(1)
C-5M	Transport - Turbine: USAF general	CF6-80C2L1F (4)	---	---	c, h(1)
		F138-GE-100 (4)	---	---	c, h(1), l(2)
C-9	Transport - Turbine: USAF general	JT8D-17 (2)	---	---	g, h(3)
C-9A	Transport - Turbine: USAF general	JT8D-9A (2)	GTCP 85-98d (1)	6.00	h(1), i(1)
C-9B	Transport - Turbine: USN	JT8D-9A (2)	---	---	c, h(1)
C-9C	Transport - Turbine: USAF general	JT8D-9A (2)	---	---	c, h(1)
C-11A	General Aviation: Business Jet	F113-RR-100 (2)	---	---	h(1), k, l(1)
		SPEY Mk511-8 (2)	---	---	c, h(1)
C-12	General Aviation: Turboprop	PT6A-27 (2)	---	---	h(3)
C-12A	General Aviation: Turboprop	PT6A-38 (2)	---	---	h(1)
		PT6A-41 (2)	---	---	h(3)
C-12C, -12D, -12L	General Aviation: Turboprop	PT6A-41 (2)	---	---	h(1)
C-12F, -12R, -12T, -12U	General Aviation: Turboprop	PT6A-42 (2)	---	---	h(1), h(6)
C-12J	General Aviation: Turboprop	PT6A-65B (2)	---	---	c, h(6)
C-12S	General Aviation: Turboprop	PT6A-60A (2)	---	---	h(1)
C-17A	Transport - Turbine: USAF general	F117-PW-100 (4)	331 250G (1)	0.50	b, h(1)
		PW2040 (4)	331 250G (1)	0.50	b, h(1), l(2)
C-18B	Transport - Turbine: USAF general	JT3D-7 (4)	T41M-9A (1)	0.50	b, c, h(1)
C-20A	General Aviation: Business Jet	F113-RR-100 (2)	GTCP 36-100 (1)	0.50	b, h(1), i(1)
		SPEY Mk511-8 (2)	GTCP 36-100 (1)	0.50	b, c, h(1)
C-20B, -20C, -20D, -20E, -20J	General Aviation: Business Jet	F113-RR-100 (2)	---	---	h(1), k, l(1)
		SPEY Mk511-8 (2)	---	---	c, h(1)
C-20F, -20G, -20H	General Aviation: Business Jet	TAY Mk611-8 (2)	---	---	h(1)
C-21A	General Aviation: Business Jet	TFE731-2-2B (2)	---	---	h(1)
C-22A	Transport - Turbine: USAF general	JT8D-7A (3)	GTCP 85-98ck (1)	1.00	c, h(1), i(1)
C-22B	Transport - Turbine: USAF general	JT8D-7 (3)	GTCP 85-98ck (1)	1.00	h(1), i(1)
C-23A	General Aviation: Turboprop	PT6A-45R (2)	---	---	c, h(1)
C-23B, -23C	General Aviation: Turboprop	PT6A-65AR (2)	---	---	c, h(1)
C-26A	General Aviation: Turboprop	TPE331-11U (2)	---	---	c, h(1)
C-26B, -26D	General Aviation: Turboprop	TPE331-12UA-701G (2)	---	---	c, h(1)
C-27J	Transport - Turbine: USAF general	AE2100D2 (2)	---	---	c, h(6)
C-28A	General Aviation: Piston	GTSIO-520-M (2)	---	---	h(1)

Table 2-6. Military Airframe/Engine/APU Combinations (cont.)

Aircraft Model(s)	Time-In-Mode Category <sup>a</sup>	Engine Model(s) (Number of Engines)	APU Model(s) (Number of APUs)	APU Hours of Operation Per LTO <sup>b</sup>	Notes:
C-32A	Transport - Turbine: USAF general	F117-PW-100 (2)	331-49-7081 (1)	3.00	b, h(1), k
		PW2040 (2)	331-49-7081 (1)	3.00	b, h(1)
C-37A	General Aviation: Business Jet	BR700-710A1-10 (2)	---	---	h(6)
C-37B	General Aviation: Business Jet	BR700-710C4-11 (2)	---	---	h(7)
C-38A	General Aviation: Business Jet	TFE731-40 (2)	---	---	c, h(1)
C-40A	Transport - Turbine: USN	CFM56-7B24 (2)	---	---	d, h(1)
C-40B	Transport - Turbine: USAF general	CFM56-7B27 (2)	131-9 (1)	0.50	b, c, h(1)
		CFM56-7B3 (2)	131-9 (1)	0.50	b, c, h(1)
C-40C	Transport - Turbine: USAF general	CFM56-7B3 (2)	---	---	c, d, h(1)
		CFM56-7B27 (2)	---	---	d, h(1)
C-123K	Transport - Turbine: USAF general	J85-GE-17 (2)	---	---	c, h(1)
		R-2800-99W (2)	---	---	h(1)
C-130A, -130D	Transport - Turbine: USAF general	T56-A-9, -9A, -9B (4)	GTCP 85L (1)	1.00	b, c, h(1)
C-130B	Transport - Turbine: USAF general	T56-A-7, -7A (4)	GTCP71/71A (1)	1.00	b, c, h(1)
C-130E	Transport - Turbine: USAF general	T56-A-7, -7A (4)	GTCP71/71A (1)	1.00	b, c, h(1)
C-130F	Transport - Turbine: USN	T56-A-7, -7A (4)	GTCP71/71A (1)	1.00	b, c, h(1)
C-130H	Transport - Turbine: USAF general	T56-A-15 (4)	GTCP 85-180L (1)	1.00	c, e, h(1), i(1)
C-130J	Transport - Turbine: USAF general	T56-A-15 (4)	GTCP 85L (1)	1.00	b, h(1)
		AE2100D3 (4)	---	---	c, h(6)
C-130T	Transport - Turbine: USN	T56-A-16 (4)	---	---	h(1)
C-135A	Transport - Turbine: USAF general	J57-P/F-59W (4)	T41M-9A (1)	1.00 to 2.00	b, c, h(5)
			ASHG70-1 (1)	1.00 to 2.00	b, c, h(5)
C-135B, -135C	Transport - Turbine: USAF general	J57-P/F-59W (4)	T41M-9A (1)	1.00 to 2.00	b, c, h(5)
			ASHG70-1 (1)	1.00 to 2.00	b, c, h(5)
		TF33-P-5 (4)	T41M-9A (1)	1.00 to 2.00	b, c, h(1)
			ASHG70-1 (1)	1.00 to 2.00	b, c, h(1)
C-135E	Transport - Turbine: USAF general	TF33-P-102 (4)	T41M-9A (1)	1.00 to 2.00	b, c, h(1)
			ASHG70-1 (1)	1.00 to 2.00	b, c, h(1)
C-137B, -137C	Transport - Turbine: USAF general	JT3D-3B (4)	---	---	h(1)
C-140A	General Aviation: Business Jet	J60-P-5A, -5B (4)	---	---	h(5)
C-140B	General Aviation: Business Jet	J60-P-5 (4)	---	---	c, h(6)
C-141	Transport - Turbine: USAF general	TF33-P-3 (4)	GTCP 165-1 (1)	3.00	h(3), i(2)
		TF33-P-5 (4)	GTCP 165-1 (1)	3.00	h(3), i(2)
C-141A, -141B, -141C	Transport - Turbine: USAF general	TF33-P-7 (4)	GTCP85-106/106A (1)	3.00	b, c, h(1), h(3)
C-145A	Trainer - Turbine: USAF General	PT6A-65B (2)	---	---	c, h(6)
C-146A	Transport - Turbine: USAF general	PW119C (2)	---	---	c, h(6)
CMV-22B	Transport - Turbine: USN	AE1107C (2)	---	---	f, h(7)
CT-1B	General Aviation: Business Jet	JT15D-5 (2)	---	---	d, h(1)
CT-39A	General Aviation: Business Jet	J60-P-3, -3A (2)	---	---	c, h(1)
CT-39E, -39G	General Aviation: Business Jet	JT12A-8 (2)	---	---	c, h(1)
CT-43A	Transport - Turbine: USAF general	JT8D-9A (2)	---	---	h(1)
CT-49A	Transport - Turbine: USAF general	JT3D-7 (4)	---	---	d, h(1)
CV-22, -22A	Transport - Turbine: USAF general	AE1107C (2)	---	---	f, h(1)
		T406-AD-400 (2)	---	---	f, h(1), h(2)
CV-22B	Transport - Turbine: USN	AE1107C (2)	---	---	f, h(7)
DC-130A	Transport - Turbine: USAF general	T56-A-9, -9A (4)	---	---	c, h(1)



**Table 2-6. Military Airframe/Engine/APU Combinations (cont.)**

Aircraft Model(s)	Time-In-Mode Category <sup>a</sup>	Engine Model(s) (Number of Engines)	APU Model(s) (Number of APUs)	APU Hours of Operation Per LTO <sup>b</sup>	Notes:
DF-8L	Combat: USN	J57-P-4A (1)	---	---	c, h(1)
DT-2B	Trainer - Turbine: USN	J60-P-6 (2)	---	---	c, h(1)
E-1B	General Aviation: Piston	R-1820-82A (2)	---	---	c, h(1)
E-2	Transport - Turbine: USN	T56-A-7 (2)	---	---	h(3)
E-2B	Transport - Turbine: USN	T56-A-8, -8A, -8B (2)	---	---	c, h(1)
E-2C	Transport - Turbine: USN	T56-A-422 (2)	---	---	c, h(1)
		T56-A-427 (2)	---	---	c, h(10)
E-2D	Transport - Turbine: USN	T56-A-427 (2)	---	---	c, h(10)
E-3A	Transport - Turbine: USAF general	TF33-P-3 (4)	---	---	d, h(3)
		TF33-P-5 (4)	---	---	d, h(3)
		TF33-P-7 (4)	---	---	d, h(3)
		TF33-P-100A (4)	---	---	c, d, h(1)
E-3B, -3C	Transport - Turbine: USAF general	TF33-P-100A (4)	GTCP 165-1 (1)	2.00	c, h(1), i(1)
E-4A	Transport - Turbine: USAF general	F103-GE-100 (4)	---	---	h(5)
E-4B	Transport - Turbine: USAF general	CF6-50E2 (4)	GTCP 660-4 (1)	2.00	h(6), i(1)
E-6B	Transport - Turbine: USN	CFM56-2A-2 (4)	---	---	c, h(7)
E-8C	Transport - Turbine: USAF general	JT3D-3B (4)	GTCP 85 (1)	2.00	e, h(1), k
		TF33-PW-102C (4)	GTCP 85 (1)	2.00	c, e, h(1)
E-9A	Transport - Turbine: USAF general	PW120A (2)	---	---	c, h(6)
EA-3B	Combat: USN	J57-P-10 (2)	---	---	h(1)
EA-4F	Combat: USN	J52-P-6A, -6B (1)	---	---	c, h(1)
		J52-P-8A (1)	---	---	c, h(1)
EA-6A	Combat: USN	J52-P-8A, -8B (2)	---	---	c, h(1)
EA-6B	Combat: USN	J52-P-8A, -8B (2)	---	---	c, h(1)
		J52-P-408 (2)	---	---	h(1)
EA-7L	Combat: USN	TF41-A-2 (1)	---	---	h(1)
		TF30-P-408 (1)	---	---	c, h(1)
EA-18G	Combat: USN	F414-GE-400 (2)	---	---	h(7)
EB-57B	Combat: USAF	J65-W-5, -5B (2)	---	---	c, h(1)
EC-18B, -18D	Transport - Turbine: USAF general	JT3D-7 (4)	---	---	h(1)
EC-24A	Transport - Turbine: USN	JT3D-3B (4)	---	---	h(1)
EC-37B	Transport - Turbine: USAF general	BR700-710C4-11 (2)	---	---	h(15)
EC-130E	Transport - Turbine: USAF general	T56-A-7, -7A (4)	---	---	c, h(1)
		T56-A-15 (4)	---	---	h(6)
EC-130H	Transport - Turbine: USAF general	T56-A-15 (4)	GTCP 85-180L (1)	1.00	h(1), i(1)
EC-130J, -130SJ	Transport - Turbine: USAF general	AE2100D3 (4)	---	---	c, h(6)
EC-130Q	Transport - Turbine: USAF general	T56-A-423 (4)	---	---	c, h(1)
EC-130V	Transport - Turbine: USN	T56-A-15 (4)	---	---	d, h(1)
EC-135A, -135G, -135L	Transport - Turbine: USAF general	J57-P/F-59W (4)	---	---	h(1), h(5)
EC-135B	Transport - Turbine: USAF general	TF33-P-5 (4)	---	---	h(1)
EC-135C, -135J	Transport - Turbine: USAF general	TF33-P-9 (4)	---	---	h(1)
EC-135E	Transport - Turbine: USAF general	TF33-P-102 (4)	---	---	h(1)
EC-135H, -135K, -135P	Transport - Turbine: USAF general	J57-P/F-59W (4)	---	---	h(1), k
		TF33-P-102 (4)	---	---	h(5)
EC-135N	Transport - Turbine: USAF general	J57-P/F-43WB (4)	---	---	h(1)

**Table 2-6. Military Airframe/Engine/APU Combinations (cont.)**

Aircraft Model(s)	Time-In-Mode Category <sup>a</sup>	Engine Model(s) (Number of Engines)	APU Model(s) (Number of APUs)	APU Hours of Operation Per LTO <sup>b</sup>	Notes:
EC-135Y	Transport - Turbine: USAF general	J57-P/F-43WB (4)	---	---	h(1)
		J57-P/F-59W (4)	---	---	h(1)
EC-137D	Transport - Turbine: USAF general	JT3D-3B (4)	---	---	h(1)
EF-4J	Combat: USN	J79-GE-8B (2)	---	---	c, h(1)
EF-111A	Combat: USAF	TF30-P-109 (2)	---	---	h(1)
EKA-3B	Combat: USN	J57-P-10 (2)	---	---	h(1)
EP-3A	Transport - Turbine: USN	T56-A-10W (4)	---	---	c, h(1)
EP-3B, -3E, -3J	Transport - Turbine: USN	T56-A-14 (4)	---	---	h(1), h(7)
ERA-3B	Combat: USN	J57-P-10 (2)	---	---	h(1)
ES-2D	General Aviation: Piston	R-1820-82A (2)	---	---	c, h(1)
F-4	Combat: USN	J79-GE-10 (2)	---	---	c, h(3)
F-4B, -4N	Combat: USN	J79-GE-8B, -8C (2)	---	---	c, h(1)
F-4C, -4D	Combat: USAF	J79-GE-15 (2)	---	---	h(1)
F-4E, -4G	Combat: USAF	J79-GE-17 (2)	---	---	h(1)
F-4J	Combat: USN	J79-GE-8B (2)	---	---	c, h(1)
F-4S	Combat: USN	J79-GE-10B (2)	---	---	c, h(1)
F-5A, -5B	Combat: USAF	J85-GE-13 (2)	---	---	d, h(3)
F-5E, -5F	Combat: USAF	J85-GE-21 (2)	---	---	d, h(1)
F-8	Combat: USN	J57-P-22 (1)	---	---	c, h(3)
F-8J	Combat: USN	J57-P-420 (1)	---	---	h(1)
F-8K	Combat: USN	J57-P-16, -16B (1)	---	---	c, h(1)
F-14A	Combat: USN	TF30-P-412 (2)	---	---	c, h(1)
		TF30-P-414A (2)	---	---	c, h(7)
F-14C	Combat: USN	TF30-P-412 (2)	---	---	c, h(1)
F-14B, -14D	Combat: USN	F110-GE-400 (2)	---	---	h(1)
F-15A, -15B	Combat: USAF	F100-PW-100 (2)	---	---	h(1)
F-15C, -15D	Combat: USAF	F100-PW-100 (2)	---	---	h(1)
		F100-PW-220 (2)	---	---	h(1)
		F100-PW-229 (2)	---	---	h(6)
F-15E	Combat: USAF	F100-PW-220 (2)	---	---	h(1)
		F100-PW-229 (2)	---	---	h(1)
F-16	Combat: USAF	F100-PW-100 (1)	T-62T-40-8 (1)	1.00	b, c, h(3)
F-16A, -16B	Combat: USAF	F100-PW-200 (1)	T-62T-40-8 (1)	1.00	b, c, h(1)
		F100-PW-220 (1)	T-62T-40-8 (1)	1.00	b, c, h(7)
F-16C, -16D	Combat: USAF	F100-PW-200 (1)	T-62T-40-8 (1)	1.00	b, c, h(1)
		F100-PW-220 (1)	T-62T-40-8 (1)	1.00	b, c, h(6)
		F100-PW-229 (1)	T-62T-40-8 (1)	1.00	b, c, h(1)
		F110-GE-100 (1)	T-62T-40-8 (1)	1.00	b, c, h(1)
		F110-GE-129 (1)	T-62T-40-8 (1)	1.00	b, c, h(1)
F-16N	Combat: USN	F110-GE-100 (1)	---	---	h(1)
F-22A, -22B	Combat: USAF	F119-PW-100 (2)	---	---	h(1)
F-35A	Combat: USAF	F135-PW-100 (1)	---	---	c, h(1)
F-35B	Combat: USN	F135-PW-600 (1)	---	---	c, d, h(11)
F-35C	Combat: USN	F135-PW-100 (1)	---	---	c, h(7)
F-100	Combat: USAF	J57-P-22 (1)	---	---	c, h(3)
F-106A, -106B	Combat: USAF	J75-P-17 (1)	---	---	h(1)

Table 2-6. Military Airframe/Engine/APU Combinations (cont.)

Aircraft Model(s)	Time-In-Mode Category <sup>a</sup>	Engine Model(s) (Number of Engines)	APU Model(s) (Number of APUs)	APU Hours of Operation Per LTO <sup>b</sup>	Notes:
F-111, -111F	Combat: USAF	TF30-P-100 (2)	---	---	h(1), h(3)
F-111A	Combat: USAF	TF30-P-3 (2)	---	---	h(1)
F-111D, -111E	Combat: USAF	TF30-P-3 (2)	---	---	h(1)
		TF30-P-9 (2)	---	---	h(5)
F-111G	Combat: USAF	TF30-P-107 (2)	---	---	h(1)
F-117A	Combat: USAF	F404-GE-F1D2 (2)	3800100-4 (1)	2.00	b, c, h(8)
F/A-18A, -18B	Combat: USN	F404-GE-400 (2)	---	---	h(1), h(7)
F/A-18C, -18D	Combat: USN	F404-GE-400 (2)	---	---	h(1)
		F404-GE-402 (2)	---	---	c, h(7)
F/A-18E, -18F	Combat: USN	F404-GE-400 (2)	---	---	h(7)
		F414-GE-400 (2)	---	---	c, h(7)
FA-22A	Combat: USAF	F119-PW-100 (2)	---	---	h(1)
FB-22A	Combat: USAF	F119-PW-100 (2)	---	---	h(1)
FB-111A	Combat: USAF	TF30-P-7 (2)	---	---	h(1)
HC-130H	Transport - Turbine: USAF general	T56-A-15 (4)	GTCP 85-180L (1)	1.00	e, h(1), i(1)
HC-130J	Transport - Turbine: USAF general	AE2100D3 (4)	---	---	c, h(6)
HC-130P/N	Transport - Turbine: USAF general	T56-A-15 (4)	---	---	h(6)
HV-22A, -22B	Transport - Turbine: USN	AE1107C (2)	---	---	f, h(1), k
		T406-AD-400 (2)	---	---	f, h(1), l(2)
JA-6A	Combat: USN	J52-P-6A, -6B (2)	---	---	c, h(1)
		J52-P-8A, -8B (2)	---	---	c, h(1)
KA-3B	Combat: USN	J57-P-10 (2)	---	---	h(1)
KA-6D	Combat: USN	J52-P-6A (2)	---	---	c, h(1)
		J52-P-8A (2)	---	---	c, h(1)
KC-10, -10A	Transport - Turbine: USAF general	CF6-50C2 (3)	TSCP 700-4B (1)	6.00	h(1), i(1)
		F103-GE-100 (3)	TSCP 700-4B (1)	6.00	h(5), i(1)
		F103-GE-101 (3)	TSCP 700-4B (1)	6.00	h(12), i(1)
KC-46A	Transport - Turbine: USAF general	PW4062 (2)	GTCP 331-200 (1)	0.87	e, h(6), j
			GTCP 331-200ER (1)	0.87	e, h(6), j
KC-130F, -130R, -130T	Transport - Turbine: USN	T56-A-16 (4)	---	---	h(1)
KC-135	Transport - Turbine: USAF KC-135	J57-P-22 (4)	---	---	h(3)
KC-135A	Transport - Turbine: USAF KC-135	J57-P/F-43WB (4)	---	---	h(1)
		J57-P/F-59W (4)	---	---	h(1)
KC-135D, -135Q	Transport - Turbine: USAF KC-135	J57-P/F-59W (4)	---	---	h(1), h(5)
KC-135E	Transport - Turbine: USAF KC-135	TF33-P-102 (4)	GTCP 85-180L (1)	1.00	c, e, h(1), i(1)
KC-135J	Transport - Turbine: USAF KC-135	AE2100D3 (4)	---	---	c, h(7)
KC-135R, -135T	Transport - Turbine: USAF KC-135	CFM56-2B-1 (4)	---	---	h(1), k
		F108-CF-100 (4)	---	---	h(1), l(2)
KC-767A	Transport - Turbine: USAF general	CF6-80C2B6F (2)	---	---	h(13)
		CF6-80C2B7F (2)	---	---	h(13)
		PW4062 (2)	---	---	h(13)
KS-3A	Combat: USN	TF34-GE-2 (2)	---	---	c, h(1)
LC-130F, -130R	Transport - Turbine: USN	T56-A-16 (4)	---	---	h(1)
LC-130H	Transport - Turbine: USAF general	T56-A-15 (4)	---	---	h(1)
MC-12W	General Aviation: Turboprop	PT6A-60 (2)	---	---	c, h(6)

**Table 2-6. Military Airframe/Engine/APU Combinations (cont.)**

Aircraft Model(s)	Time-In-Mode Category <sup>a</sup>	Engine Model(s) (Number of Engines)	APU Model(s) (Number of APUs)	APU Hours of Operation Per LTO <sup>b</sup>	Notes:
MC-130E	Transport - Turbine: USAF general	T56-A-7 (4)	---	---	h(1)
		T56-A-15, -15A (4)	---	---	c, h(1), h(6)
MC-130H	Transport - Turbine: USAF general	T56-A-15 (4)	GTCP 85-180L (1)	1.00	c, h(1), i(1)
MC-130J	Transport - Turbine: USAF general	AE2100D3 (4)	---	---	c, h(6)
MC-130P, -130W	Transport - Turbine: USAF general	T56-A-15 (4)	---	---	h(1), h(6)
MQ-1B	Military - Piston	Rotax 914F (1)	---	---	h(6)
MQ-1C	Military - Piston	TAE-125 (1)	---	---	h(13)
MQ-4C	Combat: USN	AE3007H (1)	---	---	h(7)
MQ-9	Combat: USAF	TPE331-10GD (1)	---	---	c, h(6)
MQ-25	Combat: USN	AE3007H (1)	---	---	h(7)
MV-22A, -22B	Transport - Turbine: USN	AE1107C (2)	---	---	f, h(1), k
		T406-AD-400 (2)	---	---	f, h(1), l(2)
NA-3B	Combat: USN	J57-P-10 (2)	---	---	h(1)
NA-4E	Combat: USN	J52-P-6A (1)	---	---	c, h(1)
		J52-P-8A, -8B (1)	---	---	c, h(1)
NA-4F	Combat: USN	J52-P-8A (1)	---	---	c, h(1)
NA-4M	Combat: USN	J52-P-408 (1)	---	---	h(1)
NA-6A	Combat: USN	J52-P-6A, -6B (2)	---	---	c, h(1)
		J52-P-8A, -8B (2)	---	---	c, h(1)
NA-6E	Combat: USN	J52-P-8B (2)	---	---	h(1)
NA-7A	Combat: USN	TF30-P-6 (1)	---	---	c, h(1)
NA-7C	Combat: USN	TF30-P-8 (1)	---	---	c, h(1)
NA-7E	Combat: USN	TF41-A-2 (1)	---	---	h(1)
NB-52B	Transport - Turbine: USAF B-52	J57-P-19W (8)	---	---	h(1)
NC-12B	General Aviation: Turboprop	PT6A-41 (2)	---	---	h(1)
NC-21A	General Aviation: Business Jet	TFE731-2-2B (2)	---	---	h(1)
NC-37B	General Aviation: Business Jet	BR700-710C4-11 (2)	---	---	h(7)
NC-130A	Transport - Turbine: USAF general	T56-A-9, -9A, -9B (4)	---	---	c, h(1)
NC-130B, -130E	Transport - Turbine: USAF general	T56-A-7, -7A (4)	---	---	c, h(1)
NC-130H	Transport - Turbine: USAF general	T56-A-15 (4)	GTCP 85-180L (1)	1.00	c, e, h(1), i(1)
NC-135A	Transport - Turbine: USAF general	J57-P/F-43WB (4)	---	---	h(5)
NC-135W	Transport - Turbine: USAF general	TF33-P-5 (4)	---	---	h(1)
NC-141A	Transport - Turbine: USAF general	TF33-P-7 (4)	GTCP 85-106/106A (1)	3.00	b, c, h(1)
NF-4D	Combat: USAF	J79-GE-15 (2)	---	---	h(1)
		J79-GE-17 (2)	---	---	h(1)
NF-14B	Combat: USN	F401-PW-400 (2)	---	---	c, h(1)
NF-14D	Combat: USN	F110-GE-400 (2)	---	---	h(1)
NF-16A	Combat: USAF	F100-PW-200 (1)	---	---	h(1)
NF-16D	Combat: USAF	F100-PW-200 (1)	---	---	h(1)
		F100-PW-229 (1)	---	---	h(1)
		F110-GE-100 (1)	---	---	h(1)
		F110-GE-129 (1)	---	---	h(1)
NF-106B	Combat: USAF	J75-P-17 (1)	---	---	h(5)
NF/A-18A, -18B, -18C, -18D	Combat: USN	F404-GE-400 (2)	---	---	h(1)
NKC-135A	Transport - Turbine: USAF KC-135	J57-P/F-43WB (4)	---	---	h(1)
		J57-P/F-59W (4)	---	---	h(1)

**Table 2-6. Military Airframe/Engine/APU Combinations (cont.)**

Aircraft Model(s)	Time-In-Mode Category <sup>a</sup>	Engine Model(s) (Number of Engines)	APU Model(s) (Number of APUs)	APU Hours of Operation Per LTO <sup>b</sup>	Notes:
NKC-135E	Transport - Turbine: USAF KC-135	TF33-P-102 (4)	GTCP 85-180L (1)	2.00	c, h(1), i(1)
NP-3A	Transport - Turbine: USN	T56-A-10W (4)	---	---	c, h(1)
NP-3C, -3D	Transport - Turbine: USN	T56-A-14 (4)	---	---	h(1)
NRA-3B	Combat: USN	J57-P-10 (2)	---	---	h(1)
NT-33A	Trainer - Turbine: USAF General	J33-A-35 (1)	---	---	h(1)
NT-34C	General Aviation: Piston	PT6A-25 (1)	---	---	c, h(1)
NT-39A	General Aviation: Business Jet	J60-P-3, -3A (2)	---	---	c, h(1)
NTA-4F, -4J	Combat: USN	J52-P-6A (1)	---	---	c, h(1)
NUP-3A	Transport - Turbine: USN	T56-A-14 (4)	---	---	h(1)
O-1	General Aviation: Piston	O-470C (1)	---	---	h(3)
O-2A, -2B	General Aviation: Piston	IO-360-C (2)	---	---	h(1), h(3)
		IO-360-D (2)	---	---	h(3)
OA-4M	Combat: USN	J52-P-6A, -6B (1)	---	---	c, h(1)
		J52-P-8A (1)	---	---	c, h(1)
OA-10A	Combat: USAF	TF34-GE-100 (2)	---	---	h(1)
OA-37B	Combat: USAF	J85-GE-17A (2)	---	---	h(1)
OC-135B	Transport - Turbine: USAF general	TF33-P-5 (4)	---	---	h(1)
OT-47B	General Aviation: Business Jet	JT15D-5D (2)	---	---	c, h(1)
OV-10A	General Aviation: Turboprop	T76-G-10A (2)	---	---	c, g, h(1)
		T76-G-12A (2)	---	---	c, g, h(1)
		T76-G-418 (2)	---	---	g, h(1)
		T76-G-419 (2)	---	---	g, h(1)
P-3A	Transport - Turbine: USN	T56-A-10W (4)	---	---	c, h(1)
P-3B	Transport - Turbine: USN	T56-A-14 (4)	---	---	h(1)
P-3C	Transport - Turbine: USN	T56-A-7 (4)	---	---	h(3)
		T56-A-14 (4)	---	---	h(1)
P-8A	Transport - Turbine: USN	CFM56-7B27/3 (2)	---	---	h(9)
QF-4B	Combat: USN	J79-GE-8B, -8C (2)	---	---	c, h(1)
QF-4E	Combat: USAF	J79-GE-10 (2)	---	---	c, h(1)
		J79-GE-17 (2)	---	---	h(1)
QF-4G	Combat: USAF	J79-GE-15 (2)	---	---	h(1)
		J79-GE-17 (2)	---	---	h(1)
QF-106A, -106B	Combat: USAF	J75-P-17 (1)	---	---	h(1)
QRF-4C	Combat: USAF	J79-GE-10 (2)	---	---	c, h(1)
		J79-GE-17 (2)	---	---	h(1)
QT-33A	Trainer - Turbine: USN	J33-A-35 (1)	---	---	h(1)
RA-3B	Combat: USN	J57-P-10 (2)	---	---	h(1)
RA-5C	Combat: USN	J79-GE-8B, -8C (2)	---	---	c, h(1)
		J79-GE-10 (2)	---	---	c, h(1)
RC-12D, -12G, -12H	General Aviation: Turboprop	PT6A-41 (2)	---	---	h(1)
RC-12F, -12M	General Aviation: Turboprop	PT6A-42 (2)	---	---	h(1)
RC-12K, -12N, -12P, -12Q	General Aviation: Turboprop	PT6A-67 (2)	---	---	h(1)
RC-135M, -135X	Transport - Turbine: USAF general	TF33-P-5 (4)	---	---	h(1), h(5), h(6)
RC-135S	Transport - Turbine: USAF general	TF33-P-5 (4)	---	---	h(1)
		CFM56-2B-1 (4)	---	---	h(6), k
		F108-CF-201 (4)	---	---	h(6), l(2)

**Table 2-6. Military Airframe/Engine/APU Combinations (cont.)**

Aircraft Model(s)	Time-In-Mode Category <sup>a</sup>	Engine Model(s) (Number of Engines)	APU Model(s) (Number of APUs)	APU Hours of Operation Per LTO <sup>b</sup>	Notes:
RC-135T	Transport - Turbine: USAF general	TF33-P-102 (4)	---	---	h(5)
RC-135U	Transport - Turbine: USAF general	TF33-P-9 (4)	---	---	h(1)
		CFM56-2B-1 (4)	---	---	h(6), k
		F108-CF-201 (4)	---	---	h(6), l(2)
RC-135V, -135W	Transport - Turbine: USAF general	TF33-P-5 (4)	---	---	h(1)
		CFM56-2B-1 (4)	---	---	h(6), k
		F108-CF-201 (4)	---	---	h(6), l(2)
RF-4B	Combat: USN	J79-GE-8B, -8C (2)	---	---	c, h(1)
RF-4C	Combat: USAF	J79-GE-15 (2)	---	---	h(1)
RF-5E	Combat: USAF	J85-GE-21 (2)	---	---	h(1)
RF-8G	Combat: USN	J57-P-22 (1)	---	---	c, h(1)
RF/A-18A	Combat: USN	F404-GE-400 (2)	---	---	h(1)
RP-3A	Transport - Turbine: USN	T56-A-10W (4)	---	---	c, h(1)
RP-3D	Transport - Turbine: USN	T56-A-14 (4)	---	---	h(1)
RQ-4	Combat: USAF	AE3007H (1)	---	---	c, h(1)
		F137-RR-100 (1)	---	---	c, h(6)
RQ-4A	Combat: USAF	AE3007 (1)	---	---	c, h(1)
		F137-RR-100 (1)	---	---	c, h(6)
RQ-4B	Combat: USAF	AE3007H (1)	---	---	c, h(1)
RU-21A, -21D, -21E, -21H	General Aviation: Turboprop	PT6A-20 (2)	---	---	c, h(1)
RU-21B, -21C	General Aviation: Turboprop	PT6A-29 (2)	---	---	c, h(1)
RU-21J	General Aviation: Turboprop	PT6A-41 (2)	---	---	h(1)
S-2, -2G	General Aviation: Piston	R-1820-82 (2)	---	---	h(1), h(3)
S-2D, -2E	General Aviation: Piston	R-1820-82A (2)	---	---	c, h(1)
S-3A	Combat: USN	TF34-GE-400 (2)	---	---	h(3)
SV-22A	Transport - Turbine: USN	AE1107C (2)	---	---	f, h(1), k
		T406-AD-400 (2)	---	---	f, h(1), l(2)
T-1A	Trainer - Turbine: USAF general	JT15D-5B (2)	---	---	h(1)
T-2	Trainer - Turbine: USN	J85-GE-5F (2)	---	---	h(3)
T-2B	Trainer - Turbine: USN	J60-P-6 (2)	---	---	c, h(1)
T-2C	Trainer - Turbine: USN	J85-GE-4, -4A (2)	---	---	c, h(1)
T-6A	Trainer - Turbine: USAF general	PT6A-68 (1)	---	---	g, h(1)
T-7A	Trainer-Turbine: USAF general	F404-GE-102 (1)	4501687C (1)	0.25	h(18)
T-28	General Aviation: Piston	R-1820-82 (1)	---	---	h(3)
T-28B, -28C	General Aviation: Piston	R-1820-86A (1)	---	---	c, h(1)
T-33A	Trainer - Turbine: USAF general	J33-A-35 (1)	---	---	h(1)
T-34	General Aviation: Piston	O-470C (1)	---	---	h(3)
T-34A, -34B	General Aviation: Piston	IO-470-4 (1)	---	---	c, h(1)
T-34C	General Aviation: Piston	PT6A-27 (1)	---	---	h(3)
		PT6A-25 (1)	---	---	c, h(7)
T-37, -37B	Trainer - Turbine: USAF general	J69-T-25 (2)	---	---	h(1), h(3)
T-38	Trainer - Turbine: USAF T-38	J85-GE-5F (2)	---	---	h(3)
T-38A	Trainer - Turbine: USAF T-38	J85-GE-5, -5A, -5G, -5J, -5M (2)	---	---	c, h(1)
T-38C	Trainer - Turbine: USAF T-38	J85-GE-5, -5A, -5G, -5J, -5R (2)	---	---	c, h(1)
T-38N	Trainer - Turbine: USAF T-38	J85-GE-5H, -5N (2)	---	---	c, h(1)
T-39A, -39D	General Aviation: Business Jet	J60-P-3A (2)	---	---	h(1), h(5)

**Table 2-6. Military Airframe/Engine/APU Combinations (cont.)**

Aircraft Model(s)	Time-In-Mode Category <sup>a</sup>	Engine Model(s) (Number of Engines)	APU Model(s) (Number of APUs)	APU Hours of Operation Per LTO <sup>b</sup>	Notes:
T-39B	General Aviation: Business Jet	J60-P-3, -3A (2)	---	---	c, h(1)
T-39G, -39N	General Aviation: Business Jet	JT12A-8 (2)	---	---	c, h(1)
T-41	General Aviation: Piston	IO-360-C (1)	---	---	h(3)
T-41A	General Aviation: Piston	IO-300-D (1)	---	---	c, h(1)
T-41B	General Aviation: Piston	IO-360-D (1)	---	---	h(1)
T-41C, -41D	General Aviation: Piston	IO-360-D34 (1)	---	---	h(1)
T-43A	Transport - Turbine: USAF general	JT8D-9 (2)	---	---	h(1)
T-44	Trainer - Turbine: USN	PT6A-27 (2)	---	---	h(3)
		PT6A-34B (2)	---	---	c, h(7)
T-45A, -45C	Trainer - Turbine: USN	F405-RR-401 (1)	---	---	h(7)
T-45B	Trainer - Turbine: USN	Mk-851-49	---	---	c, h(1)
T-47A	General Aviation: Business Jet	JT15D-5 (2)	---	---	h(1)
T-50A	Trainer - Turbine: USAF general	F404-GE-102 (1)	---	---	h(16)
TA-3B	Combat: USN	J57-P-10 (2)	---	---	h(1)
TA-4B	Combat: USN	J65-W-20 (1)	---	---	h(1)
TA-4F	Combat: USN	J52-P-6A, -6B (1)	---	---	c, h(1)
		J52-P-8A (1)	---	---	c, h(1)
TA-4J	Combat: USN	J52-P-6A (1)	---	---	c, h(8)
TA-7C	Combat: USN	TF30-P-8 (1)	---	---	c, h(1)
TC-18E	Transport - Turbine: USAF general	TF33-P-100A (4)	---	---	c, h(1)
TC-18F	Transport - Turbine: USAF general	JT3D-3B (4)	---	---	h(1)
TC-130H	Transport - Turbine: USAF general	T56-A-15 (4)	---	---	h(1)
TC-135S, -135W	Transport - Turbine: USAF general	TF33-P-5 (4)	---	---	h(1)
TE-2A, -2C	Transport - Turbine: USN	T56-A-8, -8A, -8B (2)	---	---	c, h(1)
TE-8A	Transport - Turbine: USAF general	JT3D-3B (4)	---	---	h(1)
TF-16N	Combat: USN	F110-GE-100 (1)	---	---	h(1)
TF-18A	Combat: USN	F404-GE-400 (2)	---	---	h(1)
TF/A-18A	Combat: USN	F404-GE-400 (2)	---	---	h(1)
TP-3A	Transport - Turbine: USN	T56-A-10W (4)	---	---	c, h(1)
TS-2A	General Aviation: Piston	R-1820-82 (2)	---	---	h(1)
TU-2R, -2S	Combat: USAF	F118-GE-101 (1)	---	---	c, h(6)
U-2S	Combat: USAF	F118-GE-101 (1)	---	---	c, h(6)
U-21	General Aviation: Turboprop	PT6A-27 (2)	---	---	h(3)
U-21A, -21G	General Aviation: Turboprop	PT6A-20 (2)	---	---	c, h(1)
U-21F	General Aviation: Turboprop	PT6A-28 (2)	---	---	c, h(1)
U-21J	General Aviation: Turboprop	PT6A-41 (2)	---	---	h(1)
U-28A	General Aviation: Turboprop	PT6A-67B (1)	---	---	h(6)
UA-3B	Combat: USN	J57-P-10 (2)	---	---	h(1)
UC-12B	General Aviation: Turboprop	PT6A-41 (2)	---	---	h(1)
UC-12F, -12M	General Aviation: Turboprop	PT6A-42 (2)	---	---	h(1)
UC-12W	General Aviation: Turboprop	PT6A-60A (2)	---	---	h(1)
UC-26C	General Aviation: Turboprop	TPE331-7 (2)	---	---	c, h(1)
UC-35A, -35C	General Aviation: Business Jet	JT15D-5D (2)	---	---	c, h(1)
UC-35D	General Aviation: Business Jet	PW535A (2)	---	---	c, h(7)
UC-123K	Transport - Turbine: USAF general	J85-GE-17 (2)	---	---	c, h(1)

**Table 2-6. Military Airframe/Engine/APU Combinations (cont.)**

Aircraft Model(s)	Time-In-Mode Category <sup>a</sup>	Engine Model(s) (Number of Engines)	APU Model(s) (Number of APUs)	APU Hours of Operation Per LTO <sup>b</sup>	Notes:
UP-3A	Transport - Turbine: USN	T56-A-10W (4)	---	---	c, h(1)
UP-3B	Transport - Turbine: USN	T56-A-14 (4)	---	---	h(1)
US-2A, -2B, -2C	General Aviation: Piston	R-1820-82 (2)	---	---	h(1)
US-2D	General Aviation: Piston	R-1820-82A (2)	---	---	c, h(1)
UV-18A	Transport - Turbine: USAF general	PT6A-20 (2)	---	---	c, h(1)
UV-18B	Transport - Turbine: USAF general	PT6A-27 (2)	---	---	h(1)
UV-20A	General Aviation: Turboprop	PT6A-27 (2)	---	---	h(1)
VC-25A	Transport - Turbine: USAF general	CF6-80C2B1 (4)	GTCP 660-4 (1)	8.00	e, h(1)
VC-137B, -137C	Transport - Turbine: USAF general	JT3D-3B (4)	---	---	h(8)
VC-140B	General Aviation: Business Jet	J60-P-5A, -5B (4)	---	---	h(5)
WC-130E	Transport - Turbine: USAF general	T56-A-7 (4)	---	---	h(5)
		T56-A-15 (4)	---	---	h(5)
WC-130H	Transport - Turbine: USAF general	T56-A-15 (4)	GTCP 85-180L (1)	1.00	c, e, h(1), i(1)
WC-130J	Transport - Turbine: USAF general	AE2100D3 (4)	---	---	c, h(6)
WC-135B, -135W	Transport - Turbine: USAF general	TF33-P-5 (4)	---	---	h(1)
WC-135C	Transport - Turbine: USAF general	TF33-P-9 (4)	---	---	h(1)
WP-3A	Transport - Turbine: USN	T56-A-10W (4)	---	---	c, h(1)
X-29A	Combat: USAF	F404-GE-400 (1)	---	---	g, h(1)
X-31A	Combat: USN	F404-GE-400 (1)	---	---	h(1)
X-44A	Combat: USAF	F119-PW-100 (2)	---	---	h(1)
YA-7D	Combat: USAF	TF41-A-1 (1)	---	---	h(1)
YC-14A	Transport - Turbine: USAF general	CF6-50A (2)	---	---	h(1)
YE-2C	Transport - Turbine: USN	T56-A-8, -8A, -8B (2)	---	---	c, h(1)
YF-4J	Combat: USN	J79-GE-8B (2)	---	---	c, h(1)
YF-15A, -15B	Combat: USAF	F100-PW-100 (2)	---	---	h(1)
YF-16A, -16B	Combat: USAF	F100-PW-200 (1)	---	---	h(1)
YOV-10D	General Aviation: Turboprop	T76-G-10, -10A (2)	---	---	c, h(1)
		T76-G-12, -12A (2)	---	---	c, h(1)
YP-3C	Transport - Turbine: USN	T56-A-14 (4)	---	---	h(1)
YS-2G	General Aviation: Piston	R-1820-82 (2)	---	---	h(1)
YT-2B	Trainer - Turbine: USN	J60-P-6 (2)	---	---	c, h(1)
YT-34C	General Aviation: Piston	PT6A-25 (1)	---	---	c, h(1)

Notes for Table 2-6 follow Table 2-7.



**Table 2-7. Military Helicopter/Engine/APU Combinations**

Aircraft Model(s)	Time-In-Phase Category <sup>a</sup>	Engine Model(s) (Number of Engines)	APU Model(s) (Number of APUs)	APU hours of Operation Per LTO <sup>b</sup>	Notes:
AH-1G	Military - Helicopter	T53-L-11D (1)	---	---	h(3)
		T53-L-13, -13A, -13B (1)	---	---	c, h(1)
AH-1J	Military - Helicopter	T400-CP-400 (1)	---	---	h(1)
AH-1W, -1Z	Military - Helicopter	T700-GE-401C (2)	---	---	h(7)
AH-64A	Military - Helicopter	T700-GE-700 (2)	---	---	h(1)
CH-3B	Military - Helicopter	T58-GE-8B (2)	---	---	c, h(1)
CH-3E	Military - Helicopter	T58-GE-5 (2)	---	---	h(8)
CH-46	Military - Helicopter	T58-GE-5 (2)	---	---	h(3)
CH-46A	Military - Helicopter	T58-GE-8B, -8F (2)	---	---	c, h(1)
CH-46E	Military - Helicopter	T58-GE-16 (2)	---	---	h(1)
CH-47F	Military - Helicopter	T55-GA-714A (2)	---	---	h(1)
CH-53A	Military - Helicopter	T64-GE-6B (2)	---	---	h(1)
CH-53D	Military - Helicopter	T64-GE-413 (2)	---	---	h(1)
CH-53E	Military - Helicopter	T64-GE-416 (3)	---	---	h(7)
CH-53K	Military - Helicopter	T408-GE-400 (3)	---	---	c, h(7)
EH-1H	Military - Helicopter	T53-L-13 (1)	---	---	h(1)
EH-1X	Military - Helicopter	T53-L-13 (1)	---	---	h(1)
EH-60A	Military - Helicopter	T700-GE-700 (2)	---	---	h(1)
HH-1H	Military - Helicopter	T53-L-13B (1)	---	---	h(1)
HH-1K	Military - Helicopter	T53-L-13, -13A, -13B (1)	---	---	c, h(1)
HH-1N	Military - Helicopter	T400-CP-400 (2)	---	---	h(7)
HH-2D	Military - Helicopter	T58-GE-8B, -8F (2)	---	---	c, h(1)
HH-3A	Military - Helicopter	T58-GE-8F (2)	---	---	h(1)
HH-3E	Military - Helicopter	T58-GE-5 (2)	---	---	h(8)
HH-3F	Military - Helicopter	T58-GE-8B, -8F (2)	---	---	c, h(1)
HH-43	Military - Helicopter	T53-L-11D (1)	---	---	h(3)
HH-46A	Military - Helicopter	T58-GE-8B, -8F (2)	---	---	c, h(1)
HH-52	Military - Helicopter	T58-GE-5 (2)	---	---	h(3)
HH-52A	Military - Helicopter	T58-GE-8B (1)	---	---	c, h(1)
HH-53	Military - Helicopter	T64-GE-6B (2)	---	---	h(3)
HH-60G	Military - Helicopter	T700-GE-700 (2)	---	---	h(6)
		T700-GE-701C (2)	---	---	h(6)
MH-53E	Military - Helicopter	T64-GE-416 (3)	---	---	c, h(1)
		T64-GE-419 (3)	---	---	c, h(7)
MH-53J	Military - Helicopter	T64-GE-415 (2)	T-62T-27 (1)	4.00	h(1), i(1)
MH-53M	Military - Helicopter	T64-GE-100 (2)	---	---	h(6)
MH-60A, -60G	Military - Helicopter	T700-GE-700 (2)	---	---	h(1)
MH-60R, -60S	Military - Helicopter	T700-GE-401C (2)	---	---	h(7)

**Table 2-7. Military Helicopter/Engine/APU Combinations**

Aircraft Model(s)	Time-In-Phase Category <sup>a</sup>	Engine Model(s) (Number of Engines)	APU Model(s) (Number of APUs)	APU hours of Operation Per LTO <sup>b</sup>	Notes:
MH-139	Military - Helicopter	PT6C-67C (2)	---	---	h(11)
NCH-46A	Military - Helicopter	T58-GE-8B, -8F (2)	---	---	c, h(1)
NRH-53D	Military - Helicopter	T64-GE-415 (2)	---	---	h(1)
NSH-3A	Military - Helicopter	T58-GE-8B (2)	---	---	c, h(1)
NUH-1E	Military - Helicopter	T53-L-11D (1)	---	---	h(1)
NUH-1N	Military - Helicopter	T400-CP-400 (2)	---	---	h(1)
NVH-3A	Military - Helicopter	T58-GE-8F (2)	---	---	h(1)
OH-6A	Military - Helicopter	T63-A-5A (1)	---	---	h(3)
OH-58	Military - Helicopter	T63-A-5A (1)	---	---	h(3)
RH-53D	Military - Helicopter	T64-GE-415A (2)	---	---	c, h(1)
SH-2D	Military - Helicopter	T58-GE-5 (2)	---	---	h(3)
		T58-GE-8B (2)	---	---	c, h(1)
SH-2F	Military - Helicopter	T58-GE-5 (2)	---	---	h(3)
		T58-GE-8F (2)	---	---	h(1)
SH-3A	Military - Helicopter	T58-GE-8B (2)	---	---	c, h(1)
SH-3G	Military - Helicopter	T58-GE-8B, -8F (2)	---	---	c, h(1)
SH-60	Military - Helicopter	T700-GE-700 (2)	---	---	h(7)
TH-1L	Military - Helicopter	T53-L-13, -13A, -13B (1)	---	---	c, h(1)
TH-53A	Military - Helicopter	T64-GE-100 (2)	---	---	h(13)
TH-57	Military - Helicopter	250-C20BJ (1)	---	---	h(7)
TH-67	Military - Helicopter	250-C20J (1)	---	---	c, h(7)
TH-73A	Military - Helicopter	PT6B-37A (1)	---	---	h(7)
UH-1E	Military - Helicopter	T53-L-11D (1)	---	---	h(1)
UH-1H	Military - Helicopter	T53-L-11D (1)	---	---	h(3)
		T53-L-13 (1)	---	---	h(1)
UH-1L	Military - Helicopter	T53-L-13, -13A, -13B (1)	---	---	c, h(1)
UH-1N	Military - Helicopter	T400-CP-400 (2)	---	---	h(6)
UH-1V	Military - Helicopter	T53-L-13 (1)	---	---	h(1)
UH-1Y	Military - Helicopter	T700-GE-401C (2)	---	---	h(7)
UH-2C	Military - Helicopter	T58-GE-8B, -8F (2)	---	---	c, h(1)
UH-3A	Military - Helicopter	T58-GE-8B (2)	---	---	c, h(1)
UH-46A	Military - Helicopter	T58-GE-8B, -8F (2)	---	---	c, h(1)
UH-60A	Military - Helicopter	T700-GE-700 (2)	T-62T-40-1 (1)	1.00	c, b, h(1)
UH-60C	Military - Helicopter	T700-GE-700 (2)	---	---	h(1)
UH-60Q	Military - Helicopter	T700-GE-700 (2)	---	---	h(1)
UH-72	Military - Helicopter	Arriel 1E2 (2)	---	---	h(7)
VH-3D	Military - Helicopter	T58-GE-400B (2)	---	---	c, h(7)
VH-60N	Military - Helicopter	T700-GE-401 (2)	---	---	h(7)
YSH-2E	Military - Helicopter	T58-GE-8B, -8F (2)	---	---	c, h(1)

Notes for Table 2-6 and Table 2-7 on following page.

Notes for Table 2-6 and Table 2-7.

Note that some Aircraft model/engine/Auxiliary Power Unit (APU) combinations may be missing due to unverified sources and/or missing emission factors for either engine(s) and/or APU(s).

- a. Time-in-Mode category selected for the aircraft based on that aircraft's expected flight pattern and not based on its mission designation.
- b. SOURCE: Flightline Emission Factors – Aircraft/Auxiliary Power Units/Aerospace Ground Support Equipment, IERA-RS-BR-SR-2005-0001, December 2004. This reference cites survey responses as source of data.
- c. This document does not have emission factors for at least one engine/APU listed for this aircraft.
- d. Time-in-Mode category for this aircraft was selected as the recommended category for calculating emissions though this aircraft is operated by another military branch.
- e. APU operating time is an estimate based on similar APUs on similar aircraft.
- f. Aircraft may also be operated as a military helicopter. If the aircraft is primarily operated in this mode at the installation, then use the appropriate Time-in-Mode category.
- g. This aircraft is operated by multiple military branches.
- h. The Airframe/Engine combination source was reported in the following documents:
  - (1) SOURCE: Model Designation of Military Aerospace Vehicles, Department of Defense May 2004.
  - (2) SOURCE: Air Force Reserve Website ([www.afreserve.com](http://www.afreserve.com)).
  - (3) SOURCE: Air Pollutant Emission Factors for Military and Civil Aircraft, EPA-450/3-78-117, October 1978.
  - (4) SOURCE: Smithsonian National Air and Space Museum website ([www.airandspace.si.edu](http://www.airandspace.si.edu)).
  - (5) SOURCE: Aircraft Engine Emissions Estimator, AFESC, November 1985.
  - (6) SOURCE: US Air Force fact sheets accessed via official Air Force website ([www.af.mil](http://www.af.mil)).
  - (7) SOURCE: US Navy fact sheets accessed via official Navy website ([www.navy.mil](http://www.navy.mil)).
  - (8) SOURCE: National Museum of the Air Force accessed via official website ([www.nationalmuseum.af.mil](http://www.nationalmuseum.af.mil)).
  - (9) SOURCE: GE Aviation website ([www.geaviation.com](http://www.geaviation.com)).
  - (10) SOURCE: Northrop Grumman website ([www.northropgrumman.com](http://www.northropgrumman.com)).
  - (11) SOURCE: Pratt and Whitney website ([www.pw.utc.com](http://www.pw.utc.com)).
  - (12) SOURCE: Energy and Environmental Viability of Select Alternative Jet Fuel Pathways, Carter, Nicholas A., et al. AIAA 2011-5968. 2011.
  - (13) SOURCE: Flightline Emission Factors-Aircraft/Auxiliary Power Units/Aerospace Ground Support Equipment, IERA-RS-BR-SR-2005-0001, December 2004.
  - (14) SOURCE: Beechcraft website ([www.beechcraft.com](http://www.beechcraft.com)).
  - (15) SOURCE: Gulfstream website ([www.gulfstream.com](http://www.gulfstream.com)).
  - (16) SOURCE: Airforce Monthly website ([www.airforcemonthly.com](http://www.airforcemonthly.com))
  - (17) SOURCE: Embraer website ([www.embraer.com](http://www.embraer.com))
  - (18) SOURCE: Airframe/engine/APU combination and run times collected from field data.
- i. The Airframe/APU combination was reported in the following documents:
  - (1) SOURCE: Air Emissions Factor Guide to Air Force Mobile Sources, AFCEC 2009.
  - (2) SOURCE: EDMS input from Paine Field.
- j. According to the source document, the actual APU operating time may range between 0.23-0.26 if there is gate power or 0.87 if there is no gate power. The most conservative value of 0.87 is listed here.
- k. This engine is not explicitly listed in the source document as the engine in this aircraft. It is listed here, however, because it is an alternate designation of an engine listed in the source document.
- l. This is the military designation of a civilian engine listed for the aircraft in the source document. The source for the military designation of the civilian engine is:
  - (1) SOURCE: Air Force One, Robert F. Dorr, 2002.
  - (2) The Federal Business Opportunities website ([www.fbo.gov](http://www.fbo.gov))

“---” – Indicates either no APU for that aircraft or no data available.

Table 2-8. Commercial Airframe/Engine/APU Combinations

Aircraft Model(s)	Time-In-Mode Category	Engine Model(s) (Number of Engines)	APU Model(s) (Number of APUs)	APU hours of Operation Per LTO <sup>a</sup> [Without Gate Power]	Notes:
A300 Series	<b>Commercial Carrier:</b> Jumbo, long, and medium range jet	CF6-50A, -50C, -50C1, -50C2 (2) CF6-80C2A1, -80C2A3, -80C2A5 (2) JT9D-7R4H1 (2) PW4158 (2)	GTCP 331-250 (1)	0.23 - 0.26 [1.0 - 1.5]	b, c(2), c(3), d(2)
A310 Series	<b>Commercial Carrier:</b> Jumbo, long, and medium range jet	CF6-80A3, -80C2A2(2) JT9D-7R4D1, -7R4E1 (2) PW4152 (2) PW4156A (2)	GTCP 331-250 (1)	0.23 - 0.26 [1.0 - 1.5]	b, c(2), c(3), d(2)
A318 Series	<b>Commercial Carrier:</b> Jumbo, long, and medium range jet	CFM56-5B8, -5B9 (2) PW6122A (2) PW6124A (2)	GTCP 36-300 (1)	0.23 - 0.26 [0.87]	b, c(3), c(4), d(2)
A319 Series	<b>Commercial Carrier:</b> Jumbo, long, and medium range jet	CFM56-5A4, -5A5, -5B5, -5B6, -5B7 (2) V2522-A5 (2) V2524-A5 (2) V2527-A5 (2)	GTCP 36-300 (1)	0.23 - 0.26 [0.87]	b, c(3), c(4), c(5), d(2)
A320 Series	<b>Commercial Carrier:</b> Jumbo, long, and medium range jet	CFM56-5A1, -5A3, -5B4, -5B5, -5B6 (2) V2500-A1 (2) V2527-A5 (2)	GTCP 36-300 (1)	0.23 - 0.26 [0.87]	b, c(3), c(4), c(5), d(2)
A321 Series	<b>Commercial Carrier:</b> Jumbo, long, and medium range jet	CFM56-5B1, -5B2, 5B3 (2) V2533-A5 (2) V2530-A5 (2)	GTCP 36-300 (1)	0.23 - 0.26 [0.87]	b, c(3), c(4), c(5), d(2)
A330 Series	<b>Commercial Carrier:</b> Jumbo, long, and medium range jet	CF6-80E1, -E1A1, -E1A3, -E1A4 (2) PW4164 (2) PW4168, PW4168A (2) PW4170 (2) Trent 768-60 (2) Trent 772-60 (2)	GTCP 331-250 (1)	0.23 - 0.26 [1.0 - 1.5]	b, c(3), c(4), c(5), d(2)
A340 Series	<b>Commercial Carrier:</b> Jumbo, long, and medium range jet	CFM56-5C2, -5C2/4, -5C2/F, -5C2/F4, -5C2/G, -5C2/G4, -5C2/P (4) CFM56-5C3/F, -5C3/F4, 5C3/G, -5C3/G4, -5C3/P (4) CFM56-5C4, -5C4/1, -5C4/P, -5C4/1P (4) Trent 553-61, -553A2-61 (4) Trent 556-61, -556A2-61 (4)	---	---	b, c(4), c(5)
A380 Series	<b>Commercial Carrier:</b> Jumbo, long, and medium range jet	GP7270 (4) Trent 970B-84 (4) Trent 972B-84 (4)	---	---	b, c(2), c(4)
ACJ318	<b>General Aviation:</b> Business Jet	CFM56-5B9/3 (2)	---	---	c(5)
ACJ319	<b>General Aviation:</b> Business Jet	CFM56-5B7/3 (2)	---	---	c(5)
ACJ320	<b>General Aviation:</b> Business Jet	CFM56-5B4/3 (2)	---	---	c(5)
ACJ330	<b>General Aviation:</b> Business Jet	Trent 772B-60 (2)	---	---	b, c(5)
ACJ340	<b>General Aviation:</b> Business Jet	Trent 553-61 (4)	---	---	c(5)
ACJ380	<b>General Aviation:</b> Business Jet	Trent 970-84 (4)	---	---	c(5)
B707 Series	<b>Commercial Carrier:</b> Jumbo, long, and medium range jet	JT3D-3, -3B (4) JT3D-7 (4)	GTCP 85 (1)	0.23 - 0.26 [0.87]	b, c(1), c(2), c(6), d(1)
B717 Series	<b>Commercial Carrier:</b> Jumbo, long, and medium range jet	BR700-715A1-30, -715C1-30 (2)	---	---	c(2)

**Table 2-8. Commercial Airframe/Engine/APU Combinations**

Aircraft Model(s)	Time-In-Mode Category	Engine Model(s) (Number of Engines)	APU Model(s) (Number of APUs)	APU hours of Operation Per LTO * [Without Gate Power]	Notes:
B727 Series	<b>Commercial Carrier:</b> Jumbo, long, and medium range jet	JT8D-7, -7A, -7B (3) JT8D-9, -9A (3) JT8D-11 (3) JT8D-15, -15A (3) JT8D-17, -17A, -17AR, -17R (3)	GTCP 85-98 (1)	0.23 - 0.26 [0.87]	b, c(1), c(2), c(6), d(1)
B737 Series	<b>Commercial Carrier:</b> Jumbo, long, and medium range jet	CFM56-3-B1, -3B-2, -3C-1 (2) CMF56-7B18/3, -7B20, -7B20/2, -7B20/3, -7B20E (2) CFM56-7B22, -7B22/2, -7B22/3, -7B22E (2) CFM56-7B24, -7B24/2, -7B24/3, -7B24/3B1, -7B24E, -7B24E/B1 (2) CFM56-7B26, -7B26E/B1, -7B26E/B2, -7B26E/B2F, -7B26/2, 7B26/3, -7B26/3F, -7B26E, -7B26E/F (2) CFM56-7B27, -7B27/2, -7B27/3, 7B27/3F, -7B27E, -7B27E/F, -7B27/3B1, -7B27/3B1F, -7B27E/B1, -7B27E/B1F, -7B27/3B3, -7B27E/B3 (2) JT8D-7, -7A, -7B (2) JT8D-9A (2) JT8D-15, -15A (2) JT8D-17, -17A (2)	GTCP 85-129 (1)	0.23 - 0.26 [0.87]	b, c(4), d(3)
B747 Series	<b>Commercial Carrier:</b> Jumbo, long, and medium range jet	CF6-50E, -50E1, -50E2 (4) CF6-80C2B1, -80C2B1F, -80C2B5F (4) Genx-2B67, -2B67B (4) JT9D-7, -7A, -7F, -7J, 7Q, -7Q3, -7R4G2 (4) JT9D-70A (4) PW4056 (4) RB211-524D4-19, -524D4-39, -524B2-19, -524C2-19, -524G2-19, -524G3-19, -524H2-19 (4) RB211-524G2-T-19, -524G3-T-19, -524H2-T-19 (4)	GTCP 660-4 (1) PW901A (1)	0.23 - 0.26 [1.0 - 1.5]	b, c(2), c(4), d(3)
B757 Series	<b>Commercial Carrier:</b> Jumbo, long, and medium range jet	RB211-535C-37, -535E4-B-37, -535E4-37, -535E4-C-37 (2) PW2037 (2) PW2040 (2)	GTCP 331-200ER (1)	0.23 - 0.26 [0.87]	b, c(2), c(4), d(3)
B767 Series	<b>Commercial Carrier:</b> Jumbo, long, and medium range jet	CF6-80A, -80A2, -80C2B2, -80C2B2F, -80C2B4, -80C2B4F, -80C2B6, -80C2B6F, -80C2B7F, -80C2B8F (2) JT9D-7R4D, -7R4E, -7R4E4 (2) PW4056, PW4060, PW4060A, PW4060C, PW4062 (2) RB211-524H36, -524H-T-36 (2)	GTCP 331-200 (1) GTCP 331-200ER (1)	0.23 - 0.26 [0.87]	b, c(2), c(4), d(1), d(3)
B777 Series	<b>Commercial Carrier:</b> Jumbo, long, and medium range jet	GE90-76B, -77B, -85B, -90B, -94B, -110B1, -110B1L, -115B, -115BL (2) PW4074, -4074D, -4077, -4077D, -4084, -4084D, -4090, -4090-3, -4098 (2) Trent 875, -877, -884, -884B, -892, -892B, -895 (2)	GTCP 331-500 (1)	0.23 - 0.26 [1.0 - 1.5]	b, c(2), c(4), c(6), d(3)
B787 Series	<b>Commercial Carrier:</b> Jumbo, long, and medium range jet	Genx-1B64, -1B64/P1, -1B67, -1B67/P1, -1B70, -1B70/P1, -1B70/75/P1 (2) Trent 1000-A, -1000-C, -1000-E (2)	---	---	b, c(2), c(4)
BAe 146-100A, -200A	<b>General Aviation:</b> Business Jet	ALF 502R-3, -3A, -5 (4)	---	---	b, c(2)
BAe 146-300A	<b>General Aviation:</b> Business Jet	ALF 502R-3A, -5 (4)	---	---	b, c(2)
BAe Avro 146-RJ100A	<b>General Aviation:</b> Business Jet	LF507-1F (4)	---	---	c(2)
BAe Avro 146-RJ70A	<b>General Aviation:</b> Business Jet	LF507-1F (4)	---	---	c(2)
BAe Avro 146-RJ85A	<b>General Aviation:</b> Business Jet	LF507-1F (4)	---	---	c(2)
BD-100-1A10	<b>General Aviation:</b> Business Jet	AS907-1-1A (2)	---	---	c(2)
BD-700-1A10, -1A11	<b>General Aviation:</b> Business Jet	BR700-710A2-20 (2)	---	---	c(2)
Beechcraft 76	<b>General Aviation:</b> Turboprop	PT6A-27 (2)	---	---	c(1)
Beechcraft 99A, -99B, -A99A, -B99	<b>General Aviation:</b> Turboprop	PT6A-27 (2)	---	---	c(2)
BH.125 Series 400A	<b>General Aviation:</b> Business Jet	TFE731-3, -3R (2)	---	---	b, c(2)
BH.125 Series 600A	<b>General Aviation:</b> Business Jet	TFE731-3, -3R (2)	---	---	b, c(2)

**Table 2-8. Commercial Airframe/Engine/APU Combinations**

Aircraft Model(s)	Time-In-Mode Category	Engine Model(s) (Number of Engines)	APU Model(s) (Number of APUs)	APU hours of Operation Per LTO <sup>a</sup> (Without Gate Power)	Notes:
Cessna 150, -150A, -150B, -150C, -150D, -150E, -150F, -150G, -150H, -150I, -150K, -150L, -150M	General Aviation: Piston	O-200-A (1)	---	---	b, c(2)
Cessna 172I, -172K, -172L, -172M	General Aviation: Piston	O-320-E2D (1)	---	---	b, c(2)
Cessna 172N	General Aviation: Piston	O-320-H2AD (1)	---	---	b, c(2)
Cessna 172P	General Aviation: Piston	O-320-D2J (1)	---	---	b, c(2)
Cessna 336	General Aviation: Piston	IO-360-A (2) TSIO-360-C (2)	---	---	b, c(1), c(2), c(6)
Cessna 337, -337A, -337B	General Aviation: Piston	IO-360-C, -360-CB, -360-D, -360-DB, -360-G, -360-GB (2)	---	---	b, c(2)
Cessna 337C, -337D, -337E, -337F, -337G	General Aviation: Piston	IO-360-C, -360-CB, -360-G, -360-GB (2)	---	---	b, c(2)
Cessna 337H	General Aviation: Piston	IO-360-G, -360-GB (2)	---	---	b, c(2)
Cessna Citation I	General Aviation: Business Jet	JT15D-1, -1A, -1B (2)	---	---	c(1), c(3)
Cessna Citation II, -II/S	General Aviation: Business Jet	JT15D-4, -4B (2)	---	---	c(3)
Cessna Citation Ultra	General Aviation: Business Jet	JT15D-5D (2)	---	---	b, c(3)
Cessna Citation V	General Aviation: Business Jet	JT15D-5A (2)	---	---	c(3)
Cessna M337B	General Aviation: Piston	IO-360-D, -360-DB (2)	---	---	b, c(2)
Cessna P337H	General Aviation: Piston	TSIO-360-C, -360-CB (2)	---	---	b, c(2)
Cessna T337B	General Aviation: Piston	TSIO-360-A, -360-AB, -360-B, -360-BB (2)	---	---	b, c(2)
Cessna T337C, -T337D, -T337E, -T337F	General Aviation: Piston	TSIO-360-A, -360-AB (2)	---	---	b, c(2)
Cessna T337H	General Aviation: Piston	IO-360-G, -360-GB (2) TSIO-360-JB (2)	---	---	b, c(2)
Cheyenne III, -IIIA	General Aviation: Turboprop	PT6A-41 (2)	---	---	c(3)
CL-600-1A11	General Aviation: Business Jet	ALF 502L, -502L-2 (2)	---	---	b, c(2)
CL-600-2A12	General Aviation: Business Jet	CF34-3A, -3A2 (2)	---	---	b, c(2)
CL-600-2B16	General Aviation: Business Jet	CF34-3A, -3A1, -3A2, -3B (2)	---	---	b, c(2)
CL-600-2B19	General Aviation: Business Jet	CF34-3A1, -3B1 (2)	---	---	b, c(2)
CL-600-2C10	General Aviation: Business Jet	CF34-8C1, -8C5B1 (2)	---	---	c(2)
CL-600-2D15	General Aviation: Business Jet	CF34-8C5, -8C5A1 (2)	---	---	c(2)
CL-600-2D24	General Aviation: Business Jet	CF34-8C5, -8C5A1 (2)	---	---	c(2)
CL-600-2E25	General Aviation: Business Jet	CF34-8C5, -8C5A1, -8C5A2 (2)	---	---	c(2)
DC-10 Series	Commercial Carrier: Jumbo, long, and medium range jet	CF6-6D, -6D1, -6D1A, -6K, -6K2 (3) CF6-50A, -50C, -50C1, -50C2, -50C2B, -50C2R, -50CA (3) JT9D-20, -20J, -59A (3)	TSCP 700-4B (1)	0.23 - 0.26 [1.0- 1.5]	b, c(1), c(2), d(2)
DC-8 Series	Commercial Carrier: Jumbo, long, and medium range jet	CFM56-2-C1, -2-C3, -2-C5 (4) JT3D-3, -3B, -7 (4)	---	---	b, c(2)
DC-9 Series	Commercial Carrier: Jumbo, long, and medium range jet	JT8D-7, -7A, -7B, -9, -9A (2) JT8D-11, -15, 15A, -17, -17A (2) JT8D-209, -217, -217A, -217C, -219 (2)	GTCP 85-98D (1)	0.23 - 0.26 [0.87]	b, c(1), c(2), d(1), d(2)
DH.125 Series 1A, -3A, -3A/RA, -400A	General Aviation: Business Jet	TFE731-3, -3R (2)	---	---	b, c(2)
DHC-6-300, -400	General Aviation: Turboprop	PT6A-27 (2)	---	---	c(2)
F.27 Mark 100, -200, -300, -400, -600, -700	General Aviation: Turboprop	SPEY Mk511, -Mk511-7E (2)	---	---	b, c(2)
F.28 Mark 0070	General Aviation: Business Jet	TAY Mk650-15 (2)	---	---	c(2)
F.28 Mark 0100	General Aviation: Business Jet	TAY Mk620-15 (2) TAY Mk650-15 (2)	---	---	c(2)
F.28 Mark 1000, -2000	General Aviation: Business Jet	SPEY MK555-15 (2)	---	---	b, c(2)
F.28 Mark 3000, -4000	General Aviation: Business Jet	SPEY MK555-15H (2)	---	---	b, c(2)

Table 2-8. Commercial Airframe/Engine/APU Combinations

Aircraft Model(s)	Time-In-Mode Category	Engine Model(s) (Number of Engines)	APU Model(s) (Number of APUs)	APU hours of Operation Per LTO <sup>a</sup> (Without Gate Power)	Notes:
Falcon 20	General Aviation: Business Jet	CF700-2D (2)	---	---	c(1)
G-1159, -1159A, -1159B	General Aviation: Business Jet	SPEY Mk511-8 (2)	GTCP 36-6 (1)	0.23 - 0.26 [0.87]	b, c(2), d(2)
G200	General Aviation: Business Jet	PW306A (2)	---	---	c(3)
G-21	General Aviation: Turboprop	PT6A-27 (2)	---	---	c(1)
G280	General Aviation: Business Jet	AS907-2-1G (2)	---	---	c(2)
GIV	General Aviation: Business Jet	TAY Mk611-8 (2)	---	---	c(2)
GIV-X	General Aviation: Business Jet	TAY Mk611-8C (2)	---	---	b, c(2)
GV	General Aviation: Business Jet	BR700-710A1-10 (2)	---	---	c(2)
GVI	General Aviation: Business Jet	BR725A1-12 (2)	---	---	c(2)
GV-SP	General Aviation: Business Jet	BR700-710C4-11 (2)	---	---	c(2)
Hawker 4000	General Aviation: Business Jet	PW308A (2)	---	---	c(3)
Hawker 400A, -400XP	General Aviation: Business Jet	JT15D-5, -5R (2)	---	---	b, c(3)
HS.125 Series 403B, -600A, -700A, -700B, -F3B, -F3B/RA, -F400B, -F600B	General Aviation: Business Jet	TFE731-3, -3R (2)	---	---	b, c(2)
JetStar 1329-25	General Aviation: Business Jet	TFE731-3-1F (4)	---	---	b, c(2)
King Air B200	General Aviation: Turboprop	PT6A-41 (2)	---	---	c(3)
L-1011-385-1	Commercial Carrier: Jumbo, long, and medium range jet	RB211-22C-02, -22B-02 (3)	---	---	b, c(2)
L-1011-385-1-14	Commercial Carrier: Jumbo, long, and medium range jet	RB211-22B-02, -524B-02, -524B4-02, -524B3-02 (3)	---	---	b, c(2)
L-1011-385-1-15	Commercial Carrier: Jumbo, long, and medium range jet	RB211-22B-02, -22B4D-02, -524B-02, -524B4-02, -524B3-02 (3)	---	---	b, c(2)
Learjet 31, -31A	General Aviation: Business Jet	TFE731-2-3B (2)	---	---	b, c(2)
Learjet 35, -36	General Aviation: Business Jet	TFE731-2, -2-2B (2)	---	---	c(1)
Learjet 35A, -36A	General Aviation: Business Jet	TFE731-2-2B (2)	---	---	c(1)
Learjet 55	General Aviation: Business Jet	TFE731-3A-2B1, -3A-2B, -3AR-2B1, -3AR-2B (2)	---	---	b, c(2)
Learjet 55B	General Aviation: Business Jet	TFE731-3AR-2B1, -3AR-2B (2)	---	---	b, c(2)
Learjet 55C	General Aviation: Business Jet	TFE731-3AR-3B1, -3AR-3B, -3AR-2B1, -3AR-2B (2)	---	---	b, c(2)
MD-10-10F	Commercial Carrier: Jumbo, long, and medium range jet	CF6-6D, -6K (3)	TSCP 700-4B (1)	0.23 - 0.26 [1.0 - 1.5]	c(2), d(2)
MD-10-30F	Commercial Carrier: Jumbo, long, and medium range jet	CF6-50C2 (3)	TSCP 700-4B (1)	0.23 - 0.26 [1.0 - 1.5]	c(2), d(2)
MD-11, -11F	Commercial Carrier: Jumbo, long, and medium range jet	CF6-80C2D1F (3) PW4460 (3)	TSCP 700-4 (1)	0.23 - 0.26 [1.0 - 1.5]	c(2), d(2)
MD-88	Commercial Carrier: Jumbo, long, and medium range jet	JT8D-217A, -217C, -219 (2)	---	---	c(2)
MD-90, -90-30	Commercial Carrier: Jumbo, long, and medium range jet	V2525-D5 (2) V2528-D5 (2)	---	---	c(2)
MU-300, -300-10	General Aviation: Business Jet	JT15D-4, -4D (2)	---	---	b, c(2)
NA-265-80	General Aviation: Business Jet	CF700-2D-2 (2)	---	---	b, c(2)
PA-18A	General Aviation: Piston	O-320 (1)	---	---	c(2)
PA-23, -23-160	General Aviation: Piston	O-320 (2)	---	---	c(2)
PA-28-140	General Aviation: Piston	O-320-E2A (1)	---	---	b, c(2)
PA-28-150	General Aviation: Piston	O-320-A2B, -E2A (1)	---	---	b, c(2)
PA-28-151	General Aviation: Piston	O-320-E3D (1)	---	---	b, c(2)

Table 2-8. Commercial Airframe/Engine/APU Combinations

Aircraft Model(s)	Time-In-Mode Category	Engine Model(s) (Number of Engines)	APU Model(s) (Number of APUs)	APU hours of Operation Per LTO <sup>a</sup> (Without Gate Power)	Notes:
PA-28-160	General Aviation: Piston	O-320-B2B, -D2A (1)	---	---	b, c(2)
PA-28-161	General Aviation: Piston	O-320-D2A, -D3G (1)	---	---	b, c(2)
PA-28-201T	General Aviation: Piston	TSIO-360-FB (1)	---	---	b, c(2)
PA-28R-180	General Aviation: Piston	IO-360-B1E (1)	---	---	b, c(2)
PA-28R-200	General Aviation: Piston	IO-360-C1C, -C1C6 (1)	---	---	b, c(2)
PA-28R-201, -28RT-201	General Aviation: Piston	IO-360-C1C6 (1)	---	---	b, c(2)
PA-28R-201T	General Aviation: Piston	TSIO-360-F, -360-FB (1)	---	---	b, c(2)
PA-28RT-201T	General Aviation: Piston	TSIO-360-FB (1)	---	---	b, c(2)
PA-28S-160	General Aviation: Piston	O-320-D2A (1)	---	---	b, c(2)
PA-31	General Aviation: Piston	TIO-540, -540-A1A, -540-A1B, -540-A2A, -540-A2B, -540-A2C (2)	---	---	b, c(1)
PA-31-325	General Aviation: Piston	TIO-540-F2BD (2)	---	---	b, c(2)
PA-31-350	General Aviation: Piston	TIO-540-J2BD, -540-J2B (2)	---	---	b, c(2)
PA-32-301T	General Aviation: Piston	TIO-540-S1AD (1)	---	---	b, c(2)
PA-32-301XTC	General Aviation: Piston	TIO-540-AH1A (1)	---	---	b, c(2)
PA-32R-301T	General Aviation: Piston	TIO-540-S1AD, 540-AH1A (1)	---	---	b, c(2)
PA-32RT-300T	General Aviation: Piston	TIO-540-S1AD (1)	---	---	b, c(2)
PA-36-285	General Aviation: Turboprop	6-285-B, -285-BA, -285-C, -285-CA (1)	---	---	b, c(2)
PA-42	General Aviation: Turboprop	PT6A-41 (2)	---	---	c(2)
PA-46-350P, -46R-350T	General Aviation: Turboprop	TIO-540-AE2A (1)	---	---	b, c(2)
SA226-AT	General Aviation: Turboprop	TPE331-3U-303G, -3U-304G, -3UW-303G (2)	---	---	b, c(2)
SA226-T	General Aviation: Turboprop	TPE331-3U-303G, -3U-304G (2)	---	---	b, c(2)
SA226-TC	General Aviation: Turboprop	TPE331-3U-303G, -3U-304G, -3UW-303G, -3UW-304G (2)	---	---	b, c(2)
SC-7	General Aviation: Turboprop	TPE331-2-201A (2)	---	---	b, c(1)
Super King Air A100-1, -200, -200C, -200CT, -200T, -A200, -A200C, -A200CT, -B200, -B200C, -B200CT, -B200T	General Aviation: Turboprop	PT6A-41 (2)	---	---	c(2)
TU-154-B	Commercial Carrier: Jumbo, long, and medium range jet	NK-8-2U (3)	---	---	c(7)
Twin Commander 685	General Aviation: Piston	GTSIO-520-F, -520-K (2)	---	---	b, c(2)

Note that some Aircraft model/engine/APU combinations may be missing due to unverified sources and/or missing emission factors for either engine(s) and/or APU(s).

- a. SOURCE: *Airport Air Quality Manual*, International Civil Aviation Organization, 2011. ICAO provides a range for both narrow body and wide body aircraft. The values given out of the brackets assume gate power while the bracketed values are in instances where there is no gate power.
- b. This document does not have emission factors for at least one engine/APU listed for this aircraft.
- c. The Aircraft/Engine combination source was reported in one of the following documents:
  - (1) SOURCE: *Air Pollutant Emission Factors for Military and Civil Aircraft*, EPA-450/3-78-117, October 1978.
  - (2) SOURCE: The Federal Aviation Administration (FAA) Type Certificate Data Sheet (TCDS) for the airframe model listed.
  - (3) SOURCE: Pratt & Whitney website ([www.pw.utc.com](http://www.pw.utc.com)).
  - (4) SOURCE: The European Aviation Safety Agency (EASA) TCDS for the airframe model listed.
  - (5) SOURCE: Airbus website ([www.airbus.com](http://www.airbus.com)).
  - (6) SOURCE: Boeing website ([www.boeing.com](http://www.boeing.com)).
  - (7) SOURCE: Tupolev website ([www.tupolev.ru/english/](http://www.tupolev.ru/english/)).
- d. Airframe/APU combination source was reported in one of the following:
  - (1) SOURCE: Emissions and Dispersion Modeling System Input from Paine Field
  - (2) SOURCE: FAA TCDS for the listed airframe
  - (3) SOURCE: EASA TCDS for the listed airframe



Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
6-285-B	Idle (Taxi)	72	0.46	1.07	363.70	12.33	0.76 (S)	0.68 (S)
	Approach	84	4.72	1.07	1022.63	18.50	0.12 (S)	0.11 (S)
	Climb out	166	5.50	1.07	668.07	9.63	0.30 (S)	0.27 (S)
	Takeoff	153	5.88	1.07	998.04	13.38	0.31 (S)	0.28 (S)
Notes: c(1), d(5) - PM <sub>10</sub> and PM <sub>2.5</sub> data at all power settings, e, h, i, k(8)								
AE1107C	Idle	362	4.15	1.07	8.35	0.10	1.58	1.42
	Flight Idle	663	6.05	1.07	3.47	0.02	1.58	1.42
	Intermediate	948	7.87	1.07	1.82	0.02	1.58	1.42
	Max Continuous	2507	18.03	1.07	0.29	0.01	1.58	1.42
Notes: c(6) - This is the commercial designation of the T406-AD-400 engine, h, k(4)								
AE3007A	Idle (Taxi)	389	3.83	1.07	17.35	2.89	0.05	0.05
	Approach	929	7.79	1.07	3.28	0.74	0.07	0.07
	Climb out	2500	17.47	1.07	0.92	0.33	0.06	0.05
	Takeoff	2992	20.54	1.07	0.75	0.29	0.08	0.07
Notes: c(2), e, f, h, k(5)								
ALF 502L-2	Idle (Taxi)	379	3.38	1.07	45.63	7.65	0.10	0.09
	Approach	930	6.47	1.07	3.97	0.21	0.11	0.10
	Climb out	2568	12.03	1.07	0.30	0.03	0.11	0.09
	Takeoff	3174	13.43	1.07	0.40	0.02	0.07	0.07
Notes: c(2), e, f, h, k(8)								
ALF 502R-3	Idle (Taxi)	343	3.30	1.07	44.67	7.49	0.09	0.08
	Approach	815	6.15	1.07	8.43	0.33	0.09	0.08
	Climb out	2286	9.94	1.07	0.50	0.06	0.10	0.09
	Takeoff	2759	11.20	1.07	0.43	0.06	0.10	0.09
Notes: c(2), e, f, h, k(8)								
ALF 502R-5	Idle (Taxi)	324	3.78	1.07	40.93	6.20	0.09	0.08
	Approach	821	6.60	1.07	7.10	0.25	0.09	0.08
	Climb out	2345	10.56	1.07	0.25	0.06	0.11	0.10
	Takeoff	2842	13.35	1.07	0.30	0.07	0.11	0.10
Notes: c(2), e, f, h, k(8)								
AS907-1-1A	Idle (Taxi)	381	3.91	1.07	33.24	1.45	0.10	0.09
	Approach	825	8.81	1.07	6.28	0.14	0.06	0.05
	Climb out	2286	16.17	1.07	0.63	0.07	0.31	0.28
	Takeoff	2754	17.90	1.07	0.56	0.06	0.36	0.33
Notes: c(2), e, f, h, k(1)								
AS907-2-1G	Idle (Taxi)	389	3.97	1.07	30.48	1.14	0.11	0.10
	Approach	849	8.96	1.07	6.07	0.14	0.06	0.06
	Climb out	2444	16.44	1.07	0.60	0.07	0.31	0.28
	Takeoff	2952	18.43	1.07	0.57	0.06	0.36	0.33
Notes: c(2), e, f, h, k(1)								

Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
BR700-710A1-10	Idle (Taxi)	706	4.69	1.07	27.82	1.25	0.06	0.05
	Approach	1698	7.68	1.07	4.78	0.06	0.05	0.04
	Climb out	4714	15.07	1.07	0.93	0.02	0.35	0.31
	Takeoff	5659	18.79	1.07	1.04	0.02	0.37	0.33
Notes: c(2), e, f, h, k(8)								
BR700-710A2-20	Idle (Taxi)	706	4.67	1.07	28.00	1.29	0.06	0.05
	Approach	1698	7.67	1.07	4.81	0.06	0.05	0.04
	Climb out	4722	15.03	1.07	0.93	0.02	0.34	0.31
	Takeoff	5667	18.73	1.07	1.04	0.02	0.37	0.33
Notes: c(2), e, f, h, k(8)								
BR700-710C4-11	Idle (Taxi)	659	4.50	1.07	31.57	2.63	0.06	0.06
	Approach	1706	7.71	1.07	4.92	0.06	0.05	0.04
	Climb out	4897	15.43	1.07	0.92	0.02	0.35	0.32
	Takeoff	5929	19.52	1.07	1.04	0.02	0.37	0.33
Notes: c(2), e, f, h, k(8)								
BR700-715A1-30	Idle (Taxi)	762	5.37	1.07	16.27	0.24	0.07	0.06
	Approach	1944	11.19	1.07	3.76	0.01	0.06	0.06
	Climb out	5476	18.65	1.07	0.75	0.02	0.09	0.08
	Takeoff	6635	23.97	1.07	0.78	0.00	0.10	0.09
Notes: c(2), e, f, h, k(8)								
BR700-715C1-30	Idle (Taxi)	833	4.28	1.07	17.85	0.07	0.04	0.04
	Approach	2159	9.23	1.07	3.23	0.02	0.07	0.06
	Climb out	6389	20.05	1.07	0.64	0.07	0.13	0.12
	Takeoff	7810	27.92	1.07	0.80	0.01	0.13	0.12
Notes: c(2), e, f, h, k(8)								
BR725A1-12	Idle (Taxi)	675	3.38	1.07	41.90	3.45	0.06	0.05
	Approach	1754	7.81	1.07	5.93	0.00	0.04	0.03
	Climb out	5159	13.32	1.07	0.32	0.00	0.13	0.12
	Takeoff	6262	16.92	1.07	0.40	0.00	0.11	0.10
Notes: c(2), e, f, h, k(8)								
CF6-6D	Idle (Taxi)	1371	4.50	1.07	54.20	24.15	0.20	0.18
	Approach	3841	11.40	1.07	6.50	0.81	0.10	0.09
	Climb out	11357	32.60	1.07	0.50	0.35	0.07	0.07
	Takeoff	13778	40.00	1.07	0.50	0.35	0.09	0.08
Notes: c(2), e, f, h, k(1)								
CF6-6D1A	Idle (Taxi)	1397	4.60	1.07	52.00	22.89	0.19	0.17
	Approach	3921	11.80	1.07	5.50	0.69	0.09	0.08
	Climb out	11921	33.90	1.07	0.50	0.35	0.07	0.07
	Takeoff	14381	41.60	1.07	0.50	0.35	0.09	0.08
Notes: c(2), e, f, h, k(1)								

Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
CF6-6K	Idle (Taxi)	1371	4.50	1.07	54.20	24.15	0.20	0.18
	Approach	3841	11.40	1.07	6.50	0.81	0.10	0.09
	Climb out	11357	32.60	1.07	0.50	0.35	0.07	0.07
	Takeoff	13778	40.00	1.07	0.50	0.35	0.09	0.08
Notes: c(2), e, f, h, k(1)								
CF6-6K2	Idle (Taxi)	1397	4.60	1.07	52.00	22.89	0.19	0.17
	Approach	3921	11.80	1.07	5.50	0.69	0.09	0.08
	Climb out	11921	33.90	1.07	0.50	0.35	0.07	0.07
	Takeoff	14381	41.60	1.07	0.50	0.35	0.09	0.08
Notes: c(2), e, f, h, k(1)								
CF6-50A	Idle (Taxi)	1294	3.40	1.07	24.04	3.13	0.06	0.06
	Approach	4960	9.72	1.07	4.35	0.36	0.06	0.06
	Climb out	14183	23.27	1.07	0.49	0.16	0.11	0.10
	Takeoff	17206	27.17	1.07	0.43	0.17	0.11	0.10
Notes: c(2), e, f, h, k(1)								
CF6-50C	Idle (Taxi)	1683	3.50	1.07	62.30	26.45	0.22	0.20
	Approach	5103	9.40	1.07	5.20	1.15	0.11	0.10
	Climb out	15199	29.00	1.07	0.50	0.81	0.10	0.09
	Takeoff	18881	35.00	1.07	0.50	0.69	0.12	0.11
Notes: c(2), e, f, h, k(1)								
CF6-50C1, -50C2	Idle (Taxi)	1706	3.60	1.07	61.80	25.07	0.21	0.19
	Approach	5238	9.50	1.07	4.30	1.15	0.11	0.10
	Climb out	15675	29.70	1.07	0.50	0.81	0.10	0.09
	Takeoff	19738	36.30	1.07	0.50	0.69	0.12	0.11
Notes: c(2) - CF6-50C2 is the commercial designation of the F103-GE-101 engine, e, f, h, k(1)								
CF6-50C2B	Idle (Taxi)	1294	3.40	1.07	24.04	3.13	0.06	0.06
	Approach	5294	10.49	1.07	3.42	0.30	0.06	0.06
	Climb out	15849	26.34	1.07	0.44	0.17	0.11	0.10
	Takeoff	19127	29.59	1.07	0.46	0.15	0.10	0.09
Notes: c(2), e, f, h, k(1)								
CF6-50C2R	Idle (Taxi)	1683	3.50	1.07	62.30	26.45	0.22	0.20
	Approach	5103	9.40	1.07	5.20	1.15	0.11	0.10
	Climb out	15199	29.00	1.07	0.50	0.81	0.10	0.09
	Takeoff	18881	35.00	1.07	0.50	0.69	0.12	0.11
Notes: c(2), e, f, h, k(1)								
CF6-50CA	Idle (Taxi)	1294	3.40	1.07	24.04	3.13	0.06	0.06
	Approach	5087	10.09	1.07	3.99	0.33	0.06	0.06
	Climb out	14881	24.30	1.07	0.46	0.16	0.11	0.10
	Takeoff	18103	28.03	1.07	0.44	0.16	0.10	0.09
Notes: c(2), e, f, h, k(1)								

**Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants**

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
CF6-50E, -50E1	Idle (Taxi)	1294	3.40	1.07	24.04	3.13	0.06	0.06
	Approach	5262	10.16	1.07	3.71	0.32	0.06	0.06
	Climb out	15397	25.50	1.07	0.45	0.17	0.11	0.10
	Takeoff	18738	28.97	1.07	0.45	0.16	0.10	0.09
Notes: c(2), e, f, h, k(1)								
CF6-50E2	Idle (Taxi)	1706	3.60	1.07	61.80	25.07	0.21	0.19
	Approach	5238	9.50	1.07	4.30	1.15	0.11	0.10
	Climb out	15675	29.70	1.07	0.50	0.81	0.10	0.09
	Takeoff	19738	36.30	1.07	0.50	0.69	0.12	0.11
Notes: c(2) - CF6-50E2 is the commercial designation of the F103-GE-100 engine, e, f, h, k(1)								
CF6-80A	Idle (Taxi)	1190	3.40	1.07	28.20	7.23	0.09	0.08
	Approach	4881	10.30	1.07	3.10	0.54	0.08	0.07
	Climb out	14246	25.60	1.07	1.10	0.33	0.11	0.10
	Takeoff	17024	29.80	1.07	1.00	0.33	0.13	0.11
Notes: c(2), e, f, h, k(1)								
CF6-80A2, -80A3	Idle (Taxi)	1190	3.40	1.07	28.20	7.22	0.09	0.08
	Approach	5087	10.80	1.07	2.80	0.52	0.07	0.07
	Climb out	14960	26.60	1.07	1.10	0.43	0.11	0.10
	Takeoff	17889	29.60	1.07	1.00	0.35	0.13	0.11
Notes: c(2), e, f, h, k(1)								
CF6-80C2A1	Idle (Taxi)	1579	3.99	1.07	42.24	10.57	0.12	0.11
	Approach	5048	9.76	1.07	2.19	0.23	0.06	0.06
	Climb out	15500	24.85	1.07	0.54	0.10	0.07	0.06
	Takeoff	19048	32.22	1.07	0.56	0.09	0.08	0.07
Notes: c(2), e, f, h, k(1)								
CF6-80C2A2	Idle (Taxi)	1500	3.95	1.07	46.01	12.05	0.13	0.11
	Approach	4603	9.44	1.07	2.94	0.26	0.06	0.06
	Climb out	13849	20.69	1.07	0.55	0.12	0.06	0.06
	Takeoff	16802	27.93	1.07	0.57	0.09	0.07	0.07
Notes: c(2), e, f, h, k(1)								
CF6-80C2A3	Idle (Taxi)	1603	3.92	1.07	41.51	10.28	0.12	0.10
	Approach	5151	9.93	1.07	2.07	0.22	0.06	0.06
	Climb out	15897	25.46	1.07	0.56	0.09	0.07	0.06
	Takeoff	19500	34.50	1.07	0.58	0.07	0.08	0.07
Notes: c(2), e, f, h, k(1)								
CF6-80C2A5	Idle (Taxi)	1643	3.79	1.07	41.65	10.34	0.12	0.10
	Approach	5452	9.11	1.07	1.93	0.23	0.06	0.06
	Climb out	16524	22.86	1.07	0.52	0.09	0.07	0.06
	Takeoff	20484	34.38	1.07	0.52	0.08	0.08	0.07
Notes: c(2), e, f, h, k(1)								

Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
CF6-80C2A5F	Idle (Taxi)	1746	4.90	1.07	16.96	1.36	0.05	0.04
	Approach	5484	12.64	1.07	1.92	0.13	0.04	0.04
	Climb out	16714	21.27	1.07	0.04	0.05	0.06	0.06
	Takeoff	20873	28.11	1.07	0.05	0.06	0.07	0.07
Notes: c(2), e, f, h, k(1)								
CF6-80C2B1	Idle (Taxi)	1556	3.73	1.07	43.22	10.88	0.12	0.11
	Approach	4889	8.83	1.07	2.37	0.24	0.06	0.06
	Climb out	14865	21.26	1.07	0.55	0.10	0.06	0.06
	Takeoff	18135	28.11	1.07	0.58	0.09	0.08	0.07
Notes: c(2), e, f, h, k(1)								
CF6-80C2B1F	Idle (Taxi)	1579	4.73	1.07	19.23	1.77	0.05	0.04
	Approach	5159	12.47	1.07	2.13	0.13	0.04	0.04
	Climb out	15738	19.72	1.07	0.04	0.06	0.06	0.05
	Takeoff	19222	24.94	1.07	0.04	0.06	0.07	0.06
Notes: c(2), e, f, h, k(1)								
CF6-80C2B2	Idle (Taxi)	1508	4.45	1.07	22.41	2.27	0.05	0.05
	Approach	4643	11.79	1.07	2.61	0.14	0.05	0.04
	Climb out	13937	18.25	1.07	0.05	0.06	0.05	0.05
	Takeoff	16857	22.02	1.07	0.04	0.06	0.07	0.06
Notes: c(2), e, f, h, k(1)								
CF6-80C2B2F	Idle (Taxi)	1492	4.52	1.07	21.56	2.14	0.05	0.05
	Approach	4706	11.80	1.07	2.64	0.14	0.05	0.04
	Climb out	14103	18.09	1.07	0.06	0.06	0.05	0.05
	Takeoff	17048	21.55	1.07	0.04	0.06	0.07	0.06
Notes: c(2), e, f, h, k(1)								
CF6-80C2B4	Idle (Taxi)	1595	4.68	1.07	19.76	1.83	0.05	0.04
	Approach	5087	12.37	1.07	2.12	0.14	0.05	0.04
	Climb out	15595	20.17	1.07	0.04	0.06	0.06	0.05
	Takeoff	19119	25.93	1.07	0.05	0.06	0.07	0.06
Notes: c(2), e, f, h, k(1)								
CF6-80C2B4F	Idle (Taxi)	1579	4.73	1.07	19.23	1.77	0.05	0.04
	Approach	5159	12.47	1.07	2.13	0.13	0.04	0.04
	Climb out	15738	19.72	1.07	0.04	0.06	0.06	0.05
	Takeoff	19302	25.08	1.07	0.04	0.06	0.07	0.06
Notes: c(2), e, f, h, k(1)								
CF6-80C2B5F	Idle (Taxi)	1635	4.91	1.07	17.45	1.51	0.05	0.04
	Approach	5532	12.74	1.07	1.83	0.13	0.04	0.04
	Climb out	17159	21.76	1.07	0.04	0.06	0.06	0.06
	Takeoff	21310	28.58	1.07	0.05	0.06	0.07	0.07
Notes: c(2), e, f, h, k(1)								

Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
CF6-80C2B6	Idle (Taxi)	1627	4.76	1.07	18.89	1.70	0.05	0.04
	Approach	5333	12.53	1.07	1.91	0.13	0.04	0.04
	Climb out	16635	21.69	1.07	0.04	0.06	0.07	0.06
	Takeoff	20476	28.57	1.07	0.06	0.05	0.07	0.06
Notes: c(2), e, f, h, k(1)								
CF6-80C2B6F	Idle (Taxi)	1611	4.81	1.07	18.42	1.64	0.05	0.04
	Approach	5413	12.63	1.07	1.93	0.13	0.04	0.04
	Climb out	16699	21.05	1.07	0.04	0.06	0.06	0.06
	Takeoff	20587	27.38	1.07	0.05	0.06	0.07	0.06
Notes: c(2), e, f, h, k(1)								
CF6-80C2B7F	Idle (Taxi)	1611	4.81	1.07	18.42	1.64	0.05	0.04
	Approach	5413	12.63	1.07	1.93	0.13	0.04	0.04
	Climb out	16699	21.05	1.07	0.04	0.06	0.06	0.06
	Takeoff	20587	27.38	1.07	0.05	0.06	0.07	0.06
Notes: c(2), e, f, h, k(1)								
CF6-80C2B8F	Idle (Taxi)	1627	4.59	1.07	16.69	1.31	0.05	0.04
	Approach	5437	12.42	1.07	1.69	0.10	0.04	0.04
	Climb out	16714	20.84	1.07	0.02	0.05	0.06	0.05
	Takeoff	20500	26.85	1.07	0.03	0.05	0.07	0.06
Notes: c(2), e, f, h, k(1)								
CF6-80C2D1F	Idle (Taxi)	1556	3.80	1.07	41.78	10.38	0.12	0.11
	Approach	5214	9.16	1.07	1.94	0.23	0.06	0.06
	Climb out	16389	24.02	1.07	0.52	0.09	0.07	0.06
	Takeoff	20603	32.65	1.07	0.52	0.08	0.08	0.07
Notes: c(2), e, f, h, k(1)								
CF6-80E1A1	Idle (Taxi)	1794	4.47	1.07	43.24	11.13	0.10	0.09
	Approach	5667	9.84	1.07	1.70	0.16	0.05	0.04
	Climb out	17452	27.11	1.07	0.34	0.08	0.07	0.07
	Takeoff	21445	37.87	1.07	0.38	0.06	0.09	0.08
Notes: c(2), e, f, h, k(1)								
CF6-80E1A2	Idle (Taxi)	1810	4.53	1.07	42.67	10.78	0.10	0.09
	Approach	5746	9.91	1.07	1.61	0.16	0.05	0.04
	Climb out	17818	28.02	1.07	0.34	0.08	0.08	0.07
	Takeoff	21960	39.29	1.07	0.38	0.06	0.09	0.08
Notes: c(2), e, f, h, k(1)								
CF6-80E1A3	Idle (Taxi)	1802	4.69	1.07	37.02	10.96	0.10	0.09
	Approach	5992	10.29	1.07	1.23	0.21	0.05	0.04
	Climb out	18945	31.74	1.07	0.31	0.08	0.08	0.08
	Takeoff	23722	45.63	1.07	0.34	0.08	0.09	0.08
Notes: c(2), e, f, h, k(1)								

Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
CF6-80E1A4	Idle (Taxi)	1802	4.62	1.07	38.09	11.90	0.10	0.09
	Approach	5905	10.13	1.07	1.33	0.21	0.05	0.04
	Climb out	18548	30.30	1.07	0.30	0.08	0.08	0.07
	Takeoff	23048	43.15	1.07	0.34	0.07	0.09	0.08
Notes: c(2), e, f, h, k(1)								
CF34-3A, -3A1	Idle (Taxi)	394	3.82	1.07	42.60	4.54	0.09	0.08
	Approach	944	6.86	1.07	1.90	0.15	0.06	0.06
	Climb out	2653	10.14	1.07	0.00	0.07	0.09	0.08
	Takeoff	3230	11.61	1.07	0.00	0.07	0.16	0.14
Notes: c(2), e, f, h, k(4)								
CF34-3B	Idle (Taxi)	388	3.72	1.07	47.59	5.39	0.09	0.08
	Approach	921	6.63	1.07	1.88	0.15	0.06	0.06
	Climb out	2610	9.68	1.07	0.00	0.06	0.09	0.08
	Takeoff	3167	11.28	1.07	0.00	0.07	0.14	0.12
Notes: c(2), e, f, h, k(1)								
CF34-8C1	Idle (Taxi)	548	4.31	1.07	24.92	0.09	0.04	0.04
	Approach	1334	11.10	1.07	2.91	0.07	0.04	0.04
	Climb out	3921	12.82	1.07	0.50	0.02	0.04	0.04
	Takeoff	4795	14.67	1.07	0.41	0.02	0.06	0.05
Notes: c(2), e, f, h, k(1)								
CF34-8C5	Idle (Taxi)	508	4.60	1.07	18.25	0.15	0.04	0.04
	Approach	1421	10.75	1.07	4.24	0.07	0.04	0.04
	Climb out	4206	12.60	1.07	0.57	0.02	0.05	0.04
	Takeoff	5143	14.69	1.07	0.64	0.02	0.07	0.07
Notes: c(2), e, f, h, k(1)								
CF34-8C5A1	Idle (Taxi)	516	4.65	1.07	17.85	0.15	0.04	0.04
	Approach	1452	10.87	1.07	4.17	0.07	0.04	0.04
	Climb out	4310	12.82	1.07	0.57	0.02	0.05	0.04
	Takeoff	5278	15.09	1.07	0.66	0.02	0.08	0.08
Notes: c(2), e, f, h, k(1)								
CF34-8C5A2	Idle (Taxi)	524	4.70	1.07	17.30	0.15	0.04	0.04
	Approach	1492	11.06	1.07	4.05	0.07	0.04	0.04
	Climb out	4468	13.15	1.07	0.57	0.02	0.05	0.05
	Takeoff	5484	15.81	1.07	0.71	0.02	0.10	0.09
Notes: c(2), e, f, h, k(1)								
CF34-8C5B1	Idle (Taxi)	500	4.50	1.07	19.52	0.18	0.04	0.04
	Approach	1357	10.42	1.07	4.44	0.08	0.04	0.04
	Climb out	3944	12.03	1.07	0.58	0.03	0.04	0.04
	Takeoff	4810	13.89	1.07	0.60	0.02	0.06	0.05
Notes: c(2), e, f, h, k(1)								

Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
CF700-2D	Idle (Taxi)	460	0.89	1.07	155.00	20.70	3.0E-03 (S)	2.7E-03 (S)
	Approach	919	1.80	1.07	62.00	1.61	0.01 (S)	0.01 (S)
	Climb out	2322	4.30	1.07	11.34	0.11	0.01 (S)	0.01 (S)
	Takeoff	2607	5.60	1.07	9.98	0.11	0.02 (S)	0.02 (S)
Notes: c(1), d(8) - PM <sub>10</sub> and PM <sub>2.5</sub> at all power settings, e, j, k(8)								
CFM56-2A Series	Idle (Taxi)	1032	4.30	1.07	23.50	1.30	0.06	0.05
	Approach	2524	8.70	1.07	3.40	0.09	0.06	0.05
	Climb out	7230	17.30	1.07	0.90	0.05	0.06	0.05
	Takeoff	8841	20.40	1.07	0.90	0.05	0.08	0.07
Notes: c(2), e, f, h, k(1)								
CFM56-2B-1	Idle (Taxi)	1136	3.88	1.07	23.65	0.19	2.07	1.86
	Approach	2547	5.73	1.07	8.57	0.06	1.55	1.40
	Intermediate	5650	11.04	1.07	2.32	0.03	0.65	0.58
	Military	6458	12.05	1.07	0.36	0.03	1.59	1.43
Notes: c(3) - CFM56-2B-1 is the commercial designation of the F108-CF-100 engine, h, k(5)								
CFM56-2-C5	Idle (Taxi)	1016	4.00	1.07	30.70	2.10	0.07	0.06
	Approach	2468	8.20	1.07	4.20	0.09	0.06	0.05
	Climb out	6500	16.00	1.07	0.90	0.06	0.05	0.05
	Takeoff	7818	18.50	1.07	0.90	0.05	0.07	0.06
Notes: c(2), e, f, h, k(1)								
CFM56-3-B1	Idle (Taxi)	905	3.90	1.07	34.40	2.62	0.07	0.06
	Approach	2302	8.30	1.07	3.80	0.09	0.06	0.05
	Climb out	6286	15.50	1.07	0.95	0.06	0.05	0.05
	Takeoff	7508	17.70	1.07	0.90	0.05	0.06	0.05
Notes: c(2), e, f, h, k(1)								
CFM56-3B-2	Idle (Taxi)	944	4.10	1.07	30.10	2.01	0.06	0.06
	Approach	2492	8.70	1.07	3.40	0.08	0.06	0.05
	Climb out	6968	16.70	1.07	0.90	0.05	0.05	0.05
	Takeoff	8381	19.40	1.07	0.90	0.04	0.07	0.06
Notes: c(2), e, f, h, k(1)								
CFM56-3C-1	Idle (Taxi)	984	4.30	1.07	26.80	1.63	0.06	0.06
	Approach	2667	9.10	1.07	3.10	0.08	0.06	0.05
	Climb out	7571	17.80	1.07	0.90	0.05	0.06	0.05
	Takeoff	9159	20.70	1.07	0.90	0.03	0.07	0.07
Notes: c(2), e, f, h, k(1)								
CFM56-5-A1	Idle (Taxi)	802	4.00	1.07	17.60	1.61	0.06	0.06
	Approach	2310	8.00	1.07	2.50	0.46	0.09	0.08
	Climb out	6841	19.60	1.07	0.90	0.26	0.13	0.12
	Takeoff	8341	24.60	1.07	0.90	0.26	0.14	0.13
Notes: c(2), e, f, h, k(1)								



Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
CFM56-5A3	Idle (Taxi)	829	4.10	1.07	16.20	1.50	0.07	0.06
	Approach	2437	8.30	1.07	2.40	0.35	0.09	0.08
	Climb out	7341	21.10	1.07	0.90	0.23	0.13	0.12
	Takeoff	8976	26.40	1.07	0.90	0.23	0.14	0.13
Notes: c(2), e, f, h, k(1)								
CFM56-5A4	Idle (Taxi)	754	4.04	1.07	20.30	2.01	0.07	0.06
	Approach	2071	8.51	1.07	3.10	0.58	0.09	0.08
	Climb out	5873	19.11	1.07	1.10	0.26	0.11	0.10
	Takeoff	7119	22.64	1.07	1.10	0.26	0.13	0.12
Notes: c(2), e, f, h, k(1)								
CFM56-5A5	Idle (Taxi)	778	4.29	1.07	18.50	1.76	0.07	0.06
	Approach	2190	8.94	1.07	2.80	0.52	0.09	0.08
	Climb out	6341	19.98	1.07	1.10	0.26	0.12	0.11
	Takeoff	7714	24.79	1.07	1.10	0.26	0.13	0.12
Notes: c(2), e, f, h, k(1)								
CFM56-5B1	Idle (Taxi)	929	4.60	1.07	28.40	3.69	0.06	0.05
	Approach	2889	10.80	1.07	1.57	0.14	0.05	0.04
	Climb out	8833	27.20	1.07	0.50	0.12	0.10	0.09
	Takeoff	10786	35.10	1.07	0.50	0.12	0.09	0.08
Notes: c(2), e, f, h, k(1)								
CFM56-5B2	Idle (Taxi)	944	4.70	1.07	27.40	3.50	0.06	0.05
	Approach	2984	11.00	1.07	1.40	0.14	0.05	0.04
	Climb out	9191	28.50	1.07	0.50	0.12	0.10	0.09
	Takeoff	11318	37.80	1.07	0.50	0.12	0.08	0.08
Notes: c(2), e, f, h, k(1)								
CFM56-5B4	Idle (Taxi)	849	4.30	1.07	31.90	4.45	0.06	0.06
	Approach	2587	10.00	1.07	2.33	0.15	0.05	0.04
	Climb out	7627	23.30	1.07	0.50	0.12	0.10	0.09
	Takeoff	9254	28.70	1.07	0.50	0.12	0.09	0.08
Notes: c(2), e, f, h, k(1)								
CFM56-5B4/3, -5B7/3	Idle (Taxi)	810	4.22	1.07	32.07	2.21	0.06	0.06
	Approach	2508	8.85	1.07	3.24	0.06	0.05	0.05
	Climb out	7452	17.23	1.07	0.16	0.02	0.09	0.08
	Takeoff	9064	21.57	1.07	0.25	0.02	0.10	0.09
Notes: c(2), e, f, h, k(1)								
CFM56-5B9/3	Idle (Taxi)	754	3.92	1.07	38.80	3.46	0.07	0.06
	Approach	2206	8.26	1.07	4.42	0.08	0.05	0.05
	Climb out	6294	14.76	1.07	0.17	0.03	0.08	0.07
	Takeoff	7587	17.54	1.07	0.16	0.02	0.09	0.08
Notes: c(2), e, f, h, k(1)								

Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
CFM56-5C2	Idle (Taxi)	933	4.19	1.07	34.00	6.53	0.12	0.11
	Approach	2824	10.00	1.07	1.75	0.09	0.08	0.07
	Climb out	8540	25.80	1.07	0.80	0.01	0.34	0.31
	Takeoff	10381	32.60	1.07	0.93	0.01	0.41	0.37
Notes: c(2), e, f, h, k(1)								
CFM56-5C2/P	Idle (Taxi)	865	3.90	1.07	35.10	6.67	0.12	0.11
	Approach	2714	9.30	1.07	2.10	0.00	0.07	0.07
	Climb out	8214	23.80	1.07	0.70	0.00	0.34	0.30
	Takeoff	9937	29.70	1.07	0.80	0.00	0.39	0.35
Notes: c(2), e, f, h, k(1)								
CFM56-5C3/P	Idle (Taxi)	889	4.00	1.07	33.40	6.21	0.12	0.11
	Approach	2817	9.60	1.07	1.90	0.00	0.07	0.07
	Climb out	8611	25.10	1.07	0.70	0.00	0.36	0.32
	Takeoff	10445	31.60	1.07	0.80	0.00	0.43	0.38
Notes: c(2), e, f, h, k(1)								
CFM56-5C4	Idle (Taxi)	984	4.28	1.07	30.93	5.75	0.12	0.11
	Approach	3064	10.67	1.07	1.40	0.07	0.08	0.07
	Climb out	9484	29.05	1.07	0.85	0.01	0.39	0.35
	Takeoff	11556	37.67	1.07	1.00	0.01	0.46	0.42
Notes: c(2), e, f, h, k(1)								
CFM56-5C4/P	Idle (Taxi)	913	4.10	1.07	31.60	5.75	0.12	0.11
	Approach	2937	9.90	1.07	1.60	0.00	0.07	0.07
	Climb out	9071	26.70	1.07	0.70	0.00	0.38	0.34
	Takeoff	11072	34.10	1.07	0.80	0.00	0.44	0.39
Notes: c(2), e, f, h, k(1)								
CFM56-7B18/3	Idle (Taxi)	730	3.65	1.07	46.64	5.19	0.08	0.07
	Approach	2032	7.78	1.07	5.54	0.09	0.05	0.05
	Climb out	5571	13.00	1.07	0.28	0.03	0.07	0.06
	Takeoff	6683	14.81	1.07	0.17	0.03	0.07	0.07
Notes: c(2), e, f, h, k(1)								
CFM56-7B20	Idle (Taxi)	794	4.30	1.07	25.90	3.57	0.06	0.05
	Approach	2175	9.50	1.07	3.20	0.12	0.04	0.04
	Climb out	6040	17.40	1.07	0.50	0.12	0.08	0.07
	Takeoff	7246	20.50	1.07	0.60	0.12	0.10	0.09
Notes: c(2), e, f, h, k(1)								
CFM56-7B20/2	Idle (Taxi)	810	3.75	1.07	49.71	9.33	0.09	0.08
	Approach	2206	9.39	1.07	11.37	0.41	0.07	0.06
	Climb out	5984	10.81	1.07	11.38	0.26	0.06	0.05
	Takeoff	7167	13.25	1.07	4.26	0.08	0.05	0.04
Notes: c(2), e, f, h, k(1)								

**Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants**

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
CFM56-7B20/3, -7B20E	Idle (Taxi)	746	3.77	1.07	43.31	4.42	0.08	0.07
	Approach	2127	7.98	1.07	5.03	0.09	0.05	0.05
	Climb out	5921	13.53	1.07	0.23	0.03	0.07	0.06
	Takeoff	7111	15.61	1.07	0.15	0.03	0.08	0.07
Notes: c(2), e, f, h, k(1)								
CFM56-7B22	Idle (Taxi)	833	4.50	1.07	22.80	2.88	0.05	0.05
	Approach	2365	10.00	1.07	2.50	0.12	0.04	0.04
	Climb out	6698	19.00	1.07	0.60	0.12	0.10	0.09
	Takeoff	8103	23.10	1.07	0.50	0.12	0.10	0.09
Notes: c(2), e, f, h, k(1)								
CFM56-7B22/2	Idle (Taxi)	833	3.94	1.07	45.35	8.35	0.09	0.08
	Approach	2405	6.37	1.07	30.87	6.97	0.38	0.34
	Climb out	6643	12.16	1.07	6.58	0.12	0.05	0.04
	Takeoff	8000	15.08	1.07	2.18	0.07	0.05	0.04
Notes: c(2), e, f, h, k(1)								
CFM56-7B22/3, -7B22E	Idle (Taxi)	786	3.95	1.07	37.90	3.25	0.07	0.06
	Approach	2310	8.35	1.07	4.18	0.08	0.05	0.05
	Climb out	6603	14.67	1.07	0.17	0.03	0.08	0.07
	Takeoff	7968	17.40	1.07	0.16	0.02	0.08	0.07
Notes: c(2), e, f, h, k(1)								
CFM56-7B24	Idle (Taxi)	865	4.40	1.07	22.00	2.76	0.05	0.05
	Approach	2508	10.10	1.07	2.20	0.12	0.04	0.04
	Climb out	7222	20.50	1.07	0.60	0.12	0.10	0.09
	Takeoff	8754	25.30	1.07	0.40	0.12	0.11	0.10
Notes: c(2), e, f, h, k(1)								
CFM56-7B24/2	Idle (Taxi)	865	4.08	1.07	42.72	7.53	0.08	0.07
	Approach	2484	6.72	1.07	30.32	6.91	0.38	0.34
	Climb out	7159	13.23	1.07	4.30	0.08	0.05	0.04
	Takeoff	8643	16.63	1.07	1.38	0.06	0.05	0.04
Notes: c(2), e, f, h, k(1)								
CFM56-7B24/3	Idle (Taxi)	817	4.09	1.07	34.71	2.65	0.07	0.06
	Approach	2444	8.60	1.07	3.68	0.07	0.05	0.05
	Climb out	7103	15.60	1.07	0.15	0.03	0.08	0.07
	Takeoff	8619	18.93	1.07	0.18	0.02	0.09	0.09
Notes: c(2), e, f, h, k(1)								
CFM56-7B24E, -7B24E/B1	Idle (Taxi)	794	4.10	1.07	34.70	2.65	0.07	0.06
	Approach	2381	8.60	1.07	3.70	0.12	0.06	0.05
	Climb out	7143	15.60	1.07	0.20	0.00	0.08	0.07
	Takeoff	8730	18.90	1.07	0.20	0.00	0.09	0.09
Notes: c(2), e, f, h, k(1)								

Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
CFM56-7B26	Idle (Taxi)	897	4.70	1.07	18.80	2.19	0.05	0.05
	Approach	2683	10.80	1.07	1.60	0.12	0.04	0.04
	Climb out	7929	22.50	1.07	0.60	0.12	0.11	0.10
	Takeoff	9691	28.80	1.07	0.20	0.12	0.12	0.11
Notes: c(2), e, f, h, k(1)								
CFM56-7B26/2	Idle (Taxi)	897	4.27	1.07	39.93	6.76	0.08	0.07
	Approach	2651	7.26	1.07	26.07	5.44	0.31	0.28
	Climb out	7849	14.77	1.07	2.51	0.07	0.05	0.04
	Takeoff	9548	19.20	1.07	0.77	0.03	0.04	0.04
Notes: c(2), e, f, h, k(1)								
CFM56-7B26/3, -7B26E, -7B26E/B1, -7B26E/B2, -7B26E/B2F, -7B26E/F	Idle (Taxi)	857	4.27	1.07	30.94	2.01	0.06	0.06
	Approach	2627	8.93	1.07	3.07	0.06	0.05	0.05
	Climb out	7825	17.08	1.07	0.16	0.02	0.09	0.08
	Takeoff	9627	21.79	1.07	0.20	0.02	0.10	0.09
Notes: c(2), e, f, h, k(1)								
CFM56-7B27	Idle (Taxi)	921	4.80	1.07	17.90	1.96	0.05	0.04
	Approach	2770	11.00	1.07	1.40	0.12	0.04	0.04
	Climb out	8278	23.70	1.07	0.50	0.12	0.11	0.10
	Takeoff	10191	30.90	1.07	0.20	0.12	0.12	0.11
Notes: c(2), e, f, h, k(1)								
CFM56-7B27/2	Idle (Taxi)	913	4.36	1.07	38.73	6.39	0.08	0.07
	Approach	2786	7.53	1.07	24.28	4.84	0.28	0.25
	Climb out	8198	15.59	1.07	1.97	0.07	0.05	0.04
	Takeoff	10040	20.81	1.07	0.54	0.06	0.05	0.04
Notes: c(2), e, f, h, k(1)								
CFM56-7B27/3, -7B27E, -7B27E/B1, -7B27E/B1F, -7B27E/B3, -7B27E/F	Idle (Taxi)	873	4.36	1.07	29.39	1.77	0.06	0.06
	Approach	2722	9.09	1.07	2.82	0.06	0.05	0.05
	Climb out	8183	17.89	1.07	0.17	0.02	0.10	0.09
	Takeoff	10262	23.94	1.07	0.31	0.03	0.10	0.09
Notes: c(2), e, f, h, k(1)								
CT7-5	Idle (Taxi)	131	2.20	1.07	35.33	3.78	0.18	0.16
	Approach	364	6.88	1.07	5.29	1.42	0.37	0.33
	Climb out	756	13.17	1.07	2.59	0.95	0.57	0.51
	Takeoff	809	13.77	1.07	2.59	0.95	0.69	0.62
Notes: c(13), j, k(8)								
F100-PW-100	Idle (Taxi)	1127	4.64	1.07	49.58	3.79	3.13	2.82
	Approach	2765	12.52	1.07	3.99	1.06	1.57	1.41
	Intermediate	7685	27.09	1.07	0.72	0.14	0.72	0.65
	Military	10996	35.01	1.07	0.70	0.12	1.24	1.12
	Afterburner-1	54007	6.62	1.07	9.57	0.13	0.87	0.78
Notes: c(14), h, k(5)								

Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
F100-PW-200	Idle (Taxi)	1006	6.21	1.07	24.06	2.05	2.47	2.22
	Approach	3251	17.93	1.07	1.22	0.05	2.37	2.13
	Intermediate	5651	26.55	1.07	0.38	0.07	1.58	1.42
	Military	8888	34.32	1.07	0.56	0.11	1.66	1.49
	Afterburner-5	40123	6.63	1.07	10.42	0.69	3.07	2.76
Notes: c(5), h, k(5)								
F100-PW-220	Idle (Taxi)	2084	4.61	1.07	35.32	7.94	0.67	0.60
	Approach	3837	12.50	1.07	1.92	5.12	0.70	0.63
	Intermediate	5770	22.20	1.07	0.86	2.89	0.70	0.63
	Military	9679	29.60	1.07	0.86	2.08	0.91	0.82
	Afterburner-5	41682	8.20	1.07	11.87	1.60	0.38	0.35
Notes: c(17), c, g, h, k(5)								
F100-PW-229	Idle (Taxi)	1087	3.80	1.07	10.17	0.45	0.67 (S)	0.60 (S)
	Approach	3098	15.08	1.07	1.17	0.24	0.70 (S)	0.63 (S)
	Intermediate	5838	17.54	1.07	0.15	0.35	0.70 (S)	0.63 (S)
	Military	11490	29.29	1.07	0.33	0.31	0.91 (S)	0.82 (S)
	Afterburner-1	20793	14.30	1.07	21.51	5.26	0.38 (S)	0.35 (S)
Notes: c(3), d(2) - PM <sub>2.5</sub> and PM <sub>10</sub> data at all power settings, e, h, k(5)								
F101-GE-100	Idle (Taxi)	476	7.30	1.07	120.10	28.98	0.09	0.08
	Approach	4533 (S)	9.16 (S)	1.07	1.03 (S)	0.02 (S)	4.21 (S)	3.74 (S)
	Intermediate	6557 (S)	13.15 (S)	1.07	0.85 (S)	0.04 (S)	1.35 (S)	0.72 (S)
	Military	10000	2.30	1.07	7.60	0.46	0.03	0.03
	Afterburner	66747	4.60	1.07	16.70	0.12	0.05	0.05
Notes: c(7), d(3) - All pollutants and fuel flow rates at Approach and Intermediate power settings, e, h, k(8)								
F101-GE-102	Idle (Taxi)	1117	4.10	1.07	24.46	0.16	2.18	1.96
	Approach	4533	9.16	1.07	1.03	0.02	4.21	3.79
	Intermediate	6557	13.15	1.07	0.85	0.04	1.35	1.21
	Military	7828	12.83	1.07	0.83	0.12	1.68	1.51
	Afterburner-1	15314	16.92	1.07	43.49	1.46	2.87	2.58
Notes: c(3), h, k(5)								
F103-GE-100, -101	Idle (Taxi)	1706	3.60	1.07	61.80	25.07	0.21	0.19
	Approach	5238	9.50	1.07	4.30	1.15	0.11	0.10
	Climb out	15675	29.70	1.07	0.50	0.81	0.10	0.09
	Takeoff	19738	36.30	1.07	0.50	0.69	0.12	0.11
Notes: c(2) - F103-GE-100 is the military designation of the CF6-50E2 engine and F103-GE-101 is the military designation of the CF6-50C2 engine, e, f, h, k(1)								
F108-CF-100, -201	Idle (Taxi)	1136	3.88	1.07	23.65	0.19	2.07	1.86
	Approach	2547	5.73	1.07	8.57	0.06	1.55	1.40
	Intermediate	5650	11.04	1.07	2.32	0.03	0.65	0.58
	Military	6458	12.05	1.07	0.36	0.03	1.59	1.43
Notes: c(3) - F108-CF-100 is the military designation of the CFM56-2B-1 engine, this engine used as a surrogate at all settings for F108-CF-201 engine, h, k(5)								
F110-GE-100	Idle (Taxi)	1111	3.77	1.07	24.11	0.22	2.60	2.34
	Approach	5080	9.78	1.07	5.77	0.03	1.37	1.23
	Intermediate	7332	16.92	1.07	3.47	0.05	0.58	0.52
	Military	11358	29.00	1.07	3.38	0.04	0.14	0.13
	Afterburner-1	18088	14.26	1.07	67.41	1.21	3.35	3.01
Notes: c(3), h, k(5)								

Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
F110-GE-129	Idle (Taxi)	961	2.62	1.07	45.04	4.90	2.60 (S)	2.34 (S)
	Approach	4832	13.42	1.07	1.93	0.03 (S)	1.37 (S)	1.23 (S)
	Intermediate	6939	17.82	1.07	1.53	0.05 (S)	0.58 (S)	0.52 (S)
	Military	8611	20.34	1.07	1.17	0.93	0.14 (S)	0.13 (S)
	Afterburner-1	15564	7.09	1.07	63.28	53.46	3.35 (S)	3.01 (S)
Notes: c(3), d(4) - VOC at Approach and Intermediate settings and PM <sub>10</sub> and PM <sub>2.5</sub> at all power settings, e, k(5)								
F110-GE-400	Idle (Taxi)	1287	2.76	1.07	16.57	3.48	0.02	0.02
	Approach	5809	12.41	1.07	0.96	0.44	0.02	0.02
	Climb out	11868	58.57	1.07	0.84	0.38	0.26	0.23
	Takeoff	11833	28.47	1.07	0.84	0.38	0.31	0.28
Notes: c(13), j, k(8)								
F113-RR-100	Idle (Taxi)	1008	3.60	1.07	31.77	4.24	0.16	0.15
	Approach	2206	7.20	1.07	2.65	0.21	0.22	0.20
	Climb out	5762	17.30	1.07	0.63	0.14	0.24	0.22
	Takeoff	7071	22.70	1.07	0.12	0.10	0.23	0.21
Notes: c(2) - F113-RR-100 is the military designation of the SPEY Mk511 engine, e, f, h, k(8)								
F117-PW-100	Idle (Taxi)	978	3.76	1.07	22.70	0.37	10.67	9.60
	Approach	4645	15.49	1.07	0.51	0.05	5.53	4.98
	Intermediate	10408	32.72	1.07	0.32	0.04	2.31	2.08
	Takeoff	13905 (S)	35.04 (S)	1.07	0.32 (S)	0.01 (S)	0.06 (S)	0.05 (S)
Notes: c(3) - F117-PW-100 is the military designation of the PW2040 engine, d(1) - HAPs at Takeoff setting only, d(16) - All remaining pollutants at Takeoff setting, h								
F118-GE-100	Idle (Taxi)	1097	4.30	1.07	20.98	0.29	1.25	1.12
	Approach	3773	11.09	1.07	2.02	0.05	4.70	4.23
	Intermediate	6350	18.01	1.07	0.85	0.03	3.05	2.75
	Military	10887	33.12	1.07	0.65	0.03	1.64	1.48
Notes: c(3), h, k(5)								
F119-PW-100	Idle (Taxi)	1377	3.01	1.07	48.15	1.67	2.42	1.76
	Approach	2740	6.59	1.07	7.92	0.05	1.96	1.73
	Intermediate	10110	12.40	1.07	2.14	0.03	1.40	1.09
	Military	18612	19.81	1.07	0.75	0.01	1.12	0.97
	Afterburner	50170	7.37	1.07	16.10	1.8E-03 (C)	0.85 (C)	0.75 (C)
Notes: c(4), d(1) - VOC, HAP, PM <sub>10</sub> , and PM <sub>2.5</sub> pollutants at Afterburner setting only, k(5)								
F135-PW-100	Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors							
F402-RR-406A	Idle (Taxi)	1251	1.80	1.07	106.08	18.75	0.49	0.44
	Approach	3735	4.99	1.07	21.46	1.05	0.30	0.27
	Intermediate	7125	9.48	1.07	8.35	0.43	0.30	0.27
	Military	8094	10.78	1.07	6.93	0.43	0.32	0.29
Notes: c(13), j, k(8)								

Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
F402-RR-408	Idle (Taxi)	1449	2.20	1.07	39.72	2.41	0.16	0.14
	Approach	3974	5.02	1.07	16.57	0.46	0.19	0.17
	Intermediate	7290	7.55	1.07	9.79	0.20	0.02	0.02
	Military	8494	8.38	1.07	8.58	0.20	0.21	0.19
Notes: c(13), j, k(8)								
F404-GE-102	Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors							
Notes: c(3), h, k(5)								
F404-GE-400	Idle (Taxi)	685	1.70	1.07	110.18	3.39	4.47	4.02
	Approach	3111	7.86	1.07	2.02	0.04	1.46	1.31
	Intermediate	6464	17.03	1.07	1.54	0.07	1.57	1.42
	Military	7739	25.83	1.07	1.48	0.02	1.61	1.45
	Afterburner-3	15851	5.43	1.07	50.31	1.85	3.57	3.21
Notes: c(3), h, k(5)								
F404-GE-402	Ground Idle	624	1.16	1.07	137.34	66.91	13.79	13.79
	Flight Idle	815	2.01	1.07	123.52	51.18	12.38	12.38
	Average Intermediate	10467	25.16	1.07	1.05	0.36	2.81	2.81
	Max Afterburner	31764	9.22	1.07	23.12	0.15	1.49 (C)	1.34 (C)
Notes: c(18), d(1), e, k(4)								
F404-GE-F1D2	Idle (Taxi)	685	1.70	1.07	110.18	3.39	4.47	4.02
	Approach	3111	7.86	1.07	2.02	0.04	1.46	1.31
	Intermediate	6464	17.03	1.07	1.54	0.07	1.57	1.42
	Military	7739	25.83	1.07	1.48	0.02	1.61	1.45
Notes: c(3), h, k(5)								
F405-RR-401	Idle (Taxi)	498	0.27	1.07	151.21	39.12	8.94	8.94
	Approach	1495	2.68	1.07	19.54	1.71	8.11	8.11
	Climb out	3826	8.33	1.07	3.72	0.23	4.92	4.92
	Takeoff	4559	10.10	1.07	3.27	0.17	3.65	3.65
Notes: c(20), e, k(4)								
F414-GE-400	Ground Idle	695	3.18	1.07	98.18	75.13	12.64	12.64
	Flight Idle	821	3.47	1.07	77.90	48.65	12.37	12.37
	Intermediate	11768	38.17	1.07	0.70	0.14	2.78	2.78
	Max Afterburner	35763	9.67	1.07	275.00	5.60	1.52 (C)	1.37 (C)
Notes: c(19), d(1), e, g, k(4)								
GE90-76B	Idle (Taxi)	2048	5.10	1.07	34.12	3.69	0.07	0.06
	Approach	5857	13.76	1.07	2.77	0.08	0.05	0.04
	Climb out	18103	32.43	1.07	0.32	0.03	0.04	0.04
	Takeoff	22191	40.25	1.07	0.31	0.03	0.04	0.04
Notes: c(2), e, f, h, k(1)								

Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
GE90-77B	Idle (Taxi)	2064	5.12	1.07	33.81	3.63	0.07	0.06
	Approach	5913	13.87	1.07	2.71	0.08	0.05	0.04
	Climb out	18326	32.78	1.07	0.32	0.03	0.04	0.04
	Takeoff	22460	40.83	1.07	0.31	0.03	0.04	0.04
Notes: c(2), e, f, h, k(1)								
GE90-85B	Idle (Taxi)	2151	5.33	1.07	31.34	3.22	0.06	0.06
	Approach	6381	14.77	1.07	2.16	0.07	0.05	0.04
	Climb out	20262	36.35	1.07	0.31	0.03	0.04	0.04
	Takeoff	24849	45.54	1.07	0.30	0.05	0.05	0.04
Notes: c(2), e, f, h, k(1)								
GE90-90B	Idle (Taxi)	2310	6.00	1.07	13.21	0.49	0.06	0.05
	Approach	6968	16.94	1.07	1.16	0.06	0.06	0.05
	Climb out	21691	39.50	1.07	0.13	0.05	0.05	0.05
	Takeoff	26572	52.48	1.07	0.12	0.05	0.06	0.05
Notes: c(2), e, f, h, k(1)								
GE90-94B	Idle (Taxi)	2349	6.09	1.07	12.69	0.47	0.06	0.05
	Approach	7206	17.38	1.07	1.07	0.06	0.06	0.05
	Climb out	22603	41.74	1.07	0.12	0.05	0.05	0.05
	Takeoff	27889	56.41	1.07	0.12	0.05	0.06	0.05
Notes: c(2), e, f, h, k(1)								
GE90-110B1	Idle (Taxi)	2937	5.11	1.07	40.59	5.23	0.07	0.07
	Approach	8571	15.78	1.07	2.29	0.07	0.05	0.04
	Climb out	27540	33.85	1.07	0.07	0.03	0.05	0.04
	Takeoff	34286	44.44	1.07	0.07	0.03	0.05	0.05
Notes: c(2), e, f, h, k(1)								
GE90-115B	Idle (Taxi)	3016	5.19	1.07	39.11	4.88	0.07	0.06
	Approach	8968	16.50	1.07	1.98	0.07	0.05	0.04
	Climb out	29127	35.98	1.07	0.07	0.03	0.05	0.04
	Takeoff	37222	50.34	1.07	0.08	0.05	0.06	0.05
Notes: c(2), e, f, h, k(1)								
GENx-1B64	Idle (Taxi)	1579	4.24	1.07	21.62	0.93	0.04	0.04
	Approach	4794	9.03	1.07	2.99	0.07	0.08	0.07
	Climb out	14770	14.61	1.07	0.38	0.02	0.04	0.04
	Takeoff	17976	24.82	1.07	0.18	0.02	0.04	0.04
Notes: c(2), e, f, h, k(1)								
GENx-1B64/P1	Idle (Taxi)	1667	4.37	1.07	19.73	0.74	0.04	0.04
	Approach	4905	9.11	1.07	2.91	0.07	0.07	0.06
	Climb out	14889	15.36	1.07	0.36	0.02	0.04	0.04
	Takeoff	18079	25.74	1.07	0.18	0.02	0.04	0.04
Notes: c(2), e, f, h, k(1)								



Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
GEnx-1B67	Idle (Taxi)	1611	4.30	1.07	20.70	0.83	0.04	0.04
	Approach	4960	9.29	1.07	2.76	0.07	0.08	0.07
	Climb out	15397	16.26	1.07	0.30	0.02	0.04	0.04
	Takeoff	18794	28.56	1.07	0.17	0.02	0.04	0.04
Notes: c(2), e, f, h, k(1)								
GEnx-1B67/P1	Idle (Taxi)	1698	4.43	1.07	18.94	0.67	0.04	0.04
	Approach	5071	9.39	1.07	2.68	0.07	0.08	0.07
	Climb out	15508	17.04	1.07	0.29	0.02	0.04	0.04
	Takeoff	18889	29.34	1.07	0.18	0.02	0.04	0.04
Notes: c(2), e, f, h, k(1)								
GEnx-1B70, -1B70/P1, -1B70/75/P1	Idle (Taxi)	1738	4.50	1.07	18.05	0.60	0.04	0.04
	Approach	5270	9.73	1.07	2.42	0.06	0.08	0.07
	Climb out	16278	19.30	1.07	0.24	0.02	0.04	0.04
	Takeoff	19881	34.61	1.07	0.17	0.02	0.04	0.04
Notes: c(2), e, f, h, k(1)								
GEnx-2B67	Idle (Taxi)	1714	4.43	1.07	18.95	0.66	0.04	0.04
	Approach	5564	9.58	1.07	2.53	0.07	0.08	0.07
	Climb out	15968	17.94	1.07	0.28	0.02	0.04	0.04
	Takeoff	19453	31.20	1.07	0.17	0.02	0.04	0.04
Notes: c(2), e, f, h, k(1)								
GEnx-2B67B	Idle (Taxi)	1611	4.66	1.07	16.39	0.67	0.04	0.04
	Approach	4183	9.27	1.07	2.81	0.07	0.04	0.04
	Climb out	12333	11.54	1.07	1.73	0.02	0.04	0.04
	Takeoff	14921	17.22	1.07	0.32	0.02	0.04	0.04
Notes: c(2), e, f, h, k(1)								
GP7270	Idle (Taxi)	1857	5.24	1.07	33.58	4.65	0.09	0.08
	Approach	5643	12.90	1.07	1.27	0.08	0.05	0.05
	Climb out	17214	31.37	1.07	0.09	0.03	0.06	0.05
	Takeoff	20929	41.73	1.07	0.11	0.03	0.06	0.05
Notes: c(2), e, f, h, k(1)								
GTSIO-520-F	Idle (Taxi)	25	0.04	1.07	1293.70	78.29	0.50	0.45
	Approach	99	1.39	1.07	1261.60	15.39	0.40	0.36
	Climb out	205	0.24	1.07	1470.90	19.12	0.70	0.63
	Takeoff	260	0.36	1.07	1442.10	14.21	0.10	0.09
Notes: c(16), e, g, h, k(8)								
GTSIO-520-H	Idle (Taxi)	22	0.88	1.07	720.50	47.31	0.50 (S)	0.45 (S)
	Pattern	102	7.70	1.07	697.40	7.52	0.40 (S)	0.36 (S)
	Climb out	145	9.76	1.07	728.75	7.04	0.70 (S)	0.63 (S)
	Takeoff	256	1.03	1.07	1045.66	11.66	0.10 (S)	0.09 (S)
Notes: c(8), d(13) - PM <sub>10</sub> and PM <sub>2.5</sub> at all power settings, e, i, k(8)								

**Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants**

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
GTSIO-520-K, -520-M	Idle (Taxi)	25	0.04	1.07	1293.70	78.29	0.50	0.45
	Approach	99	1.39	1.07	1261.60	15.39	0.40	0.36
	Climb out	205	0.24	1.07	1470.90	19.12	0.70	0.63
	Takeoff	260	0.36	1.07	1442.10	14.21	0.10	0.09
Notes: c(16), e, g, h, k(8)								
IO-360-A	Idle (Taxi)	11	0.40	1.07	956.24	278.09	0.76	0.68
	Approach	22	10.62	1.07	727.75	85.31	0.12	0.11
	Climb out	85	17.65	1.07	840.53	55.11	0.30	0.27
	Takeoff	85	18.08	1.07	842.50	52.09	0.31	0.28
Notes: c(16), e, g, h, k(7)								
IO-360-B	Idle (Taxi)	8	1.16	1.07	897.40	56.58	0.76 (S)	0.68 (S)
	Approach	37	10.16	1.07	691.26	11.15	0.12 (S)	0.11 (S)
	Climb out	72	4.59	1.07	983.26	9.38	0.30 (S)	0.27 (S)
	Takeoff	103	1.99	1.07	1199.03	11.50	0.31 (S)	0.28 (S)
Notes: c(1), d(5) - PM <sub>10</sub> and PM <sub>2.5</sub> at all power settings, e, j, k(8)								
IO-360-B1E, -360-C, -360-C1C	Idle (Taxi)	11	0.40	1.07	956.24	278.09	0.76	0.68
	Approach	22	10.62	1.07	727.75	85.31	0.12	0.11
	Climb out	85	17.65	1.07	840.53	55.11	0.30	0.27
	Takeoff	85	18.08	1.07	842.50	52.09	0.31	0.28
Notes: c(16), e, g, h, k(7)								
IO-360-C1C6	Idle (Taxi)	12	0.28	1.07	882.98	263.40	0.30	0.27
	Approach	26	3.36	1.07	938.16	123.88	0.06	0.06
	Climb out	81	6.63	1.07	753.23	53.27	0.09	0.08
	Takeoff	81	7.48	1.07	757.17	47.22	0.10	0.09
Notes: c(16), e, g, h, k(7)								
IO-360-CB	Idle (Taxi)	11	0.40	1.07	956.24	278.09	0.76	0.68
	Approach	22	10.62	1.07	727.75	85.31	0.12	0.11
	Climb out	85	17.65	1.07	840.53	55.11	0.30	0.27
	Takeoff	85	18.08	1.07	842.50	52.09	0.31	0.28
Notes: c(16), e, g, h, k(7)								
IO-360-D	Idle (Taxi)	30	1.10	1.07	848.00	166.75	60.00	54.00
	Approach	50	4.00	1.07	912.45	54.17	47.95	43.16
	Intermediate	70	6.60	1.07	972.00	20.01	40.00	36.00
	Military	90	5.80	1.07	1030.00	25.88	20.00	18.00
Notes: c(7), e, h, k(8)								
IO-360-D34, -360-DB, -360-G, -360-GB	Idle (Taxi)	11	0.40	1.07	956.24	278.09	0.76	0.68
	Approach	22	10.62	1.07	727.75	85.31	0.12	0.11
	Climb out	85	17.65	1.07	840.53	55.11	0.30	0.27
	Takeoff	85	18.08	1.07	842.50	52.09	0.31	0.28
Notes: c(16), e, g, h, k(7)								

Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
J33-A-35	Idle (Taxi)	1190	1.50	1.07	127.00	22.43	0.73	0.66
	Approach	1984	1.90	1.07	84.60	7.48	0.57	0.51
	Intermediate	4762	2.70	1.07	49.10	1.50	0.02	0.02
	Military	5556	3.60	1.07	31.30	0.58	0.02	0.02
Notes: c(7), e, g, h, k(8)								
J52-P-6B	Idle (Taxi)	714	2.07	1.07	86.37	27.46	19.94	17.95
	3000lb Thrust	2301	3.91	1.07	16.57	0.94	0.18 (S)	0.16 (S)
	75% Thrust	3977	5.84	1.07	6.00	0.75	0.18 (S)	0.16 (S)
	Military	6328	9.00	1.07	3.01	0.38	7.75	6.98
Notes: c(9), d(6) - PM <sub>10</sub> and PM <sub>2.5</sub> at 3000lb and 75% thrust power settings only, e, g, h, j - Percent thrust for 3000lb setting assumes maximum thrust of 8500lb for								
J52-P-8B	Idle (Taxi)	680	1.79	1.07	63.78	48.53	0.18 (S)	0.16 (S)
	3000lb Thrust	2300	6.34	1.07	10.54	1.98	0.18 (S)	0.16 (S)
	75% Thrust	4320	10.10	1.07	3.00	0.67	0.13 (S)	0.12 (S)
	Military	7370	13.05	1.07	0.71	1.07	0.13 (S)	0.12 (S)
Notes: c(9), d(6) - PM <sub>10</sub> and PM <sub>2.5</sub> at all power settings, e, j - Percent thrust for 3000lb setting assumes maximum thrust of 9300lb for this engine, k(8)								
J52-P-408	Idle (Taxi)	1466	2.79	1.07	50.10	3.62	0.18	0.16
	Approach	3325	7.25	1.07	16.07	0.29	0.18	0.16
	Intermediate	6502	7.53	1.07	7.70	0.03	0.13	0.12
	Military	6483	7.53	1.07	7.70	0.03	0.13	0.12
Notes: c(13), e, j, k(8)								
J57-P-10	Idle (Taxi)	1100	1.87	1.07	80.52	111.09	0.16 (S)	0.14 (S)
	75% Thrust	5670	7.40	1.07	3.21	0.87	0.93 (S)	0.84 (S)
	Normal Rated	7250	9.00	1.07	1.79	1.15	1.92 (S)	1.73 (S)
	Military	8370	10.37	1.07	1.16	0.99	1.72 (S)	1.55 (S)
Notes: c(9), d(7) - PM <sub>10</sub> and PM <sub>2.5</sub> at all power settings, e, j - Assumes 100% thrust at Military setting, k(8)								
J57-P-19W	Idle (Taxi)	952	2.20	1.07	79.00	88.55	0.16	0.14
	Approach	3333	5.80	1.07	7.90	1.61	0.93	0.84
	Intermediate	6508	9.50	1.07	2.40	0.23	1.92	1.73
	Military	7460	11.00	1.07	1.90	0.12	1.72	1.55
Notes: c(7), e, g, h, k(8)								
J57-P-22	Idle (Taxi)	1087	2.48	1.07	59.25	59.03	7.64	6.87
	Approach	1693	2.95	1.07	23.51	14.26	5.32 (C)	4.79 (C)
	Climb out	8358	11.16	1.07	1.78	0.74	1.44	1.29
	Takeoff	8358	11.16	1.07	1.78	0.74	1.44	1.29
Notes: c(1), d(1), e, g, h, k(8)								
J57-P-420	Idle (Taxi)	1322	1.53	1.07	80.74	87.93	0.16 (S)	0.14 (S)
	30% Thrust	3413	4.45	1.07	14.83	5.22	0.93 (S)	0.84 (S)
	75% Thrust	5767	6.99	1.07	4.32	1.25	1.92 (S)	1.73 (S)
	Intermediate	10570	12.97	1.07	0.34	0.56	1.72 (S)	1.55 (S)
	Afterburner	39721	5.16	1.07	14.20	2.92	3.10 (C)	2.80 (C)
Notes: c(9), d(1) - PM <sub>10</sub> and PM <sub>2.5</sub> at Afterburner power setting only, d(7) - PM <sub>10</sub> and PM <sub>2.5</sub> at all other power settings, e, j, k(8)								

Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
J57-P/F-43WB	Idle (Taxi)	952	2.20	1.07	78.00	86.25	0.14	0.13
	Approach	1825	4.45	1.07	16.85	6.33	0.41	0.37
	Intermediate	6667	9.90	1.07	2.30	0.12	1.23	1.11
	Military	7778	11.00	1.07	1.50	0.12	1.74	1.57
Notes: c(7), e, g, h, k(8)								
J57-P/F-59W	Idle (Taxi)	1270	2.40	1.07	65.00	60.84	0.13	0.12
	Approach	1825	3.30	1.07	32.50	16.33	0.22	0.20
	Intermediate	3889	6.10	1.07	8.90	1.27	0.60	0.54
	Military	7937	11.30	1.07	2.40	0.23	0.84	0.76
Notes: c(7), e, g, h, k(8)								
J60-P-3A	Idle (Taxi)	556	1.50	1.07	70.00	10.58	0.02	0.02
	Approach	556	1.70	1.07	50.50	6.44	0.02	0.02
	Intermediate	1429	4.00	1.07	5.80	0.23	0.23	0.21
	Military	3413	4.60	1.07	4.00	0.12	0.17	0.15
Notes: c(7), e, g, h, k(8)								
J60-P-5A, -5B	Idle (Taxi)	476	1.50	1.07	70.00	10.58	0.02	0.02
	Approach	556	1.70	1.07	50.50	6.44	0.02	0.02
	Intermediate	1429	4.00	1.07	5.80	0.23	0.23	0.21
	Military	2460	4.60	1.07	4.00	0.12	0.17	0.15
Notes: c(7), e, g, h, k(8)								
J65-W-5F	Idle (Taxi)	1320	2.46	1.07	47.16	11.25	0.18 (S)	0.16 (S)
	7450 rpm	4370	7.30	1.07	12.61	1.09	0.18 (S)	0.16 (S)
	8000 rpm	5970	5.71	1.07	7.39	0.83	0.13 (S)	0.12 (S)
	8300 rpm	7040	5.15	1.07	4.57	0.38	0.13 (S)	0.12 (S)
	Military	6946	5.23	1.07	5.31	0.70	0.13 (S)	0.12 (S)
Notes: c(9), d(6) - PM <sub>10</sub> and PM <sub>2.5</sub> at all power settings, e, k(8)								
J65-W-20	Idle (Taxi)	1333	2.78	1.07	50.19	4.31	0.18 (S)	0.16 (S)
	75% rpm	2346	4.82	1.07	21.82	1.57	0.18 (S)	0.16 (S)
	85% rpm	3260	7.27	1.07	16.13	0.32	0.18 (S)	0.16 (S)
	90% rpm	3951	7.97	1.07	14.30	0.15	0.18 (S)	0.16 (S)
	Intermediate (Mil)	6421	7.55	1.07	7.72	0.04	0.13 (S)	0.12 (S)
Notes: c(1), d(6) - PM <sub>10</sub> and PM <sub>2.5</sub> at all power settings, e, k(8)								
J69-T-25	Idle (Taxi)	167	0.80	1.07	160.08	2.33	3.15	2.83
	Approach	568 (C)	1.71 (C)	1.07	56.03 (C)	0.14 (C)	1.52 (C)	1.37 (C)
	Intermediate	872	2.92	1.07	38.27	0.06	0.94	0.84
	Military	1085	4.53	1.07	32.86	0.03	0.67	0.61
Notes: c(3), d(1) - All pollutants at Approach power setting only, g, h, k(5)								
J75-P-17	Idle (Taxi)	1700	1.29	1.07	76.18	65.41	0.47	0.42
	Approach	11300	11.90	1.07	1.40	0.11	0.10	0.09
	Intermediate	12386 (C)	9.79 (C)	1.07	0.94 (C)	0.20 (C)	0.64 (C)	0.58 (C)
	Military	13200	8.20	1.07	0.60	0.26	1.05	0.95
	Afterburner	53700	4.10	1.07	12.00	0.14	1.73 (C)	1.57 (C)
Notes: c(1), d(1) - PM <sub>10</sub> and PM <sub>2.5</sub> at Afterburner power setting only, e, g, h, j - Assumes military setting has maximum percent thrust of 100%, k(8)								

Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
J79-GE-8D	Idle (Taxi)	1325	2.36	1.07	55.59	16.14	0.44	0.40
	75% rpm	1550	2.97	1.07	30.55	4.20	0.90	0.81
	87% rpm	8310	8.44	1.07	2.56	0.12	0.15	0.14
	Military	9544	10.42	1.07	2.56	0.12	0.18	0.16
	Afterburner	34647	4.71	1.07	8.14	0.19	0.56	0.50
Notes: c(13), e, j, k(8)								
J79-GE-10D	Idle (Taxi)	1375	1.33	1.07	111.18	37.37	0.88	0.79
	Approach	3490	4.22	1.07	20.00	2.80	0.63	0.57
	Intermediate	7674	8.24	1.07	4.69	1.34	0.72	0.65
	Military	10097	10.24	1.07	2.83	1.34	0.72	0.65
	Afterburner	35339	4.50	1.07	8.63	1.01	0.37	0.33
Notes: c(13), e, j, k(8)								
J79-GE-15	Idle (Taxi)	1111	2.50	1.07	57.00	13.80	0.50	0.45
	Approach	3492	4.80	1.07	9.40	1.27	1.80	1.62
	Intermediate	5397	5.60	1.07	4.60	0.35	2.80	2.52
	Military	8889	8.90	1.07	2.20	0.23	2.20	1.98
	Afterburner	32223	9.10	1.07	4.00	0.01	0.15	0.14
Notes: c(7), e, g, h, k(8)								
J79-GE-17	Idle (Taxi)	1032	2.70	1.07	66.00	26.57	0.18	0.16
	Approach	3492	4.50	1.07	15.40	0.58	0.51	0.46
	Intermediate	6984	5.80	1.07	7.80	0.12	0.72	0.65
	Military	9841	10.60	1.07	5.20	0.12	0.92	0.83
	Afterburner	34921	8.10	1.07	4.00	0.01	0.15	0.14
Notes: c(7), e, g, h, k(8)								
J85-GE-5A	Idle (Taxi)	434	1.34	1.07	250.22	2.00	4.70	4.23
	Approach	875 (C)	1.45 (C)	1.07	115.08 (C)	1.31 (C)	2.42 (C)	2.17 (C)
	Intermediate	950	1.47	1.07	104.02	0.92	1.79	1.61
	Military	2740	2.64	1.07	32.91	0.12	1.13	1.01
	Afterburner-1	8138	1.98	1.07	13.46	0.05	0.25	0.23
Notes: c(3), d(1) - All pollutants at Approach power setting only, h, k(5)								
J85-GE-5F	Idle (Taxi)	524	1.34	1.07	178.05	34.46	4.70 (S)	4.02 (S)
	75% rpm	798	2.13	1.07	78.20	2.59	3.01 (C)	1.84 (C)
	85% rpm	1098	2.73	1.07	58.01	1.36	2.15 (C)	1.20 (C)
	Intermediate	1297	2.31	1.07	43.02	3.99	1.79 (S)	0.69 (S)
	Afterburner	8470	2.60	1.07	29.00	0.92	0.25 (S)	0.09 (S)
Notes: c(1), d(1) - PM <sub>10</sub> and PM <sub>2.5</sub> at 75% rpm and 85% rpm power settings, d(10) - PM <sub>10</sub> and PM <sub>2.5</sub> for remaining power settings, e, k(8)								
J85-GE-5H	Idle (Taxi)	434	1.14	1.07	211.97	39.12	4.70	4.02
	Approach	875 (C)	1.64 (C)	1.07	148.04 (C)	6.56 (C)	2.42 (C)	2.17 (C)
	Intermediate	950	1.74	1.07	123.43	6.51	1.79	0.69
	Military	2740	2.92	1.07	36.40	0.67	1.13	0.04
	Afterburner	8138	2.09	1.07	14.19	2.63	0.25	0.09
Notes: c(10), d(1) - All pollutants at Approach setting, g, h, k(8)								
J85-GE-5M	Idle (Taxi)	525	0.79	1.07	191.41	4.01	7.02	6.32
	Approach	703 (C)	1.09 (C)	1.07	110.79 (C)	1.50 (C)	8.83 (C)	7.94 (C)
	Intermediate	1045	1.81	1.07	48.90	0.54	12.30	11.07
	Military	2550	1.65	1.07	25.35	0.04	4.25	3.83
	Afterburner	7695	1.21	1.07	10.19	0.05 (S)	0.25 (S)	0.09 (S)
Notes: c(10), d(1) - All pollutants at Approach setting, d(10) - VOC, HAPs, PM <sub>10</sub> and PM <sub>2.5</sub> at Afterburner power setting only, h, k(6)								

**Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants**

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
J85-GE-5R	Idle (Taxi)	520	1.08	1.07	177.45	16.80	4.70 (S)	4.23 (S)
	Approach	689 (C)	0.91 (C)	1.07	119.23 (C)	7.96 (C)	2.42 (S)	2.17 (S)
	Intermediate	1030	0.70	1.07	65.07	2.78	1.79 (S)	1.61 (S)
	Military	2220	1.92	1.07	30.99	0.75	1.13 (S)	1.01 (S)
	Afterburner	7695	6.23	1.07	53.43	6.97	0.25 (S)	0.23 (S)
Notes: c(10), d(1) - Fuel flow, NO <sub>x</sub> , CO, and VOC at Approach setting, d(10) - PM <sub>10</sub> and PM <sub>2.5</sub> at all power settings, e, k(6)								
J85-GE-13	Idle (Taxi)	556	1.30	1.07	178.00	34.50	3.0E-03	2.7E-03
	Approach	1230	2.05	1.07	58.30	5.69	0.01	0.01
	Intermediate	2222	2.30	1.07	43.00	4.03	0.01	0.01
	Military	2778	2.60	1.07	29.00	0.92	0.02	0.02
	Afterburner	8968	2.00	1.07	26.00	0.08	0.01	0.01
Notes: c(7), e, g, h, i, k(8)								
J85-GE-17A	Idle (Taxi)	556	1.30	1.07	178.00	34.50	3.0E-03 (S)	2.7E-03 (S)
	Approach	1230	2.05	1.07	58.30	5.69	0.01 (S)	0.01 (S)
	Intermediate	2222	2.30	1.07	43.00	4.03	0.01 (S)	0.01 (S)
	Military	3810	2.60	1.07	29.00	0.92	0.02 (S)	0.02 (S)
Notes: c(7), d(8) - PM <sub>10</sub> and PM <sub>2.5</sub> for all power settings, e, g, h, k(8)								
J85-GE-21	Idle (Taxi)	400	1.25	1.07	159.00	27.89	3.0E-03 (S)	2.7E-03 (S)
	75% rpm	700	2.00	1.07	92.14	14.29	0.01 (S)	0.01 (S)
	85% rpm	1200	2.92	1.07	46.17	2.97	0.01 (S)	0.01 (S)
	Intermediate (Military)	3200	5.00	1.07	21.56	0.29	0.02 (S)	0.02 (S)
	Afterburner	10650	5.60	1.07	36.40	0.12	0.01 (S)	0.01 (S)
Notes: c(1), d(8) - PM <sub>10</sub> and PM <sub>2.5</sub> at all power settings, e, g, h, k(8)								
JT3D-3B	Idle (Taxi)	1071	2.50	1.07	98.00	128.80	0.91	0.82
	Approach	2746	4.80	1.07	24.50	4.60	0.41	0.37
	Climb out	7397	9.90	1.07	2.80	2.30	0.80	0.72
	Takeoff	9318	12.10	1.07	1.50	4.60	1.28	1.15
Notes: c(2), e, f, h, k(1)								
JT3D-7 Series	Idle (Taxi)	1016	2.20	1.07	138.99	141.45	0.97	0.87
	Approach	3087	5.30	1.07	19.50	2.42	0.29	0.26
	Climb out	8191	9.59	1.07	1.90	0.46	0.58	0.52
	Takeoff	9952	12.69	1.07	0.89	0.58	0.76	0.68
Notes: c(2), e, f, h, k(1)								
JT8D-7 Series	Idle (Taxi)	1025	2.70	1.07	35.50	12.19	0.23	0.20
	Approach	2271	5.50	1.07	10.50	1.84	0.22	0.20
	Climb out	6439	13.50	1.07	2.00	0.58	0.31	0.28
	Takeoff	7851	17.10	1.07	1.50	0.46	0.32	0.28
Notes: c(2), e, f, h, k(1)								
JT8D-9 Series	Idle (Taxi)	1048	2.90	1.07	34.50	11.50	0.23	0.20
	Approach	2365	5.64	1.07	9.43	1.99	0.24	0.21
	Climb out	6714	14.21	1.07	1.66	0.54	0.31	0.28
	Takeoff	8254	17.92	1.07	1.24	0.54	0.33	0.30
Notes: c(2), e, f, h, k(1)								

Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
JT8D-9A	Idle (Taxi)	1155	2.89	1.07	14.11	2.95	0.21	0.19
	Approach	2409	5.99	1.07	2.14	0.57	0.25	0.23
	Intermediate	6794	14.47	1.07	1.07	0.16	0.27	0.24
	Military	8334	19.26	1.07	1.07	0.16	0.27	0.24
Notes: c(13), j, k(8)								
JT8D-11	Idle (Taxi)	1155	2.75	1.07	35.00	11.50	0.23	0.20
	Approach	2650	5.80	1.07	9.40	1.61	0.22	0.19
	Climb out	7251	14.60	1.07	1.90	0.52	0.31	0.28
	Takeoff	8897	18.90	1.07	1.20	0.46	0.32	0.29
Notes: c(2), e, f, h, k(1)								
JT8D-15	Idle (Taxi)	1172	3.00	1.07	35.20	12.65	0.24	0.21
	Approach	2701	5.90	1.07	9.60	1.90	0.24	0.21
	Climb out	7500	15.00	1.07	1.00	0.29	0.31	0.28
	Takeoff	9349	19.10	1.07	0.70	0.29	0.32	0.29
Notes: c(2), e, f, h, k(1)								
JT8D-15A	Idle (Taxi)	1089	3.10	1.07	12.93	2.14	0.13	0.12
	Approach	2476	6.60	1.07	2.90	0.75	0.14	0.12
	Climb out	7107	13.90	1.07	1.20	0.38	0.22	0.19
	Takeoff	8849	18.10	1.07	1.08	0.29	0.22	0.20
Notes: c(2), e, f, h, k(1)								
JT8D-17	Idle (Taxi)	1170	3.20	1.07	10.46	1.44	0.13	0.12
	Approach	2810	8.00	1.07	2.67	0.60	0.14	0.12
	Climb out	7913	15.70	1.07	1.10	0.31	0.22	0.20
	Takeoff	9881	20.60	1.07	0.95	0.25	0.23	0.20
Notes: c(2), e, f, h, k(1)								
JT8D-17A	Idle (Taxi)	1112	3.20	1.07	12.46	7.59	0.17	0.15
	Approach	2622	6.70	1.07	2.88	0.74	0.14	0.13
	Climb out	7416	14.30	1.07	1.16	0.35	0.22	0.20
	Takeoff	9310	19.10	1.07	1.07	0.29	0.23	0.21
Notes: c(2), e, f, h, k(1)								
JT8D-17AR	Idle (Taxi)	1172	3.20	1.07	10.70	1.53	0.15	0.13
	Approach	2837	8.00	1.07	2.68	0.63	0.15	0.13
	Climb out	8310	16.00	1.07	1.08	0.31	0.25	0.22
	Takeoff	10833	24.50	1.07	0.93	0.24	0.25	0.23
Notes: c(2), e, f, h, k(1)								
JT8D-17R	Idle (Taxi)	1230	3.30	1.07	9.43	1.09	0.15	0.13
	Approach	2980	8.40	1.07	2.54	0.61	0.15	0.13
	Climb out	8754	17.60	1.07	1.03	0.31	0.25	0.22
	Takeoff	11246	25.30	1.07	0.95	0.24	0.25	0.23
Notes: c(2), e, f, h, k(1)								

Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
JT8D-209	Idle (Taxi)	1034	3.50	1.07	14.10	4.63	0.13	0.12
	Approach	2851	8.80	1.07	4.37	1.94	0.19	0.17
	Climb out	7800	19.00	1.07	1.40	0.58	0.21	0.19
	Takeoff	9452	22.80	1.07	1.03	0.40	0.21	0.19
Notes: c(2), e, f, h, k(1)								
JT8D-217, -217A	Idle (Taxi)	1089	4.57	1.07	15.31	0.00	0.07	0.06
	Approach	3042	7.66	1.07	3.54	0.00	0.06	0.06
	Climb out	8556	13.54	1.07	0.47	0.00	0.10	0.09
	Takeoff	10476	17.54	1.07	0.42	0.00	0.10	0.09
Notes: c(2), e, f, h, k(1)								
JT8D-217C	Idle (Taxi)	1087	4.05	1.07	17.89	0.00	0.04	0.03
	Approach	2881	7.65	1.07	3.79	0.00	0.06	0.05
	Climb out	8294	13.02	1.07	0.49	0.00	0.08	0.07
	Takeoff	10175	16.49	1.07	0.42	0.00	0.10	0.09
Notes: c(2), e, f, h, k(1)								
JT8D-219	Idle (Taxi)	1067	3.60	1.07	12.63	4.00	0.16	0.14
	Approach	3029	9.13	1.07	4.07	1.83	0.20	0.18
	Climb out	8611	20.80	1.07	1.20	0.48	0.25	0.22
	Takeoff	10746	27.00	1.07	0.73	0.31	0.25	0.22
Notes: c(2), e, f, h, k(1)								
JT9D-7	Idle (Taxi)	1667	3.10	1.07	84.10	41.98	0.27	0.24
	Approach	4833	7.60	1.07	7.80	1.50	0.13	0.11
	Climb out	14000	27.70	1.07	0.00	0.12	0.09	0.08
	Takeoff	16532	37.90	1.07	0.00	0.12	0.10	0.09
Notes: c(2), e, f, h, k(1)								
JT9D-7A	Idle (Taxi)	1675	3.10	1.07	83.60	41.52	0.27	0.24
	Approach	4913	7.60	1.07	7.60	1.50	0.13	0.11
	Climb out	14199	28.50	1.07	0.00	0.12	0.09	0.08
	Takeoff	16659	38.70	1.07	0.00	0.12	0.11	0.09
Notes: c(2), e, f, h, k(1)								
JT9D-7F	Idle (Taxi)	1841	3.20	1.07	68.60	29.79	0.24	0.21
	Approach	4952	9.10	1.07	5.80	0.69	0.10	0.09
	Climb out	14119	31.50	1.07	0.90	0.00	0.11	0.10
	Takeoff	17151	41.70	1.07	0.90	0.00	0.11	0.10
Notes: c(2), e, f, h, k(1)								
JT9D-7J	Idle (Taxi)	1889	3.30	1.07	66.70	28.18	0.23	0.21
	Approach	5389	9.40	1.07	5.50	0.58	0.10	0.09
	Climb out	15095	34.90	1.07	0.90	0.00	0.11	0.10
	Takeoff	18373	44.90	1.07	0.90	0.00	0.11	0.10
Notes: c(2), e, f, h, k(1)								



**Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants**

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
JT9D-7Q	Idle (Taxi)	1881	3.00	1.07	53.00	13.80	0.13	0.12
	Approach	5400	7.80	1.07	1.70	0.35	0.07	0.06
	Climb out	15870	25.60	1.07	0.20	0.23	0.09	0.08
	Takeoff	19380	31.60	1.07	0.20	0.23	0.09	0.08
Notes: c(2), e, f, h, k(1)								
JT9D-7R4D, -7R4D1	Idle (Taxi)	1630	4.10	1.07	8.84	1.44	0.06	0.05
	Approach	5233	9.80	1.07	1.36	0.15	0.05	0.05
	Climb out	13318	30.00	1.07	0.48	0.14	0.06	0.06
	Takeoff	16310	38.50	1.07	0.51	0.17	0.07	0.07
Notes: c(2), e, f, h, k(1)								
JT9D-7R4E, -7R4E1	Idle (Taxi)	1754	4.10	1.07	8.27	1.28	0.06	0.05
	Approach	5182	10.40	1.07	1.23	0.15	0.05	0.05
	Climb out	13683	34.20	1.07	0.53	0.15	0.07	0.06
	Takeoff	16810	41.60	1.07	0.57	0.18	0.08	0.07
Notes: c(2), e, f, h, k(1)								
JT9D-7R4E4	Idle (Taxi)	1750	3.50	1.07	16.00	3.85	0.07	0.06
	Approach	5079	8.50	1.07	1.46	0.25	0.06	0.05
	Climb out	14516	29.70	1.07	0.67	0.15	0.06	0.06
	Takeoff	17603	36.90	1.07	0.67	0.17	0.07	0.06
Notes: c(2), e, f, h, k(1)								
JT9D-7R4G2	Idle (Taxi)	1777	3.80	1.07	11.82	1.78	0.06	0.06
	Approach	5230	8.80	1.07	1.40	0.21	0.06	0.05
	Climb out	14921	29.50	1.07	0.63	0.16	0.08	0.07
	Takeoff	19278	41.30	1.07	0.74	0.17	0.08	0.07
Notes: c(2), e, f, h, k(1)								
JT9D-7R4H1	Idle (Taxi)	1948	3.80	1.07	11.63	1.70	0.06	0.06
	Approach	5736	8.90	1.07	1.39	0.21	0.06	0.06
	Climb out	15865	30.00	1.07	0.63	0.16	0.08	0.07
	Takeoff	19937	45.20	1.07	0.74	0.17	0.09	0.08
Notes: c(2), e, f, h, k(1)								
JT9D-20	Idle (Taxi)	1675	3.10	1.07	83.60	41.52	0.27	0.24
	Approach	4913	7.60	1.07	7.60	1.50	0.13	0.11
	Climb out	14199	28.50	1.07	0.00	0.12	0.09	0.08
	Takeoff	16659	38.70	1.07	0.00	0.12	0.11	0.09
Notes: c(2), e, f, h, k(2)								
JT9D-20J	Idle (Taxi)	1889	3.30	1.07	66.70	28.18	0.23	0.21
	Approach	5389	9.40	1.07	5.50	0.58	0.10	0.09
	Climb out	15095	34.90	1.07	0.90	0.00	0.11	0.10
	Takeoff	18373	44.90	1.07	0.90	0.00	0.11	0.10
Notes: c(2), e, f, h, k(1)								

Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
JT9D-59A, -70A	Idle (Taxi)	1881	3.00	1.07	53.00	13.80	0.13	0.12
	Approach	5400	7.80	1.07	1.70	0.35	0.07	0.06
	Climb out	15870	25.60	1.07	0.20	0.23	0.09	0.08
	Takeoff	19380	31.60	1.07	0.20	0.23	0.09	0.08
Notes: c(2), e, f, h, k(1)								
JT15D-1 Series	Idle (Taxi)	183	1.75	1.07	132.00	58.08	0.39	0.35
	Approach	405	3.44	1.07	40.50	5.09	0.32	0.29
	Climb out	984	6.77	1.07	3.50	0.01	0.11	0.10
	Takeoff	1175	7.60	1.07	2.65	0.01	0.11	0.10
Notes: c(2), e, f, h, k(2)								
JT15D-4 Series	Idle (Taxi)	207	2.63	1.07	97.00	46.00	0.32	0.29
	Approach	468	5.29	1.07	32.00	5.92	0.36	0.32
	Climb out	1135	8.56	1.07	3.18	0.22	0.12	0.11
	Takeoff	1347	9.23	1.07	2.10	0.10	0.11	0.10
Notes: c(2), e, f, h, k(2)								
JT15D-5, -5A, -5B	Idle (Taxi)	235	1.66	1.07	119.20	136.97	0.82	0.74
	Approach	524	4.93	1.07	38.60	13.46	0.73	0.66
	Climb out	1371	10.08	1.07	1.15	1.50	0.23	0.21
	Takeoff	1630	11.13	1.07	0.00	0.00	0.13	0.12
Notes: c(2), e, f, h, k(2)								
LF507-1F	Idle (Taxi)	360	3.28	1.07	37.83	5.43	0.13	0.12
	Approach	860	6.39	1.07	4.43	0.14	0.09	0.09
	Climb out	2350	12.02	1.07	0.30	0.01	0.09	0.08
	Takeoff	2840	14.52	1.07	0.20	0.01	0.08	0.08
Notes: c(2), e, f, h, k(8)								
NK-8-2U	Idle (Taxi)	1905	2.70	1.07	116.00	119.37	0.82	0.74
	Approach	4603	5.40	1.07	21.00	5.75	0.43	0.39
	Climb out	9286	12.90	1.07	6.00	0.63	0.35	0.31
	Takeoff	13889	13.90	1.07	5.50	0.52	0.36	0.33
Notes: c(2), e, f, h, k(8)								
O-200	Idle (Taxi)	8	1.58	1.07	644.42	33.36	0.55 (S)	0.49 (S)
	Approach	26	1.14	1.07	1187.84	38.20	0.13 (S)	0.12 (S)
	Climb out	45	4.87	1.07	974.10	23.93	0.17 (S)	0.16 (S)
	Takeoff	45	4.87	1.07	974.10	23.93	0.21 (S)	0.19 (S)
Notes: c(1), d(25) - PM <sub>10</sub> and PM <sub>2.5</sub> at all power settings, e, j, k(8)								
O-200A	Idle (Taxi)	9	0.93	1.07	969.24	198.77	0.55	0.49
	Approach	26	3.81	1.07	926.54	55.21	0.13	0.12
	Climb out	49	4.70	1.07	1047.01	56.02	0.17	0.16
	Takeoff	53	3.90	1.07	1033.41	55.30	0.21	0.19
Notes: c(16), e, g, h, k(7)								

Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
O-320	Idle (Taxi)	9	0.52	1.07	1077.00	42.46	0.47 (S)	0.42 (S)
	Approach	47	0.95	1.07	1221.51	22.13	0.27 (S)	0.24 (S)
	Climb out	67	3.97	1.07	989.51	14.24	0.20 (S)	0.18 (S)
	Takeoff	89	2.19	1.07	1077.44	13.55	0.20 (S)	0.18 (S)
Notes: c(1), d(9) - PM <sub>10</sub> and PM <sub>2.5</sub> at all power settings, e, j, k(8)								
O-320-A2B, -320-B2B, -320-D2A	Idle (Taxi)	10	1.63	1.07	766.81	111.03	0.47	0.42
	Approach	34	7.25	1.07	769.65	45.56	0.27	0.24
	Climb out	81	7.96	1.07	904.75	40.87	0.20	0.18
	Takeoff	81	7.96	1.07	904.75	40.87	0.20	0.18
Notes: c(16), e, g, h, k(7)								
O-320-D2J	Idle (Taxi)	8	1.94	1.07	707.12	127.12	0.02	0.02
	Approach	34 (S)	7.25 (S)	1.07	769.65 (S)	45.56 (S)	0.27 (S)	0.24 (S)
	Climb out	81 (S)	7.96 (S)	1.07	904.75 (S)	40.87 (S)	0.20 (S)	0.18 (S)
	Takeoff	81 (S)	7.96 (S)	1.07	904.75 (S)	40.87 (S)	0.20 (S)	0.18 (S)
Notes: c(16), d(9) - All fuel flow rates and pollutants at Approach, Climb out, and Takeoff power settings, e, g, h, k(7)								
O-320-D3G	Idle (Taxi)	9	1.19	1.07	771.19	79.91	0.21	0.19
	Approach	27	14.03	1.07	599.45	49.43	0.09	0.08
	Climb out	82	19.46	1.07	649.65	51.31	0.12	0.11
	Takeoff	82	19.46	1.07	649.65	51.31	0.12	0.11
Notes: c(16), e, g, h, k(7)								
O-320-E2A	Idle (Taxi)	10	1.64	1.07	689.60	18.34	0.05	0.05
	Approach	38	19.44	1.07	695.60	15.74	0.04	0.04
	Climb out	63	6.92	1.07	836.60	17.32	0.07	0.06
	Takeoff	79	6.68	1.07	815.50	14.50	0.10	0.09
Notes: c(16), e, g, h, k(7)								
O-320-E2D	Idle (Taxi)	10	1.49	1.07	756.45	118.10	0.39	0.35
	Approach	33	4.62	1.07	836.50	45.72	0.42	0.38
	Climb out	83	4.43	1.07	1020.21	35.43	0.16	0.14
	Takeoff	83	4.43	1.07	1020.21	35.43	0.16	0.14
Notes: c(16), e, g, h, k(7)								
O-320-E3D	Idle (Taxi)	7	0.59	1.07	706.42	197.76	0.19	0.17
	Approach	29	2.55	1.07	762.97	50.07	0.20	0.18
	Climb out	82	5.60	1.07	941.15	46.63	0.29	0.26
	Takeoff	82	5.60	1.07	941.15	46.63	0.29	0.26
Notes: c(16), e, g, h, k(7)								
O-320-H2AD	Idle (Taxi)	10	3.45	1.07	713.64	103.42	0.18	0.16
	Approach	44	7.94	1.07	718.04	39.68	0.30	0.27
	Climb out	69	3.95	1.07	941.82	41.35	0.16	0.15
	Takeoff	69	3.95	1.07	941.82	41.35	0.16	0.15
Notes: c(16), e, g, h, k(7)								

Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
O-470C	Idle (Taxi)	11	1.91	1.07	592.20	159.00	0.50	0.45
	Approach	61	3.77	1.07	995.10	13.01	0.40	0.36
	Climb out	99	4.32	1.07	960.80	10.98	0.07	0.06
	Takeoff	133	2.71	1.07	1082.00	10.55	0.10	0.09
Notes: c(16), e, g, h, k(8)								
PT6A-27	Idle (Taxi)	115	2.43	1.07	64.00	57.70	0.50 (S)	0.45 (S)
	Approach	215	8.37	1.07	23.26	2.51	0.10 (S)	0.09 (S)
	Climb out	400	7.00	1.07	1.20	0.00	0.25 (S)	0.23 (S)
	Takeoff	425	7.81	1.07	1.01	0.00	0.24 (S)	0.22 (S)
Notes: c(1), d(15) - PM <sub>10</sub> and PM <sub>2.5</sub> at all power settings, e, j, k(8)								
PT6A-38	Idle (Taxi)	103	2.09	1.07	82.44	2.09	0.50	0.45
	Approach	275	4.79	1.07	7.29	9.6E-05	0.10	0.09
	Climb out	450	6.69	1.07	2.17	9.6E-05	0.25	0.23
	Takeoff	489	7.08	1.07	2.05	9.6E-05	0.24	0.22
Notes: c(13), j, k(8)								
PT6A-41	Idle (Taxi)	147	1.97	1.07	115.31	116.88	0.50 (S)	0.45 (S)
	Approach	273	4.65	1.07	34.80	26.12	0.10 (S)	0.09 (S)
	Climb out	473	7.57	1.07	6.49	2.33	0.25 (S)	0.23 (S)
	Takeoff	510	7.98	1.07	5.10	2.01	0.24 (S)	0.22 (S)
Notes: c(1), d(15) - PM <sub>10</sub> and PM <sub>2.5</sub> at all power settings, e, j, k(8)								
PT6A-42	Idle (Taxi)	103	2.16	1.07	76.55	16.61	0.45	0.41
	Approach	275	4.89	1.07	6.89	9.6E-05	0.10	0.09
	Intermediate	466	6.88	1.07	1.95	9.6E-05	0.24	0.22
	Military	513	7.28	1.07	1.95	9.6E-05	0.23	0.21
Notes: c(13), j, k(8)								
PT6A-60A	Idle (Taxi)	480	2.98	1.07	42.18	166.43	0.09	0.08
	Approach	340 (S)	4.59 (S)	1.07	20.86 (S)	3.31 (S)	0.74 (S)	0.67 (S)
	Climb out	571 (S)	6.69 (S)	1.07	6.72 (S)	0.72 (S)	0.29 (S)	0.26 (S)
	Takeoff	633 (S)	7.08 (S)	1.07	5.36 (S)	0.53 (S)	0.26 (S)	0.23 (S)
Notes: c(16), d(11) - All fuel flow rates and pollutants at Approach, Climb out, and Takeoff power settings, e, g, h, k(1)								
PT6A-65	Idle (Taxi)	131	1.89	1.07	166.43	53.66	1.23	1.11
	Approach	340	4.59	1.07	20.86	3.31	0.74	0.67
	Intermediate	571	6.69	1.07	6.72	0.72	0.29	0.26
	Military	633	7.08	1.07	5.36	0.53	0.26	0.23
Notes: c(13), j, k(8)								
PT6A-67B	Idle (Taxi)	143	1.83	1.07	183.80	61.52	1.38	1.24
	Approach	364	4.59	1.07	20.96	3.24	0.72	0.65
	Intermediate	619	6.59	1.07	6.12	0.61	0.32	0.29
	Military	681	6.98	1.07	5.73	0.45	0.25	0.23
Notes: c(13), j, k(8)								

Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
PT6A-67D	Idle (Taxi)	149	1.83	1.07	177.91	57.94	1.31	1.18
	Approach	372	4.69	1.07	19.76	2.93	0.66	0.59
	Intermediate	643	6.69	1.07	5.35	0.50	0.28	0.25
	Military	713	7.18	1.07	5.09	0.35	0.24	0.22
Notes: c(13), j, k(8)								
PT6A-68	Ground Idle	156	1.77	1.07	117.85	7.89	3.95	3.56
	Flight Idle	180	1.95	1.07	94.99	1.33	4.18	3.76
	Descend	328	5.03	1.07	33.69	3.29	4.15	3.73
	Approach	449	4.73	1.07	10.91	0.71	3.34	3.01
	Max. Continuous	612	8.18	1.07	3.88	0.20	4.30	3.87
Notes: c(11), h, j - Percent hp calculated assuming maximum hp of 1250 per manufacturer's stated specifications, k(6)								
PW306A	Idle (Taxi)	335	4.26	1.07	36.35	5.01	0.07	0.06
	Approach	773	11.87	1.07	7.11	0.00	0.04	0.03
	Climb out	2096	19.26	1.07	2.51	0.00	0.05	0.05
	Takeoff	2517	20.08	1.07	2.27	0.00	0.08	0.07
Notes: c(2), e, f, h, k(2)								
PW308A	Idle (Taxi)	353	3.65	1.07	38.21	7.61	0.14	0.12
	Approach	980	8.03	1.07	4.08	0.02	0.11	0.10
	Climb out	2374	14.06	1.07	1.06	0.00	0.44	0.39
	Takeoff	2860	16.74	1.07	0.83	0.00	0.39	0.35
Notes: c(2), e, f, h, k(1)								
PW2037	Idle (Taxi)	1206	4.10	1.07	22.36	2.21	0.06	0.05
	Approach	3635	9.77	1.07	1.95	0.13	0.06	0.06
	Climb out	10373	23.96	1.07	0.34	0.02	0.09	0.08
	Takeoff	12468	29.41	1.07	0.33	0.02	0.06	0.06
Notes: c(2), e, f, h, k(1)								
PW2040	Idle (Taxi)	978	3.76	1.07	22.70	0.37	10.67	8.75
	Approach	4645	15.49	1.07	0.51	0.05	5.53	5.10
	Intermediate	10408	32.72	1.07	0.32	0.04	2.31	1.42
	Takeoff	13905	35.04	1.07	0.32	0.01	0.06	0.05
Notes: c(2) - Pollutants at Takeoff power setting, c(3) - PW2040 is the commercial designation of the F117-PW-100 engine, d(1) - HAPs at Takeoff power setting only								
PW2041	Idle (Taxi)	1388	4.49	1.07	23.05	2.13	0.15	0.14
	Approach	4184	10.98	1.07	2.49	0.15	0.13	0.12
	Climb out	12345	28.94	1.07	0.20	0.03	0.12	0.11
	Takeoff	15362	36.92	1.07	0.20	0.03	0.12	0.11
Notes: c(13), j, k(8)								
PW4056	Idle (Taxi)	1492	5.00	1.07	11.60	0.76	0.08	0.07
	Approach	5135	11.60	1.07	0.90	0.29	0.08	0.07
	Climb out	15722	24.60	1.07	0.14	0.20	0.12	0.11
	Takeoff	19437	32.50	1.07	0.08	0.13	0.12	0.11
Notes: c(2), e, f, h, k(1)								

**Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants**

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
PW4060	Idle (Taxi)	1635	3.72	1.07	44.46	13.37	0.11	0.10
	Approach	5524	11.91	1.07	2.04	0.12	0.05	0.04
	Climb out	16159	25.03	1.07	0.49	0.07	0.07	0.06
	Takeoff	20373	31.74	1.07	0.58	0.09	0.08	0.07
Notes: c(2), e, f, h, k(1)								
PW4062	Idle (Taxi)	1667	3.78	1.07	42.61	12.49	0.11	0.10
	Approach	5698	12.17	1.07	1.93	0.10	0.05	0.04
	Climb out	16865	25.98	1.07	0.50	0.08	0.07	0.06
	Takeoff	21627	34.36	1.07	0.61	0.09	0.08	0.07
Notes: c(2), e, f, h, k(1)								
PW4074	Idle (Taxi)	1810	4.20	1.07	21.00	3.68	0.06	0.05
	Approach	6310	11.00	1.07	0.40	0.23	0.05	0.05
	Climb out	18794	31.50	1.07	0.10	0.12	0.06	0.05
	Takeoff	23008	38.10	1.07	0.10	0.12	0.07	0.07
Notes: c(2), e, f, h, k(1)								
PW4074D	Idle (Taxi)	2421	3.80	1.07	26.34	3.59	0.06	0.05
	Approach	6897	11.35	1.07	0.96	0.05	0.04	0.04
	Climb out	19611	32.71	1.07	0.35	0.02	0.05	0.04
	Takeoff	24143	42.46	1.07	0.30	0.02	0.06	0.05
Notes: c(2), e, f, h, k(1)								
PW4077	Idle (Taxi)	1841	4.20	1.07	20.20	3.45	0.06	0.05
	Approach	6476	11.30	1.07	0.40	0.23	0.05	0.05
	Climb out	19460	32.50	1.07	0.10	0.12	0.06	0.05
	Takeoff	23960	39.80	1.07	0.10	0.12	0.08	0.07
Notes: c(2), e, f, h, k(1)								
PW4077D	Idle (Taxi)	1937	3.83	1.07	32.62	5.36	0.07	0.06
	Approach	6627	12.10	1.07	0.60	0.08	0.05	0.04
	Climb out	19897	35.82	1.07	0.25	0.05	0.05	0.05
	Takeoff	24460	44.74	1.07	0.22	0.03	0.06	0.05
Notes: c(2), e, f, h, k(1)								
PW4084	Idle (Taxi)	1921	4.40	1.07	18.73	3.11	0.06	0.05
	Approach	6944	12.00	1.07	0.40	0.23	0.05	0.05
	Climb out	21341	35.50	1.07	0.10	0.12	0.07	0.06
	Takeoff	27072	45.00	1.07	0.10	0.12	0.10	0.09
Notes: c(2), e, f, h, k(1)								
PW4084D	Idle (Taxi)	2048	4.08	1.07	25.74	3.78	0.06	0.05
	Approach	7198	12.70	1.07	0.48	0.07	0.05	0.04
	Climb out	21992	39.47	1.07	0.24	0.03	0.05	0.05
	Takeoff	27865	53.02	1.07	0.18	0.03	0.06	0.06
Notes: c(2), e, f, h, k(1)								

Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
PW4090	Idle (Taxi)	2683	4.48	1.07	11.94	0.79	0.04	0.04
	Approach	7770	12.74	1.07	0.55	0.05	0.04	0.04
	Climb out	23778	41.17	1.07	0.31	0.02	0.06	0.05
	Takeoff	31159	57.52	1.07	0.27	0.02	0.09	0.08
Notes: c(2), e, f, h, k(1)								
PW4098	Idle (Taxi)	2548	7.78	1.07	6.48	0.00	0.04	0.03
	Approach	8532	14.89	1.07	0.70	0.00	0.05	0.05
	Climb out	25754	36.45	1.07	0.21	0.00	0.07	0.07
	Takeoff	32841	51.29	1.07	0.16	0.00	0.06	0.06
Notes: c(2), e, f, h, k(1)								
PW4152	Idle (Taxi)	1405	4.90	1.07	12.76	0.85	0.07	0.07
	Approach	4706	11.10	1.07	1.09	0.17	0.07	0.06
	Climb out	14167	22.70	1.07	0.17	0.18	0.11	0.10
	Takeoff	17278	26.90	1.07	0.12	0.15	0.11	0.10
Notes: c(2), e, f, h, k(1)								
PW4156	Idle (Taxi)	1492	5.00	1.07	11.60	0.76	0.08	0.07
	Approach	5135	11.60	1.07	0.90	0.29	0.08	0.07
	Climb out	15722	24.60	1.07	0.14	0.20	0.12	0.11
	Takeoff	19437	32.50	1.07	0.08	0.13	0.12	0.11
Notes: c(2), e, f, h, k(1)								
PW4158	Idle (Taxi)	1675	4.80	1.07	20.99	2.05	0.07	0.06
	Approach	5413	11.80	1.07	1.88	0.16	0.06	0.05
	Climb out	15905	23.70	1.07	0.54	0.02	0.07	0.07
	Takeoff	19691	30.20	1.07	0.40	0.10	0.08	0.07
Notes: c(2), e, f, h, k(1)								
PW4164	Idle (Taxi)	1667	4.03	1.07	26.67	5.13	0.07	0.06
	Approach	5984	14.10	1.07	1.86	0.18	0.05	0.05
	Climb out	17294	31.66	1.07	0.79	0.05	0.05	0.05
	Takeoff	20841	38.57	1.07	0.69	0.03	0.05	0.05
Notes: c(2), e, f, h, k(1)								
PW4164-1D	Idle (Taxi)	1929	3.79	1.07	17.13	1.66	0.05	0.04
	Approach	6151	12.10	1.07	1.55	0.07	0.04	0.04
	Climb out	17770	20.97	1.07	0.17	0.00	0.06	0.05
	Takeoff	21595	26.31	1.07	0.16	0.00	0.06	0.05
Notes: c(2), e, f, h, k(1)								
PW4168, -4168A	Idle (Taxi)	1754	4.15	1.07	23.51	3.78	0.06	0.05
	Approach	6333	14.66	1.07	1.75	0.17	0.05	0.05
	Climb out	18468	33.91	1.07	0.74	0.05	0.05	0.05
	Takeoff	22508	42.39	1.07	0.72	0.03	0.06	0.05
Notes: c(2), e, f, h, k(1)								

Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
PW4168-1D, -4168A-1D	Idle (Taxi)	2000	4.08	1.07	14.78	1.09	0.04	0.04
	Approach	6492	12.39	1.07	1.26	0.06	0.04	0.04
	Climb out	19032	22.31	1.07	0.18	0.00	0.06	0.06
	Takeoff	23310	30.15	1.07	0.17	0.00	0.06	0.05
Notes: c(2), e, f, h, k(1)								
PW4170	Idle (Taxi)	2024	4.18	1.07	14.04	0.95	0.04	0.04
	Approach	6611	12.49	1.07	1.17	0.06	0.04	0.04
	Climb out	19445	22.84	1.07	0.18	0.00	0.06	0.06
	Takeoff	23960	31.40	1.07	0.18	0.00	0.06	0.05
Notes: c(2), e, f, h, k(1)								
PW4460	Idle (Taxi)	1690	4.90	1.07	20.32	1.91	0.07	0.06
	Approach	5579	12.00	1.07	1.78	0.16	0.06	0.05
	Climb out	16548	24.70	1.07	0.51	0.03	0.07	0.07
	Takeoff	21008	32.80	1.07	0.37	0.12	0.08	0.08
Notes: c(2), e, f, h, k(1)								
PW6122A	Idle (Taxi)	865	3.08	1.07	24.68	0.01	0.10	0.09
	Approach	2413	5.95	1.07	3.99	1.2E-03	0.08	0.07
	Climb out	6825	13.40	1.07	0.72	1.2E-03	0.14	0.12
	Takeoff	8310	17.04	1.07	0.74	0.00	0.13	0.12
Notes: c(2), e, f, h, k(1)								
PW6124A	Idle (Taxi)	905	3.58	1.07	25.19	2.3E-03	0.09	0.08
	Approach	2579	6.88	1.07	3.69	1.2E-03	0.08	0.07
	Climb out	7452	15.85	1.07	0.81	2.3E-03	0.15	0.13
	Takeoff	9278	21.03	1.07	0.68	0.00	0.15	0.13
Notes: c(2), e, f, h, k(1)								
R-1820-82	Idle (Taxi)	89	0.00	1.07	474.16	173.15	0.10 (S)	0.09 (S)
	Approach	323	6.50	1.07	384.83	6.41	0.10 (S)	0.09 (S)
	Climb out	862	2.09	1.07	435.03	55.77	0.10 (S)	0.09 (S)
	Takeoff	1166	1.72	1.07	531.73	108.89	0.10 (S)	0.09 (S)
Notes: c(1), d(12) - PM <sub>10</sub> and PM <sub>2.5</sub> at all power settings, e, k(8)								
R-2800-99W	Idle (Taxi)	8	22.00	1.07	1294.00	42.48	0.10	0.09
	Approach	175	13.64	1.07	1262.00	14.81	0.10	0.09
	Climb out	356	2.38	1.07	499.99	18.78	0.10	0.09
	Takeoff	1780	0.99	1.07	35.91	3.70	0.10	0.09
Notes: c(16), e, g, h, k(7)								
RB211-22B	Idle (Taxi)	1786	2.86	1.07	88.99	77.91	0.50	0.45
	Approach	4492	8.18	1.07	20.65	6.85	0.47	0.43
	Climb out	12270	26.89	1.07	1.68	0.29	0.17	0.15
	Takeoff	14897	37.33	1.07	0.78	0.17	0.17	0.16
Notes: c(2), e, f, h, k(8)								



Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
RB211-524B Series	Idle (Taxi)	2159	3.53	1.07	82.20	58.19	0.36	0.32
	Approach	5500	9.75	1.07	20.00	5.73	0.33	0.30
	Climb out	15389	33.00	1.07	2.82	0.46	0.14	0.12
	Takeoff	18913	47.00	1.07	1.83	0.60	0.19	0.17
Notes: c(2), e, f, h, k(8)								
RB211-524C2	Idle (Taxi)	2381	3.37	1.07	81.00	62.33	0.38	0.34
	Approach	5873	10.40	1.07	18.90	5.08	0.30	0.27
	Climb out	16032	32.30	1.07	1.63	0.25	0.11	0.10
	Takeoff	19683	41.90	1.07	0.66	0.00	0.11	0.10
Notes: c(2), e, f, h, k(8)								
RB211-524D4	Idle (Taxi)	2381	4.11	1.07	73.80	53.43	0.33	0.30
	Approach	5873	9.65	1.07	16.90	5.52	0.32	0.29
	Climb out	15952	41.00	1.07	1.18	0.48	0.11	0.10
	Takeoff	19921	56.90	1.07	0.51	0.00	0.09	0.08
Notes: c(2), e, f, h, k(8)								
RB211-524G	Idle (Taxi)	2064	4.63	1.07	13.74	1.02	0.05	0.04
	Approach	5556	9.56	1.07	1.01	0.43	0.11	0.10
	Climb out	16508	40.54	1.07	0.43	0.31	0.13	0.12
	Takeoff	20794	58.71	1.07	0.59	0.45	0.13	0.12
Notes: c(2), e, f, h, k(8)								
RB211-524G-T	Idle (Taxi)	2064	4.00	1.07	28.82	4.54	0.08	0.07
	Approach	5873	9.68	1.07	1.17	0.00	0.09	0.08
	Climb out	16667	21.80	1.07	0.14	0.03	0.15	0.14
	Takeoff	20794	28.43	1.07	0.16	0.00	0.14	0.12
Notes: c(2), e, f, h, k(8)								
RB211-524H	Idle (Taxi)	2064	4.78	1.07	11.75	0.85	0.05	0.04
	Approach	5635	10.26	1.07	0.99	0.41	0.11	0.10
	Climb out	17222	46.31	1.07	0.38	0.38	0.13	0.12
	Takeoff	21667	65.84	1.07	0.87	0.39	0.13	0.11
Notes: c(2), e, f, h, k(8)								
RB211-524H-T	Idle (Taxi)	2064	4.16	1.07	26.17	3.81	0.07	0.07
	Approach	6111	9.91	1.07	1.05	0.00	0.09	0.08
	Climb out	17619	23.19	1.07	0.14	0.02	0.15	0.14
	Takeoff	22302	31.19	1.07	0.18	0.00	0.14	0.12
Notes: c(2), e, f, h, k(8)								
RB211-535C	Idle (Taxi)	1587	3.44	1.07	18.79	1.66	0.06	0.06
	Approach	4286	6.37	1.07	0.48	0.51	0.09	0.08
	Climb out	11667	24.89	1.07	0.27	0.16	0.08	0.07
	Takeoff	14286	33.71	1.07	0.70	0.29	0.10	0.09
Notes: c(2), e, f, h, k(8)								

Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
RB211-535E4	Idle (Taxi)	1429	4.40	1.07	20.33	0.31	0.05	0.05
	Approach	4127	8.38	1.07	2.72	0.05	0.05	0.05
	Climb out	11905	17.56	1.07	0.29	0.00	0.19	0.17
	Takeoff	14683	22.31	1.07	0.26	0.03	0.19	0.17
Notes: c(2), e, f, h, k(8)								
Rotax 912	Idle (Taxi)	10	0.80	1.07	1206.17	21.03	1.0E-03	9.0E-04
	Approach	14	14.28	1.07	569.47	12.76	1.0E-03	9.0E-04
	Climb out	25	10.29	1.07	760.18	14.53	2.0E-03	1.8E-03
	Takeoff	30	12.71	1.07	700.69	14.08	3.0E-03	2.7E-03
Notes: c(16), e, g, h, k(8)								
Rotax 914	Idle (Taxi)	14	5.00	1.07	994.00	38.60	1.0E-03	9.0E-04
	Approach	23	14.00	1.07	776.00	16.00	1.0E-03	9.0E-04
	Climb out	44	18.00	1.07	664.00	12.30	2.0E-03	1.8E-03
	Takeoff	57	6.00	1.07	1020.00	15.00	3.0E-03	2.7E-03
Notes: c(16), e, g, h, k(8)								
Spey Mk511	Idle (Taxi)	1008	3.60	1.07	31.77	4.24	0.16	0.15
	Approach	2206	7.20	1.07	2.65	0.21	0.22	0.20
	Climb out	5762	17.30	1.07	0.63	0.14	0.24	0.22
	Takeoff	7071	22.70	1.07	0.12	0.10	0.23	0.21
Notes: c(2) - Spey MK511 is the commercial designation of the F113-RR-100 engine, e, f, h, k(8)								
Spey Mk555	Idle (Taxi)	762	3.70	1.07	29.30	2.14	0.18	0.16
	Approach	1754	6.80	1.07	3.70	0.33	0.35	0.32
	Climb out	4698	16.50	1.07	0.70	0.17	0.35	0.32
	Takeoff	5833	21.90	1.07	0.30	0.33	0.32	0.29
Notes: c(2), e, f, h, k(8)								
T53-L-11D	Ground Idle	145	1.58	1.07	31.51	66.80	1.44 (S)	1.30 (S)
	Flight Idle	222	2.53	1.07	37.79	15.61	2.95 (S)	2.66 (S)
	Normal Rated	645	6.43	1.07	6.83	0.66	0.31 (S)	0.28 (S)
	Military	685	6.34	1.07	3.34	0.30	0.36 (S)	0.32 (S)
	Takeoff	690	7.75	1.07	3.85	0.31	0.36 (S)	0.32 (S)
Notes: c(9), d(17) - PM <sub>10</sub> and PM <sub>2.5</sub> at all power settings, e, k(8)								
T53-L-13	Idle (Taxi)	160	1.58	1.07	31.45	64.28	1.44	1.30
	Approach	227	2.52	1.07	37.71	15.02	2.95	2.66
	Climb out	694	6.33	1.07	3.59	0.30	0.31	0.28
	Takeoff	696	7.73	1.07	3.59	0.30	0.36	0.32
Notes: c(13), j, k(8)								
T56 Series I	Idle (Taxi)	829	7.33	1.07	5.73	0.86	0.12	0.11
	Approach	1036	7.12	1.07	4.70	0.61	0.22	0.20
	Intermediate	1824	9.61	1.07	2.84	0.31	0.28	0.25
	Military	2059	9.87	1.07	2.82	0.31	0.28	0.25
Notes: c(13), j, k(8)								

Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
T56 Series III	Idle (Taxi)	986	6.05	1.07	6.50	0.90	0.12	0.11
	Approach	1262	9.10	1.07	2.79	0.44	0.19	0.17
	Intermediate	2210	12.19	1.07	1.47	0.26	0.24	0.22
	Military	2476	12.76	1.07	1.47	0.26	0.26	0.23
Notes: c(13), j, k(8)								
T56-A-7	Idle (Taxi)	724	7.58	1.07	5.06	0.08	3.64	3.28
	Approach	880	7.54	1.07	3.89	0.06	3.85	3.47
	Intermediate	1742	9.15	1.07	1.94	0.02	1.46	1.31
	Military	2262	12.46	1.07	2.30	0.01	1.22	1.10
Notes: c(3), h, k(5)								
T56-A-9	Idle	794	3.90	1.07	32.00	24.15	0.83	0.75
	Approach	1423 (C)	4.40	1.07	22.20	14.26	0.97	0.87
	Intermediate	1825	9.20	1.07	2.40	0.58	0.51	0.46
	Military	1905	9.30	1.07	2.10	0.46	0.50	0.45
Notes: c(7), d(1), e, k(4)								
T56-A-14	Idle (Taxi)	324	3.72	1.07	30.39	15.85	0.43	0.39
	Approach	839	6.79	1.07	3.49	0.92	0.28	0.25
	Intermediate	1409	10.30	1.07	1.07	0.04	0.17	0.15
	Military	1563	12.05	1.07	0.95	0.04	0.16	0.14
Notes: c(13), k(8)								
T56-A-15	Idle (Taxi)	794	3.90	1.07	32.00	24.15	0.83	0.75
	Approach	1423 (C)	4.40	1.07	22.20	14.26	0.97	0.87
	Intermediate	1825	9.20	1.07	2.40	0.58	0.51	0.46
	Military	2302	9.30	1.07	2.10	0.46	0.50	0.45
Notes: c(7), d(1), e, h, k(8)								
T56-A-16	Ground Idle	756	6.35	1.07	5.65	1.40	0.83 (S)	0.75 (S)
	Flight Idle	836	6.52	1.07	4.54	1.09	0.97 (S)	0.87 (S)
	75%	1996	9.93	1.07	0.42	0.20	0.51 (S)	0.46 (S)
	100%	2136	10.29	1.07	0.68	0.14	0.50 (S)	0.45 (S)
	Military	2219	10.45	1.07	0.65	0.16	0.50 (S)	0.45 (S)
Notes: c(9), d(18) - PM <sub>10</sub> and PM <sub>2.5</sub> at all power settings, e, k(8)								
T58-GE-5	Idle	133	1.50	1.07	169.17	111.54	0.75	0.68
	Normal Cruise	757	6.34	1.07	7.66	1.82	0.79	0.71
	Intermediate (Military)	821	6.70	1.07	6.82	3.78	0.97	0.88
	Power Takeoff	886	7.22	1.07	5.64	0.91	0.90	0.81
Notes: c(1), e, k(4)								
T58-GE-8F	Idle	132	1.43	1.07	178.44	149.98	0.75 (S)	0.68 (S)
	Approach	581	4.47	1.07	17.28	1.29	0.79 (S)	0.71 (S)
	Cruise	627	4.68	1.07	14.13	0.92	0.79 (S)	0.71 (S)
	Max Continuous	685	4.90	1.07	12.96	0.84	0.79 (S)	0.71 (S)
	Takeoff	786	5.47	1.07	9.03	0.46	0.97 (S)	0.88 (S)
Notes: c(9), d(19) - PM <sub>10</sub> and PM <sub>2.5</sub> at all power settings, e, k(8)								

Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
T58-GE-16	Ground Idle	150	3.03	1.07	139.73	47.05	0.75 (S)	0.68 (S)
	60% Normal	656	7.88	1.07	14.56	0.44	0.79 (S)	0.71 (S)
	75% Normal	779	9.47	1.07	10.89	0.72	0.79 (S)	0.71 (S)
	90% Normal	890	10.07	1.07	9.10	0.96	0.90 (S)	0.81 (S)
	Military	1020	11.60	1.07	7.73	1.52	0.90 (S)	0.81 (S)
Notes: c(9), d(19) - PM <sub>10</sub> and PM <sub>2.5</sub> at all power settings, e, k(4)								
T63-A-5A	Ground Idle	61	1.42	1.07	79.15	23.35	0.83 (S)	0.75 (S)
	Flight Idle	70	1.89	1.07	61.83	12.02	0.83 (S)	0.75 (S)
	30%	105	2.90	1.07	38.59	3.76	0.97 (S)	0.87 (S)
	60%	157	4.11	1.07	20.79	0.78	0.51 (S)	0.46 (S)
	Military	215	5.07	1.07	7.54	0.09	0.50 (S)	0.45 (S)
Notes: c(9), d(18) - PM <sub>10</sub> and PM <sub>2.5</sub> at all power settings, e, k(8)								
T64-GE-6B	Idle	337	3.86	1.07	48.66	15.01	0.30	0.27
	75% hp	1039	8.95	1.07	4.72	0.89	0.58	0.52
	Normal Rated	1257	10.42	1.07	2.86	0.82	0.72	0.64
	Intermediate (Military)	1390	11.15	1.07	2.30	0.74	0.79	0.71
Notes: c(1), e, k(8)								
T64-GE-100	Ground Idle	298	1.11	1.07	76.46	1.26	2.36	2.12
	75% Normal	941	6.85	1.07	7.85	0.05	1.97	1.77
	Normal	1698	9.46	1.07	2.21	0.01	1.61	1.45
	Military	1848	11.30	1.07	2.17	0.01	0.92	0.82
Notes: c(3), e, h, k(5)								
T64-GE-413	Idle	260	2.62	1.07	51.83	19.87	2.36 (S)	2.12 (S)
	75% hp	1287	8.54	1.07	1.94	0.40	1.97 (S)	1.77 (S)
	Normal Rated	1511	9.65	1.07	1.20	0.38	1.61 (S)	1.45 (S)
	Intermediate	1661	10.92	1.07	0.67	0.39	1.61 (S)	1.45 (S)
	Maximum	1721	11.42	1.07	0.49	0.31	1.61 (S)	1.45 (S)
Notes: c(9), d(20) - PM <sub>10</sub> and PM <sub>2.5</sub> at all power settings, e, k(8)								
T64-GE-415	Idle	269	2.12	1.07	74.33	28.00	2.36 (S)	2.12 (S)
	75%	1493	8.09	1.07	2.10	0.15	1.61 (S)	1.45 (S)
	Normal Rated	1730	9.29	1.07	1.50	0.09	1.61 (S)	1.45 (S)
	Military	1916	9.99	1.07	1.29	0.32	0.92 (S)	0.82 (S)
	Max. Rated	2005	10.83	1.07	1.47	0.22	0.92 (S)	0.82 (S)
Notes: c(9), d(20) - PM <sub>10</sub> and PM <sub>2.5</sub> at all power settings, e, k(8)								
T76-G-10	Idle (Taxi)	238	7.40	1.07	23.80	8.51	0.38	0.34
	Approach	476	8.50	1.07	17.20	0.92	0.50	0.45
	Intermediate	794	9.90	1.07	5.90	0.12	0.63	0.57
	Military	873	10.30	1.07	2.30	0.12	0.71	0.64
Notes: c(7), e, g, h, k(8)								
T76-G-12	Idle (Taxi)	397	7.40	1.07	23.80	8.51	0.38	0.34
	Approach	476	8.50	1.07	17.20	0.92	0.50	0.45
	Intermediate	794	9.90	1.07	5.90	0.12	0.63	0.57
	Military	857 (C)	10.30	1.07	2.30	0.12	0.71	0.64
Notes: c(7), d(1), e, g, h, k(8)								

Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
T76-G-418	Idle (Taxi)	238	7.40	1.07	23.80	8.51	0.38	0.34
	Approach	476	8.50	1.07	17.20	0.92	0.50	0.45
	Intermediate	794	9.90	1.07	5.90	0.12	0.63	0.57
	Military	873	10.30	1.07	2.30	0.12	0.71	0.64
Notes: c(7), e, g, h, k(8)								
T76-G-419	Idle (Taxi)	397	7.40	1.07	23.80	8.51	0.38	0.34
	Approach	476	8.50	1.07	17.20	0.92	0.50	0.45
	Intermediate	794	9.90	1.07	5.90	0.12	0.63	0.57
	Military	857 (C)	10.30	1.07	2.30	0.12	0.71	0.64
Notes: c(7), d(1), e, g, h, k(8)								
T400-CP-400	Ground Idle	136	2.21	1.07	27.94	10.99	0.44	0.40
	Flight Idle	141	2.84	1.07	29.08	8.97	0.41 (C)	0.37 (C)
	Cruise	279	4.66	1.07	1.79	0.00	0.36	0.32
	Intermediate (Military)	406	5.91	1.07	0.00	0.00	0.25	0.22
	Maximum	1069	11.51	1.07	0.00	0.22	0.28	0.25
Notes: c(1), d(1) - PM <sub>10</sub> and PM <sub>2.5</sub> at Flight Idle power setting only, e, k(8)								
T406-AD-400	Idle	362	4.15	1.07	8.35	0.10	1.58	1.42
	Flight Idle	663	6.05	1.07	3.47	0.02	1.58	1.42
	Intermediate	948	7.87	1.07	1.82	0.02	1.58	1.42
	Max Continuous	2507	18.03	1.07	0.29	0.01	1.58	1.42
Notes: c(6) - T406-AD-400 is the military designation of the AE1107C engine, h, k(4)								
T700-GE-401, -401C	Idle	432	5.36	1.07	10.46	0.54	0.12	0.11
	Approach	348	5.36	1.07	10.46	0.54	0.21	0.19
	Climb out	443	5.60	1.07	10.11	0.53	0.46	0.41
	Takeoff	442	5.59	1.07	10.15	0.53	0.53	0.48
Notes: c(13), k(8)								
T700-GE-700	Ground Idle	134	3.36	1.07	46.24	0.50	1.48	1.33
	Flight Idle	469	10.95	1.07	5.12	0.02	1.26	1.13
	Flight Max	626	11.87	1.07	3.51	0.01	2.22	2.00
	Overspeed	725	11.43	1.07	2.81	0.01	2.61	2.33
Notes: c(3), h, k(5)								
TAE-125-01	Idle (Taxi)	2	16.91	1.07	24.80	9.78	0.05	0.05
	Approach	20	26.96	1.07	16.06	3.29	0.04	0.04
	Climb out	40	22.78	1.07	6.65	1.25	0.07	0.06
	Takeoff	51	20.01	1.07	7.51	1.05	0.10	0.09
Notes: c(16), e, g, h, k(8)								
TAY Mk611-8	Idle (Taxi)	873	2.50	1.07	24.10	3.91	0.16	0.15
	Approach	1825	5.70	1.07	3.90	1.04	0.52	0.47
	Climb out	5000	16.80	1.07	0.80	0.35	0.48	0.43
	Takeoff	6032	21.10	1.07	0.70	0.92	0.56	0.50
Notes: c(2), e, f, h, k(8)								

Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
TAY Mk611-8C	Idle (Taxi)	810	2.53	1.07	24.40	1.71	0.05	0.05
	Approach	1706	5.31	1.07	2.89	0.75	0.08	0.07
	Climb out	4794	15.40	1.07	0.95	0.06	0.10	0.09
	Takeoff	5802	19.30	1.07	0.50	0.03	0.11	0.10
Notes: c(2), e, f, h, k(8)								
TAY Mk620-15	Idle (Taxi)	873	2.50	1.07	24.10	3.91	0.16	0.15
	Approach	1825	5.70	1.07	3.90	1.04	0.52	0.47
	Climb out	5000	16.80	1.07	0.80	0.35	0.48	0.43
	Takeoff	6032	21.10	1.07	0.70	0.92	0.56	0.50
Notes: c(2), e, f, h, k(8)								
TAY Mk650-15	Idle (Taxi)	944	1.70	1.07	33.77	3.78	0.06	0.06
	Approach	2016	4.55	1.07	6.54	1.01	0.14	0.12
	Climb out	5675	16.47	1.07	2.01	0.47	0.41	0.37
	Takeoff	6937	19.81	1.07	1.74	0.43	0.42	0.38
Notes: c(2), e, f, h, k(8)								
TF30-P-3	Idle (Taxi)	873	2.30	1.07	72.00	71.30	0.01	0.01
	Approach	2064	4.80	1.07	9.20	2.42	0.05	0.05
	Intermediate	4921	9.40	1.07	1.30	0.12	0.45	0.41
	Military	6191	12.00	1.07	0.80	0.03	0.40	0.36
	Afterburner	38413	3.10	1.07	4.06	0.01	0.15	0.14
Notes: c(7), e, g, h, k(8)								
TF30-P-6B	Idle (Taxi)	689	1.31	1.07	68.21	21.53	0.02 (S)	0.02 (S)
	75% Thrust	3550	6.68	1.07	6.31	3.40	0.12 (S)	0.11 (S)
	Normal Rated	4700	8.06	1.07	5.55	1.61	0.44 (S)	0.40 (S)
	Intermediate (Military)	6835	12.04	1.07	3.09	1.16	0.35 (S)	0.32 (S)
Notes: c(1), d(21) - PM <sub>10</sub> and PM <sub>2.5</sub> at all power settings, e, j - Assumes 100% thrust at Intermediate setting, k(8)								
TF30-P-7	Idle (Taxi)	952	3.00	1.07	53.00	34.50	0.02	0.02
	Approach	2064	6.10	1.07	11.50	3.68	0.12	0.11
	Intermediate	5714	14.00	1.07	1.20	0.23	0.44	0.40
	Military	7222	20.00	1.07	0.80	0.12	0.35	0.32
	Afterburner	38413	3.10	1.07	4.00	0.01	0.15	0.14
Notes: c(7), e, g, h, k(8)								
TF30-P-9	Idle (Taxi)	952	3.00	1.07	53.00	34.50	0.02	0.02
	Approach	2064	6.10	1.07	11.50	3.68	0.12	0.11
	Intermediate	5714	14.00	1.07	1.20	0.23	0.44	0.40
	Military	8730	20.00	1.07	0.80	0.12	0.35	0.32
	Afterburner	54525	3.10	1.07	4.00	0.01	0.15	0.14
Notes: c(7), e, k(8)								
TF30-P-100	Idle (Taxi)	1260	2.86	1.07	47.62	21.72	26.27	23.64
	Approach	4562 (C)	10.95 (C)	1.07	1.70 (C)	0.41 (C)	24.88 (C)	22.39 (C)
	Intermediate	6650	20.00	1.07	0.71	0.12	24.00	21.60
	Military	7120	28.01	1.07	0.70	0.11	8.34	7.51
	Afterburner	42850	4.47	1.07	24.80	2.30	5.36	4.82
Notes: c(1), d(1) - All pollutants at Approach power setting, e, j - Assumes 100% thrust at Takeoff power setting, k(8)								

Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
TF30-P-103	Idle (Taxi)	827	4.00	1.07	100.00	88.44	0.51	0.46
	30%	2003	7.00	1.07	36.20	12.54	0.82	0.74
	75%	4119	15.10	1.07	5.50	0.36	0.20	0.18
	100%	5541	20.10	1.07	2.10	0.10	16.34	14.70
	Afterburner-1	14292	11.20	1.07	77.20	32.20	35.69 (C)	31.84 (C)
Notes: c(15), d(1) - PM <sub>10</sub> and PM <sub>2.5</sub> at Afterburner power setting only, e, f, h, k(3)								
TF30-P-109	Idle (Taxi)	761	2.93	1.07	48.49	7.44	1.24	1.11
	Approach	1727	6.19	1.07	20.73	2.35	1.52	1.37
	Intermediate	2921	9.58	1.07	5.17	0.80	1.64	1.47
	Military	6263	23.63	1.07	0.71	0.87	0.92	0.82
	Afterburner-5	38460	4.89	1.07	6.19	2.50	0.51	0.46
Notes: c(12), h, k(5)								
TF30-P-412A	Idle (Taxi)	999	2.40	1.07	68.17	44.20	26.53	23.87
	75% rpm	1448	3.66	1.07	38.60	11.12	24.03	21.63
	90% rpm	3597	9.62	1.07	6.34	0.19	15.01	13.51
	Intermediate (Military)	7394	16.66	1.07	2.12	0.11	8.34	7.51
	Afterburner	40000	6.75	1.07	15.00	1.15	17.33	15.60
Notes: c(1), e, k(8)								
TF33-P-3, -P-5	Idle (Taxi)	846	1.77	1.07	88.53	105.76	5.20	4.68
	Approach	3797	7.30	1.07	9.01	4.36	13.98	12.59
	Climb out	7323	9.00	1.07	1.80	0.46	14.00	12.60
	Takeoff	9979	11.00	1.07	1.30	0.35	8.00	7.20
Notes: c(1), e, h, j, k(8)								
TF33-P-7	Idle (Taxi)	1093	0.78	1.07	134.96	5.32	6.13	5.51
	Approach	4884	7.12	1.07	9.67	0.24	3.68	3.31
	Intermediate	6356	8.10	1.07	4.16	0.06	5.28	4.76
	Military	8264	10.29	1.07	1.49	0.02	3.58	3.22
Notes: c(3), e, h, k(5)								
TF33-P-9	Idle (Taxi)	1120	1.39	1.07	95.06	90.91	4.98	4.48
	Approach	4140	6.37	1.07	5.24	1.37	3.55	3.20
	Intermediate	8960	7.88	1.07	2.11	1.50	3.15	2.84
	Military	9630	12.08	1.07	0.00	0.55	3.67	3.30
Notes: c(6), e, h, k(4)								
TF33-P-100	Idle (Taxi)	1108	1.50	1.07	136.96	131.16	6.13	5.52
	Approach	2794	6.22	1.07	14.60	3.62	5.46	4.91
	Intermediate	8069	8.47	1.07	2.96	0.39	5.29	4.76
	Military	10856	11.49	1.07	1.19	0.25	2.93	2.64
Notes: c(6), h, k(8)								
TF33-P-102	Idle (Taxi)	1114	1.39	1.07	95.02	3.42	4.96	4.46
	Approach	4737	6.37	1.07	5.24	0.11	3.55	3.20
	Intermediate	5782	7.88	1.07	2.11	0.06	3.15	2.84
	Military	7561	12.08	1.07	0.00	0.02	2.52	2.26
Notes: c(3), e, h, k(5)								

Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
TF33-P-102A	Idle (Taxi)	1065	1.80	1.07	117.03	106.96	4.98	4.48
	Approach	3912	5.84	1.07	12.37	1.74	3.55	3.20
	Intermediate	6985	8.74	1.07	2.01	0.95	3.15	2.84
	Military	8756	12.39	1.07	0.45	0.53	3.67	3.30
Notes: c(6), h, j, k(8)								
TF33-P-103	Idle (Taxi)	900	1.39	1.07	95.06	90.91	4.98	4.48
	Approach	3800	6.37	1.07	5.24	1.37	3.55	3.20
	Intermediate	6240	7.88	1.07	2.11	1.50	3.15	2.84
	Military	7440	12.08	1.07	0.00	0.55	3.67	3.30
Notes: c(6), e, h, k(4)								
TF34-GE-100	Idle (Taxi)	390	2.10	1.07	106.70	39.45	8.13 (S)	7.32 (S)
	Approach	920	5.70	1.07	16.30	2.19	6.21 (S)	5.59 (S)
	Intermediate	460	2.60	1.07	78.00	23.35	8.93 (S)	8.04 (S)
	Military	2710	10.70	1.07	2.20	0.12	2.66 (S)	2.39 (S)
Notes: c(7), d(22) - PM <sub>10</sub> and PM <sub>2.5</sub> at all power settings, e, k(8)								
TF34-GE-100A	Idle (Taxi)	498	0.32	1.07	65.62	2.24	8.13	7.32
	Approach	933	3.09	1.07	27.92	1.44	6.21	5.59
	Intermediate	1512	5.61	1.07	8.88	0.13	8.93	8.04
	Military	2628	9.11	1.07	3.94	0.07	2.66	2.39
Notes: c(3), h, k(5)								
TF34-GE-400	Idle (Taxi)	458	1.69	1.07	90.98	17.24	8.13 (S)	3.60 (S)
	Approach	1201 (C)	2.98 (C)	1.07	72.08 (C)	13.51 (C)	6.21 (S)	2.12 (S)
	Intermediate	2686 (C)	5.57 (C)	1.07	34.29 (C)	6.05 (C)	2.66 (S)	1.68 (S)
	Military	3800	7.51	1.07	5.95	0.45	2.66 (S)	1.68 (S)
Notes: c(9), d(1) - Fuel flow rates, NO <sub>x</sub> , CO, and VOC at Approach and Intermediate power settings, d(22) - PM <sub>10</sub> and PM <sub>2.5</sub> at all power settings, e, k(8)								
TF39-GE-1C	Idle (Taxi)	1448	3.37	1.07	58.43	3.44	2.80	2.52
	Approach	10477	24.91	1.07	0.77	0.03	1.20	1.08
	Intermediate	12541	28.16	1.07	1.53	0.03	0.89	0.80
	Military	13862	32.66	1.07	1.29	0.03	1.18	1.06
Notes: c(3), h, k(5)								
TF41-A-1	Idle (Taxi)	1032	1.50	1.07	119.00	105.80	0.15	0.14
	Approach	3492	6.80	1.07	10.20	2.53	0.36	0.32
	Intermediate	5873	12.00	1.07	3.70	0.46	0.52	0.47
	Military	8413	21.00	1.07	1.80	0.23	0.67	0.60
Notes: c(7), e, k(8)								
TF41-A-2	Idle (Taxi)	1047	4.00	1.07	176.00	114.54	0.65	0.59
	30%	2704	8.90	1.07	45.00	11.62	0.73	0.66
	75%	5810	23.80	1.07	4.70	0.10	16.94	15.25
	100%	8086	32.90	1.07	3.20	0.09	28.60	25.74
Notes: c(15), e, f, h, k(3)								



Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
TFE731-2, -2A	Idle (Taxi)	206	3.50	1.07	47.80	8.54	0.13 (S)	0.12 (S)
	Approach	571	6.90	1.07	15.56	1.41	0.13 (S)	0.12 (S)
	Intermediate	1476	16.08	1.07	1.62	0.07	0.09 (S)	0.09 (S)
	Military	1786	19.15	1.07	1.13	0.06	0.09 (S)	0.08 (S)
Notes: c(6), d(14) - PM <sub>10</sub> and PM <sub>2.5</sub> at all power settings, k(8)								
TFE731-2-2B	Idle (Taxi)	190	2.82	1.07	58.60	23.05	0.13 (S)	0.12 (S)
	Approach	532	5.90	1.07	22.38	4.90	0.09 (S)	0.08 (S)
	Climb out	1373	13.08	1.07	2.03	0.15	0.09 (S)	0.08 (S)
	Takeoff	1627	15.25	1.07	1.39	0.13	0.08 (S)	0.08 (S)
Notes: c(2), d(14) - PM <sub>10</sub> and PM <sub>2.5</sub> at all power settings, e, f, h, k(8)								
TFE731-3	Idle (Taxi)	206	3.72	1.07	47.70	10.40	0.13 (S)	0.12 (S)
	Approach	571	6.92	1.07	15.56	1.62	0.09 (S)	0.08 (S)
	Climb out	1476	16.02	1.07	1.62	0.08	0.09 (S)	0.08 (S)
	Takeoff	1786	19.15	1.07	1.13	0.07	0.08 (S)	0.08 (S)
Notes: c(2), d(14) - PM <sub>10</sub> and PM <sub>2.5</sub> at all power settings, e, f, h, k(8)								
TIO-540-A1A, -540-A1B, -540-A1B, -540-A2A, -540-A2B, -540-A2C, -540-AE2A, -540-AH1A, -540-F2BD, -540-J2B	Idle (Taxi)	25	0.04	1.07	1293.70	78.29	0.50	0.45
	Approach	99	1.39	1.07	1261.60	15.39	0.40	0.36
	Climb out	205	0.24	1.07	1470.90	19.12	0.70	0.63
	Takeoff	260	0.36	1.07	1442.10	14.21	0.10	0.09
Notes: c(16), e, g, h, k(8)								
TIO-540-J2B2	Idle (Taxi)	25	0.39	1.07	1293.70	78.29	0.50 (S)	0.45 (S)
	Approach	99	1.39	1.07	1261.57	15.38	0.40 (S)	0.36 (S)
	Climb out	205	0.24	1.07	1470.90	19.12	0.70 (S)	0.63 (S)
	Takeoff	260	0.36	1.07	1442.05	14.21	0.10 (S)	0.09 (S)
Notes: c(1), d(13) - PM <sub>10</sub> and PM <sub>2.5</sub> at all power settings, e, j, k(8)								
TIO-540-J2BD, -540-S1AD	Idle (Taxi)	25	0.04	1.07	1293.70	78.29	0.50	0.45
	Approach	99	1.39	1.07	1261.60	15.39	0.40	0.36
	Climb out	205	0.24	1.07	1470.90	19.12	0.70	0.63
	Takeoff	260	0.36	1.07	1442.10	14.21	0.10	0.09
Notes: c(16), e, g, h, k(8)								
TPE331-2	Idle (Taxi)	105	2.57	1.07	64.10	104.92	2.68 (S)	2.41 (S)
	Approach	220	8.27	1.07	16.59	3.08	2.40 (S)	2.16 (S)
	Climb out	372	9.92	1.07	1.37	0.46	1.47 (S)	1.32 (S)
	Takeoff	405	10.22	1.07	0.94	0.45	1.75 (S)	1.57 (S)
Notes: c(1), d(23) - PM <sub>10</sub> and PM <sub>2.5</sub> at all power settings, e, j, k(8)								
TPE331-3	Idle (Taxi)	112	2.86	1.07	61.52	90.97	2.68	2.41
	Approach	250	9.92	1.07	6.96	0.74	2.40	2.16
	Climb out	409	11.86	1.07	0.98	0.17	1.47	1.32
	Takeoff	458	12.36	1.07	0.76	0.13	1.75	1.57
Notes: c(1), e, h, j, k(8)								

Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
Trent 553-61	Idle (Taxi)	1825	5.96	1.07	10.50	0.16	0.04	0.04
	Approach	4762	11.37	1.07	0.66	0.05	0.05	0.05
	Climb out	13730	30.98	1.07	0.44	0.01	0.06	0.05
	Takeoff	16746	40.55	1.07	0.18	0.02	0.06	0.05
Notes: c(2), e, f, h, k(8)								
Trent 556-61	Idle (Taxi)	1825	6.09	1.07	9.96	0.15	0.04	0.04
	Approach	4921	11.68	1.07	0.54	0.05	0.05	0.05
	Climb out	14524	33.25	1.07	0.38	0.01	0.06	0.05
	Takeoff	17778	44.77	1.07	0.17	0.02	0.06	0.05
Notes: c(2), e, f, h, k(8)								
Trent 768	Idle (Taxi)	2056	4.46	1.07	26.94	3.67	0.06	0.06
	Approach	6198	10.12	1.07	1.71	0.05	0.05	0.05
	Climb out	18849	24.90	1.07	0.49	0.01	0.07	0.07
	Takeoff	23072	32.01	1.07	0.35	0.00	0.06	0.06
Notes: c(2), e, f, h, k(8)								
Trent 772	Idle (Taxi)	2143	4.66	1.07	23.97	2.83	0.06	0.05
	Approach	6516	10.42	1.07	1.56	0.05	0.06	0.05
	Climb out	20079	26.82	1.07	0.49	0.01	0.07	0.07
	Takeoff	24913	35.56	1.07	0.21	0.01	0.06	0.06
Notes: c(2), e, f, h, k(8)								
Trent 875	Idle (Taxi)	2222	4.64	1.07	19.66	2.05	0.05	0.05
	Approach	6984	10.43	1.07	0.86	0.00	0.05	0.05
	Climb out	20397	26.55	1.07	0.16	0.00	0.06	0.05
	Takeoff	24603	33.32	1.07	0.19	0.00	0.06	0.05
Notes: c(2), e, f, h, k(8)								
Trent 877	Idle (Taxi)	2222	4.75	1.07	18.42	1.78	0.05	0.05
	Approach	7143	10.59	1.07	0.80	0.00	0.05	0.05
	Climb out	21111	27.59	1.07	0.16	0.00	0.06	0.05
	Takeoff	25476	34.76	1.07	0.20	0.00	0.05	0.05
Notes: c(2), e, f, h, k(8)								
Trent 884	Idle (Taxi)	2460	5.04	1.07	15.19	1.15	0.05	0.04
	Approach	7698	11.07	1.07	0.65	0.00	0.05	0.05
	Climb out	22937	30.63	1.07	0.18	0.00	0.06	0.05
	Takeoff	28254	40.05	1.07	0.24	0.00	0.05	0.05
Notes: c(2), e, f, h, k(8)								
Trent 892	Idle (Taxi)	2381	5.33	1.07	13.07	0.81	0.05	0.04
	Approach	7937	11.58	1.07	0.57	0.00	0.05	0.05
	Climb out	24603	33.30	1.07	0.20	0.00	0.06	0.05
	Takeoff	31032	45.70	1.07	0.28	0.01	0.05	0.05
Notes: c(2), e, f, h, k(8)								

Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
Trent 895	Idle (Taxi)	2619	5.11	1.07	14.71	1.02	0.05	0.04
	Approach	8333	11.39	1.07	0.54	0.00	0.05	0.05
	Climb out	25318	34.29	1.07	0.19	0.00	0.06	0.05
	Takeoff	31984	47.79	1.07	0.27	0.02	0.05	0.05
Notes: c(2), e, f, h, k(8)								
Trent 970-84	Idle (Taxi)	2381	5.10	1.07	15.10	0.23	0.04	0.04
	Approach	5556	11.40	1.07	1.40	0.00	0.05	0.05
	Climb out	17460	29.10	1.07	0.20	0.00	0.06	0.05
	Takeoff	20638	37.20	1.07	0.40	0.00	0.05	0.05
Notes: c(2), e, f, h, k(8)								
Trent 972-84	Idle (Taxi)	2048	5.51	1.07	13.00	0.05	0.04	0.04
	Approach	5833	12.23	1.07	1.10	0.08	0.06	0.06
	Climb out	17540	30.36	1.07	0.31	0.13	0.07	0.07
	Takeoff	21206	39.78	1.07	0.32	0.01	0.06	0.06
Notes: c(2), e, f, h, k(8)								
Trent 1000-A	Idle (Taxi)	1881	5.40	1.07	8.73	0.07	0.04	0.04
	Approach	4960	13.29	1.07	0.77	0.00	0.06	0.05
	Climb out	14897	35.87	1.07	0.45	0.00	0.05	0.05
	Takeoff	18111	46.67	1.07	0.53	0.00	0.05	0.04
Notes: c(2), e, f, h, k(8)								
Trent 1000-C	Idle (Taxi)	1952	5.66	1.07	7.66	0.05	0.04	0.04
	Approach	5302	13.86	1.07	0.68	0.00	0.06	0.05
	Climb out	16254	40.33	1.07	0.48	0.00	0.05	0.05
	Takeoff	19905	53.54	1.07	0.51	0.00	0.05	0.04
Notes: c(2), e, f, h, k(8)								
Trent 1000-E	Idle (Taxi)	1762	5.06	1.07	10.63	0.10	0.04	0.04
	Approach	4524	12.54	1.07	0.92	0.00	0.05	0.05
	Climb out	13167	30.55	1.07	0.43	0.00	0.06	0.05
	Takeoff	15929	39.17	1.07	0.47	0.00	0.05	0.05
Notes: c(2), e, f, h, k(8)								
TSIO-360-A, -360-AB, -360-B, -360-BB, -360-C, -360-CB, -360-F, -360-FB, -360-JB	Idle (Taxi)	11	1.91	1.07	592.20	159.00	0.05	0.05
	Approach	61	3.77	1.07	995.10	13.01	0.04	0.04
	Climb out	99	4.32	1.07	960.80	10.98	0.07	0.06
	Takeoff	133	2.71	1.07	1082.00	10.55	0.10	0.09
Notes: c(16), e, g, h, k(8)								
V2500-A1	Idle (Taxi)	984	5.91	1.07	7.76	0.25	0.08	0.07
	Approach	2651	13.45	1.07	0.77	0.17	0.08	0.07
	Climb out	7333	30.82	1.07	0.55	0.13	0.12	0.11
	Takeoff	8833	37.13	1.07	0.55	0.12	0.12	0.11
Notes: c(2), e, f, h, k(1)								

**Table 2-9. Aircraft Engine Emission Factors for Criteria Pollutants**

Aircraft Engine	Power Setting <sup>a</sup>	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)					
			NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
V2522-A5	Taxi (Idle)	937	4.50	1.07	13.42	0.12	0.15	0.13
	Approach	2468	8.70	1.07	2.60	0.07	0.19	0.17
	Climb out	6484	20.80	1.07	0.67	0.05	0.24	0.21
	Takeoff	7706	24.50	1.07	0.57	0.05	0.16	0.14
Notes: c(2), e, f, h, k(1)								
V2524-A5	Idle (Taxi)	976	4.70	1.07	12.64	0.12	0.15	0.13
	Approach	2603	9.00	1.07	2.37	0.07	0.20	0.18
	Climb out	6889	22.00	1.07	0.63	0.05	0.23	0.20
	Takeoff	8270	26.20	1.07	0.54	0.05	0.15	0.14
Notes: c(2), e, f, h, k(1)								
V2525-D5	Taxi (Idle)	1016	4.70	1.07	12.43	0.12	0.15	0.13
	Approach	2532	8.90	1.07	2.44	0.07	0.20	0.18
	Climb out	6984	22.30	1.07	0.62	0.05	0.23	0.20
	Takeoff	8357	26.50	1.07	0.53	0.05	0.15	0.14
Notes: c(2), e, f, h, k(1)								
V2527-A5	Idle (Taxi)	1016	4.70	1.07	12.43	0.12	0.15	0.13
	Approach	2532	8.90	1.07	2.44	0.07	0.20	0.18
	Climb out	6984	22.30	1.07	0.62	0.05	0.23	0.20
	Takeoff	8357	26.50	1.07	0.53	0.05	0.15	0.14
Notes: c(2), e, f, h, k(1)								
V2528-D5	Taxi (Idle)	1063	4.90	1.07	11.53	0.12	0.13	0.12
	Approach	2802	9.60	1.07	2.03	0.07	0.20	0.18
	Climb out	7905	25.10	1.07	0.56	0.05	0.20	0.18
	Takeoff	9595	30.50	1.07	0.47	0.05	0.14	0.13
Notes: c(2), e, f, h, k(1)								
V2530-A5	Idle (Taxi)	1095	5.00	1.07	10.95	0.12	0.13	0.12
	Approach	2992	10.10	1.07	1.81	0.06	0.21	0.18
	Climb out	8548	27.10	1.07	0.52	0.05	0.19	0.17
	Takeoff	10564	33.80	1.07	0.45	0.05	0.14	0.13
Notes: c(2), e, f, h, k(1)								
V2533-A5	Taxi (Idle)	1082	5.24	1.07	9.32	0.12	0.13	0.12
	Approach	3096	10.83	1.07	1.65	0.06	0.21	0.19
	Climb out	9085	28.67	1.07	0.52	0.05	0.19	0.17
	Takeoff	11318	36.48	1.07	0.46	0.05	0.13	0.12
Notes: c(2), e, f, h, k(1)								

Notes for Table 2-9:

- a. Power Settings included for both Fixed-wing and Rotary aircraft.
- b. The emission factors for sulfur oxides assumes JP-8 used as the fuel. The value provided is the national average for sulfur content in JP-8, though when conducting an air emissions inventory (AEI), the sulfur content should be obtained directly from the fuel supplier.
- c. The emission factors were found in the following sources:
  - (1) SOURCE: *Air Pollutant Emission Factors for Military and Civil Aircraft*, EPA-450/3-78-117, October 1978.
  - (2) SOURCE *Airport Air Quality Manual*, International Civil Aviation Organization, 2011 version 24 datasheets.
  - (3) SOURCE: *Aircraft Engine and Auxiliary Power Unit Emissions Volume I-III*, March 1999, IERA-RS-BR-TR-1999-0006.
  - (4) SOURCE: *Aircraft Engine and Auxiliary Power Unit Emissions: Testing Final Report Addendum F119-PW-100* June 2002, IERA-RS-BR-SR-2002-0006.
  - (5) SOURCE: *Engine and Hush House Emissions from a F100-PW-200 Jet Engine Tested at Kelly AFB, TX* Final Volume I February 1997.
  - (6) SOURCE: *Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations* January 2002, IERA-RS-BR-SR-2001-0010.
  - (7) SOURCE: *Aircraft Engine Emissions Estimator*, AFESC, September 1985.
  - (8) SOURCE: *Collection and Assessment of Aircraft Emissions*, US EPA, October 1971.
  - (9) SOURCE: *Summary Tables of Gaseous and Particulate Emissions from Aircraft Engines*, Aircraft Environmental Support Office.
  - (10) SOURCE: *Clean Air Act Emission Testing of the T-38C Aircraft Engines* September 2002, IERA-RS-BR-SR-2003-001.
  - (11) SOURCE: *PT6A-68 Emissions Measurement Program Summary*, September 2002, IERA-RS-BR-SR-2003-0003.
  - (12) SOURCE: *Engine and Hush House Emissions from a TF30-P-109 Jet Engine Tested at Canon AFB, NM* Final Volume I June 1996.
  - (13) SOURCE: *Air Emissions Factor Guide to Air Force Mobile Sources*, December 2009.
  - (14) SOURCE: *Engine and Hush House Emissions from a F100-PW-100 Jet Tested at Langley Air Force Base, VA*, November 1996.
  - (15) SOURCE: *Aircraft Emissions Characterization: TF41-A2, TF30-P-103, and TF30-P-109 Engines*, December 1987.
  - (16) SOURCE: *Exhaust Emissions from In-Use General Aviation Aircraft*, The National Academies of Sciences Engineering Medicine. The National Academies Press, 2016.
  - (17) SOURCE: *Source Sampling of Aerospace Ground Equipment and Jet Engines Technical Report*, Environmental Quality Management, Inc. 1996.
  - (18) SOURCE: *Fuel Flows and Emission Indexes of the F404-GE-402 Engine Burning JP-5*, AESO Memorandum Report No. 2003-01 Revision A, September 2016.
  - (19) SOURCE: *Fuel Flows and Emission Indexes of the F414-GE-400 Engines Burning JP-5*, AESO Memorandum Report No. 9725 Revision E, September 2016.
  - (20) SOURCE: *Fuel Flows and Emission Indexes of the F405-RR-401 Engine Using JP-5*, AESO Memorandum Report No. 2006-03 Revision B, June 2017.
  - (21) SOURCE: *Guidance on the Determination of Helicopter Emissions*, Federal Office of Civil Aviations, FOCA, March 2009.
- d. Surrogate data was used for this engine. The surrogate data was found in the following sources:
  - (1) Data was calculated using values provided in the source document.
  - (2) F100-PW-220
  - (3) F101-GE-102
  - (4) F110-GE-100
  - (5) IO-360-A
  - (6) J52-P-408
  - (7) J57-P-19W
  - (8) J85-GE-13
  - (9) O-320-A2B
  - (10) J85-GE-5A

- (11) PT6A-65
  - (12) R-1820-82
  - (13) TIO-540-A1A
  - (14) LF507-1F
  - (15) PT6A-38
  - (16) PW2040
  - (17) T53-L-13
  - (18) T56-A-15
  - (19) T58-GE-5
  - (20) T64-GE-100
  - (21) TF30-P-7
  - (22) TF34-GE-100A
  - (23) TPE331-3
  - (24) F404-GE-F1D2
  - (25) O-200A
- e. Source document provided emission factors for total hydrocarbons (THC) or non-methane organic gas (NMOG). These values converted to volatile organic compounds (VOCs) using the following equations:  $VOC=1.15*THC$  or  $VOC=NMOG*0.99$  based on the document *Recommended Best Practice for Quantifying Speciated Organic Gas Emissions from Aircraft Equipped with Turbofan, Turbojet, and Turboprop Engines*, FAA 2009.
- f. PM data calculated using smoke numbers and the ICAO method. The PM calculated was assumed to be  $PM_{10}$ .
- g. PM reported in the source document was assumed to be  $PM_{10}$ .
- h.  $PM_{2.5}$  calculated as 90% of  $PM_{10}$ .
- i. For at least one setting, the emission factors reported are an average of values provided in the source document.
- j. Percent thrust is an estimate based on tables provided in the source document.
- k. Fuel used for emission testing:
- (1) Jet A
  - (2) Jet A-1
  - (3) JP-4
  - (4) JP-5
  - (5) JP-8
  - (6) JP-8+100
  - (7) AVGAS
  - (8) No data on fuel used in tests, assumed to use Kerosene-Type Jet Fuel

“(S)” – Indicates that this emission factor is from a recommended surrogate engine. See note 4 for details.

“(C)” – Indicates that this value was calculated using data provided by the source document.

“---” Indicates No Data Available

**Table 2-10. VOC and HAP Emission Factors for Select Engines****F100-PW-100**

Power Setting			Idle	Approach	Intermediate	Military	Afterburner-5
Fuel Flowrate (lb/hr)			1127	2765	7685	10996	54007
Percent Thrust/hp			3%	13%	45%	100%	134%
Compound Name	CAS Number	HAP	Emission Factors (lb/1000lb fuel burned)				
Acetaldehyde	75-07-0	X	2.35E-01	1.50E-01	1.00E-02	1.00E-02	1.00E-02
Acrolein	107-02-8	X	1.11E-01	6.00E-02	ND	ND	ND
Benzaldehyde	100-52-7		2.40E-02	1.00E-02	ND	ND	ND
Benzene	71-43-2	X	4.50E-02	2.45E-03	5.25E-04	5.01E-04	2.85E-04
1,3-Butadiene	106-99-0	X	2.93E-02	ND	ND	ND	ND
2-Butanone (MEK)	78-93-3		9.00E-03	2.00E-02	0.00E+00	0.00E+00	0.00E+00
Crotonaldehyde	4170-30-3		3.40E-02	2.00E-02	ND	ND	ND
Ethylbenzene	100-41-4	X	5.93E-03	4.44E-04	ND	3.99E-04	8.38E-05
Formaldehyde	50-00-0	X	8.61E-01	6.10E-01	2.00E-02	1.00E-02	1.00E-02
Hexanal	66-25-1		2.50E-02	3.00E-02	3.00E-02	1.00E-02	0.00E+00
Naphthalene	91-20-3	X	9.50E-02	7.49E-04	4.91E-04	3.43E-04	5.40E-04
Phenol	108-95-2	X	3.99E-02	ND	ND	ND	3.38E-03
Propanal	123-38-6	X	3.90E-02	2.00E-02	1.00E-02	4.00E-02	0.00E+00
Styrene	100-42-5	X	4.09E-03	ND	ND	ND	ND
Toluene	108-88-3	X	2.20E-02	1.73E-03	9.55E-04	9.24E-04	2.98E-04
Xylenes (mixed isomers)	1330-20-7	X	5.10E-02	7.35E-03	1.92E-03	4.55E-03	9.42E-04

Notes for F100-PW-100

SOURCE: Engine and Hush House Emission from F100-PW-100 Jet Engine Tested at Langley Air Force Base, VA Volumes I-III, November 1996.

"X" Indicates that compound is a HAP.

"--" Indicates No Data Available

ND – Compound not detected at the detection limit. Compound may be present at a value less than the detection limit

**Table 2-10. VOC and HAP Emission Factors for Select Engines****F100-PW-200**

Power Setting			Idle	Approach	Intermediate	Military	Afterburner-5
Fuel Flowrate (lb/hr)			1006	3251	5651	8888	40123
Percent Thrust/hp			3%	13%	45%	100%	134%
Compound Name	CAS Number	HAP	Emission Factors (lb/1000lb fuel burned)				
Acetaldehyde	75-07-0	X	2.41E-01	ND	7.00E-03	1.30E-02	1.60E-02
Acrolein	107-02-8	X	8.40E-02	ND	ND	ND	ND
Benzaldehyde	100-52-7		ND	ND	ND	ND	ND
Benzene	71-43-2	X	4.73E-02	3.87E-04	1.89E-04	4.90E-04	1.82E-04
1,3-Butadiene	106-99-0	X	1.04E-02	ND	ND	ND	ND
2-Butanone (MEK)	78-93-3		4.00E-02	ND	7.00E-03	6.00E-03	8.00E-03
Crotonaldehyde	4170-30-3		3.20E-02	ND	ND	ND	ND
Ethylbenzene	100-41-4	X	2.99E-03	1.93E-04	2.70E-04	3.44E-04	4.01E-05
Formaldehyde	50-00-0	X	7.77E-01	ND	ND	2.00E-03	2.00E-02
Hexanal	66-25-1		ND	ND	ND	ND	ND
Naphthalene	91-20-3	X	3.42E-02	2.13E-04	3.96E-04	4.01E-04	4.12E-04
Phenol	108-95-2	X	1.35E-02	ND	ND	2.68E-04	1.04E-03
Propanal	123-38-6	X	4.90E-02	ND	8.00E-03	6.00E-03	7.00E-03
Styrene	100-42-5	X	5.02E-04	ND	2.78E-04	ND	ND
Toluene	108-88-3	X	1.65E-02	7.62E-04	4.34E-04	1.08E-03	8.75E-04
Xylenes (mixed isomers)	1330-20-7	X	1.83E-02	1.68E-03	1.78E-03	2.58E-03	3.17E-04

Notes for F100-PW-200 Engine:

SOURCE: *Engine and Hush House Emissions from F100-PW-200 Jet Engine Tested at Kelly Air Force Base, TX* Volumes I-III, February 1997

“X” Indicates that compound is a HAP.

ND - Compound not detected at the detection limit. Compound may be present at a value less than the detection limit.



Table 2-10. VOC and HAP Emission Factors for Select Engines

## F101-GE-102

Power Setting			Idle	Approach	Intermediate	Military	Afterburner-1
Fuel Flowrate (lb/hr)			1117	4533	6557	7828	15314
Percent Thrust/hp			5%	47%	66%	77%	106%
Compound Name	CAS Number	HAP	Emission Factors (lb/1000lb fuel burned)				
Acetaldehyde	75-07-0	X	ND	ND	ND	ND	1.77E-02
Acrolein	107-02-8	X	ND	ND	ND	ND	8.23E-02
Benzaldehyde	100-52-7		ND	ND	ND	1.93E-03	4.98E-02
Benzene	71-43-2	X	1.18E-02	7.89E-04	1.32E-03	5.48E-03	2.28E-01
1,3-Butadiene	106-99-0	X	---	---	---	---	---
2-Butanone (MEK)	78-93-3		2.28E-03	ND	ND	ND	3.30E-02
Crotonaldehyde	4170-30-3		ND	ND	ND	ND	3.59E-02
Ethylbenzene	100-41-4	X	ND	ND	ND	ND	8.60E-02
Formaldehyde	50-00-0	X	1.04E-01	5.12E-03	4.64E-03	4.43E-03	3.89E-02
Hexanal	66-25-1		ND	ND	ND	ND	1.80E-02
Naphthalene	91-20-3	X	1.79E-03	AA	ND	ND	1.27E-01
Phenol	108-95-2	X	2.29E-03	1.22E-03	ND	ND	2.71E-02
Propanal	123-38-6	X	---	---	---	---	---
Styrene	100-42-5	X	1.08E-03	ND	3.36E-04	ND	1.21E-02
Toluene	108-88-3	X	5.55E-03	1.50E-03	1.69E-03	1.29E-03	1.26E-01
Xylenes (mixed isomers)	1330-20-7	X	9.22E-04	4.34E-04	6.65E-04	2.45E-03	2.24E-01

Notes for F101-GE-102 Engine:

SOURCE: *Aircraft Engine and APU Emissions Testing* Volumes I-III March 1999, IERA-RS-BR-TR-1999-0006

"X" Indicates that compound is a HAP.

"—" Indicates No Data Available

ND - Compound not detected at the detection limit. Compound may be present at a value less than the detection limit.

AA - Compound detected was less than the Ambient Air concentration resulting in a negative emission factor when the Ambient Air Concentration was removed.

Table 2-10. VOC and HAP Emission Factors for Select Engines

## F108-CF-100

Power Setting			Idle	Approach	Intermediate	Military	---
Fuel Flowrate (lb/hr)			1136	2547	5650	6458	---
Percent Thrust/hp			9%	30%	70%	78%	---
Compound Name	CAS Number	HAP	Emission Factors (lb/1000lb fuel burned)				
Acetaldehyde	75-07-0	X	AA	ND	ND	ND	---
Acrolein	107-02-8	X	ND	ND	ND	ND	---
Benzaldehyde	100-52-7		ND	ND	ND	4.09E-03	---
Benzene	71-43-2	X	1.39E-02	3.39E-03	8.30E-04	5.10E-04	---
1,3-Butadiene	106-99-0	X	---	---	---	---	---
2-Butanone (MEK)	78-93-3		5.35E-03	ND	ND	ND	---
Crotonaldehyde	4170-30-3		ND	ND	ND	ND	---
Ethylbenzene	100-41-4	X	6.84E-04	5.53E-04	ND	ND	---
Formaldehyde	50-00-0	X	9.51E-02	1.50E-02	5.58E-03	7.01E-03	---
Hexanal	66-25-1		ND	9.66E-03	ND	ND	---
Naphthalene	91-20-3	X	2.90E-03	AA	ND	ND	---
Phenol	108-95-2	X	ND	ND	ND	ND	---
Propanal	123-38-6	X	---	---	---	---	---
Styrene	100-42-5	X	1.48E-03	ND	ND	ND	---
Toluene	108-88-3	X	8.97E-03	6.23E-03	1.42E-03	1.11E-03	---
Xylenes (mixed isomers)	1330-20-7	X	1.65E-03	1.61E-03	5.42E-04	3.36E-04	---

Notes for F108-CF-100 Engine

SOURCE: *Aircraft Engine and APU Emissions Testing* Volumes I-III March 1999, IERA-RS-BR-TR-1999-0006

"X" Indicates that compound is a HAP.

"—" Indicates No Data Available

ND - Compound not detected at the detection limit. Compound may be present at a value less than the detection limit.

AA - Compound detected was less than the Ambient Air concentration resulting in a negative emission factor when the Ambient Air Concentration was removed.

**Table 2-10. VOC and HAP Emission Factors for Select Engines****F110-GE-100**

Power Setting			Idle	Approach	Intermediate	Military	Afterburner-1
Fuel Flowrate (lb/hr)			1111	5080	7332	11358	18088
Percent Thrust/hp			3%	44%	66%	100%	113%
Compound Name	CAS Number	HAP	Emission Factors (lb/1000lb fuel burned)				
Acetaldehyde	75-07-0	X	6.62E-03	ND	1.65E-04	1.44E-04	1.24E-02
Acrolein	107-02-8	X	ND	ND	ND	ND	3.90E-02
Benzaldehyde	100-52-7		3.48E-02	ND	4.26E-03	3.06E-03	7.13E-02
Benzene	71-43-2	X	2.93E-02	1.77E-03	1.59E-03	1.61E-03	1.88E-01
1,3-Butadiene	106-99-0	X	---	---	---	---	---
2-Butanone (MEK)	78-93-3		2.44E-03	ND	ND	4.55E-04	2.02E-02
Crotonaldehyde	4170-30-3		ND	ND	ND	ND	6.08E-02
Ethylbenzene	100-41-4	X	2.00E-03	3.93E-04	3.68E-04	1.69E-04	4.47E-02
Formaldehyde	50-00-0	X	1.01E-01	1.00E-02	1.94E-02	1.53E-02	1.53E-02
Hexanal	66-25-1		ND	ND	ND	ND	1.14E-02
Naphthalene	91-20-3	X	3.31E-03	AA	AA	3.31E-04	9.73E-02
Phenol	108-95-2	X	2.95E-03	ND	ND	ND	6.63E-02
Propanal	123-38-6	X	---	---	---	---	---
Styrene	100-42-5	X	3.69E-03	2.98E-04	4.91E-04	2.65E-04	5.71E-03
Toluene	108-88-3	X	1.10E-02	1.34E-03	1.90E-03	7.41E-04	1.40E-01
Xylenes (mixed isomers)	1330-20-7	X	4.22E-03	1.12E-03	9.70E-04	5.07E-04	8.89E-02

Notes for F110-GE-100 Engine:

SOURCE: *Aircraft Engine and APU Emissions* Testing Volumes I-III March 1999, IERA-RS-BR-TR-1999-0006

"X" Indicates that compound is a HAP.

"—" Indicates No Data Available

ND - Compound not detected at the detection limit. Compound may be present at a value less than the detection limit.

AA - Compound detected was less than the Ambient Air concentration resulting in a negative emission factor when the Ambient Air Concentration was removed.

Table 2-10. VOC and HAP Emission Factors for Select Engines

## F117-PW-100

Power Setting			Idle	Approach	Intermediate	Takeoff	---
Fuel Flowrate (lb/hr)			978	4645	10408	13905 (S)	---
Percent Thrust/hp			4%	31%	68%	---	---
Compound Name	CAS Number	HAP	Emission Factors (lb/1000lb fuel burned)				
Acetaldehyde	75-07-0	X	1.20E-02	ND	ND	4.27E-04 (C)	---
Acrolein	107-02-8	X	ND	ND	ND	2.45E-04 (C)	---
Benzaldehyde	100-52-7		ND	3.16E-03	3.68E-03	---	---
Benzene	71-43-2	X	2.25E-02	8.90E-04	6.25E-04	1.68E-04 (C)	---
1,3-Butadiene	106-99-0	X	---	---	---	1.69E-04 (C)	---
2-Butanone (MEK)	78-93-3		ND	ND	ND	---	---
Crotonaldehyde	4170-30-3		1.20E-02	ND	ND	---	---
Ethylbenzene	100-41-4	X	2.82E-03	ND	ND	1.74E-05 (C)	---
Formaldehyde	50-00-0	X	2.36E-01	1.65E-02	9.50E-03	1.23E-03 (C)	---
Hexanal	66-25-1		ND	ND	ND	---	---
Naphthalene	91-20-3	X	2.39E-03	ND	ND	5.41E-05 (C)	---
Phenol	108-95-2	X	3.79E-03	ND	ND	7.26E-05 (C)	---
Propanal	123-38-6	X	---	---	---	7.27E-05 (C)	---
Styrene	100-42-5	X	1.55E-03	ND	ND	3.09E-05 (C)	---
Toluene	108-88-3	X	6.68E-03	1.41E-03	1.12E-03	6.42E-05 (C)	---
Xylenes (mixed isomers)	1330-20-7	X	3.27E-03	6.21E-04	5.47E-04	4.48E-05 (C)	---

Notes for F117-PW-100 Engine:

SOURCE: *Aircraft Engine and APU Emissions Testing* Volumes I-III March 1999, IERA-RS-BR-TR-1999-0006

"X" Indicates that compound is a HAP.

"S" Indicates a surrogate engine was used for this data.

"C" indicates this value was calculated. For VOC and HAP emission factors, these values were calculated taking the product of the VOC emission factor at the specified power setting and the mass fraction for this pollutant as given in Table 2-10

"—" Indicates No Data Available

ND - Compound not detected at the detection limit. Compound may be present at a value less than the detection limit.

AA - Compound detected was less than the Ambient Air concentration resulting in a negative emission factor when the Ambient Air Concentration was removed.

Table 2-10. VOC and HAP Emission Factors for Select Engines

## F118-GE-100

Power Setting			Idle	Approach	Intermediate	Military	---
Fuel Flowrate (lb/hr)			1097	3773	6350	10887	---
Percent Thrust/hp			---	---	---	---	---
Compound Name	CAS Number	HAP	Emission Factors (lb/1000lb fuel burned)				
Acetaldehyde	75-07-0	X	7.86E-03	ND	ND	ND	---
Acrolein	107-02-8	X	ND	ND	ND	ND	---
Benzaldehyde	100-52-7		6.59E-03	1.59E-03	1.65E-03	1.94E-03	---
Benzene	71-43-2	X	2.70E-02	8.58E-04	3.71E-04	3.38E-04	---
1,3-Butadiene	106-99-0	X	---	---	---	---	---
2-Butanone (MEK)	78-93-3		3.01E-03	ND	ND	ND	---
Crotonaldehyde	4170-30-3		ND	ND	ND	ND	---
Ethylbenzene	100-41-4	X	1.23E-03	3.72E-04	ND	ND	---
Formaldehyde	50-00-0	X	1.80E-01	1.22E-02	1.17E-02	6.55E-03	---
Hexanal	66-25-1		ND	ND	ND	ND	---
Naphthalene	91-20-3	X	AA	ND	ND	ND	---
Phenol	108-95-2	X	1.20E-03	ND	ND	ND	---
Propanal	123-38-6	X	---	---	---	---	---
Styrene	100-42-5	X	2.25E-03	ND	ND	ND	---
Toluene	108-88-3	X	9.88E-03	1.35E-03	2.98E-04	3.85E-04	---
Xylenes (mixed isomers)	1330-20-7	X	5.26E-03	1.96E-03	2.87E-04	2.05E-04	---

Notes for F118-GE-100 Engine:

SOURCE: *Aircraft Engine and APU Emissions Testing* Volumes I-III March 1999, IERA-RS-BR-TR-1999-0006

"X" Indicates that compound is a HAP.

"—" Indicates No Data Available

ND - Compound not detected at the detection limit. Compound may be present at a value less than the detection limit.

AA - Compound detected was less than the Ambient Air concentration resulting in a negative emission factor when the Ambient Air Concentration was removed.

**Table 2-10. VOC and HAP Emission Factors for Select Engines****F119-PW-100**

Power Setting			Idle	Approach	Intermediate	Military	Afterburner
Fuel Flowrate (lb/hr)			1377	2740	10110	18612	50170
Percent Thrust/hp			10%	20%	70%	100%	150%
Compound Name	CAS Number	HAP	Emission Factors (lb/1000lb fuel burned)				
Acetaldehyde	75-07-0	X	1.11E-01	6.75E-03	2.61E-03	8.33E-04	7.69E-05 (C)
Acrolein	107-02-8	X	3.60E-02	ND	ND	ND	4.41E-05 (C)
Benzaldehyde	100-52-7		4.15E-02	ND	ND	ND	---
Benzene	71-43-2	X	1.06E-01	3.33E-03	6.86E-04	4.88E-04	3.03E-05 (C)
1,3-Butadiene	106-99-0	X	4.99E-02	ND	4.27E-04	ND	3.04E-05 (C)
2-Butanone (MEK)	78-93-3		3.33E-02	ND	ND	ND	---
Crotonaldehyde	4170-30-3		2.66E-02	ND	ND	ND	---
Ethylbenzene	100-41-4	X	1.64E-02	2.55E-04	4.99E-04	1.34E-04	3.13E-06 (C)
Formaldehyde	50-00-0	X	9.95E-01	3.56E-02	2.44E-02	7.58E-03	2.22E-04 (C)
Hexanal	66-25-1		ND	ND	ND	ND	---
Naphthalene	91-20-3	X	---	---	---	---	9.74E-06 (C)
Phenol	108-95-2	X	---	---	---	---	1.31E-05 (C)
Propanal	123-38-6	X	1.60E-02	ND	9.78E-04	4.10E-04	1.31E-05 (C)
Styrene	100-42-5	X	3.12E-02	2.55E-04	ND	ND	5.56E-06 (C)
Toluene	108-88-3	X	6.37E-02	2.68E-04	AA	AA	1.16E-05 (C)
Xylenes (mixed isomers)	1330-20-7	X	6.71E-02	8.81E-04	4.89E-04	3.77E-04	8.06E-06 (C)

Notes for F119-PW-100 Engine:

SOURCE: *Aircraft Engine and Auxiliary Power Unit Emissions Testing* Final Report Addendum F119-PW-100 June 2002, IERA-RS-BR-SR-2002-0006

"X" Indicates that compound is a HAP.

"C" indicates this value was calculated. For VOC and HAP emission factors, these values were calculated taking the product of the VOC emission factor at the specified power setting and the mass fraction for this pollutant as given in Table 2-11

"—" Indicates No Data Available

ND - Compound not detected at the detection limit. Compound may be present at a value less than the detection limit.

AA - Compound detected was less than the Ambient Air concentration resulting in a negative emission factor when the Ambient Air Concentration was removed.

**Table 2-10. VOC and HAP Emission Factors for Select Engines****F404-GE-400, -F1D2 (excluding AB for the -F1D2)**

Power Setting			Idle	Approach	Intermediate	Military	Afterburner-3
Fuel Flowrate (lb/hr)			685	3111	6464	7739	15851
Percent Thrust/hp			6%	38%	79%	91%	114%
Compound Name	CAS Number	HAP	Emission Factors (lb/1000lb fuel burned)				
Acetaldehyde	75-07-0	X	5.69E-02	ND	ND	ND	3.38E-02
Acrolein	107-02-8	X	1.71E-01	ND	ND	ND	1.44E-01
Benzaldehyde	100-52-7		1.31E-01	ND	1.70E-03	ND	1.32E-01
Benzene	71-43-2	X	5.12E-01	7.56E-04	6.45E-04	7.38E-04	3.70E-01
1,3-Butadiene	106-99-0	X	---	---	---	---	---
2-Butanone (MEK)	78-93-3		2.31E-02	ND	ND	ND	2.74E-02
Crotonaldehyde	4170-30-3		9.14E-02	ND	ND	ND	8.45E-02
Ethylbenzene	100-41-4	X	7.48E-02	4.84E-04	3.53E-04	ND	4.86E-02
Formaldehyde	50-00-0	X	1.14E+00	1.67E-02	2.17E-02	9.02E-03	3.74E-02
Hexanal	66-25-1		ND	ND	ND	ND	1.26E-02
Naphthalene	91-20-3	X	1.31E-01	3.10E-04	7.04E-05	1.03E-04	7.32E-02
Phenol	108-95-2	X	1.15E-01	ND	ND	ND	6.69E-02
Propanal	123-38-6	X	---	---	---	---	---
Styrene	100-42-5	X	8.66E-02	ND	ND	ND	4.90E-03
Toluene	108-88-3	X	2.60E-01	8.73E-04	1.07E-03	6.61E-04	1.78E-01
Xylenes (mixed isomers)	1330-20-7	X	2.49E-01	2.64E-03	1.97E-03	1.01E-03	1.42E-01

Notes for F404-GE-400, -F1D2 Engines:

SOURCE: *Aircraft Engine and APU Emissions Testing* Volumes I-III March 1999, IERA-RS-BR-TR-1999-0006

"X" Indicates that compound is a HAP.

"—" Indicates No Data Available

ND - Compound not detected at the detection limit. Compound may be present at a value less than the detection limit.

AA - Compound detected was less than the Ambient Air concentration resulting in a negative emission factor when the Ambient Air Concentration was removed.

The F404-GE-F1D2 is a non-afterburning version of the F404-GE-400 and has the same emissions (without the afterburner setting) as the F404-GE-400.

Table 2-10. VOC and HAP Emission Factors for Select Engines

GTCP85-180

Power Setting			Constant	---	---	---	---
Fuel Flowrate (lb/hr)			270	---	---	---	---
Compound Name	CAS Number	HAP	Emission Factors (lb/1000lb fuel burned)				
Acetaldehyde	75-07-0	X	2.09E-03	---	---	---	---
Acrolein	107-02-8	X	3.04E-04	---	---	---	---
Benzaldehyde	100-52-7		ND	---	---	---	---
Benzene	71-43-2	X	1.50E-02	---	---	---	---
1,3-Butadiene	106-99-0	X	---	---	---	---	---
2-Butanone (MEK)	78-93-3		9.96E-04	---	---	---	---
Crotonaldehyde	4170-30-3		5.25E-04	---	---	---	---
Ethylbenzene	100-41-4	X	1.20E-04	---	---	---	---
Formaldehyde	50-00-0	X	2.03E-02	---	---	---	---
Hexanal	66-25-1		ND	---	---	---	---
Naphthalene	91-20-3	X	AA	---	---	---	---
Phenol	108-95-2	X	1.44E-04	---	---	---	---
Propanal	123-38-6	X	---	---	---	---	---
Styrene	100-42-5	X	1.91E-04	---	---	---	---
Toluene	108-88-3	X	2.94E-03	---	---	---	---
Xylenes (mixed isomers)	1330-20-7	X	2.65E-03	---	---	---	---

Notes for GTCP85-180 Engine:

SOURCE: *Aircraft Engine and APU Emissions Testing* Volumes I-III March 1999, IERA-RS-BR-TR-1999-0006

"X" Indicates that compound is a HAP.

"—" Indicates No Data Available

ND - Compound not detected at the detection limit. Compound may be present at a value less than the detection limit.

AA - Compound detected was less than the Ambient Air concentration resulting in a negative emission factor when the Ambient Air Concentration was removed.



Table 2-10. VOC and HAP Emission Factors for Select Engines

GTCP165-1

Power Setting			Constant	---	---	---	---
Fuel Flowrate (lb/hr)			273	---	---	---	---
Compound Name	CAS Number	HAP	Emission Factors (lb/1000lb fuel burned)				
Acetaldehyde	75-07-0	X	5.61E-03	---	---	---	---
Acrolein	107-02-8	X	1.21E-02	---	---	---	---
Benzaldehyde	100-52-7		1.26E-02	---	---	---	---
Benzene	71-43-2	X	3.79E-02	---	---	---	---
1,3-Butadiene	106-99-0	X	---	---	---	---	---
2-Butanone (MEK)	78-93-3		2.77E-03	---	---	---	---
Crotonaldehyde	4170-30-3		5.83E-03	---	---	---	---
Ethylbenzene	100-41-4	X	8.63E-04	---	---	---	---
Formaldehyde	50-00-0	X	1.88E-02	---	---	---	---
Hexanal	66-25-1		ND	---	---	---	---
Naphthalene	91-20-3	X	5.54E-03	---	---	---	---
Phenol	108-95-2	X	4.48E-03	---	---	---	---
Propanal	123-38-6	X	--	---	---	---	---
Styrene	100-42-5	X	2.24E-03	---	---	---	---
Toluene	108-88-3	X	1.87E-02	---	---	---	---
Xylenes (mixed isomers)	1330-20-7	X	6.01E-03	---	---	---	---

Notes for GTCP165-1 Engine:

SOURCE: *Aircraft Engine and APU Emissions Testing* Volumes I-III March 1999, IERA-RS-BR-TR-1999-0006

"X" Indicates that compound is a HAP.

"—" Indicates No Data Available

ND - Compound not detected at the detection limit. Compound may be present at a value less than the detection limit.

AA - Compound detected was less than the Ambient Air concentration resulting in a negative emission factor when the Ambient Air Concentration was removed.

**Table 2-10. VOC and HAP Emission Factors for Select Engines****J69-T-25**

Power Setting			Idle	Approach	Intermediate	Military	---
Fuel Flowrate (lb/hr)			167	568 (C)	872	1085	---
Percent Thrust/hp			4%	30%	63%	84%	---
Compound Name	CAS Number	HAP	Emission Factors (lb/1000lb fuel burned)				
Acetaldehyde	75-07-0	X	9.76E-02	5.98E-03 (C)	2.12E-03	ND	---
Acrolein	107-02-8	X	1.96E-01	3.43E-03 (C)	ND	ND	---
Benzaldehyde	100-52-7		1.04E-01	---	ND	ND	---
Benzene	71-43-2	X	1.89E-01	2.35E-03 (C)	3.47E-03	1.86E-03	---
1,3-Butadiene	106-99-0	X	---	2.36E-03 (C)	---	---	---
2-Butanone (MEK)	78-93-3		2.41E-02	---	8.70E-04	8.79E-04	---
Crotonaldehyde	4170-30-3		1.22E-01	---	ND	ND	---
Ethylbenzene	100-41-4	X	2.03E-02	2.44E-04 (C)	ND	ND	---
Formaldehyde	50-00-0	X	9.16E-01	1.72E-02 (C)	2.72E-02	1.16E-02	---
Hexanal	66-25-1		ND	---	ND	ND	---
Naphthalene	91-20-3	X	3.54E-02	7.57E-04 (C)	3.41E-04	2.22E-04	---
Phenol	108-95-2	X	2.85E-02	1.02E-03 (C)	9.86E-04	ND	---
Propanal	123-38-6	X	---	1.02E-03 (C)	---	---	---
Styrene	100-42-5	X	2.72E-02	4.33E-04 (C)	ND	ND	---
Toluene	108-88-3	X	1.12E-01	8.99E-04 (C)	1.56E-03	8.29E-04	---
Xylenes (mixed isomers)	1330-20-7	X	8.96E-02	6.27E-04 (C)	2.79E-03	4.94E-04	---

Notes for J69-T-25 Engine:

SOURCE: *Aircraft Engine and APU Emissions Testing* Volumes I-III March 1999, IERA-RS-BR-TR-1999-0006

"X" Indicates that compound is a HAP.

"C" indicates this value was calculated. For VOC and HAP emission factors, these values were calculated taking the product of the VOC emission factor at the specified power setting and the mass fraction for this pollutant as given in Table 2-11

"—" Indicates No Data Available

ND - Compound not detected at the detection limit. Compound may be present at a value less than the detection limit.

AA - Compound detected was less than the Ambient Air concentration resulting in a negative emission factor when the Ambient Air Concentration was removed.

**Table 2-10. VOC and HAP Emission Factors for Select Engines****J85-GE-5A**

Power Setting			Idle	Approach	Intermediate	Military	Afterburner-1
Fuel Flowrate (lb/hr)			434	875 (C)	950	2740	8138
Percent Thrust/hp			4%	13% (C)	15%	88%	116%
Compound Name	CAS Number	HAP	Emission Factors (lb/1000lb fuel burned)				
Acetaldehyde	75-07-0	X	1.18E-01	5.60E-02 (C)	ND	ND	ND
Acrolein	107-02-8	X	2.70E-01	3.21E-02 (C)	ND	ND	ND
Benzaldehyde	100-52-7		1.10E-01	---	ND	ND	ND
Benzene	71-43-2	X	1.48E-01	2.20E-02 (C)	1.34E-01	1.14E-02	6.84E-03
1,3-Butadiene	106-99-0	X	---	2.21E-02 (C)	---	---	---
2-Butanone (MEK)	78-93-3		2.88E-02	---	9.09E-03	ND	3.27E-04
Crotonaldehyde	4170-30-3		1.34E-01	---	ND	ND	ND
Ethylbenzene	100-41-4	X	3.06E-02	2.28E-03 (C)	8.80E-03	3.75E-04	5.24E-04
Formaldehyde	50-00-0	X	2.26E-01	1.61E-01 (C)	5.45E-01	7.37E-02	2.40E-02
Hexanal	66-25-1		ND	---	ND	ND	ND
Naphthalene	91-20-3	X	9.65E-02	7.09E-03 (C)	1.28E-02	1.27E-03	8.16E-04
Phenol	108-95-2	X	7.17E-02	9.51E-03 (C)	1.24E-02	1.52E-03	9.39E-04
Propanal	123-38-6	X	---	9.52E-03 (C)	---	---	---
Styrene	100-42-5	X	4.17E-02	4.05E-03 (C)	1.29E-02	5.02E-04	2.85E-04
Toluene	108-88-3	X	1.67E-01	8.41E-03 (C)	4.91E-02	3.23E-03	1.74E-03
Xylenes (mixed isomers)	1330-20-7	X	1.37E-01	5.87E-03 (C)	3.62E-02	1.78E-03	2.78E-03

Notes for J85-GE-5A Engine:

SOURCE: *Aircraft Engine and APU Emissions Testing* Volumes I-III March 1999, IERA-RS-BR-TR-1999-0006

"X" Indicates that compound is a HAP.

"C" indicates this value was calculated. For VOC and HAP emission factors, these values were calculated taking the product of the VOC emission factor at the specified power setting and the mass fraction for this pollutant as given in Table 2-11

"—" Indicates No Data Available

ND - Compound not detected at the detection limit. Compound may be present at a value less than the detection limit.

AA - Compound detected was less than the Ambient Air concentration resulting in a negative emission factor when the Ambient Air Concentration was removed.

**Table 2-10. VOC and HAP Emission Factors for Select Engines****J85-GE-5M**

Power Setting			Idle	Approach	Intermediate	Military	---
Fuel Flowrate (lb/hr)			525	703 (C)	1045	2550	---
Percent Thrust/hp			---	---	---	---	---
Compound Name	CAS Number	HAP	Emission Factors (lb/1000lb fuel burned)				
Acetaldehyde	75-07-0	X	2.44E-01	6.41E-02 (C)	1.91E-02	1.57E-03	---
Acrolein	107-02-8	X	3.14E-01	3.67E-02 (C)	1.24E-02	1.18E-03	---
Benzaldehyde	100-52-7		7.81E-02	---	1.24E-02	1.18E-03	---
Benzene	71-43-2	X	3.05E-02	2.52E-02 (C)	2.34E-02	2.56E-03	---
1,3-Butadiene	106-99-0	X	1.20E-02	2.53E-02 (C)	6.02E-03	ND	---
2-Butanone (MEK)	78-93-3		3.94E-02	---	6.77E-03	9.29E-04	---
Crotonaldehyde	4170-30-3		1.18E-01	---	1.24E-02	1.18E-03	---
Ethylbenzene	100-41-4	X	7.36E-03	2.61E-03 (C)	2.38E-03	8.21E-05	---
Formaldehyde	50-00-0	X	2.27E+00	1.85E-01 (C)	3.48E-01	2.39E-02	---
Hexanal	66-25-1		7.81E-02	---	1.24E-02	1.18E-03	---
Naphthalene	91-20-3	X	8.29E-02	8.12E-03 (C)	ND	ND	---
Phenol	108-95-2	X	---	1.09E-02 (C)	---	---	---
Propanal	123-38-6	X	7.81E-02	1.09E-02 (C)	1.24E-02	1.18E-03	---
Styrene	100-42-5	X	7.88E-03	4.64E-03 (C)	2.44E-03	1.08E-04	---
Toluene	108-88-3	X	2.76E-02	9.63E-03 (C)	1.14E-02	9.14E-04	---
Xylenes (mixed isomers)	1330-20-7	X	4.04E-02	6.72E-03 (C)	1.25E-02	6.65E-04	---

Notes for J85-GE-5M Engine:

SOURCE: *Clean Air Act Emissions Testing of the T-38C Aircraft Engines* September 2002, IERA-RS-BR-SR-2003-0001

"X" Indicates that compound is a HAP.

"C" indicates this value was calculated. For VOC and HAP emission factors, these values were calculated taking the product of the VOC emission factor at the specified power setting and the mass fraction for this pollutant as given in Table 2-11

"—" Indicates No Data Available

ND - Compound not detected at the detection limit. Compound may be present at a value less than the detection limit.

AA - Compound detected was less than the Ambient Air concentration resulting in a negative emission factor when the Ambient Air Concentration was removed.

Table 2-10. VOC and HAP Emission Factors for Select Engines

## PT6A-68

Power Setting			Ground Idle	Flight Idle	Descend	Approach	Max. Continuous
Fuel Flowrate (lb/hr)			156	180	328	449	612
Percent Thrust/hp			2%	3%	19%	46%	88%
Compound Name	CAS Number	HAP	Emission Factors (lb/1000lb fuel burned)				
Acetaldehyde	75-07-0	X	2.99E-01	3.47E-01	8.78E-02	1.04E-02	2.17E-03
Acrolein	107-02-8	X	7.16E-01	6.00E-01	5.06E-02	ND	ND
Benzaldehyde	100-52-7		2.34E-02	1.73E-01	4.45E-02	8.01E-03	ND
Benzene	71-43-2	X	1.67E-01	5.22E-01	8.49E-02	1.04E-02	8.63E-04
1,3-Butadiene	106-99-0	X	1.49E-01	2.67E-01	1.10E-02	ND	ND
2-Butanone (MEK)	78-93-3		3.71E-01	ND	2.65E-03	ND	ND
Crotonaldehyde	4170-30-3		2.08E-01	1.73E-01	ND	ND	ND
Ethylbenzene	100-41-4	X	4.76E-02	4.94E-02	2.52E-03	2.09E-04	1.07E-04
Formaldehyde	50-00-0	X	4.81E+00	5.27E+00	2.93E+00	6.73E-01	2.21E-02
Hexanal	66-25-1		1.56E-01	ND	ND	ND	ND
Naphthalene	91-20-3	X	ND	1.16E-02	ND	ND	7.68E-02
Phenol	108-95-2	X	---	---	---	---	---
Propanal	123-38-6	X	1.30E-01	1.08E-01	ND	ND	ND
Styrene	100-42-5	X	4.68E-02	3.80E-02	8.05E-03	ND	ND
Toluene	108-88-3	X	1.65E-01	2.42E-01	2.46E-02	2.37E-03	5.18E-04
Xylenes (mixed isomers)	1330-20-7	X	1.73E-01	1.97E-01	8.95E-03	8.60E-04	1.44E-03

Notes for PT6A-68 Engine:

SOURCE: *PT6A-68 Emissions Measurement Program Summary* September 2002, IERA-RS-BR-SR-2003-0003

"X" Indicates that compound is a HAP.

"—" Indicates No Data Available

ND - Compound not detected at the detection limit. Compound may be present at a value less than the detection limit.

AA - Compound detected was less than the Ambient Air concentration resulting in a negative emission factor when the Ambient Air Concentration was removed.

**Table 2-10. VOC and HAP Emission Factors for Select Engines****T56-A-7**

Power Setting			Idle	Approach	Intermediate	Military	---
Fuel Flowrate (lb/hr)			724	880	1742	2262	---
Percent Thrust/hp			5%	15%	61%	90%	---
Compound Name	CAS Number	HAP	Emission Factors (lb/1000lb fuel burned)				
Acetaldehyde	75-07-0	X	1.04E-02	AA	5.43E-04	1.64E-04	---
Acrolein	107-02-8	X	ND	ND	ND	ND	---
Benzaldehyde	100-52-7		1.13E-03	8.76E-04	4.67E-04	ND	---
Benzene	71-43-2	X	4.77E-03	4.45E-03	1.34E-03	7.84E-04	---
1,3-Butadiene	106-99-0	X	---	---	---	---	---
2-Butanone (MEK)	78-93-3		4.63E-04	3.62E-04	ND	1.75E-04	---
Crotonaldehyde	4170-30-3		ND	ND	ND	ND	---
Ethylbenzene	100-41-4	X	ND	4.06E-04	2.07E-04	1.80E-04	---
Formaldehyde	50-00-0	X	4.10E-02	3.34E-02	9.30E-03	3.81E-04	---
Hexanal	66-25-1		ND	ND	ND	ND	---
Naphthalene	91-20-3	X	1.16E-03	1.03E-03	1.77E-04	1.34E-04	---
Phenol	108-95-2	X	ND	ND	ND	ND	---
Propanal	123-38-6	X	---	---	---	---	---
Styrene	100-42-5	X	7.09E-04	3.67E-04	ND	ND	---
Toluene	108-88-3	X	2.71E-03	2.29E-03	9.61E-04	2.53E-05	---
Xylenes	1330-20-7	X	1.33E-03	1.05E-03	5.82E-04	8.75E-04	---

Notes for T56-A-7 Engine:

SOURCE: *Aircraft Engine and APU Emissions Testing Volumes I-III* March 1999, IERA-RS-BR-TR-1999-0006

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"—" Indicates No Data Available

ND - Compound not detected at the detection limit. Compound may be present at a value less than the detection limit.

AA - Compound detected was less than the Ambient Air concentration resulting in a negative emission factor when the Ambient Air Concentration was removed.

Table 2-10. VOC and HAP Emission Factors for Select Engines

## T64-GE-100

Power Setting			Ground Idle	75% Normal	Normal	Military	---
Fuel Flowrate (lb/hr)			298	941	1698	1848	---
Percent Thrust/hp			2%	34%	81%	90%	---
Compound Name	CAS Number	HAP	Emission Factors (lb/1000lb fuel burned)				
Acetaldehyde	75-07-0	X	5.07E-02	1.20E-03	ND	ND	---
Acrolein	107-02-8	X	1.14E-01	1.37E-03	ND	ND	---
Benzaldehyde	100-52-7		5.90E-02	1.86E-03	ND	ND	---
Benzene	71-43-2	X	2.16E-01	1.26E-02	4.00E-03	3.88E-03	---
1,3-Butadiene	106-99-0	X	---	---	---	---	---
2-Butanone (MEK)	78-93-3		2.96E-02	2.33E-04	ND	ND	---
Crotonaldehyde	4170-30-3		5.07E-02	1.01E-03	ND	ND	---
Ethylbenzene	100-41-4	X	2.24E-02	3.07E-04	ND	ND	---
Formaldehyde	50-00-0	X	7.15E-02	1.17E-02	3.18E-04	1.83E-04	---
Hexanal	66-25-1		1.81E-02	3.83E-05	ND	ND	---
Naphthalene	91-20-3	X	5.44E-02	1.52E-03	4.96E-06	2.50E-03	---
Phenol	108-95-2	X	8.26E-03	ND	ND	ND	---
Propanal	123-38-6	X	---	---	---	---	---
Styrene	100-42-5	X	4.11E-02	5.12E-04	ND	ND	---
Toluene	108-88-3	X	1.02E-01	2.88E-03	1.33E-04	1.27E-04	---
Xylenes (mixed isomers)	1330-20-7	X	6.45E-02	9.68E-04	ND	ND	---

Notes for T64-GE-100 Engine:

SOURCE: *Aircraft Engine and APU Emissions Testing* Volumes I-III March 1999, IERA-RS-BR-TR-1999-0006

"X" Indicates that compound is a HAP.

"—" Indicates No Data Available

ND - Compound not detected at the detection limit. Compound may be present at a value less than the detection limit.

AA - Compound detected was less than the Ambient Air concentration resulting in a negative emission factor when the Ambient Air Concentration was removed.

Table 2-10. VOC and HAP Emission Factors for Select Engines

## T700-GE-700

Power Setting			Ground Idle	Flight Idle	Flight Max	Overspeed	---
Fuel Flowrate (lb/hr)			134	469	626	725	---
Percent Thrust/hp			4%	56%	82%	100%	---
Compound Name	CAS Number	HAP	Emission Factors (lb/1000lb fuel burned)				
Acetaldehyde	75-07-0	X	1.81E-02	3.03E-04	2.00E-04	ND	---
Acrolein	107-02-8	X	7.23E-03	9.68E-05	1.10E-05	ND	---
Benzaldehyde	100-52-7		ND	9.00E-04	4.15E-04	ND	---
Benzene	71-43-2	X	4.87E-02	2.97E-04	3.12E-04	3.00E-04	---
1,3-Butadiene	106-99-0	X	---	---	---	---	---
2-Butanone (MEK)	78-93-3		2.00E-03	3.26E-04	ND	ND	---
Crotonaldehyde	4170-30-3		9.93E-03	ND	ND	ND	---
Ethylbenzene	100-41-4	X	2.25E-03	2.57E-04	ND	1.99E-04	---
Formaldehyde	50-00-0	X	2.19E-01	4.09E-03	2.09E-03	4.81E-03	---
Hexanal	66-25-1		ND	ND	ND	ND	---
Naphthalene	91-20-3	X	7.33E-03	1.56E-04	6.73E-05	2.91E-05	---
Phenol	108-95-2	X	6.24E-03	ND	ND	ND	---
Propanal	123-38-6	X	---	---	---	---	---
Styrene	100-42-5	X	5.16E-03	ND	ND	ND	---
Toluene	108-88-3	X	1.28E-02	1.24E-03	AA	2.92E-04	---
Xylenes (mixed isomers)	1330-20-7	X	7.14E-03	5.69E-04	5.07E-04	1.24E-03	---

Notes for T700-GE-700 Engine:

SOURCE: *Aircraft Engine and APU Emissions Testing* Volumes I-III March 1999, IERA-RS-BR-TR-1999-0006

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"—" Indicates No Data Available

ND - Compound not detected at the detection limit. Compound may be present at a value less than the detection limit.

AA - Compound detected was less than the Ambient Air concentration resulting in a negative emission factor when the Ambient Air Concentration was removed.



Table 2-10. VOC and HAP Emission Factors for Select Engines

TF30-P-109

Power Setting			Idle	Approach	Intermediate	Military	Afterburner
Fuel Flowrate (lb/hr)			761	1727	2921	6263	38460
Percent Thrust/hp			5%	23%	47%	99%	---
Compound Name	CAS Number	HAP	Emission Factors (lb/1000lb fuel burned)				
Acetaldehyde	75-07-0	X	4.47E-01	2.36E-01	9.00E-03	1.50E-02	6.70E-03
Acrolein	107-02-8	X	3.50E-02	2.30E-02	ND	ND	ND
Benzaldehyde	100-52-7		1.90E-02	7.00E-03	ND	ND	ND
Benzene	71-43-2	X	1.95E-01	5.16E-02	4.39E-03	3.74E-04	6.85E-04
1,3-Butadiene	106-99-0	X	8.34E-02	2.89E-02	ND	ND	ND
2-Butanone (MEK)	78-93-3		2.00E-02	3.60E-02	1.10E-02	4.00E-03	2.50E-03
Crotonaldehyde	4170-30-3		6.20E-02	3.30E-02	ND	ND	ND
Ethylbenzene	100-41-4	X	4.36E-02	4.99E-03	5.67E-04	3.65E-04	6.31E-05
Formaldehyde	50-00-0	X	1.82E+00	7.52E-01	4.70E-02	3.00E-03	2.44E-02
Hexanal	66-25-1		8.00E-02	1.85E-01	2.02E-01	1.17E-01	4.41E-02
Naphthalene	91-20-3	X	1.13E-01	2.24E-02	3.59E-03	8.94E-04	8.44E-04
Phenol	108-95-2	X	7.12E-02	1.70E-02	1.69E-03	2.37E-04	7.38E-04
Propanal	123-38-6	X	5.50E-02	2.50E-02	ND	ND	ND
Styrene	100-42-5	X	2.95E-02	1.28E-02	3.95E-04	ND	3.13E-05
Toluene	108-88-3	X	1.61E-01	2.45E-02	2.12E-03	8.63E-04	2.77E-04
Xylenes (mixed isomers)	1330-20-7	X	1.95E-01	1.77E-02	2.64E-03	1.77E-03	2.68E-04

Notes for TF30-P-109 Engine:

SOURCE: *Engine and Hush House Emissions from a TF30-P109 Jet Engine Tested at Cannon Air Force Base, NM*

"—" Indicates No Data Available

"X" Indicates that compound is a HAP.

ND - Compound not detected at the detection limit. Compound may be present at a value less than the detection limit.

AA - Compound detected was less than the Ambient Air concentration resulting in a negative emission factor when the Ambient Air Concentration was removed.

Table 2-10. VOC and HAP Emission Factors for Select Engines

TF33-P-7/7A

Power Setting			Idle	Approach	Intermediate	Military	---
Fuel Flowrate (lb/hr)			1093	4884	6356	8264	---
Percent Thrust/hp			4%	45%	58%	73%	---
Compound Name	CAS Number	HAP	Emission Factors (lb/1000lb fuel burned)				
Acetaldehyde	75-07-0	X	ND	8.72E-03	ND	ND	---
Acrolein	107-02-8	X	ND	ND	ND	ND	---
Benzaldehyde	100-52-7		ND	ND	ND	ND	---
Benzene	71-43-2	X	5.23E-01	2.84E-02	6.49E-03	1.47E-03	---
1,3-Butadiene	106-99-0	X	---	---	---	---	---
2-Butanone (MEK)	78-93-3		1.89E-02	7.11E-03	ND	ND	---
Crotonaldehyde	4170-30-3		ND	ND	ND	ND	---
Ethylbenzene	100-41-4	X	2.00E-01	2.04E-03	5.11E-04	3.88E-04	---
Formaldehyde	50-00-0	X	2.31E+00	1.26E-01	2.80E-02	5.28E-03	---
Hexanal	66-25-1		ND	ND	ND	ND	---
Naphthalene	91-20-3	X	3.71E-01	3.13E-03	3.54E-04	AA	---
Phenol	108-95-2	X	1.67E-01	3.54E-03	1.28E-03	ND	---
Propanal	123-38-6	X	---	---	---	---	---
Styrene	100-42-5	X	2.42E-01	3.43E-03	7.46E-04	ND	---
Toluene	108-88-3	X	3.73E-01	1.01E-02	2.54E-03	2.27E-03	---
Xylenes (mixed isomers)	1330-20-7	X	4.62E-01	4.82E-03	1.34E-03	1.64E-03	---

Notes for TF33-P-7/7A Engine:

SOURCE: *Aircraft Engine and APU Emissions Testing Volumes I-III March 1999*, IERA-RS-BR-TR-1999-0006

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"---" Indicates No Data Available

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AA – Compound detected was less than the ambient air concentration resulting in a negative emission factor when the ambient air concentration was removed.

Table 2-10. VOC and HAP Emission Factors for Select Engines

TF33-P-102

Power Setting			Idle	Approach	Intermediate	Military	---
Fuel Flowrate (lb/hr)			1114	4737	5782	7561	---
Percent Thrust/hp			5%	49%	59%	75%	---
Compound Name	CAS Number	HAP	Emission Factors (lb/1000lb fuel burned)				
Acetaldehyde	75-07-0	X	ND	ND	ND	ND	---
Acrolein	107-02-8	X	ND	ND	ND	ND	---
Benzaldehyde	100-52-7		ND	ND	ND	ND	---
Benzene	71-43-2	X	7.09E-01	1.14E-02	4.05E-03	9.53E-04	---
1,3-Butadiene	106-99-0	X	---	---	---	---	---
2-Butanone (MEK)	78-93-3		3.64E-02	1.59E-03	7.45E-04	ND	---
Crotonaldehyde	4170-30-3		ND	ND	ND	ND	---
Ethylbenzene	100-41-4	X	8.63E-02	8.23E-04	4.79E-04	ND	---
Formaldehyde	50-00-0	X	9.43E-01	6.65E-02	2.27E-02	ND	---
Hexanal	66-25-1		ND	ND	ND	ND	---
Naphthalene	91-20-3	X	2.15E-01	1.10E-03	7.35E-04	1.30E-04	---
Phenol	108-95-2	X	8.41E-02	1.76E-03	ND	ND	---
Propanal	123-38-6	X	---	---	---	---	---
Styrene	100-42-5	X	1.09E-01	1.18E-03	4.38E-04	ND	---
Toluene	108-88-3	X	2.65E-01	2.28E-03	2.65E-03	9.50E-04	---
Xylenes (mixed isomers)	1330-20-7	X	1.98E-01	2.40E-03	1.04E-03	1.08E-03	---

Notes for TF33-P-102 Engine:

SOURCE: *Aircraft Engine and APU Emissions Testing* Volumes I-III March 1999, IERA-RS-BR-TR-1999-0006

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"---" Indicates No Data Available

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AA – Compound detected was less than the ambient air concentration resulting in a negative emission factor when the ambient air concentration was removed.

Table 2-10. VOC and HAP Emission Factors for Select Engines

## TF34-GE-100A

Power Setting			Idle	Approach	Intermediate	Military	---
Fuel Flowrate (lb/hr)			498	933	1512	2628	---
Percent Thrust/hp			7%	28%	46%	78%	---
Compound Name	CAS Number	HAP	Emission Factors (lb/1000lb fuel burned)				
Acetaldehyde	75-07-0	X	1.27E-01	3.08E-02	ND	ND	---
Acrolein	107-02-8	X	6.10E-02	1.36E-02	5.42E-03	2.96E-03	---
Benzaldehyde	100-52-7		5.10E-02	2.03E-02	7.80E-03	5.94E-03	---
Benzene	71-43-2	X	2.81E-01	6.37E-02	9.57E-03	4.27E-03	---
1,3-Butadiene	106-99-0	X	---	---	---	---	---
2-Butanone (MEK)	78-93-3		1.50E-02	5.94E-03	ND	ND	---
Crotonaldehyde	4170-30-3		5.10E-02	ND	ND	ND	---
Ethylbenzene	100-41-4	X	2.62E-02	3.50E-03	ND	6.82E-04	---
Formaldehyde	50-00-0	X	1.22E+00	5.31E-01	6.61E-02	2.82E-02	---
Hexanal	66-25-1		ND	ND	ND	ND	---
Naphthalene	91-20-3	X	4.48E-02	8.51E-03	1.59E-03	3.20E-05	---
Phenol	108-95-2	X	2.73E-02	6.61E-01	ND	ND	---
Propanal	123-38-6	X	---	---	---	---	---
Styrene	100-42-5	X	4.41E-02	6.72E-03	ND	ND	---
Toluene	108-88-3	X	1.12E-01	1.40E-02	3.21E-03	1.34E-04	---
Xylenes (mixed isomers)	1330-20-7	X	8.17E-02	1.16E-02	1.52E-03	3.14E-03	---

Notes for TF34-GE-100A Engine:

SOURCE: *Aircraft Engine and APU Emissions Testing* Volumes I-III March 1999, IERA-RS-BR-TR-1999-0006

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“---” Indicates No Data Available

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AA – Compound detected was less than the ambient air concentration resulting in a negative emission factor when the ambient air concentration was removed.

Table 2-10. VOC and HAP Emission Factors for Select Engines

## TF39-GE-1C

Power Setting			Idle	Approach	Intermediate	Military	---
Fuel Flowrate (lb/hr)			1448	10477	12541	13862	---
Percent Thrust/hp			7%	76%	87%	94%	---
Compound Name	CAS Number	HAP	Emission Factors (lb/1000lb fuel burned)				
Acetaldehyde	75-07-0	X	2.12E-01	3.16E-03	2.61E-04	6.17E-04	---
Acrolein	107-02-8	X	2.06E-01	ND	ND	ND	---
Benzaldehyde	100-52-7		1.42E-01	1.15E-03	1.88E-03	1.70E-03	---
Benzene	71-43-2	X	3.58E-01	1.56E-03	1.41E-03	2.16E-03	---
1,3-Butadiene	106-99-0	X	---	---	---	---	---
2-Butanone (MEK)	78-93-3		2.59E-02	ND	1.16E-03	2.46E-04	---
Crotonaldehyde	4170-30-3		8.77E-02	ND	ND	ND	---
Ethylbenzene	100-41-4	X	2.01E-02	ND	4.99E-04	AA	---
Formaldehyde	50-00-0	X	1.42E+00	8.15E-03	4.90E-03	1.05E-02	---
Hexanal	66-25-1		ND	ND	ND	ND	---
Naphthalene	91-20-3	X	9.74E-02	AA	AA	AA	---
Phenol	108-95-2	X	4.38E-02	ND	ND	ND	---
Propanal	123-38-6	X	---	---	---	---	---
Styrene	100-42-5	X	4.49E-02	ND	ND	6.94E-04	---
Toluene	108-88-3	X	1.28E-01	AA	AA	AA	---
Xylenes (mixed isomers)	1330-20-7	X	5.82E-02	9.26E-04	2.58E-03	AA	---

Notes for TF39-GE-1C Engine:

SOURCE: *Aircraft Engine and APU Emissions Testing Volumes I-III March 1999*, IERA-RS-BR-TR-1999-0006

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“---” Indicates No Data Available

ND – Compound not detected at the detection limit. Compound may be present at a value less than the detection limit.

AA – Compound detected was less than the ambient air concentration resulting in a negative emission factor when the ambient air concentration was removed.

**Table 2-11. HAP Mass Fractions in Aircraft Engine Exhaust**

Compound Name	CAS	Mass Fraction
Acetaldehyde	75-07-0	0.04272
Acrolein	107-02-8	0.02449
Benzene	71-43-2	0.01681
1,3-Butadiene	106-99-0	0.01687
Ethylbenzene	100-41-4	0.00174
Formaldehyde	50-00-0	0.1231
Isopropylbenzene	98-82-8	0.00003
Methanol	67-56-1	0.01805
1-Methylnaphthalene	90-12-0	0.00247
2-Methylnaphthalene	91-57-6	0.00206
Naphthalene	91-20-3	0.00541
Phenol	108-95-2	0.00726
Propionaldehyde	123-38-6	0.00727
Styrene	100-42-5	0.00309
Toluene	108-88-3	0.00642
Xylenes - Mixed isomers	1330-20-7	0.00448

SOURCE: Recommended Best Practice for Quantifying Speciated Organic Gas Emissions from Aircraft Equipped with Turbofan, Turbojet, and Turboprop Engines, FAA, 2009

**Table 2-12. Criteria Pollutant and GHG Emission Factors for APUs**

APU Model	Manufacturer	Emission Factors in lb/hr of Operation						
		NO <sub>x</sub>	CO	VOC	SO <sub>x</sub> <sup>a</sup>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2e</sub> <sup>b</sup>
4501687C	Hamilton Sundstrand	1.38	1.07	0.01	0.23	---	---	740.44
GTC 85-72 (200 hp) <sup>d</sup>	Honeywell Inc.	0.81	3.11	0.03	0.23	---	---	674.49
GTCP 30-300	Honeywell Inc.	2.85	---	0.06	0.30	---	---	---
GTCP 36-6 <sup>c</sup>	Honeywell Inc.	0.87	1.41	0.06	0.16	---	---	---
GTCP 36-50	Honeywell Inc.	4.25	11.65	0.05	0.15	---	---	---
GTCP 36-300 (80 hp)	Honeywell Inc.	2.85	0.58 <sup>f</sup>	0.06	0.30	---	---	---
GTCP 85 (200 hp)	Honeywell Inc.	1.12	---	0.24	0.25	---	---	---
GTCP 85-98ck (200 hp)	Honeywell Inc.	1.12	4.23 <sup>f</sup>	0.24	0.25	---	---	---
GTCP 85-98d	Honeywell Inc.	1.78	1.64	0.04	0.32	---	---	---
GTCP 85-129 (200 hp)	Honeywell Inc.	1.12	4.23 <sup>f</sup>	0.24	0.25	---	---	---
GTCP 85-129ck (200 hp)	Honeywell Inc.	1.12	4.23 <sup>f</sup>	0.24	0.25	---	---	---
GTCP 85-180 <sup>g</sup>	Honeywell Inc.	1.28	2.05	0.01	0.29	0.05	0.01	906.25
GTCP 95-2 (300 hp) <sup>d</sup>	Honeywell Inc.	1.65	0.94	0.11	0.32	---	---	948.89
GTCP 100-54 (400 hp) <sup>d</sup>	Honeywell Inc.	2.46	2.43	0.07	0.45	---	---	1337.86
GTCP 165-1 <sup>g</sup>	Honeywell Inc.	1.22	3.76	0.49	0.29	0.13	0.04	910.75
GTCP 331-200/250 (143 hp)	Honeywell Inc.	2.55	---	0.12	0.29	---	---	---
GTCP 331-200ER (143 hp)	Honeywell Inc.	2.55	1.11 <sup>f</sup>	0.12	0.29	---	---	---
GTCP 331-500 (143 hp)	Honeywell Inc.	7.86	0.05 <sup>f</sup>	0.07	0.58	---	---	---
GTCP 660-4 (300 hp)	Honeywell Inc.	4.60	7.46 <sup>f</sup>	0.24	0.93	---	---	---
PW901A	Pratt & Whitney	2.72	14.48 <sup>f</sup>	1.29	0.93	---	---	---
ST-6 <sup>h</sup>	United Technologies Corporation	3.92	0.02	0.01	0.48	---	---	---
T-62T-27 (100 hp) <sup>d</sup>	United Technologies Corporation	0.40	4.36	0.79	0.11	---	---	344.76
T-62T-47C1 <sup>f</sup>	United Technologies Corporation	1.01	9.46	0.04	0.25	---	---	---
TSCP 700 (142 hp)	Honeywell Inc.	2.77	---	0.08	0.35	---	---	---
TSCP 700-4B (142 hp)	Honeywell Inc.	2.77	0.48 <sup>f</sup>	0.08	0.35	---	---	---
WR27-1 <sup>d</sup>	Williams International	0.65	0.79	0.03	0.15	---	---	444.77

Notes for Table 2-12 on following page

## Notes for Table 2-12:

SOURCE (unless otherwise stated): Technical Data to Support FAA's Advisory Circular on Reducing Emissions from Commercial Aviation memorandum. This document states the original source as Proposed Federal Implementation Plan for California, Docket No. A-94-09 memorandum.

- a. SO<sub>x</sub> Emission factors assume that JP-8, with an average wt. % of 0.054 Sulfur, is used to power the APU.
- b. Greenhouse Gas (GHG) emission factors are presented in equivalent CO<sub>2</sub> (CO<sub>2</sub>e). Original source document provided emission factors for CO<sub>2</sub> and CH<sub>4</sub>. CH<sub>4</sub> emissions were then multiplied by the global warming potential (GWP) which is stated as 25 per Table A-1 to Subpart A of 40 CFR 98.
- c. SOURCE: Emission factors for this unit calculated using collected field data
- d. SOURCE: Summary Tables of Gaseous and Particulate Emissions from Aircraft Engines, June 1990.
- e. SOURCE: *Air Pollutant Emission Factors for Military and Civil Aircraft*, October 1978.
- f. SOURCE: Technical Data to Support FAA's Advisory Circular on Reducing Emissions from Commercial Aviation memorandum. This document states the original source as United Air Lines' APU Emissions Database (note: data for LAX 1991)
- g. SOURCE: Aircraft Engine and Auxiliary Power Unit Emissions Testing Volume I -III, March 1999
- h. SOURCE: Technical Data to Support FAA's Advisory Circular on Reducing Emissions from Commercial Aviation memorandum. This document states the original source as AIA Exhaust Emissions Data Sheet letter

"---" Indicates No Data Available



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### 3.0 FLIGHTLINE GROUND SUPPORT EQUIPMENT (AGE)

#### 3.1 Introduction

Most USAF bases operate a variety of Ground Support Equipment (GSE) or Aerospace Ground Equipment (AGE) to support flightline operations and service aircraft. Emissions from AGE or GSE vary by device type, time of operation, and fuel flow rate. For simplicity, both GSE and AGE are generically referred to as GSE in this section. Common examples of military GSE include generators, air conditioners, start carts, heaters, hydraulic test stands, portable light units, air compressors, cargo and bomb lifts, jacking units, aircraft deicers, tractors tugs, and other service equipment. GSE are designed to be mobile so that they can be used at any number of locations on the flightline and can be easily transported to support readiness and deployment activities around the world. Depending on whether the GSE is designed to be self-propelled, it can be categorized as either vehicular or non-vehicular in nature. Although essentially non-road engines, this section addresses emissions from flightline GSE only. Other non-road engines and equipment are addressed separately in this document in the NONROAD ENGINES AND EQUIPMENT (NRDE) chapter. Emissions of concern from the operation of GSE include the criteria pollutants and several HAPs that are commonly associated with fuel combustion processes (including, but not limited to: benzene, naphthalene, and 1,3-butadiene).

GSE operated on a USAF installation are powered by internal combustion engines fueled by JP-8, diesel fuel, motor gasoline (MOGAS), Compressed Natural Gas (CNG), or Liquefied Petroleum Gas (LPG). The process in which fuel ignition occurs in the engine determines whether GSE is categorized as Compression Ignition (CI) or Spark Ignition (SI) in nature. CI GSE include turbine engines fueled with JP-8, and non-turbine engines fueled with diesel. SI GSE may be fueled with MOGAS, CNG, or LPG.

Individual pollutant emissions from each type of GSE are usually calculated using operating time and/or fuel consumption information applied across an operational parameter such as an LTO cycle or over an inventory period (typically one year). Military aircraft and GSE combinations and their associated EF data are provided in Table 3-2. This information was obtained from a survey developed and distributed by Air Force Institute for Operational Health (AFIOH/RSEQ) to various flight squadrons and AGE shops throughout the USAF (Wade 2004). **These aircraft-GSE combinations are provided as a guideline though do not necessarily reflect all potential combinations.** In instances where military GSE information was unavailable, data was obtained from the FAA Emissions and Dispersion Modeling System (EDMS). Common, non-model specific GSE data from EDMS are provided in Table 3-5.

**While most USAF GSE is intended to be mobile by design, there may be instances where the regular use of the equipment results in it not being moved at least once in a 12-month**

**period. Where the GSE is not physically moved during a 12-month consecutive period, or where it is replaced in the same location, by GSE, then the GSE is deemed a stationary source by regulation and must be reviewed for stationary permit requirements.** If an air program manager is uncertain whether a piece of GSE should be considered mobile or stationary for regulatory purposes, he/she should coordinate with their Major Command for assistance and consider consulting with the Air Force Regional Environmental Offices to obtain their insight on state-specific requirements as they may apply to GSE.

### 3.2 Emission Factors

EFs for flightline GSE have been developed through measurement and testing and are provided in a variety of sources. EFs may be model-specific and provided in units of pounds per hour (lb/hr) as provided in Table 3-3, based on the GSE and fuel type as shown in Table 3-6. For equipment that use either diesel or JP-8, the High Heat Value (HHV) of diesel was used for unit conversions where necessary, since the HHV for diesel is higher than JP-8 and conversion results in conservative estimates. EFs are selected based on the calculation method as described in the next section.

### 3.3 Emissions Calculation

Information commonly collected and used to calculate emissions from GSE operations include the type and model of equipment, the operating time, type and volume of fuel consumed, and engine operating load and rated power. There are multiple methods used for calculation of emissions, depending on the available information.

#### 3.3.1 Sortie/LTO Method (Preferred Method)

**The Sortie/LTO Method is the Air Force's default method and should be used for all GSE that are included in Table 3-2 and Table 3-3.** This method involves applying an EF to the operating time of each GSE during a set period (e.g., an aircraft sortie or LTO cycle, annually, or another inventory period). Emissions using this method are calculated as follows:

$$E(\text{Pol}) = OT \times EF(\text{Pol}) \times N$$

**Equation 3-1**

Where,

- E(Pol)** = Emission of each individual pollutant for each piece of GSE (lb/yr)
- EF(Pol)** = Emission factor of each pollutant (lb/hr)
- OT** = Operating time of GSE per sortie (hr/sortie)
- N** = Number of sorties per year (sortie/yr)

The EFs and operating times for calculating emissions for GSE using the sortie/LTO method may be found in the following tables:

- Operating times per LTO for each GSE and associated aircraft are in Table 3-2.
- EFs for each GSE are found in Table 3-3.

### 3.3.2 Horsepower/Load Factor Method

The horsepower/load factor method is an alternative method for emissions calculations using the engine’s rated hp and typical load factor. The load factor is defined as the ratio of the power an engine draws while in operation to its rated power. To calculate emissions using this method, the rated horsepower, load factor, and operating time for each GSE must be known. Emissions from common, non-model specific GSE may be calculated using the data provided in Table 3-5 and Table 3-6. The following general equation is used:

$$E(Pol) = OT \times \frac{LF}{100} \times hp_{rtd} \times \frac{1}{1000} \times EF(Pol) \times N$$

**Equation 3-2**

Where,

- E(Pol)** = Emissions of each individual pollutant (lb/yr)
- OT** = Operating time (hr/unit)
- LF** = Load factor (%)
- 100** = Factor for converting percent to a fraction (%)
- hp<sub>rtd</sub>** = Engine rated hp (hp)
- 1000** = Factor converting from hp to 10<sup>3</sup> hp (hp/10<sup>3</sup> hp)
- EF(Pol)** = Emission factor of each pollutant (lb/10<sup>3</sup> hp-hr)
- N** = Number of ground support equipment used each year (units/yr)

Assuming a load factor of 100% will result in conservative emissions estimates. However, Table 3-5 does provide average operating loads for the many common GSE types. Alternatively, the load factor may be calculated according to the following equation if the engine horsepower and horsepower under load are known:

$$LF = \frac{hp}{hp_{rtd}}$$

**Equation 3-3**

Where,

- hp** = Engine horsepower under load (hp)

The EFs and operating times for common GSE needed to calculate emissions using the horsepower/load factor method may be found in the following tables.

- The typical commercial GSE assignments are given in Table 3-4.
- Table 3-5 provides the average rated hp for each GSE.
- EFs for common GSE are provided in a lb/10<sup>3</sup> hp-hr basis in Table 3-6.
- Table 3-7 provides EFs for several speciated HAPs for uncontrolled diesel reciprocating internal combustion engines.

### 3.3.3 Fuel Consumption Method

Another method that can be used to calculate GSE emissions involves multiplying the volume of fuel consumed by an EF that is provided in terms of a mass of pollutant emitted per volume of fuel consumed such as lb/hr or gal/hr. As with the horsepower/load factor method, the fuel consumption method also requires that the user know the operating time for each GSE. The following equation can be used as an alternative method of calculating GSE HAP emissions based exclusively on fuel consumption data:

$$E(Pol) = FC \times \frac{1}{1000} \times EF(Pol) \times N$$

**Equation 3-4**

Where,

**FC** = Fuel consumption (gal/unit)

In cases where fuel consumption data is unknown, fuel consumption may be estimated using the operating time and fuel flow rate as shown:

$$FC = OT \times FFR$$

**Equation 3-5**

Where,

**FFR** = Fuel flow rate. This may be available from the manufacturer (gal/hr)

Alternatively, fuel consumption may also be estimated using engine and operating parameters including hp (if known), hours of operation, brake-specific-fuel consumption (BSFC) factor, and the heating value of the fuel. The following equation is used:

$$FC = OT \times \frac{(hp \times BSFC)}{HV}$$

**Equation 3-6**



Where,

**BSFC** = Brake specific fuel consumption (Btu/hp-hr). **Given in Table 3-1.**  
**HV** = Heating value of the fuel (Btu/gal). **Given in Table 3-1.**

To calculate GSE emissions using the fuel consumption method, the following tables are used:

- Table 3-5 provides typical hp for common GSE.
- Table 3-7 provides the EPAs EFs for HAPs from uncontrolled diesel reciprocating internal combustion engines.

### 3.3.4 Calculating SO<sub>2</sub> Emissions

A more precise method for estimating SO<sub>2</sub> emissions involves applying fuel flow rate data to derive an SO<sub>2</sub> EF based on pounds of pollutant emitted per hour of operation (lb/hr). There is a conservative assumption that all the sulfur in the fuel is converted to SO<sub>2</sub> during the combustion process. Under this assumption, and with the density and sulfur content values known, an SO<sub>2</sub> EF is calculated using the following equation:

$$EF(SO_2) = FFR \times \rho \times \frac{S}{100} \times 2$$

**Equation 3-7**

Where,

**EF(SO<sub>2</sub>)** = SO<sub>2</sub> emission factor (lb/hr)  
**ρ** = Density of fuel (lb/gal)  
**S** = Weight percent sulfur content of fuel (%)  
**100** = Factor for converting a percent to a fraction (%)  
**2** = Conversion factor which is the ratio of the molecular weight of SO<sub>2</sub> to the molecular weight of S

The value for S typically varies from supplier to supplier and the geographic location where the fuel is produced. For enhanced accuracy of the emissions inventory, the sulfur content and density of the fuel should be obtained from the fuel supplier whenever possible. In the absence of such information, the average density and sulfur content is listed in Table 3-1. The sulfur content of JP-8 varies by region, so if the region-specific sulfur content is required, then refer to Table 2-2.

**Table 3-1. Fuel Data**

Fuel Type	Heating Value (Btu/unit fuel) <sup>a</sup>	BSFC (Btu/hp-hr) <sup>b</sup>	Density (lb/gal) <sup>c</sup>	Sulfur Content (wt. %) <sup>c</sup>
Diesel	138,000 Btu/gal	8,089	7.14	0.025
MOGAS	125,000 Btu/gal	7,000	6.15	0.018
JP-8	124,000 Btu/gal <sup>d</sup>	---	6.71 <sup>e</sup>	0.054 <sup>e</sup>
LPG	92,000 Btu/gal	10,577 <sup>f</sup>	4.41	Negligible
CNG	1,026 Btu/ft <sup>3</sup>	7,858	0.046	0.001

a. SOURCE (Unless otherwise noted): Table C-1 to Subpart C of 40 CFR 98.

b. SOURCE (Unless otherwise noted): *Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Natural Gas Industry*, American Petroleum Institute, 2009.

c. SOURCE (Unless otherwise noted): Department of Energy, Energy Information Administration report DOE/EIA-0464/ (2005), *Household Vehicles Energy Use: Latest Data & Trends*, Appendix C, Table C4

d. SOURCE: Defense Logistics Agency, Defense Energy Support Center, *Petroleum Quality Information System Fuels Data (2005)*, April 2006.

e. SOURCE: *Petroleum Quality Information System Fuels Data*. Defense Logistics Agency, Defense Energy Support Center, 2001 – 2013. Values were calculated as the average weighted average density for years 2001 – 2013.

f. SOURCE: *Exhaust Emission Factors for Nonroad Engine Modeling: Spark Ignition*, EPA420-R-05-019, 2005.

“---” – Indicates no data available.

### 3.3.5 Calculating Emissions from Synthetic Aviation Fuel

On-going DoD and USAF initiatives to reduce dependency on foreign petroleum sources are expected to result in the increased use of non-petroleum fuels in a 50-50 blend with JP-8. Testing and certification of such fuels in aircraft engines indicate the blend reduces PM emissions by an average of 35%, sulfur emissions by 50%, and CO<sub>2</sub> emissions by 1.8% (USAF Research Laboratory 2007). Accordingly, when collecting information on GSE operations, verify the blend percentage and whether synthetic fuel was used. If a 50-50 blend was used, apply the appropriate emission reduction factors as given in Table 2-1.

### 3.4 Information Resources

The base AGE shop is responsible for the operation and repair of most pieces of GSE. Therefore, they should be able to provide most, if not all, of the information needed to calculate the emissions from the GSE used on the installation. In the absence of base-specific data, default EPA information can be used. In some cases, it may be necessary to contact the GSE manufacturer to obtain necessary information.

### 3.5 Example Calculations

The following section provides examples of how to calculate emissions from GSE operations using the various methodologies identified above and their associated equations.

#### 3.5.1 Problem 1 – Sortie/LTO Method

A USAF base needs to calculate annual NO<sub>x</sub> and xylene emissions from GSE operations associated with their B-1B aircraft. The following information was obtained from the base:

B-1B Aircraft	
GSE Types	A/M32A-86D Generator, A/M32A-95 Start Cart, B-1B AC unit, MJ-40 Bomb lift, NF-2 Light Cart
Sorties/year	200

**Step 1 – Record the operating times and NO<sub>x</sub> emission factors for each GSE.** Since the table above does not provide specific operating times for these GSE, the typical operating times for these GSE may be used. Table 3-2 lists the operating times for the generator as **2.20 hr**, the start cart as **0.50 hr**, the AC unit as **2.40 hr**, the bomb lift as **2.50 hr**, and the light cart as **0.50 hr**. Table 3-3 has the NO<sub>x</sub> EFs as **6.102 lb/hr** for the generator, **1.470 lb/hr** for the start cart, **7.659 lb/hr** for the AC unit, **0.340 lb/hr** for the bomb lift, and **0.110 lb/hr** for the light cart.

**Step 2 – Calculate annual NO<sub>x</sub> emissions for each GSE.** Using the information in the table above, the data collected in Step 1, and Equation 3-1, the NO<sub>x</sub> emissions for each GSE are calculated as follows:

$$E(\text{Pol}) = OT \times EF(\text{Pol}) \times N$$

$$E(\text{NO}_x)_{A/M32A-86D} = 2.20 \frac{\text{hr}}{\text{sortie}} \times 6.102 \frac{\text{lb}}{\text{hr}} \times 200 \frac{\text{sortie}}{\text{yr}} = 2,684.88 \frac{\text{lb}}{\text{yr}}$$

$$E(\text{NO}_x)_{A/M32A-95} = 0.50 \frac{\text{hr}}{\text{sortie}} \times 1.470 \frac{\text{lb}}{\text{hr}} \times 200 \frac{\text{sortie}}{\text{yr}} = 147.00 \frac{\text{lb}}{\text{yr}}$$

$$E(\text{NO}_x)_{B-1B \text{ AC Unit}} = 2.40 \frac{\text{hr}}{\text{sortie}} \times 7.659 \frac{\text{lb}}{\text{hr}} \times 200 \frac{\text{sortie}}{\text{yr}} = 3,676.32 \frac{\text{lb}}{\text{yr}}$$

$$E(\text{NO}_x)_{MJ-40} = 2.50 \frac{\text{hr}}{\text{sortie}} \times 0.340 \frac{\text{lb}}{\text{hr}} \times 200 \frac{\text{sortie}}{\text{yr}} = 170.00 \frac{\text{lb}}{\text{yr}}$$

$$E(\text{NO}_x)_{NF-2} = 0.50 \frac{\text{hr}}{\text{sortie}} \times 0.110 \frac{\text{lb}}{\text{hr}} \times 200 \frac{\text{sortie}}{\text{yr}} = 11.00 \frac{\text{lb}}{\text{yr}}$$

**Step 3 – Calculate total NO<sub>x</sub> emissions.** Sum the emissions from each GSE to get the total NO<sub>x</sub> emissions for GSE used for the B-1B.

$$E(NO_x)_{Total} = (2684.88 + 147 + 3676.32 + 170 + 11) \frac{lb}{yr}$$

$$E(NO_x)_{Total} = 6,689.2 \frac{lb}{yr}$$

Next, calculate xylene emissions.

**Step 4 – Record the fuel flow rate for each GSE.** Table 3-3 shows that the fuel flow rate is **6.47 gal/hr** for the generator and **17.14 gal/hr** for the AC unit. Since the fuel flow rate of the start cart, bomb lift, and light cart are not provided in the table, surrogates must be selected. Ideally, the best surrogates will be similar GSE types with similar hp. For this example, the A/M32A-86D was selected as a surrogate for the A/M32A-95, the elevator loader was selected for the MJ-40, and the generator light cart was selected for the NF-2 light cart. The fuel flow rates for the surrogate equipment are listed as **6.47 gal/hr** for the A/M32A-86D, **6.29 gal/hr** for the elevator loader, and **0.62 gal/hr** for the generator light cart.

**Step 5 – Calculate the fuel consumption for each GSE.** Use the operating times and fuel flow rates recorded in Step 1 and Step 4 above and Equation 3-5.

$$FC = OT \times FFR$$

$$FC_{A/M32A-86D} = 2.20 \frac{hr}{unit} \times 6.47 \frac{gal}{hr} = 14.23 \frac{gal}{unit}$$

$$FC_{A/M32A-95} = 0.50 \frac{hr}{unit} \times 6.47 \frac{gal}{hr} = 3.24 \frac{gal}{unit}$$

$$FC_{B-1B AC Unit} = 2.40 \frac{hr}{unit} \times 17.14 \frac{gal}{hr} = 41.14 \frac{gal}{unit}$$

$$FC_{MJ-40} = 2.50 \frac{hr}{unit} \times 6.29 \frac{gal}{hr} = 15.73 \frac{gal}{unit}$$

$$FC_{NF-2} = 0.50 \frac{hr}{unit} \times 0.62 \frac{gal}{hr} = 0.31 \frac{gal}{unit}$$

**Step 6 – Calculate the total fuel flow rate for GSE.** Sum the values calculated in Step 5 as follows:

$$FC_{GSE(Total)} = (14.23 + 3.24 + 41.14 + 15.73 + 0.31) \frac{gal}{unit} = 74.65 \frac{gal}{unit}$$

**Step 7 – Record the xylene emission factor.** Table 3-7 lists the total xylenes EF as **3.93E-02 lb/10<sup>3</sup> gal**.

**Step 8 – Calculate xylene emissions.** With the estimated fuel consumption calculated in Step 6 and the EF data from Step 7, use Equation 3-4 to calculate xylene emissions:

$$E(Pol) = FC \times \frac{1}{1000} \times EF(Pol) \times N$$

$$E(Xylenes) = 74.65 \frac{\text{gal}}{\text{unit}} \times \frac{1}{1000} \left( \frac{10^3 \text{gal}}{\text{gal}} \right) \times 0.0393 \frac{\text{lb}}{10^3 \text{gal}} \times 200 \frac{\text{unit}}{\text{yr}}$$

$E(Xylenes) = 0.587 \frac{\text{lb}}{\text{yr}}$
--

### 3.5.2 Problem 2 – Horsepower/Load Factor Method

A USAF base periodically operates two diesel-powered baggage tractors used to transport the luggage of visiting dignitaries. Using the following information obtained from the base, calculate CO and 1,3-butadiene emissions.

GSE Type – Baggage tractor	
# of GSE	2
Operating Time	15 hr/unit

**Step 1 – Record the average rated power and average operating load.** This information is provided in Table 3-5. The average rated power is given as **83 hp** and the operating load is shown as **55%**.

**Step 2 – Record the emission factors for this GSE for CO and 1,3-butadiene.** Table 3-6 gives the EF for CO for diesel baggage tractors as **11.00 lb/10<sup>3</sup> hp-hr**. Table 3-7 lists the EF for 1,3-butadiene as **3.16E-04 lb/10<sup>3</sup> hp-hr**.

**Step 3 – Calculate CO and 1,3-butadiene emissions.** Use the data collected in Step 1 and Step 2 with Equation 3-2 to calculate the CO and 1,3-butadiene emissions:

$$E(Pol) = OT \times \frac{LF}{100} \times hp_{rtd} \times \frac{1}{1000} \times EF(Pol) \times N$$

For CO:

$$E(CO)_{Baggage} = 15 \frac{\text{hr}}{\text{unit}} \times \frac{55\%}{100\%} \times 83 \text{hp} \times \frac{1}{1000} \left( \frac{10^3 \text{hp}}{\text{hp}} \right) \times 11.00 \frac{\text{lb}}{10^3 \text{hp-hr}} \times 2 \frac{\text{unit}}{\text{yr}}$$

$$E(CO)_{\text{Baggage}} = 15.06 \frac{\text{lb}}{\text{yr}}$$

For 1,3-Butadiene:

$$E(1,3 - \text{Butadiene})_{\text{Baggage}} = 15 \frac{\text{hp}}{\text{unit}} \times \frac{55\%}{100\%} \times 83 \text{hp} \times \frac{1}{1000} \left( \frac{10^3 \text{hp}}{\text{hp}} \right) \times 0.000316 \frac{\text{lb}}{10^3 \text{hp-hr}} \times 2 \frac{\text{unit}}{\text{yr}}$$

$$E(1,3 - \text{Butadiene})_{\text{Baggage}} = 4.33\text{E} - 04 \frac{\text{lb}}{\text{yr}}$$

### 3.5.3 Problem 3 – Fuel Consumption Method

A USAF base wants to estimate total toluene emissions for the previous year resulting from the operation of air start units using JP-8. The following information was obtained from the base:

GSE Type – Air Start Units	
GSE Model	A/M32A-95
# of GSE	35
Fuel Consumption	5,000 gal/unit

**Step 1 – Record the toluene emission factor.** Table 3-7 provides HAP speciation for diesel-fired engines. This table lists the toluene EF as **5.64E-02 lb/10<sup>3</sup> gal**.

**Step 2 – Calculate the toluene emissions.** Use the EF in Step 1, the data from the table above, and Equation 3-4.

$$E(\text{Pol}) = FC \times \frac{1}{1000} \times EF(\text{Pol}) \times N$$

$$E(\text{Toluene}) = 5000 \frac{\text{gal}}{\text{unit}} \times \frac{1}{1000} \left( \frac{10^3 \text{gal}}{\text{gal}} \right) \times 0.0564 \frac{\text{lb}}{10^3 \text{gal}} \times 35 \frac{\text{unit}}{\text{yr}}$$

$$E(\text{Toluene}) = 9.87 \frac{\text{lb}}{\text{yr}}$$

### 3.5.4 Problem 4 – Estimating SO<sub>2</sub> Emissions

A USAF base has been asked to estimate SO<sub>2</sub> emissions from the operation of its GSE. The following information was obtained from the base:

Equipment Data – GSE	
# of GSE	40
Fuel	JP-8
Fuel Flow Rate	18 gal/hr
Operating time	2 hours

Calculate SO<sub>2</sub> emissions for the AFB which is in the East Central United States.

**Step 1 – Record the density and sulfur content of JP-8.** Table 3-1 lists the density of JP-8 as **6.71 lb/gal**. Though Table 3-1 also provides the sulfur content, since it is known that the AFB is in the East Central portion of the United States, a more accurate value given in Table 2-2 of Chapter 2 in this document states the sulfur content of JP-8 in that particular region as **0.067%**.

**Step 2 – Calculate the SO<sub>2</sub> emission factor.** This is accomplished by using Equation 3-7.

$$EF(SO_2) = FFR \times \rho \times \frac{S}{100} \times 2$$

$$EF(SO_2) = 18 \frac{\text{gal}}{\text{hr}} \times 6.71 \frac{\text{lb}}{\text{gal}} \times \frac{0.067\%}{100\%} \times 2 = \mathbf{0.162 \frac{\text{lb}}{\text{hr}}}$$

**Step 3 – Calculate SO<sub>2</sub> emissions.** Use the EF calculated in Step 2 and Equation 3-1.

$$E(\text{Pol}) = OT \times EF(\text{Pol}) \times N$$

$$E(SO_2) = 2 \frac{\text{hr}}{\text{unit}} \times 0.162 \frac{\text{lb}}{\text{hr}} \times 40 \frac{\text{unit}}{\text{yr}}$$

$$\boxed{E(SO_2) = \mathbf{12.96 \frac{\text{lb}}{\text{yr}}}}$$

Table 3-2. Military Aircraft and GSE Assignments

Aircraft	GSE Type	GSE Model	Operating Time Per Sortie or LTO (hr)
A-3A, -3B		See Generic 2	
A-4, -4C, -4E, -4F, -4L, -4M		See Generic 2	
A-6A, -6B, -6C, -6E, -6F		See Generic 2	
A-7A, -7B, -7C, -7D, -7E, -7K		See Generic 2	
A-10, -10A, -10C	Generator Set	A/M32A-86D	1.00
	Start Cart	A/M32A-60A	1.00
		A/M32A-95	1.00
	Heater	1H1	2.00
	Hydraulic Test Stand	MJ-2A	2.00
	Light Cart	FL-1D (S)	2.00
		NF-2	2.00
Air Compressor	MC-1A	2.00	
	MC-2A (S)	1.00	
Bomb Lift	MJ-1B <sup>(a)</sup>	1.00 - 8.00	
A-37		See Generic 2	
AC-130A, -130H, -130U, -130W		See C-130A	
AH-1G, -1J		See Generic 4	
AH-64A		See Generic 4	
AT-38B		See T-38	
AU-24		See Generic 2	
B-1A, -1B	Generator Set	A/M32A-86D	2.20
	Start Cart	A/M32A-95	0.50
	Heater/Air Conditioner	B-1B Heater/Air Conditioner	2.40
	Heater	H1	4.00
	Light Cart	FL-1D (S)	0.50
		NF-2	0.50
Bomb Lift	MJ-40	2.50	
B-2A	Generator Set	A/M32A-86D	3.00
	Start Cart	A/M32A-60A	2.00
		A/M32A-95	2.00
	Air Conditioner	Ace 401	12.00
		PD501	12.00
	Heater	H1	2.00
	Hydraulic Test Stand	MJ-2/TTU-228	1.00
		MJ-2/TTU-229	1.50
		A/M27T-13	4.00
	Light Cart	NF-2	4.00
FL-1D (S)		4.00	
Air Compressor	MC-1A	1.50	
	MC-6 (S)	5.00	
	MC-7	1.50	
Bomb Lift	MJ-40	2.00	
B-52D, -52G, -52H	Generator Set	A/M32A-86D	4.00
	Start Cart	A/M32A-95	1.00
	Air Conditioner	MA-3D	1.00
	Light Cart	NF-2	1.00
	Air Compressor	MC-1A	1.00
	Bomb Lift	MJ-1B	2.00
C-1, -1A		See Generic 1	
C-2, -2A		See Generic 4	



Table 3-2. Military Aircraft and GSE Assignments

Aircraft	GSE Type	GSE Model	Operating Time Per Sortie or LTO (hr)
C-5A, -5B, -5C, -5M	Generator Set	A/M32A-86D	13.00
	Start Cart	A/M32A-95	2.00
	Air Conditioner	MA-3D	3.00 - 12.00
	Heater	H1	9.00
		BT400-46HT	10.00
	Hydraulic Test Stand	MJ-1-1 <sup>(a)</sup>	1.00
		M32T1 (S)	1.00
		MJ-2A	1.00
	Light Cart	NF-2	16.00
Air Compressor	MC-2A (S)	16.00	
	MC-1A	7.00	
	MC-7	2.00	
Pumping Unit	AF/M27M-1 <sup>(a)</sup>	3.00	
C-9, -9A, -9B, -9C	Generator Set	A/M32A-86D	6.00
	Start Cart	A/M32A-95	0.50
	Air Conditioner	MA-3D	6.00
	Heater	H1	6.00
	Light Cart	NF-2	12.00
	Air Compressor	MC-2A (S)	2.00
		MC-1A	0.50
MC-7		2.00	
C-11A	See Generic 1		
C-12, -12A, -12C, -12D, -12F, -12J, -12L, -12R, -12S, -12T, -12U	Generator Set	A/M32A-86D	0.75
C-17A	Generator Set	A/M32A-86D	2.00
	Start Cart	A/M32A-95	2.00
	Air Conditioner	MA-3D	1.50
	Heater	BT400-46	1.50
		H1	1.50
	Light Cart	NF-2	1.50
	Air Compressor	MC-1A	0.66
		MC-2A (S)	0.66
MC-7		0.66	
Pumping Unit	AF/M27M-1	0.50	
Bomb Lift	MJ-1B	1.50	
C-18B	See Generic 1		
C-20A, -20B, -20C, -20D, -20E, -20F, -20G, -20H, -20J	Generator Set	A/M32A-86D	5.50
	Air Conditioner	Ace 802-329S <sup>(a)</sup>	1.00
		MA-3D	1.00
	Heater	1H1	3.00
	Light Cart	FL-1D (S)	6.00
	Air Compressor	MC-2A (S)	0.50
		MC-5	0.50
MC-7		2.00	
	MC-8	3.00	
C-21A	See Generic 1		
C-22A, -22B	Generator Set	A/M32A-86D	1.50
	Start Cart	A/M32A-60A <sup>(a)</sup>	0.25
	Heater	H1	0.25
	Light Cart	NF-2	0.25
	Air Compressor	MC-1A	0.25
		MC-7	0.25
Pumping Unit	AF/M27M-1	0.25	
C-23A, -23B, -23C	See Generic 1		
C-26A, -26B, -26C	See Generic 1		

Table 3-2. Military Aircraft and GSE Assignments

Aircraft	GSE Type	GSE Model	Operating Time Per Sortie or LTO (hr)
C-27J		See Generic 1	
C-28A		See Generic 1	
C-32A	Generator Set	A/M32A-86D	6.00
C-37A		See Generic 1	
C-38		See Generic 1	
C-40A, -40B, -40C		See Generic 1	
C-123K		See Generic 1	
C-130A, -130B, -130D, -130E, -130F, -130H, -130J, -130T	Generator Set	A/M32A-86D	4.00 - 11.00
		Trielectron D200T 400	3.00
	Start Cart	MA-1A (S)	0.25
		A/M32A-60A	0.25
	Air Conditioner	A/M32A-95	0.25
		Ace 802-993 (S)	1.00
	Heater	MA-3D	1.00
	Hydraulic Test Stand	H1	1.00
Light Cart	MJ-2A <sup>(a)</sup>	3.00	
Air Compressor	NF-2	2.00 - 10.00	
C-135A, -135B, -135C, -135E	Generator Set	MC-1A	0.50 - 10.00
		MC-2A (S)	0.50 - 10.00
	Generator Set	A/M32A-86D	10.00
		A/M32A-60A	1.00
	Start Cart	A/M32A-95	0.10
		Ace 802-993 (S)	10.00
	Air Conditioner	MA-3C (S)	2.00
	Heater	H1	4.00
Light Cart	1H1	5.00	
Air Compressor	NF-2	2.00	
	MC-1A	0.33	
C-137B, -137C		See Generic 1	
C-140A, -140B		See Generic 1	
C-141, -141A, -141B, -141C	Generator Set	A/M32A-86D	0.50
	Start Cart	MD-3 (S)	0.10
		A/M32A-60A	0.50
	Heater	H1	0.40
	Hydraulic Test Stand	TTU-228E (S)	0.10
		M32T1 (S)	0.10
	Light Cart	NF-2	0.50
Air Compressor	MC-1A	0.10	
	MC-2A (S)	0.10	
CH-3B, -3E		See Generic 4	
CH-46, -46A, -46E		See Generic 4	
CH-53A, -53D		See Generic 4	
CT-1B		See Generic 1	
CT-39A, -39E, -39G		See Generic 1	
CT-43A		See T-43A	
CT-49A		See Generic 1	
CV-22, -22A		See Generic 1	
DC-130A		See C-130A	
E-1B		See Generic 1	
E-2, -2B, -2C, -2D		See Generic 1	
E-3A, -3B, -3C		See Generic 1	
E-4A, -4B		See Generic 1	
E-6B		See Generic 1	
E-8C		See Generic 1	
EA-3B		See Generic 1	

Table 3-2. Military Aircraft and GSE Assignments

Aircraft	GSE Type	GSE Model	Operating Time Per Sortie or LTO (hr)
EA-4F		See Generic 1	
EA-6A, -6B		See Generic 1	
EA-7L		See Generic 1	
EB-57B		See Generic 1	
EC-18B, -18D		See Generic 1	
EC-24A		See Generic 1	
EC-130E, -130H, -130J, -130SJ, -130V		See C-130A	
EC-135A, -135B, -135C, -135E, -135G, -135H, -135J, -135K, -135L, -135N, -135P, -135Y		See C-135A	
EC-137D		See Generic 1	
EF-4J		See Generic 2	
EF-111A		See Generic 2	
EH-1H, -1X		See Generic 4	
EH-60A		See Generic 4	
EKA-3B		See Generic 1	
EP-3B, -3J		See Generic 1	
ERA-3B		See Generic 2	
ES-2D		See Generic 1	
F-4, -4B, -4C, -4D, -4E, -4G, -4J, -4N, -4S		See Generic 2	
F-5A, -5B, -5E, -5F		See Generic 2	
F-8, -8J		See Generic 2	
F-14A, -14B, -14C, -14D		See Generic 2	
F-15A, -15B, -15C, -15D, -15E	Generator Set	A/M32A-86D	0.33
	Start Cart	A/M32A-60A	0.33
		A/M32A-95	0.33
	Heater	H1	0.50
	Hydraulic Test Stand	MJ-1-1	0.50
		MJ-2/TTU-228	0.50
	Light Cart	NF-2	1.00 - 8.00
	Air Compressor	MC-1A	0.33
MC-2A (S)		0.25	
MC-11 (S)		2.00	
Bomb Lift	MJ-1B	1.00	
F-16, -16A, -16B, -16C, -16D, -16N	Generator Set	A/M32A-86D	0.33
	Start Cart	A/M32A-60A	0.33
		A/M32A-95	0.33
	Heater	H1	0.50
	Hydraulic Test Stand	MJ-1-1	0.50
		MJ-2/TTU-228	0.50
	Light Cart	NF-2	1.00 - 8.00
	Air Compressor	MC-1A	0.33
MC-2A (S)		0.25	
MC-11 (S)		2.00	
Bomb Lift	MJ-1B	1.00	
F-22A, -22B		See Generic 2	
F-35A, -35B, -35C		See Generic 2	
F-100		See Generic 2	
F-106A, -106B		See Generic 2	
F-111, -111A, -111D, -111E, -111F		See Generic 2	

Table 3-2. Military Aircraft and GSE Assignments

Aircraft	GSE Type	GSE Model	Operating Time Per Sortie or LTO (hr)
F-117A	Generator Set	A/M32A-86D	2.00
	Start Cart	A/M32A-60A	2.00
		A/M32A-95	0.50
	Air Conditioner	Ace 802-329S <sup>(a)</sup>	2.00
	Heater	H1	1.00
	Hydraulic Test Stand	MJ-1-1	1.00
	Light Cart	NF-2	1.00
	Air Compressor	MC-1A	0.33
MC-2A (S)		0.33	
Bomb Lift	MJ-1B	1.00 <sup>(b)</sup>	
F/A-18A, -18B, -18C, -18D, -18E, -18F	See Generic 2		
FA-22A	See Generic 2		
FB-22A	See Generic 2		
FB-111A	See Generic 2		
HC-130H, -130J, -130N, -130P	See C-130A		
HH-1H, -1K, -1N	Generator Set	A/M32A-86D	1.00 - 16.00
	Start Cart	M24A-9 (S)	0.25
	Heater	H1	8.00
	Hydraulic Test Stand	MJ-2/TTU-229	1.00
	Light Cart	NF-2D (S)	2.00
		TF-1	2.00
Air Compressor	MC-1A	1.00	
	MC-2A (S)	1.00	
HH-2D	See Generic 4		
HH-3A, -3E, -3F	See Generic 4		
HH-43	See Generic 4		
HH-46A	See Generic 4		
HH-52, -52A	See Generic 4		
HH-53	See Generic 4		
HH-60G	See Generic 4		
HV-22A, -22B	See Generic 1		
JA-6A	See Generic 2		
KA-3B	See Generic 2		
KA-6D	See Generic 2		
KC-10, -10A	Generator Set	A/M32A-86D	12.00
		90CU24P5 (S)	12.00
	Hydraulic Test Stand	9780-0023D (S)	2.00
		05-7056-3600 (S)	2.00
	Generator Light Cart	Generator Light Cart	6.00
Air Compressor	MODP160WJDACJF (S)	6.00	
KC-46A	See Generic 1		
KC-130F, -130R, -130T	See C-130A		
KC-135, -135A, -135D, -135E, -135Q, -135R, -135T	See C-135A		
KC-767A	See Generic 1		
LC-130F, -130H, -130R	See C-130A		
MC-12W	See C-12		
MC-130E, -130H, -130J, -130P, -130W	See C-130A		
MH-53J, -53M	Generator Set	A/M32A-86D	3.00
	Heater	H1	8.00
	Hydraulic Test Stand	MJ-2/TTU-228	2.00
	Light Cart	NF-2D (S)	2.00
		FL-1D (S)	2.00
Air Compressor	MC-2A (S)	4.00	
MH-60A, -60G	See Generic 4		

**Table 3-2. Military Aircraft and GSE Assignments**

Aircraft	GSE Type	GSE Model	Operating Time Per Sortie or LTO (hr)
MV-22A, -22B		See Generic 1	
NA-3B		See Generic 2	
NA-4E, -4F, -4M		See Generic 2	
NA-6A, -6E		See Generic 2	
NA-7A, -7C, -7E		See Generic 2	
NB-52B		See B-52D	
NC-12B		See C-12	
NC-21A		See Generic 1	
NC-130A, -130B, -130E, -130H		See C-130A	
NC-135A, -135W		See C-135A	
NC-141A		See C-141	
NCH-46A		See Generic 4	
NF-4D		See Generic 2	
NF-16A, -16D		See F-16	
NF-106B		See Generic 2	
NF/A-18A, -18B, -18C		See Generic 2	
NKC-135A, -135E		See C-135A	
NPC-3C, -3D		See Generic 1	
NRA-3B		See Generic 2	
NRH-53D		See Generic 4	
NSH-3A		See Generic 4	
NT-33A		See Generic 1	
NT-39A		See Generic 1	
NTA-4F, -4J		See Generic 1	
NUH-1E, -1N		See Generic 4	
NUP-3A		See Generic 1	
NVH-3A		See Generic 4	
O-1		See Generic 1	
O-2A, -2B		See Generic 1	
OA-4M		See Generic 2	
OA-10A		See A-10	
OA-37B		See Generic 2	
OC-135B		See C-135A	
OH-6A		See Generic 4	
OH-58A		See Generic 4	
OT-47B		See Generic 1	
OV-10A		See Generic 1	
P-3B, -3C		See Generic 1	
QF-4B, -4E, -4G		See Generic 2	
QF-106A, -106B		See Generic 2	
QRF-4C		See Generic 2	
QT-33A		See Generic 1	
RA-3B		See Generic 2	
RA-5C		See Generic 2	
RC-12D, -12G, -12H		See C-12	
RC-135M, -135S, -135T, -135U, -135V, -135W, -135X		See C-135A	
RF-4B, -4C		See Generic 2	
RF-8G		See Generic 2	
RF/A-18A		See Generic 2	
RH-53D		See Generic 4	

Table 3-2. Military Aircraft and GSE Assignments

Aircraft	GSE Type	GSE Model	Operating Time Per Sortie or LTO (hr)
RP-3D	See Generic 1		
RQ-1A, -4, -4A, -4B <sup>(d)</sup>	Generator Set	805 (S) 806 (S)	24.00 24.00
	Air Conditioner	MA-3D	2.00
	Heater	H1	4.00
	Light Cart	FL-1D (S)	6.00
RU-21J	See Generic 1		
S-2, -2D, -2E, -2G	See Generic 1		
S-3A	See Generic 2		
SH-2D, -2F	See Generic 4		
SH-3A, -3G	See Generic 4		
SH-60	See Generic 4		
SV-22A	See Generic 1		
T-1A	Generator Set	Jetex (S)	0.33
	Hydraulic Test Stand	Airton (S)	0.10
T-2	See Generic 3		
T-6A	Generator Set	Jettex-40 (S)	0.50
	Start Cart	Jet Series 703D (S) MA-1A (S)	0.50 0.50
	Air Conditioner	MA-3D	0.75
	Hydraulic Test Stand	6X620-RDF (S)	1.00
	Light Cart	FL-2D (S)	1.00
	Tug	(See "Tug" in Table 3-4 and select appropriate size)	0.33
T-28	See Generic 3		
T-33A	See Generic 3		
T-34, -34C	See Generic 3		
T-37, -37B	Generator Set	A/M32A-86D <sup>(a)</sup>	0.17
	Heater	H1	0.17
	Hydraulic Test Stand	MJ-1-1	0.50
	Light Cart	TL-1D (S)	1.00
	Air Compressor	MC-1A	0.50
		MC-2A (S)	0.50
Tug	(See "Tug" in Table 3-4 and select appropriate size)	0.33	
T-38, -38A, -38C, -38N	Generator Set	A/M32A-86D	0.25
	Hydraulic Test Stand	MK1 (S)	0.75
		MK3A (S)	0.75
T-39A, -39B, -39D	See Generic 3		
T-41, -41B, -41C, -41D	See Generic 3		
T-43A	Generator Set	A/M32A-86D	2.00
		Essex B8098 (S)	2.00
	Air Conditioner	MA-3D	12.00
	Hydraulic Test Stand	HPE-45 (S)	2.00
	Light Cart	FL-1D (S)	2.00
Air Compressor	MC-1A	1.00	
T-44	See Generic 3		
T-47A	See Generic 3		
TA-3B	See Generic 2		
TA-4B, -4F	See Generic 2		
TA-7C	See Generic 2		
TC-18E, -18F	See Generic 1		
TC-130H	See C-130A		
TC-135S, -135W	See C-135A		
TE-2A, -2C	See Generic 1		
TE-8A	See Generic 1		
TF-16N	See F-16		

Table 3-2. Military Aircraft and GSE Assignments

Aircraft	GSE Type	GSE Model	Operating Time Per Sortie or LTO (hr)
TF-18A		See Generic 2	
TF/A-18A		See Generic 2	
TH-1L		See Generic 4	
TH-53A		See Generic 4	
TS-2A		See Generic 2	
TU-2S		See Generic 2	
U-2S		See Generic 2	
U-21, -21J		See Generic 1	
U-28A		See Generic 1	
UA-3B		See Generic 2	
UC-12B		See C-12	
UC-35A, -35C		See Generic 1	
UC-123K		See Generic 1	
UH-1E, -1H, -1L, -1N, -1V		See Generic 4	
UH-2C		See Generic 4	
UH-3A		See Generic 4	
UH-46A		See Generic 4	
UH-60A, -60C, -60Q	Generator Set	A/M32A-86D	1.00 - 5.00
	Start Cart	A/M32A-95	0.50
	Air Conditioner	MA-3D	2.00
	Heater	H1 <sup>(a)</sup>	2.00
	Hydraulic Test Stand	MJ-1-1	2.50
		MJ-2/TTU-228	1.00
	Light Cart	FL-1D (S)	0.50 - 4.00
Air Compressor	MC-1A	1.00	
	MC-2A (S)	2.50	
UP-3B		See Generic 1	
US-2A, -2B, -2C, -2D		See Generic 1	
UV-18B		See Generic 1	
UV-20A		See Generic 1	
VC-25A		See C-5A	
VC-137B, -137C		See Generic 1	
VC-140B		See Generic 1	
WC-130E, -130H, -130J		See C-130A	
WC-135B, -135C, -135W		See C-135A	
X-29A		See Generic 2	
X-31A		See Generic 2	
X-44A		See Generic 2	
YA-7D		See Generic 2	
YC-14A		See Generic 1	
YE-2C		See Generic 1	
YF-4J		See Generic 2	
YF-15A, -15B		See F-15A	
YF-16A, -16B		See F-16	
YOV-10D		See Generic 2	
YP-3C		See Generic 1	
YS-2G		See Generic 2	
YSH-2E		See Generic 4	

Table 3-2. Military Aircraft and GSE Assignments

Aircraft	GSE Type	GSE Model	Operating Time Per Sortie or LTO (hr)
Generic 1 Cargo/Bomber (C-130)	Generator Set	A/M32A-86D	4.00 - 11.00
		Trielectron D200T 400	3.00
	Start Cart	MA-1A (S)	0.25
		A/M32A-60A	0.25
	Air Conditioner	A/M32A-95	0.25
		Ace 802-993 (S)	1.00
	Heater	MA-3D	1.00
	Hydraulic Test Stand	H1	1.00
Light Cart	MJ-2A <sup>a</sup>	3.00	
Air Compressor	NF-2	2.00 - 10.00	
	MC-1A	0.50 - 10.00	
	MC-2A (S)	0.50 - 10.00	
Generic 2 Fighter/Fighter Bomber (F-15)	Generator Set	A/M32A-86D	0.33
	Start Cart	A/M32A-60A	0.33
		A/M32A-95	0.33
	Heater	H1	0.50
	Hydraulic Test Stand	MJ-1-1	0.50
		MJ-2/TTU-228	0.50
	Light Cart	NF-2	1.00 - 8.00
	Air Compressor	MC-1A	0.33
MC-2A (S)		0.25	
Bomb Lift	MC-11 (S)	2.00	
	MJ-1B	1.00	
Generic 3 Small Trainers (T-37, -37B)	Generator Set	A/M32A-86D <sup>a</sup>	0.17
	Heater	H1	0.17
	Hydraulic Test Stand	MJ-1-1	0.50
	Light Cart	TL-1D (S)	1.00
	Air Compressor	MC-1A	0.50
		MC-2A (S)	0.50
Tug	(See "Tug" in Table 3-4 and select appropriate size)	0.33	
Generic 4 Helicopter (UH-60A)	Generator Set	A/M32A-86D	1.00 - 5.00
	Start Cart	A/M32A-95	0.50
	Air Conditioner	MA-3D	2.00
	Heater	H1	2.00
	Hydraulic Test Stand	MJ-1-1	2.50
		MJ-2/TTU-228	1.00
	Light Cart	FL-1D (S)	0.50 - 4.00
	Air Compressor	MC-1A	1.00
MC-2A (S)		2.50	
Generic (Not otherwise specified)	Aircraft Tug	(See "Tug" in Table 3-4 and select appropriate size)	0.10
	Package Tug	(See "Tug" in Table 3-4 and select appropriate size)	1.30
	Cargo Loader	Cargo Loader	1.50
	Fuel Truck	Fuel Truck	0.60
	Deicer Truck <sup>c</sup>	Deicer Truck	0.15

Notes for Table 3-2 are provided on the following page.



Notes for Table 3-2:

SOURCE (unless otherwise noted): Data obtained from USAF, IERA-RS-BR-SR-2005-0001, *Flightline Emission Factors – Aircraft/Auxiliary Power Units/Aerospace Ground Support Equipment*, December 2004. Data provided by the USAF flight squadrons and associated AGE shops. When calculating GSE emissions, use the data available at the installation. These aircraft/GSE combinations should be used only in the absence of current, more accurate, data.

- a. Operating time estimated based on operating time of GSE on similar aircraft.
- b. GSE model changed from what was stated in the source document because of suspected error in source.
- c. Cold weather months and cold weather bases only.
- d. Uses GSE assignments for similar, surrogate engine provided in source document.

“(S)” – Indicates that emission factors for this GSE are not found in this document. In the absence of available data, it is recommended that a similar GSE and associated emission factors be used as a surrogate.

Table 3-3. Military Aircraft GSE Emission Factors

GSE Model	GSE Type	Source of Data <sup>a</sup>	Engine Manufacturer	Model Number	Rated Hp	Fuel	Operational Mode	Fuel Flow Rate (gal/hr)	Emission Factors (lb/hr)						
									NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC <sup>c</sup>	PM <sub>10</sub>	PM <sub>2.5</sub> <sup>d</sup>	CO <sub>2e</sub> <sup>e</sup>
IH1	Heater	(5)	---	---	6.5	Diesel/JP-8	All Loads	0.39	0.160	0.003	0.180	0.105	0.006	0.006	8.81
AM27T-13	Hydraulic Test Stand	(5)	---	---	30	Diesel/JP-8	All Loads	---	0.180	0.051	12.250	0.295	0.167 <sup>g</sup>	0.162 <sup>g</sup>	39.70
AM32A-60A	Start Cart	(5)	Garrett	---	180	Diesel/JP-8	All Loads	---	1.820	0.306	5.480	0.284	0.211	0.205	238.22
AM32A-86D	Generator Set	(2)	Detroit Diesel	4-71N	148	Diesel/JP-8	All Loads	6.47	6.102	0.047	0.457	0.294	0.091	0.089	146.08
AM32A-95	Start Cart	(5)	Garrett	---	155	Diesel/JP-8	All Loads	---	1.470	0.264	5.860	0.074	0.110	0.107	205.14
AM32C-18	Air Compressor	(1)	Detroit Diesel	6V71T	290	Diesel/JP-8	100% Load	16.57	7.973	0.120	1.522	0.205	0.211	0.205	374.13
Ace 401	Air Conditioner	(5)	Detroit Diesel	---	---	Diesel/JP-8	All Loads	---	7.970	0.408	1.520	0.211	0.211	0.205	337.48
Ace 802-329S	Air Conditioner	(3)	Detroit Diesel	6V71N	272	Diesel/JP-8	All Loads	6.8	2.938	0.049	0.150	0.204	0.198	0.192	153.53
AF/M27M-1	Pumping Unit	(1)	Wisconsin	VH4D	30	Gasoline	100% Load	1.78	0.177	0.004	12.262	0.276	0.167 <sup>g</sup>	0.162 <sup>g</sup>	34.57
AF/M32T-1	Cabin Pressure Tester	(7)	Hatz	4M40	---	Diesel/JP-8	All Loads	---	0.118	0.238	0.203	0.095	0.167 <sup>g</sup>	0.162 <sup>g</sup>	185.29
B-1B Heater/Air Conditioner	Heater/Air Conditioner	(1)	Detroit Diesel	6V-92TA	300	Diesel/JP-8	100% Load	17.14	7.659	0.124	1.409	0.258	0.152	0.148	387.00
BAK-13	Arresting Barrier	(1)	Wisconsin	MV-465D	64	Gasoline	100% Load	3.9	0.377	0.010	29.207	0.319	0.167 <sup>g</sup>	0.162 <sup>g</sup>	75.74
BT400-46	Heater	(1)	Lister-Petter	AC1-389548	6.5	Diesel/JP-8	All Loads	0.39	0.158	0.003	0.181	0.100	0.167 <sup>g</sup>	0.162 <sup>g</sup>	8.81
Cargo Loader	Cargo Loader	(6)	---	---	133	Diesel/JP-8	All Loads	7.28	2.554	0.053	1.862	0.420	0.279	0.271	164.37
Deicer Truck	Deicer Truck	(6)	---	---	270	Gasoline	All Loads	14.78	5.940	0.036	73.170	2.519	0.027	0.024	287.04
Elevator Loader	Elevator Loader	(1)	Detroit Diesel	3-53 Series	110	Diesel/JP-8	100% Load	6.29	3.128	0.046	1.048	0.129	0.063	0.061	142.02
EMU-15	Generator Set	(1)	Detroit Diesel	3-71	100	Diesel/JP-8	100% Load	5.71	3.505	0.041	4.905	0.095	0.115	0.111	128.92
EMU-17	Generator Set	(1)	Detroit Diesel	12V-71N	300	Diesel/JP-8	100% Load	17.14	8.863	0.124	11.078	0.337	0.185	0.180	387.00
EMU-19U	Generator Set	(1)	Lister	ST-3	30	Diesel/JP-8	All Loads	1.78	0.743	0.013	0.351	0.266	0.167 <sup>g</sup>	0.162 <sup>g</sup>	40.19
FL-1D	Light Cart	(7)	Kubota	D905	10.5	Diesel/JP-8	All Loads	---	0.030	0.018	0.025	0.008	0.167 <sup>g</sup>	0.162 <sup>g</sup>	13.90
Fuel Truck	Fuel Truck	(6)	---	---	300	Diesel/JP-8	All Loads	16.42	3.300	0.119	0.900	0.316	0.210	0.204	370.74
Generator Light Cart	Generator Light Cart	(4)	Onan	P218G-V10876C	10.5	Diesel/JP-8	All Loads	0.62	0.181	0.004	0.139	0.022 <sup>f</sup>	0.167 <sup>g</sup>	0.162 <sup>g</sup>	14.00
Generator Set	Generator Set	(1)	Caterpillar	D3333T	214	Diesel/JP-8	100% Load	17.5	3.170	0.127	0.689	0.547	0.071	0.069	395.13
							62% Load	10.46	3.067	0.026	0.618	0.745	0.080	0.078	236.17
Ground Mobile Terminal Generator Set	Ground Mobile Terminal Generator Set	(1)	Detroit Diesel	4-71-T	150	Diesel/JP-8	100% Load	8.57	6.855	0.062	1.114	0.155	0.109	0.106	193.50
H1	Heater	(5)	---	---	6.5	Diesel/JP-8	All Loads	0.39	0.160	0.003	0.180	0.105	0.006	0.006	8.81
MA-3	Air Conditioner	(1)	Onan	L643T*/1C178-C	65	Diesel/JP-8	All Loads	3.79	0.497	0.027	0.133	0.011	0.167 <sup>g</sup>	0.162 <sup>g</sup>	85.57
MA-3D	Air Conditioner	(1)	John Deere	4045T	120	Diesel/JP-8	All Loads	7.12	4.167	0.052	0.317	0.053	0.167 <sup>g</sup>	0.162 <sup>g</sup>	160.76
MA-3D	Air Conditioner	(3)	John Deere	4039T	110	Diesel/JP-8	All Loads	4.57	0.640	0.033	0.058	0.284	0.063	0.061	103.18

Table 3-3. Military Aircraft GSE Emission Factors

GSE Model	GSE Type	Source of Data <sup>a</sup>	Engine Manufacturer	Model Number	Rated Hp	Fuel	Operational Mode	Fuel Flow Rate (gal/hr)	Emission Factors (lb/hr)						
									NO <sub>x</sub>	SO <sub>x</sub> <sup>b</sup>	CO	VOC <sup>c</sup>	PM <sub>10</sub>	PM <sub>2.5</sub> <sup>d</sup>	CO <sub>2e</sub> <sup>e</sup>
MC-1A	Air Compressor	(1)	Hatz	Z790-193	18.4	Diesel/JP-8	All Loads	1.09	0.419	0.008	0.267	0.267	0.071	0.068	24.61
MC-1A	Air Compressor	(1)	Lister Engineering Co.	ST2A/MC1A	20	Diesel/JP-8	All Loads	1.19	0.496	0.009	0.234	0.177	0.167 <sup>g</sup>	0.162 <sup>g</sup>	26.87
MC-5	Air Compressor	(3)	Deutz	F4L912 4CYL	100	Diesel/JP-8	All Loads	2.38	0.547	0.017	0.333	0.110	0.167 <sup>g</sup>	0.162 <sup>g</sup>	53.74
MC-5	Air Compressor	(1)	GMC	Series 4-53	130	Diesel/JP-8	100% Load	7.43	3.396	0.054	0.794	0.195	0.089	0.086	167.76
MC-5	Air Compressor	(1)	John Deere	4039	110	Diesel/JP-8	All Loads	6.52	2.425	0.047	0.485	0.073	0.167 <sup>g</sup>	0.162 <sup>g</sup>	147.21
MC-7	Air Compressor	(1)	John Deere	3164D	52	Diesel/JP-8	100% Load	3.3	1.285	0.024	0.642	0.057	0.167 <sup>g</sup>	0.162 <sup>g</sup>	74.51
MC-7	Air Compressor	(3)	John Deere	3179 SPEC FD16694J	48	Diesel/JP-8	All Loads	1.8	0.414	0.013	0.018	0.053	0.167 <sup>g</sup>	0.162 <sup>g</sup>	40.64
MC-8	Air Compressor	(1)	Deutz	F6L912	110	Diesel/JP-8	All Loads	6.52	2.983	0.047	0.752	0.121	0.167 <sup>g</sup>	0.162 <sup>g</sup>	147.21
MC-20	Air Compressor	(7)	Hatz	1B50	11	Diesel/JP-8	All Loads	---	0.025	0.019	0.045	0.016	0.012	0.012	14.56
Miller Concrete Cutter	Miller Concrete Cutter	(1)	Deutz	BF4D-1011T	75	Diesel/JP-8	All Loads	4.45	1.042	0.032	0.198	0.083	0.167 <sup>g</sup>	0.162 <sup>g</sup>	100.47
MJ-1-1	Hydraulic Test Stand	(1)	Detroit Diesel	3-53 N	97	Diesel/JP-8	All Loads	2.52	0.757	0.018	0.043	0.026	0.167 <sup>g</sup>	0.162 <sup>g</sup>	56.90
MJ-1B	Bomb Lift	(5)	Detroit Diesel	---	---	Diesel/JP-8	All Loads	---	4.780	0.219	3.040	3.201	0.800	0.776	152.20
MJ-1B/C	Bomb Lift	(7)	Deutz	F21011F	26	Diesel/JP-8	All Loads	---	0.009	0.050	0.023	0.006	0.167 <sup>g</sup>	0.162 <sup>g</sup>	34.54
MJ-2/TTU-228	Hydraulic Test Stand	(3)	Detroit Diesel	6V-53N	125	Diesel/JP-8	All Loads	4.92	0.937	0.036	0.083	0.292	0.083	0.080	111.09
MJ-2/TTU-228	Hydraulic Test Stand	(1)	Detroit Diesel	4-53	130	Diesel/JP-8	100% Load	7.43	3.396	0.054	0.794	0.195	0.089	0.086	167.76
MJ-2/TTU-229	Hydraulic Test Stand	(1)	Detroit Diesel	6V-53N	125	Diesel/JP-8	100% Load	10.86	3.858	0.079	2.466	0.193	0.083	0.080	245.20
MJ-2A	Hydraulic Test Stand	(5)	Detroit Diesel	---	---	Diesel/JP-8	All Loads	---	3.850	0.238	2.460	0.200	0.083	0.076	185.29
MJ-40	Bomb Lift	(5)	Detroit Diesel	---	---	Diesel/JP-8	All Loads	---	0.340	0.219	0.210	0.221	0.060	0.055	152.20
NF-2	Light Cart	(5)	---	---	18	Diesel/JP-8	All Loads	---	0.110	0.031	0.080	0.011	0.010	0.010	23.82
Nitrogen Cart	Nitrogen Generating Cart	(7)	Isuzu	4LE1PW14	52	Diesel/JP-8	All Loads	---	0.147	0.089	0.050	0.006	0.016	0.015	69.22
PD501	Air Conditioner	(5)	---	---	---	Diesel/JP-8	All Loads	---	7.650	0.408	1.410	0.274	0.167 <sup>g</sup>	0.162 <sup>g</sup>	337.48
PMU 27/M	Pumping Unit	(1)	Petter Diesel Engine	AC-1	6.5	Diesel/JP-8	All Loads	0.39	0.158	0.003	0.181	0.100	0.167 <sup>g</sup>	0.162 <sup>g</sup>	8.81
R-22	Pumping Unit	(1)	Detroit Diesel	3-53 Series	110	Diesel/JP-8	100% Load	6.29	3.128	0.046	1.048	0.129	0.063	0.061	142.02
TF-1	Light Cart	(5)	---	---	---	Diesel/JP-8	All Loads	---	0.170	0.043	0.130	0.026 <sup>f</sup>	0.160	0.155	33.09
Triectron D200T 400	Generator Set	(3)	Detroit Diesel	8V-71T	236	Diesel/JP-8	All Loads	10.9	8.621	0.079	0.219	0.271	0.208	0.202	246.11
Tug - Large	Tug	(6)	---	---	617	Diesel/JP-8	All Loads	33.4	10.489	0.242	4.936	0.650	0.864	0.839	754.13
Tug - Medium	Tug	(6)	---	---	475	Diesel/JP-8	All Loads	25.7	8.075	0.186	3.800	0.500	0.665	0.646	580.27
Tug - Small	Tug	(6)	---	---	190	Diesel/JP-8	All Loads	10.3	3.230	0.075	1.520	0.200	0.266	0.258	232.56

Notes for Table 3-3 are provided on the following page:

## Notes for Table 3-3:

- a. Sources of data include the following:
    - (1) Emission factors were obtained from the manufacturer. any documents? Fuel usage rates were based on 7,500 Btu/hp-hr.
    - (2) Emission factors were obtained from the Southwest Research Institute report titled *Exhaust Emissions from a USAF A/M32-86D Generator*.
    - (3) Emission factors were obtained from the Pacific Environmental Services report titled *Aerospace Ground Support Equipment Emissions Characterization for Edwards AFB, California*.
    - (4) Emission factors are EPA tier I Non-road engine factors.
    - (5) Emission factors were obtained from *Aircraft/Auxiliary Power Units/Ground Support Equipment Emission Factors*, December 2002
    - (6) Emission factors calculated using the emission factors in Table 3-6 using the hp stated in the table above. If no hp was given, then the average hp for that equipment type was used (Table 3-5). Fuel usage rates were based on 7,500 Btu/hp-hr.
    - (7) Emission factors calculated from on-site emissions testing.
  - b. SO<sub>x</sub> emission factor assumes that all sulfur in the fuel reacts to form SO<sub>2</sub>. Emission factors calculated using Equation 3-7. Sulfur content and density of the fuels taken from Table 3-1. Where the fuel flow rate was not provided, the appropriate EF was selected from Table 3-6 and multiplied by the horsepower (hp). If no hp was provided, the appropriate value was selected from Table 3-5. For equipment capable of using "Diesel/JP-8", the density and sulfur content of JP-8 were used.
  - c. Emission factors from reference (5) were converted from total hydrocarbons (THC) to VOC by multiplying by a factor of 1.053. Emission factors from reference (7) were converted from total organic gas (TOG) to VOC by multiplying by a factor 1.053 and dividing the result by 1.07. These hydrocarbon conversion factors come from "Conversion Factors for Hydrocarbon Emission Components", U.S. Environmental Protection Agency (EPA), Office of Transportation and Air Quality, July 2010.
  - d. PM<sub>2.5</sub> conservatively estimated at 97% of PM<sub>10</sub> for JP-8 or diesel and 92% of PM<sub>10</sub> for gasoline (per *Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling-Compression-Ignition*, EPA420-P-04-009, April 2004).
  - e. CO<sub>2</sub>e emission factor calculated by taking the product of the default CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O emission factors from Tables C-1 and C-2 of 40 Code of Federal Regulations (CFR) part 98, subpart C and their respective global warming potentials (GWP). The GWP for CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O are 1, 25, and 298, respectively. These values were multiplied by the high heat value of the fuel from Table C-1 of 40 CFR part 98 and the fuel flow rate. In cases where the fuel flow rate was not provided, the product of the EF and GWP were multiplied by the engine hp and brake specific fuel consumption (BSFC). A BSFC value of 8089 Btu/hp-hr was used for the diesel/JP-8 equipment.
  - f. These values were not provided from test data but calculated using the hp (or hp from Table 3-5) and the appropriate emission factor from Table 3-6.
  - g. The source did not provide an EF for this pollutant. The value provided is the average of EF for this pollutant for all ground support equipment.
- “---” Indicates No Data Available.

**Table 3-4. Typical Commercial Aircraft GSE Assignments**

Long Haul Turbine Powered Aircraft	Short Haul/Regional Turbine Powered Aircraft	Turbo-prop Powered Aircraft	Piston Powered Aircraft
Air Conditioner (Diesel/Electric)	Aircraft Tractor (Diesel)	Aircraft Tractor (Diesel)	Fuel Truck (Diesel)
Air Start (Diesel)	Baggage Tractor (Gasoline)	Baggage Tractor (Gasoline)	X
Aircraft Tractor/Tug (Diesel)	Belt Loader (Gasoline)	Belt Loader (Gasoline)	
Baggage Tractor (Gasoline)	Catering Truck (Diesel)	Catering Truck (Diesel)	
Belt Loader (Gasoline)	Fuel Truck (Diesel)	Cabin Service Truck (Diesel)	
Cabin Service Truck (Diesel)	Lavatory Truck (Diesel)	Fuel Truck (Diesel)	
Catering Truck (Diesel)	Service Truck (Diesel)	Service Truck (Diesel)	
Hydrant Truck (Diesel)	X	Cabin Service Truck (Diesel)	
Lavatory Truck (Diesel)		X	
Service Truck (Diesel)			
Water Service Truck (Diesel)			

SOURCE: FAA Emissions and Dispersion Modeling System, Version 5.02

**Table 3-5. Common GSE Operating Parameters**

GSE Type	Fuel Type	Average Rated Power (hp)	Average Operating Load (% Max Power)	Operating Time Per LTO (hr)
Air Conditioner	Diesel	255	75	0.50
Air Start	Diesel	613	90	0.12
	Gasoline	---	---	0.12
Aircraft Tractor/Tug	Diesel	617	80	0.13
	Diesel	475	80	0.13
	Diesel	190	80	0.13
	Diesel	88	80	0.13
	Gasoline	110	80	0.13
	CNG/LPG	124	80	0.13
Baggage Tractor	Diesel	83	55	1.20
	Gasoline	107	55	1.20
	CNG	83	55	1.20
	LPG	107	55	1.20
Belt Loader	Diesel	71	50	0.80
	Gasoline	107	50	0.80
	CNG	83	50	0.80
	LPG	107	50	0.80
Bobtail	Diesel	225	55	---
	Gasoline	124	55	---
	CNG	110	55	---
	LPG	124	55	---
Cabin Service Truck	Diesel	210	53	0.33
	Diesel	71	53	0.33
	Gasoline	260	53	0.33
	Gasoline	107	53	0.33
	CNG	360	53	0.33
	CNG	83	53	0.33
	LPG	260	53	0.33
	LPG	107	53	0.33
Cargo Loader	Diesel	133	50	1.33
	Diesel	80	50	1.33
	Gasoline	107	50	1.33
	CNG	83	50	1.33
	LPG	107	50	1.33
Cargo Tractor	Diesel	88	54	---
	Gasoline	107	54	---
	CNG	83	54	---
	LPG	88	54	---

**Table 3-5. Common GSE Operating Parameters**

GSE Type	Fuel Type	Average Rated Power (hp)	Average Operating Load (% Max Power)	Operating Time Per LTO (hr)
Cart (Light Cart)	Diesel	25	50	0.17
	Gasoline	25	50	0.17
	CNG/LPG	25	50	0.17
Catering Truck	Diesel	210	53	25.00
	Diesel	71	53	0.25
	Gasoline	260	53	0.25
	Gasoline	107	53	0.25
	CNG	360	53	25.00
	CNG	83	53	0.25
	LPG	260	53	0.25
	LPG	107	53	0.25
Deicer	Diesel	263	95	---
	Diesel	165	95	---
	Gasoline	270	95	---
	Gasoline	107	95	---
	CNG	83	95	---
	CNG	54	95	---
	LPG	270	95	---
	LPG	107	95	---
Forklift	Diesel	55	30	---
	Gasoline	54	30	---
	CNG/LPG	54	30	---
Fuel Truck	Diesel	300	25	0.75
	Diesel	235	25	0.54
	Diesel	175	25	0.33
	Gasoline	420	25	0.75
	Gasoline	260	25	0.54
	CNG	420	25	0.75
	CNG	360	25	0.54
	LPG	420	25	0.75
	LPG	260	25	0.54
Generator Sets	Diesel	158	82	2.00
	Gasoline	107	82	2.00
	CNG/LPG	107	82	2.00
Ground Power Unit	Diesel	194	75	0.67
	Diesel	71	75	0.67
	Gasoline	107	75	0.67
	CNG	83	75	0.67
	LPG	107	75	0.67

**Table 3-5. Common GSE Operating Parameters**

GSE Type	Fuel Type	Average Rated Power (hp)	Average Operating Load (% Max Power)	Operating Time Per LTO (hr)
Hydrant Truck	Diesel	235	70	0.20
	Gasoline	260	70	0.20
	CNG	360	70	0.20
	LPG	260	70	0.20
Lavatory Truck	Diesel	235	25	25.00
	Diesel	56	25	0.25
	Gasoline	260	25	0.25
	Gasoline	97	25	0.25
	CNG	360	25	25.00
	CNG	82	25	0.25
	LPG	260	25	0.25
	LPG	89	25	0.25
Lift	Diesel	115	50	0.17
	Gasoline	105	50	0.17
	CNG/LPG	132	50	0.17
Passenger Stand	Diesel	65	57	---
	Gasoline	107	57	---
	CNG	107	57	---
	LPG	83	57	---
Service Truck	Diesel	235	20	25.00
	Gasoline	260	20	0.25
	CNG	360	20	0.25
	LPG	260	20	0.25
Sweeper	Diesel	53	51	---
	Gasoline	53	51	---
	CNG/LPG	45	51	---
Water Service	Diesel	235	20	0.20
	Gasoline	260	20	0.20
	CNG	360	20	0.20
	LPG	260	20	0.20
Other	Diesel	140	50	---
	Gasoline	126	50	---
	CNG/LPG	173	50	---

SOURCE: FAA Emissions and Dispersion Modeling System, Version 5.02

“---” Indicates No Data Available



**Table 3-6. Common GSE Emission Factors**

GSE Type	Fuel Type	Emission Factors (lb/1000hp-hr)						
		CO	VOC <sup>a</sup>	NO <sub>x</sub>	SO <sub>x</sub>	PM <sub>10</sub> <sup>b</sup>	PM <sub>2.5</sub> <sup>c</sup>	CO <sub>2e</sub> <sup>d</sup>
Air Conditioner	Diesel	5.00	1.05	16.40	1.60	1.00	0.97	1330.83
Air Start	Diesel	6.00	1.05	19.30	1.60	1.20	1.16	1330.83
	Gasoline	271.00	9.33	22.00	0.40	0.10	0.09	1093.30
Aircraft Tractor/Tug	Diesel	8.00	1.05	17.00	1.70	1.40	1.36	1330.83
	Gasoline	393.00	12.13	23.20	0.40	0.10	0.09	1093.30
	CNG/LPG	---	---	---	---	---	---	1458.76
Baggage Tractor	Diesel	11.00	2.11	13.70	1.80	2.10	2.04	1330.83
	Gasoline	395.00	12.13	22.30	0.40	0.20	0.18	1093.30
	CNG/LPG	107.00	6.00	26.90	0.00	0.10	0.10	1458.76
Belt Loader	Diesel	8.00	2.11	14.80	1.80	1.70	1.65	1330.83
	Gasoline	275.00	9.33	22.30	0.40	0.20	0.18	1093.30
	CNG	275.00	10.00	22.30	0.00	0.10	0.10	2229.82
	LPG	74.00	4.00	26.90	0.00	0.00	0.00	1453.67
Bobtail	Diesel	8.00	1.05	16.70	1.70	1.30	1.26	1330.83
	Gasoline	398.00	12.13	22.30	0.40	0.20	0.18	1093.30
	CNG/LPG	---	---	---	---	---	---	1458.76
Cabin Service Truck	Diesel	2.00	1.05	10.30	1.60	0.30	0.29	1330.83
	Gasoline	24.00	3.73	10.70	0.30	0.10	0.09	1093.30
	CNG/LPG	107.00	6.00	26.90	0.00	0.10	0.10	1062.84
Cargo Loader	Diesel	14.00	3.16	19.20	1.90	2.10	2.04	1330.83
	Gasoline	400.00	12.13	22.30	0.40	0.20	0.18	1093.30
	CNG/LPG	106.00	5.00	26.80	0.00	0.10	0.10	1062.84
Cargo Tractor	Diesel	12.00	2.11	17.00	1.80	2.40	2.33	1330.83
	Gasoline	404.00	12.13	22.40	0.40	0.20	0.18	1093.30
	CNG/LPG	107.00	6.00	26.90	0.00	0.10	0.10	1062.84
Cart (Light Cart)	Diesel	---	---	---	---	---	---	1330.83
	Gasoline	392.00	12.13	22.30	0.40	0.10	0.09	1093.30
	CNG/LPG	---	---	---	---	---	---	1458.76
Catering Truck	Diesel	2.00	1.05	10.30	1.60	0.30	0.29	1330.83
	Gasoline	24.00	3.73	10.70	0.30	0.10	0.09	1093.30
	CNG/LPG	107.00	6.00	27.00	0.00	0.10	0.10	1062.84
Deicer	Diesel	---	---	---	---	---	---	1330.83
	Gasoline	271.00	9.33	22.00	0.40	0.10	0.09	1093.30
	CNG/LPG	---	---	---	---	---	---	1458.76
Forklift	Diesel	15.00	4.21	22.00	1.90	2.70	2.62	1330.83
	Gasoline	392.00	12.13	22.00	0.40	0.10	0.09	1093.30
	CNG/LPG	108.00	6.00	27.00	0.00	0.10	0.10	1062.84

**Table 3-6. Common GSE Emission Factors**

GSE Type	Fuel Type	Emission Factors (lb/1000hp-hr)						
		CO	VOC <sup>a</sup>	NO <sub>x</sub>	SO <sub>x</sub>	PM <sub>10</sub> <sup>b</sup>	PM <sub>2.5</sub> <sup>c</sup>	CO <sub>2e</sub> <sup>d</sup>
Fuel Truck	Diesel	3.00	1.05	11.00	1.60	0.70	0.68	1330.83
	Gasoline	37.00	4.67	11.00	0.30	0.10	0.09	1093.30
	CNG/LPG	106.00	5.00	27.00	0.00	0.10	0.10	1062.84
Generator	Diesel	6.00	2.11	20.00	1.60	1.40	1.36	1330.83
	Gasoline	271.00	9.33	22.00	0.40	0.10	0.09	1093.30
	CNG/LPG	---	---	---	---	---	---	1458.76
Ground Power Unit	Diesel	5.00	1.05	17.00	1.60	1.00	0.97	1330.83
	Gasoline	271.00	9.33	22.00	0.40	0.10	0.09	1093.30
	CNG/LPG	---	---	---	---	---	---	---
Hydrant Truck	Diesel	4.00	1.05	12.00	1.60	1.60	1.55	1330.83
	Gasoline	26.00	3.73	11.00	0.30	0.10	0.09	1093.30
	CNG/LPG	---	---	---	---	---	---	1458.76
Lavatory Truck	Diesel	4.00	1.05	12.00	1.60	1.30	1.26	1330.83
	Gasoline	18.00	3.73	11.00	0.30	0.10	0.09	1093.30
	CNG/LPG	106.00	5.00	27.00	0.00	0.10	0.10	1062.84
Lift	Diesel	15.00	4.21	22.00	1.90	2.70	2.62	1330.83
	Gasoline	397.00	12.13	22.00	0.40	0.20	0.18	1093.30
	CNG/LPG	106.00	5.00	27.00	0.00	0.10	0.10	1062.84
Passenger Stand	Diesel	4.00	1.05	12.00	1.60	1.60	1.55	1330.83
	Gasoline	46.00	4.67	11.00	0.30	0.10	0.09	1093.30
	CNG/LPG	106.00	5.00	27.00	0.00	0.10	0.10	1062.84
Service Truck	Diesel	3.00	1.05	11.00	1.60	0.90	0.87	1330.83
	Gasoline	46.00	4.67	11.00	0.30	0.10	0.09	1093.30
Sweeper	Diesel	12.00	2.11	17.00	1.80	2.40	2.33	1330.83
	Gasoline	393.00	12.13	22.00	0.40	0.10	0.09	1093.30
	CNG/LPG	108.00	6.00	27.00	0.00	0.10	0.10	1062.84
Water Service	Diesel	---	---	---	---	---	---	1330.83
	Gasoline	46.00	4.67	11.00	0.30	0.10	0.09	1093.30
	CNG/LPG	---	---	---	---	---	---	1458.76
Other	Diesel	8.00	1.05	17.00	1.70	1.30	1.26	1330.83
	Gasoline	396.00	12.13	22.00	0.40	0.20	0.18	1093.30
	CNG/LPG	106.00	5.00	27.00	0.00	0.10	0.10	1062.84

SOURCE: FAA Emission and Dispersion Modeling System, Version 5.02 for model year 2000 GSE and converted from g/hp-hr to lb/10<sup>3</sup> hp-hr.

- Reported as HC in EDMS. All values assumed to be equal to total hydrocarbons (THC) and converted into VOC. For diesel engines, THC was converted to VOC by multiplying THC value by 1.053. All gasoline engines were assumed to be 4-stroke. For gasoline engines, THC was converted to VOC by multiplying the THC value by 0.933. THC values were assumed to equal VOC emissions for CNG and LPG-fired engines. Hydrocarbon conversion factors come from *Conversion Factors for Hydrocarbon Emission Components*, U.S. Environmental Protection Agency (EPA), July 2010.
- Reported as PM in EDMS. All PM assumed to be PM<sub>10</sub>.
- Using assumptions and factors applied by EPA in its NONROAD model, PM<sub>2.5</sub> emissions conservatively estimated as 97% of JP-8 or diesel PM<sub>10</sub> emissions, 92% of gasoline PM<sub>10</sub> emissions, and 100% of CNG or LPG PM<sub>10</sub> emissions.
- CO<sub>2e</sub> is the sum of emission factors for CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O. The emission factors are presented in equivalent CO<sub>2</sub> (CO<sub>2e</sub>) using global warming potentials of 25 and 298 for CH<sub>4</sub> and N<sub>2</sub>O, respectively. The emission factors were provided by the EPA's Emission Factors for Greenhouse Gas Inventories. When "CNG/LPG" is provided as the fuel used, then the greenhouse gas emission factor provided was calculated using the more conservative estimate from LPG. The emission factors for N<sub>2</sub>O and CH<sub>4</sub> for CNG and LPG were assumed to be equal to those for gasoline. Calculations were made using the heating values and fuel usage rates provided in Table 3-1.

“---” Indicates No Data Available.

**Table 3-7. Speciated HAP Emission Factors for Uncontrolled Diesel Reciprocating Internal Combustion Engines**

Compound	Emission Factors	
	lb/10 <sup>3</sup> gal	lb/10 <sup>3</sup> hp-hr
1,3-Butadiene	5.40E-03	3.16E-04
Acenaphthene	1.96E-04	1.15E-05
Acenaphthylene	6.98E-04	4.09E-05
Acetaldehyde	1.06E-01	6.20E-03
Acrolein	1.28E-02	7.48E-04
Anthracene	2.58E-04	1.51E-05
Benz(a)anthracene	2.32E-04	1.36E-05
Benzene	1.29E-01	7.55E-03
Benzo(a)pyrene	2.59E-05	1.52E-06
Benzo(b)fluoranthene	1.37E-05	8.02E-07
Benzo(g,h,i)perylene	6.75E-05	3.96E-06
Benzo(k)fluoranthene	2.14E-05	1.25E-06
Chrysene	4.87E-05	2.86E-06
Dibenz(a,h)anthracene	8.05E-05	4.72E-06
Fluoranthene	1.05E-03	6.16E-05
Fluorene	4.03E-03	2.36E-04
Formaldehyde	1.63E-01	9.55E-03
Indeno(1,2,3-c,d)pyrene	5.18E-05	3.03E-06
Naphthalene	1.17E-03	6.86E-05
Phenanthrene	4.06E-03	2.38E-04
Pyrene	6.60E-04	3.87E-05
Toluene	5.64E-02	3.31E-03
Xylenes	3.93E-02	2.31E-03

SOURCE: *Compilation of Air Pollutant Emission Factors Volume I: Stationary Point and Area Sources fifth edition*, January 1995. Section 3.3. Where necessary, the average brake specific fuel consumption (BSFC) and heating value from Table 3-1 were used for unit conversion.

### 3.6 References

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## 4.0 NONROAD ENGINES AND EQUIPMENT (NRDE)

### 4.1 Introduction

Air emissions at USAF installations result not only from military operations, but also from day-to-day activities involving nonroad engines and equipment (NRDE). The full federal definition of a nonroad engine can be found in 40 CFR 1068.30. Examples of NRDE that are commonly operated on USAF installations include: industrial equipment (e.g., forklifts, aerial lifts, sweepers, etc.); lawn and garden equipment (e.g., lawn mowers, trimmers, leaf blowers, snow blowers, etc.); agricultural equipment (e.g., sprayers, agricultural tractors, agricultural mowers, etc.); commercial equipment (e.g., pumps, air compressors, etc.); recreational vehicles (e.g., off-road motorcycles, all-terrain vehicles, including utility vehicles, snowmobiles, golf carts, etc.); and logging equipment (e.g., shredders). Portable generators are nonroad engines but as internal combustion (ICOM) units, their emissions are covered in the appropriate sections of either the *Air Emissions Guide for Air Force Stationary Sources* or *Transitory Sources*. Similarly, AGE and GSE are also nonroad engines that are widely used on USAF installations, but are addressed separately in the “Flightline Ground Support Equipment” section of this Guide. Emissions of concern from the operation of NRDE include criteria pollutants and HAPs associated with fuel combustion processes.

NRDE are typically powered by either a reciprocating internal combustion engine or a small gas turbine. For reciprocating engines, a piston moves inside a cylinder to compress an air/fuel mixture. The air/fuel mixture combusts and expands, pushing the piston through the cylinder. The piston returns, pushing out the exhaust gases, and the cycle is repeated. For gas turbines, ambient air is pressurized with a compressor. Fuel is introduced to this compressed air and is ignited. The high temperature, high pressure air flows through a turbine where it expands, producing shaft energy that is used to drive both the compressor and the electric generator.

Reciprocating engines may differ in design by the diameter of the cylinders in the engine, known as the bore, and the length of the linear movement of the piston in each cylinder, known as the stroke. The size of the engine is related to its displacement per cylinder, which is a measure of the volume of the cylinder multiplied by the length of the stroke. A reciprocating engine may be classified as either 4-stroke or 2-stroke. For a 4-stroke engine, the combustion cycle involves two revolutions of the crankshaft, to which the pistons are connected, and the cycle consists of four stages. The induction stroke occurs when the piston moves down within the cylinder, creating a vacuum and drawing in air or an air/fuel mixture. During the compression stroke, the piston moves up to pressurize the air or air/fuel mixture which then ignites. The heated air expands generating a force on the piston such that it is forced downward again in what is called the power stroke. Finally, the piston moves upward again to force the exhaust gas out of the cylinder during the exhaust stroke and returns to the starting position of the induction stroke so

the cycle may be repeated. 2-stroke engines can operate with just one revolution of the crankshaft because induction of the air or air/fuel mixture occurs concurrently with the release of the exhaust gas.

Detonation of the air/fuel mixture during the compression stroke may occur through either compression or spark ignition (CI or SI). In a CI engine, air is first compressed by the piston in the cylinder, which causes the temperature of the air to rise. Fuel is added to the heated air and combusts due to the temperature of the air being above the auto-ignition temperature of the fuel. Reciprocating CI engines are powered either by diesel fuel or JP-8. SI engines, which use gasoline, natural gas, or LPG differ from CI engines in that the fuel/air mixture does not ignite spontaneously, but rather by a spark. Emissions from nonroad engines will vary due to operating conditions such as temperature, humidity, torque, ignition timing, or even air/fuel mixture. Even slight variations in the air/fuel mixture will dramatically affect pollutant emissions.

While most NRDE are powered by either diesel or gasoline fuel, engines fueled with JP-8 are becoming increasingly more common. Presently, there are few EPA-approved NRDE EFs developed specifically for JP-8. However, since the combustion characteristics between JP-8 and diesel fuel are similar, **emissions from JP-8 fueled NRDE are typically calculated using diesel EFs.**

Gas turbines are composed of three major components: a compressor, a combustor, and a power turbine. In a gas turbine, ambient air is drawn in at the front of the engine with a fan, and the pressure is raised up to 30 times the ambient pressure via a compressor. The compressed air is directed into the combustor section where it is sprayed with fuel and ignited with an electric spark. The burning gases expand, and the high-pressure, high-velocity gas stream passes through a turbine area, driving the movement of an output shaft that converts the energy to useful power. Typically, more than half of the shaft energy produced is needed to drive the internal compressor, with the balance available to drive an external load such as an electric generator or water pump. Gas turbines may be more advantageous than reciprocating engines because of their lower operational cost, lower levels of CO and VOC emissions, and potential for use in cogeneration systems. However, the large initial cost of a gas turbine engine means that they are not likely to be a part of NRDE.

## 4.2 Emission Factors

Emission factors for NRDE are provided at the end of this section. They have been developed for specific equipment and are in units of lb/10<sup>3</sup> hp-hr. The appropriate EF should be selected based on the fuel the engine uses and whether the equipment is a 2-stroke or 4-stroke engine, if applicable. The tables also provide typical load factors and calculated BSFC values which may be needed for emissions calculations as described later in this chapter.



### 4.2.1 Alternative Fuels and Emissions Reduction

Increasingly stringent regulatory requirements mean that some USAF installations may be encouraged to operate non-road engines and equipment on alternative fuels such as ethanol based E85 (a blend of 85% ethanol and 15% gasoline) or B20 (a blend of 20% biodiesel and 80% petroleum diesel). While there are currently no NRDE that use these alternative fuels, there are on-highway flexible fuel vehicles (FFVs) that can operate on E85 and are required to meet EPA's Tier II vehicle emission standards regardless of the fuel type. Some research suggests evidence of potential emission reduction benefits from the use of E85, although testing has been limited and emissions impacts have not been fully characterized. While some reduction in evaporative emissions is expected due to the displacement of gasoline, emissions are believed to be generally similar to gasoline emissions. Note, however, that data indicates that some HAP emissions are reduced while others are increased. Accordingly, EPA does not support the use of emission reduction factors for engines using E85 fuels.

A somewhat similar situation exists regarding information on the emissions impact of B20 fuels. In October 2002, the EPA issued its technical report on biodiesel emissions (USEPA 2002). This report was developed using various statistical analysis tools to compile and assess the results of 39 studies regarding the impact of B20 use on vehicle emissions. Relative to conventional, on-highway diesel fuel (i.e., conventional low-sulfur diesel with sulfur content < 500 ppm), B20 showed a +2% impact on NO<sub>x</sub> emissions, a -10% impact on PM emissions, a -21% impact on HC emissions, and a -11% impact on CO emissions. Since the time of the study, however, ultra-low sulfur diesel (ULSD) regulations limiting the sulfur content of on-highway diesel fuel to 15 ppm have been enacted. Since June 2007, the sulfur content of nonroad diesel fuel has been limited to 500 ppm which was then further reduced to 15 ppm effective June 2010. Another study was conducted under the auspices of the DoD Environmental Security Technology Certification Program (ESTCP). This study sought to measure the impact of B20 on CO, NO<sub>x</sub>, PM, HC, and HAP emissions from engines used in on-road and portable power generation applications (Environmental Security Technology Certification Program 2006). Using primarily a B20 biodiesel/ULSD blend, the study showed no significant differences in emissions between the B20 blended with ULSD and the ULSD by itself. No consistent trend was observed with regards to HAP emissions.

These examples indicate that efforts to apply emission reduction factors to estimate emissions from alternatively fueled NRDE should be attempted only after careful review of the most current, validated information available. Information can be obtained from either the EPA, the Department of Energy (DoE), the DoD, and Service Engineering and Research Organizations. Application of the B20 EFs developed by the EPA should only be considered if an installation is confident that the nonroad diesel fuel it is replacing has a sulfur concentration of 500 ppm or less. It is important to note that should the sulfur content exceed 500 ppm, potential emissions

benefits of B20 may be underreported because, to date, emission impacts studies have generally not focused on nonroad engines and fuels.

### 4.3 Emissions Calculation

This section describes several methodologies available for calculating emissions from nonroad engines and equipment using either the EPA's NONROAD emissions estimating software model, or the underlying EFs in the NONROAD model and manual calculation procedures. Regardless of which approach is chosen, the methodology is applied to each individual piece of NRDE for each pollutant for which emissions are being calculated. The methodologies are briefly described in the following paragraphs.

#### 4.3.1 Emissions Estimation Using the EPA NONROAD Model

The EPA recommends use of its NONROAD modeling software for estimating emissions from the operation of nonroad vehicles and equipment. The software was developed to provide consistent means of generating emissions data required by the CAA. The current NONROAD model predicts emissions of six exhaust pollutants (HC, NO<sub>x</sub>, CO, CO<sub>2</sub>, SO<sub>x</sub>, and PM) for more than 80 basic and 260 specific types of NRDE across a variety of model years that use gasoline, diesel, CNG, or LPG. The model allows PM to be reported as PM<sub>10</sub> or PM<sub>2.5</sub>. **As of June 2014, the NONROAD model was integrated into the Motor Vehicle Emissions Simulator (MOVES 2014) model as an additional module and can now be run within the MOVES software. On January 7, 2021, the MOVES3 model became the official version of MOVES, which continues to include and support the NONROAD model.**

A major benefit of the NONROAD model is that it recognizes that an engine's performance degrades over time due to normal operation and use. Engine deterioration not only increases exhaust emissions, but usually leads to a loss of combustion efficiency, and may increase non-exhaust emissions. EPA believes there is insufficient information to justify the use of adjustment factors for small SI engines. Therefore, the NONROAD model uses EFs based on unadjusted steady-state test results, and applies an adjustment factor only to SI engines with a power rating greater than 25 hp. In terms of CI engines, the NONROAD model addresses the effects of deterioration by multiplying a zero-hour EF for each category of engine by a deterioration factor to reflect degraded performance as the engine ages.

While the core model for NONROAD is written in FORTRAN and can be operated as a standalone application in a DOS environment, the graphical user interface will generate scenarios for only one specified set of conditions. If the user requires multiple scenarios in a single model run, the scenarios must be generated in a DOS environment. The NONROAD reporting utility is written in Microsoft Access and operated similarly to the graphical user

interface. The reporting utility is a standalone application and knowledge of Access is not required to generate reports.

EFs for NRDE manufactured prior to Model Year 1998 have been derived from the NONROAD model and its underlying data sets by the EPA Office of Transportation Air Quality. EFs are provided in Table 4-1 through Table 4-5 and serve as the basis for estimating emissions manually using the methodologies discussed in the following subsections.

### 4.3.2 Horsepower/Load Factor Method

The most common approach for calculating emissions from NRDE is essentially the same as the method incorporated into the NONROAD model and the horsepower/load factor method used in the “FLIGHTLINE GROUND SUPPORT EQUIPMENT (AGE)” section. Emissions are estimated based on the engine’s rated power output, a load factor, and annual operating time. Generally, for calculating emissions from non-road engines, a load factor of 100% is assumed and used in the following equation:

$$E(\text{Pol}) = OT \times \frac{LF}{100} \times hp_{rtd} \times \frac{1}{1000} \times EF(\text{Pol}) \times N$$

Equation 4-1

Where,

- E(Pol)** = Annual emissions of each individual pollutant (lb/yr)
- OT** = Operating time (hr/unit)
- LF** = Load factor (%). Typically assumed to be 100%, though it may be calculated using Equation 3-3 in this guide.
- 100** = Factor for converting percent to a fraction (%)
- hp<sub>rtd</sub>** = Engine rated horsepower (hp)
- 1000** = Factor converting from hp to 10<sup>3</sup> hp (hp/10<sup>3</sup> hp)
- EF(Pol)** = Emission factor of each pollutant (lb/10<sup>3</sup> hp-hr)
- N** = Number of nonroad engines and equipment used each year (units/yr)

The data required for calculating emissions using the horsepower/load factor method may be found in Table 4-1 through Table 4-5.

### 4.3.3 Fuel Consumption Method

Estimating emissions based on fuel consumption can be utilized in instances when the fuel consumption is known but the operating time of the NRDE is not. The annual fuel consumption, fuel density, BSFC values for the piece of equipment, and EF must be known to calculate emissions using this method as illustrated in the equation below:

$$E(\text{Pol}) = \frac{(\text{FC} \times \rho)}{\text{BSFC}} \times \text{EF}(\text{Pol}) \times N$$

Equation 4-2

Where,

- E(Pol)** = Annual emissions of each individual pollutant (lb/yr)
- FC** = Annual fuel consumption (gal/unit). If the total fuel consumed is unknown, the fuel consumed may be calculated using Equation 3-5 or Equation 3-6
- $\rho$**  = Fuel density (lb/gal)
- BSFC** = Brake-specific fuel consumption for the engine (lb/10<sup>3</sup> hp-hr)
- EF(Pol)** = Emission factor for each pollutant (lb/10<sup>3</sup> hp-hr)
- N** = Number of equipment used each year (units/yr)

When performing emissions calculations using the fuel consumption method, enhanced accuracy may be achieved by using the density of the fuel as provided by the fuel supplier, and the BSFC for the engine provided directly from the engine manufacturer. If this data is unavailable, then suggested values for these variables may be found in the following tables:

- Table 3-1 provides the average density for nonroad fuels.
- Table 4-1 through Table 4-6 provides the EFs and BSFC for specific equipment types in lb/10<sup>3</sup> hp-hr.

#### 4.3.4 VOC and HAP Speciation

There is little data available for the speciation of VOCs for nonroad engines. Whenever the quantity of speciated compounds is required to be calculated, the average percentage of each species within the total VOC may be used as a gross estimate of the emissions of that compound. This section should only be used if no acceptable speciated EFs are available for the engine in question. Speciated VOCs are calculated by taking the product of the total VOCs and the weighted percentage of the individual VOC as follows:

$$E(\text{Pol}) = E(\text{VOC}) \times \frac{P(\text{Pol})}{100}$$

Equation 4-3

Where,

- E(Pol)** = Emissions of speciated VOC (lb/yr)
- E(VOC)** = Emissions of total VOC (lb/yr)
- P(Pol)** = Weight percent of a given pollutant (%). These are provided in Table 4-7
- 100** = Factor for converting percent to a fraction (%)

The weight percent of individual pollutants were calculated for engines combusting diesel, gasoline, natural gas (which is further subdivided into 2- and 4-stroke lean burn and 4-stroke rich burn), and LPG. The values provided in Table 4-7 were calculated using the equation below. The EF data used in these calculations are from several sources including *Compilation of Air Pollutant Emission Factors* (AP-42), the Mojave Desert Air Quality Management District, and the EPAs *SPECIATE* database. Since the available data regarding mobile NRDE EFs is limited, the factors presented in these sources were assumed to be representative of all non-road engines.

$$P_{(Pol)} = \frac{EF(Pol)}{EF(VOC)_{Total}}$$

Where,

- P(Pol)** = Weight percent of a given pollutant (%)  
**EF(Pol)** = Individual pollutant emission factor (lb/10<sup>3</sup> hp-hr)  
**EF(VOC)<sub>Total</sub>** = Total VOC emission factor (lb/10<sup>3</sup> hp-hr)

In addition to the weight percent pollutant speciation values provided in Table 4-7, most equipment manufacturers have data on emissions specific to their product, and many are willing to provide it upon request. HAP emissions may be calculated using the following tables:

- Table 3-7 provides EFs for uncontrolled diesel reciprocating internal combustion engines in a lb/1000 hp-hr format and may be used to calculate HAPs directly using Equation 4-1.
- Table 4-7 gives the weight percent VOC and HAP speciation of emissions for estimating specific VOCs/HAPs using Equation 4-3 above.

#### 4.4 Information Resources

The primary source of information for most NRDE is the Transportation Squadron. The Transportation Vehicle Operations Flight and/or the Transportation Vehicle Maintenance Flight typically maintain records on most USAF-owned NRDE. Records include information such as the identity of the shops/organizations operating the vehicles/equipment, hp rating of the vehicles/equipment, and hours of operation. In some cases, it may be necessary to contact the actual organizations/shops using the vehicle/equipment to obtain information that Transportation may not have. For example, for construction equipment and lawn/garden equipment, it will probably be necessary to contact the Civil Engineering (CE) Operations Flight, the CE Flight and the CE Housing Flight, or a similar organization if base housing has been privatized.

It is important to note that many of the construction and lawn care activities at USAF installations are performed by contractors, and therefore it may be necessary to contact the

contractors directly to obtain the necessary information on their equipment. The contracts section of the CE Engineering Flight should be able to provide information on what equipment was used to perform construction and lawn care activities on base during the year.

In addition, some NRDE (such as leaf blowers, trimmers/edgers, snow blowers, etc.) operated on USAF installations may be owned by personnel who live on base. Since this equipment is privately owned, obtaining this information is usually more difficult than for USAF-owned equipment. One approach to obtaining the necessary information is to work with the CE Housing Flight to identify the types of NRDE used on base housing, estimate the number of each different equipment type, estimate the average hp of each equipment type, and estimate the average operating time (hours per year) for each equipment type. If adequate resources and time are available, a more comprehensive approach would be to survey a representative number of housing units to determine the type and size of equipment used and their associated estimated usage. For NRDE in which emissions are calculated using EFs based on fuel usage (i.e., using “g/gal” EFs), Fuels Supply may be a source of information regarding fuel consumption.

## 4.5 Example Calculations

The following section provides examples of how the equations and methodologies discussed earlier can be applied to calculate emissions from non-road vehicle and equipment operations. The procedures are applied to each individual NRDE and for each pollutant for which emissions must be calculated. Emissions for all NRDE and pollutants are then summed to obtain the pollutant-specific, base-wide totals. Load factors, BSFCs, and EFs necessary for calculating emissions were obtained from Table 4-1 through Table 4-7.

### 4.5.1 Problem 1 – Estimating Emissions Using the Horsepower/Load Factor Method

As part of its requirement to conduct an annual mobile source emissions inventory for CY 2022, a USAF base has collected information on the NRDE operating on the base. Calculate the CO emissions associated with the operation of diesel-powered forklifts on base. The following information was obtained from the base:

Equipment Type – Diesel powered forklift (SCC-2270003020)	
# of pieces	6
Power Rating	85 hp
Operating Time	200 hr/unit

**Step 1 – Record the CO emission factor and load factor.** The EF and typical load factor are given in Table 4-1 as **0.269 lb/10<sup>3</sup> hp-hr** and **59%** respectively.

**Step 2 – Calculate the annual emissions for the six forklifts.** Using the information in the table above and the values recorded in Step 1, the annual CO emissions for the six forklifts can be calculated using Equation 4-1:

$$E(\text{Pol}) = OT \times \frac{LF}{100} \times hp \times \frac{1}{1000} \times EF(\text{Pol}) \times N$$

$$E(\text{CO}) = 200 \frac{hr}{unit} \times \frac{59\%}{100\%} \times 85(\cancel{hp}) \times \frac{1}{1000} \left( \frac{10^3 \cancel{hp}}{\cancel{hp}} \right) \times 0.269 \frac{lb}{10^3 \cancel{hp-hr}} \times 6 \frac{unit}{yr}$$

$$E(\text{CO}) = 16.19 \frac{lb}{yr}$$

#### 4.5.2 Problem 2 – Estimating Emissions Using Fuel Consumption

A USAF base operates gasoline fueled commercial lawn mowers to maintain the appearance of public areas on base. Calculate the VOC and formaldehyde emissions associated with operation of the lawnmowers on base for CY 2022. The following information was obtained from the base:

Equipment Type – 4-stroke gasoline lawnmower (SCC 2265004011)	
# of pieces	25
Power rating	5 hp
Fuel Consumption	40 gal each

**Step 1 – Record the fuel density, VOC emission factor, and appropriate BSFC.** The fuel density is provided in Table 3-1 and the VOC EF and BSFC value for gas powered commercial lawn mowers are provided in Table 4-1. The fuel density is given as **6.15 lb/gal** while the VOC EF and BSFC (for 2022) are given as **13.997 and 880 lb/10<sup>3</sup> hp-hr**, respectively.

**Step 2 – Calculate annual VOC emissions.** Using the data from Step 1 and Equation 4-2:

$$E(\text{Pol}) = \frac{(FC \times D)}{BSFC} \times EF(\text{Pol}) \times N$$

$$E(\text{VOC}) = \frac{\left( 40 \frac{gal}{unit} \times 6.15 \frac{lb}{gal} \right)}{880 \frac{lb}{10^3 \cancel{hp-hr}}} \times 13.997 \frac{lb}{10^3 \cancel{hp-hr}} \times 25 \frac{unit}{yr}$$

$$E(\text{VOC}) = 0.2795 \frac{10^3 \cancel{hp-hr}}{unit} \times 13.997 \frac{lb}{10^3 \cancel{hp-hr}} \times 25 \frac{unit}{yr}$$

$$E(VOC) = 97.82 \frac{lb}{yr}$$

Next, calculate formaldehyde emissions.

**Step 3 – Record formaldehyde weight percent VOC emissions for 4-stroke gasoline engines.**

Table 4-7 lists this value as **1.32%**.

**Step 4 – Calculate annual formaldehyde emissions.** Using the formaldehyde weight percent recorded in Step 3 and Equation 4-3:

$$E(Pol) = E(VOC) \times \frac{P(Pol)}{100}$$

$$E(Formaldehyde) = 97.82 \frac{lb}{yr} \times \frac{1.32\%}{100\%}$$

$$E(Formaldehyde) = 97.82 \frac{lb}{yr} \times 0.0132$$

$$E(Formaldehyde) = 1.29 \frac{lb}{yr}$$

### 4.5.3 Problem 3 – Estimating SO<sub>x</sub> Emissions

A USAF base needs to estimate SO<sub>x</sub> emissions from the operation of rough terrain forklifts. The following information was obtained from the base:

Equipment Data – Rough terrain forklifts (SCC 2270002057)	
# of pieces	5
Fuel	Diesel
Power rating	80 hp
Model year	1997
Fuel Consumption	200 gal (each); 1,000 gal (total)
Hours of operation	250 hr/unit (each)

Since the model year of the forklifts are pre-1998, then the EFs applicable to these engines are found in Table 4-6. The preferred method of using the horsepower and load factor is used for the calculation of emissions.



**Step 1 – Record the load factor and SO<sub>x</sub> emission factor.** According to Table 4-1, for diesel-powered rough terrain forklifts, the typical load factor is **59%** and Table 4-6 lists the SO<sub>x</sub> EF as **0.21 lb/10<sup>3</sup> hp-hr**.

**Step 2 – Calculate the total SO<sub>x</sub> emissions.** Using these values and the data in the table above, the SO<sub>x</sub> emissions can be calculated using Equation 4-1:

$$E(Pol) = OT \times \frac{LF}{100} \times hp \times \frac{1}{1000} \times EF(Pol) \times N$$

$$E(SO_x) = 250 \frac{hr}{unit} \times \frac{59\%}{100\%} \times 80hp \times \frac{1}{1000} \left( \frac{10^3 hp}{hr} \right) \times 0.21 \frac{lb}{10^3 hp-hr} \times 5 \frac{unit}{yr}$$

$$E(SO_x) = 12.39 \frac{lb}{yr}$$

#### 4.5.4 Problem 4 – Estimating Emissions from the Use of B20

A USAF base has been blending B20 biodiesel into the non-road fuel used to power its off-highway trucks. The normal sulfur content of the non-road diesel is 500 ppm. The following information was obtained from the base.

Equipment Data – Off-Highway Trucks (SCC 2270002051)	
# of pieces	10
Fuel	B20/nonroad diesel (500 ppm blend)
Power rating	250 hp
Model year	2001
Hours of operation	200 hours (each); 2,000 hours (total)

Estimate the NO<sub>x</sub> and PM<sub>10</sub> emissions from the operation of the vehicles.

**Step 1 – Record the NO<sub>x</sub> emission factor and load factor.** Table 4-1 gives the EF and load factor (for 2022) as **3.390 lb/10<sup>3</sup> hp-hr** and **59%** respectively.

**Step 2 – Calculate annual NO<sub>x</sub> emissions.** Use the EF and load factor recorded in Step 1, the data provided in the table, and Equation 4-1 as follows:

$$E(Pol) = OT \times \frac{LF}{100} \times hp \times \frac{1}{1000} \times EF(Pol) \times N$$

$$E(NO_X) = 200 \frac{hr}{unit} \times \frac{59\%}{100\%} \times 250hp \times \frac{1}{1000} \left( \frac{10^3 hp}{hr} \right) \times 3.390 \frac{lb}{10^3 hp-hr} \times 10 \frac{unit}{yr} =$$

$$1,000.05 \frac{lb}{yr}$$

**Step 3 – Adjust the estimated emissions to reflect the expected 2% increase in NO<sub>x</sub> attributable to the use of B20.**

$$E(NO_X) = 1,000.05 \frac{lb}{yr} \times \left( 1 + \frac{2\%}{100\%} \right)$$

$$E(NO_X) = 1,000.05 \frac{lb}{yr} \times (1.02)$$

$$E(NO_X) = 1,020.05 \frac{lb}{yr}$$

**Step 4 – Record the PM<sub>10</sub> emission factor.** Table 4-1 lists this value as **0.070 lb/10<sup>3</sup> hp-hr.**

**Step 5 – Calculate annual PM<sub>10</sub> emissions.** Use Equation 4-1, the EF recorded in Step 4, and the data provided in the table above as follows:

$$E(PM_{10}) = OT \times \frac{LF}{100} \times hp \times \frac{1}{1000} \times EF(PM_{10}) \times N$$

$$E(PM_{10}) = 200 \frac{hr}{unit} \times \frac{59\%}{100\%} \times 250hp \times \frac{1}{1000} \left( \frac{10^3 hp}{hr} \right) \times 0.070 \frac{lb}{10^3 hp-hr} \times 10 \frac{unit}{yr} = 20.65 \frac{lb}{yr}$$

**Step 6 – Adjust the estimated emissions to reflect the expected 10% decrease in PM emissions attributable to the use of B20 fuel:**

$$E(PM_{10}) = 20.65 \frac{lb}{yr} \times \left( 1 - \frac{10\%}{100\%} \right)$$

$$E(PM_{10}) = 20.65 \frac{lb}{yr} \times (0.9)$$

$$E(PM_{10}) = 18.59 \frac{lb}{yr}$$

**Table 4-1. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2023**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2260001010	2 Stroke Motorcycles: Off-Road <sup>c</sup>	100	260	78.732	69.691	0.922	0.003	2.551	2.347	573.000
2260001020	2 Stroke Snowmobiles	34	1640	132.426	175.450	5.990	0.012	1.607	1.479	2105.580
2260001030	2 Stroke ATVs <sup>c</sup>	100	210	82.177	15.107	0.942	0.003	0.406	0.373	501.717
2260001060	2 Stroke Specialty Vehicles/Carts	58	1000	575.914	20.587	4.630	0.013	0.296	0.272	2348.316
2260002006	2 Stroke Tampers/Rammers	55	680	560.570	134.770	3.366	0.008	20.412	18.779	1596.022
2260002009	2 Stroke Plate Compactors	55	830	490.658	110.085	5.246	0.013	16.835	15.489	2440.287
2260002021	2 Stroke Paving Equipment	59	830	494.394	109.698	5.246	0.013	16.949	15.593	2437.570
2260002027	2 Stroke Signal Boards/Light Plants	72	830	512.954	128.849	5.246	0.013	17.574	16.168	2422.471
2260002039	2 Stroke Concrete/Industrial Saws	78	630	580.948	136.956	3.517	0.009	21.176	19.482	1645.706
2260002054	2 Stroke Crushing/Proc. Equipment	85	830	512.954	112.858	5.246	0.013	17.574	16.168	2422.470
2260003030	2 Stroke Sweepers/Scrubbers	71	820	512.953	115.390	5.246	0.013	17.574	16.168	2422.469
2260003040	2 Stroke Other General Industrial Equipment	54	830	512.953	113.920	5.246	0.013	17.574	16.168	2422.469
2260004015	2 Stroke Rotary Tillers < 6 HP (Residential)	40	940	455.120	108.327	5.259	0.013	16.271	14.969	2454.502
2260004016	2 Stroke Rotary Tillers < 6 HP (Commercial)	40	900	459.895	94.306	5.259	0.013	16.408	15.095	2451.195
2260004020	2 Stroke Chain Saws < 6 HP (Residential)	70	900	470.395	108.616	5.246	0.013	16.250	14.950	2454.278
2260004021	2 Stroke Chain Saws < 6 HP (Commercial)	70	650	577.069	133.544	3.616	0.009	20.971	19.293	1690.024
2260004025	2 Stroke Trimmers/Edgers/Brush Cutter (Residential)	91	890	434.296	110.004	5.296	0.013	16.888	15.537	2441.523
2260004026	2 Stroke Trimmers/Edgers/Brush Cutter (Commercial)	91	810	494.612	103.040	4.976	0.012	17.170	15.797	2323.489
2260004030	2 Stroke Leaf blowers/Vacuums (Residential)	94	890	460.603	130.463	5.259	0.013	16.428	15.113	2450.712
2260004031	2 Stroke Leaf blowers/Vacuums (Commercial)	94	760	520.116	113.799	4.354	0.011	18.424	16.950	2042.139
2260004035	2 Stroke Snow blowers (Residential)	35	870	530.459	401.579	1.774	0.006	5.897	5.425	1239.587
2260004036	2 Stroke Snow blowers (Commercial)	35	870	619.164	231.267	2.069	0.007	6.881	6.331	1446.110

**Table 4-1. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2023 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2260004071	2 Stroke Commercial Turf Equipment	60	840	481.741	98.316	5.246	0.013	16.571	15.246	2446.606
2260005035	2 Stroke Sprayers	65	840	423.969	107.817	5.318	0.013	17.367	15.978	2430.965
2260006005	2 Stroke Generator Sets	68	830	483.463	131.458	5.251	0.013	16.808	15.464	2441.149
2260006010	2 Stroke Pumps	69	830	461.411	136.148	5.276	0.013	18.336	16.869	2396.367
2260006015	2 Stroke Air Compressors	56	830	512.954	134.653	5.246	0.013	17.574	16.168	2422.472
2260006035	2 Stroke Hydro Power Units	56	830	512.954	141.762	5.246	0.013	17.574	16.168	2422.470
2260007005	2 Stroke Chain Saws > 6 HP	70	620	586.887	137.090	3.366	0.008	21.491	19.772	1577.859
2265001010	4 Stroke Motorcycles: Off- Road	100	160	58.517	6.898	1.237	0.003	0.147	0.135	504.310
2265001030	4 Stroke ATVs	100	170	80.824	8.047	0.961	0.003	0.147	0.135	532.985
2265001050	4 Stroke Golf Carts	46	740	587.436	13.470	4.915	0.013	0.301	0.277	2345.372
2265001060	4 Stroke Specialty Vehicles/Carts	58	820	584.215	19.695	7.051	0.013	0.240	0.221	2309.831
2265002003	4 Stroke Pavers	66	700	434.559	9.498	4.296	0.012	0.257	0.236	2156.830
2265002006	4 Stroke Tampers/Rammers	55	760	572.517	12.595	4.534	0.013	0.250	0.230	2345.279
2265002009	4 Stroke Plate Compactors	55	830	488.542	15.027	5.119	0.014	0.516	0.475	2584.954
2265002015	4 Stroke Rollers	62	690	448.720	9.937	4.301	0.012	0.254	0.233	2152.867
2265002021	4 Stroke Paving Equipment	59	780	531.498	14.125	4.784	0.013	0.346	0.318	2416.100
2265002024	4 Stroke Surfacing Equipment	49	750	535.852	13.424	4.829	0.013	0.359	0.330	2389.483
2265002027	4 Stroke Signal Boards/Light Plants	72	780	525.744	13.414	5.090	0.014	0.464	0.427	2495.238
2265002030	4 Stroke Trenchers	66	710	417.021	10.356	4.436	0.012	0.323	0.297	2203.365
2265002033	4 Stroke Bore/Drill Rigs	79	790	367.050	14.581	7.043	0.013	0.490	0.450	2408.597
2265002039	4 Stroke Concrete/Industrial Saws	78	710	519.777	11.418	4.626	0.012	0.279	0.257	2250.915
2265002042	4 Stroke Cement & Mortar Mixers	59	820	535.695	18.152	4.829	0.013	0.351	0.323	2451.316

**Table 4-1. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2023 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2265002045	4 Stroke Cranes	47	590	104.046	3.715	4.692	0.009	0.161	0.149	1651.204
2265002054	4 Stroke Crushing/Proc. Equipment	85	740	496.672	12.098	4.786	0.013	0.326	0.300	2312.256
2265002057	4 Stroke Rough Terrain Forklifts	63	570	36.079	1.772	3.156	0.009	0.153	0.141	1557.782
2265002060	4 Stroke Rubber Tire Loaders	71	550	24.332	1.389	2.722	0.009	0.153	0.141	1544.026
2265002066	4 Stroke Tractors/Loaders/ Backhoes	48	730	543.027	11.340	4.565	0.013	0.263	0.242	2293.835
2265002072	4 Stroke Skid Steer Loaders	58	640	248.464	6.281	4.566	0.010	0.190	0.174	1865.682
2265002078	4 Stroke Dumpers/Tenders	41	800	550.525	17.661	5.061	0.013	0.281	0.259	2367.958
2265002081	4 Stroke Other Construction Equipment	48	580	58.483	3.078	5.429	0.009	0.149	0.137	1580.964
2265003010	4 Stroke Aerial Lifts	46	630	174.701	5.003	4.561	0.010	0.174	0.160	1756.142
2265003020	4 Stroke Forklifts	30	560	24.006	1.346	2.705	0.009	0.152	0.140	1544.026
2265003030	4 Stroke Sweepers/Scrubbers	71	610	202.600	5.244	3.451	0.010	0.219	0.202	1822.910
2265003040	4 Stroke Other General Industrial Equipment	54	760	441.486	13.779	5.056	0.013	0.533	0.490	2400.478
2265003050	4 Stroke Other Material Handling Equipment	53	640	203.342	5.246	4.005	0.010	0.182	0.168	1802.680
2265003060	4 Stroke AC/Refrigeration	46	740	575.255	12.569	4.604	0.013	0.260	0.239	2345.291
2265003070	4 Stroke Terminal Tractors	78	520	24.452	1.358	2.728	0.009	0.154	0.142	1544.026
2265004010	4 Stroke Lawn mowers (Residential)	33	900	423.059	24.112	5.355	0.015	0.642	0.591	2759.982
2265004011	4 Stroke Lawn mowers (Commercial)	33	880	427.369	14.858	5.557	0.015	0.717	0.659	2759.982
2265004015	4 Stroke Rotary Tillers < 6 HP (Residential)	40	910	422.946	20.986	5.355	0.015	0.643	0.591	2760.134
2265004016	4 Stroke Rotary Tillers < 6 HP (Commercial)	40	890	423.798	13.409	5.395	0.015	0.658	0.605	2760.141
2265004025	4 Stroke Trimmers/Edgers/Brush Cutter HP (Residential)	91	900	423.901	20.269	5.400	0.015	0.660	0.607	2760.146
2265004026	4 Stroke Trimmers/Edgers/Brush Cutter (Commercial)	91	820	496.859	12.439	5.116	0.014	0.500	0.460	2566.413
2265004030	4 Stroke Leaf blowers/Vacuums (Residential)	94	900	423.918	27.587	5.401	0.015	0.660	0.607	2760.145

**Table 4-1. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2023 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2265004031	4 Stroke Leaf blowers/Vacuums (Commercial)	94	700	434.998	8.493	4.272	0.012	0.249	0.229	2155.291
2265004035	4 Stroke Snow blowers (Residential)	35	940	605.498	232.016	4.734	0.008	0.126	0.116	1506.663
2265004036	4 Stroke Snow blowers (Commercial)	35	940	710.190	33.889	5.385	0.009	0.147	0.135	1757.282
2265004040	4 Stroke Rear Engine Riding Mowers (Residential)	38	760	571.689	22.433	4.529	0.013	0.247	0.228	2346.431
2265004041	4 Stroke Rear Engine Riding Mowers (Commercial)	38	740	574.505	11.400	4.594	0.013	0.259	0.238	2346.059
2265004046	4 Stroke Front Mowers	65	790	573.599	12.715	4.887	0.013	0.243	0.223	2342.084
2265004051	4 Stroke Shredders < 6 HP	80	890	423.374	13.951	5.375	0.015	0.651	0.599	2760.138
2265004055	4 Stroke Lawn & Garden Tractors (Residential)	44	760	571.456	16.888	4.517	0.013	0.247	0.227	2345.592
2265004056	4 Stroke Lawn & Garden Tractors (Commercial)	44	740	574.674	10.813	4.593	0.013	0.258	0.238	2345.581
2265004066	4 Stroke Chippers/Stump Grinders	78	640	292.398	6.264	3.692	0.011	0.213	0.196	1930.389
2265004071	4 Stroke Commercial Turf Equipment	60	730	487.196	10.457	4.536	0.013	0.315	0.290	2309.798
2265004075	4 Stroke Other Lawn & Garden Equipment	58	850	500.240	24.026	5.206	0.014	0.446	0.410	2557.740
2265004076	4 Stroke Other Lawn & Garden Equipment	58	850	498.182	22.242	5.239	0.014	0.445	0.409	2552.252
2265005010	4 Stroke 2-Wheel Tractors	62	740	577.380	11.894	4.658	0.013	0.267	0.245	2345.308
2265005015	4 Stroke Agricultural Tractors	62	580	105.786	2.876	3.013	0.009	0.170	0.156	1661.918
2265005020	4 Stroke Combines	74	580	139.845	10.993	12.643	0.009	0.153	0.141	1664.631
2265005025	4 Stroke Balers	62	580	139.921	13.446	12.648	0.009	0.153	0.141	1664.610
2265005030	4 Stroke Agricultural Mowers	48	770	571.638	12.478	4.596	0.013	0.250	0.230	2347.902
2265005035	4 Stroke Sprayers	65	740	395.816	15.509	7.838	0.012	0.299	0.275	2196.249
2265005040	4 Stroke Tillers > 6 HP	71	870	749.723	25.236	8.459	0.013	0.253	0.233	2471.814
2265005045	4 Stroke Swathers	52	580	139.921	11.043	12.648	0.009	0.153	0.141	1664.610
2265005055	4 Stroke Other Agricultural Equipment	55	620	226.934	9.422	11.015	0.010	0.175	0.161	1805.880

**Table 4-1. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2023 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2265005060	4 Stroke Irrigation Sets	60	550	36.225	1.756	2.801	0.009	0.168	0.154	1571.228
2265006005	4 Stroke Generator Sets	68	780	558.465	14.801	4.668	0.013	0.287	0.264	2384.119
2265006010	4 Stroke Pumps	69	760	439.135	12.426	4.950	0.013	0.414	0.381	2360.611
2265006015	4 Stroke Air Compressors	56	700	360.493	9.580	4.294	0.012	0.336	0.309	2144.262
2265006025	4 Stroke Welders	68	710	472.989	9.939	4.388	0.012	0.259	0.238	2199.512
2265006030	4 Stroke Pressure Washers	85	800	520.754	14.104	4.904	0.014	0.415	0.382	2489.869
2265006035	4 Stroke Hydro Power Units	56	750	540.048	12.593	4.753	0.013	0.334	0.307	2370.646
2265007010	4 Stroke Shredders > 6 HP	80	800	579.858	12.652	4.767	0.013	0.246	0.226	2350.199
2265007015	4 Stroke Forest Equipment - Feller/Bunch/Skidder	70	810	492.116	14.559	5.384	0.014	0.598	0.550	2593.343
2265008005	4 Stroke Airport Ground Support Equipment	56	600	129.385	4.222	3.260	0.010	0.232	0.213	1744.054
2265010010	4 Stroke Other Oil Field Equipment	90	740	594.069	12.551	5.085	0.013	0.323	0.297	2345.418
2267001060	LPG Specialty Vehicle Carts	58	490	46.060	1.904	8.867	0.006	0.126	0.126	1297.670
2267002003	LPG Pavers	66	460	12.972	0.318	2.333	0.006	0.127	0.127	1219.228
2267002015	LPG Rollers	62	450	10.633	0.246	2.054	0.006	0.129	0.129	1216.735
2267002021	LPG Paving Equipment	59	480	25.208	0.851	4.504	0.006	0.125	0.125	1244.158
2267002024	LPG Surfacing Equipment	49	460	12.956	0.326	2.367	0.006	0.128	0.128	1219.811
2267002030	LPG Trenchers	66	460	12.959	0.313	2.311	0.006	0.127	0.127	1218.866
2267002033	LPG Bore/Drill Rigs	79	490	54.451	2.206	10.082	0.006	0.125	0.125	1309.824
2267002039	LPG Concrete/Industrial Saws	78	430	10.772	0.251	2.066	0.006	0.130	0.130	1216.744
2267002045	LPG Cranes	47	480	21.781	0.687	3.822	0.006	0.124	0.124	1236.059
2267002054	LPG Crushing/Proc. Equipment	85	480	20.247	0.619	3.546	0.006	0.125	0.125	1232.842
2267002057	LPG Rough Terrain Forklifts	63	470	13.839	0.343	2.430	0.006	0.127	0.127	1220.032

**Table 4-1. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2023 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2267002060	LPG Rubber Tire Loaders	71	460	10.548	0.243	2.046	0.006	0.128	0.128	1216.728
2267002066	LPG Tractors/Loaders/ Backhoes	48	450	10.655	0.246	2.056	0.006	0.129	0.129	1216.737
2267002072	LPG Skid Steer Loaders	58	470	20.879	0.658	3.707	0.006	0.125	0.125	1234.970
2267002081	LPG Other Construction Equipment	48	480	25.716	0.852	4.480	0.006	0.124	0.124	1243.422
2267003010	LPG Aerial Lifts	46	480	21.820	0.665	3.716	0.006	0.124	0.124	1234.184
2267003020	LPG Forklifts	30	460	10.406	0.237	2.033	0.006	0.126	0.126	1216.719
2267003030	LPG Sweepers/Scrubbers	71	440	10.557	0.243	2.047	0.006	0.128	0.128	1216.729
2267003040	LPG Other General Industrial Equipment	54	450	10.456	0.239	2.038	0.006	0.127	0.127	1216.722
2267003050	LPG Other Material Handling Equipment	53	480	16.733	0.477	2.983	0.006	0.125	0.125	1226.729
2267003070	LPG Terminal Tractors	78	430	10.599	0.244	2.051	0.006	0.128	0.128	1216.731
2267004066	LPG Chippers/Stump Grinders	78	450	10.508	0.241	2.043	0.006	0.127	0.127	1216.726
2267005055	LPG Other Agricultural Equipment	55	490	64.969	2.438	10.922	0.006	0.128	0.128	1312.994
2267005060	LPG Irrigation Sets	60	450	10.572	0.243	2.048	0.006	0.128	0.128	1216.731
2267006005	LPG Generator Sets	68	480	30.540	1.117	6.968	0.006	0.124	0.124	1274.451
2267006010	LPG Pumps	69	470	18.532	0.507	3.569	0.006	0.126	0.126	1233.345
2267006015	LPG Air Compressors	56	460	11.828	0.263	2.182	0.006	0.127	0.127	1217.849
2267006025	LPG Welders	68	460	12.399	0.287	2.208	0.006	0.127	0.127	1217.678
2267006030	LPG Pressure Washers	85	470	22.284	0.704	3.891	0.006	0.125	0.125	1236.637
2267006035	LPG Hydro Power Units	56	460	11.683	0.268	2.203	0.006	0.127	0.127	1218.242
2267008005	LPG Airport Ground Support Equipment	56	450	10.429	0.238	2.035	0.006	0.127	0.127	1216.722
2268002081	CNG Other Construction Equipment	48	480	25.623	3.065	4.541	0.006	0.124	0.124	1407.887
2268003020	CNG Forklifts	30	460	10.406	0.903	2.129	0.006	0.126	0.126	1159.473



**Table 4-1. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2023 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2268003030	CNG Sweepers/Scrubbers	71	460	10.416	0.905	2.130	0.006	0.127	0.127	1159.609
2268003040	CNG Other General Industrial Equipment	54	460	10.418	0.905	2.130	0.006	0.127	0.127	1159.637
2268003060	CNG AC\Refrigeration	46	450	11.040	0.965	2.187	0.006	0.127	0.127	1166.048
2268003070	CNG Terminal Tractors	78	430	10.598	0.930	2.147	0.006	0.128	0.128	1162.144
2268005055	CNG Other Agricultural Equipment	55	510	64.879	8.710	10.963	0.006	0.128	0.128	2057.224
2268005060	CNG Irrigation Sets	60	510	10.577	0.927	2.145	0.006	0.128	0.128	1161.855
2268006005	CNG Generator Sets	68	490	32.632	4.493	7.789	0.006	0.124	0.124	1594.412
2268006010	CNG Pumps	69	480	22.217	2.314	4.386	0.006	0.125	0.125	1328.745
2268006015	CNG Air Compressors	56	470	11.912	0.996	2.285	0.006	0.127	0.127	1170.132
2268006020	CNG Gas Compressors	85	410	11.753	1.087	2.256	0.006	0.139	0.139	1178.200
2268006035	CNG Hydro Power Units	56	470	12.619	1.072	2.410	0.006	0.126	0.126	1179.292
2268010010	CNG Other Oil Field Equipment	90	410	11.075	0.995	2.192	0.006	0.133	0.133	1168.774
2270001060	Diesel Specialty Vehicle Carts	21	450	6.160	1.564	8.053	0.005	0.929	0.901	1439.632
2270002003	Diesel Pavers	59	380	0.526	0.086	1.968	0.003	0.094	0.091	1214.341
2270002006	Diesel Tampers/Rammers	43	1000	5.691	1.829	9.387	0.005	0.583	0.565	1300.175
2270002009	Diesel Plate Compactors	43	410	4.911	1.492	9.039	0.005	0.515	0.500	1300.452
2270002015	Diesel Rollers	59	390	0.783	0.123	2.555	0.003	0.129	0.125	1233.929
2270002018	Diesel Scrapers	59	370	0.587	0.077	1.366	0.003	0.084	0.082	1183.452
2270002021	Diesel Paving Equipment	59	390	1.021	0.198	3.008	0.003	0.167	0.162	1227.270
2270002024	Diesel Surfacing Equipment	59	380	1.787	0.277	4.840	0.004	0.246	0.239	1224.318
2270002027	Diesel Signal Boards/Light Plants	43	410	2.695	0.670	7.553	0.004	0.332	0.322	1293.757
2270002030	Diesel Trenchers	59	400	1.274	0.207	4.522	0.004	0.179	0.173	1273.707

**Table 4-1. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2023 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2270002033	Diesel Bore/Drill Rigs	43	370	1.688	0.429	6.324	0.004	0.310	0.301	1190.482
2270002036	Diesel Excavators	59	380	0.292	0.053	1.101	0.003	0.057	0.056	1194.764
2270002039	Diesel Concrete/Industrial Saws	59	410	1.442	0.247	4.910	0.004	0.198	0.192	1305.066
2270002042	Diesel Cement & Mortar Mixers	43	390	3.155	0.799	7.680	0.004	0.498	0.483	1244.748
2270002045	Diesel Cranes	43	370	0.446	0.100	1.830	0.003	0.081	0.078	1175.735
2270002048	Diesel Graders	59	370	0.281	0.051	0.832	0.003	0.060	0.058	1185.404
2270002051	Diesel Off-highway Trucks	59	370	0.299	0.079	3.282	0.003	0.061	0.059	1183.448
2270002054	Diesel Crushing/Proc. Equipment	43	380	0.674	0.138	2.996	0.003	0.105	0.102	1203.271
2270002057	Diesel Rough Terrain Forklifts	59	390	1.098	0.133	2.926	0.004	0.185	0.179	1255.859
2270002060	Diesel Rubber Tire Loaders	59	370	0.664	0.109	2.239	0.003	0.112	0.109	1190.478
2270002066	Diesel Tractors/Loaders/ Backhoes	21	460	3.987	0.836	5.401	0.004	0.643	0.624	1466.932
2270002069	Diesel Crawler Tractor/Dozers	59	370	0.502	0.079	1.796	0.003	0.086	0.083	1190.038
2270002072	Diesel Skid Steer Loaders	21	480	7.050	1.478	8.492	0.005	1.100	1.067	1529.379
2270002075	Diesel Off-Highway Tractors	59	370	0.836	0.139	3.637	0.003	0.121	0.118	1183.357
2270002078	Diesel Dumpers/Tenders	21	470	7.227	1.682	8.664	0.005	1.099	1.066	1508.566
2270002081	Diesel Other Construction Equipment	59	370	1.301	0.185	3.251	0.003	0.182	0.177	1185.469
2270003010	Diesel Aerial Lifts	21	480	6.395	1.382	8.515	0.005	0.888	0.862	1531.187
2270003020	Diesel Forklifts	59	400	0.225	0.047	2.341	0.003	0.034	0.033	1265.583
2270003030	Diesel Sweepers/Scrubbers	43	380	0.423	0.081	2.006	0.003	0.075	0.073	1219.326
2270003040	Diesel Other General Industrial Equipment	43	380	0.625	0.123	2.423	0.003	0.119	0.115	1205.541
2270003050	Diesel Other Material Handling Equipment	21	440	3.598	0.929	6.237	0.004	0.608	0.590	1413.916
2270003060	Diesel AC\Refrigeration	43	410	0.818	0.204	5.908	0.004	0.086	0.084	1301.600

**Table 4-1. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2023 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2270003070	Diesel Terminal Tractors	59	380	0.156	0.033	0.784	0.003	0.033	0.032	1199.665
2270004031	Diesel Leaf blowers/Vacuums	43	410	5.481	1.550	10.479	0.004	0.809	0.785	1298.747
2270004036	Diesel Snow blowers	43	370	0.966	0.240	3.670	0.002	0.163	0.158	682.509
2270004046	Diesel Front Mowers	43	410	2.657	0.634	7.720	0.004	0.376	0.365	1300.971
2270004056	Diesel Lawn & Garden Tractors	43	410	3.299	0.778	8.188	0.005	0.392	0.380	1300.982
2270004066	Diesel Chippers/Stump Grinders	43	380	2.232	0.497	6.605	0.004	0.403	0.390	1215.752
2270004071	Diesel Commercial Turf Equipment	43	400	0.927	0.203	4.094	0.004	0.129	0.126	1263.293
2270004076	Diesel Other Lawn & Garden Equipment	43	410	3.542	0.798	8.604	0.004	0.592	0.574	1293.228
2270005010	Diesel 2-Wheel Tractors	59	410	5.454	1.836	9.216	0.005	0.530	0.514	1313.078
2270005015	Diesel Agricultural Tractors	59	380	2.005	0.343	4.931	0.004	0.338	0.328	1211.336
2270005020	Diesel Combines	59	370	2.468	0.583	7.094	0.004	0.520	0.504	1185.396
2270005025	Diesel Balers	59	400	4.756	0.892	8.291	0.004	0.704	0.682	1269.803
2270005030	Diesel Agricultural Mowers	59	410	5.649	0.737	7.455	0.004	0.851	0.826	1312.984
2270005035	Diesel Sprayers	59	380	2.915	0.682	6.937	0.004	0.488	0.474	1195.803
2270005040	Diesel Tillers > 6 HP	59	370	3.188	0.505	6.811	0.004	0.406	0.394	1186.605
2270005045	Diesel Swathers	59	400	5.031	0.794	8.269	0.004	0.771	0.748	1284.403
2270005055	Diesel Other Agricultural Equipment	59	380	2.615	0.504	6.121	0.004	0.467	0.453	1196.360
2270005060	Diesel Irrigation Sets	43	390	1.209	0.230	3.857	0.004	0.223	0.216	1235.212
2270006005	Diesel Generator Sets	43	390	2.488	0.595	6.777	0.004	0.410	0.398	1254.191
2270006010	Diesel Pumps	43	390	2.576	0.606	6.760	0.004	0.435	0.422	1253.246
2270006015	Diesel Air Compressors	43	400	1.144	0.196	4.140	0.004	0.184	0.179	1266.144
2270006020	Diesel Gas Compressors	43	410	0.205	0.044	2.965	0.003	0.032	0.032	1301.569

**Table 4-1. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2023 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2270006025	Diesel Welders	21	480	6.170	1.279	8.302	0.005	0.891	0.864	1529.655
2270006030	Diesel Pressure Washers	43	380	2.396	0.647	6.714	0.004	0.369	0.357	1224.409
2270006035	Diesel Hydro Power Units	43	400	1.263	0.239	4.567	0.004	0.196	0.191	1272.368
2270007015	Diesel Forest Equipment - Feller/Bunch/Skidder	59	370	0.174	0.034	0.575	0.003	0.037	0.036	1186.536
2270008005	Diesel Airport Ground Support Equipment	59	380	0.776	0.114	1.981	0.003	0.134	0.130	1195.476
2270009010	Diesel Other Underground Mining Equipment	21	450	8.454	2.012	11.074	0.005	1.008	0.977	1428.784
2270010010	Diesel Other Oil Field Equipment	43	370	0.612	0.133	3.287	0.003	0.095	0.093	1174.751
2282005010	2 Stroke Outboard	21	850	215.991	70.721	13.000	0.012	0.491	0.451	2241.035
2282005015	2 Stroke Personal Water Craft	21	820	252.968	20.229	13.996	0.012	0.174	0.160	2152.131
2282010005	4 Stroke Inboard/Stern-drive	21	630	129.663	23.485	12.355	0.010	0.151	0.139	1855.773
2282020005	Diesel Inboard/Stern-drive	35	370	2.264	0.625	9.997	0.011	0.234	0.227	1173.271
2282020010	Diesel Outboards	35	410	4.199	1.295	7.078	0.012	0.656	0.637	1299.940
2285002015	Diesel Railway Maintenance	21	440	4.146	1.018	6.770	0.004	0.732	0.710	1401.642
2285004015	4 Stroke Railway Maintenance	62	750	530.592	13.728	4.606	0.013	0.294	0.270	2343.833
2285006015	LPG Railway Maintenance	62	480	16.512	0.444	2.832	0.006	0.126	0.126	1224.261

Notes for Table 4-1 follow Table 4-5

**Table 4-2. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2024**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2260001010	2 Stroke Motorcycles: Off- Road <sup>c</sup>	100	260	78.494	68.979	0.925	0.003	2.524	2.322	573.849
2260001020	2 Stroke Snowmobiles	34	1640	129.544	171.949	6.108	0.012	1.554	1.429	2098.727
2260001030	2 Stroke ATVs <sup>c</sup>	100	210	81.901	13.492	0.947	0.003	0.345	0.317	504.174
2260001060	2 Stroke Specialty Vehicles/Carts	58	1000	575.770	20.523	4.626	0.013	0.296	0.273	2348.247
2260002006	2 Stroke Tampers/Rammers	55	680	561.176	134.927	3.366	0.008	20.437	18.802	1595.599
2260002009	2 Stroke Plate Compactors	55	830	490.716	110.105	5.246	0.013	16.837	15.490	2440.244
2260002021	2 Stroke Paving Equipment	59	830	494.465	109.723	5.246	0.013	16.951	15.595	2437.505
2260002027	2 Stroke Signal Boards/Light Plants	72	830	512.953	128.849	5.246	0.013	17.574	16.168	2422.471
2260002039	2 Stroke Concrete/Industrial Saws	78	630	580.949	136.956	3.517	0.009	21.176	19.482	1645.707
2260002054	2 Stroke Crushing/Proc. Equipment	85	830	512.953	112.858	5.246	0.013	17.574	16.168	2422.469
2260003030	2 Stroke Sweepers/Scrubbers	71	820	512.953	115.390	5.246	0.013	17.574	16.168	2422.472
2260003040	2 Stroke Other General Industrial Equipment	54	830	512.954	113.920	5.246	0.013	17.574	16.168	2422.470
2260004015	2 Stroke Rotary Tillers < 6 HP (Residential)	40	940	455.101	108.322	5.259	0.013	16.270	14.968	2454.510
2260004016	2 Stroke Rotary Tillers < 6 HP (Commercial)	40	900	459.767	94.262	5.259	0.013	16.404	15.092	2451.291
2260004020	2 Stroke Chain Saws < 6 HP (Residential)	70	900	470.421	108.624	5.246	0.013	16.251	14.951	2454.258
2260004021	2 Stroke Chain Saws < 6 HP (Commercial)	70	650	577.070	133.544	3.616	0.009	20.971	19.293	1690.025
2260004025	2 Stroke Trimmers/Edgers/Brush Cutter (Residential)	91	890	434.319	110.012	5.296	0.013	16.889	15.538	2441.505
2260004026	2 Stroke Trimmers/Edgers/Brush Cutter (Commercial)	91	810	494.666	103.059	4.976	0.012	17.172	15.798	2323.450
2260004030	2 Stroke Leaf blowers/Vacuums (Residential)	94	890	460.628	130.471	5.259	0.013	16.428	15.114	2450.695
2260004031	2 Stroke Leaf blowers/Vacuums (Commercial)	94	760	520.168	113.815	4.354	0.011	18.426	16.952	2042.101
2260004035	2 Stroke Snow blowers (Residential)	35	870	530.510	401.593	1.774	0.006	5.897	5.426	1239.563
2260004036	2 Stroke Snow blowers (Commercial)	35	870	618.992	231.221	2.069	0.007	6.880	6.329	1446.196

**Table 4-2. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2024 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2260004071	2 Stroke Commercial Turf Equipment	60	840	481.766	98.325	5.246	0.013	16.572	15.247	2446.586
2260005035	2 Stroke Sprayers	65	840	424.082	107.860	5.318	0.013	17.371	15.981	2430.870
2260006005	2 Stroke Generator Sets	68	830	483.491	131.468	5.251	0.013	16.809	15.464	2441.125
2260006010	2 Stroke Pumps	69	830	461.345	136.117	5.276	0.013	18.336	16.869	2396.339
2260006015	2 Stroke Air Compressors	56	830	512.954	134.652	5.246	0.013	17.574	16.168	2422.471
2260006035	2 Stroke Hydro Power Units	56	830	512.953	141.762	5.246	0.013	17.574	16.168	2422.471
2260007005	2 Stroke Chain Saws > 6 HP	70	620	586.887	137.090	3.366	0.008	21.491	19.772	1577.860
2265001010	4 Stroke Motorcycles: Off- Road	100	160	58.200	6.865	1.235	0.003	0.147	0.135	504.298
2265001030	4 Stroke ATVs	100	170	80.718	8.002	0.956	0.003	0.147	0.135	532.965
2265001050	4 Stroke Golf Carts	46	740	587.436	13.470	4.915	0.013	0.301	0.277	2345.372
2265001060	4 Stroke Specialty Vehicles/Carts	58	820	573.347	18.763	6.730	0.013	0.239	0.220	2301.856
2265002003	4 Stroke Pavers	66	700	434.215	9.484	4.265	0.012	0.257	0.236	2156.460
2265002006	4 Stroke Tampers/Rammers	55	760	572.705	12.614	4.539	0.013	0.251	0.231	2345.278
2265002009	4 Stroke Plate Compactors	55	830	488.662	15.044	5.123	0.014	0.518	0.476	2584.957
2265002015	4 Stroke Rollers	62	690	448.736	9.939	4.302	0.012	0.254	0.233	2152.869
2265002021	4 Stroke Paving Equipment	59	780	531.252	14.099	4.767	0.013	0.345	0.318	2415.973
2265002024	4 Stroke Surfacing Equipment	49	750	535.814	13.423	4.826	0.013	0.359	0.330	2389.446
2265002027	4 Stroke Signal Boards/Light Plants	72	780	525.752	13.415	5.090	0.014	0.464	0.427	2495.238
2265002030	4 Stroke Trenchers	66	710	416.698	10.343	4.407	0.012	0.324	0.298	2203.024
2265002033	4 Stroke Bore/Drill Rigs	79	790	364.722	14.446	6.821	0.013	0.491	0.451	2405.562
2265002039	4 Stroke Concrete/Industrial Saws	78	710	519.778	11.418	4.625	0.012	0.279	0.257	2250.915
2265002042	4 Stroke Cement & Mortar Mixers	59	820	535.493	18.096	4.806	0.013	0.352	0.324	2451.083

**Table 4-2. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2024 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2265002045	4 Stroke Cranes	47	590	100.464	3.539	4.382	0.009	0.162	0.149	1647.238
2265002054	4 Stroke Crushing/Proc. Equipment	85	740	496.271	12.079	4.751	0.013	0.327	0.300	2311.797
2265002057	4 Stroke Rough Terrain Forklifts	63	570	34.231	1.687	3.000	0.009	0.154	0.142	1555.981
2265002060	4 Stroke Rubber Tire Loaders	71	550	24.454	1.394	2.729	0.009	0.154	0.142	1544.026
2265002066	4 Stroke Tractors/Loaders/ Backhoes	48	730	543.041	11.341	4.565	0.013	0.263	0.242	2293.835
2265002072	4 Stroke Skid Steer Loaders	58	640	246.423	6.182	4.388	0.010	0.190	0.175	1863.508
2265002078	4 Stroke Dumpers/Tenders	41	800	548.837	17.486	4.982	0.013	0.282	0.259	2366.790
2265002081	4 Stroke Other Construction Equipment	48	580	53.391	2.827	5.000	0.009	0.149	0.137	1575.872
2265003010	4 Stroke Aerial Lifts	46	630	171.231	4.829	4.279	0.010	0.174	0.160	1753.271
2265003020	4 Stroke Forklifts	30	560	24.025	1.347	2.706	0.009	0.152	0.140	1544.026
2265003030	4 Stroke Sweepers/Scrubbers	71	610	202.622	5.245	3.452	0.010	0.220	0.202	1822.909
2265003040	4 Stroke Other General Industrial Equipment	54	760	441.501	13.780	5.056	0.013	0.533	0.491	2400.478
2265003050	4 Stroke Other Material Handling Equipment	53	640	201.483	5.153	3.843	0.010	0.183	0.168	1800.650
2265003060	4 Stroke AC/Refrigeration	46	740	575.270	12.571	4.605	0.013	0.260	0.239	2345.294
2265003070	4 Stroke Terminal Tractors	78	520	24.467	1.359	2.729	0.009	0.154	0.142	1544.026
2265004010	4 Stroke Lawn mowers (Residential)	33	900	423.025	24.102	5.354	0.015	0.642	0.591	2759.975
2265004011	4 Stroke Lawn mowers (Commercial)	33	880	427.374	14.859	5.557	0.015	0.717	0.659	2759.984
2265004015	4 Stroke Rotary Tillers < 6 HP (Residential)	40	910	422.906	20.974	5.353	0.015	0.643	0.591	2760.133
2265004016	4 Stroke Rotary Tillers < 6 HP (Commercial)	40	890	423.781	13.406	5.394	0.015	0.658	0.605	2760.144
2265004025	4 Stroke Trimmers/Edgers/Brush Cutter HP (Residential)	91	900	423.906	20.270	5.400	0.015	0.660	0.607	2760.147
2265004026	4 Stroke Trimmers/Edgers/Brush Cutter (Commercial)	91	820	496.870	12.441	5.116	0.014	0.500	0.460	2566.415
2265004030	4 Stroke Leaf blowers/Vacuums (Residential)	94	900	423.923	27.588	5.401	0.015	0.660	0.607	2760.149

**Table 4-2. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2024 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2265004031	4 Stroke Leaf blowers/Vacuums (Commercial)	94	700	434.580	8.478	4.237	0.012	0.249	0.229	2154.918
2265004035	4 Stroke Snow blowers (Residential)	35	940	605.577	232.018	4.734	0.008	0.126	0.116	1506.665
2265004036	4 Stroke Snow blowers (Commercial)	35	940	709.919	33.881	5.385	0.009	0.147	0.135	1757.280
2265004040	4 Stroke Rear Engine Riding Mowers (Residential)	38	760	571.564	22.404	4.522	0.013	0.247	0.228	2346.366
2265004041	4 Stroke Rear Engine Riding Mowers (Commercial)	38	740	574.510	11.400	4.594	0.013	0.259	0.238	2346.060
2265004046	4 Stroke Front Mowers	65	790	571.581	12.526	4.784	0.013	0.243	0.224	2341.085
2265004051	4 Stroke Shredders < 6 HP	80	890	423.362	13.949	5.375	0.015	0.651	0.598	2760.138
2265004055	4 Stroke Lawn & Garden Tractors (Residential)	44	760	571.380	16.870	4.511	0.013	0.247	0.227	2345.570
2265004056	4 Stroke Lawn & Garden Tractors (Commercial)	44	740	574.680	10.813	4.593	0.013	0.258	0.238	2345.579
2265004066	4 Stroke Chippers/Stump Grinders	78	640	292.404	6.264	3.692	0.011	0.213	0.196	1930.390
2265004071	4 Stroke Commercial Turf Equipment	60	730	487.202	10.458	4.536	0.013	0.315	0.290	2309.800
2265004075	4 Stroke Other Lawn & Garden Equipment	58	850	498.870	23.782	5.135	0.014	0.445	0.410	2557.165
2265004076	4 Stroke Other Lawn & Garden Equipment	58	850	496.636	21.992	5.162	0.014	0.444	0.409	2551.576
2265005010	4 Stroke 2-Wheel Tractors	62	740	577.417	11.897	4.659	0.013	0.267	0.245	2345.306
2265005015	4 Stroke Agricultural Tractors	62	580	105.583	2.869	3.000	0.009	0.169	0.156	1661.917
2265005020	4 Stroke Combines	74	580	131.089	10.339	11.820	0.009	0.153	0.141	1653.212
2265005025	4 Stroke Balers	62	580	131.217	12.666	11.829	0.009	0.153	0.141	1653.256
2265005030	4 Stroke Agricultural Mowers	48	770	571.204	12.411	4.564	0.013	0.249	0.229	2347.805
2265005035	4 Stroke Sprayers	65	740	391.427	15.138	7.501	0.012	0.300	0.276	2191.481
2265005040	4 Stroke Tillers > 6 HP	71	870	732.852	24.307	8.187	0.013	0.251	0.231	2458.074
2265005045	4 Stroke Swathers	52	580	131.217	10.390	11.829	0.009	0.153	0.141	1653.255
2265005055	4 Stroke Other Agricultural Equipment	55	620	219.733	8.996	10.348	0.010	0.175	0.161	1796.728



**Table 4-2. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2024 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2265005060	4 Stroke Irrigation Sets	60	550	36.279	1.758	2.804	0.009	0.168	0.155	1571.227
2265006005	4 Stroke Generator Sets	68	780	558.061	14.726	4.638	0.013	0.287	0.264	2384.020
2265006010	4 Stroke Pumps	69	760	438.748	12.402	4.902	0.013	0.414	0.381	2360.059
2265006015	4 Stroke Air Compressors	56	700	360.285	9.569	4.269	0.012	0.336	0.309	2143.991
2265006025	4 Stroke Welders	68	710	472.790	9.930	4.372	0.012	0.259	0.238	2199.356
2265006030	4 Stroke Pressure Washers	85	800	520.792	14.108	4.904	0.014	0.415	0.382	2489.857
2265006035	4 Stroke Hydro Power Units	56	750	540.044	12.593	4.751	0.013	0.334	0.307	2370.617
2265007010	4 Stroke Shredders > 6 HP	80	800	576.686	12.324	4.648	0.013	0.242	0.223	2349.099
2265007015	4 Stroke Forest Equipment - Feller/Bunch/Skidder	70	810	492.127	14.560	5.384	0.014	0.598	0.551	2593.347
2265008005	4 Stroke Airport Ground Support Equipment	56	600	129.378	4.222	3.259	0.010	0.232	0.213	1744.054
2265010010	4 Stroke Other Oil Field Equipment	90	740	594.070	12.551	5.085	0.013	0.323	0.297	2345.416
2267001060	LPG Specialty Vehicle Carts	58	490	42.798	1.728	8.115	0.006	0.126	0.126	1288.197
2267002003	LPG Pavers	66	460	12.229	0.289	2.221	0.006	0.127	0.127	1218.054
2267002015	LPG Rollers	62	450	10.643	0.246	2.055	0.006	0.129	0.129	1216.735
2267002021	LPG Paving Equipment	59	480	23.358	0.769	4.163	0.006	0.126	0.126	1240.184
2267002024	LPG Surfacing Equipment	49	460	12.351	0.302	2.275	0.006	0.128	0.128	1218.847
2267002030	LPG Trenchers	66	460	12.193	0.286	2.204	0.006	0.127	0.127	1217.788
2267002033	LPG Bore/Drill Rigs	79	490	51.124	2.038	9.353	0.006	0.125	0.125	1300.875
2267002039	LPG Concrete/Industrial Saws	78	430	10.730	0.249	2.063	0.006	0.129	0.129	1216.742
2267002045	LPG Cranes	47	480	19.950	0.610	3.510	0.006	0.125	0.125	1232.518
2267002054	LPG Crushing/Proc. Equipment	85	480	18.586	0.550	3.265	0.006	0.126	0.126	1229.660
2267002057	LPG Rough Terrain Forklifts	63	470	12.831	0.307	2.286	0.006	0.127	0.127	1218.566

**Table 4-2. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2024 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2267002060	LPG Rubber Tire Loaders	71	460	10.601	0.244	2.051	0.006	0.128	0.128	1216.733
2267002066	LPG Tractors/Loaders/ Backhoes	48	450	10.647	0.246	2.055	0.006	0.129	0.129	1216.735
2267002072	LPG Skid Steer Loaders	58	470	19.208	0.593	3.446	0.006	0.125	0.125	1232.146
2267002081	LPG Other Construction Equipment	48	480	23.155	0.754	4.092	0.006	0.124	0.124	1239.326
2267003010	LPG Aerial Lifts	46	480	19.103	0.576	3.377	0.006	0.124	0.124	1231.109
2267003020	LPG Forklifts	30	460	10.415	0.238	2.034	0.006	0.127	0.127	1216.720
2267003030	LPG Sweepers/Scrubbers	71	440	10.568	0.243	2.048	0.006	0.128	0.128	1216.730
2267003040	LPG Other General Industrial Equipment	54	450	10.475	0.240	2.040	0.006	0.127	0.127	1216.724
2267003050	LPG Other Material Handling Equipment	53	480	15.431	0.424	2.771	0.006	0.125	0.125	1224.374
2267003070	LPG Terminal Tractors	78	430	10.607	0.245	2.051	0.006	0.128	0.128	1216.732
2267004066	LPG Chippers/Stump Grinders	78	450	10.517	0.241	2.043	0.006	0.128	0.128	1216.727
2267005055	LPG Other Agricultural Equipment	55	490	61.876	2.274	10.199	0.006	0.128	0.128	1303.976
2267005060	LPG Irrigation Sets	60	450	10.597	0.244	2.051	0.006	0.128	0.128	1216.733
2267006005	LPG Generator Sets	68	480	28.065	0.992	6.269	0.006	0.124	0.124	1266.047
2267006010	LPG Pumps	69	470	16.943	0.461	3.305	0.006	0.126	0.126	1230.658
2267006015	LPG Air Compressors	56	460	11.374	0.252	2.118	0.006	0.127	0.127	1217.231
2267006025	LPG Welders	68	460	11.685	0.265	2.126	0.006	0.127	0.127	1217.000
2267006030	LPG Pressure Washers	85	470	20.411	0.625	3.572	0.006	0.125	0.125	1233.047
2267006035	LPG Hydro Power Units	56	460	11.345	0.257	2.142	0.006	0.127	0.127	1217.592
2267008005	LPG Airport Ground Support Equipment	56	450	10.422	0.238	2.035	0.006	0.127	0.127	1216.719
2268002081	CNG Other Construction Equipment	48	480	23.066	2.718	4.157	0.006	0.124	0.124	1368.202
2268003020	CNG Forklifts	30	460	10.415	0.905	2.130	0.006	0.127	0.127	1159.598

**Table 4-2. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2024 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2268003030	CNG Sweepers/Scrubbers	71	460	10.427	0.906	2.131	0.006	0.127	0.127	1159.761
2268003040	CNG Other General Industrial Equipment	54	460	10.439	0.908	2.132	0.006	0.127	0.127	1159.933
2268003060	CNG AC/Refrigeration	46	450	10.812	0.939	2.160	0.006	0.127	0.127	1163.166
2268003070	CNG Terminal Tractors	78	430	10.605	0.931	2.148	0.006	0.128	0.128	1162.247
2268005055	CNG Other Agricultural Equipment	55	510	61.785	8.126	10.243	0.006	0.128	0.128	1988.150
2268005060	CNG Irrigation Sets	60	510	10.601	0.930	2.147	0.006	0.128	0.128	1162.183
2268006005	CNG Generator Sets	68	490	30.211	3.995	7.009	0.006	0.124	0.124	1533.727
2268006010	CNG Pumps	69	480	20.017	2.076	4.006	0.006	0.125	0.125	1300.376
2268006015	CNG Air Compressors	56	470	11.428	0.955	2.217	0.006	0.127	0.127	1165.289
2268006020	CNG Gas Compressors	85	410	11.753	1.087	2.256	0.006	0.139	0.139	1178.200
2268006035	CNG Hydro Power Units	56	470	12.012	1.007	2.305	0.006	0.126	0.126	1171.469
2268010010	CNG Other Oil Field Equipment	90	410	11.071	0.994	2.192	0.006	0.133	0.133	1168.724
2270001060	Diesel Specialty Vehicle Carts	21	450	5.638	1.422	7.614	0.005	0.850	0.824	1440.021
2270002003	Diesel Pavers	59	380	0.433	0.073	1.763	0.003	0.078	0.076	1214.347
2270002006	Diesel Tampers/Rammers	43	1000	5.637	1.831	9.337	0.005	0.571	0.554	1300.218
2270002009	Diesel Plate Compactors	43	410	4.867	1.490	9.002	0.005	0.507	0.492	1300.484
2270002015	Diesel Rollers	59	390	0.667	0.108	2.328	0.003	0.110	0.107	1233.941
2270002018	Diesel Scrapers	59	370	0.483	0.066	1.145	0.003	0.071	0.068	1183.459
2270002021	Diesel Paving Equipment	59	390	0.913	0.180	2.776	0.003	0.148	0.143	1227.291
2270002024	Diesel Surfacing Equipment	59	380	1.593	0.251	4.477	0.004	0.220	0.213	1224.368
2270002027	Diesel Signal Boards/Light Plants	43	410	2.614	0.650	7.425	0.004	0.315	0.306	1293.795
2270002030	Diesel Trenchers	59	400	1.105	0.184	4.312	0.004	0.152	0.147	1273.741

**Table 4-2. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2024 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2270002033	Diesel Bore/Drill Rigs	43	370	1.538	0.392	5.849	0.004	0.282	0.273	1190.573
2270002036	Diesel Excavators	59	380	0.226	0.045	0.957	0.003	0.044	0.043	1194.766
2270002039	Diesel Concrete/Industrial Saws	59	410	1.272	0.226	4.755	0.004	0.171	0.166	1305.098
2270002042	Diesel Cement & Mortar Mixers	43	390	2.971	0.758	7.291	0.004	0.463	0.449	1244.878
2270002045	Diesel Cranes	43	370	0.380	0.085	1.565	0.003	0.070	0.068	1175.750
2270002048	Diesel Graders	59	370	0.218	0.042	0.685	0.003	0.047	0.046	1185.407
2270002051	Diesel Off-highway Trucks	59	370	0.230	0.070	3.183	0.003	0.052	0.050	1183.453
2270002054	Diesel Crushing/Proc. Equipment	43	380	0.573	0.119	2.716	0.003	0.089	0.086	1203.297
2270002057	Diesel Rough Terrain Forklifts	59	390	0.922	0.112	2.661	0.003	0.155	0.151	1255.884
2270002060	Diesel Rubber Tire Loaders	59	370	0.570	0.095	2.006	0.003	0.098	0.095	1190.492
2270002066	Diesel Tractors/Loaders/ Backhoes	21	460	3.369	0.699	4.797	0.004	0.548	0.532	1467.168
2270002069	Diesel Crawler Tractor/Dozers	59	370	0.410	0.068	1.607	0.003	0.071	0.069	1190.045
2270002072	Diesel Skid Steer Loaders	21	480	6.530	1.357	8.149	0.005	1.015	0.985	1529.685
2270002075	Diesel Off-Highway Tractors	59	370	0.711	0.123	3.411	0.003	0.106	0.103	1183.379
2270002078	Diesel Dumpers/Tenders	21	470	6.628	1.541	8.274	0.005	1.002	0.972	1508.952
2270002081	Diesel Other Construction Equipment	59	370	1.093	0.157	2.771	0.003	0.155	0.150	1185.509
2270003010	Diesel Aerial Lifts	21	480	5.828	1.246	8.146	0.005	0.803	0.779	1531.532
2270003020	Diesel Forklifts	59	400	0.198	0.045	2.312	0.003	0.030	0.029	1265.584
2270003030	Diesel Sweepers/Scrubbers	43	380	0.341	0.068	1.819	0.003	0.059	0.058	1219.331
2270003040	Diesel Other General Industrial Equipment	43	380	0.534	0.105	2.134	0.003	0.101	0.098	1205.559
2270003050	Diesel Other Material Handling Equipment	21	440	3.265	0.837	5.740	0.004	0.549	0.533	1414.124
2270003060	Diesel AC Refrigeration	43	410	0.763	0.195	5.868	0.004	0.078	0.076	1301.605

**Table 4-2. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2024 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2270003070	Diesel Terminal Tractors	59	380	0.123	0.029	0.710	0.003	0.027	0.026	1199.665
2270004031	Diesel Leaf blowers/Vacuums	43	410	5.197	1.468	10.116	0.004	0.751	0.728	1299.052
2270004036	Diesel Snow blowers	43	370	0.888	0.221	3.372	0.002	0.151	0.146	682.553
2270004046	Diesel Front Mowers	43	410	2.511	0.597	7.540	0.004	0.347	0.337	1301.043
2270004056	Diesel Lawn & Garden Tractors	43	410	3.237	0.764	8.123	0.005	0.381	0.370	1301.006
2270004066	Diesel Chippers/Stump Grinders	43	380	2.042	0.452	6.089	0.004	0.366	0.355	1215.862
2270004071	Diesel Commercial Turf Equipment	43	400	0.856	0.192	3.904	0.004	0.115	0.112	1263.300
2270004076	Diesel Other Lawn & Garden Equipment	43	410	3.329	0.744	8.308	0.004	0.549	0.532	1293.363
2270005010	Diesel 2-Wheel Tractors	59	410	5.453	1.841	9.219	0.005	0.530	0.514	1313.075
2270005015	Diesel Agricultural Tractors	59	380	1.794	0.306	4.542	0.004	0.303	0.294	1211.401
2270005020	Diesel Combines	59	370	2.318	0.546	6.648	0.004	0.480	0.466	1185.485
2270005025	Diesel Balers	59	400	4.484	0.829	7.966	0.004	0.654	0.634	1269.967
2270005030	Diesel Agricultural Mowers	59	410	5.202	0.664	6.952	0.004	0.774	0.751	1313.158
2270005035	Diesel Sprayers	59	380	2.724	0.630	6.531	0.004	0.451	0.437	1195.934
2270005040	Diesel Tillers > 6 HP	59	370	2.968	0.472	6.399	0.004	0.378	0.366	1186.691
2270005045	Diesel Swathers	59	400	4.766	0.744	7.874	0.004	0.718	0.697	1284.528
2270005055	Diesel Other Agricultural Equipment	59	380	2.370	0.450	5.586	0.004	0.420	0.407	1196.467
2270005060	Diesel Irrigation Sets	43	390	1.072	0.201	3.556	0.004	0.198	0.192	1235.255
2270006005	Diesel Generator Sets	43	390	2.308	0.553	6.454	0.004	0.374	0.363	1254.292
2270006010	Diesel Pumps	43	390	2.410	0.566	6.443	0.004	0.403	0.391	1253.342
2270006015	Diesel Air Compressors	43	400	0.962	0.168	3.863	0.004	0.154	0.149	1266.178
2270006020	Diesel Gas Compressors	43	410	0.205	0.044	2.965	0.003	0.032	0.032	1301.567

**Table 4-2. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2024 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2270006025	Diesel Welders	21	480	5.595	1.154	7.982	0.005	0.798	0.774	1529.937
2270006030	Diesel Pressure Washers	43	380	2.240	0.602	6.381	0.004	0.340	0.330	1224.530
2270006035	Diesel Hydro Power Units	43	400	1.100	0.213	4.324	0.004	0.168	0.163	1272.399
2270007015	Diesel Forest Equipment - Feller/Bunch/Skidder	59	370	0.129	0.028	0.475	0.003	0.029	0.028	1186.536
2270008005	Diesel Airport Ground Support Equipment	59	380	0.644	0.096	1.708	0.003	0.113	0.109	1195.493
2270009010	Diesel Other Underground Mining Equipment	21	450	8.335	1.984	10.976	0.005	0.986	0.957	1428.906
2270010010	Diesel Other Oil Field Equipment	43	370	0.505	0.113	3.003	0.003	0.081	0.078	1174.762
2282005010	2 Stroke Outboard	21	850	214.286	64.918	12.992	0.012	0.424	0.390	2241.265
2282005015	2 Stroke Personal Water Craft	21	820	252.756	19.458	14.032	0.012	0.160	0.147	2152.556
2282010005	4 Stroke Inboard/Sterndrive	21	630	123.548	22.334	11.450	0.010	0.151	0.139	1850.443
2282020005	Diesel Inboard/Sterndrive	35	370	2.257	0.626	9.763	0.011	0.231	0.224	1173.311
2282020010	Diesel Outboards	35	410	4.091	1.255	6.826	0.012	0.630	0.611	1300.093
2285002015	Diesel Railway Maintenance	21	440	3.805	0.931	6.272	0.004	0.671	0.651	1401.841
2285004015	4 Stroke Railway Maintenance	62	750	530.628	13.736	4.598	0.013	0.294	0.271	2343.684
2285006015	LPG Railway Maintenance	62	480	15.238	0.394	2.631	0.006	0.126	0.126	1222.096

Notes for Table 4-2 follow Table 4-5

**Table 4-3. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2025**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2260001010	2 Stroke Motorcycles: Off-Road <sup>c</sup>	100	260	78.305	68.407	0.928	0.003	2.503	2.303	574.529
2260001020	2 Stroke Snowmobiles	34	1640	127.264	169.102	6.199	0.012	1.512	1.391	2093.481
2260001030	2 Stroke ATVs <sup>c</sup>	100	210	81.674	12.161	0.951	0.003	0.295	0.271	506.200
2260001060	2 Stroke Specialty Vehicles/Carts	58	1000	575.650	20.467	4.625	0.013	0.296	0.273	2348.192
2260002006	2 Stroke Tampers/Rammers	55	680	561.595	135.035	3.366	0.008	20.454	18.818	1595.313
2260002009	2 Stroke Plate Compactors	55	830	490.917	110.178	5.246	0.013	16.844	15.497	2440.078
2260002021	2 Stroke Paving Equipment	59	830	494.578	109.765	5.246	0.013	16.955	15.599	2437.421
2260002027	2 Stroke Signal Boards/Light Plants	72	830	512.954	128.849	5.246	0.013	17.574	16.168	2422.471
2260002039	2 Stroke Concrete/Industrial Saws	78	630	580.949	136.956	3.517	0.009	21.176	19.482	1645.707
2260002054	2 Stroke Crushing/Proc. Equipment	85	830	512.953	112.858	5.246	0.013	17.574	16.168	2422.472
2260003030	2 Stroke Sweepers/Scrubbers	71	820	512.954	115.390	5.246	0.013	17.574	16.168	2422.472
2260003040	2 Stroke Other General Industrial Equipment	54	830	512.953	113.920	5.246	0.013	17.574	16.168	2422.470
2260004015	2 Stroke Rotary Tillers < 6 HP (Residential)	40	940	455.086	108.317	5.259	0.013	16.270	14.968	2454.523
2260004016	2 Stroke Rotary Tillers < 6 HP (Commercial)	40	900	459.752	94.256	5.259	0.013	16.403	15.091	2451.304
2260004020	2 Stroke Chain Saws < 6 HP (Residential)	70	900	470.397	108.617	5.246	0.013	16.250	14.950	2454.272
2260004021	2 Stroke Chain Saws < 6 HP (Commercial)	70	650	577.069	133.544	3.616	0.009	20.971	19.293	1690.024
2260004025	2 Stroke Trimmers/Edgers/Brush Cutter (Residential)	91	890	434.298	110.005	5.296	0.013	16.888	15.537	2441.520
2260004026	2 Stroke Trimmers/Edgers/Brush Cutter (Commercial)	91	810	494.613	103.041	4.976	0.012	17.170	15.797	2323.487
2260004030	2 Stroke Leaf blowers/Vacuums (Residential)	94	890	460.606	130.464	5.259	0.013	16.428	15.114	2450.710
2260004031	2 Stroke Leaf blowers/Vacuums (Commercial)	94	760	520.118	113.800	4.354	0.011	18.424	16.950	2042.137
2260004035	2 Stroke Snow blowers (Residential)	35	870	530.439	401.574	1.774	0.006	5.897	5.425	1239.598
2260004036	2 Stroke Snow blowers (Commercial)	35	870	618.956	231.209	2.069	0.007	6.879	6.329	1446.217

**Table 4-3. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2025 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2260004071	2 Stroke Commercial Turf Equipment	60	840	481.730	98.312	5.246	0.013	16.571	15.245	2446.614
2260005035	2 Stroke Sprayers	65	840	424.230	107.921	5.318	0.013	17.376	15.986	2430.731
2260006005	2 Stroke Generator Sets	68	830	483.510	131.475	5.251	0.013	16.810	15.465	2441.109
2260006010	2 Stroke Pumps	69	830	461.294	136.093	5.275	0.013	18.336	16.869	2396.321
2260006015	2 Stroke Air Compressors	56	830	512.953	134.652	5.246	0.013	17.574	16.168	2422.472
2260006035	2 Stroke Hydro Power Units	56	830	512.954	141.762	5.246	0.013	17.574	16.168	2422.474
2260007005	2 Stroke Chain Saws > 6 HP	70	620	586.888	137.090	3.366	0.008	21.491	19.772	1577.861
2265001010	4 Stroke Motorcycles: Off- Road	100	160	57.946	6.838	1.233	0.003	0.147	0.135	504.293
2265001030	4 Stroke ATVs	100	170	80.631	7.967	0.951	0.003	0.147	0.135	532.952
2265001050	4 Stroke Golf Carts	46	740	587.435	13.470	4.915	0.013	0.301	0.277	2345.373
2265001060	4 Stroke Specialty Vehicles/Carts	58	820	564.133	17.901	6.431	0.013	0.238	0.219	2295.176
2265002003	4 Stroke Pavers	66	700	434.070	9.482	4.247	0.012	0.257	0.237	2156.232
2265002006	4 Stroke Tampers/Rammers	55	760	572.805	12.623	4.542	0.013	0.251	0.231	2345.279
2265002009	4 Stroke Plate Compactors	55	830	488.766	15.060	5.127	0.014	0.519	0.477	2584.958
2265002015	4 Stroke Rollers	62	690	448.784	9.944	4.303	0.012	0.254	0.234	2152.867
2265002021	4 Stroke Paving Equipment	59	780	531.075	14.084	4.755	0.013	0.345	0.318	2415.866
2265002024	4 Stroke Surfacing Equipment	49	750	535.838	13.427	4.825	0.013	0.359	0.330	2389.411
2265002027	4 Stroke Signal Boards/Light Plants	72	780	525.803	13.420	5.091	0.014	0.464	0.427	2495.239
2265002030	4 Stroke Trenchers	66	710	416.508	10.338	4.387	0.012	0.324	0.298	2202.786
2265002033	4 Stroke Bore/Drill Rigs	79	790	362.358	14.315	6.599	0.013	0.492	0.452	2402.441
2265002039	4 Stroke Concrete/Industrial Saws	78	710	519.799	11.420	4.626	0.012	0.279	0.257	2250.915
2265002042	4 Stroke Cement & Mortar Mixers	59	820	535.121	18.034	4.783	0.013	0.353	0.324	2450.899



**Table 4-3. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2025 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2265002045	4 Stroke Cranes	47	590	97.598	3.397	4.132	0.009	0.163	0.150	1643.999
2265002054	4 Stroke Crushing/Proc. Equipment	85	740	495.998	12.070	4.722	0.013	0.327	0.301	2311.409
2265002057	4 Stroke Rough Terrain Forklifts	63	570	32.940	1.628	2.891	0.009	0.154	0.142	1554.735
2265002060	4 Stroke Rubber Tire Loaders	71	550	24.468	1.394	2.729	0.009	0.154	0.142	1544.025
2265002066	4 Stroke Tractors/Loaders/ Backhoes	48	730	543.112	11.348	4.567	0.013	0.264	0.243	2293.835
2265002072	4 Stroke Skid Steer Loaders	58	640	244.782	6.102	4.244	0.010	0.191	0.175	1861.658
2265002078	4 Stroke Dumpers/Tenders	41	800	547.148	17.313	4.900	0.013	0.281	0.259	2365.760
2265002081	4 Stroke Other Construction Equipment	48	580	49.470	2.631	4.661	0.009	0.150	0.138	1571.559
2265003010	4 Stroke Aerial Lifts	46	630	168.416	4.689	4.049	0.010	0.174	0.160	1750.876
2265003020	4 Stroke Forklifts	30	560	24.055	1.348	2.708	0.009	0.152	0.140	1544.026
2265003030	4 Stroke Sweepers/Scrubbers	71	610	202.641	5.246	3.453	0.010	0.220	0.202	1822.911
2265003040	4 Stroke Other General Industrial Equipment	54	760	441.503	13.780	5.056	0.013	0.533	0.491	2400.477
2265003050	4 Stroke Other Material Handling Equipment	53	640	199.897	5.073	3.708	0.010	0.183	0.168	1798.998
2265003060	4 Stroke AC/Refrigeration	46	740	575.282	12.572	4.605	0.013	0.260	0.239	2345.293
2265003070	4 Stroke Terminal Tractors	78	520	24.498	1.360	2.731	0.009	0.154	0.142	1544.027
2265004010	4 Stroke Lawn mowers (Residential)	33	900	422.998	24.096	5.353	0.015	0.642	0.591	2759.966
2265004011	4 Stroke Lawn mowers (Commercial)	33	880	427.368	14.858	5.557	0.015	0.717	0.659	2759.983
2265004015	4 Stroke Rotary Tillers < 6 HP (Residential)	40	910	422.890	20.969	5.353	0.015	0.643	0.591	2760.131
2265004016	4 Stroke Rotary Tillers < 6 HP (Commercial)	40	890	423.778	13.405	5.394	0.015	0.658	0.605	2760.144
2265004025	4 Stroke Trimmers/Edgers/Brush Cutter HP (Residential)	91	900	423.903	20.269	5.400	0.015	0.660	0.607	2760.145
2265004026	4 Stroke Trimmers/Edgers/Brush Cutter (Commercial)	91	820	496.861	12.440	5.116	0.014	0.500	0.460	2566.415
2265004030	4 Stroke Leaf blowers/Vacuums (Residential)	94	900	423.919	27.587	5.401	0.015	0.660	0.607	2760.143

**Table 4-3. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2025 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2265004031	4 Stroke Leaf blowers/Vacuums (Commercial)	94	700	434.252	8.465	4.211	0.012	0.249	0.229	2154.673
2265004035	4 Stroke Snow blowers (Residential)	35	940	605.467	232.015	4.734	0.008	0.126	0.116	1506.664
2265004036	4 Stroke Snow blowers (Commercial)	35	940	709.869	33.879	5.385	0.009	0.147	0.135	1757.278
2265004040	4 Stroke Rear Engine Riding Mowers (Residential)	38	760	571.481	22.387	4.518	0.013	0.247	0.228	2346.314
2265004041	4 Stroke Rear Engine Riding Mowers (Commercial)	38	740	574.507	11.400	4.594	0.013	0.259	0.238	2346.061
2265004046	4 Stroke Front Mowers	65	790	570.140	12.402	4.720	0.013	0.243	0.224	2340.323
2265004051	4 Stroke Shredders < 6 HP	80	890	423.361	13.949	5.375	0.015	0.651	0.598	2760.139
2265004055	4 Stroke Lawn & Garden Tractors (Residential)	44	760	571.345	16.862	4.508	0.013	0.247	0.227	2345.561
2265004056	4 Stroke Lawn & Garden Tractors (Commercial)	44	740	574.676	10.813	4.593	0.013	0.258	0.238	2345.580
2265004066	4 Stroke Chippers/Stump Grinders	78	640	292.419	6.265	3.693	0.011	0.213	0.196	1930.390
2265004071	4 Stroke Commercial Turf Equipment	60	730	487.196	10.457	4.536	0.013	0.315	0.290	2309.799
2265004075	4 Stroke Other Lawn & Garden Equipment	58	850	497.922	23.599	5.083	0.014	0.445	0.410	2556.772
2265004076	4 Stroke Other Lawn & Garden Equipment	58	850	495.490	21.794	5.101	0.014	0.444	0.408	2551.093
2265005010	4 Stroke 2-Wheel Tractors	62	740	577.450	11.901	4.660	0.013	0.267	0.246	2345.308
2265005015	4 Stroke Agricultural Tractors	62	580	105.653	2.873	3.003	0.009	0.170	0.156	1661.917
2265005020	4 Stroke Combines	74	580	122.039	9.670	10.981	0.009	0.154	0.141	1641.595
2265005025	4 Stroke Balers	62	580	122.196	11.865	10.993	0.009	0.154	0.141	1641.699
2265005030	4 Stroke Agricultural Mowers	48	770	571.139	12.393	4.550	0.013	0.250	0.230	2347.748
2265005035	4 Stroke Sprayers	65	740	386.869	14.741	7.146	0.012	0.300	0.276	2186.748
2265005040	4 Stroke Tillers > 6 HP	71	870	715.869	23.375	7.903	0.013	0.250	0.230	2444.695
2265005045	4 Stroke Swathers	52	580	122.195	9.720	10.993	0.009	0.154	0.141	1641.698
2265005055	4 Stroke Other Agricultural Equipment	55	620	212.357	8.567	9.671	0.010	0.175	0.161	1787.440

**Table 4-3. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2025 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2265005060	4 Stroke Irrigation Sets	60	550	36.275	1.758	2.804	0.009	0.168	0.155	1571.228
2265006005	4 Stroke Generator Sets	68	780	557.892	14.686	4.621	0.013	0.287	0.264	2383.963
2265006010	4 Stroke Pumps	69	760	438.425	12.382	4.863	0.013	0.414	0.381	2359.622
2265006015	4 Stroke Air Compressors	56	700	360.134	9.561	4.251	0.012	0.336	0.309	2143.818
2265006025	4 Stroke Welders	68	710	472.663	9.925	4.362	0.012	0.259	0.238	2199.297
2265006030	4 Stroke Pressure Washers	85	800	520.820	14.110	4.903	0.014	0.416	0.382	2489.843
2265006035	4 Stroke Hydro Power Units	56	750	540.040	12.593	4.750	0.013	0.334	0.307	2370.599
2265007010	4 Stroke Shredders > 6 HP	80	800	574.873	12.138	4.583	0.013	0.240	0.221	2348.476
2265007015	4 Stroke Forest Equipment - Feller/Bunch/Skidder	70	810	492.131	14.561	5.384	0.014	0.598	0.551	2593.347
2265008005	4 Stroke Airport Ground Support Equipment	56	600	129.439	4.224	3.262	0.010	0.232	0.214	1744.054
2265010010	4 Stroke Other Oil Field Equipment	90	740	594.073	12.552	5.085	0.013	0.323	0.297	2345.417
2267001060	LPG Specialty Vehicle Carts	58	490	39.571	1.556	7.383	0.006	0.126	0.126	1279.002
2267002003	LPG Pavers	66	460	11.694	0.271	2.149	0.006	0.128	0.128	1217.324
2267002015	LPG Rollers	62	450	10.625	0.245	2.053	0.006	0.129	0.129	1216.734
2267002021	LPG Paving Equipment	59	480	21.734	0.695	3.857	0.006	0.126	0.126	1236.558
2267002024	LPG Surfacing Equipment	49	460	11.889	0.284	2.203	0.006	0.128	0.128	1218.063
2267002030	LPG Trenchers	66	460	11.603	0.266	2.127	0.006	0.128	0.128	1217.036
2267002033	LPG Bore/Drill Rigs	79	490	47.879	1.865	8.612	0.006	0.125	0.125	1291.603
2267002039	LPG Concrete/Industrial Saws	78	430	10.724	0.249	2.062	0.006	0.129	0.129	1216.741
2267002045	LPG Cranes	47	480	18.484	0.548	3.258	0.006	0.126	0.126	1229.629
2267002054	LPG Crushing/Proc. Equipment	85	480	17.207	0.491	3.028	0.006	0.126	0.126	1226.942
2267002057	LPG Rough Terrain Forklifts	63	470	12.078	0.281	2.184	0.006	0.128	0.128	1217.553

**Table 4-3. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2025 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2267002060	LPG Rubber Tire Loaders	71	460	10.606	0.245	2.051	0.006	0.128	0.128	1216.733
2267002066	LPG Tractors/Loaders/ Backhoes	48	450	10.613	0.245	2.052	0.006	0.128	0.128	1216.733
2267002072	LPG Skid Steer Loaders	58	470	17.960	0.540	3.235	0.006	0.126	0.126	1229.750
2267002081	LPG Other Construction Equipment	48	480	21.341	0.678	3.786	0.006	0.125	0.125	1235.872
2267003010	LPG Aerial Lifts	46	480	16.929	0.503	3.099	0.006	0.124	0.124	1228.550
2267003020	LPG Forklifts	30	460	10.428	0.238	2.035	0.006	0.127	0.127	1216.720
2267003030	LPG Sweepers/Scrubbers	71	440	10.581	0.244	2.049	0.006	0.128	0.128	1216.731
2267003040	LPG Other General Industrial Equipment	54	450	10.490	0.240	2.041	0.006	0.127	0.127	1216.724
2267003050	LPG Other Material Handling Equipment	53	480	14.344	0.380	2.595	0.006	0.125	0.125	1222.456
2267003070	LPG Terminal Tractors	78	430	10.620	0.245	2.053	0.006	0.128	0.128	1216.734
2267004066	LPG Chippers/Stump Grinders	78	450	10.527	0.242	2.044	0.006	0.128	0.128	1216.727
2267005055	LPG Other Agricultural Equipment	55	490	58.705	2.106	9.469	0.006	0.128	0.128	1294.883
2267005060	LPG Irrigation Sets	60	450	10.596	0.244	2.050	0.006	0.128	0.128	1216.733
2267006005	LPG Generator Sets	68	480	25.799	0.878	5.636	0.006	0.124	0.124	1258.436
2267006010	LPG Pumps	69	470	15.607	0.424	3.093	0.006	0.126	0.126	1228.544
2267006015	LPG Air Compressors	56	460	11.008	0.244	2.073	0.006	0.127	0.127	1216.834
2267006025	LPG Welders	68	460	11.124	0.251	2.078	0.006	0.127	0.127	1216.746
2267006030	LPG Pressure Washers	85	470	18.838	0.557	3.295	0.006	0.126	0.126	1229.877
2267006035	LPG Hydro Power Units	56	460	11.091	0.250	2.103	0.006	0.127	0.127	1217.201
2267008005	LPG Airport Ground Support Equipment	56	450	10.456	0.239	2.038	0.006	0.127	0.127	1216.722
2268002081	CNG Other Construction Equipment	48	480	21.264	2.452	3.856	0.006	0.125	0.125	1337.469
2268003020	CNG Forklifts	30	460	10.428	0.906	2.131	0.006	0.127	0.127	1159.779

**Table 4-3. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2025 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2268003030	CNG Sweepers/Scrubbers	71	460	10.439	0.908	2.132	0.006	0.127	0.127	1159.937
2268003040	CNG Other General Industrial Equipment	54	460	10.454	0.910	2.134	0.006	0.127	0.127	1160.143
2268003060	CNG AC\Refrigeration	46	450	10.660	0.925	2.147	0.006	0.127	0.127	1161.720
2268003070	CNG Terminal Tractors	78	430	10.619	0.932	2.149	0.006	0.128	0.128	1162.429
2268005055	CNG Other Agricultural Equipment	55	510	58.612	7.530	9.515	0.006	0.128	0.128	1917.751
2268005060	CNG Irrigation Sets	60	510	10.601	0.930	2.147	0.006	0.128	0.128	1162.182
2268006005	CNG Generator Sets	68	490	27.954	3.534	6.291	0.006	0.124	0.124	1477.602
2268006010	CNG Pumps	69	480	18.124	1.885	3.697	0.006	0.125	0.125	1277.589
2268006015	CNG Air Compressors	56	470	11.036	0.927	2.169	0.006	0.127	0.127	1161.970
2268006020	CNG Gas Compressors	85	410	11.753	1.087	2.256	0.006	0.139	0.139	1178.200
2268006035	CNG Hydro Power Units	56	470	11.537	0.963	2.235	0.006	0.126	0.126	1166.305
2268010010	CNG Other Oil Field Equipment	90	410	11.074	0.994	2.192	0.006	0.133	0.133	1168.757
2270001060	Diesel Specialty Vehicle Carts	21	450	5.171	1.298	7.201	0.005	0.778	0.755	1440.354
2270002003	Diesel Pavers	59	380	0.348	0.062	1.619	0.003	0.063	0.061	1214.353
2270002006	Diesel Tampers/Rammers	43	1000	5.599	1.833	9.303	0.005	0.564	0.547	1300.249
2270002009	Diesel Plate Compactors	43	410	4.833	1.489	8.974	0.005	0.501	0.486	1300.509
2270002015	Diesel Rollers	59	390	0.577	0.097	2.144	0.003	0.095	0.092	1233.947
2270002018	Diesel Scrapers	59	370	0.403	0.058	0.962	0.003	0.061	0.059	1183.461
2270002021	Diesel Paving Equipment	59	390	0.813	0.164	2.573	0.003	0.129	0.125	1227.309
2270002024	Diesel Surfacing Equipment	59	380	1.401	0.225	4.111	0.004	0.193	0.187	1224.413
2270002027	Diesel Signal Boards/Light Plants	43	410	2.553	0.635	7.326	0.004	0.303	0.294	1293.822
2270002030	Diesel Trenchers	59	400	0.973	0.165	4.133	0.004	0.131	0.127	1273.769

**Table 4-3. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2025 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2270002033	Diesel Bore/Drill Rigs	43	370	1.401	0.357	5.396	0.004	0.255	0.247	1190.657
2270002036	Diesel Excavators	59	380	0.185	0.040	0.864	0.003	0.037	0.036	1194.768
2270002039	Diesel Concrete/Industrial Saws	59	410	1.149	0.209	4.623	0.004	0.151	0.146	1305.122
2270002042	Diesel Cement & Mortar Mixers	43	390	2.797	0.721	6.927	0.004	0.430	0.417	1245.000
2270002045	Diesel Cranes	43	370	0.329	0.073	1.357	0.003	0.061	0.059	1175.759
2270002048	Diesel Graders	59	370	0.168	0.035	0.569	0.003	0.037	0.036	1185.409
2270002051	Diesel Off-highway Trucks	59	370	0.176	0.063	3.104	0.003	0.045	0.043	1183.456
2270002054	Diesel Crushing/Proc. Equipment	43	380	0.493	0.103	2.500	0.003	0.076	0.074	1203.316
2270002057	Diesel Rough Terrain Forklifts	59	390	0.776	0.094	2.429	0.003	0.131	0.127	1255.905
2270002060	Diesel Rubber Tire Loaders	59	370	0.491	0.083	1.816	0.003	0.086	0.083	1190.505
2270002066	Diesel Tractors/Loaders/ Backhoes	21	460	2.816	0.578	4.267	0.004	0.466	0.452	1467.363
2270002069	Diesel Crawler Tractor/Dozers	59	370	0.337	0.059	1.453	0.003	0.059	0.058	1190.050
2270002072	Diesel Skid Steer Loaders	21	480	6.057	1.248	7.830	0.005	0.937	0.908	1529.960
2270002075	Diesel Off-Highway Tractors	59	370	0.613	0.111	3.225	0.003	0.094	0.091	1183.397
2270002078	Diesel Dumpers/Tenders	21	470	6.046	1.408	7.902	0.005	0.907	0.880	1509.314
2270002081	Diesel Other Construction Equipment	59	370	0.913	0.133	2.346	0.003	0.131	0.127	1185.545
2270003010	Diesel Aerial Lifts	21	480	5.322	1.127	7.814	0.005	0.726	0.705	1531.825
2270003020	Diesel Forklifts	59	400	0.186	0.044	2.298	0.003	0.028	0.027	1265.584
2270003030	Diesel Sweepers/Scrubbers	43	380	0.283	0.060	1.691	0.003	0.048	0.046	1219.335
2270003040	Diesel Other General Industrial Equipment	43	380	0.444	0.088	1.873	0.003	0.084	0.081	1205.573
2270003050	Diesel Other Material Handling Equipment	21	440	2.961	0.753	5.282	0.004	0.495	0.480	1414.309
2270003060	Diesel AC/Refrigeration	43	410	0.727	0.190	5.842	0.004	0.073	0.071	1301.611

**Table 4-3. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2025 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2270003070	Diesel Terminal Tractors	59	380	0.103	0.026	0.667	0.003	0.023	0.022	1199.665
2270004031	Diesel Leaf blowers/Vacuums	43	410	4.953	1.406	9.805	0.004	0.701	0.680	1299.297
2270004036	Diesel Snow blowers	43	370	0.812	0.203	3.079	0.002	0.138	0.134	682.595
2270004046	Diesel Front Mowers	43	410	2.381	0.565	7.380	0.004	0.321	0.312	1301.100
2270004056	Diesel Lawn & Garden Tractors	43	410	3.185	0.752	8.067	0.005	0.372	0.361	1301.025
2270004066	Diesel Chippers/Stump Grinders	43	380	1.855	0.407	5.579	0.004	0.330	0.320	1215.967
2270004071	Diesel Commercial Turf Equipment	43	400	0.797	0.183	3.741	0.004	0.104	0.101	1263.303
2270004076	Diesel Other Lawn & Garden Equipment	43	410	3.131	0.696	8.024	0.004	0.508	0.493	1293.486
2270005010	Diesel 2-Wheel Tractors	59	410	5.453	1.845	9.222	0.005	0.531	0.515	1313.073
2270005015	Diesel Agricultural Tractors	59	380	1.607	0.274	4.194	0.004	0.270	0.262	1211.457
2270005020	Diesel Combines	59	370	2.179	0.512	6.228	0.004	0.443	0.430	1185.567
2270005025	Diesel Balers	59	400	4.231	0.772	7.662	0.004	0.608	0.590	1270.118
2270005030	Diesel Agricultural Mowers	59	410	4.716	0.587	6.408	0.004	0.691	0.671	1313.335
2270005035	Diesel Sprayers	59	380	2.548	0.583	6.149	0.004	0.416	0.404	1196.053
2270005040	Diesel Tillers > 6 HP	59	370	2.761	0.441	6.004	0.004	0.351	0.341	1186.769
2270005045	Diesel Swathers	59	400	4.518	0.697	7.503	0.004	0.669	0.649	1284.644
2270005055	Diesel Other Agricultural Equipment	59	380	2.111	0.393	5.020	0.004	0.373	0.362	1196.565
2270005060	Diesel Irrigation Sets	43	390	0.904	0.170	3.229	0.004	0.166	0.161	1235.293
2270006005	Diesel Generator Sets	43	390	2.150	0.516	6.163	0.004	0.343	0.333	1254.379
2270006010	Diesel Pumps	43	390	2.252	0.529	6.146	0.004	0.372	0.361	1253.430
2270006015	Diesel Air Compressors	43	400	0.836	0.147	3.634	0.004	0.132	0.128	1266.203
2270006020	Diesel Gas Compressors	43	410	0.205	0.044	2.965	0.003	0.032	0.032	1301.567

**Table 4-3. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2025 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2</sub> <sup>g</sup>
2270006025	Diesel Welders	21	480	5.055	1.041	7.680	0.005	0.711	0.689	1530.177
2270006030	Diesel Pressure Washers	43	380	2.101	0.563	6.077	0.004	0.316	0.306	1224.634
2270006035	Diesel Hydro Power Units	43	400	0.981	0.192	4.118	0.004	0.147	0.142	1272.425
2270007015	Diesel Forest Equipment - Feller/Bunch/Skidder	59	370	0.106	0.026	0.422	0.003	0.024	0.024	1186.535
2270008005	Diesel Airport Ground Support Equipment	59	380	0.534	0.082	1.473	0.003	0.095	0.092	1195.505
2270009010	Diesel Other Underground Mining Equipment	21	450	8.238	1.961	10.896	0.005	0.969	0.940	1429.004
2270010010	Diesel Other Oil Field Equipment	43	370	0.425	0.099	2.773	0.003	0.070	0.068	1174.768
2282005010	2 Stroke Outboard	21	850	212.876	60.135	12.993	0.012	0.371	0.341	2241.292
2282005015	2 Stroke Personal Water Craft	21	820	252.540	18.894	14.055	0.012	0.149	0.137	2152.915
2282010005	4 Stroke Inboard/Stern-drive	21	630	117.482	21.165	10.502	0.010	0.151	0.139	1845.488
2282020005	Diesel Inboard/Stern-drive	35	370	2.250	0.628	9.540	0.011	0.228	0.221	1173.350
2282020010	Diesel Outboards	35	410	3.994	1.214	6.602	0.012	0.606	0.588	1300.228
2285002015	Diesel Railway Maintenance	21	440	3.453	0.842	5.755	0.004	0.608	0.590	1402.037
2285004015	4 Stroke Railway Maintenance	62	750	530.499	13.727	4.587	0.013	0.294	0.271	2343.575
2285006015	LPG Railway Maintenance	62	480	14.054	0.351	2.465	0.006	0.126	0.126	1220.466

Notes for Table 4-3 follow Table 4-5



**Table 4-4. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2026**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2260001010	2 Stroke Motorcycles: Off- Road <sup>c</sup>	100	260	78.159	67.958	0.930	0.003	2.486	2.287	575.056
2260001020	2 Stroke Snowmobiles	34	1640	125.658	166.919	6.260	0.012	1.484	1.366	2090.082
2260001030	2 Stroke ATVs <sup>c</sup>	100	210	81.491	11.079	0.954	0.003	0.254	0.234	507.847
2260001060	2 Stroke Specialty Vehicles/Carts	58	1000	575.557	20.418	4.625	0.013	0.296	0.273	2348.143
2260002006	2 Stroke Tampers/Rammers	55	680	561.023	134.887	3.366	0.008	20.431	18.796	1595.706
2260002009	2 Stroke Plate Compactors	55	830	490.703	110.101	5.246	0.013	16.837	15.490	2440.250
2260002021	2 Stroke Paving Equipment	59	830	494.439	109.714	5.246	0.013	16.950	15.594	2437.533
2260002027	2 Stroke Signal Boards/Light Plants	72	830	512.953	128.849	5.246	0.013	17.574	16.168	2422.469
2260002039	2 Stroke Concrete/Industrial Saws	78	630	580.949	136.956	3.517	0.009	21.176	19.482	1645.708
2260002054	2 Stroke Crushing/Proc. Equipment	85	830	512.954	112.858	5.246	0.013	17.574	16.168	2422.473
2260003030	2 Stroke Sweepers/Scrubbers	71	820	512.955	115.391	5.246	0.013	17.574	16.168	2422.474
2260003040	2 Stroke Other General Industrial Equipment	54	830	512.954	113.920	5.246	0.013	17.574	16.168	2422.471
2260004015	2 Stroke Rotary Tillers < 6 HP (Residential)	40	940	455.057	108.307	5.259	0.013	16.269	14.967	2454.545
2260004016	2 Stroke Rotary Tillers < 6 HP (Commercial)	40	900	459.843	94.286	5.259	0.013	16.406	15.094	2451.241
2260004020	2 Stroke Chain Saws < 6 HP (Residential)	70	900	470.343	108.599	5.246	0.013	16.249	14.949	2454.308
2260004021	2 Stroke Chain Saws < 6 HP (Commercial)	70	650	577.069	133.544	3.616	0.009	20.971	19.293	1690.024
2260004025	2 Stroke Trimmers/Edgers/Brush Cutter (Residential)	91	890	434.250	109.988	5.296	0.013	16.887	15.536	2441.560
2260004026	2 Stroke Trimmers/Edgers/Brush Cutter (Commercial)	91	810	494.627	103.045	4.976	0.012	17.171	15.797	2323.476
2260004030	2 Stroke Leaf blowers/Vacuums (Residential)	94	890	460.554	130.447	5.259	0.013	16.426	15.112	2450.749
2260004031	2 Stroke Leaf blowers/Vacuums (Commercial)	94	760	520.131	113.803	4.354	0.011	18.424	16.950	2042.129
2260004035	2 Stroke Snow blowers (Residential)	35	870	530.461	401.580	1.774	0.006	5.897	5.425	1239.586
2260004036	2 Stroke Snow blowers (Commercial)	35	870	619.109	231.251	2.069	0.007	6.881	6.330	1446.141

**Table 4-4. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2026 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2260004071	2 Stroke Commercial Turf Equipment	60	840	481.749	98.319	5.246	0.013	16.572	15.246	2446.601
2260005035	2 Stroke Sprayers	65	840	424.243	107.926	5.318	0.013	17.377	15.987	2430.717
2260006005	2 Stroke Generator Sets	68	830	483.481	131.465	5.251	0.013	16.809	15.464	2441.134
2260006010	2 Stroke Pumps	69	830	461.249	136.072	5.275	0.013	18.335	16.869	2396.302
2260006015	2 Stroke Air Compressors	56	830	512.954	134.653	5.246	0.013	17.574	16.168	2422.469
2260006035	2 Stroke Hydro Power Units	56	830	512.953	141.762	5.246	0.013	17.574	16.168	2422.469
2260007005	2 Stroke Chain Saws > 6 HP	70	620	586.888	137.090	3.366	0.008	21.491	19.772	1577.862
2265001010	4 Stroke Motorcycles: Off- Road	100	160	57.747	6.817	1.231	0.003	0.147	0.135	504.290
2265001030	4 Stroke ATVs	100	170	80.563	7.938	0.948	0.003	0.147	0.135	532.944
2265001050	4 Stroke Golf Carts	46	740	587.437	13.470	4.915	0.013	0.301	0.277	2345.375
2265001060	4 Stroke Specialty Vehicles/Carts	58	820	555.837	17.093	6.150	0.013	0.237	0.218	2289.246
2265002003	4 Stroke Pavers	66	700	433.852	9.469	4.232	0.012	0.257	0.237	2156.090
2265002006	4 Stroke Tampers/Rammers	55	760	572.771	12.620	4.541	0.013	0.251	0.231	2345.277
2265002009	4 Stroke Plate Compactors	55	830	488.696	15.048	5.124	0.014	0.518	0.476	2584.957
2265002015	4 Stroke Rollers	62	690	448.733	9.939	4.301	0.012	0.254	0.233	2152.868
2265002021	4 Stroke Paving Equipment	59	780	530.969	14.075	4.746	0.013	0.345	0.318	2415.769
2265002024	4 Stroke Surfacing Equipment	49	750	535.789	13.423	4.822	0.013	0.359	0.330	2389.386
2265002027	4 Stroke Signal Boards/Light Plants	72	780	525.775	13.417	5.091	0.014	0.464	0.427	2495.240
2265002030	4 Stroke Trenchers	66	710	416.325	10.327	4.375	0.012	0.324	0.298	2202.699
2265002033	4 Stroke Bore/Drill Rigs	79	790	359.475	14.138	6.343	0.013	0.491	0.452	2398.936
2265002039	4 Stroke Concrete/Industrial Saws	78	710	519.784	11.419	4.625	0.012	0.279	0.257	2250.914
2265002042	4 Stroke Cement & Mortar Mixers	59	820	534.548	17.959	4.759	0.013	0.352	0.324	2450.754

**Table 4-4. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2026 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2265002045	4 Stroke Cranes	47	590	94.948	3.266	3.903	0.009	0.164	0.151	1641.071
2265002054	4 Stroke Crushing/Proc. Equipment	85	740	495.656	12.051	4.695	0.013	0.327	0.301	2311.077
2265002057	4 Stroke Rough Terrain Forklifts	63	570	32.060	1.588	2.817	0.009	0.155	0.143	1553.970
2265002060	4 Stroke Rubber Tire Loaders	71	550	24.388	1.391	2.725	0.009	0.154	0.141	1544.026
2265002066	4 Stroke Tractors/Loaders/ Backhoes	48	730	543.060	11.343	4.565	0.013	0.264	0.242	2293.834
2265002072	4 Stroke Skid Steer Loaders	58	640	243.285	6.026	4.115	0.010	0.191	0.176	1860.007
2265002078	4 Stroke Dumpers/Tenders	41	800	545.705	17.183	4.833	0.013	0.281	0.259	2364.822
2265002081	4 Stroke Other Construction Equipment	48	580	46.077	2.462	4.366	0.009	0.151	0.139	1567.746
2265003010	4 Stroke Aerial Lifts	46	630	166.517	4.593	3.888	0.010	0.174	0.160	1748.892
2265003020	4 Stroke Forklifts	30	560	24.058	1.348	2.708	0.009	0.152	0.140	1544.027
2265003030	4 Stroke Sweepers/Scrubbers	71	610	202.642	5.246	3.453	0.010	0.220	0.202	1822.910
2265003040	4 Stroke Other General Industrial Equipment	54	760	441.500	13.780	5.056	0.013	0.533	0.491	2400.478
2265003050	4 Stroke Other Material Handling Equipment	53	640	198.547	5.003	3.596	0.010	0.183	0.168	1797.650
2265003060	4 Stroke AC/Refrigeration	46	740	575.277	12.572	4.605	0.013	0.260	0.239	2345.293
2265003070	4 Stroke Terminal Tractors	78	520	24.513	1.361	2.732	0.009	0.154	0.142	1544.026
2265004010	4 Stroke Lawn mowers (Residential)	33	900	422.985	24.094	5.353	0.015	0.642	0.591	2759.961
2265004011	4 Stroke Lawn mowers (Commercial)	33	880	427.371	14.859	5.557	0.015	0.717	0.659	2759.983
2265004015	4 Stroke Rotary Tillers < 6 HP (Residential)	40	910	422.886	20.968	5.353	0.015	0.643	0.591	2760.134
2265004016	4 Stroke Rotary Tillers < 6 HP (Commercial)	40	890	423.791	13.408	5.395	0.015	0.658	0.605	2760.143
2265004025	4 Stroke Trimmers/Edgers/Brush Cutter HP (Residential)	91	900	423.894	20.268	5.399	0.015	0.660	0.607	2760.146
2265004026	4 Stroke Trimmers/Edgers/Brush Cutter (Commercial)	91	820	496.861	12.439	5.116	0.014	0.500	0.460	2566.417
2265004030	4 Stroke Leaf blowers/Vacuums (Residential)	94	900	423.910	27.586	5.400	0.015	0.660	0.607	2760.143

**Table 4-4. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2026 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2</sub> <sup>g</sup>
2265004031	4 Stroke Leaf blowers/Vacuums (Commercial)	94	700	434.060	8.459	4.197	0.012	0.249	0.229	2154.585
2265004035	4 Stroke Snow blowers (Residential)	35	940	605.502	232.016	4.734	0.008	0.126	0.116	1506.663
2265004036	4 Stroke Snow blowers (Commercial)	35	940	710.111	33.886	5.385	0.009	0.147	0.135	1757.281
2265004040	4 Stroke Rear Engine Riding Mowers (Residential)	38	760	571.421	22.379	4.516	0.013	0.247	0.227	2346.273
2265004041	4 Stroke Rear Engine Riding Mowers (Commercial)	38	740	574.506	11.400	4.594	0.013	0.259	0.238	2346.059
2265004046	4 Stroke Front Mowers	65	790	568.892	12.291	4.664	0.013	0.243	0.224	2339.692
2265004051	4 Stroke Shredders < 6 HP	80	890	423.367	13.950	5.375	0.015	0.651	0.599	2760.138
2265004055	4 Stroke Lawn & Garden Tractors (Residential)	44	760	571.327	16.859	4.507	0.013	0.247	0.227	2345.559
2265004056	4 Stroke Lawn & Garden Tractors (Commercial)	44	740	574.675	10.813	4.593	0.013	0.258	0.238	2345.581
2265004066	4 Stroke Chippers/Stump Grinders	78	640	292.427	6.265	3.694	0.011	0.213	0.196	1930.389
2265004071	4 Stroke Commercial Turf Equipment	60	730	487.198	10.458	4.536	0.013	0.315	0.290	2309.800
2265004075	4 Stroke Other Lawn & Garden Equipment	58	850	497.239	23.448	5.040	0.014	0.445	0.410	2556.499
2265004076	4 Stroke Other Lawn & Garden Equipment	58	850	494.610	21.628	5.050	0.014	0.443	0.408	2550.718
2265005010	4 Stroke 2-Wheel Tractors	62	740	577.449	11.901	4.660	0.013	0.267	0.246	2345.307
2265005015	4 Stroke Agricultural Tractors	62	580	105.699	2.874	3.006	0.009	0.170	0.156	1661.918
2265005020	4 Stroke Combines	74	580	112.242	8.952	10.090	0.009	0.153	0.141	1629.334
2265005025	4 Stroke Balers	62	580	112.593	11.022	10.119	0.009	0.153	0.141	1629.650
2265005030	4 Stroke Agricultural Mowers	48	770	571.191	12.390	4.541	0.013	0.250	0.230	2347.707
2265005035	4 Stroke Sprayers	65	740	382.500	14.391	6.803	0.012	0.300	0.276	2182.026
2265005040	4 Stroke Tillers > 6 HP	71	870	700.061	22.460	7.620	0.013	0.248	0.228	2432.569
2265005045	4 Stroke Swathers	52	580	112.593	9.014	10.119	0.009	0.153	0.141	1629.651
2265005055	4 Stroke Other Agricultural Equipment	55	620	204.610	8.124	8.969	0.010	0.175	0.161	1777.836

**Table 4-4. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2026 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2</sub> <sup>g</sup>
2265005060	4 Stroke Irrigation Sets	60	550	36.233	1.756	2.802	0.009	0.168	0.154	1571.227
2265006005	4 Stroke Generator Sets	68	780	557.794	14.660	4.610	0.013	0.287	0.264	2383.925
2265006010	4 Stroke Pumps	69	760	438.125	12.362	4.829	0.013	0.414	0.381	2359.256
2265006015	4 Stroke Air Compressors	56	700	360.047	9.557	4.243	0.012	0.336	0.309	2143.773
2265006025	4 Stroke Welders	68	710	472.588	9.922	4.358	0.012	0.259	0.238	2199.299
2265006030	4 Stroke Pressure Washers	85	800	520.813	14.109	4.902	0.014	0.416	0.382	2489.842
2265006035	4 Stroke Hydro Power Units	56	750	540.025	12.592	4.749	0.013	0.334	0.307	2370.590
2265007010	4 Stroke Shredders > 6 HP	80	800	574.107	12.080	4.563	0.013	0.240	0.221	2348.001
2265007015	4 Stroke Forest Equipment - Feller/Bunch/Skidder	70	810	492.144	14.562	5.385	0.014	0.599	0.551	2593.340
2265008005	4 Stroke Airport Ground Support Equipment	56	600	129.504	4.227	3.266	0.010	0.233	0.214	1744.052
2265010010	4 Stroke Other Oil Field Equipment	90	740	594.074	12.552	5.085	0.013	0.323	0.297	2345.417
2267001060	LPG Specialty Vehicle Carts	58	490	36.401	1.388	6.678	0.006	0.126	0.126	1270.185
2267002003	LPG Pavers	66	460	11.270	0.258	2.098	0.006	0.128	0.128	1216.873
2267002015	LPG Rollers	62	450	10.610	0.245	2.052	0.006	0.128	0.128	1216.732
2267002021	LPG Paving Equipment	59	480	20.139	0.623	3.559	0.006	0.127	0.127	1233.042
2267002024	LPG Surfacing Equipment	49	460	11.504	0.269	2.143	0.006	0.128	0.128	1217.417
2267002030	LPG Trenchers	66	460	11.167	0.255	2.086	0.006	0.128	0.128	1216.754
2267002033	LPG Bore/Drill Rigs	79	490	44.126	1.668	7.778	0.006	0.125	0.125	1281.195
2267002039	LPG Concrete/Industrial Saws	78	430	10.726	0.249	2.062	0.006	0.129	0.129	1216.740
2267002045	LPG Cranes	47	480	17.138	0.492	3.029	0.006	0.126	0.126	1227.018
2267002054	LPG Crushing/Proc. Equipment	85	480	15.986	0.441	2.824	0.006	0.127	0.127	1224.639
2267002057	LPG Rough Terrain Forklifts	63	470	11.503	0.263	2.115	0.006	0.128	0.128	1216.926

**Table 4-4. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2026 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2</sub> <sup>g</sup>
2267002060	LPG Rubber Tire Loaders	71	460	10.572	0.243	2.048	0.006	0.128	0.128	1216.731
2267002066	LPG Tractors/Loaders/ Backhoes	48	450	10.590	0.244	2.050	0.006	0.128	0.128	1216.731
2267002072	LPG Skid Steer Loaders	58	470	16.869	0.494	3.047	0.006	0.126	0.126	1227.613
2267002081	LPG Other Construction Equipment	48	480	19.804	0.613	3.521	0.006	0.126	0.126	1232.821
2267003010	LPG Aerial Lifts	46	480	15.752	0.455	2.908	0.006	0.124	0.124	1226.450
2267003020	LPG Forklifts	30	460	10.429	0.238	2.035	0.006	0.127	0.127	1216.720
2267003030	LPG Sweepers/Scrubbers	71	440	10.583	0.244	2.049	0.006	0.128	0.128	1216.731
2267003040	LPG Other General Industrial Equipment	54	450	10.478	0.240	2.040	0.006	0.127	0.127	1216.724
2267003050	LPG Other Material Handling Equipment	53	480	13.426	0.343	2.450	0.006	0.125	0.125	1220.889
2267003070	LPG Terminal Tractors	78	430	10.627	0.245	2.053	0.006	0.129	0.129	1216.734
2267004066	LPG Chippers/Stump Grinders	78	450	10.533	0.242	2.045	0.006	0.128	0.128	1216.729
2267005055	LPG Other Agricultural Equipment	55	490	55.227	1.925	8.694	0.006	0.128	0.128	1285.298
2267005060	LPG Irrigation Sets	60	450	10.576	0.244	2.049	0.006	0.128	0.128	1216.731
2267006005	LPG Generator Sets	68	480	23.914	0.789	5.139	0.006	0.124	0.124	1252.545
2267006010	LPG Pumps	69	470	14.291	0.392	2.905	0.006	0.125	0.125	1226.755
2267006015	LPG Air Compressors	56	460	10.732	0.241	2.051	0.006	0.127	0.127	1216.726
2267006025	LPG Welders	68	460	10.744	0.244	2.054	0.006	0.127	0.127	1216.731
2267006030	LPG Pressure Washers	85	470	17.502	0.501	3.069	0.006	0.126	0.126	1227.339
2267006035	LPG Hydro Power Units	56	460	10.887	0.245	2.072	0.006	0.127	0.127	1216.902
2267008005	LPG Airport Ground Support Equipment	56	450	10.492	0.241	2.041	0.006	0.127	0.127	1216.725
2268002081	CNG Other Construction Equipment	48	480	19.743	2.223	3.595	0.006	0.126	0.126	1310.910
2268003020	CNG Forklifts	30	460	10.429	0.907	2.131	0.006	0.127	0.127	1159.795

**Table 4-4. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2026 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2</sub> <sup>g</sup>
2268003030	CNG Sweepers/Scrubbers	71	460	10.440	0.908	2.132	0.006	0.127	0.127	1159.953
2268003040	CNG Other General Industrial Equipment	54	460	10.441	0.908	2.132	0.006	0.127	0.127	1159.962
2268003060	CNG AC\Refrigeration	46	450	10.572	0.920	2.142	0.006	0.127	0.127	1161.206
2268003070	CNG Terminal Tractors	78	430	10.626	0.933	2.150	0.006	0.129	0.129	1162.526
2268005055	CNG Other Agricultural Equipment	55	510	55.133	6.888	8.744	0.006	0.128	0.128	1842.065
2268005060	CNG Irrigation Sets	60	510	10.581	0.927	2.146	0.006	0.128	0.128	1161.903
2268006005	CNG Generator Sets	68	490	26.166	3.184	5.741	0.006	0.124	0.124	1434.974
2268006010	CNG Pumps	69	480	16.212	1.714	3.422	0.006	0.125	0.125	1257.532
2268006015	CNG Air Compressors	56	470	10.741	0.914	2.147	0.006	0.127	0.127	1160.584
2268006020	CNG Gas Compressors	85	410	11.753	1.087	2.256	0.006	0.139	0.139	1178.200
2268006035	CNG Hydro Power Units	56	470	11.156	0.931	2.183	0.006	0.126	0.126	1162.568
2268010010	CNG Other Oil Field Equipment	90	410	11.075	0.995	2.192	0.006	0.133	0.133	1168.770
2270001060	Diesel Specialty Vehicle Carts	21	450	4.750	1.189	6.816	0.005	0.714	0.692	1440.643
2270002003	Diesel Pavers	59	380	0.281	0.054	1.503	0.003	0.050	0.048	1214.357
2270002006	Diesel Tampers/Rammers	43	1000	5.555	1.836	9.276	0.005	0.555	0.539	1300.271
2270002009	Diesel Plate Compactors	43	410	4.800	1.489	8.951	0.005	0.496	0.481	1300.528
2270002015	Diesel Rollers	59	390	0.478	0.086	2.002	0.003	0.078	0.075	1233.953
2270002018	Diesel Scrapers	59	370	0.334	0.051	0.799	0.003	0.052	0.051	1183.462
2270002021	Diesel Paving Equipment	59	390	0.724	0.151	2.384	0.003	0.114	0.110	1227.323
2270002024	Diesel Surfacing Equipment	59	380	1.228	0.202	3.768	0.004	0.169	0.164	1224.453
2270002027	Diesel Signal Boards/Light Plants	43	410	2.505	0.624	7.246	0.004	0.294	0.285	1293.840
2270002030	Diesel Trenchers	59	400	0.845	0.148	3.970	0.003	0.111	0.108	1273.793

**Table 4-4. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2026 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2270002033	Diesel Bore/Drill Rigs	43	370	1.263	0.322	4.931	0.004	0.227	0.220	1190.736
2270002036	Diesel Excavators	59	380	0.159	0.036	0.801	0.003	0.032	0.031	1194.769
2270002039	Diesel Concrete/Industrial Saws	59	410	1.027	0.194	4.500	0.004	0.131	0.127	1305.142
2270002042	Diesel Cement & Mortar Mixers	43	390	2.614	0.682	6.536	0.004	0.394	0.382	1245.121
2270002045	Diesel Cranes	43	370	0.281	0.063	1.185	0.003	0.053	0.051	1175.769
2270002048	Diesel Graders	59	370	0.133	0.030	0.484	0.003	0.030	0.029	1185.409
2270002051	Diesel Off-highway Trucks	59	370	0.154	0.060	3.072	0.003	0.042	0.041	1183.457
2270002054	Diesel Crushing/Proc. Equipment	43	380	0.433	0.092	2.323	0.003	0.067	0.065	1203.330
2270002057	Diesel Rough Terrain Forklifts	59	390	0.657	0.079	2.227	0.003	0.112	0.109	1255.918
2270002060	Diesel Rubber Tire Loaders	59	370	0.407	0.071	1.642	0.003	0.072	0.070	1190.517
2270002066	Diesel Tractors/Loaders/ Backhoes	21	460	2.400	0.487	3.868	0.004	0.403	0.391	1467.517
2270002069	Diesel Crawler Tractor/Dozers	59	370	0.280	0.052	1.326	0.003	0.051	0.049	1190.053
2270002072	Diesel Skid Steer Loaders	21	480	5.537	1.132	7.477	0.005	0.849	0.824	1530.250
2270002075	Diesel Off-Highway Tractors	59	370	0.530	0.100	3.062	0.003	0.084	0.082	1183.410
2270002078	Diesel Dumpers/Tenders	21	470	5.458	1.275	7.514	0.005	0.810	0.786	1509.650
2270002081	Diesel Other Construction Equipment	59	370	0.771	0.114	2.043	0.003	0.111	0.108	1185.574
2270003010	Diesel Aerial Lifts	21	480	4.852	1.020	7.507	0.005	0.656	0.636	1532.088
2270003020	Diesel Forklifts	59	400	0.183	0.044	2.293	0.003	0.027	0.027	1265.584
2270003030	Diesel Sweepers/Scrubbers	43	380	0.251	0.055	1.612	0.003	0.041	0.040	1219.338
2270003040	Diesel Other General Industrial Equipment	43	380	0.375	0.075	1.655	0.003	0.071	0.069	1205.582
2270003050	Diesel Other Material Handling Equipment	21	440	2.677	0.676	4.856	0.004	0.445	0.432	1414.476
2270003060	Diesel AC/Refrigeration	43	410	0.702	0.186	5.825	0.004	0.069	0.067	1301.614



**Table 4-4. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2026 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2270003070	Diesel Terminal Tractors	59	380	0.091	0.025	0.642	0.003	0.021	0.020	1199.665
2270004031	Diesel Leaf blowers/Vacuums	43	410	4.725	1.354	9.531	0.004	0.656	0.637	1299.511
2270004036	Diesel Snow blowers	43	370	0.738	0.184	2.785	0.002	0.125	0.122	682.635
2270004046	Diesel Front Mowers	43	410	2.263	0.539	7.227	0.004	0.295	0.287	1301.150
2270004056	Diesel Lawn & Garden Tractors	43	410	3.144	0.743	8.026	0.005	0.365	0.354	1301.038
2270004066	Diesel Chippers/Stump Grinders	43	380	1.695	0.369	5.142	0.004	0.300	0.291	1216.052
2270004071	Diesel Commercial Turf Equipment	43	400	0.733	0.175	3.629	0.004	0.092	0.089	1263.308
2270004076	Diesel Other Lawn & Garden Equipment	43	410	2.937	0.650	7.743	0.004	0.467	0.453	1293.604
2270005010	Diesel 2-Wheel Tractors	59	410	5.447	1.846	9.223	0.005	0.530	0.514	1313.072
2270005015	Diesel Agricultural Tractors	59	380	1.460	0.248	3.908	0.004	0.245	0.238	1211.504
2270005020	Diesel Combines	59	370	2.040	0.477	5.801	0.004	0.407	0.395	1185.648
2270005025	Diesel Balers	59	400	3.978	0.715	7.353	0.004	0.563	0.546	1270.263
2270005030	Diesel Agricultural Mowers	59	410	4.150	0.507	5.823	0.004	0.612	0.594	1313.474
2270005035	Diesel Sprayers	59	380	2.374	0.536	5.759	0.004	0.382	0.371	1196.167
2270005040	Diesel Tillers > 6 HP	59	370	2.566	0.412	5.624	0.004	0.326	0.317	1186.837
2270005045	Diesel Swathers	59	400	4.261	0.649	7.124	0.004	0.620	0.602	1284.760
2270005055	Diesel Other Agricultural Equipment	59	380	1.867	0.341	4.494	0.004	0.330	0.320	1196.650
2270005060	Diesel Irrigation Sets	43	390	0.792	0.148	2.956	0.003	0.145	0.141	1235.321
2270006005	Diesel Generator Sets	43	390	2.009	0.481	5.896	0.004	0.316	0.307	1254.458
2270006010	Diesel Pumps	43	390	2.104	0.493	5.863	0.004	0.344	0.333	1253.511
2270006015	Diesel Air Compressors	43	400	0.710	0.128	3.422	0.003	0.110	0.107	1266.224
2270006020	Diesel Gas Compressors	43	410	0.205	0.044	2.965	0.003	0.032	0.032	1301.567

**Table 4-4. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2026 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2</sub> <sup>g</sup>
2270006025	Diesel Welders	21	480	4.586	0.942	7.414	0.005	0.635	0.616	1530.392
2270006030	Diesel Pressure Washers	43	380	1.973	0.527	5.789	0.004	0.293	0.284	1224.727
2270006035	Diesel Hydro Power Units	43	400	0.867	0.174	3.928	0.004	0.126	0.123	1272.446
2270007015	Diesel Forest Equipment - Feller/Bunch/Skidder	59	370	0.091	0.024	0.391	0.003	0.022	0.021	1186.535
2270008005	Diesel Airport Ground Support Equipment	59	380	0.443	0.070	1.300	0.003	0.078	0.076	1195.515
2270009010	Diesel Other Underground Mining Equipment	21	450	8.151	1.942	10.825	0.005	0.954	0.925	1429.090
2270010010	Diesel Other Oil Field Equipment	43	370	0.350	0.086	2.553	0.003	0.060	0.059	1174.770
2282005010	2 Stroke Outboard	21	850	211.744	56.251	12.995	0.012	0.328	0.302	2241.271
2282005015	2 Stroke Personal Water Craft	21	820	252.363	18.490	14.070	0.012	0.142	0.131	2153.175
2282010005	4 Stroke Inboard/Stern-drive	21	630	112.441	20.163	9.681	0.010	0.151	0.139	1841.372
2282020005	Diesel Inboard/Stern-drive	35	370	2.245	0.628	9.364	0.011	0.225	0.218	1173.380
2282020010	Diesel Outboards	35	410	3.915	1.179	6.404	0.012	0.586	0.569	1300.336
2285002015	Diesel Railway Maintenance	21	440	3.197	0.778	5.398	0.004	0.565	0.548	1402.171
2285004015	4 Stroke Railway Maintenance	62	750	530.486	13.729	4.582	0.013	0.295	0.271	2343.499
2285006015	LPG Railway Maintenance	62	480	13.261	0.322	2.352	0.006	0.126	0.126	1219.319

Notes for Table 4-4 follow Table 4-5

**Table 4-5. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2027**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2260001010	2 Stroke Motorcycles: Off-Road <sup>c</sup>	100	260	78.045	67.611	0.932	0.003	2.473	2.276	575.464
2260001020	2 Stroke Snowmobiles	34	1640	124.370	165.150	6.310	0.012	1.462	1.345	2087.269
2260001030	2 Stroke ATVs <sup>c</sup>	100	210	81.345	10.198	0.956	0.003	0.221	0.203	509.188
2260001060	2 Stroke Specialty Vehicles/Carts	58	1000	575.455	20.369	4.625	0.013	0.296	0.273	2348.101
2260002006	2 Stroke Tampers/Rammers	55	680	561.174	134.926	3.366	0.008	20.437	18.802	1595.606
2260002009	2 Stroke Plate Compactors	55	830	490.853	110.155	5.246	0.013	16.842	15.495	2440.129
2260002021	2 Stroke Paving Equipment	59	830	494.543	109.752	5.246	0.013	16.954	15.598	2437.443
2260002027	2 Stroke Signal Boards/Light Plants	72	830	512.953	128.849	5.246	0.013	17.574	16.168	2422.470
2260002039	2 Stroke Concrete/Industrial Saws	78	630	580.948	136.956	3.517	0.009	21.176	19.482	1645.708
2260002054	2 Stroke Crushing/Proc. Equipment	85	830	512.953	112.858	5.246	0.013	17.574	16.168	2422.469
2260003030	2 Stroke Sweepers/Scrubbers	71	820	512.953	115.390	5.246	0.013	17.574	16.168	2422.472
2260003040	2 Stroke Other General Industrial Equipment	54	830	512.954	113.920	5.246	0.013	17.574	16.168	2422.471
2260004015	2 Stroke Rotary Tillers < 6 HP (Residential)	40	940	455.079	108.314	5.259	0.013	16.269	14.968	2454.531
2260004016	2 Stroke Rotary Tillers < 6 HP (Commercial)	40	900	459.829	94.283	5.259	0.013	16.406	15.093	2451.246
2260004020	2 Stroke Chain Saws < 6 HP (Residential)	70	900	470.366	108.605	5.246	0.013	16.249	14.949	2454.295
2260004021	2 Stroke Chain Saws < 6 HP (Commercial)	70	650	577.069	133.544	3.616	0.009	20.971	19.293	1690.026
2260004025	2 Stroke Trimmers/Edgers/Brush Cutter (Residential)	91	890	434.270	109.994	5.296	0.013	16.887	15.536	2441.546
2260004026	2 Stroke Trimmers/Edgers/Brush Cutter (Commercial)	91	810	494.660	103.057	4.976	0.012	17.172	15.798	2323.450
2260004030	2 Stroke Leaf blowers/Vacuums (Residential)	94	890	460.575	130.453	5.259	0.013	16.427	15.113	2450.738
2260004031	2 Stroke Leaf blowers/Vacuums (Commercial)	94	760	520.163	113.813	4.354	0.011	18.425	16.951	2042.107
2260004035	2 Stroke Snow blowers (Residential)	35	870	530.446	401.576	1.774	0.006	5.897	5.425	1239.595
2260004036	2 Stroke Snow blowers (Commercial)	35	870	619.073	231.242	2.069	0.007	6.880	6.330	1446.158

**Table 4-5. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2027 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2260004071	2 Stroke Commercial Turf Equipment	60	840	481.757	98.322	5.246	0.013	16.572	15.246	2446.591
2260005035	2 Stroke Sprayers	65	840	424.206	107.912	5.318	0.013	17.376	15.986	2430.751
2260006005	2 Stroke Generator Sets	68	830	483.483	131.465	5.251	0.013	16.809	15.464	2441.131
2260006010	2 Stroke Pumps	69	830	461.214	136.054	5.275	0.013	18.335	16.868	2396.282
2260006015	2 Stroke Air Compressors	56	830	512.953	134.653	5.246	0.013	17.574	16.168	2422.471
2260006035	2 Stroke Hydro Power Units	56	830	512.954	141.762	5.246	0.013	17.574	16.168	2422.474
2260007005	2 Stroke Chain Saws > 6 HP	70	620	586.888	137.090	3.366	0.008	21.491	19.772	1577.859
2265001010	4 Stroke Motorcycles: Off- Road	100	160	57.594	6.801	1.230	0.003	0.147	0.135	504.291
2265001030	4 Stroke ATVs	100	170	80.511	7.915	0.945	0.003	0.147	0.135	532.941
2265001050	4 Stroke Golf Carts	46	740	587.435	13.470	4.915	0.013	0.301	0.277	2345.374
2265001060	4 Stroke Specialty Vehicles/Carts	58	820	548.195	16.333	5.881	0.013	0.236	0.217	2283.892
2265002003	4 Stroke Pavers	66	700	433.776	9.466	4.226	0.012	0.257	0.237	2156.052
2265002006	4 Stroke Tampers/Rammers	55	760	572.718	12.615	4.539	0.013	0.251	0.231	2345.274
2265002009	4 Stroke Plate Compactors	55	830	488.677	15.046	5.123	0.014	0.518	0.476	2584.958
2265002015	4 Stroke Rollers	62	690	448.749	9.941	4.302	0.012	0.254	0.233	2152.867
2265002021	4 Stroke Paving Equipment	59	780	530.888	14.070	4.739	0.013	0.345	0.318	2415.679
2265002024	4 Stroke Surfacing Equipment	49	750	535.791	13.424	4.821	0.013	0.359	0.330	2389.370
2265002027	4 Stroke Signal Boards/Light Plants	72	780	525.787	13.418	5.091	0.014	0.464	0.427	2495.238
2265002030	4 Stroke Trenchers	66	710	416.274	10.326	4.371	0.012	0.324	0.298	2202.697
2265002033	4 Stroke Bore/Drill Rigs	79	790	356.787	13.981	6.103	0.013	0.491	0.452	2395.650
2265002039	4 Stroke Concrete/Industrial Saws	78	710	519.790	11.420	4.626	0.012	0.279	0.257	2250.914
2265002042	4 Stroke Cement & Mortar Mixers	59	820	534.240	17.922	4.747	0.013	0.351	0.323	2450.651

**Table 4-5. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2027 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2265002045	4 Stroke Cranes	47	590	92.661	3.153	3.706	0.009	0.164	0.151	1638.570
2265002054	4 Stroke Crushing/Proc. Equipment	85	740	495.398	12.039	4.672	0.013	0.327	0.301	2310.778
2265002057	4 Stroke Rough Terrain Forklifts	63	570	31.599	1.568	2.782	0.009	0.155	0.143	1553.764
2265002060	4 Stroke Rubber Tire Loaders	71	550	24.345	1.389	2.723	0.009	0.153	0.141	1544.028
2265002066	4 Stroke Tractors/Loaders/ Backhoes	48	730	543.081	11.346	4.566	0.013	0.264	0.243	2293.833
2265002072	4 Stroke Skid Steer Loaders	58	640	241.978	5.960	4.003	0.010	0.191	0.176	1858.567
2265002078	4 Stroke Dumpers/Tenders	41	800	544.577	17.087	4.779	0.013	0.281	0.259	2364.039
2265002081	4 Stroke Other Construction Equipment	48	580	43.023	2.309	4.101	0.009	0.152	0.140	1564.314
2265003010	4 Stroke Aerial Lifts	46	630	164.916	4.511	3.752	0.010	0.174	0.160	1747.175
2265003020	4 Stroke Forklifts	30	560	24.058	1.348	2.708	0.009	0.152	0.140	1544.026
2265003030	4 Stroke Sweepers/Scrubbers	71	610	202.633	5.245	3.452	0.010	0.220	0.202	1822.910
2265003040	4 Stroke Other General Industrial Equipment	54	760	441.493	13.779	5.056	0.013	0.533	0.491	2400.477
2265003050	4 Stroke Other Material Handling Equipment	53	640	197.451	4.948	3.504	0.010	0.183	0.168	1796.548
2265003060	4 Stroke AC/Refrigeration	46	740	575.264	12.570	4.604	0.013	0.260	0.239	2345.291
2265003070	4 Stroke Terminal Tractors	78	520	24.496	1.360	2.731	0.009	0.154	0.142	1544.025
2265004010	4 Stroke Lawn mowers (Residential)	33	900	422.982	24.094	5.353	0.015	0.642	0.591	2759.957
2265004011	4 Stroke Lawn mowers (Commercial)	33	880	427.374	14.859	5.557	0.015	0.717	0.659	2759.984
2265004015	4 Stroke Rotary Tillers < 6 HP (Residential)	40	910	422.889	20.969	5.353	0.015	0.643	0.591	2760.132
2265004016	4 Stroke Rotary Tillers < 6 HP (Commercial)	40	890	423.788	13.407	5.394	0.015	0.658	0.605	2760.143
2265004025	4 Stroke Trimmers/Edgers/Brush Cutter HP (Residential)	91	900	423.898	20.269	5.400	0.015	0.660	0.607	2760.145
2265004026	4 Stroke Trimmers/Edgers/Brush Cutter (Commercial)	91	820	496.870	12.441	5.116	0.014	0.500	0.460	2566.416
2265004030	4 Stroke Leaf blowers/Vacuums (Residential)	94	900	423.915	27.586	5.400	0.015	0.660	0.607	2760.146

**Table 4-5. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2027 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2265004031	4 Stroke Leaf blowers/Vacuums (Commercial)	94	700	433.969	8.458	4.191	0.012	0.249	0.229	2154.584
2265004035	4 Stroke Snow blowers (Residential)	35	940	605.480	232.016	4.734	0.008	0.126	0.116	1506.663
2265004036	4 Stroke Snow blowers (Commercial)	35	940	710.051	33.885	5.385	0.009	0.147	0.135	1757.280
2265004040	4 Stroke Rear Engine Riding Mowers (Residential)	38	760	571.391	22.375	4.515	0.013	0.247	0.228	2346.244
2265004041	4 Stroke Rear Engine Riding Mowers (Commercial)	38	740	574.510	11.400	4.594	0.013	0.259	0.238	2346.060
2265004046	4 Stroke Front Mowers	65	790	567.916	12.200	4.620	0.013	0.243	0.224	2339.209
2265004051	4 Stroke Shredders < 6 HP	80	890	423.374	13.951	5.375	0.015	0.651	0.599	2760.139
2265004055	4 Stroke Lawn & Garden Tractors (Residential)	44	760	571.332	16.859	4.507	0.013	0.247	0.227	2345.557
2265004056	4 Stroke Lawn & Garden Tractors (Commercial)	44	740	574.680	10.813	4.593	0.013	0.258	0.238	2345.580
2265004066	4 Stroke Chippers/Stump Grinders	78	640	292.434	6.266	3.694	0.011	0.213	0.196	1930.390
2265004071	4 Stroke Commercial Turf Equipment	60	730	487.201	10.458	4.536	0.013	0.315	0.290	2309.799
2265004075	4 Stroke Other Lawn & Garden Equipment	58	850	496.792	23.336	5.009	0.014	0.445	0.410	2556.328
2265004076	4 Stroke Other Lawn & Garden Equipment	58	850	494.065	21.511	5.014	0.014	0.443	0.408	2550.472
2265005010	4 Stroke 2-Wheel Tractors	62	740	577.448	11.900	4.660	0.013	0.267	0.246	2345.308
2265005015	4 Stroke Agricultural Tractors	62	580	105.750	2.877	3.008	0.009	0.170	0.157	1661.918
2265005020	4 Stroke Combines	74	580	101.750	8.189	9.153	0.009	0.153	0.141	1616.511
2265005025	4 Stroke Balers	62	580	102.099	10.105	9.182	0.009	0.153	0.141	1616.851
2265005030	4 Stroke Agricultural Mowers	48	770	571.193	12.386	4.535	0.013	0.251	0.231	2347.679
2265005035	4 Stroke Sprayers	65	740	377.861	14.023	6.440	0.012	0.300	0.276	2177.119
2265005040	4 Stroke Tillers > 6 HP	71	870	685.645	21.528	7.332	0.013	0.246	0.226	2421.882
2265005045	4 Stroke Swathers	52	580	102.099	8.247	9.182	0.009	0.153	0.141	1616.851
2265005055	4 Stroke Other Agricultural Equipment	55	620	196.244	7.654	8.221	0.010	0.175	0.161	1767.691

**Table 4-5. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2027 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2265005060	4 Stroke Irrigation Sets	60	550	36.194	1.755	2.800	0.009	0.168	0.154	1571.227
2265006005	4 Stroke Generator Sets	68	780	557.703	14.642	4.602	0.013	0.287	0.264	2383.902
2265006010	4 Stroke Pumps	69	760	437.915	12.349	4.803	0.013	0.414	0.381	2358.942
2265006015	4 Stroke Air Compressors	56	700	359.999	9.554	4.239	0.012	0.336	0.309	2143.772
2265006025	4 Stroke Welders	68	710	472.538	9.919	4.354	0.012	0.259	0.238	2199.296
2265006030	4 Stroke Pressure Washers	85	800	520.770	14.104	4.901	0.014	0.415	0.382	2489.834
2265006035	4 Stroke Hydro Power Units	56	750	540.015	12.592	4.748	0.013	0.334	0.307	2370.581
2265007010	4 Stroke Shredders > 6 HP	80	800	573.912	12.079	4.558	0.013	0.241	0.222	2347.570
2265007015	4 Stroke Forest Equipment - Feller/Bunch/Skidder	70	810	492.136	14.561	5.384	0.014	0.598	0.551	2593.347
2265008005	4 Stroke Airport Ground Support Equipment	56	600	129.540	4.228	3.268	0.010	0.233	0.214	1744.053
2265010010	4 Stroke Other Oil Field Equipment	90	740	594.072	12.552	5.085	0.013	0.323	0.297	2345.418
2267001060	LPG Specialty Vehicle Carts	58	490	33.352	1.229	6.016	0.006	0.126	0.126	1261.943
2267002003	LPG Pavers	66	460	10.956	0.251	2.073	0.006	0.128	0.128	1216.746
2267002015	LPG Rollers	62	450	10.596	0.244	2.050	0.006	0.128	0.128	1216.732
2267002021	LPG Paving Equipment	59	480	18.692	0.557	3.287	0.006	0.127	0.127	1229.821
2267002024	LPG Surfacing Equipment	49	460	11.204	0.259	2.103	0.006	0.128	0.128	1217.022
2267002030	LPG Trenchers	66	460	10.865	0.250	2.068	0.006	0.128	0.128	1216.743
2267002033	LPG Bore/Drill Rigs	79	490	40.496	1.479	6.988	0.006	0.125	0.125	1271.389
2267002039	LPG Concrete/Industrial Saws	78	430	10.725	0.249	2.062	0.006	0.129	0.129	1216.741
2267002045	LPG Cranes	47	480	15.954	0.442	2.831	0.006	0.127	0.127	1224.784
2267002054	LPG Crushing/Proc. Equipment	85	480	14.911	0.396	2.641	0.006	0.127	0.127	1222.548
2267002057	LPG Rough Terrain Forklifts	63	470	11.084	0.254	2.081	0.006	0.128	0.128	1216.750

**Table 4-5. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2027 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2267002060	LPG Rubber Tire Loaders	71	460	10.553	0.243	2.047	0.006	0.128	0.128	1216.729
2267002066	LPG Tractors/Loaders/ Backhoes	48	450	10.569	0.243	2.048	0.006	0.128	0.128	1216.730
2267002072	LPG Skid Steer Loaders	58	470	15.924	0.454	2.884	0.006	0.127	0.127	1225.749
2267002081	LPG Other Construction Equipment	48	480	18.443	0.554	3.283	0.006	0.126	0.126	1230.079
2267003010	LPG Aerial Lifts	46	480	14.808	0.415	2.748	0.006	0.125	0.125	1224.638
2267003020	LPG Forklifts	30	460	10.429	0.238	2.035	0.006	0.127	0.127	1216.720
2267003030	LPG Sweepers/Scrubbers	71	440	10.578	0.244	2.049	0.006	0.128	0.128	1216.731
2267003040	LPG Other General Industrial Equipment	54	450	10.469	0.240	2.039	0.006	0.127	0.127	1216.724
2267003050	LPG Other Material Handling Equipment	53	480	12.675	0.313	2.331	0.006	0.125	0.125	1219.608
2267003070	LPG Terminal Tractors	78	430	10.619	0.245	2.053	0.006	0.128	0.128	1216.734
2267004066	LPG Chippers/Stump Grinders	78	450	10.538	0.242	2.045	0.006	0.128	0.128	1216.728
2267005055	LPG Other Agricultural Equipment	55	490	51.441	1.732	7.876	0.006	0.128	0.128	1275.242
2267005060	LPG Irrigation Sets	60	450	10.561	0.243	2.047	0.006	0.128	0.128	1216.730
2267006005	LPG Generator Sets	68	480	22.532	0.719	4.745	0.006	0.124	0.124	1247.780
2267006010	LPG Pumps	69	470	13.627	0.367	2.767	0.006	0.125	0.125	1225.214
2267006015	LPG Air Compressors	56	460	10.553	0.239	2.042	0.006	0.127	0.127	1216.722
2267006025	LPG Welders	68	460	10.485	0.239	2.038	0.006	0.126	0.126	1216.720
2267006030	LPG Pressure Washers	85	470	16.389	0.454	2.881	0.006	0.126	0.126	1225.252
2267006035	LPG Hydro Power Units	56	460	10.709	0.241	2.051	0.006	0.127	0.127	1216.726
2267008005	LPG Airport Ground Support Equipment	56	450	10.513	0.241	2.043	0.006	0.127	0.127	1216.727
2268002081	CNG Other Construction Equipment	48	480	18.384	2.016	3.360	0.006	0.126	0.126	1286.929
2268003020	CNG Forklifts	30	460	10.429	0.907	2.131	0.006	0.127	0.127	1159.797



**Table 4-5. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2027**  
**Table 4-5. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 202 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2268003030	CNG Sweepers/Scrubbers	71	460	10.439	0.908	2.132	0.006	0.127	0.127	1159.931
2268003040	CNG Other General Industrial Equipment	54	460	10.432	0.907	2.131	0.006	0.127	0.127	1159.838
2268003060	CNG AC Refrigeration	46	450	10.519	0.917	2.139	0.006	0.127	0.127	1160.908
2268003070	CNG Terminal Tractors	78	430	10.618	0.932	2.149	0.006	0.128	0.128	1162.417
2268005055	CNG Other Agricultural Equipment	55	510	51.347	6.200	7.929	0.006	0.128	0.128	1761.163
2268005060	CNG Irrigation Sets	60	510	10.566	0.925	2.144	0.006	0.128	0.128	1161.700
2268006005	CNG Generator Sets	68	490	24.688	2.904	5.299	0.006	0.124	0.124	1400.851
2268006010	CNG Pumps	69	480	15.226	1.585	3.218	0.006	0.125	0.125	1241.954
2268006015	CNG Air Compressors	56	470	10.550	0.908	2.137	0.006	0.127	0.127	1159.978
2268006020	CNG Gas Compressors	85	410	11.753	1.087	2.256	0.006	0.139	0.139	1178.200
2268006035	CNG Hydro Power Units	56	470	10.827	0.911	2.149	0.006	0.126	0.126	1160.218
2268010010	CNG Other Oil Field Equipment	90	410	11.074	0.995	2.192	0.006	0.133	0.133	1168.758
2270001060	Diesel Specialty Vehicle Carts	21	450	4.359	1.088	6.451	0.005	0.653	0.634	1440.903
2270002003	Diesel Pavers	59	380	0.242	0.049	1.427	0.003	0.042	0.041	1214.360
2270002006	Diesel Tampers/Rammers	43	1000	5.524	1.838	9.256	0.005	0.549	0.533	1300.291
2270002009	Diesel Plate Compactors	43	410	4.778	1.489	8.935	0.005	0.491	0.477	1300.540
2270002015	Diesel Rollers	59	390	0.400	0.078	1.885	0.003	0.063	0.061	1233.959
2270002018	Diesel Scrapers	59	370	0.270	0.044	0.666	0.003	0.044	0.043	1183.462
2270002021	Diesel Paving Equipment	59	390	0.650	0.139	2.222	0.003	0.101	0.097	1227.333
2270002024	Diesel Surfacing Equipment	59	380	1.068	0.181	3.458	0.003	0.147	0.143	1224.488
2270002027	Diesel Signal Boards/Light Plants	43	410	2.465	0.615	7.188	0.004	0.285	0.277	1293.852
2270002030	Diesel Trenchers	59	400	0.725	0.133	3.829	0.003	0.094	0.091	1273.812

**Table 4-5. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2027 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2</sub> <sup>g</sup>
2270002033	Diesel Bore/Drill Rigs	43	370	1.120	0.284	4.459	0.004	0.200	0.194	1190.809
2270002036	Diesel Excavators	59	380	0.138	0.034	0.754	0.003	0.028	0.027	1194.769
2270002039	Diesel Concrete/Industrial Saws	59	410	0.919	0.182	4.388	0.004	0.115	0.111	1305.159
2270002042	Diesel Cement & Mortar Mixers	43	390	2.437	0.645	6.153	0.004	0.359	0.348	1245.223
2270002045	Diesel Cranes	43	370	0.234	0.053	1.029	0.003	0.044	0.043	1175.777
2270002048	Diesel Graders	59	370	0.111	0.027	0.427	0.003	0.026	0.025	1185.409
2270002051	Diesel Off-highway Trucks	59	370	0.139	0.058	3.049	0.003	0.040	0.039	1183.458
2270002054	Diesel Crushing/Proc. Equipment	43	380	0.377	0.082	2.174	0.003	0.058	0.057	1203.342
2270002057	Diesel Rough Terrain Forklifts	59	390	0.526	0.066	2.062	0.003	0.091	0.088	1255.930
2270002060	Diesel Rubber Tire Loaders	59	370	0.339	0.062	1.497	0.003	0.061	0.059	1190.523
2270002066	Diesel Tractors/Loaders/ Backhoes	21	460	2.127	0.427	3.605	0.004	0.359	0.348	1467.635
2270002069	Diesel Crawler Tractor/Dozers	59	370	0.231	0.046	1.227	0.003	0.044	0.043	1190.057
2270002072	Diesel Skid Steer Loaders	21	480	5.011	1.016	7.118	0.005	0.760	0.737	1530.534
2270002075	Diesel Off-Highway Tractors	59	370	0.456	0.090	2.913	0.003	0.076	0.073	1183.420
2270002078	Diesel Dumpers/Tenders	21	470	4.917	1.155	7.145	0.005	0.719	0.697	1509.931
2270002081	Diesel Other Construction Equipment	59	370	0.673	0.100	1.823	0.003	0.098	0.095	1185.595
2270003010	Diesel Aerial Lifts	21	480	4.387	0.916	7.205	0.005	0.587	0.569	1532.338
2270003020	Diesel Forklifts	59	400	0.182	0.043	2.291	0.003	0.027	0.026	1265.585
2270003030	Diesel Sweepers/Scrubbers	43	380	0.229	0.052	1.559	0.003	0.037	0.036	1219.340
2270003040	Diesel Other General Industrial Equipment	43	380	0.319	0.064	1.474	0.003	0.060	0.058	1205.589
2270003050	Diesel Other Material Handling Equipment	21	440	2.400	0.600	4.437	0.004	0.396	0.384	1414.637
2270003060	Diesel AC/Refrigeration	43	410	0.683	0.183	5.812	0.004	0.067	0.065	1301.619

**Table 4-5. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2027 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2e</sub> <sup>g</sup>
2270003070	Diesel Terminal Tractors	59	380	0.084	0.024	0.628	0.003	0.019	0.019	1199.666
2270004031	Diesel Leaf blowers/Vacuums	43	410	4.525	1.310	9.293	0.004	0.617	0.599	1299.694
2270004036	Diesel Snow blowers	43	370	0.672	0.168	2.527	0.002	0.114	0.111	682.669
2270004046	Diesel Front Mowers	43	410	2.161	0.518	7.102	0.004	0.275	0.267	1301.187
2270004056	Diesel Lawn & Garden Tractors	43	410	3.112	0.735	7.991	0.005	0.359	0.349	1301.045
2270004066	Diesel Chippers/Stump Grinders	43	380	1.532	0.330	4.714	0.004	0.269	0.261	1216.131
2270004071	Diesel Commercial Turf Equipment	43	400	0.691	0.170	3.550	0.003	0.084	0.081	1263.312
2270004076	Diesel Other Lawn & Garden Equipment	43	410	2.764	0.610	7.495	0.004	0.431	0.418	1293.705
2270005010	Diesel 2-Wheel Tractors	59	410	5.439	1.847	9.223	0.005	0.529	0.513	1313.071
2270005015	Diesel Agricultural Tractors	59	380	1.293	0.221	3.593	0.004	0.215	0.209	1211.545
2270005020	Diesel Combines	59	370	1.893	0.439	5.340	0.004	0.370	0.359	1185.731
2270005025	Diesel Balers	59	400	3.696	0.656	7.007	0.004	0.514	0.499	1270.413
2270005030	Diesel Agricultural Mowers	59	410	3.605	0.432	5.272	0.004	0.539	0.523	1313.599
2270005035	Diesel Sprayers	59	380	2.193	0.489	5.337	0.004	0.348	0.338	1196.279
2270005040	Diesel Tillers > 6 HP	59	370	2.365	0.383	5.213	0.004	0.301	0.292	1186.903
2270005045	Diesel Swathers	59	400	3.977	0.598	6.715	0.004	0.569	0.552	1284.881
2270005055	Diesel Other Agricultural Equipment	59	380	1.632	0.294	4.009	0.004	0.288	0.279	1196.724
2270005060	Diesel Irrigation Sets	43	390	0.671	0.126	2.677	0.003	0.122	0.118	1235.344
2270006005	Diesel Generator Sets	43	390	1.875	0.448	5.632	0.004	0.291	0.282	1254.532
2270006010	Diesel Pumps	43	390	1.958	0.459	5.576	0.004	0.315	0.306	1253.589
2270006015	Diesel Air Compressors	43	400	0.601	0.110	3.227	0.003	0.092	0.089	1266.243
2270006020	Diesel Gas Compressors	43	410	0.205	0.044	2.965	0.003	0.032	0.032	1301.567

**Table 4-5. Criteria Pollutant Emission Factors for Non-Road Engines and Equipment – 2027 (cont.)**

SCC	Equipment Description	Load Factor <sup>a</sup> (% Max Power)	BSFC <sup>b</sup> (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> <sup>d</sup>	PM <sub>2.5</sub> <sup>e,f</sup>	CO <sub>2</sub> <sup>g</sup>
2270006025	Diesel Welders	21	480	4.189	0.856	7.181	0.005	0.573	0.556	1530.584
2270006030	Diesel Pressure Washers	43	380	1.848	0.492	5.500	0.004	0.271	0.262	1224.814
2270006035	Diesel Hydro Power Units	43	400	0.767	0.158	3.749	0.004	0.109	0.106	1272.464
2270007015	Diesel Forest Equipment - Feller/Bunch/Skidder	59	370	0.081	0.022	0.369	0.003	0.020	0.019	1186.535
2270008005	Diesel Airport Ground Support Equipment	59	380	0.362	0.059	1.146	0.003	0.064	0.062	1195.522
2270009010	Diesel Other Underground Mining Equipment	21	450	8.080	1.925	10.765	0.005	0.943	0.915	1429.164
2270010010	Diesel Other Oil Field Equipment	43	370	0.287	0.075	2.369	0.003	0.052	0.050	1174.773
2282005010	2 Stroke Outboard	21	850	210.774	52.946	12.992	0.012	0.291	0.268	2241.266
2282005015	2 Stroke Personal Water Craft	21	820	252.215	18.196	14.080	0.012	0.137	0.126	2153.366
2282010005	4 Stroke Inboard/Stern-drive	21	630	107.630	19.175	8.852	0.010	0.151	0.139	1837.679
2282020005	Diesel Inboard/Stern-drive	35	370	2.242	0.627	9.238	0.011	0.223	0.217	1173.399
2282020010	Diesel Outboards	35	410	3.851	1.150	6.229	0.012	0.570	0.553	1300.424
2285002015	Diesel Railway Maintenance	21	440	2.848	0.684	4.889	0.004	0.503	0.488	1402.334
2285004015	4 Stroke Railway Maintenance	62	750	530.287	13.711	4.573	0.013	0.294	0.270	2343.443
2285006015	LPG Railway Maintenance	62	480	12.570	0.299	2.261	0.006	0.126	0.126	1218.454

Notes for Table 4-1 through Table 4-5 provided on the following page.

## Notes for Table 4-1 through Table 4-5

- a. Load factor and activity data obtained from EPA Office of Transportation Air Quality and were derived from *Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling*, EPA 420-R-10-016, NR-005d, July 2010.
- b. BSFC and emission factors obtained from EPA Office of Transportation Air Quality and were derived from *Exhaust Emission Factors for Nonroad Engine Modeling: Spark-Ignition*, EPA 420-R-019, NR-010e, December 2005, and *Exhaust Emission Factors for Nonroad Engine Modeling: Compression-Ignition*, EPA 420-P-04-009, NR-009c, April 2004. The emission factors are composite emission factors that represent the national mix of model years and technology types believed to be in existence in 2007. They represent in-use emissions and consider NONROAD model deterioration and transient adjustment factors across all model years.
- c. Activities for off-road motorcycles and all-terrain vehicles are in units of miles per year instead of hours per year.
- d. PM<sub>10</sub> is assumed to be equivalent to total PM for gasoline engines.
- e. For gasoline engines, PM<sub>2.5</sub> is assumed to be 92% of the PM<sub>10</sub> value.
- f. For LPG and CNG engines, all PM is assumed to be PM<sub>2.5</sub>.
- g. The Carbon Dioxide Equivalent (CO<sub>2</sub>e) emission factors are the total of CO<sub>2</sub> and CH<sub>4</sub> converted to equivalent CO<sub>2</sub> (CO<sub>2</sub>e) using a global warming potential (GWP) value of 25 for CH<sub>4</sub>. The converted CH<sub>4</sub> value was added to the CO<sub>2</sub> emission factor and presented as a CO<sub>2</sub>e emission factor in units of lb/1000lb. Calculations were made using the stated BSFC, the fuel density in Table 3-1, and if the fuel was not stated, it was assumed to be gasoline. N<sub>2</sub>O is not included in these calculations because there is no N<sub>2</sub>O pollutant output for the NONROAD module within MOVES3.

**Table 4-6. Pre-1998 Non-Road CI Engine Criteria Pollutant Emission Factors (Power Rating > 50 hp)**

Equipment Description	Emission Factors (lb/1000 hp-hr)						
	CO	VOC <sup>a</sup>	NO <sub>x</sub>	SO <sub>x</sub>	PM <sub>10</sub> <sup>b</sup>	PM <sub>2.5</sub> <sup>c</sup>	CO <sub>2e</sub> <sup>d</sup>
<b>Construction Equipment</b>							
Asphalt Pavers	7.05	1.39	22.71	0.21	1.98	1.92	1323.47
Plate Compactors	6.83	1.86	20.50	0.21	1.98	1.92	1323.47
Concrete Pavers	10.08	2.55	22.09	0.21	1.98	1.92	1323.47
Rollers	6.83	1.86	20.50	0.21	1.72	1.67	1323.47
Scrapers	11.02	1.63	19.18	0.21	2.78	2.69	1323.47
Paving Equipment	10.14	2.34	24.27	0.21	1.98	1.92	1323.47
Signal Boards	11.02	2.79	17.64	0.21	2.20	2.14	1323.47
Trenchers	20.15	3.58	22.09	0.21	3.17	3.08	1323.47
Bore/Drill Rigs	20.28	3.27	24.27	0.21	3.17	3.08	1323.47
Excavators	11.46	1.63	23.70	0.21	3.17	3.08	1323.47
Concrete/Industrial Saws	20.28	3.27	24.27	0.21	3.17	3.08	1323.47
Cement and Mortar Mixers	10.14	2.34	24.27	0.21	1.98	1.92	1323.47
Cranes	9.26	2.93	22.71	0.21	3.17	3.08	1323.47
Graders	8.38	3.58	21.16	0.21	2.20	2.14	1323.47
Off-Highway Trucks	6.17	1.95	21.16	0.21	1.76	1.71	1323.47
Crushing/Processing Equipment	20.28	3.27	24.27	0.21	3.17	3.08	1323.47
Rough Terrain Forklifts	22.05	3.90	17.64	0.21	3.53	3.42	1323.47
Rubber Tired Dozers	6.17	1.95	22.71	0.21	1.46	1.41	1323.47
Tractors/Loaders/Backhoes	14.99	3.25	22.27	0.21	2.31	2.25	1323.47
Crawler Tractors	10.58	2.93	22.71	0.21	2.45	2.37	1323.47
Skid Steer Loaders	19.84	4.88	21.16	0.21	3.17	3.08	1323.47
Off-Highway Tractors	32.36	4.78	26.26	0.21	4.48	4.34	1323.47
Dumpers/Tenders	6.17	1.95	21.16	0.21	3.17	3.08	1323.47
Other Construction Equipment	20.28	3.27	24.27	0.21	3.17	3.08	1323.47
<b>Industrial Equipment</b>							
Aerial Lifts	13.36	3.64	30.86	0.21	3.53	3.42	1323.47
Forklifts	13.36	3.64	30.86	0.21	3.53	3.42	1323.47
Sweepers/Scrubbers	13.36	3.64	30.86	0.21	3.53	3.42	1323.47
Other General Equipment	13.36	3.64	30.86	0.21	3.53	3.42	1323.47
Other Material Handling Equipment	13.36	3.64	30.86	0.21	3.53	3.42	1323.47
<b>Lawn and Garden Equipment</b>							
Rear Engine Riding Mowers	11.02	2.79	17.64	0.21	2.20	2.14	1323.47
Lawn and Garden Tractors	11.02	2.79	17.64	0.21	2.20	2.14	1323.47
Wood Splitters	11.02	2.79	17.64	0.21	2.20	2.14	1323.47
Chippers/Stump Grinders	11.02	2.79	17.64	0.21	2.20	2.14	1323.47
Other Equipment	11.02	2.79	17.64	0.21	2.20	2.14	1323.47

**Table 4-6. Pre-1998 Non-Road CI Engine Criteria Pollutant Emission Factors (Power Rating > 50 hp)**

Equipment Description	Emission Factors (lb/1000 hp-hr)						
	CO	VOC <sup>a</sup>	NO <sub>x</sub>	SO <sub>x</sub>	PM <sub>10</sub> <sup>b</sup>	PM <sub>2.5</sub> <sup>c</sup>	CO <sub>2e</sub> <sup>d</sup>
<b>Agricultural Equipment</b>							
Tractors	19.71	5.32	24.71	0.21	4.52	4.38	1323.47
Sprayers	8.33	5.18	17.15	0.21	3.33	3.23	1323.47
Tillers	11.02	2.79	17.64	0.21	2.20	2.14	1323.47
Hydro Power Units	8.33	5.18	17.15	0.21	3.33	3.23	1323.47
Other Equipment	9.63	4.23	24.52	0.21	3.33	3.23	1323.47
<b>Logging Equipment</b>							
Skidders	11.46	1.95	24.91	0.21	3.17	3.08	1323.47
Fellers/Bunchers	11.46	1.95	24.91	0.21	3.17	3.08	1323.47
<b>Recreational Equipment</b>							
Specialty Vehicles/Carts	11.02	2.79	17.64	0.21	2.20	2.14	1323.47

SOURCE: *Nonroad Engine and Vehicle Emission Study – Report*, EPA 460/3-91-02, 21A-2001, November 1991.

- Reported as hydrocarbon (HC) and converted to VOC by multiplying value by a conversion factor (1.053). This value recommended by the document *Conversion Factors for Hydrocarbon Emission Components*, U.S. Environmental Protection Agency (EPA), Office of Transportation and Air Quality, July 2010.
- Reported as particulate matter (PM) in the source document and assumed to be equal to PM<sub>10</sub>.
- Assumed to be 97% of PM<sub>10</sub> per *Exhaust and Crankshaft Emission Factors for Nonroad Engine Modeling: Compression-Ignition*, EPA 420-P-04-009, April 2004.
- The Greenhouse Gas (GHG) emission factors calculated by summing the product of the emission factors for CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O and their respective global warming potentials (GWP). The GWP for CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O are 1, 25, and 298, respectively. Emission factors for individual GHG calculated by taking the product of the default emission factor provided in Tables C-1 and C-2 of Title 40 Code of Federal Regulations (CFR) Part 98 and the brake-specific fuel consumption (BSFC) for diesel engines provided in Table 3-1.

**Table 4-7. Weight Percent Speciation of VOC Emissions for Non-Road Engines**

Compound	HAP	Gasoline <sup>a</sup>	Diesel <sup>b</sup>	Natural Gas <sup>c</sup>			LPG <sup>d</sup>
				2-Stroke LB	4-Stroke LB	4-Stroke RB	
Acenaphthene	X	---	0.02%	0.00%	0.00%	---	---
Acenaphthylene	X	---	0.08%	0.00%	0.01%	---	---
Acetaldehyde	X	0.30%	11.88%	6.49%	7.00%	8.63%	0.88%
Acetylene		15.47%	---	---	---	---	---
Acrolein	X	---	1.43%	6.51%	4.31%	8.14%	---
Anthracene	X	---	0.03%	0.00%	---	---	---
Benz(a)anthracene	X	---	0.03%	0.00%	---	---	---
Benzaldehyde		0.26%	---	---	---	---	---
Benzene	X	5.83%	14.46%	1.62%	0.37%	4.89%	3.23%
Benzo(a)pyrene	X	---	0.00%	0.00%	---	---	---
Benzo(b)fluoranthene	X	---	0.00%	0.00%	0.00%	---	---
Benzo(k)fluoranthene	X	---	0.00%	0.00%	---	---	---
Benzo(g,h,i)perylene	X	---	0.01%	0.00%	0.00%	---	---
Benzo(c)pyrene	X	---	---	0.00%	0.00%	---	---
Biphenyl	X	---	---	0.00%	0.18%	---	---
1,3-Butadiene	X	0.99%	0.61%	0.69%	0.22%	2.05%	---
Butane		---	---	3.97%	0.45%	---	---
n-Butane		2.19%	---	---	---	---	---
1-Butene		0.40%	---	---	---	---	---
cis-2-Butene		0.22%	---	---	---	---	---
trans-2-Butene		0.28%	---	---	---	---	---
Butyl isobutyraldehyde		---	---	0.37%	0.09%	0.15%	0.59%
Carbon Tetrachloride	X	---	---	0.03%	0.03%	0.03%	---
Chlorobenzene		---	---	0.04%	0.03%	0.04%	---
Chloroethane	X	---	---	---	0.00%	---	---
Chloroform	X	---	---	0.04%	0.02%	0.04%	---
Chrysene	X	---	0.00%	0.00%	0.00%	---	---
Cyclohexane		---	---	0.26%	---	---	---
Cyclopentane		---	---	0.08%	0.19%	---	---
1,3-Cyclopentadiene		0.26%	---	---	---	---	---
Dibenz(a,h)anthracene	X	---	0.01%	---	---	---	---
1,1-Dichloroethane	X	---	---	0.03%	0.02%	0.03%	---
1,2-Dichloroethane	X	---	---	0.04%	0.02%	0.03%	---
1,2-Dichloropropane	X	---	---	0.04%	0.02%	0.04%	---
1,3-Dichloropropane	X	---	---	0.04%	0.02%	0.04%	---
Dicyclopentadiene		0.27%	---	---	---	---	---
1,2-Dimethylbenzene		0.56%	---	---	---	---	---
1,3-Dimethylbenzene		0.45%	---	---	---	---	---
2,2-Dimethylbutane		0.30%	---	---	---	---	---
2,3-Dimethylbutane		0.62%	---	---	---	---	---
trans-1,3-Dimethylcyclopentane		0.28%	---	---	---	---	---
2,3-Dimethylhexane		0.32%	---	---	---	---	---
2,4-Dimethylhexane		0.45%	---	---	---	---	---
2,5-Dimethylhexane		0.24%	---	---	---	---	---
2,3-Dimethylpentane		1.16%	---	---	---	---	---
2,4-Dimethylpentane		0.71%	---	---	---	---	---
1,2-Dimethyl-4-Ethylbenzene		0.17%	---	---	---	---	---
1,3-Dimethyl-2-Ethylbenzene		0.34%	---	---	---	---	---
1,3-Dimethyl-4-Ethylbenzene		0.20%	---	---	---	---	---
Ethylbenzene	X	2.00%	---	0.09%	0.03%	0.08%	0.29%
Ethylene		11.39%	---	---	---	---	18.53%
Ethylene Dibromide	X	---	---	0.06%	0.04%	0.07%	---
Fluoranthene	X	---	0.12%	0.00%	0.00%	---	---
Fluorene	X	---	0.45%	0.00%	0.01%	---	---
Formaldehyde	X	1.32%	18.28%	46.17%	44.24%	63.43%	23.82%
n-Heptane		0.78%	---	---	---	---	---
1-Hexene		0.20%	---	---	---	---	---
n-Hexane	X	0.45%	---	0.37%	0.93%	---	0.59%
trans-2-Hexene		0.16%	---	---	---	---	---
Indan		---	---	---	---	---	---
Indeno(1,2,3-c,d)pyrene	X	0.24%	0.01%	0.00%	---	---	---

Compound	HAP	Gasoline <sup>a</sup>	Diesel <sup>b</sup>	Natural Gas <sup>c</sup>			LPG <sup>d</sup>
				2-Stroke LB	4-Stroke LB	4-Stroke RB	
Isobutane		---	---	---	3.14%	---	---
Isobutene		2.02%	---	---	---	---	---
Isopentane		5.50%	---	---	---	---	---
Isoprene		0.32%	---	---	---	---	---
Methanol	X	0.15%	---	2.07%	2.10%	9.47%	---
2-Methyl-1-Butene		0.35%	---	---	---	---	---
2-Methyl-2-Butene		0.37%	---	---	---	---	---
Methylcyclohexane		0.24%	---	0.28%	1.03%	---	---
Methylcyclopentane		0.40%	---	---	---	---	---
1-Methylcyclopentene		0.16%	---	---	---	---	---
1-Methyl-2-Ethylbenzene		0.50%	---	---	---	---	---
1-Methyl-3-Ethylbenzene		1.52%	---	---	---	---	---
1-Methyl-4-Ethylbenzene		0.71%	---	---	---	---	---
2-Methylheptane		0.37%	---	---	---	---	---
3-Methylheptane		0.40%	---	---	---	---	---
4-Methylheptane		0.17%	---	---	---	---	---
2-Methylhexane		1.02%	---	---	---	---	---
3-Methylhexane		1.18%	---	---	---	---	---
3-Methyl-cis-3-Hexene		0.18%	---	---	---	---	---
2-Methylnaphthalene		---	---	0.02%	0.03%	---	---
3-Methyloctane		0.20%	---	---	---	---	---
2-Methyl-2-Pentene		0.18%	---	---	---	---	---
2-Methylpentane		1.73%	---	---	---	---	---
3-Methylpentane		0.99%	---	---	---	---	---
1-Methyl-3-Propylbenzene		0.26%	---	---	---	---	---
Methyl t-butyl ether	X	0.30%	---	---	---	---	---
Naphthalene	X	0.35%	1.31%	0.08%	0.06%	0.30%	---
n-Nonane		---	---	0.03%	0.09%	---	---
1-Nonene		0.61%	---	---	---	---	---
n-Octane		0.30%	---	0.06%	0.29%	---	---
1-Octene		0.22%	---	---	---	---	---
n-Pentane		0.71%	---	1.28%	2.18%	---	---
1-Pentene		0.27%	---	---	---	---	---
cis-2-Pentene		0.21%	---	---	---	---	---
trans-2-Pentene		0.34%	---	---	---	---	---
Perylene		---	---	0.00%	---	---	---
Phenanthrene	X	---	0.46%	0.00%	0.01%	---	---
Phenol	X	---	---	0.03%	0.02%	---	---
1,2-Propadiene		0.29%	---	---	---	---	---
Propane		---	---	24.01%	35.11%	---	---
n-Propylbenzene		0.38%	---	---	---	---	---
Propylene		4.72%	39.98%	---	---	---	49.71%
1-Propyne		0.48%	---	---	---	---	---
Pyrene	X	---	0.07%	0.00%	0.00%	---	---
Styrene	X	---	---	0.05%	0.02%	0.04%	---
Tetrachloroethane		---	---	---	0.00%	---	---
1,1,2,2-Tetrachloroethane	X	---	---	0.06%	0.03%	0.08%	---
1,2,3,5-Tetramethylbenzene		0.22%	---	---	---	---	---
Toluene		0.16%	---	---	---	---	---
Toluene	X	8.21%	6.34%	0.81%	0.34%	1.73%	1.18%
1,1,2-Trichloroethane	X	---	---	0.04%	0.03%	0.05%	---
1,2,3-Trimethylbenzene		0.40%	---	0.03%	0.02%	---	---
1,2,4-Trimethylbenzene		2.18%	---	0.09%	0.01%	---	---
1,3,5-Trimethylbenzene		0.77%	---	0.01%	0.03%	---	---
2,2,5-Trimethylbenzene		0.30%	---	---	---	---	---
2,2,4-Trimethylpentane	X	2.37%	---	0.71%	0.21%	---	---
2,3,4-Trimethylpentane		0.52%	---	---	---	---	---
Vinyl Chloride	X	---	---	0.02%	0.01%	0.02%	---
Vinylacetylene		0.23%	---	---	---	---	---
o-Vinyltoluene		0.26%	---	---	---	---	---
Xylenes	X	7.47%	4.42%	0.22%	0.15%	0.60%	1.18%

- a. SOURCE: Emission factors used to calculate weight percent taken from EPA’s SPECIATE profile #4738.
- b. SOURCE: Emission factors used to calculate weight percent taken from Section 3.3 of AP-42.
- c. SOURCE: Emission factors used to calculate weight percent taken from Section 3.2 of AP-42.
- d. SOURCE: Emission factors used to calculate weight percent taken from Mojave Desert AQMD.

“X” Indicates the compound is a HAP.

“---” Indicates No Data Available.



## 4.6 References

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## 5.0 ON-ROAD VEHICLES (VEHE)

**\*Air Force policy considers the dispensing of fuel into on-road vehicles as a mobile source of emissions. However, if the regulator insists this category be included as a stationary source, subtract those emissions from the Mobile AEI and add them to the Stationary AEI to avoid duplicate reporting. This is accomplished by manually calculating emissions generated from on-road vehicle refueling using the procedures given in the “Fuel Dispensing” section of this document, then subtracting those values from the emissions generated by on-road vehicles described in this section. \***

### 5.1 Introduction

On-road vehicles encompass the full range of passenger cars, light duty trucks, heavy duty trucks, buses, and motorcycles that are specifically designed to operate on highways and other road systems. On-road vehicles in use on USAF installations are classified either as Government Owned Vehicles (GOVs) or Privately Owned Vehicles (POVs). GOVs include all on-road vehicles that are owned or leased and operated by government organizations on the base (e.g., Air Force, Guard, Reserve, etc.). Such vehicles are typically referred to as “fleet vehicles” and range from small passenger cars to large vehicles such as refueling or fire trucks. This classification also includes Tactical Vehicles. Tactical vehicles are defined as any motor vehicle designed to military specifications to meet direct transportation support of combat, tactical or relief operations, or for training of personnel for such purposes. POVs are those on-road vehicles that travel on a USAF installation, but are owned or leased and operated by base employees and visitors. Both GOVs and POVs typically operate on conventional gasoline and diesel motor fuels, but may also operate on alternative, non-petroleum-based fuels.

**The emissions of concern from the operation of on-road vehicles include the criteria pollutants: NO<sub>x</sub>, VOC, CO, SO<sub>2</sub>, PM<sub>2.5</sub>, PM<sub>10</sub>, and GHGs as well as HAPs.** HAPs include: 1,3-butadiene., benzene, acetaldehyde, formaldehyde, acrolein, and methyl tert-butyl ether (MTBE). Some of these direct pollutant emissions also participate in atmospheric reactions that contribute to the formation of ground level ozone and fine PM pollution. Factors which impact the volume of pollutants emitted include the vehicle make and model, the vehicle miles traveled (VMT), the average operating speed, vehicle age, climate, altitude, fuel type and quality, and maintenance procedures. To control vehicle emissions, the EPA has adopted an integrated approach to controlling on-road vehicle emissions. This approach has resulted in the establishment of regulatory standards that consider changes in vehicle and engine design, advanced emission controls, and the mandated use of reformulated and cleaner burning fuels.

Emissions from the operation of on-road vehicles are designated as exhaust, evaporative, or fugitive in nature. Exhaust emissions result from the combustion (sometimes incomplete) of the

motor fuel while evaporative emissions result from the volatilization of the fuel in engine components during the different stages of a vehicle's operating cycle. Additionally, fugitive particulate emissions, in the form of road dust, brake wear dust, and tire wear dust, can be attributed to the operation of on-road vehicles.

The EPA is currently proposing to regulate greenhouse gases (GHGs) for both mobile and stationary sources. As a matter of USAF policy, GHG emissions are to be reported as part of the mobile AEI. Specifically, CO<sub>2</sub>, N<sub>2</sub>O and CH<sub>4</sub> emissions should be estimated for all mobile sources when EFs are available. Since CO<sub>2</sub>, N<sub>2</sub>O and CH<sub>4</sub> EFs are attainable for on-road vehicles, emissions should be estimated as part of a mobile source AEI. Additionally, although not currently regulated under the CAA, many regulatory agencies may request installations to include GHG emissions from motor vehicles in mobile source AEIs. Specific requests to calculate and provide CO<sub>2</sub> and/or N<sub>2</sub>O and CH<sub>4</sub> emissions data to regulatory agencies as part of this process should be reported through the appropriate Air Force Civil Engineer Center (AFCEC) channels and coordinated through the chain-of-command. Such coordination should be accomplished prior to responding to the request to ensure a consistent USAF response.

Since 1978, the EPA has used computer models to estimate emissions from cars, trucks, and other mobile sources. The EPA's initial on-road vehicle emissions modeling software, known as the MOBILE model, was expanded many times over the years to incorporate new data. The updates included new data on vehicle emissions and new vehicle emission standards, and better addressed new policy questions, while keeping the basic structure of the model. MOBILE uses average gram per mile emission rates and a series of correction factors to estimate emissions over a wide range of driving conditions. MOBILE6.2, finalized in 2004, was the EPA's official model for highway vehicle emissions. Several analysts have critiqued the MOBILE series of models and suggested that the EPA develop a modeling "toolkit" that would better serve the range of users for highway vehicle modeling, including consistent modeling at the aggregate scale, mesoscale, and microscale analyses.

In response to these and other concerns, the EPA developed the Motor Vehicle Emissions Simulator (MOVES) model. MOVES incorporates extensive new data and advanced algorithms to estimate highway vehicle emissions of GHGs, criteria pollutants, and selected air toxics at the national, regional, and project levels. In January of 2021, the EPA published an announcement in the Federal Register approving the newest model, MOVES3, for official use (outside of California). MOVES3 includes updated vehicle population data, travel activity, and emission rates and incorporates the impacts of the Heavy-Duty Greenhouse Gas Phase 2 rule. MOVES3 is used for EPA internal policy analysis and is required for use (outside of California) in the evaluation of State Implementation Plans (SIPs) and transportation conformity determinations. On the official EPA website, use of other models, such as the MOBILE model and previous

versions of MOVES, is being discouraged as they contain outdated or otherwise inaccurate data. The emission factors derived in this guide were generated using the MOVES3 model.

Vehicle emissions within the state of California are not calculated using MOVES software but instead use a similar, California-developed calculation model known as the EMISSION FACTOR (EMFAC) model. On January 15, 2021, California released the latest EMFAC Model, EMFAC2021 and an update was released in April 2022. The EMFAC2021 model was used to derive county emission factors in this guide.

The EPA has historically classified on-road vehicles into eight broad categories based on the motor fuel type and Gross Vehicle Weight (GVW). MOVES was designed to reflect the general fleet distribution or fleet characterization (i.e., fractional vehicle category distribution by year) for a specific location. MOVES can also estimate emission rates (e.g., grams/mile, grams/vehicle) or accept input VMT and vehicle populations to generate total emissions for any year from 1990 and 1999-2050. **The MOVES model incorporates emissions from on-road vehicle refueling. Therefore, these emissions are not addressed in the “Fuel Dispensing” section of this document since they are already accounted for in the EFs presented in this section.**

### 5.1.1 Vehicle Categories

The 28 vehicle *categories* from MOVES have been grouped into seven major aggregate categories based on vehicle type and Gross Vehicle Weight Rating (GVWR). Table 5-1 provides the seven major aggregate categories based upon available MOBILE6 EF outputs and readily identifiable general vehicle groupings. The seven aggregate vehicle categories are:

- ***Light-Duty Gasoline Vehicles (LDGV)*** – All gasoline-powered passenger cars
- ***Light-Duty Diesel Vehicles (LDDV)*** – All diesel-powered passenger cars
- ***Light-Duty Gasoline Trucks (LDGT)*** – All smaller gasoline-powered trucks (0 to 8,500 lbs. GVWR)
- ***Light-Duty Diesel Trucks (LDDT)*** – All smaller diesel-powered trucks (0 to 8,500 lbs. GVWR)
- ***Heavy-Duty Gasoline Vehicles (HDGV)*** – All larger gasoline-powered vehicles (8,501 lbs. to >60,000 lbs. GVWR)
- ***Heavy-Duty Diesel Vehicles (HDDV)*** – All larger diesel-powered vehicles (10,001 lbs. to > 60,000 lbs. GVWR)
- ***Motorcycles (MC)*** – All motorcycles (assumed to be gasoline-powered)

### 5.1.2 Vehicle Fleet Characterization

Based upon a review of recent USAF mobile source emission inventories, the vehicle categories that are most representative of the types of GOVs and POVs expected to be encountered on a typical USAF installation have been identified. The seven Air Force vehicle categories provide the most readily identifiable and discernible vehicle classes for vehicle mix identification and characterization. It is recognized that some vehicles encountered may not fit within the specific weight parameters of the categories chosen. In such instances, personnel conducting the AEI should use professional judgment to assign the vehicles to the listed category which most closely approximates the vehicle(s) in question. This approximation should be based on the fuel type and vehicle weight. Table 5-2 provides a breakdown of the fleet characterization for the typical POV and GOV vehicle mix at a USAF installation. **The vehicle mix provided in this table is to be used for estimating vehicle emissions unless specific vehicle mix data is available from a recent traffic study.**

### 5.1.3 Tactical Vehicles

Tactical vehicles are defined as any motor vehicle designed to military specifications to meet direct transportation support of combat, tactical or relief operations, or for training of personnel for such purposes. This also includes commercially designed motor vehicles modified to military specifications. Tactical vehicles are a subset of GOVs, and Table 5-3 provides vehicle mix percentages for Tactical Vehicles as well as Non-Tactical Vehicles out of the total GOV vehicle mix. This supplemental information is provided if the need to calculate emissions specific to tactical or non-tactical vehicles arises.

**Table 5-1. Air Force On-Road Vehicle Categories**

CATEGORY		VEHICLE CLASS DESCRIPTION
Air Force	MOVES	
<b>Gas/Diesel</b>		
LDGV	LDGV	Light-Duty Gasoline Vehicles (Passenger Cars)
LDDV	LDDV	Light-Duty Diesel Vehicles (Passenger Cars)
LDGT	LDGT1	Light-Duty Gasoline Trucks 1 (0-6,000 lbs. GVWR, 0-3,750 lbs. LVW)
	LDGT2	Light-Duty Gasoline Trucks 2 (0-6,000 lbs. GVWR, 3,751-5,750 lbs. LVW)
	LDGT3	Light-Duty Gasoline Trucks 3 (6,001-8,500 lbs. GVWR, 0-5,750 lbs. ALVW)
	LDGT4	Light-Duty Gasoline Trucks 4 (6,001-8,500 lbs. GVWR, greater than 5,751 lbs. ALVW)
LDDT	LDDT1/2	Light-Duty Diesel Trucks 1 and 2 (0-6,000 lbs. GVWR)
	LDDT3/4	Light-Duty Diesel Trucks 3 and 4 (6,001-8,500 lbs. GVWR)
HDGV	HDGV2a	Class 2b Heavy-Duty Gasoline Vehicles (8,501-10,000 lbs. GVWR)
	HDDV2b	Class 2b Heavy-Duty Diesel Vehicles (8,501-10,000 lbs. GVWR)
	HDGV3	Class 3 Heavy-Duty Gasoline Vehicles (10,001-14,000 lbs. GVWR)
	HDGV4	Class 4 Heavy-Duty Gasoline Vehicles (14,001-16,000 lbs. GVWR)
	HDGV5	Class 5 Heavy-Duty Gasoline Vehicles (16,001-19,500 lbs. GVWR)
	HDGV6	Class 6 Heavy-Duty Gasoline Vehicles (19,501-26,000 lbs. GVWR)
	HDGV7	Class 7 Heavy-Duty Gasoline Vehicles (26,001-33,000 lbs. GVWR)
	HDGV8a	Class 8a Heavy-Duty Gasoline Vehicles (33,001-60,000 lbs. GVWR)
	HDGV8b	Class 8b Heavy-Duty Gasoline Vehicles (>60,000 lbs. GVWR)
	HDGB	Gasoline Buses (School, Transit and Urban)
HDDV	HDDV3	Class 3 Heavy-Duty Diesel Vehicles (10,001-14,000 lbs. GVWR)
	HDDV4	Class 4 Heavy-Duty Diesel Vehicles (14,001-16,000 lbs. GVWR)
	HDDV5	Class 5 Heavy-Duty Diesel Vehicles (16,001-19,500 lbs. GVWR)
	HDDV6	Class 6 Heavy-Duty Diesel Vehicles (19,501-26,000 lbs. GVWR)
	HDDV7	Class 7 Heavy-Duty Diesel Vehicles (26,001-33,000 lbs. GVWR)
	HDDV8a	Class 8a Heavy-Duty Diesel Vehicles (33,001-60,000 lbs. GVWR)
	HDDV8b	Class 8b Heavy-Duty Diesel Vehicles (>60,000 lbs. GVWR)
		HDDBT
	HDDBS	Diesel School Buses
MC	MC	Motorcycles (Gasoline)
<b>HYBRID</b>		
LDGV (H)	---	---
LDGT (H)	---	---
<b>ELECTRIC</b>		
LDGV (V)	---	---
LDGT (V)	---	---

Table 5-2. Typical Air Force POV &amp; GOV Mix

CATEGORY		2012 to 2020 Avg. National Vehicle Mix (%)		POV Vehicle Mix (%) <sup>a</sup>	GOV Vehicle Mix (%) <sup>b</sup>
Air Force	MOVES				
<b>Gas/Diesel</b>					
LDGV	LDGV	34.86	34.86	42.40	9.48
LDDV	LDDV	0.03	0.03	0.65	0.59
LDGT	LDGT1	9.57	56.00	44.36	46.57
	LDGT2	31.86			
	LDGT3	9.98			
	LDGT4	4.59			
LDDT	LDDT1/2	0.00	0.19	0.62	16.43
	LDDT3/4	0.19			
HDGV	HDGV2a	2.88	3.46	3.66	4.60
	HDGV2b				
	HDGV3	0.10			
	HDGV4	0.03			
	HDGV5	0.11			
	HDGV6	0.24			
	HDGV7	0.10			
	HDGV8a	0.00			
	HDGV8b	0.00			
	HDGB	0.00			
HDDV	HDDV2b	0.72	3.70	2.82	21.22
	HDDV3	0.22			
	HDDV4	0.21			
	HDDV5	0.10			
	HDDV6	0.41			
	HDDV7	0.59			
	HDDV8a	0.35			
	HDDV8b	0.82			
	HDDBT	0.03			
	HDDBS	0.25			
MC	MC	1.76	1.76	2.15	0.00
<b>HYBRID</b>					
LDGV (H)	---	---	---	1.83	0.85
LDGT (H)	---	---	---	0.49	0.11
<b>ELECTRIC</b>					
LDGV (V)	---	---	---	0.84	0.08
LDGT (V)	---	---	---	0.19	0.08

a. SOURCE: POV vehicle mix based on available Employee-Certification and Reporting System (ECARS) data collected on 3/2022.

b. SOURCE: GOV vehicle mix based on information provided by the Air Force Vehicle and Equipment Management Office (VEMSO).

“---” Indicates No Data Available



**Table 5-3. GOV Tactical and Non-Tactical Vehicle Mix**

CATEGORY		GOV Tactical Vehicle Mix (%)	GOV Non-Tactical Vehicle Mix (%)
Air Force	MOVES		
<b>Gas/Diesel</b>			
LDGV	LDGV	0.00	9.48
LDDV	LDDV	0.00	0.59
LDGT	LDGT1	1.34	46.57
	LDGT2		
	LDGT3		
	LDGT4		
LDDT	LDDT1/2	5.24	16.43
	LDDT3/4		
HDGV	HDGV2a	3.03	4.60
	HDGV2b		
	HDGV3		
	HDGV4		
	HDGV5		
	HDGV6		
	HDGV7		
	HDGV8a		
	HDGV8b		
	HDGB		
HDDV	HDDV2b	90.39	21.22
	HDDV3		
	HDDV4		
	HDDV5		
	HDDV6		
	HDDV7		
	HDDV8a		
	HDDV8b		
	HDDBT		
	HDDBS		
MC	MC	0.00	0.00
<b>HYBRID</b>			
LDGV (H)	---	0.00	0.85
LDGT (H)	---	0.00	0.11
<b>ELECTRIC</b>			
LDGV (V)	---	0.00	0.08
LDGT (V)	---	0.00	0.08

SOURCE: GOV vehicle mix based on information provided by the Air Force Vehicle and Equipment Management Office (VEMSO).

## 5.2 Emission Factors

Emissions from on-road vehicles include exhaust emissions, which occur both when the vehicle is in motion and while idling, as well as fugitive particulate emissions from road dust. The methodology for estimating emissions from each of these contributing sources is described in the following sections.

### 5.2.1 Vehicle Exhaust Emissions

The operation of on-road vehicles results in the generation of vehicle exhaust, which emits criteria pollutants, HAPs, and GHGs. Estimating emissions from vehicle exhaust is made more challenging because the number of pollutants emitted is different for a vehicle in normal operation versus when a vehicle is idling. The emissions total from vehicle exhaust is quantified by taking the sum of both the idling and normal operating exhaust emissions. **MOVES accounts for idling in proportion to normal driving, therefore calculation of idling emissions is not required for an AEI.** Particulate emissions estimation is made further complicated by the fact that particulate is emitted from vehicle exhaust from both idle and normal vehicle use, as well as from the suspension of road dust. The EFs for each contributing source are described in more detail below.

#### 5.2.1.1 Vehicle Exhaust Emissions– Normal Vehicle Operation

EFs for the Air Force vehicle categories were obtained directly from MOVES3. The MOVES3 model was used to generate estimations of on-road vehicle emissions for each state (except California), the District of Columbia, and relevant US territories. This model requires various inputs such as population of personnel and VMT by vehicle type, age distribution and average speed distribution, ambient meteorological conditions, and elevation among other inputs. The “default” input database for MOVES3 was used for all calculations and derivations. The MOVES3 model was run for each state for calendar years 2021 through 2025 using the national estimates contained within the default database for all vehicle types listed in Table 5-1. The vehicle types selected for the run were all gasoline and diesel vehicles available in the MOVES database. The vehicle model years used for each run include the 30-year span from the calendar year of the run to 30 years prior. The output emission rates were averaged using an activity- (mileage) weighted average over all vehicle model years for each calendar year to estimate a representative emission factor for each pollutant for each vehicle type. The resultant EFs are provided in a gram/mile format and are presented in Table 5-18 through Table 5-22 for all states except California. The State of California uses the EMFAC2021 Model to calculate vehicle emissions. This model calculates emissions in a manner similar to MOVES in that it calculates emissions for all motor vehicles (across model years) in the state using data stored in a default database structured similarly to the MOVES database. EMFAC vehicle emissions data provided in this guide is on a county-basis for each county in California and is presented in Table 5-36

through Table 5-39. Vehicle-specific emission factors for California vehicle types are also included.

Additionally, there are composite EF tables included in this section. These values account for emissions reductions resulting in the use of alternative fuels and are calculated using Air Force-specific vehicle mix data (refer to Section 5.2.1.3 for more information on alternative fuels). The composite EFs are provided in Table 5-9 through Table 5-17 and are presented chronologically by calendar year. Furthermore, since the calculation of composite EFs account for Air Force vehicle mix data, the tables are further subdivided in to POV and GOV categories. The composite EFs for California were derived from EMFAC and are provided in Table 5-36 through Table 5-39. The model inputs and default values used to calculate EFs in MOVES and EMFAC are provided in Table 5-4 and Table 5-5, respectively.

**Table 5-4. MOVES2021 Model Inputs and Default Values**

<b>Model Input</b>	<b>Input Value</b>
Scale	National
Calculation Type	Inventory
Model Years	30-year range from calendar year back
Years	2022-2026
Months	All
Days	Weekend and Weekdays
Hours	All
Geographic Bounds	State/Territory Specific
Fuels	Diesel Fuel and Gasoline
Source Use Types	All
Road Types	All
Pollutants and Processes	NO <sub>x</sub> , SO <sub>x</sub> , CO, VOC, PM <sub>10</sub> , PM <sub>2.5</sub> , CO <sub>2</sub> , NH <sub>3</sub> , and all required additional processes
Activity	Distance Traveled, Populations, Starts

**Table 5-5. EMFAC2021 Model Inputs and Default Values**

<b>Model Input</b>	<b>Input Value</b>
Run Mode	Emissions
Run Type	Default Activity
Area	County Specific
Years	2022-2026
Season	Annual
Aggregation Level	Day
Vehicle Class	ALL
Model Year	30-year range from calendar year back
Fuel	By Fuel
Speed	Aggregated
Pollutants and Processes	NO <sub>x</sub> , SO <sub>x</sub> , CO, ROG, PM <sub>10</sub> , PM <sub>2.5</sub> , CO <sub>2</sub> , CH <sub>4</sub>
Activities	VMT, Population

There is no universally accepted set of EFs for installations located outside of the continental United States (OCONUS). Additionally, determining the vehicle mix or classifying vehicles may be more difficult in a foreign country. Calculating emissions for on-road vehicles at OCONUS facilities can be approximated by calculating the average of all state-specific composite EFs. The EFs for vehicle emissions at OCONUS installations are provided in Table 5-45 and Table 5-46 and are to be used with the same methodology as calculating on-road vehicle emissions within the United States.

#### **5.2.1.2 Vehicle Exhaust Emissions – Idling**

An idling vehicle wastes fuel, increases the cost of maintenance, and creates air pollution. Several states have adopted anti-idling restrictions with some including these restrictions in their SIPs. EFs for emissions from idling vehicles were developed and are provided in a gram/hour format. An idling vehicle is not in motion; therefore, emissions may not be calculated on miles driven, but rather on the time spent in idle. For this reason, the total amount of time that a vehicle spends in idle must be known or closely approximated. **Note that MOVES EFs already account for vehicle idling in proportion to normal driving. For this reason, the EFs provided in this chapter are presented for calculating theoretical emissions for NEPA, or for intersection modeling.** Idling EFs for each vehicle category are provided in Table 5-6.

**Table 5-6. Idling Emission Factors for On-Road Vehicles**

Vehicle Category	Emission Factors (g/hr)				
	CO	NO <sub>x</sub>	VOC	PM <sub>10</sub> <sup>a</sup>	PM <sub>2.5</sub> <sup>b</sup>
LDGV (Passenger Cars)	71.225	3.515	2.683	---	---
LDGT (0-8,500 lb GVWR)	72.725	4.065	4.043	---	---
HDGV (>8,500 lb GVWR)	151.900	5.330	6.495	---	---
LDDV (Passenger Cars)	7.018	2.690	1.373	---	---
LDDT (Light-Duty Trucks)	5.853	3.705	2.720	---	---
HDDV (>8,500 lb GVWR)	25.628	33.763	3.455	1.196	1.100
MC (Motorcycles)	301.075	1.625	19.153	---	---

SOURCE: *Idling Vehicle Emissions for Passenger Cars, Light-Duty Trucks, and Heavy-Duty Trucks*, United States Environmental Protection Agency, Office of Transportation and Air Quality, EPA420-F-08-025, October 2008.

a. PM<sub>10</sub> is an average of HDDV particulate emissions.

b. PM<sub>2.5</sub> value is assumed to be 92% of the PM<sub>10</sub> value per *Air Emissions Factor Guide to Air Force Mobile Sources*, December 2009.

“---” Indicates No Data Available

### 5.2.1.3 Alternative Fuel Emission Reduction Factors

Progressively stringent requirements resulting from the EPA, Presidential Executive Orders, DoD, and Air Force pollution prevention and energy conservation initiatives will result in an increasing number of GOVs and POVs powered by alternative fuels such as E85, CNG, or B20, and advanced hybrid electric vehicles (HEVs). Regardless of fuel type, all vehicles operating on alternative fuels are currently required to meet existing EPA emission standards established for gasoline and/or diesel-powered vehicles. However, some fuels offer potential emission reductions beyond those standards.

Relative to conventional gasoline, the higher-octane value and oxygen content of E85 fuel should lead to reduced vehicle emissions. The EPA’s Office of Transportation Air Quality (OTAQ) notes that while potential reductions will vary with engine design, E85 fuel should lead to reductions in VOCs, CO, PM, and NO<sub>x</sub> relative to conventional gasoline (USEPA 2006a). The case with HAP emissions is not as clear since some data indicates a reduction in benzene and fewer total toxics, but an increase in ethanol and acetaldehyde emissions (USEPA 2006a). Adding to the complexity, some studies have shown that with the use of a catalytic converter, there is virtually no difference in exhaust emissions from on-road vehicles powered by gasoline. Due to these inconsistencies and the lack of clear data trends, **the application of E85 emission reduction factors is not recommended.**

CNG is recognized as one of the cleanest burning alternative fuels available and offers several advantages over gasoline (USDOE 2002). There is limited data for emissions reductions that CNG offers over conventional gasoline, especially since emissions will vary with engine design and performance. However, the EPA suggests that, relative to conventional gasoline-powered

vehicle applications, emissions from CNG-powered vehicles are estimated to be substantially lower for CO, PM, NO<sub>x</sub>, and non-methane hydrocarbons.

There have been a few studies on the impacts of B20 fuel on vehicle emissions. In October 2002, the EPA issued a draft technical report on biodiesel emissions (USEPA 2002b). The EPA used the results from 39 studies to compare the difference in emissions between vehicles using B20 versus diesel fuel. Relative to low sulfur diesel (sulfur content of 500 ppm), B20 use resulted in notable reductions of NO<sub>x</sub>, PM, HC, and CO emissions. Since the publication of the study, Ultra-Low Sulfur Diesel (ULSD) regulations that limit the sulfur content of on-highway diesel fuel to 15 ppm have been enacted and are in place across the country. Another study conducted under the auspices of the DoD Environmental Security Technology Certification Program (ESTCP) sought to measure the impact of B20 on emissions from engines used in on-road and portable power generation applications (DoD 2006). Whereas the EPA study used a B20/low sulfur diesel blend, the ESTCP study used a B20 biodiesel/ULSD blend to reflect the fact that conventional low sulfur diesel is no longer available for use in on-road vehicles. **The ESTCP study concluded that there were no statistically significant differences in criteria pollutant emissions between the B20 biodiesel blended with ULSD and ULSD by itself.** Likewise, no consistent trend was observed regarding HAP emissions.

Hybrid Electric Vehicles (HEVs) produce fewer criteria pollutant, HAP, and CO<sub>2</sub> emissions than comparable dedicated gasoline-powered vehicles. This is because HEVs utilize an electric motor in conjunction with a traditional, and often smaller, internal combustion engine. The electric motor decreases the frequency in which the combustion engine is used, which reduces fuel consumption and, therefore, emissions. Overall emissions will vary depending on several factors, including the vehicle's electrical storage capacity and how long it can operate in "electric-only" mode. Additional factors include how advanced the engine controls are, which emission standards the vehicles have been produced to meet, vehicle size, and model year. For these reasons, the emission profile of HEVs must be judged individually based on the miles traveled under each power mode, complicating attempts to estimate vehicle emission reductions. To estimate the potential emission reduction benefits from the use of HEVs, two sources were utilized: Vehicle family application and emission certification data contained in the EPA OTAQ Certification and Fuel Economy Information System, and the California Air Resources Board (CARB) On-Road Vehicle and Engine Certification website. The assessment of representative certification data indicated NO<sub>x</sub>, CO, HC (assumed to be equal to VOCs), and CO<sub>2</sub> were substantially reduced on average (U.S. Environmental Protection Agency, Office of Transportation Air Quality, Certification and Fuel Economy Information System).

Based upon this data, reduction factors for alternative fuels were calculated for on-road vehicles and are provided in Table 5-7. To estimate potential emission reductions from the use of these alternative fuels and advanced vehicle technologies, calculate vehicle emissions using the

MOVES3 gasoline or diesel fuel emission factors provided, and apply an appropriate percent impact based upon the values listed in the table.

**Table 5-7. Alternative Fuel Emission Reduction Factors (FERFs)**

Alternative Fuel (Original fuel type)	Vehicle Category	Fuel Reduction Emission Factor (%)					
		CO	NO <sub>x</sub>	VOC <sup>a</sup>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>
CNG (Gasoline) <sup>b</sup>	LDGV, LDGT, HDGV	90	35	50	90 <sup>c</sup>	90 <sup>c</sup>	25
B20 (Diesel) <sup>d</sup>	LDDV, LDDT, HDDV	0	0	0	0	0	0
HEVs (Gasoline) <sup>e</sup>	LDGV, LDGT	50	75	35	---	---	30

- Source provided emission factors (EFs) for hydrocarbons (HC) or non-methane HCs which are assumed to be equivalent to VOC emissions reduction.
  - SOURCE: *Clean Alternative Fuels: Compressed Natural Gas* (EPA 420-F-00-033), U.S. Environmental Protection Agency, March 2002.
  - SOURCE: Arkansas Gas Association, Natural Gas Vehicles
  - Based on EFs using a default of 15 parts per million (ppm) sulfur for diesel, and results of the Department of Defense Environmental Security Technology Certification Program study, Effect of Biodiesel on Diesel Engine Nitrogen Oxide and Other Regulated Emissions, Project number WP-0308, May 2006, indicating no statistically significant difference in B20/Ultra Low Sulfur Diesel (ULSD) vs. ULSD emissions.
  - EFs represent the difference in CO<sub>2</sub> emissions associated with the combustion of one gallon of gasoline equivalent of Compressed Natural Gas (CNG). Source: California Climate Action Registry, General Reporting Protocol Version 2.2, Table C-3, March 2007.
- “---” Indicates No Data Available.

## 5.2.2 Fugitive Particulate Matter (PM) Emissions

Though roads are themselves stationary, the generation of airborne road dust is the result of the turbulent wake created by on-road vehicles, which are mobile sources. Therefore, road dust emissions are provided in this section. **Note that this section does not describe emissions from asphalt paving since those operations are considered transitory and are addressed in the *Air Emissions Guide for Air Force Transitory Sources*.** Since fugitive PM emissions are the result of road dust suspended as the vehicle moves across a road surface, the extent of the emitted PM is dependent on whether the road surface is paved or unpaved. These surfaces are subjected to strong air currents from the turbulent wake that follows behind a vehicle as it passes. The currents disturb the loose material pulverized under the weight of the vehicle and PM is cast into the air. PM emissions will fluctuate for several reasons, including construction activities in the area, road degradation due to vehicular traffic, and the application of granular material for snow and ice control. Typically, the most important factors regarding road PM emissions are the number and weight of the vehicles that travel the road, and the VMT. Paved and unpaved road EFs are already derived and may be found in Table 5-8.

**Table 5-8. Fugitive PM Emission Factors**

	POV		GOV	
	PM <sub>10</sub> (g/mi)	PM <sub>2.5</sub> (g/mi)	PM <sub>10</sub> (g/mi)	PM <sub>2.5</sub> (g/mi)
<b>Paved Road</b>	0.058	0.014	0.069	0.017
<b>Unpaved Road</b>	466.206	46.621	505.981	50.598

The EFs for suspension of loose material on paved and unpaved road surfaces due to vehicle travel were derived from the following empirical equations from AP-42 Chapter 13.2.1 (Jan 2011) and AP-42 Chapter 13.2.2 (Nov 2006):

$$EF(Pol)_P = k(Pol) \times (sL)^{0.91} \times W^{1.02} \quad \text{AP-42 Chapter 13.2.1.3}$$

Where,

- EF(Pol)<sub>p</sub>** = Particulate emission factor for **paved** roads (g/mi)
- k(Pol)** = Particle size multiplier (g/mi). **PM<sub>2.5</sub> = 0.25 and PM<sub>10</sub> = 1.00**
- sL** = Road surface silt loading (g/m<sup>2</sup>). **AP-42 Chapter 13.2.1 recommends a default value of 0.015 for limited access roadways (such as Air Force roads)**
- W** = Average weight of the vehicles traveling the road (tons). **POVs = 2.581 and GOVs = 3.096**

$$EF(Pol)_U = k(Pol) \times \left(\frac{s}{12}\right)^a \times \left(\frac{W}{3}\right)^b \times 453.6 \quad \text{AP-42 Chapter 13.2.2.2}$$

Where,

- EF(Pol)<sub>U</sub>** = Particulate emission factor for **unpaved** roads (g/mi)
- k(Pol)** = Particle size multiplier (lb/mi). **PM<sub>2.5</sub> = 0.15 and PM<sub>10</sub> = 1.5**
- s** = Surface material silt content (%). **AP-42 Chapter 13.2.2 value for construction site road value of 8.5**
- a, b** = Empirical constants for industrial roads from AP-42 Table 13.2.2-2. **a=0.9 and b=0.45**
- 453.6** = Factor converting lbs to grams (g/lb)

**\*Note:** The equation above calls for the average weight of all vehicles traveling the road and is **not** intended to be used to calculate a separate EF for each vehicle weight class. Rather, one EF should be calculated to represent the “fleet” average weight of all vehicles.



### 5.2.2.1 Corrected Emission Factors Accounting for Precipitation

Average fugitive PM emissions are inversely proportional to the frequency of measurable precipitation (>0.01 inch). The total fugitive PM emissions are calculated using the appropriate EF listed above, the total vehicle miles traveled, and a precipitation correction factor. When accounting for precipitation, the fugitive PM EFs must be corrected. The corrected EFs for both paved ( $EF(Pol)_{CP}$ ) and unpaved ( $EF(Pol)_{CU}$ ) roads are calculated as follows:

$$EF(Pol)_{CP} = EF(Pol)_P \times \left(1 - \frac{P}{4N}\right)$$

**Equation 5-1**

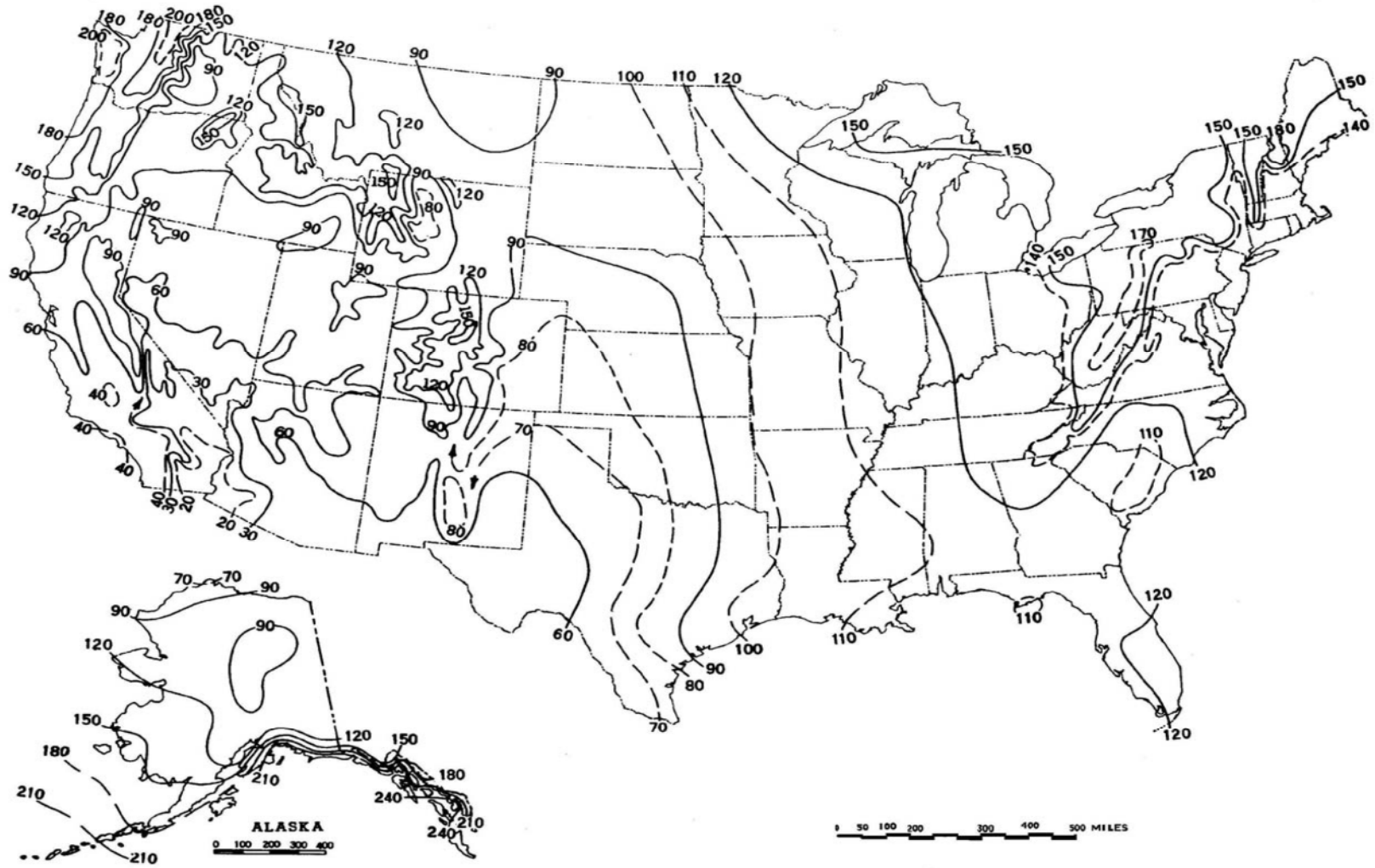
$$EF(Pol)_{CU} = EF(Pol)_U \times \left(1 - \frac{P}{N}\right)$$

**Equation 5-2**

Where,

- $EF(Pol)_{CP/CU}$  = Corrected emission factor for paved or unpaved roads (g/mi)
- $P$  = Number of days in the inventory period in which at least 0.01 inches of precipitation was measured (days). See Figure 5-1 to determine this value based on the installation's geographic location.
- $N$  = Number of days in the inventory period (days). 1 year = 365 days

**\*Note** – The paved road precipitation factor differs from the unpaved precipitation factor since it incorporates a factor of 4 in the denominator to account for the fact that paved roads dry more quickly than unpaved roads.



1  
2

Figure 5-1. Mean Number of Days in the Year with Precipitation of 0.01 Inches or More

### 5.3 Emission Calculations

The total emissions from the operation of on-road vehicles are the sum of the emissions from the vehicle exhaust and fugitive PM from road dust. There are three accepted methods for estimating vehicle emissions. The first, which is the simplest and preferred method, uses Air Force/State/Territory composite EFs. The second method uses POV and GOV fleet mix from recent traffic studies. The third and final method uses the typical USAF POV and GOV fleet mix from Table 5-2. **No matter which method is used for estimation, POV and GOV emissions are calculated independently.**

#### 5.3.1 Vehicle Exhaust Emissions – Typical Vehicle Operation

Calculating emissions from vehicle exhaust is dependent on the VMT and appropriate EF. Vehicle exhaust emissions are directly dependent on the vehicle mix at the installation. There are two circumstances that determine the method for calculating vehicle exhaust emissions – when the specific vehicle mix is known, or when it is unknown. If the vehicle mix is known, that data may be used for emissions calculations. If the vehicle mix is unknown, the mix from Table 5-2 may be assumed. Calculating these emissions is discussed below.

##### 5.3.1.1 Method 1: Using Air Force/State/Territory Composite Emission Factors (Preferred Method)

This is the preferred method for emissions estimates because it is the simplest method to use. The EFs used for this method are selected based on the emission inventory year and the state/territory in which the installation is located. The Air Force/State/Territory composite EFs ( $EF(Pol)_{Comp}$ ) were derived using the assumed vehicle mix as provided in Table 5-2 and Table 5-18 through Table 5-22 for most states. For the State of California, the composite values are provided in Table 5-28 through Table 5-35. Use Table 5-45 and Table 5-46 for OCONUS installations. Note that the tables are separated into POV and GOV since the EFs account for the vehicle mix which differs between these two classifications. **Also note that these EFs have already been adjusted to reflect the reduction in emissions due to vehicles that operate on alternative fuels.** Therefore, no additional calculation is needed to account for the reduction in emissions from the use of alternative fuels. Emissions calculation using the adjusted EFs is estimated as follows:

$$E(Pol)_{Total} = VMT_{Total} \times EF(Pol)_{Comp} \times 0.002205$$

Equation 5-3

Where,

- E(Pol)<sub>Total</sub>** (lb/yr) = Total annual emissions of specific pollutant from vehicle exhaust
- VMT<sub>Total</sub>** = Total annual vehicle miles traveled for all POV or GOV (mi/yr). This should be available for GOVs through records or estimated for GOVs and POVs using Equation 5-4 and Equation 5-5 respectively. **Note that this includes both paved and unpaved roads, as applicable.**
- EF(Pol)<sub>Comp</sub>** = Air Force/State/Territory composite EF for specific pollutant (g/mi) from Table 5-9 through Table 5-17 and for California, Table 5-36 through Table 5-39.
- 0.002205** = Factor for converting grams to pound (lb/g)

Emissions from GOVs and POVs are calculated using the general formula provided in Equation 5-3. **These steps must be completed independently for each pollutant of concern. Note GOVs and POVs should not be combined, and their emissions must be calculated independently.** Due to the complexity of calculating on-road vehicle emissions, the following steps are recommended for use as a guideline for data collection and emissions calculations:

**Step 1 – Gather fleet data.** The first step is to determine the number of POVs or GOVs (N) operating on base. Also, the total vehicle miles traveled (VMT<sub>Total</sub>) or average vehicle miles traveled (AVM) for GOVs should be recorded. This data can often be provided or estimated by the Security Forces Squadron (from the Pass & Registration section) and/or the Military Personnel Flight (MPF). For POVs, VMT<sub>Total</sub> is calculated using Equation 5-5 while Equation 5-4 may be used to calculate VMT<sub>Total</sub> for GOVs only if necessary.

#### Vehicle Miles Traveled for GOVs:

The total vehicle miles traveled (VMT<sub>Total</sub>) for GOVs is the sum of all the miles driven using GOVs during the inventory period. These values should be available through records kept by the base transportation organization or directly from the organizations that operate and/or maintain the vehicles. Alternatively, VMT<sub>Total</sub> may be estimated if it is assumed that each vehicle category traveled the same distance per year, as shown:

$$VMT_{Total} = AVM \times N$$

**Equation 5-4**

Where,

- VMT<sub>Total</sub>** = The total vehicle miles traveled for all GOV vehicles (mi/yr)
- AVM** = The annual average miles traveled per vehicle (mi/yr)
- N** = The number of vehicles – GOV in this case – at the installation

Vehicle Miles Traveled for POVs:

For POVs, the suggested method for estimating  $VMT_{Total}$  is to assume that each POV in operation on an installation travels twice the distance from the main gate to the population centroid of the installation. Not every person will operate their vehicle every day of the year so it is assumed that the majority of POVs will be driven during the workweek. Additionally, a statistical analysis of available Employee-Certification and Reporting System (ECARS) data revealed that typically only 70% of the installation population operates their vehicles on the installation during the week. Using this information, the  $VMT_{Total}$  for POVs is estimated as follows:

$$VMT_{Total} = D \times 520 \times 0.7 \times P$$

Equation 5-5

Where,

- D** = One-way distance from the main gate to the population centroid of the installation (miles/trip)
- 520** = Factor converting the number of miles per trip to miles per year (trips/year)
- 0.7** = Fraction of the installation population that operates their vehicle during the week
- P** = Installation population

In Equation 5-5, the 520-multiplying factor was derived as follows:

$$2 \frac{\text{trips}}{\text{days}} \times 5 \frac{\text{days}}{\text{weeks}} \times 52 \frac{\text{weeks}}{\text{yr}} = 520 \frac{\text{trips}}{\text{yr}}$$

**Step 2 – Select emission factors.** These are provided in Table 5-18 through Table 5-22 for all states other than California, Table 5-28 through Table 5-35 for California, or Table 5-45 and Table 5-46 for OCONUS installations.

**Step 3 – Calculate emissions.** Emissions of each pollutant (and vehicle classification) are calculated *independently* using Equation 5-3.

### 5.3.1.2 Method 2: Using Specific Vehicle Mix Data

This method is more intensive than the preferred method given above. However, it may be desirable if a recent traffic study conflicts with the typical vehicle mix provided, or if emissions from each vehicle category are required. The EFs used for this method are selected based on the emission inventory year, the state in which the installation is located, and the vehicle category (LDGV, LDDV, etc.). Additionally, they can be found in Table 5-18 through Table 5-22 (for states other than California) and Table 5-28 through Table 5-35 for California. To account for the reduction in emissions due to the use of alternative fuels, the appropriate emissions reduction

factor, as given in Table 5-7, is employed. Emissions are estimated using the VMT for each vehicle category and summed as follows:

$$E(\text{Pol})_{\text{Total}} = \sum_{i=1}^n \left\{ VMT_i \times EF(\text{Pol})_i \times \left[ 1 - \frac{FERF(\text{Pol})}{100} \right] \times 0.002205 \right\}$$

Equation 5-6

Where,

**E(Pol)<sub>Total</sub>** = Total annual emissions of specific pollutant from vehicle exhaust (lb/yr)

**VMT<sub>i</sub>** = Total annual vehicle miles traveled for each vehicle class (mi/yr).

This should be available for GOVs through records and estimated for POVs using Equation 5-5. Note that this includes both paved and unpaved roads, if applicable.

**EF(Pol)<sub>i</sub>** = Air Force/State/Territory emission factor for specific pollutant (g/mi)

**FERF(Pol)** = Pollutant-specific fuel emission reduction factor, as applicable (%). This is provided in Table 5-7.

**100** = Factor converting percent to fraction

**0.002205** = Factor converting grams to pounds (lb/g)

To accurately account for the reduction of emissions using alternative fuels, the VMT<sub>i</sub> for each hybrid and CNG vehicle should be known and treated as a separate vehicle category. If the annual VMT for each vehicle category is not known, the following equation may be used to approximate VMT for each specific vehicle category (VMT<sub>i</sub>):

$$VMT_i = AVM_i \times n_i = AVM_i \times N \times \frac{MIX_i}{100}$$

Equation 5-7

Where,

**AVM<sub>i</sub>** = Average annual vehicle miles traveled by each vehicle category (mi/yr)

**n<sub>i</sub>** = Number of vehicles in a specific vehicle category

**N** = Total number of vehicles (POV or GOV)

**MIX<sub>i</sub>** = Vehicle mix for a specific vehicle category (%)

To quantify the emissions from on-road vehicles using this method, the following process is recommended:

**Step 1 – Gather fleet data.** Data required to calculate vehicle emissions typically includes vehicle category, model year, and vehicle miles traveled. (VMT<sub>i</sub>) during the year in question.

- a. **GOV Fleet Mix Data:** If a GOV is driven both on and off base during the inventory year, an estimate must be made to apportion the number of miles driven between off and on installation miles. The best way to collect GOV information is to provide blank forms for each vehicle category to the installation organization(s) responsible for managing GOVs.
- b. **POV Fleet Mix Data:** Prior to conducting an AEI that includes POVs, it is recommended that the individual responsible for preparing the mobile source emission inventory contacts the Base Development and/or Community Planning section of the Civil Engineering Squadron. This is to determine if a traffic survey has been conducted recently at the installation, which may contain information that will be useful in calculating POV emissions.

If a recent traffic survey is not available, and resources do not allow for a new traffic survey to be conducted, data provided by the Security Forces Squadron (from the Pass & Registration section) and/or the Military Personnel Flight (MPF) can be used to estimate POV fleet data. Types of data that can usually be obtained from the Security Forces Squadron and/or MPF include:

- 1) The estimated average number of registered POVs at the installation during the applicable inventory year.
- 2) The estimated percentage of registered vehicles that fall under the seven vehicle categories.
- 3) The estimated distance (in miles) of the average POV trip on the installation during a typical weekday and weekend day.
- 4) The estimated distance (in miles) of non-registered vehicles that travel on the installation during a typical weekday and weekend day.

An alternative approach to obtaining vehicle registration information may be available at some installations as some installations may be able to provide a listing of the vehicles contained in their databases.

**Step 2 – Group vehicle categories.** Upon gathering fleet data, group together all vehicles based on the USAF vehicle categories identified in Table 5-1. Record the number of vehicles ( $n_i$ ) and total annual miles traveled ( $VMT_i$ ) for each vehicle category.

- a. If  $VMT_i$  is unknown, it can be estimated using Equation 5-7.

- b. If there is insufficient fleet data to provide the number of vehicles ( $n_i$ ) for each vehicle category despite the total number of vehicles and associated relative vehicle mix ( $MIX_i$ ) for each specific category being known, the equation below can be used to estimate  $n_i$ :

$$n_i = N \times \frac{MIX_i}{100}$$

**Step 3 – Select emission factors.** The appropriate EFs are selected based on the vehicle category, the calendar year for which emissions calculations are being performed, and the installation's geographic location. Vehicle exhaust EFs are selected from Table 5-18 through Table 5-22 for states other than California, Table 5-28 through Table 5-35 for California emissions calculations, and for OCONUS, Table 5-45 and Table 5-46.

**Step 4 – Calculate emissions.** For vehicle exhaust emissions, calculate the emissions for each individual vehicle category and sum these values for the total vehicle emissions for that pollutant. Pollutant emissions for each vehicle category are calculated using Equation 5-6.

### 5.3.1.3 Method 3: Using USAF Typical Vehicle Mix Data

Another method for calculating on-road vehicle emissions is to calculate the emissions from each vehicle category using the typical USAF vehicle mix. This method is like that of calculating emissions using specific vehicle mix data. The EFs used for this method are selected based on three metrics: 1) the emission inventory year, 2) the state in which the installation is located, and 3) the vehicle category. Emissions are estimated via this method using a modified version of Equation 5-3 by substituting the correct EF as shown:

$$E(Pol)_{Total} = VMT_{Total} \times EF(Pol)_{Total} \times 0.002205$$

Equation 5-8

Where,

$$EF(Pol)_{Total} = \text{Total adjusted on-road vehicle exhaust emissions (lb/yr).}$$

The total adjusted on-road vehicle EF considers any reduction in emissions due to alternative fuel use. This is calculated as follows:

$$EF(Pol)_{Total} = \sum_{i=1}^n \left\{ \left( \frac{MIX_i}{100} \right) \times EF(Pol)_i \times \left[ 1 - \frac{FERF(Pol)}{100} \right] \right\}$$

Equation 5-9

The total vehicle miles traveled ( $VMT_{Total}$ ) is the sum of the average miles traveled for all vehicle categories as shown:



$$VMT_{Total} = \sum_{i=1}^n \left( AVM_i \times N \times \frac{MIX_i}{100} \right)$$

Equation 5-10

Emissions from vehicles are calculated by applying the equations in Method 2 using the typical POV or GOV vehicle mix data from Table 5-2. **These steps must be completed separately for each pollutant of concern. GOVs and POVs should not be combined, and their emissions should be calculated independently of each other.** Due to the complexity of calculating on-road vehicle emissions, the following steps are recommended for use as a guideline for data collection and emissions calculations:

**Step 1 – Gather fleet data.** In this case, fleet data or a traffic survey for the base is not available. Therefore, obtain the total number (N) of vehicles (POV or GOV) driving on base and the overall average annual vehicle miles traveled (AVM) for all vehicle categories. The data can often be provided or estimated by the Security Forces Squadron (from the Pass & Registration section) and/or the Military Personnel Flight (MPF) can be used to estimate POV fleet data. Types of data that can usually be obtained from the Security Forces Squadron and/or MPF include: 1) the estimated average number of registered POVs and/or GOVs at the installation during the applicable inventory year; 2) the estimated distance (in miles) of the average POV travels on the installation during a typical weekday and weekend day; and 3) the estimated number of non-registered vehicles that travel on the installation during a typical weekday and weekend day.

An alternative approach to obtaining vehicle registration information may be available at some installations. Data such as listings of vehicles held in databases (preferably in hardcopy format) as well as the number of registered vehicles are examples of alternative data options that may be available at specific installations.

**Step 2 – Group vehicle categories.** Upon gathering fleet data on the total number (N) of vehicles (POV or GOV) driving on base and overall average AVM, obtain and record the typical vehicle mix values (MIX<sub>i</sub>) from Table 5-2 for each vehicle category. Then, assuming all vehicle categories traveled the same distance per year, calculate the total annual vehicle miles traveled (VMT<sub>Total</sub>) for all vehicle categories combined using Equation 5-4.

**Step 3 – Select emission factors.** Selection of the appropriate EF is based on the vehicle category, the calendar year being calculated for, the installation's location (state), and the installation's altitude. The EFs are then selected from Table 5-18 through Table 5-22 for all states except California, Table 5-28 through Table 5-35 for California, or Table 5-45 and Table 5-46 for OCONUS installations.

Once the appropriate pollutant specific EFs for each vehicle have been obtained, calculate the total composite EF using Equation 5-9.

**Step 4 – Calculate emissions.** The total pollutant emissions, on a per vehicle category-basis, for on-road emissions are calculated using Equation 5-8.

### 5.3.2 Vehicle Exhaust Emissions – Idling

Calculating idling emissions uses slightly modified versions of equations used for calculating on-road emissions caused by normal vehicle operation as discussed in the previous sections. The primary difference is that the EFs for idling vehicles are presented as grams/hr, meaning the time spent in idle mode must be known (or estimated). Idling emissions from typical on-road vehicle operation have also been addressed in the previous section. Estimating the emissions from vehicle idling is performed under two circumstances: 1) where the vehicle mix is known (e.g., from a recent traffic study) and 2) where the typical USAF vehicle mix is used. **This section describes the calculation of theoretical emissions from idling vehicles for NEPA and intersection modeling, not for a mobile AEI.**

#### 5.3.2.1 Method 1: Using Specific Vehicle Mix Data

If necessary, emissions may be calculated using a specific vehicle mix different from the one provided in Table 5-2. This method may be desirable if a recent traffic study conflicts with the typical vehicle mix provided. The EFs used for this method are selected based on the vehicle category. These EFs are provided in Table 5-6. Idling emissions are estimated as follows:

$$E(Pol)_{Total} = \sum_{i=1}^n \left\{ VIT_i \times EF(Pol)_i \times \left[ 1 - \frac{FERF(Pol)}{100} \right] \times 0.002205 \right\}$$

Equation 5-11

Where,

- E(Pol)<sub>Total</sub>** = Total theoretical emissions of specific pollutant from idling (lb/yr)
- VIT<sub>i</sub>** = Annual vehicle idling time (hr/yr)
- EF(Pol)<sub>i</sub>** = Idling emission factor for specific pollutant (g/hr) from Table 5-6.

The vehicle idling time is the most difficult parameter to determine. Depending on the proposed action, idling times of varying lengths may be recommended for each vehicle *category* and/or *classification*. The idling time for each vehicle category may be estimated using an average idling time as shown:

$$VIT_i = AVIT_i \times n_i = AVIT_i \times N \times \frac{MIX_i}{100}$$

Equation 5-12

Where,

**AVIT<sub>i</sub>** = Average annual vehicle idling time (hr/yr)

### 5.3.2.2 Method 2: Using Air Force Typical Vehicle Mix Data

If the specific vehicle mix data is not available from a recent traffic study, the typical vehicle mix from Table 5-2 can be assumed. The EFs used for this method are selected based on the Air Force vehicle category. These EFs can be found in Table 5-6. Theoretical emissions from vehicle idling using this method are calculated as follows:

$$E(Pol)_{Total} = VIT_{Total} \times EF(Pol)_{Total} \times 0.002205$$

Equation 5-13

Where,

**VIT<sub>Total</sub>** = Total annual vehicle idling time for all POVs or GOVs (hr/yr)

**EF(Pol)<sub>Total</sub>** = Total adjusted idling emission factor (g/hr). Calculated using Equation 5-14 below.

The total adjusted idling EF considers any reduction in emissions due to alternative fuel use and is calculated as follows:

$$EF(Pol)_{Total} = \sum_{i=1}^n \left\{ EF(Pol)_i \times \frac{MIX_i}{100} \times \left[ 1 - \frac{FERF(Pol)}{100} \right] \right\}$$

Equation 5-14

The total vehicle idling time (VIT<sub>Total</sub>) is the sum of the average idling time for all vehicles categories as shown below:

$$VIT_{Total} = \sum_{i=1}^n \left( AVIT_i \times N \times \frac{MIX_i}{100} \right)$$

Equation 5-15

Equation 5-15 may be simplified if it is assumed that each vehicle category will idle for the same amount of time per year. This simplification reduces Equation 5-15 to the equation that follows:

$$VIT_{Total} = AVIT \times N$$

Equation 5-16

In the absence of average vehicle idling time (AVIT) data, contact Base CE for assistance in estimating this value.

### 5.3.3 Fugitive PM Emissions

Particulate emissions are generated from vehicle exhaust and are described in the previous sections. Fugitive particulate emissions, however, are generated from the operation of on-road vehicles across paved or unpaved road surfaces. The amount of particulate generated is a function of the road surface (paved or unpaved) and the total vehicle miles traveled ( $VMT_{Total}$ ). The EFs are selected from Table 5-8 based on the road surface type (paved or unpaved) and vehicle classification (POV or GOV). The selected EFs must be corrected based on the number of days in the year with precipitation greater than or equal to 0.01 inches using the appropriate equation (either Equation 5-1 or Equation 5-2) and the type of road surface. Using the corrected EF for paved or unpaved roads ( $EF(Pol)_{CP}$  or  $EF(Pol)_{CU}$  respectively), fugitive PM emissions are calculated as follows:

$$E(Pol)_{Total} = VMT_{Total} \times \left\{ \left[ \frac{\%VMT_P}{100} \times EF(Pol)_{CP} \right] + \left[ \frac{\%VMT_U}{100} \times EF(Pol)_{CU} \right] \right\} \times 0.002205$$

Equation 5-17

Where,

$E(Pol)_{Total}$  = Total annual emission of fugitive PM from on-road vehicles (lb/yr)

$\%VMT_P$  = Percent of total miles driven on paved roads (%)

$\%VMT_U$  = Percent of total miles driven on unpaved roads (%)

### 5.3.4 VOC Speciation

On-road vehicles have the potential to produce a significant amount of air pollutants released into the atmosphere. The amount of pollution is a function of the number of on-road vehicles, the average number of miles driven, the time of year, the content of the fuel used, and even the average idling time. The large number of variables impacting air emissions from on-road vehicles increases the complexity of quantifying their emissions. However, measurements are continually being taken to develop more accurate air emissions estimates. Individual VOCs may be estimated using the weight fractions of each chemical to the total emitted VOC.

The weight fractions provided in this document were determined using test data from a variety of sources, including the EPA's *SPECIATE* database. The emission profiles used to determine the VOC weight percent are assumed to be representative of the vehicle category's emissions.

However, this information should only be used when no alternative emission profiles are available. The average weight percent of individual pollutants were calculated using the following equations:

$$P_{Pol} = \frac{A_{Pol}}{AVOC_{Total}}$$

**Equation 5-18**

Where,

- P<sub>Pol</sub>** = Weight percent of a given pollutant (%)
- A<sub>Pol</sub>** = Individual pollutant emission factor (mg/mi)
- AVOC<sub>Total</sub>** = Total VOC emission factor (mg/mi)

Speciated VOCs are calculated by taking the product of the total VOCs and the weighted percentage of the individual VOC as follows:

$$E_{Pol} = E_{VOC} \times \frac{P_{Pol}}{100}$$

**Equation 5-19**

Where,

- E<sub>Pol</sub>** = Emission of speciated VOC (lb/yr)
- 100** = Factor for converting percent to a fraction (%)
- E<sub>VOC</sub>** = Emissions of total VOC (lb/yr)

The percentages of each VOC to total VOC are provided in Table 5-47. Note that the light-duty gas vehicles, light-duty gas trucks, and heavy-duty gas vehicles (LDGV, LDGT, and HDGV) are not further subdivided into hybrid and CNG-fueled vehicles. To calculate emissions specific to these vehicles, apply the vehicle mix (using the default values if no onsite data is available).

## 5.4 Information Resources

Information required for calculating emissions from GOVs can usually be obtained from the installation transportation organization as it typically maintains records on most, if not all, GOVs assigned to the installation. At some installations, it may also be necessary to obtain information directly from the organizations that use and/or maintain the vehicles. For example, the Fire Department may need to be contacted to obtain information specific to fire trucks and rescue vehicles.

In some cases, it may be necessary to obtain and review data contained in the installation's vehicle maintenance index file (VMIF), on-line vehicle interactive management system

(OLVIMS) report, or equivalent vehicle information management system to verify vehicle class/type as some installations do not use the same classification system used by the EPA. Some facilities may have a cross-reference tool with management codes that will assist in interpreting how vehicle usage is being tracked (e.g., miles, hours, and kilometers).

Most information required to calculate POV emissions may be obtained from the Security Forces Squadron. The Pass & Registration section of the base Security Forces Squadron usually maintains computer records on all POVs registered at the installation. Some installations perform vehicle registration at MPF. The office that handles vehicle registrations (Pass & Registration or MPF) is also in a good position to survey personnel on their vehicle usage. Since the Security Forces Squadron is responsible for staffing the installation gates, they are usually the best source of information on non-registered vehicles.

If the POV information needed to calculate vehicle emissions cannot be obtained from the Security Forces Squadron, it might be necessary to survey a representative number of installation personnel to obtain the required information. It is also highly recommended that personnel conducting the AEI check with the Base Development and/or Community Planning sections of the Civil Engineering Squadron to determine whether any recent traffic surveys have been conducted.

For purposes of estimating the length of typical on-installation POV trips, consider the trip length in terms of the mileage from the main gate to a common on-installation destination and back. For instance, if most POVs are believed to be traveling to the Base Exchange, the Commissary, or the Medical Clinic, estimate the distance from the main gate to those locations. In such instances, it may be assumed that a median round-trip distance of 3-4 miles is appropriate for use. However, it may also be necessary to estimate vehicle travel distances for individuals who travel on and off the installation more than once per day, such as personnel who leave during lunchtime. **In the absence of installation-specific survey data, it can be conservatively assumed that 5% of installation personnel will travel off-installation during lunchtime.** Since this is a second trip through the gate, you should assume the daily on-installation mileage is doubled for those individuals. If installation organizations are unable to provide required data, it may be possible to obtain trip length and driver behavior data that can be extrapolated to on-installation conditions from the local metropolitan planning office (MPO).

## 5.5 Example Problems

### 5.5.1 Problem 1 – Calculating POV and GOV Emissions Using Method 1

A USAF base in performing an air emissions inventory for calendar year (CY) 2022 CO emissions for their POVs and GOVs operated by the facility during the year. Data indicates that

there is a total of 422 POVs and 38 GOVs and all vehicles traveled an average of 4,563 miles each. Calculate CO emissions for CY2022 if the base is in Alabama.

**Step 1 – Gather fleet data.** The data required to calculate emissions is provided in the problem statement. This information includes the number of POVs ( $N_{POV} = 422$ ), the number of GOVs ( $N_{GOV} = 38$ ), and the average miles traveled for each vehicle ( $AVM = 4,563 \text{ mi/yr}$ ).

Next, calculate total vehicle miles traveled ( $VMT_{Total}$ ). Using the number of POVs and GOVs, the average vehicle miles traveled (AVM), and Equation 5-4, the  $VMT_{Total}$  is calculated as follows:

$$VMT_{Total} = AVM \times N$$

For POVs

$$VMT_{Total-POV} = 4,563 \frac{\text{mi}}{\text{yr}} \times 422 = 1,925,586 \frac{\text{mi}}{\text{yr}}$$

For GOVs:

$$VMT_{Total-GOV} = 4,563 \frac{\text{mi}}{\text{yr}} \times 38 = 173,394 \frac{\text{mi}}{\text{yr}}$$

**Step 2 – Select emission factors.** According to Table 5-9, for CY2022 in Alabama, the CO EF ( $EF(CO)_{Alabama}$ ) for POVs is **4.678 g/mi**. Similarly, the CO EF ( $EF(CO)_{Alabama}$ ) for GOVs is **4.392 g/mi**.

**Step 3 – Calculate emissions.** Emissions are calculated using the adjusted EFs from Step 2, the  $VMT_{Total}$  calculated from Step 1, and Equation 5-3 as shown below:

$$E(Pol)_{Total} = VMT_{Total} \times EF(Pol)_{Total} \times 0.002205$$

For POVs:

$$E(CO)_{Total} = 1,925,586 \frac{\text{mi}}{\text{yr}} \times 4.678 \frac{\text{g}}{\text{mi}} \times 0.002205 \frac{\text{lb}}{\text{g}}$$

$$E(CO)_{Total} = 19,862.4 \frac{\text{lb}}{\text{yr}}$$

For GOVs:

$$E(CO)_{Total} = 173,394 \frac{\text{mi}}{\text{yr}} \times 4.392 \frac{\text{g}}{\text{mi}} \times 0.002205 \frac{\text{lb}}{\text{g}}$$

$$E(CO)_{Total} = 1,679.21 \frac{lb}{yr}$$

### 5.5.2 Problem 2 – Calculating GOV Emissions Using Method 2

A USAF base is performing an inventory for CY2022 CO emissions for their 15 GOVs operated by the facility during the year. The Air Force Base is in Alabama.

**Step 1** – Gather fleet data and **Step 2** – Group vehicle categories. Since the data was available from the Environmental manager, steps 1 and 2 are combined.



Installation Name: Anytown AFB		Inventory Year: 2022		
Responsible Organization (Name and Office Symbol):				
POC (Name, Phone #, and email):				
Vehicle Category:				
Vehicle Identification Number (VIN)	Vehicle Description	Bldg. Number	Model Year	Miles Driven (mi/yr)
<b>LDGV</b>				
Vehicle #1	Sedan	Bldg. 45-2	1999	4,900
Vehicle #10	Sedan	Bldg. 45-2	1999	5,670
Vehicle #11	Sedan	Bldg. 15-1	2004	4,368
Vehicle #15	Sedan	Bldg. 23-6	2002	6,670
Vehicle #8	Sedan	Bldg. 15	1998	2,700
Vehicle #3	Sedan	Bldg. 1	2004	7,400
Vehicle #5	Sedan	Bldg. 10	1997	1,730
Vehicle #9	Sedan	Bldg. 10	1997	1,450
		<b>Average</b>	<b>2000</b>	<b>4,361</b>
		<b>Total</b>		<b>34,888</b>
<b>LDGT</b>				
Vehicle #6	Pickup	Bldg. 15	2000	4,600
Vehicle #7	Pickup	Bldg. 15	2000	5,200
Vehicle #13	Van	Bldg. 15	1999	6,500
Vehicle #14	SUV	Bldg. 15	2003	3,200
		<b>Average</b>	<b>2000</b>	<b>4,875</b>
		<b>Total</b>		<b>19,500</b>
<b>HDGV</b>				
Vehicle #2	Flatbed	Bldg. 15	1998	4,450
		<b>Average</b>	<b>1998</b>	<b>4,450</b>
		<b>Total</b>		<b>4,450</b>
<b>LDDT</b>				
Vehicle #4	Pickup	Bldg. 1	2004	4,300
		<b>Average</b>	<b>2004</b>	<b>4,300</b>
		<b>Total</b>		<b>4,300</b>
<b>HDDV</b>				
Vehicle #12	Fire Truck	Bldg. 45-2	2002	5,300
		<b>Average</b>	<b>2002</b>	<b>5,300</b>
		<b>Total</b>		<b>5,300</b>

**Step 3 – Select emission factors.** For vehicles in CY2022 in Alabama, the CO EFs for each vehicle category are given in Table 5-18. The EFs are provided in the table below.

Vehicle Category	CO Emission Factor (g/mi)
LDGV	3.907
LDGT	4.492
HDGV	15.898
LDDV	3.593
LDDT	3.209
HDDV	1.707
MC	13.285

**Step 4 – Calculate emissions.** No information was provided regarding whether any of the vehicles operated on alternative fuel. Using the vehicle miles traveled for each vehicle category ( $VMT_i$ ) from the fleet data, the EFs recorded in Step 3, and Equation 5-6, the emissions are first calculated for each vehicle category as follows:

$$E(Pol)_{Total} = \sum_{i=1}^7 \left\{ VMT_i \times EF(Pol)_i \times \left[ 1 - \frac{FERF(Pol)}{100} \right] \times 0.002205 \right\}$$

$$E(CO)_{LDGV} = 34,888 \frac{mi}{yr} \times 3.907 \frac{g}{mi} \times \left[ 1 - \frac{0\%}{100\%} \right] \times 0.002205 \frac{lb}{g} = 300.56 \frac{lb}{yr}$$

$$E(CO)_{LDGT} = 19,500 \frac{mi}{yr} \times 4.492 \frac{g}{mi} \times \left[ 1 - \frac{0\%}{100\%} \right] \times 0.002205 \frac{lb}{g} = 193.14 \frac{lb}{yr}$$

$$E(CO)_{HDGV} = 4,450 \frac{mi}{yr} \times 15.898 \frac{g}{mi} \times \left[ 1 - \frac{0\%}{100\%} \right] \times 0.002205 \frac{lb}{g} = 156.0 \frac{lb}{yr}$$

$$E(CO)_{LDDV} = 0 \frac{mi}{yr} \times 3.593 \frac{g}{mi} \times \left[ 1 - \frac{0\%}{100\%} \right] \times 0.002205 \frac{lb}{g} = 0.0 \frac{lb}{yr}$$

$$E(CO)_{LDDT} = 4,300 \frac{mi}{yr} \times 3.209 \frac{g}{mi} \times \left[ 1 - \frac{0\%}{100\%} \right] \times 0.002205 \frac{lb}{g} = 30.43 \frac{lb}{yr}$$

$$E(CO)_{HDDV} = 5,300 \frac{mi}{yr} \times 1.707 \frac{g}{mi} \times \left[ 1 - \frac{0\%}{100\%} \right] \times 0.002205 \frac{lb}{g} = 19.95 \frac{lb}{yr}$$

$$E(CO)_{MC} = 0 \frac{mi}{yr} \times 13.285 \frac{g}{mi} \times \left[ 1 - \frac{0\%}{100\%} \right] \times 0.002205 \frac{lb}{g} = 0.0 \frac{lb}{yr}$$

Finally, the total CO emission are calculated by summing the contributing CO emission from each vehicle category.

$$E(Pol)_{Total} = \sum_{i=1}^7 E(Pol)_i$$

$$E(CO)_{TOTAL} = (300.56 + 193.14 + 156.0 + 0 + 30.43 + 19.95 + 0) \frac{lb}{yr}$$

$$E(CO)_{TOTAL} = 700.1 \frac{lb}{yr}$$

### 5.5.3 Problem 3 – Calculate POV Emissions Using Method 2

A USAF Base (located in Alabama) is conducting an emissions inventory to quantify CY2022 emissions attributable to the operation of POVs. Using the information provided by the Security Forces Squadron, the following data was used to calculate the CY2022 emissions of CO from the operation of POVs.

**Step 1 – Gather fleet data.** Fleet data information is provided in the figure following Step 2.

**Step 2 – Group vehicle categories.** The first step in grouping the vehicle categories is to calculate the estimated total number of vehicles (N) driving on base. Using the data provided in the form referenced in Step 1, the total number of POVs is estimated as follows:

$$N = Registered + Unregistered$$

$$N = 1,675 + 125 = \mathbf{1,800 vehicles}$$

<b>Installation Name:</b> Anytown AFB		<b>Inventory Year:</b> 2022
<b>Responsible Organization (Name and Office Symbol):</b> 58 CES/CD		
<b>POC (Name, Phone #, and email):</b> SSgt John Jones, DSN 234-5678		
<b>Question</b>	<b>Response</b>	
Can you provide the listing of all registered vehicles on base? (Y/N)? If so, be sure to include all specific information (make/model year, etc.) about the vehicles.	N	
What is the estimated average number of <u>registered</u> POVs at the installation during the inventory period?	1,675	
What is the estimated percentage of <u>registered</u> vehicles which travel on the installation during a typical weekday (Monday-Friday)?	75	
What is the estimated percentage of <u>registered</u> vehicles which travel on the installation during a typical weekend day (Saturday and Sunday)?	50	
What is the estimated distance the average POV travels on base during a typical weekday?	6 mi/day	
What is the estimated distance the average POV travels on base during a typical weekend day?	4 mi/day	
What is the estimated number of <u>non-registered</u> POVs which travel on base during a typical weekday?	125	
What is the estimated average model year of all POVs driven on base during the inventory year? (NOTE: This is not required if the average model years are listed below for each vehicle category)		
<b>Using registration information, provide an estimate of the percentage of <u>registered</u> POVs which fall under each of the 7 vehicle categories listed below.</b>		
<b>Vehicle Category</b>	<b>Category Description</b>	<b>Estimated % of Registered Vehicles</b>
LDGV	Light-Duty Gasoline Vehicles – All gasoline-powered passenger cars	36
LDDV	Light-Duty Diesel Vehicles – All diesel-powered passenger cars	1
LDGT	Light-Duty Gasoline Trucks – All smaller gasoline-powered trucks (0 to 8,500 lbs. GVWR)	54
LDDT	Light-Duty Diesel Trucks (LDDT) – All smaller diesel-powered trucks (0 to 8,500 lbs. GVWR)	1
HDGV	Heavy-Duty Gasoline Vehicles (HDGV) – All larger gasoline-powered vehicles (8,501 to >60,000 lbs. GVWR)	4
HDDV	Heavy-Duty Diesel Vehicles – All larger diesel-powered vehicles (10,001 to >60,000 lbs. GVWR)	3
MC	Motorcycles (MC) – All motorcycles (assumed to be gasoline powered)	1

Next, the number of vehicles which fall under each vehicle category are calculated under the assumption that the fleet mix for the unregistered vehicles is the same as for the registered

vehicles. By slightly modifying Equation 5-7, the number of vehicles for each category ( $n_i$ ) may be derived from the total number of vehicles ( $N$ ) and vehicle category mix ( $MIX_i$ ).

$$n_i = N \times \frac{MIX_i}{100}$$

$$n_{LDGV} = 1,800 \times \frac{36\%}{100\%} = \mathbf{648 \text{ Vehicles}}$$

$$n_{LDDV} = 1,800 \times \frac{1\%}{100\%} = \mathbf{18 \text{ Vehicles}}$$

$$n_{LDGT} = 1,800 \times \frac{54\%}{100\%} = \mathbf{972 \text{ Vehicles}}$$

$$n_{LDDT} = 1,800 \times \frac{1\%}{100\%} = \mathbf{18 \text{ Vehicles}}$$

$$n_{HDGV} = 1,800 \times \frac{4\%}{100\%} = \mathbf{72 \text{ Vehicles}}$$

$$n_{HDDV} = 1,800 \times \frac{3\%}{100\%} = \mathbf{54 \text{ Vehicles}}$$

$$n_{MC} = 1,800 \times \frac{1\%}{100\%} = \mathbf{18 \text{ Vehicles}}$$

Next, the average annual vehicle miles traveled ( $AVM_i$ ) is calculated. Using the data provided in the form above, the AVM traveled is calculated as follows:

$$AVM_i = \frac{52 \text{ weeks}}{\text{yr}} \times \left[ \left( \frac{75\%}{100\%} \times 6 \frac{\text{mi}}{\text{day}} \times 5 \frac{\text{day}}{\text{week}} \right) + \left( \frac{50\%}{100\%} \times 4 \frac{\text{mi}}{\text{day}} \times 2 \frac{\text{day}}{\text{week}} \right) \right]$$

$$AVM_i = \frac{52 \text{ weeks}}{\text{yr}} \times \left[ \left( 0.75 \times 6 \frac{\text{mi}}{\text{day}} \times 5 \frac{\text{day}}{\text{week}} \right) + \left( 0.5 \times 4 \frac{\text{mi}}{\text{day}} \times 2 \frac{\text{day}}{\text{week}} \right) \right]$$

$$AVM_i = \frac{52 \text{ weeks}}{\text{yr}} \times \left[ \left( 22.5 \frac{\text{mi}}{\text{week}} \right) + \left( 4 \frac{\text{mi}}{\text{week}} \right) \right]$$

$$AVM_i = \frac{52 \text{ weeks}}{\text{yr}} \times \left[ \left( 26.5 \frac{\text{mi}}{\text{week}} \right) \right] = \mathbf{1,378 \frac{\text{mi}}{\text{yr}}}$$

Finally, the total annual VMT for each category ( $VMT_i$ ) is calculated using Equation 5-7.

$$VMT_i = AVM_i \times n_i$$

$$VMT_{LDGV} = 1378 \frac{\text{mi}}{\text{yr}} \times 648 \text{ vehicles} = \mathbf{892,944 \frac{\text{mi}}{\text{yr}}}$$

$$VMT_{LDDV} = 1378 \frac{\text{mi}}{\text{yr}} \times 18 \text{ vehicles} = \mathbf{24,804 \frac{\text{mi}}{\text{yr}}}$$

$$VMT_{LDGT} = 1378 \frac{mi}{yr} \times 972 \text{ vehicles} = 1,339,416 \frac{mi}{yr}$$

$$VMT_{LDDT} = 1378 \frac{mi}{yr} \times 18 \text{ vehicles} = 24,804 \frac{mi}{yr}$$

$$VMT_{HDGV} = 1378 \frac{mi}{yr} \times 72 \text{ vehicles} = 99,216 \frac{mi}{yr}$$

$$VMT_{HDDV} = 1378 \frac{mi}{yr} \times 54 \text{ vehicles} = 74,412 \frac{mi}{yr}$$

$$VMT_{MC} = 1378 \frac{mi}{yr} \times 18 \text{ vehicles} = 24,804 \frac{mi}{yr}$$

**Step 3 – Select emission factors.** EFs for vehicles in CY2022 are provided in Table 5-18. The CO EFs for a base in Alabama for 2022 are provided in the sub-table below.

Vehicle Category	CO Emission Factor (g/mi)
LDGV	3.907
LDGT	4.492
HDGV	15.898
LDDV	3.593
LDDT	3.209
HDDV	1.707
MC	13.285

**Step 4 – Calculate emissions.** Emissions are calculated using the vehicle miles traveled as calculated in Step 2, the EFs recorded in Step 3, and Equation 5-6. First, the CO emissions from each vehicle category are individually calculated and then summed for total CO emissions. Also, since no information was provided regarding the use of alternative fuels, a FERF value of “0” is used.

$$E(Pol)_{Total} = \sum_{i=1}^n \left[ VMT_i \times EF(Pol)_i \times \frac{FERF(Pol)}{100} \times 0.002205 \right]$$

$$E(CO)_{LDGV} = 892,944 \frac{mi}{yr} \times 3.907 \frac{g}{mi} \times \left[ 1 - \frac{0\%}{100\%} \right] \times 0.002205 \frac{lb}{g} = 7,692.65 \frac{lb}{yr}$$

$$E(CO)_{LDDV} = 24,804 \frac{mi}{yr} \times 4.492 \frac{g}{mi} \times \left[ 1 - \frac{0\%}{100\%} \right] \times 0.002205 \frac{lb}{g} = 245.68 \frac{lb}{yr}$$

$$E(CO)_{LDGT} = 1,339,416 \frac{mi}{yr} \times 15.898 \frac{g}{mi} \times \left[ 1 - \frac{0\%}{100\%} \right] \times 0.002205 \frac{lb}{g} = 46,953.35 \frac{lb}{yr}$$

$$E(\text{CO})_{LDDT} = 24,804 \frac{\text{mi}}{\text{yr}} \times 3.593 \frac{\text{g}}{\text{mi}} \times \left[1 - \frac{0\%}{100\%}\right] \times 0.002205 \frac{\text{lb}}{\text{g}} = \mathbf{196.51 \frac{\text{lb}}{\text{yr}}}$$

$$E(\text{CO})_{HDGV} = 99,216 \frac{\text{mi}}{\text{yr}} \times 3.209 \frac{\text{g}}{\text{mi}} \times \left[1 - \frac{0\%}{100\%}\right] \times 0.002205 \frac{\text{lb}}{\text{g}} = \mathbf{702.04 \frac{\text{lb}}{\text{yr}}}$$

$$E(\text{CO})_{HDDV} = 74,412 \frac{\text{mi}}{\text{yr}} \times 1.707 \frac{\text{g}}{\text{mi}} \times \left[1 - \frac{0\%}{100\%}\right] \times 0.002205 \frac{\text{lb}}{\text{g}} = \mathbf{280.09 \frac{\text{lb}}{\text{yr}}}$$

$$E(\text{CO})_{MC} = 24,804 \frac{\text{mi}}{\text{yr}} \times 13.285 \frac{\text{g}}{\text{mi}} \times \left[1 - \frac{0\%}{100\%}\right] \times 0.002205 \frac{\text{lb}}{\text{g}} = \mathbf{726.59 \frac{\text{lb}}{\text{yr}}}$$

The total CO emissions are calculated by summing the CO emissions from each contributing vehicle category as shown:

$$E(\text{Pol})_{\text{Total}} = \sum_{i=1}^n E(\text{Pol})_i$$

$$E(\text{CO})_{\text{Total}} = (7,692.65 + 245.68 + 46,953.35 + 196.51 + 702.04 + 280.09 + 726.59) \frac{\text{lb}}{\text{yr}}$$

$$\boxed{E(\text{CO})_{\text{TOTAL}} = \mathbf{56,796.9 \frac{\text{lb}}{\text{yr}}}}$$

#### 5.5.4 Problem 4 – Calculating POV Emissions Using Method 3

A USAF base is interested in determining the NO<sub>x</sub> generated by the operation of POVs driven on base. There are approximately 600 POVs that average 3,700 miles per year, but no vehicle studies have been conducted to describe the vehicle mix. Using the typical USAF vehicle mix, determine the NO<sub>x</sub> generated by the operation of these vehicles on base for CY 2023. The base is in Colorado.

**Step 1 – Gather fleet data.** The problem statement provided information regard the number of POVs (**N=600**) and the average vehicle miles driven by each vehicle (**AVM = 3,700 miles per year**).

**Step 2 – Group vehicle categories.** The first step is to determine the total annual vehicle miles traveled ( $VMT_{\text{Total}}$ ) for all vehicles. The problem statement provided information regarding the average vehicle miles traveled for all POVs (AVM), but not the average miles traveled for each vehicle category ( $AVM_i$ ). Therefore, the appropriate method for calculating the total annual vehicle miles traveled for all vehicles utilizes Equation 5-4 as shown:

$$VMT_{\text{Total}} = AVM \times N$$

$$VMT_{Total} = 3,700 \frac{mi}{yr} \times 600 = 2,220,000 \frac{mi}{yr}$$

Since the typical vehicle mix is assumed for this example, the vehicle mix (MIX<sub>i</sub>) for each category for POVs has been extracted from Table 5-2 and presented in the following table.

Vehicle Category	POV Vehicle Mix (%)
LDGV	42.40
LDDV	0.65
LDGT	44.36
LDDT	0.62
HDGV	3.66
HDDV	2.82
MC	2.15
LDGV (H)	1.83
LDGT (H)	0.49
LDGV (V)	0.84
LDGT (V)	0.19

**Step 3 – Select emission factors.** The EFs for CY 2023 POVs are presented in Table 5-18. The EFs for NO<sub>x</sub> in Colorado have been extracted from the table and presented in the table below.

Vehicle Category	NO <sub>x</sub> Emission Factor (g/mi)
LDGV	0.148
LDDV	0.248
LDGT	1.056
LDDT	0.101
HDGV	0.236
HDDV	2.870
MC	0.743

**Step 4 – Calculate emissions.** First, a total composite EF is calculated by taking the product of the EF for each vehicle category (EF(Pol)<sub>i</sub>) – from the table in Step 3 above), the vehicle mix value for the corresponding vehicle category (MIX<sub>i</sub> – from the table in Step 2), and the appropriate FERF from Table 5-7. FERF for electric vehicles are assumed to be 100%. These values are calculated as follows:



$$EF(Pol)_{Total} = \sum_{i=1}^n \left\{ EF(Pol)_i \times \frac{MIX_i}{100} \times \left[ 1 - \frac{FERF(Pol)}{100} \right] \right\}$$

$$EF(NO_X)_{LDGV} = 0.148 \frac{g}{mi} \times \left( \frac{42.40\%}{100\%} \right) \times \left[ 1 - \frac{0\%}{100\%} \right] = \mathbf{0.0627} \frac{g}{mi}$$

$$EF(NO_X)_{LDDV} = 0.248 \frac{g}{mi} \times \left( \frac{0.65\%}{100\%} \right) \times \left[ 1 - \frac{0\%}{100\%} \right] = \mathbf{0.0016} \frac{g}{mi}$$

$$EF(NO_X)_{LDGT} = 1.056 \frac{g}{mi} \times \left( \frac{44.36\%}{100\%} \right) \times \left[ 1 - \frac{0\%}{100\%} \right] = \mathbf{0.468} \frac{g}{mi}$$

$$EF(NO_X)_{LDDT} = 0.101 \frac{g}{mi} \times \left( \frac{0.62\%}{100\%} \right) \times \left[ 1 - \frac{0\%}{100\%} \right] = \mathbf{0.0006} \frac{g}{mi}$$

$$EF(NO_X)_{HDGV} = 0.236 \frac{g}{mi} \times \left( \frac{3.66\%}{100\%} \right) \times \left[ 1 - \frac{0\%}{100\%} \right] = \mathbf{0.009} \frac{g}{mi}$$

$$EF(NO_X)_{HDDV} = 2.870 \frac{g}{mi} \times \left( \frac{2.82\%}{100\%} \right) \times \left[ 1 - \frac{0\%}{100\%} \right] = \mathbf{0.081} \frac{g}{mi}$$

$$EF(NO_X)_{MC} = 0.743 \frac{g}{mi} \times \left( \frac{2.15\%}{100\%} \right) \times \left[ 1 - \frac{0\%}{100\%} \right] = \mathbf{0.016} \frac{g}{mi}$$

$$EF(NO_X)_{LDGV(H)} = 0.148 \frac{g}{mi} \times \left( \frac{1.83\%}{100\%} \right) \times \left[ 1 - \frac{75\%}{100\%} \right] = \mathbf{0.0007} \frac{g}{mi}$$

$$EF(NO_X)_{LDGT(H)} = 1.056 \frac{g}{mi} \times \left( \frac{0.49\%}{100\%} \right) \times \left[ 1 - \frac{75\%}{100\%} \right] = \mathbf{0.001} \frac{g}{mi}$$

$$EF(NO_X)_{LDGV(V)} = 0.148 \frac{g}{mi} \times \left( \frac{0.84\%}{100\%} \right) \times \left[ 1 - \frac{100\%}{100\%} \right] = \mathbf{0.00} \frac{g}{mi}$$

$$EF(NO_X)_{LDGT(V)} = 1.056 \frac{g}{mi} \times \left( \frac{0.19\%}{100\%} \right) \times \left[ 1 - \frac{100\%}{100\%} \right] = \mathbf{0.00} \frac{g}{mi}$$

Next, sum these values for a total composite emission factor ( $EF(Pol)_{Total}$ ) as shown:

$$EF(Pol)_{Total} = \sum_{i=1}^n EF(Pol)_i$$

$$EF(NO_X)_{Total} = (0.0627 + 0.0016 + 0.468 + 0.0006 + 0.009 + 0.081 + 0.016 + 0.0007 + 0.001 + 0.00 + 0.00) \frac{g}{mi} = \mathbf{0.6406} \frac{g}{mi}$$

Finally, using the total vehicle miles traveled ( $VMT_{Total}$ ) from Step 2, and the total composite EF, the total  $NO_X$  emissions are calculated using Equation 5-8 as shown:

$$E(\text{Pol})_{\text{Total}} = \text{VMT}_{\text{Total}} \times EF(\text{Pol})_{\text{Total}} \times 0.002205$$

$$E(\text{NO}_x)_{\text{Total}} = 2,220,000 \frac{\text{mi}}{\text{yr}} \times 0.6406 \frac{\text{g}}{\text{mi}} \times 0.002205 \frac{\text{lb}}{\text{g}}$$

$$E(\text{NO}_x)_{\text{Total}} = 3,135.8 \frac{\text{lb}}{\text{yr}}$$

### 5.5.5 Problem 5 – Calculating Fugitive PM Emissions

Determine the fugitive PM<sub>10</sub> generated from the POVs and GOVs provided in Problem 1 given that the base is in central Alabama. It can be assumed that 100% of all miles traveled by POVs are on paved roads, whereas GOVs traveled 90% on paved roads and 10% on unpaved roads.

**Step 1 – Gather fleet data.** Calculation of fugitive PM<sub>10</sub> emissions from on-road vehicle operation requires that the total vehicle miles driven (VMT<sub>Total</sub>) for POVs and GOVs is known. These values have been calculated in Step 1 of Problem 1: **VMT<sub>Total-POV</sub> = 1,925,586** and **VMT<sub>Total-GOV</sub> = 173,394 miles/year**.

**Step 2 – Select emission factors.** Fugitive PM<sub>10</sub> EFs are provided in Table 5-8. For POVs, the EFs for paved and unpaved roads are **0.058** and **466.206 g/mi**, respectively. Similarly, for GOVs, the EFs for paved and unpaved roads are **0.069** and **505.981 g/mi**, respectively.

Once selected, the EFs must be corrected to account for precipitation at the base. It is given that the base is in central Alabama. Based on this information, a review of Figure 5-1 reveals that the base is estimated to have 110 days in the year with precipitation of 0.01 inches or more. The EFs are corrected using this value and Equation 5-1 or Equation 5-2.

For POVs:

$$EF(Pol)_{CP} = EF(Pol)_P \times \left(1 - \frac{P}{4N}\right)$$

$$EF(PM_{10})_{CP} = 0.058 \frac{g}{mi} \times \left(1 - \frac{110}{4 \times 365}\right)$$

$$EF(PM_{10})_{CP} = 0.058 \frac{g}{mi} \times \left(1 - \frac{110}{1460}\right) = \mathbf{0.054 \frac{g}{mi}}$$

For GOVs:

$$EF(PM_{10})_{CP} = 0.069 \frac{g}{mi} \times \left(1 - \frac{110}{4 \times 365}\right)$$

$$EF(PM_{10})_{CP} = 0.069 \frac{g}{mi} \times \left(1 - \frac{110}{1460}\right) = \mathbf{0.064 \frac{g}{mi}}$$

$$EF(Pol)_{CU} = EF(Pol)_U \times \left(1 - \frac{P}{N}\right)$$

$$EF(PM_{10})_{CU} = 505.981 \frac{g}{mi} \times \left(1 - \frac{110}{365}\right) = \mathbf{353.494 \frac{g}{mi}}$$

**Step 3 – Calculate emissions.** Using the  $VMT_{Total}$  for POVs and GOVs as recorded in Step 1, the estimated percentage of driving on paved and unpaved roads (as given in the problem statement), and Equation 5-17, emissions are calculated as follows:

$$E(Pol)_{Total} = VMT_{Total} \times \left[ \left( \frac{\%VMT_P}{100} \times EF(Pol)_{CP} \right) + \left( \frac{\%VMT_U}{100} \times EF(Pol)_{CU} \right) \right] \times 0.002205$$

For POVs:

$$E(PM_{10})_{Total} = 1,925,586 \frac{mi}{yr} \times \left[ \left( \frac{100\%}{100\%} \times 0.054 \frac{g}{mi} \right) + (0) \right] \times 0.002205 \frac{lb}{g}$$

$$E(PM_{10})_{Total} = 1,925,586 \frac{mi}{yr} \times \left[ \left( 1 \times 0.054 \frac{g}{mi} \right) \right] \times 0.002205 \frac{lb}{g}$$

$$\boxed{E(PM_{10})_{Total} = 229.28 \frac{lb}{yr}}$$

For GOVs:

$$E(PM_{10})_{Total} = 173,394 \frac{mi}{yr} \times \left[ \left( \frac{90\%}{100\%} \times 0.064 \frac{g}{mi} \right) + \left( \frac{10\%}{100\%} \times 353.494 \frac{g}{mi} \right) \right] \times 0.002205 \frac{lb}{g}$$

$$E(PM_{10})_{Total} = 173,394 \frac{mi}{yr} \times \left[ \left( 0.9 \times 0.064 \frac{g}{mi} \right) + \left( 0.1 \times 353.494 \frac{g}{mi} \right) \right] \times 0.002205 \frac{lb}{g}$$

$$E(PM_{10})_{Total} = 173,394 \frac{mi}{yr} \times \left[ \left( 0.0576 \frac{g}{mi} \right) + \left( 35.3494 \frac{g}{mi} \right) \right] \times 0.002205 \frac{lb}{g}$$

$$E(PM_{10})_{Total} = 173,394 \frac{mi}{yr} \times \left[ 35.407 \frac{g}{mi} \right] \times 0.002205 \frac{lb}{g}$$

$$\boxed{E(PM_{10})_{Total} = 13,537.29 \frac{lb}{yr}}$$

**Table 5-9. Air Force/State/Territory-Specific On-Road Vehicle Composite Emission Factors – 2023 POV**

State	Vehicle Type	Emission Factors (g/mi)							
		Criteria Pollutants and Ozone Precursors							
		CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2e</sub>	NH <sub>3</sub>
ALABAMA	All Vehicles	4.473	0.307	0.301	0.003	0.007	0.006	409.154	0.027
ALASKA	All Vehicles	5.486	0.298	0.308	0.002	0.008	0.007	404.638	0.027
ARIZONA	All Vehicles	4.352	0.339	0.311	0.002	0.007	0.007	416.775	0.027
ARKANSAS	All Vehicles	4.428	0.302	0.305	0.003	0.008	0.007	403.968	0.027
CALIFORNIA	All Vehicles	3.670	0.285	0.279	0.001	0.007	0.006	405.416	0.027
COLORADO	All Vehicles	3.954	0.305	0.316	0.003	0.008	0.007	402.883	0.027
CONNECTICUT	All Vehicles	3.758	0.291	0.292	0.003	0.008	0.007	408.516	0.027
DELAWARE	All Vehicles	3.828	0.286	0.299	0.003	0.008	0.007	412.709	0.027
DISTRICT OF COLUMBIA	All Vehicles	3.953	0.299	0.301	0.003	0.008	0.007	438.313	0.026
FLORIDA	All Vehicles	4.893	0.340	0.294	0.003	0.007	0.006	426.282	0.027
GEORGIA	All Vehicles	4.264	0.306	0.301	0.003	0.007	0.007	411.440	0.027
HAWAII	All Vehicles	4.795	0.349	0.293	0.003	0.008	0.007	417.130	0.027
IDAHO	All Vehicles	4.064	0.291	0.323	0.003	0.008	0.007	398.322	0.027
ILLINOIS	All Vehicles	4.111	0.297	0.307	0.003	0.008	0.007	410.602	0.027
INDIANA	All Vehicles	4.296	0.297	0.319	0.003	0.008	0.008	406.029	0.027
IOWA	All Vehicles	4.273	0.292	0.314	0.003	0.009	0.008	397.909	0.027
KANSAS	All Vehicles	4.378	0.302	0.314	0.003	0.008	0.007	399.333	0.027
KENTUCKY	All Vehicles	4.342	0.294	0.309	0.003	0.008	0.007	401.643	0.027
LOUISIANA	All Vehicles	4.562	0.316	0.294	0.003	0.007	0.006	412.950	0.027
MAINE	All Vehicles	3.972	0.271	0.309	0.002	0.009	0.008	393.573	0.027
MARYLAND	All Vehicles	3.902	0.295	0.301	0.003	0.008	0.007	410.317	0.027
MASSACHUSETTS	All Vehicles	3.841	0.299	0.307	0.003	0.008	0.008	413.943	0.027
MICHIGAN	All Vehicles	4.341	0.302	0.321	0.003	0.009	0.008	405.903	0.027
MINNESOTA	All Vehicles	4.443	0.297	0.322	0.003	0.009	0.008	400.389	0.027
MISSISSIPPI	All Vehicles	4.428	0.296	0.296	0.003	0.007	0.006	402.883	0.027
MISSOURI	All Vehicles	4.204	0.299	0.307	0.003	0.008	0.007	400.459	0.027
MONTANA	All Vehicles	4.149	0.286	0.326	0.002	0.008	0.008	392.214	0.027

State	Vehicle Type	Emission Factors (g/mi)							
		Criteria Pollutants and Ozone Precursors							
		CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2e</sub>	NH <sub>3</sub>
NEBRASKA	All Vehicles	4.336	0.299	0.318	0.002	0.009	0.008	397.220	0.027
NEVADA	All Vehicles	4.193	0.350	0.328	0.003	0.009	0.008	413.565	0.027
NEW HAMPSHIRE	All Vehicles	3.742	0.277	0.300	0.003	0.009	0.008	401.038	0.027
NEW JERSEY	All Vehicles	3.846	0.298	0.300	0.003	0.008	0.007	414.407	0.027
NEW MEXICO	All Vehicles	4.194	0.309	0.325	0.003	0.008	0.007	402.120	0.027
NEW YORK	All Vehicles	3.739	0.283	0.292	0.003	0.008	0.008	408.950	0.027
NORTH CAROLINA	All Vehicles	4.123	0.299	0.303	0.003	0.007	0.007	407.700	0.027
NORTH DAKOTA	All Vehicles	4.416	0.287	0.321	0.002	0.010	0.009	392.272	0.027
OHIO	All Vehicles	4.266	0.301	0.313	0.003	0.009	0.008	405.117	0.026
OKLAHOMA	All Vehicles	4.420	0.304	0.308	0.003	0.008	0.007	402.590	0.027
OREGON	All Vehicles	3.857	0.282	0.311	0.003	0.008	0.007	401.450	0.027
PACIFIC ISLANDS	All Vehicles	4.075	0.294	0.301	0.002	0.008	0.007	406.519	0.027
PENNSYLVANIA	All Vehicles	3.966	0.286	0.304	0.003	0.008	0.007	407.562	0.027
PUERTO RICO	All Vehicles	4.991	0.297	0.271	0.003	0.006	0.006	428.037	0.027
RHODE ISLAND	All Vehicles	3.783	0.291	0.294	0.003	0.008	0.007	410.668	0.027
SOUTH CAROLINA	All Vehicles	4.453	0.304	0.303	0.003	0.007	0.006	407.874	0.027
SOUTH DAKOTA	All Vehicles	4.396	0.286	0.321	0.002	0.009	0.008	392.244	0.027
TENNESSEE	All Vehicles	4.445	0.310	0.311	0.003	0.008	0.007	409.016	0.027
TEXAS	All Vehicles	4.186	0.305	0.287	0.003	0.007	0.006	412.854	0.027
UTAH	All Vehicles	4.021	0.308	0.322	0.003	0.008	0.007	404.803	0.027
VERMONT	All Vehicles	3.740	0.266	0.301	0.002	0.009	0.008	392.605	0.027
VIRGIN ISLANDS	All Vehicles	5.382	0.420	0.289	0.003	0.007	0.006	416.845	0.027
VIRGINIA	All Vehicles	4.141	0.293	0.303	0.003	0.008	0.007	405.717	0.027
WASHINGTON	All Vehicles	4.103	0.293	0.323	0.003	0.008	0.007	401.851	0.027
WEST VIRGINIA	All Vehicles	4.226	0.289	0.310	0.003	0.008	0.007	398.733	0.027
WISCONSIN	All Vehicles	4.198	0.283	0.312	0.003	0.009	0.008	398.546	0.027
WYOMING	All Vehicles	4.233	0.297	0.330	0.002	0.009	0.008	393.662	0.027

**Table 5-10. Air Force/State/Territory-Specific On-Road Vehicle Composite Emission Factors – 2024 POV**

State	Vehicle Type	Emission Factors (g/mi)							
		Criteria Pollutants and Ozone Precursors							
		CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2e</sub>	NH <sub>3</sub>
ALABAMA	All Vehicles	4.276	0.291	0.263	0.003	0.007	0.006	401.166	0.027
ALASKA	All Vehicles	5.239	0.283	0.272	0.001	0.008	0.007	396.900	0.027
ARIZONA	All Vehicles	4.166	0.323	0.271	0.002	0.007	0.006	408.619	0.027
ARKANSAS	All Vehicles	4.239	0.287	0.267	0.002	0.007	0.006	396.093	0.027
CALIFORNIA	All Vehicles	3.515	0.272	0.245	0.001	0.006	0.006	397.551	0.027
COLORADO	All Vehicles	3.781	0.291	0.278	0.002	0.008	0.007	395.117	0.027
CONNECTICUT	All Vehicles	3.584	0.278	0.258	0.003	0.008	0.007	400.648	0.027
DELAWARE	All Vehicles	3.647	0.272	0.262	0.003	0.007	0.006	404.711	0.027
DISTRICT OF COLUMBIA	All Vehicles	3.756	0.285	0.266	0.003	0.008	0.007	429.846	0.026
FLORIDA	All Vehicles	4.670	0.322	0.257	0.003	0.007	0.006	417.925	0.027
GEORGIA	All Vehicles	4.074	0.291	0.264	0.003	0.007	0.006	403.429	0.027
HAWAII	All Vehicles	4.582	0.330	0.256	0.003	0.007	0.007	408.976	0.027
IDAHO	All Vehicles	3.889	0.277	0.283	0.002	0.008	0.007	390.625	0.027
ILLINOIS	All Vehicles	3.920	0.282	0.269	0.003	0.008	0.007	402.669	0.027
INDIANA	All Vehicles	4.107	0.282	0.280	0.003	0.008	0.007	398.170	0.027
IOWA	All Vehicles	4.092	0.277	0.275	0.002	0.009	0.008	390.210	0.027
KANSAS	All Vehicles	4.193	0.287	0.275	0.002	0.008	0.007	391.587	0.027
KENTUCKY	All Vehicles	4.155	0.279	0.271	0.002	0.007	0.007	393.838	0.027
LOUISIANA	All Vehicles	4.360	0.300	0.256	0.003	0.007	0.006	404.865	0.027
MAINE	All Vehicles	3.801	0.258	0.270	0.002	0.008	0.007	385.978	0.027
MARYLAND	All Vehicles	3.721	0.280	0.263	0.003	0.007	0.007	402.376	0.027
MASSACHUSETTS	All Vehicles	3.656	0.284	0.269	0.003	0.008	0.007	405.983	0.027
MICHIGAN	All Vehicles	4.150	0.286	0.282	0.003	0.009	0.008	398.076	0.027
MINNESOTA	All Vehicles	4.251	0.283	0.282	0.002	0.009	0.008	392.685	0.027
MISSISSIPPI	All Vehicles	4.237	0.281	0.258	0.002	0.007	0.006	395.006	0.027
MISSOURI	All Vehicles	4.023	0.284	0.268	0.002	0.008	0.007	392.692	0.027
MONTANA	All Vehicles	3.976	0.272	0.286	0.002	0.008	0.007	384.649	0.026

State	Vehicle Type	Emission Factors (g/mi)							
		Criteria Pollutants and Ozone Precursors							
		CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2e</sub>	NH <sub>3</sub>
NEBRASKA	All Vehicles	4.154	0.285	0.279	0.002	0.009	0.008	389.536	0.027
NEVADA	All Vehicles	4.007	0.333	0.286	0.003	0.009	0.008	405.516	0.027
NEW HAMPSHIRE	All Vehicles	3.572	0.263	0.262	0.002	0.008	0.007	393.305	0.027
NEW JERSEY	All Vehicles	3.664	0.283	0.263	0.003	0.008	0.007	406.409	0.027
NEW MEXICO	All Vehicles	4.015	0.294	0.284	0.002	0.008	0.007	394.299	0.027
NEW YORK	All Vehicles	3.571	0.270	0.257	0.003	0.008	0.007	401.064	0.027
NORTH CAROLINA	All Vehicles	3.939	0.284	0.265	0.003	0.007	0.006	399.772	0.027
NORTH DAKOTA	All Vehicles	4.230	0.273	0.282	0.002	0.009	0.008	384.725	0.026
OHIO	All Vehicles	4.079	0.286	0.275	0.003	0.008	0.007	397.291	0.026
OKLAHOMA	All Vehicles	4.232	0.289	0.269	0.003	0.007	0.007	394.745	0.027
OREGON	All Vehicles	3.686	0.268	0.273	0.002	0.007	0.007	393.689	0.027
PACIFIC ISLANDS	All Vehicles	3.895	0.280	0.264	0.002	0.007	0.006	398.629	0.027
PENNSYLVANIA	All Vehicles	3.789	0.272	0.266	0.003	0.008	0.007	399.677	0.027
PUERTO RICO	All Vehicles	4.766	0.280	0.236	0.003	0.006	0.005	419.587	0.027
RHODE ISLAND	All Vehicles	3.609	0.278	0.259	0.003	0.008	0.007	402.756	0.027
SOUTH CAROLINA	All Vehicles	4.258	0.289	0.265	0.003	0.007	0.006	399.911	0.027
SOUTH DAKOTA	All Vehicles	4.212	0.272	0.281	0.002	0.008	0.007	384.674	0.027
TENNESSEE	All Vehicles	4.250	0.294	0.272	0.003	0.007	0.007	401.065	0.027
TEXAS	All Vehicles	3.997	0.290	0.251	0.003	0.007	0.006	404.785	0.027
UTAH	All Vehicles	3.844	0.293	0.282	0.003	0.008	0.007	396.990	0.027
VERMONT	All Vehicles	3.578	0.253	0.263	0.002	0.009	0.008	385.029	0.027
VIRGIN ISLANDS	All Vehicles	5.137	0.399	0.253	0.003	0.007	0.006	408.691	0.026
VIRGINIA	All Vehicles	3.957	0.278	0.265	0.003	0.007	0.006	397.841	0.027
WASHINGTON	All Vehicles	3.925	0.279	0.284	0.002	0.007	0.007	394.099	0.027
WEST VIRGINIA	All Vehicles	4.044	0.274	0.271	0.002	0.008	0.007	391.003	0.027
WISCONSIN	All Vehicles	4.014	0.269	0.274	0.002	0.008	0.007	390.860	0.027
WYOMING	All Vehicles	4.058	0.283	0.289	0.002	0.008	0.007	386.069	0.027

**Table 5-11. Air Force/State/Territory-Specific On-Road Vehicle Composite Emission Factors – 2025 POV**

State	Vehicle Type	Emission Factors (g/mi)							
		Criteria Pollutants and Ozone Precursors							
		CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2e</sub>	NH <sub>3</sub>
ALABAMA	All Vehicles	4.072	0.280	0.238	0.002	0.006	0.006	393.408	0.026
ALASKA	All Vehicles	4.976	0.272	0.247	0.001	0.007	0.006	389.394	0.026
ARIZONA	All Vehicles	3.961	0.311	0.245	0.002	0.007	0.006	400.696	0.026
ARKANSAS	All Vehicles	4.040	0.276	0.241	0.002	0.007	0.006	388.447	0.026
CALIFORNIA	All Vehicles	3.339	0.262	0.222	0.001	0.006	0.005	389.912	0.026
COLORADO	All Vehicles	3.605	0.281	0.252	0.002	0.008	0.007	387.580	0.026
CONNECTICUT	All Vehicles	3.408	0.268	0.234	0.002	0.007	0.007	393.009	0.027
DELAWARE	All Vehicles	3.464	0.262	0.237	0.003	0.007	0.006	396.942	0.026
DISTRICT OF COLUMBIA	All Vehicles	3.564	0.274	0.242	0.003	0.007	0.006	421.610	0.026
FLORIDA	All Vehicles	4.443	0.309	0.232	0.003	0.006	0.005	409.803	0.026
GEORGIA	All Vehicles	3.877	0.279	0.239	0.002	0.007	0.006	395.648	0.026
HAWAII	All Vehicles	4.365	0.317	0.232	0.003	0.007	0.006	401.050	0.026
IDAHO	All Vehicles	3.708	0.267	0.256	0.002	0.007	0.007	383.158	0.026
ILLINOIS	All Vehicles	3.726	0.272	0.243	0.002	0.008	0.007	394.966	0.026
INDIANA	All Vehicles	3.912	0.271	0.253	0.002	0.008	0.007	390.541	0.026
IOWA	All Vehicles	3.905	0.267	0.249	0.002	0.008	0.008	382.740	0.026
KANSAS	All Vehicles	3.999	0.277	0.249	0.002	0.008	0.007	384.071	0.026
KENTUCKY	All Vehicles	3.959	0.269	0.244	0.002	0.007	0.006	386.263	0.026
LOUISIANA	All Vehicles	4.151	0.289	0.231	0.003	0.006	0.006	397.013	0.026
MAINE	All Vehicles	3.622	0.248	0.244	0.002	0.008	0.007	378.611	0.026
MARYLAND	All Vehicles	3.536	0.270	0.238	0.002	0.007	0.006	394.665	0.027
MASSACHUSETTS	All Vehicles	3.469	0.273	0.243	0.003	0.008	0.007	398.251	0.027
MICHIGAN	All Vehicles	3.955	0.276	0.255	0.002	0.009	0.008	390.479	0.026
MINNESOTA	All Vehicles	4.053	0.272	0.256	0.002	0.009	0.008	385.209	0.026
MISSISSIPPI	All Vehicles	4.035	0.270	0.233	0.002	0.006	0.006	387.359	0.026
MISSOURI	All Vehicles	3.832	0.274	0.242	0.002	0.007	0.007	385.155	0.027
MONTANA	All Vehicles	3.795	0.263	0.258	0.002	0.008	0.007	377.312	0.026

State	Vehicle Type	Emission Factors (g/mi)							
		Criteria Pollutants and Ozone Precursors							
		CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2e</sub>	NH <sub>3</sub>
NEBRASKA	All Vehicles	3.964	0.274	0.252	0.002	0.008	0.007	382.082	0.026
NEVADA	All Vehicles	3.815	0.320	0.259	0.003	0.008	0.007	397.697	0.026
NEW HAMPSHIRE	All Vehicles	3.395	0.253	0.237	0.002	0.008	0.007	385.800	0.026
NEW JERSEY	All Vehicles	3.480	0.273	0.238	0.003	0.007	0.006	398.640	0.027
NEW MEXICO	All Vehicles	3.827	0.283	0.256	0.002	0.007	0.007	386.708	0.026
NEW YORK	All Vehicles	3.401	0.261	0.234	0.002	0.008	0.007	393.407	0.027
NORTH CAROLINA	All Vehicles	3.748	0.273	0.240	0.002	0.007	0.006	392.073	0.026
NORTH DAKOTA	All Vehicles	4.037	0.263	0.255	0.002	0.009	0.008	377.406	0.026
OHIO	All Vehicles	3.886	0.276	0.249	0.002	0.008	0.007	389.694	0.025
OKLAHOMA	All Vehicles	4.034	0.278	0.243	0.002	0.007	0.006	387.130	0.026
OREGON	All Vehicles	3.511	0.258	0.247	0.002	0.007	0.006	386.154	0.026
PACIFIC ISLANDS	All Vehicles	3.707	0.269	0.239	0.002	0.007	0.006	390.968	0.026
PENNSYLVANIA	All Vehicles	3.606	0.262	0.241	0.002	0.008	0.007	392.021	0.027
PUERTO RICO	All Vehicles	4.535	0.269	0.213	0.003	0.006	0.005	411.370	0.026
RHODE ISLAND	All Vehicles	3.434	0.268	0.235	0.002	0.007	0.007	395.072	0.027
SOUTH CAROLINA	All Vehicles	4.056	0.278	0.239	0.002	0.006	0.006	392.178	0.026
SOUTH DAKOTA	All Vehicles	4.018	0.262	0.254	0.002	0.008	0.007	377.332	0.026
TENNESSEE	All Vehicles	4.048	0.283	0.246	0.002	0.007	0.006	393.344	0.026
TEXAS	All Vehicles	3.802	0.279	0.227	0.003	0.006	0.005	396.948	0.026
UTAH	All Vehicles	3.663	0.283	0.256	0.002	0.008	0.007	389.407	0.026
VERMONT	All Vehicles	3.406	0.243	0.237	0.002	0.008	0.007	377.680	0.026
VIRGIN ISLANDS	All Vehicles	4.883	0.383	0.228	0.003	0.006	0.006	400.773	0.026
VIRGINIA	All Vehicles	3.767	0.268	0.240	0.002	0.007	0.006	390.194	0.027
WASHINGTON	All Vehicles	3.741	0.269	0.257	0.002	0.007	0.006	386.576	0.026
WEST VIRGINIA	All Vehicles	3.854	0.264	0.245	0.002	0.007	0.007	383.501	0.026
WISCONSIN	All Vehicles	3.823	0.259	0.248	0.002	0.008	0.007	383.403	0.026
WYOMING	All Vehicles	3.874	0.273	0.262	0.002	0.008	0.007	378.706	0.026

**Table 5-12. Air Force/State/Territory-Specific On-Road Vehicle Composite Emission Factors – 2026 POV**

State	Vehicle Type	Emission Factors (g/mi)							
		Criteria Pollutants and Ozone Precursors							
		CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2e</sub>	NH <sub>3</sub>
ALABAMA	All Vehicles	3.825	0.255	0.209	0.002	0.006	0.005	385.870	0.026
ALASKA	All Vehicles	4.660	0.252	0.219	0.001	0.007	0.006	382.067	0.026
ARIZONA	All Vehicles	3.708	0.284	0.214	0.002	0.006	0.006	393.001	0.026
ARKANSAS	All Vehicles	3.801	0.252	0.212	0.002	0.007	0.006	381.016	0.026
CALIFORNIA	All Vehicles	3.118	0.239	0.194	0.001	0.006	0.005	382.486	0.026
COLORADO	All Vehicles	3.397	0.260	0.224	0.002	0.007	0.007	380.240	0.026
CONNECTICUT	All Vehicles	3.192	0.247	0.206	0.002	0.007	0.006	385.567	0.026
DELAWARE	All Vehicles	3.232	0.239	0.205	0.002	0.007	0.006	389.384	0.026
DISTRICT OF COLUMBIA	All Vehicles	3.334	0.251	0.213	0.003	0.007	0.006	413.601	0.025
FLORIDA	All Vehicles	4.167	0.280	0.204	0.003	0.006	0.005	401.917	0.026
GEORGIA	All Vehicles	3.636	0.254	0.210	0.002	0.006	0.006	388.085	0.026
HAWAII	All Vehicles	4.103	0.288	0.204	0.002	0.007	0.006	393.355	0.026
IDAHO	All Vehicles	3.487	0.246	0.224	0.002	0.007	0.006	375.887	0.026
ILLINOIS	All Vehicles	3.473	0.248	0.212	0.002	0.007	0.006	387.466	0.026
INDIANA	All Vehicles	3.678	0.248	0.224	0.002	0.007	0.007	383.115	0.026
IOWA	All Vehicles	3.679	0.245	0.219	0.002	0.008	0.007	375.468	0.026
KANSAS	All Vehicles	3.765	0.254	0.219	0.002	0.007	0.007	376.759	0.026
KENTUCKY	All Vehicles	3.722	0.246	0.215	0.002	0.007	0.006	378.896	0.026
LOUISIANA	All Vehicles	3.895	0.262	0.203	0.002	0.006	0.005	389.386	0.026
MAINE	All Vehicles	3.399	0.228	0.215	0.002	0.008	0.007	371.435	0.026
MARYLAND	All Vehicles	3.299	0.247	0.206	0.002	0.007	0.006	387.161	0.026
MASSACHUSETTS	All Vehicles	3.239	0.250	0.214	0.002	0.007	0.007	390.719	0.026
MICHIGAN	All Vehicles	3.719	0.253	0.225	0.002	0.008	0.007	383.078	0.026
MINNESOTA	All Vehicles	3.816	0.251	0.226	0.002	0.008	0.007	377.923	0.026
MISSISSIPPI	All Vehicles	3.793	0.246	0.204	0.002	0.006	0.005	379.932	0.026
MISSOURI	All Vehicles	3.589	0.250	0.212	0.002	0.007	0.006	377.822	0.026
MONTANA	All Vehicles	3.578	0.242	0.228	0.002	0.007	0.007	370.167	0.026

State	Vehicle Type	Emission Factors (g/mi)							
		Criteria Pollutants and Ozone Precursors							
		CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2e</sub>	NH <sub>3</sub>
NEBRASKA	All Vehicles	3.735	0.252	0.222	0.002	0.008	0.007	374.825	0.026
NEVADA	All Vehicles	3.573	0.293	0.224	0.002	0.008	0.007	390.098	0.026
NEW HAMPSHIRE	All Vehicles	3.148	0.231	0.205	0.002	0.008	0.007	378.490	0.026
NEW JERSEY	All Vehicles	3.244	0.250	0.207	0.002	0.007	0.006	391.076	0.026
NEW MEXICO	All Vehicles	3.598	0.260	0.224	0.002	0.007	0.006	379.326	0.026
NEW YORK	All Vehicles	3.201	0.241	0.207	0.002	0.007	0.007	385.949	0.026
NORTH CAROLINA	All Vehicles	3.515	0.248	0.211	0.002	0.006	0.006	384.588	0.026
NORTH DAKOTA	All Vehicles	3.806	0.243	0.226	0.002	0.009	0.008	370.273	0.025
OHIO	All Vehicles	3.654	0.253	0.220	0.002	0.008	0.007	382.297	0.025
OKLAHOMA	All Vehicles	3.796	0.254	0.214	0.002	0.007	0.006	379.729	0.026
OREGON	All Vehicles	3.293	0.236	0.217	0.002	0.007	0.006	378.823	0.026
PACIFIC ISLANDS	All Vehicles	3.475	0.246	0.210	0.002	0.007	0.006	383.517	0.026
PENNSYLVANIA	All Vehicles	3.375	0.239	0.211	0.002	0.007	0.007	384.569	0.026
PUERTO RICO	All Vehicles	4.259	0.242	0.186	0.003	0.005	0.005	403.406	0.026
RHODE ISLAND	All Vehicles	3.227	0.248	0.208	0.002	0.007	0.006	387.588	0.026
SOUTH CAROLINA	All Vehicles	3.810	0.253	0.210	0.002	0.006	0.005	384.665	0.026
SOUTH DAKOTA	All Vehicles	3.786	0.241	0.225	0.002	0.008	0.007	370.182	0.026
TENNESSEE	All Vehicles	3.802	0.258	0.217	0.002	0.007	0.006	385.835	0.026
TEXAS	All Vehicles	3.561	0.253	0.199	0.002	0.006	0.005	389.334	0.026
UTAH	All Vehicles	3.439	0.261	0.224	0.002	0.007	0.006	382.024	0.026
VERMONT	All Vehicles	3.172	0.222	0.206	0.002	0.008	0.007	370.522	0.026
VIRGIN ISLANDS	All Vehicles	4.572	0.347	0.201	0.002	0.006	0.005	393.071	0.025
VIRGINIA	All Vehicles	3.536	0.245	0.211	0.002	0.007	0.006	382.757	0.026
WASHINGTON	All Vehicles	3.519	0.247	0.227	0.002	0.007	0.006	379.251	0.026
WEST VIRGINIA	All Vehicles	3.625	0.242	0.216	0.002	0.007	0.006	376.203	0.026
WISCONSIN	All Vehicles	3.586	0.238	0.218	0.002	0.008	0.007	376.139	0.026
WYOMING	All Vehicles	3.653	0.252	0.231	0.002	0.008	0.007	371.534	0.026



**Table 5-13. Air Force/State/Territory-Specific On-Road Vehicle Composite Emission Factors – 2027 POV**

State	Vehicle Type	Emission Factors (g/mi)							
		Criteria Pollutants and Ozone Precursors							
		CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2e</sub>	NH <sub>3</sub>
ALABAMA	All Vehicles	3.638	0.245	0.191	0.002	0.006	0.005	378.852	0.026
ALASKA	All Vehicles	4.431	0.243	0.202	0.001	0.006	0.006	375.226	0.025
ARIZONA	All Vehicles	3.522	0.273	0.196	0.002	0.006	0.005	385.842	0.026
ARKANSAS	All Vehicles	3.619	0.242	0.194	0.002	0.006	0.006	374.091	0.026
CALIFORNIA	All Vehicles	2.961	0.231	0.178	0.001	0.005	0.005	375.574	0.026
COLORADO	All Vehicles	3.235	0.251	0.206	0.002	0.007	0.006	373.398	0.025
CONNECTICUT	All Vehicles	3.035	0.239	0.190	0.002	0.007	0.006	378.644	0.026
DELAWARE	All Vehicles	3.071	0.231	0.188	0.002	0.006	0.006	382.356	0.026
DISTRICT OF COLUMBIA	All Vehicles	3.158	0.242	0.196	0.003	0.006	0.006	406.192	0.025
FLORIDA	All Vehicles	3.957	0.269	0.186	0.003	0.006	0.005	394.595	0.026
GEORGIA	All Vehicles	3.457	0.244	0.192	0.002	0.006	0.005	381.048	0.026
HAWAII	All Vehicles	3.900	0.276	0.187	0.002	0.006	0.006	386.215	0.025
IDAHO	All Vehicles	3.323	0.237	0.206	0.002	0.007	0.006	369.098	0.025
ILLINOIS	All Vehicles	3.303	0.239	0.195	0.002	0.007	0.006	380.483	0.026
INDIANA	All Vehicles	3.501	0.239	0.206	0.002	0.007	0.006	376.195	0.026
IOWA	All Vehicles	3.508	0.236	0.201	0.002	0.008	0.007	368.681	0.025
KANSAS	All Vehicles	3.587	0.244	0.201	0.002	0.007	0.006	369.936	0.025
KENTUCKY	All Vehicles	3.544	0.237	0.197	0.002	0.006	0.006	372.018	0.026
LOUISIANA	All Vehicles	3.703	0.252	0.185	0.002	0.006	0.005	382.286	0.026
MAINE	All Vehicles	3.241	0.220	0.197	0.002	0.007	0.007	364.735	0.026
MARYLAND	All Vehicles	3.136	0.238	0.189	0.002	0.006	0.006	380.179	0.026
MASSACHUSETTS	All Vehicles	3.045	0.240	0.193	0.002	0.007	0.006	383.718	0.026
MICHIGAN	All Vehicles	3.541	0.244	0.207	0.002	0.008	0.007	376.185	0.026
MINNESOTA	All Vehicles	3.637	0.242	0.208	0.002	0.008	0.007	371.131	0.025
MISSISSIPPI	All Vehicles	3.609	0.236	0.187	0.002	0.006	0.005	373.010	0.025
MISSOURI	All Vehicles	3.419	0.241	0.195	0.002	0.007	0.006	370.976	0.026
MONTANA	All Vehicles	3.414	0.234	0.209	0.002	0.007	0.006	363.486	0.025

State	Vehicle Type	Emission Factors (g/mi)							
		Criteria Pollutants and Ozone Precursors							
		CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2e</sub>	NH <sub>3</sub>
NEBRASKA	All Vehicles	3.561	0.243	0.204	0.002	0.008	0.007	368.048	0.025
NEVADA	All Vehicles	3.400	0.282	0.205	0.002	0.008	0.007	383.025	0.026
NEW HAMPSHIRE	All Vehicles	2.999	0.223	0.188	0.002	0.007	0.006	371.674	0.026
NEW JERSEY	All Vehicles	3.082	0.241	0.191	0.002	0.007	0.006	384.046	0.026
NEW MEXICO	All Vehicles	3.428	0.250	0.205	0.002	0.007	0.006	372.439	0.026
NEW YORK	All Vehicles	3.046	0.232	0.191	0.002	0.007	0.006	379.007	0.026
NORTH CAROLINA	All Vehicles	3.344	0.239	0.193	0.002	0.006	0.005	377.619	0.026
NORTH DAKOTA	All Vehicles	3.632	0.235	0.207	0.002	0.008	0.007	363.608	0.025
OHIO	All Vehicles	3.478	0.244	0.202	0.002	0.007	0.007	375.404	0.025
OKLAHOMA	All Vehicles	3.615	0.244	0.196	0.002	0.006	0.006	372.830	0.026
OREGON	All Vehicles	3.136	0.228	0.199	0.002	0.006	0.006	371.988	0.025
PACIFIC ISLANDS	All Vehicles	3.305	0.237	0.192	0.002	0.006	0.006	376.578	0.026
PENNSYLVANIA	All Vehicles	3.213	0.230	0.193	0.002	0.007	0.006	377.623	0.026
PUERTO RICO	All Vehicles	4.044	0.232	0.170	0.003	0.005	0.004	396.021	0.026
RHODE ISLAND	All Vehicles	3.068	0.239	0.192	0.002	0.007	0.006	380.625	0.026
SOUTH CAROLINA	All Vehicles	3.625	0.243	0.192	0.002	0.006	0.005	377.664	0.026
SOUTH DAKOTA	All Vehicles	3.612	0.233	0.206	0.002	0.007	0.007	363.495	0.025
TENNESSEE	All Vehicles	3.618	0.249	0.198	0.002	0.006	0.006	378.842	0.026
TEXAS	All Vehicles	3.384	0.243	0.182	0.002	0.006	0.005	382.252	0.026
UTAH	All Vehicles	3.275	0.252	0.206	0.002	0.007	0.006	375.140	0.025
VERMONT	All Vehicles	3.027	0.215	0.189	0.002	0.008	0.007	363.834	0.026
VIRGIN ISLANDS	All Vehicles	4.340	0.332	0.184	0.002	0.006	0.005	385.914	0.025
VIRGINIA	All Vehicles	3.365	0.236	0.194	0.002	0.006	0.006	375.825	0.026
WASHINGTON	All Vehicles	3.351	0.238	0.209	0.002	0.006	0.006	372.421	0.026
WEST VIRGINIA	All Vehicles	3.453	0.233	0.198	0.002	0.007	0.006	369.394	0.026
WISCONSIN	All Vehicles	3.417	0.229	0.200	0.002	0.007	0.007	369.362	0.025
WYOMING	All Vehicles	3.486	0.243	0.212	0.002	0.007	0.007	364.824	0.025

**Table 5-14. Air Force/State/Territory-Specific On-Road Vehicle Composite Emission Factors – 2023 GOV**

State	Vehicle Type	Emission Factors (g/mi)							
		Criteria Pollutants and Ozone Precursors							
		CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2e</sub>	NH <sub>3</sub>
ALABAMA	All Vehicles	4.140	0.236	0.579	0.003	0.013	0.011	532.308	0.025
ALASKA	All Vehicles	4.887	0.250	0.608	0.002	0.013	0.012	529.619	0.025
ARIZONA	All Vehicles	4.115	0.255	0.622	0.002	0.013	0.012	541.261	0.025
ARKANSAS	All Vehicles	4.084	0.233	0.579	0.003	0.013	0.012	527.388	0.025
COLORADO	All Vehicles	3.706	0.241	0.615	0.003	0.014	0.012	526.201	0.025
CONNECTICUT	All Vehicles	3.619	0.239	0.594	0.003	0.014	0.012	530.713	0.025
DELAWARE	All Vehicles	3.653	0.232	0.596	0.003	0.013	0.012	534.575	0.025
DISTRICT OF COLUMBIA	All Vehicles	3.813	0.250	0.653	0.003	0.015	0.014	559.945	0.025
FLORIDA	All Vehicles	4.558	0.261	0.578	0.003	0.013	0.012	549.755	0.025
GEORGIA	All Vehicles	3.998	0.239	0.587	0.003	0.013	0.012	534.430	0.025
HAWAII	All Vehicles	4.436	0.270	0.573	0.003	0.014	0.012	537.866	0.025
IDAHO	All Vehicles	3.757	0.229	0.614	0.003	0.013	0.012	523.116	0.025
ILLINOIS	All Vehicles	3.857	0.241	0.603	0.003	0.014	0.013	534.160	0.025
INDIANA	All Vehicles	3.963	0.237	0.602	0.003	0.014	0.012	529.685	0.025
IOWA	All Vehicles	3.896	0.230	0.590	0.003	0.014	0.013	521.003	0.025
KANSAS	All Vehicles	4.027	0.235	0.592	0.003	0.013	0.012	523.771	0.025
KENTUCKY	All Vehicles	4.011	0.230	0.588	0.003	0.013	0.012	527.355	0.025
LOUISIANA	All Vehicles	4.253	0.242	0.568	0.003	0.012	0.011	537.180	0.025
MAINE	All Vehicles	3.644	0.217	0.586	0.003	0.013	0.012	516.465	0.025
MARYLAND	All Vehicles	3.722	0.238	0.597	0.003	0.013	0.012	532.885	0.025
MASSACHUSETTS	All Vehicles	3.678	0.248	0.616	0.003	0.014	0.013	535.980	0.025
MICHIGAN	All Vehicles	3.985	0.244	0.611	0.003	0.014	0.013	528.351	0.025
MINNESOTA	All Vehicles	4.037	0.240	0.604	0.003	0.014	0.013	521.833	0.025
MISSISSIPPI	All Vehicles	4.090	0.226	0.562	0.003	0.012	0.011	525.852	0.025
MISSOURI	All Vehicles	3.928	0.234	0.585	0.003	0.013	0.012	526.247	0.025
MONTANA	All Vehicles	3.784	0.224	0.608	0.003	0.013	0.012	517.012	0.025

State	Vehicle Type	Emission Factors (g/mi)							
		Criteria Pollutants and Ozone Precursors							
		CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2e</sub>	NH <sub>3</sub>
NEBRASKA	All Vehicles	3.967	0.234	0.597	0.003	0.014	0.012	521.995	0.025
NEVADA	All Vehicles	3.956	0.268	0.642	0.003	0.014	0.013	537.699	0.025
NEW HAMPSHIRE	All Vehicles	3.531	0.225	0.588	0.003	0.014	0.012	523.499	0.025
NEW JERSEY	All Vehicles	3.690	0.244	0.605	0.003	0.014	0.012	536.817	0.025
NEW MEXICO	All Vehicles	3.879	0.235	0.617	0.003	0.013	0.012	526.800	0.025
NEW YORK	All Vehicles	3.561	0.231	0.592	0.003	0.014	0.013	531.813	0.025
NORTH CAROLINA	All Vehicles	3.874	0.234	0.588	0.003	0.013	0.012	530.833	0.025
NORTH DAKOTA	All Vehicles	3.969	0.228	0.597	0.003	0.014	0.013	515.204	0.025
OHIO	All Vehicles	3.922	0.240	0.600	0.003	0.014	0.013	528.651	0.025
OKLAHOMA	All Vehicles	4.074	0.234	0.582	0.003	0.013	0.012	525.677	0.025
OREGON	All Vehicles	3.607	0.226	0.603	0.003	0.013	0.012	524.618	0.025
PACIFIC ISLANDS	All Vehicles	3.822	0.232	0.590	0.003	0.013	0.012	529.960	0.025
PENNSYLVANIA	All Vehicles	3.713	0.229	0.596	0.003	0.014	0.012	531.924	0.025
PUERTO RICO	All Vehicles	4.644	0.233	0.542	0.003	0.012	0.011	550.678	0.025
RHODE ISLAND	All Vehicles	3.619	0.239	0.597	0.003	0.014	0.013	533.436	0.025
SOUTH CAROLINA	All Vehicles	4.122	0.234	0.581	0.003	0.012	0.011	532.224	0.025
SOUTH DAKOTA	All Vehicles	3.990	0.224	0.597	0.003	0.013	0.012	517.828	0.025
TENNESSEE	All Vehicles	3.992	0.239	0.591	0.003	0.013	0.012	533.007	0.025
TEXAS	All Vehicles	3.975	0.236	0.569	0.003	0.012	0.011	535.692	0.025
UTAH	All Vehicles	3.788	0.244	0.626	0.003	0.014	0.012	529.140	0.025
VERMONT	All Vehicles	3.476	0.213	0.577	0.003	0.014	0.012	516.278	0.025
VIRGIN ISLANDS	All Vehicles	4.984	0.305	0.530	0.003	0.012	0.011	534.968	0.025
VIRGINIA	All Vehicles	3.873	0.231	0.588	0.003	0.013	0.012	529.658	0.025
WASHINGTON	All Vehicles	3.808	0.237	0.616	0.003	0.013	0.012	525.920	0.025
WEST VIRGINIA	All Vehicles	3.885	0.227	0.586	0.003	0.013	0.012	521.979	0.025
WISCONSIN	All Vehicles	3.836	0.228	0.592	0.003	0.014	0.012	521.084	0.025
WYOMING	All Vehicles	3.864	0.231	0.616	0.003	0.013	0.012	520.137	0.025

**Table 5-15. Air Force/State/Territory-Specific On-Road Vehicle Composite Emission Factors – 2024 GOV**

State	Vehicle Type	Emission Factors (g/mi)							
		Criteria Pollutants and Ozone Precursors							
		CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2e</sub>	NH <sub>3</sub>
ALABAMA	All Vehicles	3.867	0.214	0.508	0.003	0.011	0.010	521.716	0.025
ALASKA	All Vehicles	4.581	0.228	0.537	0.002	0.012	0.011	519.187	0.025
ARIZONA	All Vehicles	3.842	0.233	0.546	0.002	0.012	0.011	530.491	0.025
ARKANSAS	All Vehicles	3.820	0.212	0.508	0.003	0.011	0.010	516.877	0.025
COLORADO	All Vehicles	3.463	0.220	0.542	0.003	0.012	0.011	515.805	0.025
CONNECTICUT	All Vehicles	3.370	0.218	0.525	0.003	0.012	0.011	520.271	0.025
DELAWARE	All Vehicles	3.396	0.210	0.525	0.003	0.012	0.011	524.036	0.025
DISTRICT OF COLUMBIA	All Vehicles	3.536	0.227	0.583	0.003	0.014	0.012	549.109	0.025
FLORIDA	All Vehicles	4.250	0.236	0.509	0.003	0.011	0.010	538.856	0.025
GEORGIA	All Vehicles	3.730	0.216	0.517	0.003	0.012	0.010	523.833	0.025
HAWAII	All Vehicles	4.141	0.245	0.506	0.003	0.012	0.011	527.237	0.025
IDAHO	All Vehicles	3.515	0.209	0.540	0.003	0.012	0.011	512.719	0.025
ILLINOIS	All Vehicles	3.594	0.219	0.532	0.003	0.012	0.011	523.618	0.025
INDIANA	All Vehicles	3.704	0.215	0.530	0.003	0.012	0.011	519.193	0.025
IOWA	All Vehicles	3.649	0.210	0.518	0.003	0.013	0.011	510.651	0.025
KANSAS	All Vehicles	3.771	0.214	0.520	0.003	0.012	0.011	513.341	0.025
KENTUCKY	All Vehicles	3.752	0.209	0.516	0.003	0.012	0.010	516.834	0.025
LOUISIANA	All Vehicles	3.970	0.219	0.499	0.003	0.011	0.010	526.467	0.025
MAINE	All Vehicles	3.409	0.198	0.514	0.003	0.012	0.011	506.206	0.025
MARYLAND	All Vehicles	3.464	0.216	0.525	0.003	0.012	0.011	522.366	0.025
MASSACHUSETTS	All Vehicles	3.418	0.225	0.544	0.003	0.013	0.012	525.482	0.025
MICHIGAN	All Vehicles	3.726	0.223	0.539	0.003	0.013	0.012	517.929	0.025
MINNESOTA	All Vehicles	3.780	0.219	0.531	0.003	0.013	0.012	511.534	0.025
MISSISSIPPI	All Vehicles	3.823	0.205	0.493	0.003	0.011	0.010	515.351	0.025
MISSOURI	All Vehicles	3.672	0.214	0.514	0.003	0.012	0.011	515.752	0.025
MONTANA	All Vehicles	3.547	0.205	0.534	0.003	0.012	0.011	506.720	0.025

State	Vehicle Type	Emission Factors (g/mi)							
		Criteria Pollutants and Ozone Precursors							
		CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2e</sub>	NH <sub>3</sub>
NEBRASKA	All Vehicles	3.717	0.214	0.524	0.003	0.013	0.011	511.605	0.025
NEVADA	All Vehicles	3.690	0.244	0.565	0.003	0.013	0.012	527.040	0.025
NEW HAMPSHIRE	All Vehicles	3.290	0.205	0.516	0.003	0.012	0.011	513.144	0.025
NEW JERSEY	All Vehicles	3.430	0.222	0.534	0.003	0.012	0.011	526.269	0.025
NEW MEXICO	All Vehicles	3.629	0.214	0.541	0.003	0.012	0.011	516.298	0.025
NEW YORK	All Vehicles	3.320	0.211	0.523	0.003	0.013	0.011	521.332	0.025
NORTH CAROLINA	All Vehicles	3.615	0.212	0.517	0.003	0.012	0.010	520.299	0.025
NORTH DAKOTA	All Vehicles	3.722	0.209	0.524	0.003	0.013	0.012	504.982	0.025
OHIO	All Vehicles	3.665	0.219	0.529	0.003	0.013	0.011	518.191	0.025
OKLAHOMA	All Vehicles	3.811	0.213	0.511	0.003	0.012	0.010	515.201	0.025
OREGON	All Vehicles	3.367	0.205	0.531	0.003	0.012	0.011	514.232	0.025
PACIFIC ISLANDS	All Vehicles	3.567	0.211	0.519	0.003	0.012	0.011	519.452	0.025
PENNSYLVANIA	All Vehicles	3.464	0.209	0.524	0.003	0.012	0.011	521.387	0.025
PUERTO RICO	All Vehicles	4.331	0.209	0.476	0.003	0.011	0.010	539.714	0.025
RHODE ISLAND	All Vehicles	3.371	0.218	0.528	0.003	0.013	0.011	522.943	0.025
SOUTH CAROLINA	All Vehicles	3.852	0.212	0.510	0.003	0.011	0.010	521.614	0.025
SOUTH DAKOTA	All Vehicles	3.742	0.205	0.524	0.003	0.012	0.011	507.504	0.025
TENNESSEE	All Vehicles	3.727	0.217	0.520	0.003	0.012	0.011	522.425	0.025
TEXAS	All Vehicles	3.703	0.214	0.501	0.003	0.011	0.010	525.041	0.025
UTAH	All Vehicles	3.537	0.223	0.551	0.003	0.012	0.011	518.669	0.025
VERMONT	All Vehicles	3.248	0.194	0.506	0.003	0.012	0.011	506.006	0.025
VIRGIN ISLANDS	All Vehicles	4.645	0.279	0.465	0.003	0.011	0.010	524.367	0.024
VIRGINIA	All Vehicles	3.616	0.210	0.517	0.003	0.012	0.010	519.138	0.025
WASHINGTON	All Vehicles	3.561	0.216	0.543	0.003	0.012	0.011	515.515	0.025
WEST VIRGINIA	All Vehicles	3.635	0.206	0.515	0.003	0.012	0.011	511.599	0.025
WISCONSIN	All Vehicles	3.586	0.207	0.521	0.003	0.012	0.011	510.764	0.025
WYOMING	All Vehicles	3.624	0.211	0.540	0.003	0.012	0.011	509.769	0.025

**Table 5-16. Air Force/State/Territory-Specific On-Road Vehicle Composite Emission Factors – 2025 GOV**

State	Vehicle Type	Emission Factors (g/mi)							
		Criteria Pollutants and Ozone Precursors							
		CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2e</sub>	NH <sub>3</sub>
ALABAMA	All Vehicles	3.679	0.203	0.466	0.003	0.010	0.009	512.060	0.025
ALASKA	All Vehicles	4.344	0.218	0.493	0.002	0.011	0.010	509.693	0.024
ARIZONA	All Vehicles	3.651	0.220	0.501	0.002	0.010	0.009	520.664	0.025
ARKANSAS	All Vehicles	3.639	0.201	0.465	0.003	0.010	0.009	507.303	0.025
COLORADO	All Vehicles	3.298	0.210	0.498	0.003	0.011	0.010	506.339	0.024
CONNECTICUT	All Vehicles	3.202	0.208	0.483	0.003	0.011	0.010	510.759	0.025
DELAWARE	All Vehicles	3.224	0.200	0.483	0.003	0.011	0.010	514.424	0.025
DISTRICT OF COLUMBIA	All Vehicles	3.353	0.215	0.541	0.003	0.012	0.011	539.193	0.025
FLORIDA	All Vehicles	4.040	0.223	0.468	0.003	0.010	0.009	528.898	0.025
GEORGIA	All Vehicles	3.547	0.205	0.474	0.003	0.010	0.009	514.171	0.025
HAWAII	All Vehicles	3.941	0.231	0.465	0.003	0.011	0.010	517.535	0.024
IDAHO	All Vehicles	3.348	0.199	0.494	0.003	0.011	0.010	503.259	0.024
ILLINOIS	All Vehicles	3.413	0.208	0.488	0.003	0.011	0.010	514.009	0.025
INDIANA	All Vehicles	3.526	0.205	0.486	0.003	0.011	0.010	509.635	0.025
IOWA	All Vehicles	3.479	0.199	0.474	0.003	0.011	0.010	501.231	0.024
KANSAS	All Vehicles	3.593	0.204	0.476	0.003	0.011	0.010	503.848	0.024
KENTUCKY	All Vehicles	3.573	0.198	0.472	0.003	0.010	0.009	507.255	0.025
LOUISIANA	All Vehicles	3.777	0.207	0.457	0.003	0.010	0.009	516.698	0.025
MAINE	All Vehicles	3.245	0.188	0.470	0.003	0.011	0.010	496.876	0.024
MARYLAND	All Vehicles	3.289	0.205	0.483	0.003	0.011	0.010	512.780	0.025
MASSACHUSETTS	All Vehicles	3.240	0.214	0.501	0.003	0.012	0.011	515.912	0.025
MICHIGAN	All Vehicles	3.546	0.212	0.495	0.003	0.012	0.011	508.435	0.025
MINNESOTA	All Vehicles	3.600	0.209	0.487	0.003	0.012	0.011	502.162	0.024
MISSISSIPPI	All Vehicles	3.639	0.194	0.451	0.003	0.010	0.009	505.786	0.024
MISSOURI	All Vehicles	3.495	0.203	0.470	0.003	0.011	0.010	506.202	0.025
MONTANA	All Vehicles	3.383	0.195	0.488	0.003	0.011	0.010	497.363	0.024

State	Vehicle Type	Emission Factors (g/mi)							
		Criteria Pollutants and Ozone Precursors							
		CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2e</sub>	NH <sub>3</sub>
NEBRASKA	All Vehicles	3.544	0.203	0.480	0.003	0.011	0.010	502.153	0.024
NEVADA	All Vehicles	3.510	0.232	0.519	0.003	0.012	0.011	517.318	0.025
NEW HAMPSHIRE	All Vehicles	3.124	0.195	0.473	0.003	0.011	0.010	503.719	0.025
NEW JERSEY	All Vehicles	3.255	0.211	0.492	0.003	0.011	0.010	516.652	0.025
NEW MEXICO	All Vehicles	3.456	0.203	0.495	0.003	0.011	0.010	506.735	0.025
NEW YORK	All Vehicles	3.159	0.201	0.481	0.003	0.011	0.010	511.783	0.025
NORTH CAROLINA	All Vehicles	3.437	0.201	0.474	0.003	0.010	0.009	510.698	0.025
NORTH DAKOTA	All Vehicles	3.548	0.199	0.479	0.003	0.012	0.011	495.689	0.024
OHIO	All Vehicles	3.488	0.208	0.485	0.003	0.011	0.010	508.665	0.025
OKLAHOMA	All Vehicles	3.630	0.202	0.468	0.003	0.010	0.009	505.661	0.024
OREGON	All Vehicles	3.204	0.195	0.487	0.003	0.011	0.009	504.773	0.024
PACIFIC ISLANDS	All Vehicles	3.391	0.200	0.476	0.002	0.010	0.009	509.877	0.025
PENNSYLVANIA	All Vehicles	3.293	0.198	0.481	0.003	0.011	0.010	511.787	0.025
PUERTO RICO	All Vehicles	4.120	0.197	0.438	0.003	0.010	0.009	529.691	0.025
RHODE ISLAND	All Vehicles	3.205	0.208	0.486	0.003	0.011	0.010	513.381	0.025
SOUTH CAROLINA	All Vehicles	3.666	0.201	0.467	0.003	0.010	0.009	511.943	0.025
SOUTH DAKOTA	All Vehicles	3.567	0.195	0.479	0.003	0.011	0.010	498.119	0.024
TENNESSEE	All Vehicles	3.545	0.205	0.477	0.003	0.011	0.010	512.781	0.025
TEXAS	All Vehicles	3.520	0.202	0.459	0.003	0.010	0.009	515.329	0.025
UTAH	All Vehicles	3.368	0.212	0.505	0.003	0.011	0.010	509.135	0.024
VERMONT	All Vehicles	3.090	0.184	0.462	0.003	0.011	0.010	496.667	0.025
VIRGIN ISLANDS	All Vehicles	4.411	0.264	0.426	0.003	0.010	0.009	514.708	0.024
VIRGINIA	All Vehicles	3.439	0.200	0.474	0.003	0.010	0.009	509.554	0.025
WASHINGTON	All Vehicles	3.391	0.205	0.498	0.003	0.011	0.010	506.041	0.025
WEST VIRGINIA	All Vehicles	3.461	0.196	0.471	0.003	0.011	0.010	502.151	0.025
WISCONSIN	All Vehicles	3.412	0.197	0.477	0.003	0.011	0.010	501.374	0.024
WYOMING	All Vehicles	3.457	0.201	0.494	0.003	0.011	0.010	500.343	0.024

**Table 5-17. Air Force/State/Territory-Specific On-Road Vehicle Composite Emission Factors – 2026 GOV**

State	Vehicle Type	Emission Factors (g/mi)							
		Criteria Pollutants and Ozone Precursors							
		CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2e</sub>	NH <sub>3</sub>
ALABAMA	All Vehicles	3.435	0.180	0.421	0.003	0.009	0.008	502.796	0.024
ALASKA	All Vehicles	4.038	0.198	0.447	0.002	0.010	0.009	500.562	0.024
ARIZONA	All Vehicles	3.400	0.196	0.452	0.002	0.009	0.008	511.239	0.024
ARKANSAS	All Vehicles	3.403	0.179	0.420	0.003	0.009	0.008	498.118	0.024
COLORADO	All Vehicles	3.089	0.190	0.451	0.003	0.010	0.009	497.247	0.024
CONNECTICUT	All Vehicles	2.983	0.188	0.438	0.003	0.010	0.009	501.617	0.024
DELAWARE	All Vehicles	2.992	0.178	0.435	0.003	0.010	0.009	505.194	0.024
DISTRICT OF COLUMBIA	All Vehicles	3.118	0.193	0.496	0.003	0.011	0.010	529.666	0.024
FLORIDA	All Vehicles	3.766	0.197	0.424	0.003	0.009	0.008	519.346	0.024
GEORGIA	All Vehicles	3.305	0.182	0.429	0.003	0.009	0.008	504.898	0.024
HAWAII	All Vehicles	3.681	0.205	0.421	0.003	0.010	0.009	508.229	0.024
IDAHO	All Vehicles	3.130	0.179	0.445	0.003	0.010	0.009	494.177	0.024
ILLINOIS	All Vehicles	3.165	0.186	0.441	0.003	0.010	0.009	504.779	0.024
INDIANA	All Vehicles	3.294	0.184	0.440	0.003	0.010	0.009	500.456	0.024
IOWA	All Vehicles	3.258	0.180	0.428	0.003	0.010	0.009	492.186	0.024
KANSAS	All Vehicles	3.363	0.183	0.429	0.003	0.010	0.009	494.740	0.024
KENTUCKY	All Vehicles	3.339	0.177	0.426	0.003	0.009	0.008	498.064	0.024
LOUISIANA	All Vehicles	3.523	0.184	0.412	0.003	0.009	0.008	507.328	0.024
MAINE	All Vehicles	3.029	0.170	0.423	0.003	0.010	0.009	487.915	0.024
MARYLAND	All Vehicles	3.052	0.184	0.434	0.003	0.010	0.009	503.571	0.024
MASSACHUSETTS	All Vehicles	3.005	0.192	0.455	0.003	0.011	0.010	506.710	0.024
MICHIGAN	All Vehicles	3.313	0.191	0.448	0.003	0.011	0.010	499.313	0.024
MINNESOTA	All Vehicles	3.367	0.189	0.441	0.003	0.011	0.010	493.155	0.024
MISSISSIPPI	All Vehicles	3.401	0.172	0.407	0.003	0.009	0.008	496.613	0.024
MISSOURI	All Vehicles	3.257	0.182	0.423	0.003	0.010	0.009	497.036	0.024
MONTANA	All Vehicles	3.171	0.177	0.440	0.003	0.010	0.009	488.380	0.024

State	Vehicle Type	Emission Factors (g/mi)							
		Criteria Pollutants and Ozone Precursors							
		CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2e</sub>	NH <sub>3</sub>
NEBRASKA	All Vehicles	3.319	0.183	0.433	0.003	0.010	0.009	493.080	0.024
NEVADA	All Vehicles	3.270	0.207	0.466	0.003	0.011	0.010	507.989	0.024
NEW HAMPSHIRE	All Vehicles	2.887	0.174	0.424	0.003	0.010	0.009	494.664	0.024
NEW JERSEY	All Vehicles	3.017	0.189	0.445	0.003	0.010	0.009	507.409	0.024
NEW MEXICO	All Vehicles	3.231	0.182	0.445	0.003	0.010	0.009	497.560	0.024
NEW YORK	All Vehicles	2.955	0.183	0.437	0.003	0.010	0.009	502.606	0.024
NORTH CAROLINA	All Vehicles	3.203	0.179	0.428	0.003	0.009	0.008	501.485	0.024
NORTH DAKOTA	All Vehicles	3.325	0.181	0.433	0.003	0.011	0.010	486.764	0.024
OHIO	All Vehicles	3.258	0.187	0.439	0.003	0.010	0.009	499.515	0.024
OKLAHOMA	All Vehicles	3.396	0.180	0.422	0.003	0.009	0.008	496.508	0.024
OREGON	All Vehicles	2.988	0.175	0.440	0.003	0.009	0.009	495.692	0.024
PACIFIC ISLANDS	All Vehicles	3.160	0.179	0.430	0.002	0.009	0.009	500.686	0.024
PENNSYLVANIA	All Vehicles	3.063	0.177	0.433	0.003	0.010	0.009	502.566	0.024
PUERTO RICO	All Vehicles	3.846	0.173	0.396	0.003	0.009	0.008	520.090	0.024
RHODE ISLAND	All Vehicles	2.994	0.188	0.442	0.003	0.010	0.009	504.190	0.024
SOUTH CAROLINA	All Vehicles	3.424	0.179	0.422	0.003	0.009	0.008	502.667	0.024
SOUTH DAKOTA	All Vehicles	3.341	0.176	0.432	0.003	0.010	0.009	489.111	0.024
TENNESSEE	All Vehicles	3.305	0.183	0.430	0.003	0.010	0.009	503.524	0.024
TEXAS	All Vehicles	3.279	0.179	0.415	0.003	0.009	0.008	506.012	0.024
UTAH	All Vehicles	3.145	0.191	0.456	0.003	0.010	0.009	499.979	0.024
VERMONT	All Vehicles	2.867	0.165	0.414	0.003	0.010	0.009	487.698	0.024
VIRGIN ISLANDS	All Vehicles	4.106	0.233	0.384	0.003	0.009	0.008	505.425	0.024
VIRGINIA	All Vehicles	3.209	0.179	0.428	0.003	0.009	0.008	500.355	0.024
WASHINGTON	All Vehicles	3.169	0.184	0.450	0.003	0.010	0.009	496.944	0.024
WEST VIRGINIA	All Vehicles	3.235	0.176	0.425	0.003	0.010	0.009	493.082	0.024
WISCONSIN	All Vehicles	3.180	0.178	0.430	0.003	0.010	0.009	492.353	0.024
WYOMING	All Vehicles	3.241	0.182	0.445	0.003	0.010	0.009	491.293	0.024

Table 5-18. On-Road Vehicle Criteria Pollutant Emission Factors – 2023

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Alabama	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.759	0.228	0.145	0.002	0.004	0.003	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.278	0.241	0.245	0.003	0.005	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.905	0.909	0.977	0.006	0.025	0.022	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.530	0.070	0.098	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.841	0.113	0.225	0.001	0.004	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.636	0.129	2.654	0.004	0.058	0.053	0.032
	Gasoline	MC	Motorcycles	13.110	2.648	0.643	0.003	0.024	0.021	0.053
Alaska	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	4.757	0.240	0.149	0.001	0.005	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	5.281	0.255	0.244	0.002	0.007	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	18.531	0.784	0.892	0.003	0.026	0.023	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.967	0.113	0.099	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.430	0.151	0.231	0.001	0.004	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.621	0.159	2.909	0.004	0.058	0.053	0.033
	Gasoline	MC	Motorcycles	13.243	1.817	0.707	0.001	0.017	0.015	0.053
Arizona	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.589	0.244	0.142	0.001	0.004	0.003	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.104	0.263	0.241	0.002	0.005	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	15.716	1.017	1.030	0.004	0.025	0.022	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.801	0.067	0.106	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	3.075	0.114	0.251	0.001	0.004	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.694	0.131	2.950	0.004	0.059	0.055	0.033
	Gasoline	MC	Motorcycles	12.920	3.171	0.724	0.002	0.023	0.021	0.053
Arkansas	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.714	0.229	0.148	0.002	0.004	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.237	0.239	0.250	0.003	0.006	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.647	0.878	0.979	0.006	0.025	0.022	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.434	0.074	0.098	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.777	0.113	0.226	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.602	0.128	2.632	0.004	0.057	0.052	0.032
	Gasoline	MC	Motorcycles	13.313	2.513	0.667	0.003	0.024	0.021	0.054
Colorado	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.233	0.230	0.148	0.002	0.005	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.679	0.243	0.248	0.003	0.007	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.606	0.861	1.056	0.006	0.027	0.024	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.152	0.090	0.101	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.587	0.133	0.236	0.001	0.004	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.628	0.146	2.870	0.004	0.058	0.053	0.033
	Gasoline	MC	Motorcycles	12.790	2.506	0.743	0.003	0.022	0.020	0.053
Connecticut	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.981	0.209	0.130	0.002	0.004	0.004	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.472	0.235	0.222	0.003	0.007	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	15.016	0.900	1.033	0.006	0.027	0.024	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.169	0.089	0.099	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.639	0.138	0.233	0.001	0.004	0.004	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.671	0.157	2.838	0.004	0.060	0.055	0.033
	Gasoline	MC	Motorcycles	12.292	2.393	0.678	0.003	0.022	0.019	0.053
Delaware	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.093	0.207	0.138	0.002	0.004	0.004	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.538	0.228	0.233	0.003	0.006	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.797	0.896	1.008	0.006	0.026	0.023	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.318	0.081	0.097	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.690	0.127	0.229	0.001	0.004	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.684	0.150	2.827	0.004	0.061	0.056	0.032
	Gasoline	MC	Motorcycles	12.207	2.361	0.652	0.003	0.022	0.020	0.052
District of Columbia	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.220	0.207	0.128	0.002	0.004	0.004	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.594	0.235	0.213	0.003	0.006	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	15.810	1.035	1.085	0.007	0.030	0.026	0.053
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.563	0.079	0.096	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.833	0.139	0.231	0.001	0.004	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.985	0.195	3.320	0.004	0.074	0.068	0.032
	Gasoline	MC	Motorcycles	12.023	2.544	0.592	0.003	0.022	0.020	0.047

**Table 5-18. On-Road Vehicle Criteria Pollutant Emission Factors – 2023 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Florida	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	4.148	0.240	0.137	0.002	0.003	0.003	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.715	0.270	0.236	0.003	0.005	0.004	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	16.203	1.053	0.993	0.006	0.025	0.022	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.986	0.061	0.097	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	3.202	0.113	0.227	0.001	0.004	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.759	0.135	2.683	0.004	0.062	0.057	0.033
Georgia	Gasoline	MC	Motorcycles	13.043	3.047	0.571	0.003	0.024	0.021	0.051
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.501	0.219	0.141	0.002	0.004	0.003	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.040	0.242	0.241	0.003	0.005	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	15.140	0.933	1.006	0.006	0.025	0.022	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.495	0.073	0.098	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.839	0.118	0.228	0.001	0.004	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.667	0.136	2.719	0.004	0.059	0.054	0.032
Hawaii	Gasoline	MC	Motorcycles	13.111	2.725	0.644	0.003	0.024	0.021	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	4.045	0.249	0.136	0.002	0.004	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.580	0.280	0.234	0.003	0.006	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	16.113	1.126	1.000	0.006	0.027	0.024	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.747	0.057	0.095	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	3.017	0.107	0.224	0.001	0.004	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.734	0.132	2.654	0.004	0.062	0.057	0.032
Idaho	Gasoline	MC	Motorcycles	13.688	2.955	0.607	0.003	0.025	0.022	0.052
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.390	0.229	0.158	0.002	0.005	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.811	0.232	0.261	0.003	0.006	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.185	0.796	1.022	0.006	0.026	0.023	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.127	0.091	0.101	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.541	0.126	0.233	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.585	0.135	2.825	0.004	0.056	0.051	0.033
Illinois	Gasoline	MC	Motorcycles	12.805	2.273	0.767	0.003	0.022	0.020	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.383	0.221	0.144	0.002	0.005	0.004	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.868	0.242	0.241	0.003	0.007	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.947	0.880	1.012	0.006	0.028	0.024	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.264	0.088	0.098	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.668	0.134	0.231	0.001	0.004	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.669	0.150	2.837	0.004	0.060	0.055	0.033
Indiana	Gasoline	MC	Motorcycles	12.418	2.329	0.671	0.003	0.022	0.020	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.587	0.225	0.151	0.002	0.005	0.004	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.070	0.239	0.252	0.003	0.007	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.722	0.860	1.006	0.006	0.028	0.025	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.228	0.086	0.098	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.624	0.127	0.228	0.001	0.004	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.629	0.142	2.771	0.004	0.058	0.053	0.033
Iowa	Gasoline	MC	Motorcycles	13.137	2.317	0.691	0.003	0.024	0.021	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.609	0.233	0.156	0.002	0.006	0.005	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.047	0.235	0.257	0.003	0.007	0.007	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.097	0.798	0.981	0.006	0.029	0.026	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.126	0.089	0.098	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.528	0.122	0.224	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.568	0.134	2.681	0.004	0.056	0.051	0.032
Kansas	Gasoline	MC	Motorcycles	13.338	2.133	0.718	0.003	0.024	0.021	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.667	0.233	0.154	0.002	0.005	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.184	0.242	0.258	0.003	0.007	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.523	0.846	0.993	0.006	0.027	0.024	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.301	0.082	0.099	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.688	0.120	0.228	0.001	0.004	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.589	0.131	2.685	0.004	0.056	0.051	0.033

**Table 5-18. On-Road Vehicle Criteria Pollutant Emission Factors – 2023 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Kentucky	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.623	0.225	0.151	0.002	0.004	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.153	0.234	0.253	0.003	0.006	0.005	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.601	0.840	0.970	0.006	0.025	0.022	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.297	0.081	0.099	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.687	0.118	0.227	0.001	0.004	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.595	0.128	2.688	0.004	0.056	0.051	0.033
	Gasoline	MC	Motorcycles	13.054	2.365	0.688	0.003	0.024	0.021	0.055
Louisiana	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.818	0.231	0.140	0.002	0.004	0.003	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.375	0.248	0.238	0.003	0.005	0.004	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	15.362	0.949	0.968	0.006	0.024	0.021	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.729	0.067	0.098	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	3.012	0.111	0.226	0.001	0.004	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.653	0.126	2.608	0.004	0.058	0.053	0.033
	Gasoline	MC	Motorcycles	13.117	2.798	0.615	0.003	0.024	0.021	0.053
Maine	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.335	0.220	0.152	0.002	0.005	0.005	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.718	0.218	0.249	0.003	0.007	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.660	0.740	0.960	0.006	0.027	0.024	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.945	0.094	0.098	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.393	0.124	0.224	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.543	0.135	2.692	0.004	0.055	0.051	0.032
	Gasoline	MC	Motorcycles	12.619	1.915	0.741	0.003	0.023	0.020	0.055
Maryland	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.142	0.212	0.139	0.002	0.004	0.004	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.630	0.237	0.235	0.003	0.006	0.005	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	15.019	0.908	1.022	0.006	0.026	0.023	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.305	0.082	0.099	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.723	0.130	0.232	0.001	0.004	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.672	0.149	2.808	0.004	0.060	0.055	0.033
	Gasoline	MC	Motorcycles	12.369	2.459	0.664	0.003	0.022	0.020	0.053
Massachusetts	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.060	0.214	0.139	0.002	0.005	0.004	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.567	0.245	0.236	0.003	0.007	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	15.177	0.921	1.053	0.006	0.028	0.025	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.179	0.091	0.098	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.636	0.143	0.234	0.001	0.004	0.004	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.721	0.168	2.939	0.004	0.062	0.057	0.033
	Gasoline	MC	Motorcycles	12.248	2.399	0.669	0.003	0.022	0.019	0.052
Michigan	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.636	0.231	0.156	0.002	0.005	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.123	0.248	0.260	0.003	0.008	0.007	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.698	0.860	1.028	0.006	0.030	0.027	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.143	0.092	0.098	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.564	0.134	0.229	0.001	0.004	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.634	0.151	2.808	0.004	0.059	0.054	0.032
	Gasoline	MC	Motorcycles	13.236	2.234	0.707	0.003	0.024	0.021	0.053
Minnesota	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.768	0.235	0.159	0.002	0.006	0.005	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.220	0.245	0.263	0.003	0.008	0.007	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.796	0.806	1.021	0.006	0.030	0.026	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.060	0.096	0.098	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.495	0.133	0.227	0.001	0.004	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.588	0.148	2.742	0.004	0.057	0.053	0.032
	Gasoline	MC	Motorcycles	13.236	2.098	0.736	0.003	0.024	0.021	0.054
Mississippi	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.721	0.225	0.143	0.002	0.004	0.003	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.245	0.230	0.242	0.003	0.005	0.004	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.567	0.868	0.945	0.006	0.024	0.021	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.503	0.068	0.097	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.817	0.107	0.222	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.589	0.122	2.560	0.004	0.056	0.052	0.032
	Gasoline	MC	Motorcycles	13.141	2.536	0.650	0.003	0.024	0.021	0.054



Table 5-18. On-Road Vehicle Criteria Pollutant Emission Factors – 2023 (cont.)

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Missouri	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.451	0.227	0.148	0.002	0.005	0.004	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.012	0.240	0.249	0.003	0.006	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.674	0.846	0.981	0.006	0.026	0.023	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.297	0.083	0.100	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.723	0.122	0.230	0.001	0.004	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.591	0.130	2.675	0.004	0.055	0.051	0.033
Montana	Gasoline	MC	Motorcycles	12.921	2.395	0.690	0.003	0.023	0.021	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.515	0.235	0.163	0.002	0.005	0.005	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.916	0.229	0.267	0.003	0.007	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.804	0.742	0.993	0.006	0.026	0.023	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.013	0.096	0.101	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.447	0.124	0.229	0.001	0.003	0.003	0.009
Nebraska	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.547	0.132	2.765	0.004	0.055	0.050	0.033
	Gasoline	MC	Motorcycles	12.839	2.073	0.783	0.003	0.022	0.020	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.648	0.237	0.158	0.002	0.005	0.005	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.129	0.240	0.261	0.003	0.007	0.007	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.323	0.812	0.991	0.006	0.028	0.025	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.187	0.089	0.100	0.001	0.002	0.002	0.008
Nevada	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.593	0.123	0.228	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.575	0.132	2.708	0.004	0.055	0.051	0.033
	Gasoline	MC	Motorcycles	13.356	2.276	0.724	0.003	0.024	0.021	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.412	0.254	0.152	0.002	0.005	0.004	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.892	0.275	0.256	0.003	0.007	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	15.749	1.061	1.132	0.006	0.029	0.026	0.052
New Hampshire	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.541	0.074	0.105	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.880	0.122	0.248	0.001	0.004	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.689	0.139	3.000	0.004	0.060	0.055	0.033
	Gasoline	MC	Motorcycles	13.610	3.096	0.749	0.003	0.025	0.022	0.052
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.019	0.212	0.141	0.002	0.005	0.004	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.459	0.223	0.234	0.003	0.007	0.006	0.027
New Jersey	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.272	0.806	0.997	0.006	0.027	0.024	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.057	0.093	0.099	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.503	0.131	0.228	0.001	0.004	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.594	0.144	2.758	0.004	0.057	0.052	0.032
	Gasoline	MC	Motorcycles	12.538	2.122	0.718	0.003	0.023	0.020	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.070	0.211	0.137	0.002	0.004	0.004	0.025
New Mexico	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.560	0.241	0.226	0.003	0.006	0.005	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	15.256	0.933	1.045	0.006	0.027	0.024	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.291	0.085	0.099	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.722	0.137	0.234	0.001	0.004	0.004	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.718	0.160	2.900	0.004	0.062	0.057	0.033
	Gasoline	MC	Motorcycles	12.241	2.488	0.658	0.003	0.022	0.019	0.052
New York	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.486	0.238	0.157	0.002	0.005	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.960	0.241	0.263	0.003	0.006	0.005	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.406	0.857	1.039	0.006	0.026	0.023	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.282	0.079	0.102	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.656	0.116	0.236	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.595	0.128	2.822	0.004	0.056	0.052	0.033
New York	Gasoline	MC	Motorcycles	13.316	2.649	0.759	0.003	0.024	0.021	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.998	0.206	0.131	0.002	0.005	0.004	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.411	0.225	0.219	0.003	0.007	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.842	0.880	1.033	0.006	0.028	0.025	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.168	0.090	0.099	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.614	0.136	0.232	0.001	0.004	0.003	0.009
New York	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.663	0.154	2.841	0.004	0.060	0.055	0.033
	Gasoline	MC	Motorcycles	12.653	2.311	0.688	0.003	0.023	0.020	0.053

**Table 5-18. On-Road Vehicle Criteria Pollutant Emission Factors – 2023 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
North Carolina	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.360	0.218	0.143	0.002	0.004	0.004	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.888	0.236	0.244	0.003	0.006	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.862	0.900	1.002	0.006	0.025	0.022	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.384	0.075	0.098	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.752	0.119	0.228	0.001	0.004	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.641	0.135	2.717	0.004	0.058	0.054	0.032
North Dakota	Gasoline	MC	Motorcycles	13.128	2.595	0.664	0.003	0.024	0.021	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.803	0.239	0.162	0.002	0.006	0.005	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.170	0.233	0.263	0.003	0.008	0.007	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.293	0.739	0.986	0.006	0.030	0.026	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.986	0.099	0.099	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.417	0.127	0.225	0.001	0.003	0.003	0.008
Ohio	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.539	0.137	2.702	0.004	0.055	0.050	0.032
	Gasoline	MC	Motorcycles	13.261	1.930	0.770	0.003	0.024	0.021	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.526	0.226	0.150	0.002	0.005	0.004	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.044	0.244	0.252	0.003	0.007	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.853	0.874	1.022	0.006	0.028	0.025	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.196	0.088	0.099	0.001	0.003	0.002	0.008
Oklahoma	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.624	0.131	0.230	0.001	0.004	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.630	0.145	2.773	0.004	0.058	0.053	0.033
	Gasoline	MC	Motorcycles	13.311	2.382	0.697	0.003	0.024	0.021	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.708	0.232	0.150	0.002	0.004	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.231	0.240	0.253	0.003	0.006	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.589	0.872	0.987	0.006	0.025	0.023	0.052
Oregon	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.414	0.075	0.099	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.764	0.113	0.227	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.593	0.128	2.639	0.004	0.056	0.052	0.032
	Gasoline	MC	Motorcycles	13.323	2.535	0.682	0.003	0.024	0.021	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.156	0.213	0.148	0.002	0.004	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.575	0.224	0.244	0.003	0.006	0.005	0.026
Pacific Islands	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.195	0.834	1.021	0.006	0.025	0.023	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.080	0.085	0.098	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.510	0.126	0.229	0.001	0.004	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.617	0.141	2.816	0.004	0.058	0.053	0.032
	Gasoline	MC	Motorcycles	12.764	2.253	0.732	0.003	0.022	0.020	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.337	0.216	0.141	0.002	0.004	0.004	0.025
Pennsylvania	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.831	0.233	0.238	0.002	0.006	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.744	0.883	0.992	0.005	0.025	0.022	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.310	0.078	0.099	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.702	0.122	0.230	0.001	0.004	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.641	0.138	2.760	0.004	0.058	0.054	0.033
	Gasoline	MC	Motorcycles	12.830	2.495	0.679	0.002	0.023	0.020	0.053
Puerto Rico	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.224	0.211	0.142	0.002	0.005	0.004	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.692	0.229	0.238	0.003	0.007	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.755	0.859	1.015	0.006	0.027	0.024	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.212	0.087	0.099	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.630	0.130	0.230	0.001	0.004	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.637	0.143	2.797	0.004	0.058	0.053	0.033
Puerto Rico	Gasoline	MC	Motorcycles	12.964	2.337	0.693	0.003	0.023	0.021	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	4.260	0.200	0.124	0.002	0.003	0.003	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.871	0.238	0.215	0.003	0.004	0.004	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	15.590	0.968	0.901	0.006	0.023	0.021	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	4.130	0.048	0.089	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	3.320	0.101	0.216	0.001	0.003	0.003	0.008
Puerto Rico	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.776	0.133	2.551	0.004	0.062	0.057	0.033
	Gasoline	MC	Motorcycles	13.031	2.730	0.543	0.003	0.024	0.021	0.052

Table 5-18. On-Road Vehicle Criteria Pollutant Emission Factors – 2023 (cont.)

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Rhode Island	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.021	0.211	0.130	0.002	0.005	0.004	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.494	0.234	0.222	0.003	0.006	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.983	0.901	1.032	0.006	0.027	0.024	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.170	0.090	0.098	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.626	0.139	0.232	0.001	0.004	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.684	0.158	2.871	0.004	0.060	0.056	0.033
South Carolina	Gasoline	MC	Motorcycles	12.265	2.373	0.673	0.003	0.022	0.019	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.734	0.227	0.146	0.002	0.004	0.003	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.262	0.239	0.247	0.003	0.005	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.850	0.895	0.975	0.006	0.024	0.022	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.500	0.071	0.098	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.825	0.113	0.226	0.001	0.004	0.003	0.009
South Dakota	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.627	0.127	2.663	0.004	0.057	0.053	0.033
	Gasoline	MC	Motorcycles	13.122	2.604	0.652	0.003	0.024	0.021	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.731	0.233	0.161	0.002	0.005	0.005	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.178	0.229	0.264	0.003	0.007	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.458	0.748	0.980	0.006	0.027	0.024	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.076	0.095	0.100	0.001	0.002	0.002	0.008
Tennessee	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.507	0.123	0.227	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.546	0.129	2.701	0.004	0.054	0.050	0.033
	Gasoline	MC	Motorcycles	13.274	2.079	0.761	0.003	0.024	0.021	0.056
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.710	0.229	0.149	0.002	0.004	0.004	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.251	0.247	0.253	0.003	0.006	0.005	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	15.025	0.910	1.006	0.006	0.026	0.023	0.052
Texas	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.402	0.077	0.099	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.770	0.121	0.229	0.001	0.004	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.647	0.136	2.734	0.004	0.058	0.054	0.033
	Gasoline	MC	Motorcycles	13.213	2.608	0.664	0.003	0.024	0.021	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.440	0.218	0.132	0.002	0.004	0.003	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.957	0.239	0.225	0.003	0.005	0.004	0.026
Utah	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	15.067	0.943	0.984	0.006	0.024	0.021	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.690	0.067	0.099	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.991	0.113	0.230	0.001	0.004	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.664	0.131	2.664	0.004	0.059	0.054	0.032
	Gasoline	MC	Motorcycles	12.496	2.763	0.623	0.003	0.023	0.020	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.281	0.230	0.151	0.002	0.005	0.004	0.024
Vermont	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.762	0.247	0.254	0.003	0.007	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.813	0.875	1.074	0.006	0.027	0.024	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.232	0.090	0.102	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.656	0.133	0.240	0.001	0.004	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.637	0.145	2.910	0.004	0.058	0.053	0.033
	Gasoline	MC	Motorcycles	12.792	2.543	0.754	0.003	0.022	0.020	0.054
Virgin Islands	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.049	0.214	0.145	0.002	0.006	0.005	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.447	0.212	0.236	0.003	0.007	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.727	0.737	0.968	0.006	0.028	0.025	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.962	0.095	0.099	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.411	0.123	0.224	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.536	0.133	2.681	0.004	0.055	0.050	0.032
Virgin Islands	Gasoline	MC	Motorcycles	13.149	1.927	0.756	0.003	0.024	0.021	0.056
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	4.635	0.342	0.146	0.002	0.004	0.003	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	5.198	0.323	0.241	0.003	0.005	0.004	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	17.758	1.206	0.999	0.006	0.024	0.021	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	4.498	0.071	0.112	0.001	0.003	0.003	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	3.525	0.109	0.231	0.001	0.004	0.004	0.008
Virgin Islands	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.615	0.113	2.277	0.004	0.056	0.052	0.031
	Gasoline	MC	Motorcycles	13.166	3.322	0.569	0.003	0.024	0.021	0.054

**Table 5-18. On-Road Vehicle Criteria Pollutant Emission Factors – 2023 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Virginia	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.413	0.218	0.143	0.002	0.004	0.004	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.919	0.233	0.243	0.003	0.006	0.005	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.664	0.866	0.990	0.006	0.025	0.022	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.291	0.080	0.099	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.692	0.122	0.229	0.001	0.004	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.624	0.136	2.724	0.004	0.057	0.053	0.033
Washington	Gasoline	MC	Motorcycles	12.681	2.417	0.673	0.003	0.023	0.020	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.384	0.221	0.156	0.002	0.004	0.004	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.882	0.239	0.263	0.003	0.006	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.433	0.847	1.032	0.006	0.026	0.023	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.054	0.089	0.099	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.521	0.132	0.231	0.001	0.004	0.003	0.009
West Virginia	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.626	0.145	2.829	0.004	0.058	0.053	0.033
	Gasoline	MC	Motorcycles	12.800	2.289	0.729	0.003	0.022	0.020	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.521	0.223	0.152	0.002	0.005	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.014	0.230	0.253	0.003	0.006	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.267	0.819	0.978	0.006	0.026	0.023	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.142	0.083	0.098	0.001	0.002	0.002	0.008
Wisconsin	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.559	0.120	0.225	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.577	0.132	2.671	0.004	0.056	0.052	0.032
	Gasoline	MC	Motorcycles	13.274	2.283	0.706	0.003	0.024	0.021	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.525	0.224	0.153	0.002	0.005	0.005	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.955	0.230	0.252	0.003	0.007	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.455	0.781	0.991	0.006	0.028	0.024	0.052
Wyoming	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.055	0.093	0.098	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.487	0.129	0.226	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.577	0.141	2.723	0.004	0.056	0.052	0.032
	Gasoline	MC	Motorcycles	12.880	2.047	0.729	0.003	0.023	0.020	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.586	0.244	0.165	0.002	0.005	0.005	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.012	0.238	0.271	0.003	0.007	0.006	0.026
Wyoming	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.027	0.754	1.000	0.006	0.027	0.023	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.061	0.097	0.102	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.497	0.126	0.233	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.556	0.130	2.797	0.004	0.054	0.050	0.033
	Gasoline	MC	Motorcycles	12.856	2.177	0.788	0.003	0.022	0.020	0.056

Table 5-19. On-Road Vehicle Criteria Pollutant Emission Factors – 2024

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Alabama	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.626	0.215	0.118	0.002	0.004	0.003	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.051	0.223	0.208	0.003	0.005	0.004	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.135	0.880	0.888	0.006	0.024	0.021	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.381	0.065	0.085	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.311	0.068	0.126	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.571	0.114	2.452	0.004	0.049	0.045	0.032
Alaska	Gasoline	MC	Motorcycles	12.975	2.648	0.641	0.003	0.024	0.021	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	4.583	0.227	0.125	0.001	0.005	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	5.003	0.239	0.209	0.002	0.006	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	17.505	0.758	0.812	0.003	0.024	0.021	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.841	0.107	0.086	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.969	0.108	0.129	0.001	0.003	0.003	0.008
Arizona	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.557	0.143	2.685	0.004	0.049	0.045	0.033
	Gasoline	MC	Motorcycles	13.094	1.820	0.705	0.001	0.017	0.015	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.467	0.231	0.115	0.001	0.004	0.003	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.894	0.244	0.203	0.002	0.005	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.893	0.985	0.937	0.004	0.024	0.021	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.641	0.061	0.092	0.001	0.002	0.002	0.008
Arkansas	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.502	0.068	0.140	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.627	0.115	2.728	0.004	0.050	0.046	0.033
	Gasoline	MC	Motorcycles	12.803	3.169	0.722	0.002	0.023	0.021	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.587	0.217	0.122	0.002	0.004	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.017	0.221	0.213	0.003	0.006	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.924	0.850	0.890	0.006	0.024	0.022	0.051
Colorado	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.289	0.068	0.085	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.261	0.070	0.127	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.538	0.112	2.427	0.004	0.048	0.044	0.032
	Gasoline	MC	Motorcycles	13.178	2.512	0.665	0.003	0.024	0.021	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.115	0.219	0.123	0.002	0.005	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.489	0.228	0.212	0.003	0.007	0.006	0.026
Connecticut	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.864	0.832	0.961	0.006	0.026	0.023	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.019	0.085	0.087	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.098	0.089	0.132	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.564	0.130	2.652	0.004	0.049	0.045	0.032
	Gasoline	MC	Motorcycles	12.658	2.508	0.741	0.003	0.022	0.020	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.867	0.199	0.107	0.002	0.004	0.004	0.024
Delaware	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.282	0.220	0.189	0.003	0.006	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.206	0.870	0.942	0.006	0.026	0.023	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.034	0.083	0.086	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.137	0.092	0.132	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.606	0.140	2.628	0.004	0.051	0.047	0.032
	Gasoline	MC	Motorcycles	12.162	2.394	0.675	0.003	0.022	0.019	0.053
District of Columbia	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.972	0.196	0.112	0.002	0.004	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.339	0.212	0.196	0.003	0.006	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.983	0.866	0.917	0.006	0.025	0.022	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.177	0.075	0.085	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.178	0.081	0.128	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.619	0.133	2.620	0.004	0.052	0.048	0.032
District of Columbia	Gasoline	MC	Motorcycles	12.078	2.359	0.650	0.003	0.022	0.020	0.052
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.080	0.195	0.104	0.002	0.004	0.003	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.392	0.219	0.179	0.003	0.005	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.834	1.000	0.990	0.007	0.028	0.025	0.053
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.410	0.073	0.083	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.277	0.085	0.127	0.001	0.003	0.003	0.008
District of Columbia	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.913	0.173	3.112	0.004	0.064	0.059	0.032
	Gasoline	MC	Motorcycles	11.896	2.541	0.590	0.003	0.022	0.020	0.047

Table 5-19. On-Road Vehicle Criteria Pollutant Emission Factors – 2024 (cont.)

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Florida	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.995	0.227	0.112	0.002	0.003	0.003	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.463	0.249	0.200	0.003	0.005	0.004	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	15.294	1.020	0.905	0.006	0.024	0.021	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.818	0.055	0.084	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.601	0.064	0.127	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.691	0.117	2.489	0.004	0.053	0.049	0.032
Georgia	Gasoline	MC	Motorcycles	12.909	3.044	0.569	0.003	0.024	0.021	0.052
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.375	0.207	0.115	0.002	0.004	0.003	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.824	0.224	0.205	0.003	0.005	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.342	0.903	0.915	0.006	0.024	0.021	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.347	0.067	0.085	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.305	0.073	0.128	0.001	0.003	0.003	0.009
Hawaii	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.601	0.120	2.515	0.004	0.050	0.046	0.032
	Gasoline	MC	Motorcycles	12.977	2.725	0.642	0.003	0.024	0.021	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.899	0.234	0.111	0.002	0.004	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.341	0.259	0.199	0.003	0.006	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	15.222	1.090	0.912	0.006	0.026	0.023	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.589	0.051	0.083	0.001	0.002	0.002	0.008
Idaho	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.447	0.059	0.125	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.667	0.115	2.465	0.004	0.053	0.049	0.032
	Gasoline	MC	Motorcycles	13.552	2.950	0.605	0.003	0.025	0.022	0.052
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.270	0.218	0.130	0.002	0.005	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.612	0.216	0.222	0.003	0.006	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.504	0.770	0.928	0.006	0.025	0.022	0.051
Illinois	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.995	0.086	0.088	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.065	0.084	0.131	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.521	0.120	2.602	0.004	0.047	0.043	0.032
	Gasoline	MC	Motorcycles	12.672	2.275	0.764	0.003	0.022	0.020	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.254	0.209	0.118	0.002	0.005	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.653	0.225	0.205	0.003	0.007	0.006	0.026
Indiana	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.153	0.851	0.922	0.006	0.026	0.023	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.125	0.082	0.085	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.162	0.088	0.129	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.603	0.134	2.625	0.004	0.051	0.047	0.032
	Gasoline	MC	Motorcycles	12.288	2.329	0.669	0.003	0.022	0.020	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.458	0.213	0.124	0.002	0.005	0.004	0.024
Iowa	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.855	0.222	0.215	0.003	0.007	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.979	0.832	0.915	0.006	0.027	0.024	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.091	0.081	0.085	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.129	0.084	0.128	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.565	0.126	2.560	0.004	0.049	0.045	0.032
	Gasoline	MC	Motorcycles	13.002	2.318	0.689	0.003	0.024	0.021	0.054
Kansas	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.484	0.221	0.129	0.002	0.006	0.005	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.840	0.218	0.219	0.003	0.007	0.007	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.431	0.771	0.891	0.006	0.028	0.025	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.994	0.083	0.085	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.055	0.081	0.126	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.505	0.119	2.470	0.004	0.047	0.043	0.032
Kansas	Gasoline	MC	Motorcycles	13.202	2.133	0.716	0.003	0.024	0.021	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.542	0.221	0.127	0.002	0.005	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.969	0.224	0.220	0.003	0.007	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.828	0.819	0.902	0.006	0.026	0.023	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.161	0.077	0.086	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.188	0.078	0.129	0.001	0.003	0.003	0.008
Kansas	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.525	0.115	2.474	0.004	0.047	0.043	0.032
	Gasoline	MC	Motorcycles	13.180	2.404	0.699	0.003	0.024	0.022	0.055

Table 5-19. On-Road Vehicle Criteria Pollutant Emission Factors – 2024 (cont.)

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Kentucky	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.498	0.213	0.124	0.002	0.004	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.935	0.217	0.216	0.003	0.006	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.899	0.813	0.882	0.006	0.024	0.021	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.158	0.075	0.086	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.188	0.076	0.128	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.531	0.113	2.475	0.004	0.047	0.043	0.033
Louisiana	Gasoline	MC	Motorcycles	12.919	2.365	0.686	0.003	0.024	0.021	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.683	0.219	0.114	0.002	0.004	0.003	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.142	0.229	0.202	0.003	0.005	0.004	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.562	0.919	0.881	0.006	0.023	0.020	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.572	0.061	0.085	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.453	0.066	0.127	0.001	0.003	0.003	0.009
Maine	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.587	0.110	2.408	0.004	0.049	0.045	0.032
	Gasoline	MC	Motorcycles	12.982	2.796	0.613	0.003	0.024	0.021	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.219	0.208	0.125	0.002	0.005	0.005	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.521	0.203	0.212	0.003	0.007	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.006	0.716	0.871	0.006	0.026	0.023	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.821	0.089	0.085	0.001	0.002	0.002	0.008
Maryland	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.945	0.084	0.126	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.481	0.120	2.479	0.004	0.047	0.043	0.032
	Gasoline	MC	Motorcycles	12.486	1.915	0.739	0.003	0.023	0.020	0.056
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.023	0.201	0.113	0.002	0.004	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.428	0.220	0.199	0.003	0.006	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.208	0.878	0.931	0.006	0.025	0.022	0.052
Massachusetts	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.165	0.077	0.086	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.208	0.084	0.131	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.607	0.132	2.600	0.004	0.051	0.047	0.032
	Gasoline	MC	Motorcycles	12.239	2.458	0.662	0.003	0.022	0.020	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.939	0.202	0.113	0.002	0.005	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.360	0.228	0.200	0.003	0.007	0.006	0.026
Michigan	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.337	0.891	0.960	0.006	0.027	0.024	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.044	0.085	0.085	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.130	0.096	0.131	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.655	0.150	2.729	0.004	0.053	0.049	0.032
	Gasoline	MC	Motorcycles	12.119	2.400	0.667	0.003	0.022	0.019	0.052
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.504	0.219	0.129	0.002	0.005	0.005	0.024
Minnesota	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.906	0.231	0.222	0.003	0.008	0.007	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.950	0.831	0.936	0.006	0.029	0.026	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.010	0.086	0.085	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.077	0.090	0.128	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.570	0.134	2.597	0.004	0.050	0.046	0.032
	Gasoline	MC	Motorcycles	13.100	2.235	0.704	0.003	0.024	0.021	0.053
Mississippi	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.634	0.223	0.132	0.002	0.006	0.005	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.001	0.229	0.224	0.003	0.008	0.007	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.049	0.779	0.928	0.006	0.029	0.025	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.930	0.090	0.085	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.024	0.091	0.128	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.525	0.133	2.532	0.004	0.048	0.045	0.032

Table 5-19. On-Road Vehicle Criteria Pollutant Emission Factors – 2024 (cont.)

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Missouri	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.333	0.216	0.121	0.002	0.005	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.800	0.224	0.213	0.003	0.006	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.971	0.819	0.892	0.006	0.025	0.022	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.159	0.078	0.087	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.219	0.080	0.131	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.527	0.115	2.462	0.004	0.047	0.043	0.033
Montana	Gasoline	MC	Motorcycles	12.788	2.395	0.688	0.003	0.023	0.021	0.056
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.395	0.223	0.134	0.002	0.005	0.005	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.716	0.213	0.228	0.003	0.007	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.170	0.718	0.901	0.006	0.025	0.023	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.886	0.090	0.087	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.991	0.085	0.129	0.001	0.003	0.003	0.009
Nebraska	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.484	0.117	2.543	0.004	0.046	0.042	0.032
	Gasoline	MC	Motorcycles	12.706	2.074	0.780	0.003	0.022	0.020	0.056
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.523	0.225	0.130	0.002	0.005	0.005	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.918	0.224	0.223	0.003	0.007	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.656	0.785	0.900	0.006	0.027	0.024	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.053	0.083	0.086	0.001	0.002	0.002	0.008
Nevada	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.111	0.082	0.128	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.511	0.117	2.493	0.004	0.047	0.043	0.032
	Gasoline	MC	Motorcycles	13.220	2.277	0.722	0.003	0.024	0.021	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.287	0.240	0.124	0.002	0.005	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.685	0.256	0.216	0.003	0.007	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.929	1.026	1.031	0.006	0.028	0.025	0.052
New Hampshire	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.391	0.069	0.091	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.338	0.076	0.139	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.623	0.123	2.776	0.004	0.051	0.047	0.032
	Gasoline	MC	Motorcycles	13.474	3.095	0.747	0.003	0.025	0.022	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.908	0.200	0.115	0.002	0.005	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.265	0.208	0.198	0.003	0.007	0.006	0.026
New Jersey	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.548	0.779	0.906	0.006	0.026	0.023	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.927	0.087	0.086	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.030	0.089	0.128	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.530	0.129	2.546	0.004	0.048	0.044	0.032
	Gasoline	MC	Motorcycles	12.406	2.123	0.715	0.003	0.023	0.020	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.949	0.200	0.112	0.002	0.004	0.004	0.024
New Mexico	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.360	0.224	0.192	0.003	0.006	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.411	0.902	0.953	0.006	0.026	0.023	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.152	0.079	0.086	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.202	0.089	0.132	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.651	0.142	2.691	0.004	0.053	0.048	0.032
	Gasoline	MC	Motorcycles	12.112	2.489	0.656	0.003	0.022	0.019	0.052
New York	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.365	0.225	0.129	0.002	0.005	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.754	0.223	0.223	0.003	0.006	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.718	0.830	0.943	0.006	0.025	0.022	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.143	0.073	0.089	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.161	0.074	0.132	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.531	0.113	2.600	0.004	0.048	0.044	0.032
New York	Gasoline	MC	Motorcycles	13.180	2.651	0.757	0.003	0.024	0.021	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.885	0.196	0.108	0.002	0.005	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.231	0.211	0.187	0.003	0.007	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.061	0.851	0.941	0.006	0.027	0.024	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.033	0.084	0.086	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.117	0.091	0.130	0.001	0.003	0.003	0.009
New York	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.597	0.137	2.629	0.004	0.051	0.047	0.032
	Gasoline	MC	Motorcycles	12.522	2.312	0.686	0.003	0.023	0.020	0.053



Table 5-19. On-Road Vehicle Criteria Pollutant Emission Factors – 2024 (cont.)

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
North Carolina	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.239	0.206	0.116	0.002	0.004	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.680	0.219	0.207	0.003	0.005	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.096	0.872	0.912	0.006	0.024	0.022	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.241	0.070	0.085	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.235	0.075	0.128	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.576	0.119	2.511	0.004	0.049	0.045	0.032
North Dakota	Gasoline	MC	Motorcycles	12.993	2.595	0.662	0.003	0.024	0.021	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.672	0.228	0.134	0.002	0.006	0.005	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.958	0.218	0.224	0.003	0.008	0.007	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.617	0.714	0.895	0.006	0.029	0.025	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.860	0.094	0.086	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.965	0.087	0.126	0.001	0.003	0.003	0.008
Ohio	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.477	0.122	2.488	0.004	0.046	0.043	0.032
	Gasoline	MC	Motorcycles	13.122	1.931	0.768	0.003	0.024	0.021	0.056
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.400	0.214	0.124	0.002	0.005	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.831	0.227	0.215	0.003	0.007	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.107	0.846	0.930	0.006	0.027	0.024	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.060	0.082	0.086	0.001	0.002	0.002	0.008
Oklahoma	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.129	0.087	0.129	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.566	0.129	2.561	0.004	0.049	0.045	0.032
	Gasoline	MC	Motorcycles	13.174	2.383	0.695	0.003	0.024	0.021	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.581	0.220	0.123	0.002	0.004	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.012	0.222	0.215	0.003	0.006	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.871	0.844	0.896	0.006	0.025	0.022	0.051
Oregon	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.271	0.069	0.086	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.251	0.071	0.128	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.529	0.112	2.433	0.004	0.048	0.044	0.032
	Gasoline	MC	Motorcycles	13.188	2.535	0.680	0.003	0.024	0.021	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.041	0.202	0.122	0.002	0.004	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.385	0.209	0.208	0.003	0.006	0.005	0.026
Pacific Islands	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.481	0.807	0.929	0.006	0.024	0.022	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.950	0.080	0.086	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.034	0.082	0.128	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.553	0.125	2.602	0.004	0.049	0.045	0.032
	Gasoline	MC	Motorcycles	12.632	2.254	0.730	0.003	0.022	0.020	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.217	0.204	0.115	0.002	0.004	0.004	0.024
Pennsylvania	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.627	0.217	0.203	0.002	0.006	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.985	0.855	0.903	0.005	0.024	0.022	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.170	0.073	0.086	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.193	0.077	0.129	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.576	0.122	2.551	0.004	0.049	0.046	0.032
	Gasoline	MC	Motorcycles	12.701	2.495	0.677	0.002	0.023	0.020	0.054
Puerto Rico	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.106	0.200	0.117	0.002	0.005	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.493	0.213	0.202	0.003	0.007	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.009	0.831	0.924	0.006	0.026	0.023	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.076	0.082	0.086	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.134	0.086	0.129	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.572	0.127	2.583	0.004	0.049	0.045	0.033
Puerto Rico	Gasoline	MC	Motorcycles	12.830	2.337	0.691	0.003	0.023	0.021	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	4.107	0.187	0.100	0.002	0.003	0.003	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.611	0.218	0.181	0.003	0.004	0.004	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.730	0.939	0.820	0.006	0.022	0.020	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.957	0.042	0.077	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.703	0.053	0.119	0.001	0.003	0.003	0.008
Puerto Rico	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.707	0.115	2.367	0.004	0.053	0.049	0.032
	Gasoline	MC	Motorcycles	12.897	2.725	0.541	0.003	0.024	0.021	0.052

Table 5-19. On-Road Vehicle Criteria Pollutant Emission Factors – 2024 (cont.)

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Rhode Island	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.904	0.201	0.108	0.002	0.004	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.306	0.219	0.189	0.003	0.006	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.172	0.871	0.941	0.006	0.026	0.023	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.035	0.084	0.085	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.125	0.092	0.131	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.619	0.141	2.660	0.004	0.051	0.047	0.032
South Carolina	Gasoline	MC	Motorcycles	12.136	2.374	0.671	0.003	0.022	0.019	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.603	0.215	0.119	0.002	0.004	0.003	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.037	0.221	0.210	0.003	0.005	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.099	0.867	0.886	0.006	0.023	0.021	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.352	0.066	0.085	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.299	0.069	0.127	0.001	0.003	0.003	0.009
South Dakota	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.562	0.112	2.457	0.004	0.048	0.045	0.032
	Gasoline	MC	Motorcycles	12.987	2.603	0.650	0.003	0.024	0.021	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.606	0.221	0.133	0.002	0.005	0.005	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.964	0.213	0.226	0.003	0.007	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.794	0.724	0.889	0.006	0.026	0.023	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.946	0.089	0.087	0.001	0.002	0.002	0.008
Tennessee	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.043	0.084	0.128	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.483	0.115	2.482	0.004	0.046	0.042	0.032
	Gasoline	MC	Motorcycles	13.136	2.081	0.759	0.003	0.024	0.021	0.056
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.578	0.217	0.122	0.002	0.004	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.026	0.229	0.215	0.003	0.006	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.256	0.881	0.916	0.006	0.025	0.022	0.052
Texas	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.258	0.072	0.086	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.251	0.077	0.129	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.581	0.120	2.526	0.004	0.049	0.045	0.032
	Gasoline	MC	Motorcycles	13.078	2.608	0.662	0.003	0.024	0.021	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.316	0.206	0.107	0.002	0.004	0.003	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.743	0.221	0.191	0.003	0.005	0.004	0.026
Utah	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.259	0.913	0.895	0.006	0.023	0.020	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.535	0.062	0.086	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.434	0.068	0.129	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.598	0.114	2.463	0.004	0.050	0.046	0.032
	Gasoline	MC	Motorcycles	12.367	2.761	0.621	0.003	0.023	0.020	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.162	0.219	0.125	0.002	0.005	0.004	0.024
Vermont	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.565	0.230	0.216	0.003	0.007	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.062	0.846	0.978	0.006	0.026	0.023	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.095	0.084	0.089	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.156	0.089	0.135	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.572	0.129	2.688	0.004	0.049	0.045	0.033
	Gasoline	MC	Motorcycles	12.661	2.545	0.752	0.003	0.022	0.020	0.054
Virgin Islands	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.942	0.203	0.119	0.002	0.006	0.005	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.259	0.197	0.200	0.003	0.007	0.007	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.102	0.712	0.878	0.006	0.027	0.024	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.837	0.089	0.086	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.962	0.084	0.126	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.474	0.118	2.466	0.004	0.046	0.042	0.032
Virgin Islands	Gasoline	MC	Motorcycles	13.014	1.927	0.753	0.003	0.024	0.021	0.056
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	4.471	0.324	0.120	0.002	0.004	0.003	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.917	0.300	0.205	0.003	0.005	0.004	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	16.710	1.166	0.911	0.006	0.023	0.020	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	4.306	0.064	0.099	0.001	0.003	0.003	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.874	0.062	0.133	0.001	0.004	0.004	0.008
Virgin Islands	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.551	0.098	2.106	0.004	0.048	0.044	0.031
	Gasoline	MC	Motorcycles	13.032	3.317	0.568	0.003	0.024	0.021	0.054

**Table 5-19. On-Road Vehicle Criteria Pollutant Emission Factors – 2024 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Virginia	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.290	0.206	0.117	0.002	0.004	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.710	0.217	0.207	0.003	0.006	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.914	0.838	0.900	0.006	0.024	0.021	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.152	0.074	0.086	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.187	0.078	0.129	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.560	0.120	2.515	0.004	0.049	0.045	0.032
Washington	Gasoline	MC	Motorcycles	12.549	2.417	0.671	0.003	0.023	0.020	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.264	0.210	0.129	0.002	0.004	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.680	0.222	0.225	0.003	0.006	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.710	0.819	0.940	0.006	0.025	0.022	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.924	0.083	0.086	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.044	0.088	0.130	0.001	0.003	0.003	0.009
West Virginia	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.562	0.129	2.613	0.004	0.049	0.045	0.032
	Gasoline	MC	Motorcycles	12.668	2.291	0.727	0.003	0.022	0.020	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.399	0.211	0.125	0.002	0.005	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.804	0.213	0.216	0.003	0.006	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.578	0.793	0.889	0.006	0.025	0.022	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.010	0.078	0.085	0.001	0.002	0.002	0.008
Wisconsin	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.080	0.078	0.126	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.513	0.117	2.462	0.004	0.047	0.044	0.032
	Gasoline	MC	Motorcycles	13.137	2.284	0.704	0.003	0.024	0.021	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.399	0.213	0.126	2.01E-03	5.15E-03	4.56E-03	2.41E-02
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.744	0.214	0.214	0.003	0.007	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.734	0.755	0.901	0.006	0.027	0.024	0.051
Wyoming	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.926	0.088	0.085	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.019	0.087	0.127	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.514	0.126	2.512	0.004	0.048	0.044	0.032
	Gasoline	MC	Motorcycles	12.744	2.048	0.727	0.003	0.023	0.020	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.465	0.232	0.137	0.002	0.005	0.005	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.809	0.222	0.232	0.003	0.007	0.006	0.026
Wyoming	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.396	0.730	0.908	0.006	0.026	0.023	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.932	0.092	0.089	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.035	0.087	0.131	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.492	0.115	2.570	0.004	0.046	0.042	0.033
	Gasoline	MC	Motorcycles	12.722	2.179	0.786	0.003	0.022	0.020	0.056

Table 5-20. On-Road Vehicle Criteria Pollutant Emission Factors – 2025

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Alabama	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.448	0.206	0.103	0.002	0.004	0.003	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.841	0.210	0.183	0.003	0.005	0.004	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.409	0.858	0.810	0.006	0.023	0.020	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.322	0.062	0.079	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.237	0.065	0.116	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.514	0.100	2.281	0.004	0.041	0.038	0.032
	Gasoline	MC	Motorcycles	12.823	2.646	0.639	0.003	0.024	0.021	0.054
Alaska	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	4.357	0.218	0.111	0.001	0.004	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.730	0.227	0.186	0.001	0.006	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	16.517	0.737	0.743	0.003	0.024	0.021	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.791	0.105	0.080	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.905	0.104	0.119	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.500	0.130	2.496	0.004	0.041	0.037	0.032
	Gasoline	MC	Motorcycles	12.902	1.822	0.703	0.001	0.017	0.015	0.054
Arizona	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.293	0.221	0.100	0.001	0.004	0.003	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.688	0.230	0.179	0.002	0.005	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.076	0.960	0.856	0.004	0.024	0.021	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.577	0.058	0.086	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.423	0.064	0.129	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.568	0.101	2.540	0.004	0.042	0.039	0.032
	Gasoline	MC	Motorcycles	12.654	3.166	0.720	0.002	0.023	0.021	0.053
Arkansas	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.413	0.208	0.107	0.002	0.004	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.812	0.208	0.188	0.003	0.005	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.245	0.828	0.812	0.006	0.024	0.021	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.231	0.066	0.080	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.189	0.067	0.117	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.481	0.099	2.255	0.004	0.040	0.037	0.032
	Gasoline	MC	Motorcycles	13.025	2.510	0.663	0.003	0.024	0.021	0.055
Colorado	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.964	0.210	0.108	0.002	0.005	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.311	0.216	0.188	0.003	0.007	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.171	0.810	0.878	0.006	0.026	0.023	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.965	0.082	0.081	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.031	0.085	0.122	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.507	0.116	2.468	0.004	0.041	0.038	0.032
	Gasoline	MC	Motorcycles	12.510	2.510	0.739	0.003	0.022	0.020	0.054
Connecticut	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.722	0.191	0.094	0.002	0.004	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.104	0.209	0.167	0.003	0.006	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.447	0.847	0.862	0.006	0.025	0.022	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.980	0.081	0.080	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.068	0.089	0.121	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.548	0.126	2.451	0.004	0.043	0.039	0.032
	Gasoline	MC	Motorcycles	12.015	2.393	0.674	0.003	0.022	0.019	0.054
Delaware	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.819	0.189	0.098	0.002	0.004	0.003	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.155	0.200	0.173	0.003	0.005	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.216	0.843	0.838	0.006	0.024	0.021	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.121	0.073	0.079	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.108	0.078	0.118	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.561	0.118	2.446	0.004	0.043	0.040	0.032
	Gasoline	MC	Motorcycles	11.932	2.357	0.648	0.003	0.022	0.020	0.053
District of Columbia	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.921	0.187	0.091	0.002	0.004	0.003	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.208	0.208	0.158	0.003	0.005	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.897	0.972	0.907	0.007	0.028	0.025	0.053
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.351	0.071	0.077	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.204	0.082	0.117	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.849	0.154	2.935	0.004	0.053	0.049	0.032
	Gasoline	MC	Motorcycles	11.752	2.537	0.589	0.003	0.022	0.020	0.048

Table 5-20. On-Road Vehicle Criteria Pollutant Emission Factors – 2025 (cont.)

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Florida	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.798	0.217	0.097	0.002	0.003	0.003	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.231	0.234	0.176	0.003	0.004	0.004	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.430	0.995	0.827	0.006	0.023	0.021	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.752	0.053	0.078	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.519	0.060	0.117	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.630	0.103	2.324	0.004	0.044	0.041	0.032
Georgia	Gasoline	MC	Motorcycles	12.758	3.040	0.567	0.003	0.024	0.021	0.052
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.207	0.198	0.101	0.002	0.004	0.003	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.623	0.210	0.181	0.003	0.005	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.590	0.881	0.836	0.006	0.024	0.021	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.288	0.064	0.079	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.232	0.069	0.118	0.001	0.003	0.003	0.009
Hawaii	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.543	0.106	2.343	0.004	0.042	0.039	0.032
	Gasoline	MC	Motorcycles	12.825	2.724	0.641	0.003	0.024	0.021	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.711	0.224	0.097	0.002	0.004	0.003	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.122	0.244	0.175	0.003	0.005	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.374	1.063	0.835	0.006	0.026	0.023	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.526	0.049	0.077	0.001	0.003	0.002	0.008
Idaho	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.370	0.056	0.115	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.608	0.100	2.304	0.004	0.044	0.041	0.032
	Gasoline	MC	Motorcycles	13.399	2.944	0.603	0.003	0.025	0.022	0.052
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.112	0.209	0.114	0.002	0.005	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.426	0.204	0.196	0.003	0.006	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.870	0.749	0.847	0.006	0.025	0.022	0.051
Illinois	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.942	0.083	0.082	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.999	0.081	0.120	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.465	0.108	2.415	0.004	0.039	0.036	0.032
	Gasoline	MC	Motorcycles	12.523	2.275	0.762	0.003	0.022	0.020	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.090	0.201	0.103	0.002	0.005	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.453	0.213	0.181	0.003	0.006	0.006	0.026
Indiana	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.407	0.828	0.842	0.006	0.026	0.023	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.070	0.080	0.080	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.093	0.084	0.119	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.546	0.120	2.447	0.004	0.042	0.039	0.032
	Gasoline	MC	Motorcycles	12.140	2.328	0.667	0.003	0.022	0.020	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.289	0.205	0.109	0.002	0.005	0.004	0.024
Iowa	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.655	0.210	0.190	0.003	0.006	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.283	0.810	0.836	0.006	0.026	0.023	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.037	0.078	0.080	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.061	0.080	0.118	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.508	0.113	2.381	0.004	0.041	0.038	0.032
	Gasoline	MC	Motorcycles	12.849	2.316	0.687	0.003	0.024	0.021	0.054
Kansas	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.318	0.213	0.113	0.002	0.006	0.005	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.645	0.207	0.194	0.003	0.007	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.810	0.750	0.812	0.006	0.027	0.024	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.941	0.081	0.079	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.989	0.078	0.115	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.449	0.107	2.293	0.004	0.039	0.036	0.032
Kansas	Gasoline	MC	Motorcycles	13.049	2.132	0.714	0.003	0.024	0.021	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.372	0.212	0.111	0.002	0.005	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.767	0.212	0.195	0.003	0.006	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.180	0.797	0.823	0.006	0.026	0.023	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.106	0.074	0.080	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.119	0.074	0.118	0.001	0.003	0.003	0.008
Kansas	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.469	0.103	2.296	0.004	0.039	0.036	0.032
	Gasoline	MC	Motorcycles	13.028	2.402	0.697	0.003	0.024	0.022	0.055

Table 5-20. On-Road Vehicle Criteria Pollutant Emission Factors – 2025 (cont.)

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Kentucky	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.327	0.205	0.108	0.002	0.004	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.730	0.205	0.190	0.003	0.006	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.245	0.792	0.804	0.006	0.024	0.021	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.102	0.073	0.080	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.119	0.073	0.118	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.474	0.100	2.296	0.004	0.039	0.036	0.032
Louisiana	Gasoline	MC	Motorcycles	12.767	2.364	0.684	0.003	0.024	0.021	0.056
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.501	0.209	0.099	0.002	0.003	0.003	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.926	0.216	0.178	0.003	0.005	0.004	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.808	0.897	0.804	0.006	0.023	0.020	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.510	0.059	0.079	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.376	0.063	0.117	0.001	0.003	0.003	0.009
Maine	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.528	0.097	2.239	0.004	0.041	0.038	0.032
	Gasoline	MC	Motorcycles	12.830	2.794	0.612	0.003	0.024	0.021	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.062	0.200	0.110	0.002	0.005	0.005	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.336	0.193	0.187	0.003	0.007	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.401	0.696	0.793	0.006	0.025	0.023	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.771	0.086	0.079	0.001	0.003	0.002	0.008
Maryland	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.882	0.081	0.115	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.426	0.108	2.299	0.004	0.039	0.036	0.032
	Gasoline	MC	Motorcycles	12.337	1.913	0.737	0.003	0.023	0.020	0.056
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.870	0.192	0.099	0.002	0.004	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.239	0.208	0.175	0.003	0.006	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.446	0.856	0.851	0.006	0.024	0.021	0.051
Massachusetts	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.109	0.074	0.080	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.137	0.081	0.120	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.549	0.118	2.424	0.004	0.042	0.039	0.032
	Gasoline	MC	Motorcycles	12.092	2.457	0.660	0.003	0.022	0.020	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.787	0.194	0.099	0.002	0.005	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.168	0.216	0.176	0.003	0.007	0.006	0.026
Michigan	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.546	0.867	0.879	0.006	0.027	0.024	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.990	0.083	0.080	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.061	0.092	0.121	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.596	0.135	2.551	0.004	0.044	0.041	0.032
	Gasoline	MC	Motorcycles	11.973	2.400	0.665	0.003	0.022	0.019	0.052
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.335	0.210	0.113	0.002	0.005	0.005	0.024
Minnesota	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.705	0.219	0.197	0.003	0.007	0.007	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.249	0.809	0.855	0.006	0.029	0.025	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.956	0.084	0.079	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.010	0.086	0.118	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.513	0.121	2.418	0.004	0.042	0.038	0.032
	Gasoline	MC	Motorcycles	12.947	2.234	0.703	0.003	0.024	0.021	0.054
Mississippi	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.462	0.214	0.116	0.002	0.005	0.005	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.798	0.217	0.199	0.003	0.007	0.007	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.351	0.758	0.848	0.006	0.028	0.025	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.878	0.088	0.079	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.958	0.088	0.117	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.470	0.119	2.355	0.004	0.040	0.037	0.032
Missouri	Gasoline	MC	Motorcycles	12.943	2.098	0.732	0.003	0.024	0.021	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.417	0.203	0.102	0.002	0.004	0.003	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.813	0.200	0.181	0.003	0.005	0.004	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.151	0.821	0.781	0.006	0.022	0.020	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.297	0.061	0.079	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.223	0.061	0.115	0.001	0.003	0.003	0.009
Montana	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.469	0.094	2.192	0.004	0.040	0.036	0.032
	Gasoline	MC	Motorcycles	12.853	2.533	0.647	0.003	0.024	0.021	0.055

Table 5-20. On-Road Vehicle Criteria Pollutant Emission Factors – 2025 (cont.)

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Missouri	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.169	0.207	0.106	0.002	0.005	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.599	0.211	0.188	0.003	0.006	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.318	0.798	0.815	0.006	0.024	0.021	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.102	0.075	0.081	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.148	0.077	0.120	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.470	0.102	2.283	0.004	0.039	0.036	0.032
Montana	Gasoline	MC	Motorcycles	12.638	2.395	0.686	0.003	0.023	0.021	0.056
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.235	0.215	0.119	0.002	0.005	0.005	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.528	0.202	0.201	0.002	0.007	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.584	0.698	0.821	0.006	0.025	0.022	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.834	0.088	0.081	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.928	0.082	0.118	0.001	0.003	0.003	0.009
Nebraska	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.429	0.105	2.356	0.004	0.038	0.035	0.032
	Gasoline	MC	Motorcycles	12.555	2.075	0.778	0.003	0.022	0.020	0.056
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.355	0.216	0.114	0.002	0.005	0.005	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.720	0.212	0.197	0.003	0.007	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.036	0.764	0.821	0.006	0.027	0.024	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.999	0.081	0.081	0.001	0.003	0.002	0.008
Nevada	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.043	0.079	0.118	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.455	0.104	2.312	0.004	0.039	0.036	0.032
	Gasoline	MC	Motorcycles	13.066	2.276	0.720	0.003	0.024	0.021	0.056
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.125	0.230	0.108	0.002	0.005	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.492	0.241	0.190	0.003	0.007	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.154	0.999	0.942	0.006	0.028	0.025	0.051
New Hampshire	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.332	0.066	0.085	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.264	0.072	0.128	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.564	0.109	2.586	0.004	0.042	0.039	0.032
	Gasoline	MC	Motorcycles	13.322	3.093	0.745	0.003	0.025	0.022	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.759	0.192	0.101	0.002	0.005	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.082	0.197	0.174	0.003	0.007	0.006	0.026
New Jersey	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.874	0.758	0.827	0.006	0.026	0.023	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.875	0.085	0.080	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.965	0.085	0.118	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.474	0.116	2.367	0.004	0.040	0.037	0.032
	Gasoline	MC	Motorcycles	12.257	2.122	0.713	0.003	0.023	0.020	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.798	0.192	0.097	0.002	0.004	0.004	0.024
New Mexico	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.174	0.212	0.169	0.003	0.006	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.616	0.878	0.872	0.006	0.025	0.022	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.096	0.077	0.080	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.131	0.086	0.121	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.592	0.127	2.514	0.004	0.044	0.040	0.032
	Gasoline	MC	Motorcycles	11.966	2.487	0.654	0.003	0.022	0.019	0.053
New York	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.201	0.216	0.112	0.002	0.005	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.559	0.211	0.197	0.003	0.006	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.075	0.808	0.860	0.006	0.025	0.022	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.088	0.071	0.083	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.092	0.071	0.122	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.475	0.100	2.413	0.004	0.040	0.036	0.032
New York	Gasoline	MC	Motorcycles	13.028	2.651	0.755	0.003	0.024	0.021	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.742	0.188	0.095	0.002	0.005	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.063	0.201	0.166	0.003	0.007	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.328	0.828	0.861	0.006	0.026	0.023	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.979	0.081	0.080	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.049	0.087	0.120	0.001	0.003	0.003	0.009
New York	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.540	0.123	2.451	0.004	0.042	0.039	0.032
	Gasoline	MC	Motorcycles	12.373	2.311	0.684	0.003	0.023	0.020	0.054

Table 5-20. On-Road Vehicle Criteria Pollutant Emission Factors – 2025 (cont.)

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
North Carolina	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.075	0.197	0.102	0.002	0.004	0.003	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.484	0.206	0.183	0.003	0.005	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.376	0.850	0.833	0.006	0.024	0.021	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.184	0.067	0.079	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.164	0.071	0.118	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.519	0.106	2.338	0.004	0.041	0.038	0.032
North Dakota	Gasoline	MC	Motorcycles	12.841	2.594	0.660	0.003	0.024	0.021	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.500	0.219	0.118	0.002	0.006	0.005	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.758	0.207	0.199	0.002	0.008	0.007	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.990	0.695	0.815	0.006	0.028	0.025	0.050
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.809	0.091	0.080	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.902	0.084	0.116	0.001	0.003	0.003	0.008
Ohio	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.422	0.110	2.307	0.004	0.038	0.035	0.032
	Gasoline	MC	Motorcycles	12.966	1.930	0.766	0.003	0.024	0.021	0.056
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.234	0.205	0.109	0.002	0.005	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.632	0.215	0.191	0.003	0.007	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.409	0.824	0.850	0.006	0.027	0.024	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.006	0.080	0.080	0.001	0.003	0.002	0.008
Oklahoma	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.061	0.083	0.119	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.508	0.115	2.383	0.004	0.041	0.038	0.032
	Gasoline	MC	Motorcycles	13.020	2.383	0.693	0.003	0.024	0.021	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.408	0.210	0.108	0.002	0.004	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.807	0.210	0.190	0.003	0.006	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.198	0.822	0.817	0.006	0.024	0.021	0.051
Oregon	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.213	0.067	0.080	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.179	0.068	0.117	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.472	0.099	2.260	0.004	0.040	0.036	0.032
	Gasoline	MC	Motorcycles	13.035	2.533	0.678	0.003	0.024	0.021	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.891	0.194	0.107	0.002	0.004	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.206	0.198	0.184	0.003	0.006	0.005	0.025
Pacific Islands	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.813	0.786	0.848	0.006	0.024	0.021	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.897	0.077	0.080	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.969	0.079	0.118	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.497	0.112	2.421	0.004	0.041	0.038	0.032
	Gasoline	MC	Motorcycles	12.484	2.254	0.728	0.003	0.022	0.020	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.057	0.196	0.101	0.002	0.004	0.004	0.024
Pennsylvania	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.434	0.205	0.179	0.002	0.005	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.312	0.809	0.844	0.006	0.026	0.023	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.022	0.079	0.080	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.066	0.082	0.119	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.514	0.114	2.402	0.004	0.041	0.038	0.032
	Gasoline	MC	Motorcycles	12.678	2.336	0.689	0.003	0.023	0.021	0.054
Puerto Rico	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.951	0.192	0.102	0.002	0.005	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.305	0.201	0.179	0.003	0.006	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.312	0.809	0.844	0.006	0.026	0.023	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.022	0.079	0.080	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.066	0.082	0.119	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.514	0.114	2.402	0.004	0.041	0.038	0.032
Puerto Rico	Gasoline	MC	Motorcycles	12.745	2.718	0.540	0.003	0.024	0.021	0.052
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.904	0.179	0.086	0.002	0.003	0.002	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.375	0.204	0.159	0.003	0.004	0.003	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.904	0.917	0.748	0.006	0.022	0.019	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.892	0.041	0.071	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.619	0.050	0.110	0.001	0.003	0.003	0.008
Puerto Rico	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.645	0.100	2.210	0.004	0.045	0.041	0.032
	Gasoline	MC	Motorcycles	12.745	2.718	0.540	0.003	0.024	0.021	0.052



Table 5-20. On-Road Vehicle Criteria Pollutant Emission Factors – 2025 (cont.)

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Rhode Island	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.758	0.193	0.095	0.002	0.004	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.131	0.209	0.168	0.003	0.006	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.410	0.848	0.861	0.006	0.026	0.023	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.981	0.081	0.080	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.057	0.089	0.120	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.561	0.127	2.482	0.004	0.043	0.040	0.032
South Carolina	Gasoline	MC	Motorcycles	11.989	2.373	0.669	0.003	0.022	0.019	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.426	0.206	0.104	0.002	0.004	0.003	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.828	0.208	0.185	0.003	0.005	0.004	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.394	0.845	0.808	0.006	0.023	0.020	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.294	0.063	0.080	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.226	0.066	0.117	0.001	0.003	0.003	0.009
South Dakota	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.504	0.098	2.283	0.004	0.040	0.037	0.032
	Gasoline	MC	Motorcycles	12.835	2.601	0.649	0.003	0.024	0.021	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.434	0.213	0.118	0.002	0.005	0.005	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.762	0.202	0.200	0.002	0.007	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.182	0.705	0.810	0.006	0.025	0.023	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.894	0.087	0.081	0.001	0.003	0.002	0.008
Tennessee	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.978	0.081	0.118	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.427	0.103	2.298	0.004	0.038	0.035	0.032
	Gasoline	MC	Motorcycles	12.980	2.081	0.757	0.003	0.024	0.021	0.057
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.403	0.208	0.107	0.002	0.004	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.817	0.216	0.190	0.003	0.006	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.535	0.858	0.837	0.006	0.025	0.022	0.051
Texas	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.200	0.069	0.080	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.179	0.073	0.118	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.524	0.107	2.350	0.004	0.041	0.038	0.032
	Gasoline	MC	Motorcycles	12.925	2.607	0.660	0.003	0.024	0.021	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.149	0.197	0.094	0.002	0.003	0.003	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.545	0.208	0.168	0.003	0.005	0.004	0.026
Utah	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.497	0.890	0.817	0.006	0.022	0.020	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.473	0.059	0.080	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.357	0.064	0.119	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.540	0.101	2.293	0.004	0.042	0.038	0.032
	Gasoline	MC	Motorcycles	12.221	2.758	0.620	0.003	0.023	0.020	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.007	0.210	0.109	0.002	0.005	0.004	0.024
Vermont	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.380	0.219	0.191	0.003	0.006	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.360	0.823	0.894	0.006	0.026	0.023	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.040	0.081	0.083	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.087	0.085	0.124	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.515	0.115	2.500	0.004	0.041	0.038	0.032
	Gasoline	MC	Motorcycles	12.512	2.546	0.750	0.003	0.022	0.020	0.054
Virgin Islands	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.794	0.195	0.105	0.002	0.006	0.005	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.080	0.187	0.177	0.002	0.007	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.523	0.693	0.799	0.006	0.027	0.024	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.787	0.087	0.080	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.899	0.081	0.116	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.419	0.106	2.285	0.004	0.038	0.035	0.032
Virgin Islands	Gasoline	MC	Motorcycles	12.862	1.926	0.751	0.003	0.024	0.021	0.056
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	4.250	0.311	0.106	0.002	0.004	0.003	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.660	0.282	0.182	0.003	0.005	0.004	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	15.726	1.138	0.833	0.006	0.023	0.020	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	4.227	0.061	0.092	0.001	0.003	0.003	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.784	0.058	0.123	0.001	0.004	0.003	0.008
Virgin Islands	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.494	0.085	1.962	0.004	0.040	0.037	0.031
	Gasoline	MC	Motorcycles	12.880	3.310	0.566	0.003	0.024	0.021	0.055

**Table 5-20. On-Road Vehicle Criteria Pollutant Emission Factors – 2025 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Virginia	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.128	0.198	0.103	0.002	0.004	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.514	0.205	0.182	0.003	0.005	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.212	0.816	0.822	0.006	0.024	0.021	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.096	0.072	0.080	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.117	0.075	0.118	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.502	0.107	2.338	0.004	0.041	0.037	0.032
Washington	Gasoline	MC	Motorcycles	12.399	2.416	0.669	0.003	0.023	0.020	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.107	0.201	0.113	0.002	0.004	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.490	0.211	0.199	0.003	0.006	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.035	0.798	0.859	0.006	0.024	0.021	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.872	0.081	0.080	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.978	0.084	0.120	0.001	0.003	0.003	0.009
West Virginia	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.505	0.115	2.431	0.004	0.041	0.038	0.032
	Gasoline	MC	Motorcycles	12.519	2.292	0.725	0.003	0.022	0.020	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.234	0.202	0.110	0.002	0.005	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.606	0.202	0.191	0.003	0.006	0.005	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.936	0.772	0.810	0.006	0.025	0.022	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.956	0.075	0.079	0.001	0.003	0.002	0.008
Wisconsin	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.013	0.075	0.116	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.458	0.104	2.286	0.004	0.039	0.036	0.032
	Gasoline	MC	Motorcycles	12.983	2.283	0.702	0.003	0.024	0.021	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.234	0.204	0.111	0.002	0.005	0.004	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.547	0.203	0.190	0.003	0.007	0.006	0.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.063	0.735	0.822	0.006	0.026	0.023	0.051
Wyoming	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.874	0.086	0.079	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.954	0.084	0.117	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.458	0.113	2.333	0.004	0.040	0.037	0.032
	Gasoline	MC	Motorcycles	12.592	2.047	0.725	0.003	0.023	0.020	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.302	0.223	0.120	0.002	0.005	0.005	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.617	0.211	0.205	0.002	0.007	0.006	0.026
Wyoming	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.815	0.710	0.827	0.006	0.025	0.022	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.880	0.089	0.083	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.970	0.083	0.120	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.436	0.103	2.379	0.004	0.038	0.035	0.032
	Gasoline	MC	Motorcycles	12.572	2.180	0.783	0.003	0.022	0.020	0.057

Table 5-21. On-Road Vehicle Criteria Pollutant Emission Factors – 2026

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Alabama	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.262	0.182	0.089	0.002	0.004	0.003	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.565	0.186	0.149	0.003	0.005	0.004	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.457	0.777	0.717	0.006	0.022	0.019	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.974	0.057	0.068	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.110	0.055	0.097	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.465	0.089	2.143	0.004	0.034	0.031	0.032
	Gasoline	MC	Motorcycles	12.681	2.640	0.638	0.003	0.024	0.021	0.054
Alaska	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	4.124	0.200	0.098	0.001	0.004	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.375	0.206	0.154	0.001	0.006	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	15.222	0.675	0.658	0.003	0.022	0.019	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.499	0.099	0.069	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.792	0.094	0.100	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.451	0.119	2.343	0.004	0.034	0.031	0.032
	Gasoline	MC	Motorcycles	12.722	1.823	0.701	0.001	0.017	0.015	0.054
Arizona	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.102	0.195	0.084	0.001	0.004	0.003	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.412	0.205	0.143	0.002	0.005	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.020	0.870	0.757	0.004	0.022	0.020	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.203	0.053	0.074	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.285	0.053	0.108	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.517	0.089	2.388	0.004	0.035	0.032	0.032
	Gasoline	MC	Motorcycles	12.515	3.157	0.718	0.002	0.023	0.021	0.054
Arkansas	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.232	0.184	0.093	0.002	0.004	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.544	0.185	0.154	0.003	0.005	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.358	0.752	0.719	0.006	0.023	0.020	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.893	0.060	0.069	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.065	0.057	0.098	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.432	0.088	2.115	0.004	0.033	0.031	0.032
	Gasoline	MC	Motorcycles	12.883	2.503	0.662	0.003	0.024	0.021	0.055
Colorado	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.808	0.190	0.095	0.002	0.005	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.087	0.197	0.155	0.003	0.006	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.277	0.737	0.780	0.006	0.024	0.022	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.655	0.076	0.070	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.911	0.075	0.102	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.458	0.105	2.319	0.004	0.034	0.032	0.032
	Gasoline	MC	Motorcycles	12.372	2.510	0.737	0.003	0.022	0.020	0.055
Connecticut	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.568	0.172	0.081	0.002	0.004	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	2.870	0.190	0.136	0.003	0.006	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.461	0.770	0.765	0.006	0.024	0.021	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.669	0.075	0.069	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.945	0.078	0.102	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.498	0.114	2.308	0.004	0.036	0.033	0.032
	Gasoline	MC	Motorcycles	11.878	2.387	0.672	0.003	0.022	0.019	0.054
Delaware	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.648	0.169	0.081	0.002	0.004	0.003	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	2.903	0.179	0.135	0.003	0.005	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.216	0.765	0.742	0.006	0.023	0.020	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.795	0.067	0.068	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.985	0.067	0.098	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.512	0.106	2.304	0.004	0.036	0.033	0.032
	Gasoline	MC	Motorcycles	11.796	2.349	0.647	0.003	0.022	0.020	0.053
District of Columbia	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.753	0.166	0.076	0.002	0.004	0.003	0.024
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	2.976	0.187	0.126	0.003	0.005	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.667	0.881	0.804	0.007	0.026	0.023	0.053
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.000	0.065	0.067	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.073	0.068	0.096	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.794	0.139	2.791	0.004	0.045	0.041	0.032
	Gasoline	MC	Motorcycles	11.617	2.527	0.587	0.003	0.022	0.020	0.048

Table 5-21. On-Road Vehicle Criteria Pollutant Emission Factors – 2026 (cont.)

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Florida	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.594	0.190	0.083	0.002	0.003	0.003	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.925	0.206	0.143	0.003	0.004	0.004	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.297	0.899	0.734	0.006	0.022	0.019	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.359	0.047	0.068	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.376	0.049	0.098	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.578	0.090	2.190	0.004	0.037	0.034	0.032
Georgia	Gasoline	MC	Motorcycles	12.617	3.029	0.566	0.003	0.024	0.021	0.052
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.031	0.174	0.087	0.002	0.004	0.003	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.353	0.186	0.148	0.003	0.005	0.004	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.606	0.798	0.742	0.006	0.022	0.020	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.944	0.059	0.068	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.104	0.059	0.099	0.001	0.003	0.003	0.009
Hawaii	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.493	0.094	2.204	0.004	0.035	0.032	0.032
	Gasoline	MC	Motorcycles	12.683	2.718	0.639	0.003	0.024	0.021	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.515	0.197	0.083	0.002	0.004	0.003	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.834	0.215	0.142	0.003	0.005	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.285	0.964	0.742	0.006	0.025	0.022	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.157	0.043	0.067	0.001	0.002	0.002	0.008
Idaho	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.235	0.044	0.096	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.557	0.087	2.174	0.004	0.037	0.034	0.032
	Gasoline	MC	Motorcycles	13.257	2.928	0.602	0.003	0.025	0.022	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.943	0.188	0.099	0.002	0.005	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.179	0.184	0.159	0.002	0.006	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.047	0.682	0.750	0.006	0.023	0.020	0.050
Illinois	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.634	0.077	0.071	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.883	0.071	0.101	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.417	0.097	2.264	0.004	0.033	0.030	0.032
	Gasoline	MC	Motorcycles	12.383	2.274	0.760	0.003	0.022	0.020	0.056
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.898	0.179	0.088	0.002	0.005	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.172	0.190	0.145	0.003	0.006	0.006	0.025
Indiana	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.432	0.751	0.747	0.006	0.025	0.022	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.749	0.074	0.069	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.969	0.074	0.100	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.496	0.108	2.302	0.004	0.035	0.032	0.032
	Gasoline	MC	Motorcycles	12.002	2.322	0.666	0.003	0.022	0.020	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.113	0.183	0.095	0.002	0.005	0.004	0.023
Iowa	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.394	0.189	0.156	0.003	0.006	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.368	0.736	0.741	0.006	0.025	0.022	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.719	0.072	0.069	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.941	0.070	0.099	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.459	0.101	2.238	0.004	0.034	0.031	0.032
	Gasoline	MC	Motorcycles	12.706	2.311	0.685	0.003	0.024	0.021	0.054
Kansas	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.144	0.192	0.099	0.002	0.006	0.005	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.393	0.186	0.159	0.002	0.007	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.994	0.684	0.719	0.006	0.026	0.023	0.050
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.634	0.075	0.068	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.875	0.068	0.097	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.401	0.096	2.150	0.004	0.033	0.030	0.032
Kansas	Gasoline	MC	Motorcycles	12.906	2.127	0.712	0.003	0.024	0.021	0.056
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.195	0.190	0.098	0.002	0.005	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.504	0.190	0.160	0.002	0.006	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.331	0.725	0.729	0.006	0.024	0.021	0.050
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.781	0.069	0.070	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.998	0.065	0.099	0.001	0.003	0.003	0.008
Kansas	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.420	0.092	2.153	0.004	0.033	0.030	0.032
	Gasoline	MC	Motorcycles	12.886	2.397	0.695	0.003	0.024	0.022	0.056

Table 5-21. On-Road Vehicle Criteria Pollutant Emission Factors – 2026 (cont.)

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Kentucky	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.149	0.183	0.095	0.002	0.004	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.461	0.183	0.156	0.003	0.006	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.383	0.720	0.712	0.006	0.022	0.020	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.778	0.067	0.069	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.997	0.063	0.099	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.425	0.090	2.152	0.004	0.033	0.030	0.032
Louisiana	Gasoline	MC	Motorcycles	12.625	2.358	0.682	0.003	0.024	0.021	0.056
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.309	0.184	0.085	0.002	0.003	0.003	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.640	0.191	0.144	0.003	0.005	0.004	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.820	0.812	0.712	0.006	0.021	0.019	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.142	0.053	0.069	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.242	0.052	0.098	0.001	0.003	0.003	0.009
Maine	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.478	0.086	2.103	0.004	0.034	0.031	0.032
	Gasoline	MC	Motorcycles	12.688	2.785	0.610	0.003	0.024	0.021	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.890	0.181	0.095	0.002	0.005	0.005	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.088	0.173	0.152	0.002	0.007	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.605	0.634	0.701	0.006	0.024	0.021	0.050
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.481	0.080	0.069	0.001	0.002	0.002	0.008
Maryland	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.773	0.072	0.097	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.379	0.097	2.154	0.004	0.032	0.030	0.032
	Gasoline	MC	Motorcycles	12.197	1.909	0.735	0.003	0.023	0.020	0.056
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.695	0.172	0.082	0.002	0.004	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	2.978	0.186	0.137	0.003	0.006	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.455	0.776	0.755	0.006	0.023	0.020	0.051
Massachusetts	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.784	0.068	0.069	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.011	0.070	0.101	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.499	0.106	2.281	0.004	0.035	0.033	0.032
	Gasoline	MC	Motorcycles	11.955	2.449	0.658	0.003	0.022	0.020	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.629	0.173	0.086	0.002	0.004	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	2.910	0.193	0.142	0.003	0.006	0.006	0.025
Michigan	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.518	0.788	0.781	0.006	0.025	0.022	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.677	0.077	0.069	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.937	0.081	0.101	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.546	0.123	2.407	0.004	0.037	0.034	0.032
	Gasoline	MC	Motorcycles	11.836	2.393	0.664	0.003	0.022	0.019	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.158	0.189	0.099	0.002	0.005	0.005	0.023
Minnesota	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.442	0.197	0.162	0.003	0.007	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.329	0.736	0.759	0.006	0.027	0.024	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.647	0.078	0.069	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.892	0.076	0.099	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.465	0.109	2.274	0.004	0.035	0.032	0.032
	Gasoline	MC	Motorcycles	12.805	2.228	0.701	0.003	0.024	0.021	0.054
Mississippi	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.281	0.194	0.102	0.002	0.005	0.005	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.535	0.196	0.164	0.003	0.007	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.442	0.691	0.752	0.006	0.026	0.023	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.577	0.082	0.069	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.844	0.078	0.098	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.422	0.108	2.212	0.004	0.034	0.031	0.032
Missouri	Gasoline	MC	Motorcycles	12.798	2.094	0.730	0.003	0.024	0.021	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.233	0.180	0.089	0.002	0.004	0.003	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.540	0.177	0.147	0.003	0.005	0.004	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.252	0.744	0.691	0.006	0.021	0.018	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.952	0.055	0.068	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.099	0.052	0.096	0.001	0.003	0.003	0.009
Montana	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.421	0.083	2.056	0.004	0.033	0.030	0.032
	Gasoline	MC	Motorcycles	12.710	2.527	0.645	0.003	0.024	0.021	0.056

Table 5-21. On-Road Vehicle Criteria Pollutant Emission Factors – 2026 (cont.)

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Missouri	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.985	0.184	0.092	0.002	0.005	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.324	0.189	0.152	0.003	0.006	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.464	0.725	0.722	0.006	0.023	0.020	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.778	0.069	0.070	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.024	0.067	0.101	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.420	0.091	2.138	0.004	0.032	0.030	0.032
Montana	Gasoline	MC	Motorcycles	12.498	2.388	0.685	0.003	0.023	0.021	0.057
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.067	0.195	0.105	0.002	0.005	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.285	0.183	0.166	0.002	0.006	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.819	0.637	0.726	0.006	0.023	0.021	0.050
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.538	0.082	0.070	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.817	0.072	0.099	0.001	0.003	0.003	0.009
Nebraska	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.381	0.095	2.206	0.004	0.032	0.029	0.032
	Gasoline	MC	Motorcycles	12.415	2.074	0.776	0.003	0.022	0.020	0.057
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.180	0.195	0.101	0.002	0.005	0.005	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.462	0.191	0.162	0.002	0.007	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.221	0.697	0.727	0.006	0.025	0.023	0.050
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.685	0.075	0.070	0.001	0.002	0.002	0.008
Nevada	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.926	0.069	0.099	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.407	0.094	2.167	0.004	0.032	0.030	0.032
	Gasoline	MC	Motorcycles	12.924	2.273	0.718	0.003	0.024	0.021	0.056
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.943	0.205	0.089	0.002	0.005	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.228	0.215	0.149	0.003	0.007	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.156	0.909	0.836	0.006	0.027	0.024	0.051
New Hampshire	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.983	0.060	0.073	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.133	0.061	0.107	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.514	0.097	2.433	0.004	0.035	0.033	0.032
	Gasoline	MC	Motorcycles	13.179	3.088	0.743	0.003	0.025	0.022	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.565	0.171	0.083	0.002	0.005	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	2.809	0.175	0.136	0.003	0.007	0.006	0.025
New Jersey	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.993	0.689	0.732	0.006	0.024	0.022	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.575	0.079	0.069	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.850	0.075	0.099	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.426	0.105	2.222	0.004	0.034	0.031	0.032
	Gasoline	MC	Motorcycles	12.118	2.117	0.711	0.003	0.023	0.020	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.625	0.171	0.080	0.002	0.004	0.004	0.023
New Mexico	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	2.916	0.190	0.135	0.003	0.006	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.581	0.797	0.774	0.006	0.024	0.021	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.772	0.071	0.069	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.004	0.074	0.101	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.542	0.115	2.370	0.004	0.037	0.034	0.032
	Gasoline	MC	Motorcycles	11.830	2.480	0.653	0.003	0.022	0.019	0.053
New York	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.026	0.193	0.097	0.002	0.004	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.303	0.188	0.159	0.003	0.006	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.232	0.735	0.761	0.006	0.023	0.021	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.765	0.065	0.071	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.972	0.061	0.102	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.426	0.089	2.263	0.004	0.033	0.030	0.032
New York	Gasoline	MC	Motorcycles	12.885	2.652	0.753	0.003	0.024	0.021	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.594	0.170	0.083	0.002	0.005	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	2.854	0.183	0.136	0.003	0.006	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.374	0.753	0.764	0.006	0.025	0.022	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.668	0.075	0.069	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.927	0.076	0.100	0.001	0.003	0.003	0.009
New York	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.490	0.111	2.306	0.004	0.035	0.033	0.032
	Gasoline	MC	Motorcycles	12.234	2.304	0.682	0.003	0.023	0.020	0.054

Table 5-21. On-Road Vehicle Criteria Pollutant Emission Factors – 2026 (cont.)

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
North Carolina	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.906	0.174	0.088	0.002	0.004	0.003	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.222	0.182	0.149	0.003	0.005	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.434	0.770	0.738	0.006	0.022	0.020	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.851	0.062	0.069	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.039	0.061	0.099	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.470	0.094	2.197	0.004	0.034	0.032	0.032
North Dakota	Gasoline	MC	Motorcycles	12.699	2.588	0.658	0.003	0.024	0.021	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.320	0.199	0.105	0.002	0.006	0.005	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.502	0.188	0.164	0.002	0.008	0.007	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.168	0.635	0.722	0.006	0.026	0.023	0.050
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.515	0.086	0.069	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.793	0.075	0.097	0.001	0.003	0.003	0.008
Ohio	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.375	0.099	2.161	0.004	0.032	0.030	0.032
	Gasoline	MC	Motorcycles	12.821	1.928	0.764	0.003	0.024	0.021	0.056
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.061	0.184	0.095	0.002	0.005	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.372	0.194	0.157	0.003	0.007	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.492	0.749	0.755	0.006	0.025	0.022	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.692	0.074	0.069	0.001	0.003	0.002	0.008
Oklahoma	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.940	0.073	0.100	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.459	0.104	2.239	0.004	0.034	0.032	0.032
	Gasoline	MC	Motorcycles	12.876	2.378	0.691	0.003	0.024	0.021	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.227	0.187	0.094	0.002	0.004	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.540	0.187	0.155	0.003	0.005	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.319	0.747	0.724	0.006	0.023	0.020	0.051
Oregon	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.877	0.061	0.069	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.056	0.058	0.098	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.424	0.089	2.120	0.004	0.033	0.030	0.032
	Gasoline	MC	Motorcycles	12.893	2.527	0.676	0.003	0.024	0.021	0.056
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.727	0.173	0.092	0.002	0.004	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	2.966	0.177	0.149	0.003	0.005	0.005	0.025
Pacific Islands	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.949	0.713	0.752	0.006	0.023	0.020	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.594	0.071	0.069	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.853	0.069	0.099	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.449	0.101	2.275	0.004	0.034	0.031	0.032
	Gasoline	MC	Motorcycles	12.346	2.250	0.726	0.003	0.022	0.020	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.885	0.174	0.087	0.002	0.004	0.003	0.023
Pennsylvania	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.178	0.183	0.145	0.002	0.005	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.327	0.755	0.731	0.006	0.022	0.020	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.788	0.064	0.069	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.000	0.064	0.100	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.470	0.097	2.232	0.004	0.034	0.032	0.032
	Gasoline	MC	Motorcycles	12.411	2.488	0.674	0.002	0.023	0.020	0.054
Puerto Rico	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.777	0.170	0.087	0.002	0.005	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.049	0.180	0.143	0.003	0.006	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.396	0.735	0.748	0.006	0.024	0.022	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.706	0.073	0.069	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.944	0.072	0.100	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.465	0.102	2.257	0.004	0.034	0.032	0.032
Puerto Rico	Gasoline	MC	Motorcycles	12.537	2.331	0.687	0.003	0.023	0.021	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.698	0.155	0.073	0.002	0.003	0.002	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.067	0.178	0.128	0.003	0.004	0.003	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.803	0.832	0.662	0.006	0.020	0.018	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.483	0.036	0.061	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.479	0.039	0.091	0.001	0.003	0.003	0.008
Puerto Rico	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.593	0.088	2.082	0.004	0.037	0.034	0.032
	Gasoline	MC	Motorcycles	12.604	2.705	0.538	0.003	0.024	0.021	0.053

Table 5-21. On-Road Vehicle Criteria Pollutant Emission Factors – 2026 (cont.)

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Rhode Island	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.608	0.173	0.082	0.002	0.004	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	2.913	0.190	0.138	0.003	0.006	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.420	0.770	0.764	0.006	0.024	0.021	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.670	0.075	0.069	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.934	0.078	0.101	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.511	0.114	2.338	0.004	0.036	0.033	0.032
South Carolina	Gasoline	MC	Motorcycles	11.853	2.367	0.667	0.003	0.022	0.019	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.242	0.182	0.090	0.002	0.004	0.003	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.552	0.184	0.151	0.003	0.005	0.004	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.469	0.766	0.716	0.006	0.022	0.019	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.949	0.057	0.069	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.100	0.055	0.098	0.001	0.003	0.003	0.009
South Dakota	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.455	0.087	2.143	0.004	0.034	0.031	0.032
	Gasoline	MC	Motorcycles	12.693	2.595	0.647	0.003	0.024	0.021	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.255	0.192	0.104	0.002	0.005	0.005	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.500	0.183	0.165	0.002	0.007	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.377	0.643	0.717	0.006	0.024	0.021	0.050
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.591	0.081	0.070	0.001	0.002	0.002	0.008
Tennessee	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.865	0.072	0.099	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.379	0.093	2.150	0.004	0.032	0.029	0.032
	Gasoline	MC	Motorcycles	12.834	2.079	0.755	0.003	0.024	0.021	0.057
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.220	0.184	0.093	0.002	0.004	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.542	0.193	0.156	0.003	0.005	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.587	0.778	0.742	0.006	0.023	0.020	0.051
Texas	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.866	0.063	0.069	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.053	0.063	0.099	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.474	0.095	2.208	0.004	0.034	0.032	0.032
	Gasoline	MC	Motorcycles	12.782	2.602	0.658	0.003	0.024	0.021	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.970	0.173	0.080	0.002	0.003	0.003	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.279	0.184	0.136	0.003	0.005	0.004	0.025
Utah	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.506	0.805	0.724	0.006	0.021	0.018	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.109	0.053	0.069	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.223	0.054	0.100	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.490	0.089	2.156	0.004	0.035	0.032	0.032
	Gasoline	MC	Motorcycles	12.085	2.748	0.618	0.003	0.023	0.020	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.838	0.189	0.094	0.002	0.005	0.004	0.023
Vermont	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.135	0.197	0.155	0.003	0.006	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.453	0.749	0.793	0.006	0.024	0.021	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.722	0.075	0.072	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.965	0.075	0.104	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.465	0.104	2.348	0.004	0.034	0.031	0.032
	Gasoline	MC	Motorcycles	12.374	2.545	0.748	0.003	0.022	0.020	0.055
Virgin Islands	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.605	0.175	0.088	0.002	0.006	0.005	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	2.819	0.167	0.139	0.002	0.007	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.759	0.632	0.707	0.006	0.025	0.022	0.050
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.496	0.081	0.069	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.789	0.072	0.097	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.372	0.095	2.140	0.004	0.032	0.029	0.032
Virgin Islands	Gasoline	MC	Motorcycles	12.720	1.922	0.749	0.003	0.024	0.021	0.057
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	4.013	0.273	0.092	0.002	0.004	0.003	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.318	0.250	0.149	0.003	0.005	0.004	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.475	1.021	0.741	0.006	0.021	0.019	0.050
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.784	0.053	0.080	0.001	0.003	0.003	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.626	0.047	0.104	0.001	0.004	0.003	0.008
Virgin Islands	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.446	0.074	1.845	0.004	0.033	0.031	0.031
	Gasoline	MC	Motorcycles	12.739	3.286	0.564	0.003	0.024	0.021	0.055



Table 5-21. On-Road Vehicle Criteria Pollutant Emission Factors – 2026 (cont.)

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Virginia	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.957	0.176	0.090	0.002	0.004	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.257	0.184	0.149	0.003	0.005	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.294	0.740	0.728	0.006	0.022	0.020	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.772	0.066	0.069	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.994	0.065	0.099	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.453	0.095	2.196	0.004	0.034	0.031	0.032
Washington	Gasoline	MC	Motorcycles	12.260	2.409	0.667	0.003	0.023	0.020	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.942	0.181	0.099	0.002	0.004	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.241	0.190	0.164	0.003	0.006	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.163	0.724	0.763	0.006	0.023	0.020	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.572	0.075	0.069	0.001	0.003	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.860	0.074	0.100	0.001	0.003	0.003	0.009
West Virginia	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.456	0.104	2.284	0.004	0.034	0.031	0.032
	Gasoline	MC	Motorcycles	12.379	2.288	0.723	0.003	0.022	0.020	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.061	0.181	0.096	0.002	0.004	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.348	0.180	0.157	0.002	0.006	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.090	0.702	0.718	0.006	0.023	0.021	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.647	0.070	0.069	0.001	0.002	0.002	0.008
Wisconsin	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.897	0.065	0.098	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.410	0.094	2.144	0.004	0.033	0.030	0.032
	Gasoline	MC	Motorcycles	12.840	2.279	0.700	0.003	0.024	0.021	0.056
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.052	0.184	0.097	0.002	0.005	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.284	0.183	0.155	0.002	0.007	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.186	0.669	0.729	0.006	0.025	0.022	0.051
Wyoming	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.574	0.080	0.069	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.840	0.074	0.098	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.411	0.102	2.190	0.004	0.033	0.031	0.032
	Gasoline	MC	Motorcycles	12.449	2.043	0.723	0.003	0.023	0.020	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.131	0.203	0.106	0.002	0.005	0.005	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.368	0.191	0.169	0.002	0.007	0.006	0.025
Wyoming	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.055	0.648	0.732	0.006	0.024	0.021	0.050
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.579	0.084	0.071	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.856	0.074	0.101	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.388	0.093	2.226	0.004	0.032	0.029	0.032
	Gasoline	MC	Motorcycles	12.432	2.181	0.781	0.003	0.022	0.020	0.057

Table 5-22. On-Road Vehicle Criteria Pollutant Emission Factors – 2027

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Alabama	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.090	0.175	0.082	0.002	0.004	0.003	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.399	0.175	0.132	0.003	0.005	0.004	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.627	0.743	0.638	0.006	0.021	0.018	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.621	0.051	0.057	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.049	0.049	0.087	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.421	0.079	2.023	0.004	0.029	0.026	0.032
	Gasoline	MC	Motorcycles	12.550	2.629	0.636	0.003	0.024	0.021	0.055
Alaska	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.923	0.193	0.091	0.001	0.004	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.168	0.196	0.137	0.001	0.006	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	14.103	0.643	0.587	0.003	0.021	0.018	0.050
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.204	0.093	0.058	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.739	0.089	0.089	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.408	0.110	2.211	0.004	0.028	0.026	0.032
	Gasoline	MC	Motorcycles	12.557	1.820	0.699	0.001	0.017	0.015	0.055
Arizona	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.938	0.187	0.076	0.001	0.004	0.003	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.249	0.193	0.126	0.002	0.005	0.004	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.099	0.829	0.673	0.004	0.021	0.019	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.822	0.047	0.062	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.217	0.047	0.096	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.472	0.079	2.256	0.004	0.029	0.027	0.032
	Gasoline	MC	Motorcycles	12.385	3.140	0.717	0.002	0.023	0.021	0.054
Arkansas	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.062	0.177	0.085	0.002	0.004	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.382	0.175	0.136	0.002	0.005	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.582	0.718	0.640	0.006	0.022	0.019	0.050
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.550	0.055	0.057	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.006	0.052	0.087	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.389	0.079	1.994	0.004	0.028	0.026	0.032
	Gasoline	MC	Motorcycles	12.751	2.493	0.660	0.003	0.024	0.021	0.056
Colorado	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.665	0.183	0.087	0.002	0.005	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	2.945	0.188	0.138	0.002	0.006	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.495	0.704	0.696	0.006	0.023	0.021	0.050
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.341	0.070	0.059	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.855	0.069	0.091	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.415	0.095	2.190	0.004	0.029	0.026	0.032
	Gasoline	MC	Motorcycles	12.244	2.503	0.735	0.003	0.022	0.020	0.055
Connecticut	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.436	0.166	0.075	0.002	0.004	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	2.732	0.181	0.121	0.003	0.006	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.603	0.735	0.683	0.006	0.023	0.020	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.353	0.069	0.058	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.887	0.072	0.091	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.455	0.104	2.183	0.004	0.030	0.027	0.032
	Gasoline	MC	Motorcycles	11.751	2.379	0.670	0.003	0.022	0.019	0.054
Delaware	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.510	0.162	0.074	0.002	0.004	0.003	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	2.762	0.170	0.120	0.003	0.005	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.346	0.730	0.661	0.006	0.022	0.019	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.464	0.061	0.057	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.926	0.061	0.087	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.468	0.096	2.181	0.004	0.030	0.028	0.032
	Gasoline	MC	Motorcycles	11.670	2.339	0.645	0.003	0.022	0.020	0.053
District of Columbia	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.608	0.160	0.070	0.002	0.004	0.003	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	2.827	0.178	0.111	0.003	0.005	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.601	0.839	0.717	0.007	0.025	0.022	0.053
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.643	0.059	0.055	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.006	0.062	0.085	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.747	0.125	2.664	0.004	0.038	0.035	0.032
	Gasoline	MC	Motorcycles	11.493	2.516	0.586	0.003	0.022	0.020	0.048

Table 5-22. On-Road Vehicle Criteria Pollutant Emission Factors – 2027 (cont.)

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Florida	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.402	0.182	0.076	0.002	0.003	0.003	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.739	0.194	0.125	0.003	0.004	0.004	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.312	0.858	0.655	0.006	0.021	0.018	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.959	0.041	0.056	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.304	0.042	0.087	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.532	0.080	2.074	0.004	0.031	0.028	0.032
Georgia	Gasoline	MC	Motorcycles	12.487	3.013	0.564	0.003	0.024	0.021	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.871	0.167	0.080	0.002	0.004	0.003	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.196	0.176	0.130	0.003	0.005	0.004	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.749	0.762	0.661	0.006	0.021	0.019	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.595	0.053	0.057	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.041	0.053	0.088	0.001	0.003	0.003	0.009
Hawaii	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.449	0.085	2.083	0.004	0.029	0.027	0.032
	Gasoline	MC	Motorcycles	12.552	2.707	0.637	0.003	0.024	0.021	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.328	0.188	0.076	0.002	0.004	0.003	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.656	0.203	0.125	0.003	0.005	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.334	0.922	0.663	0.006	0.023	0.021	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.782	0.037	0.056	0.001	0.002	0.002	0.008
Idaho	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.167	0.038	0.086	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.513	0.077	2.061	0.004	0.031	0.028	0.032
	Gasoline	MC	Motorcycles	13.124	2.912	0.600	0.003	0.025	0.022	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.793	0.182	0.091	0.002	0.005	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.034	0.175	0.141	0.002	0.006	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.325	0.652	0.667	0.006	0.022	0.020	0.050
Illinois	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.323	0.072	0.059	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.829	0.066	0.090	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.374	0.088	2.133	0.004	0.027	0.025	0.032
	Gasoline	MC	Motorcycles	12.254	2.268	0.758	0.003	0.022	0.020	0.056
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.749	0.172	0.081	0.002	0.004	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.021	0.180	0.128	0.003	0.006	0.005	0.025
Indiana	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.583	0.717	0.666	0.006	0.023	0.021	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.423	0.068	0.057	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.910	0.068	0.089	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.452	0.098	2.176	0.004	0.029	0.027	0.032
	Gasoline	MC	Motorcycles	11.874	2.314	0.664	0.003	0.022	0.020	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.952	0.176	0.087	0.002	0.005	0.004	0.023
Iowa	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.237	0.179	0.138	0.002	0.006	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.570	0.703	0.661	0.006	0.024	0.021	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.397	0.067	0.057	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.884	0.064	0.088	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.415	0.092	2.112	0.004	0.029	0.026	0.032
	Gasoline	MC	Motorcycles	12.574	2.303	0.683	0.003	0.024	0.021	0.055
Kansas	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.983	0.185	0.091	0.002	0.005	0.005	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.241	0.177	0.141	0.002	0.007	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.280	0.653	0.640	0.006	0.025	0.022	0.050
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.322	0.070	0.057	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.822	0.063	0.086	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.359	0.087	2.026	0.004	0.027	0.025	0.032
Kansas	Gasoline	MC	Motorcycles	12.774	2.120	0.710	0.003	0.024	0.022	0.056
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.029	0.183	0.089	0.002	0.005	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.345	0.180	0.142	0.002	0.006	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.588	0.693	0.650	0.006	0.023	0.021	0.050
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.452	0.063	0.058	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.940	0.059	0.089	0.001	0.003	0.003	0.008
Kansas	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.377	0.083	2.028	0.004	0.027	0.025	0.032
	Gasoline	MC	Motorcycles	12.754	2.388	0.693	0.003	0.024	0.022	0.056

Table 5-22. On-Road Vehicle Criteria Pollutant Emission Factors – 2027 (cont.)

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Kentucky	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.984	0.176	0.087	0.002	0.004	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.301	0.173	0.138	0.002	0.006	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.630	0.688	0.634	0.006	0.021	0.019	0.050
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.449	0.061	0.058	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.940	0.058	0.088	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.381	0.081	2.026	0.004	0.027	0.025	0.032
Louisiana	Gasoline	MC	Motorcycles	12.493	2.350	0.680	0.003	0.024	0.021	0.056
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.134	0.177	0.078	0.002	0.003	0.003	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.469	0.180	0.127	0.003	0.005	0.004	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.959	0.776	0.635	0.006	0.020	0.018	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.769	0.047	0.057	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.177	0.046	0.087	0.001	0.003	0.003	0.009
Maine	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.434	0.076	1.985	0.004	0.028	0.026	0.032
	Gasoline	MC	Motorcycles	12.557	2.772	0.608	0.003	0.024	0.021	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.744	0.175	0.088	0.002	0.005	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	2.948	0.165	0.135	0.002	0.006	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	10.909	0.605	0.623	0.006	0.023	0.020	0.050
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.188	0.075	0.057	0.001	0.002	0.002	0.008
Maryland	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.724	0.066	0.086	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.337	0.088	2.029	0.004	0.027	0.025	0.032
	Gasoline	MC	Motorcycles	12.068	1.903	0.733	0.003	0.023	0.020	0.057
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.555	0.165	0.075	0.002	0.004	0.003	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	2.835	0.177	0.122	0.003	0.005	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.592	0.741	0.674	0.006	0.022	0.019	0.051
Massachusetts	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.454	0.062	0.058	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.951	0.064	0.090	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.455	0.096	2.157	0.004	0.030	0.027	0.032
	Gasoline	MC	Motorcycles	11.827	2.440	0.656	0.003	0.022	0.020	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.453	0.165	0.075	0.002	0.004	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	2.734	0.183	0.121	0.003	0.006	0.006	0.025
Michigan	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.623	0.752	0.697	0.006	0.024	0.021	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.360	0.071	0.057	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.878	0.074	0.090	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.502	0.112	2.281	0.004	0.031	0.029	0.032
	Gasoline	MC	Motorcycles	11.710	2.386	0.662	0.003	0.022	0.019	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.996	0.182	0.091	0.002	0.005	0.005	0.023
Minnesota	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.283	0.187	0.144	0.002	0.007	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.526	0.702	0.677	0.006	0.026	0.023	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.334	0.072	0.057	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.836	0.070	0.088	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.422	0.099	2.149	0.004	0.029	0.027	0.032
	Gasoline	MC	Motorcycles	12.672	2.221	0.699	0.003	0.024	0.021	0.054
Mississippi	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.117	0.187	0.094	0.002	0.005	0.005	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.375	0.187	0.146	0.002	0.007	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.649	0.660	0.671	0.006	0.025	0.022	0.050
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.272	0.076	0.057	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.791	0.072	0.088	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.380	0.099	2.088	0.004	0.028	0.026	0.032
Missouri	Gasoline	MC	Motorcycles	12.664	2.088	0.729	0.003	0.024	0.021	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.062	0.172	0.081	0.002	0.003	0.003	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.377	0.167	0.130	0.002	0.005	0.004	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.466	0.712	0.614	0.006	0.020	0.017	0.050
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.602	0.049	0.057	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.040	0.046	0.086	0.001	0.003	0.003	0.009
Montana	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.378	0.074	1.938	0.004	0.028	0.025	0.032
	Gasoline	MC	Motorcycles	12.578	2.516	0.643	0.003	0.024	0.021	0.056

Table 5-22. On-Road Vehicle Criteria Pollutant Emission Factors – 2027 (cont.)

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Missouri	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.830	0.177	0.084	0.002	0.004	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.171	0.179	0.135	0.002	0.006	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.717	0.693	0.644	0.006	0.022	0.019	0.050
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.450	0.064	0.059	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.966	0.061	0.090	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.377	0.083	2.013	0.004	0.027	0.025	0.032
Montana	Gasoline	MC	Motorcycles	12.368	2.379	0.683	0.003	0.023	0.021	0.057
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.912	0.188	0.096	0.002	0.005	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.138	0.174	0.147	0.002	0.006	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.148	0.609	0.645	0.006	0.022	0.020	0.050
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.238	0.076	0.059	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.766	0.067	0.089	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.339	0.086	2.076	0.004	0.027	0.024	0.032
Nebraska	Gasoline	MC	Motorcycles	12.285	2.068	0.774	0.003	0.022	0.020	0.057
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.017	0.187	0.092	0.002	0.005	0.005	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.306	0.181	0.144	0.002	0.007	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.508	0.666	0.647	0.006	0.024	0.022	0.050
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.368	0.069	0.058	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.871	0.064	0.088	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.364	0.085	2.040	0.004	0.027	0.025	0.032
Nevada	Gasoline	MC	Motorcycles	12.791	2.266	0.716	0.003	0.024	0.022	0.056
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.790	0.197	0.082	0.002	0.005	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.078	0.204	0.132	0.003	0.007	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	12.283	0.868	0.746	0.006	0.026	0.023	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.629	0.055	0.061	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.069	0.055	0.095	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.469	0.087	2.300	0.004	0.030	0.027	0.032
New Hampshire	Gasoline	MC	Motorcycles	13.047	3.075	0.741	0.003	0.025	0.022	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.436	0.165	0.077	0.002	0.005	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	2.679	0.167	0.121	0.002	0.006	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.225	0.658	0.652	0.006	0.023	0.021	0.050
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.270	0.073	0.058	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.796	0.070	0.088	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.384	0.095	2.097	0.004	0.028	0.026	0.032
New Jersey	Gasoline	MC	Motorcycles	11.989	2.111	0.710	0.003	0.023	0.020	0.056
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.490	0.165	0.074	0.002	0.004	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	2.775	0.181	0.119	0.003	0.006	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.681	0.761	0.691	0.006	0.023	0.020	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.444	0.065	0.058	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.944	0.068	0.090	0.001	0.003	0.003	0.009
New Mexico	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.498	0.104	2.245	0.004	0.031	0.028	0.032
	Gasoline	MC	Motorcycles	11.704	2.471	0.651	0.003	0.022	0.019	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.869	0.186	0.089	0.002	0.004	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.152	0.179	0.141	0.002	0.006	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.494	0.701	0.676	0.006	0.022	0.020	0.050
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.438	0.060	0.060	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.916	0.055	0.091	0.001	0.003	0.003	0.009
New York	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.383	0.080	2.132	0.004	0.028	0.025	0.032
	Gasoline	MC	Motorcycles	12.753	2.643	0.751	0.003	0.024	0.021	0.056
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.462	0.164	0.076	0.002	0.005	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	2.719	0.175	0.121	0.003	0.006	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.542	0.718	0.682	0.006	0.024	0.021	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.352	0.070	0.058	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.869	0.071	0.090	0.001	0.003	0.003	0.009
New York	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.447	0.101	2.181	0.004	0.030	0.027	0.032
	Gasoline	MC	Motorcycles	12.106	2.297	0.680	0.003	0.023	0.020	0.054

Table 5-22. On-Road Vehicle Criteria Pollutant Emission Factors – 2027 (cont.)

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
North Carolina	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.755	0.167	0.081	0.002	0.004	0.003	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.069	0.172	0.131	0.003	0.005	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.612	0.736	0.658	0.006	0.021	0.019	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.513	0.056	0.057	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.980	0.055	0.088	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.426	0.085	2.075	0.004	0.029	0.026	0.032
North Dakota	Gasoline	MC	Motorcycles	12.567	2.578	0.656	0.003	0.024	0.021	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.156	0.193	0.097	0.002	0.006	0.005	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.347	0.179	0.146	0.002	0.008	0.007	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.448	0.606	0.642	0.006	0.025	0.022	0.050
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.218	0.080	0.057	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.743	0.070	0.087	0.001	0.003	0.003	0.008
Ohio	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.333	0.091	2.035	0.004	0.027	0.025	0.032
	Gasoline	MC	Motorcycles	12.685	1.922	0.762	0.003	0.024	0.021	0.057
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.903	0.177	0.088	0.002	0.005	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.216	0.184	0.139	0.002	0.007	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.691	0.715	0.674	0.006	0.024	0.022	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.373	0.068	0.058	0.001	0.002	0.002	0.008
Oklahoma	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.883	0.067	0.089	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.416	0.094	2.114	0.004	0.029	0.026	0.032
	Gasoline	MC	Motorcycles	12.743	2.370	0.689	0.003	0.024	0.021	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.058	0.180	0.086	0.002	0.004	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.378	0.176	0.137	0.002	0.005	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.549	0.714	0.644	0.006	0.022	0.019	0.050
Oregon	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.536	0.055	0.058	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.998	0.052	0.088	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.381	0.079	1.998	0.004	0.028	0.025	0.032
	Gasoline	MC	Motorcycles	12.761	2.516	0.674	0.003	0.024	0.021	0.056
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.586	0.167	0.084	0.002	0.004	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	2.828	0.168	0.132	0.002	0.005	0.005	0.025
Pacific Islands	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.193	0.682	0.671	0.006	0.021	0.019	0.050
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.288	0.066	0.057	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.799	0.063	0.088	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.406	0.091	2.148	0.004	0.029	0.026	0.032
	Gasoline	MC	Motorcycles	12.218	2.243	0.724	0.003	0.022	0.020	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.733	0.167	0.080	0.002	0.004	0.003	0.023
Pennsylvania	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.027	0.173	0.128	0.002	0.005	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.508	0.721	0.652	0.006	0.021	0.019	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.458	0.059	0.058	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.941	0.058	0.089	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.426	0.087	2.107	0.004	0.029	0.026	0.032
	Gasoline	MC	Motorcycles	12.281	2.479	0.672	0.002	0.023	0.020	0.055
Puerto Rico	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.634	0.164	0.080	0.002	0.004	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	2.906	0.170	0.127	0.003	0.006	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.598	0.702	0.667	0.006	0.023	0.021	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.386	0.068	0.058	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.887	0.066	0.089	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.421	0.093	2.130	0.004	0.029	0.026	0.032
Puerto Rico	Gasoline	MC	Motorcycles	12.406	2.324	0.685	0.003	0.023	0.021	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.499	0.148	0.066	0.002	0.003	0.002	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.874	0.167	0.112	0.003	0.004	0.003	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.845	0.796	0.589	0.006	0.019	0.017	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.068	0.031	0.051	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.404	0.033	0.080	0.001	0.003	0.003	0.008
Puerto Rico	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.547	0.077	1.970	0.004	0.031	0.029	0.032
	Gasoline	MC	Motorcycles	12.473	2.689	0.537	0.003	0.024	0.021	0.053

Table 5-22. On-Road Vehicle Criteria Pollutant Emission Factors – 2027 (cont.)

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Rhode Island	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.474	0.167	0.076	0.002	0.004	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	2.773	0.181	0.122	0.003	0.006	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.559	0.735	0.682	0.006	0.023	0.020	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.354	0.069	0.057	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.876	0.072	0.090	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.467	0.104	2.212	0.004	0.030	0.028	0.032
South Carolina	Gasoline	MC	Motorcycles	11.726	2.360	0.666	0.003	0.022	0.019	0.054
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.070	0.174	0.083	0.002	0.004	0.003	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.387	0.174	0.133	0.003	0.005	0.004	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.661	0.733	0.637	0.006	0.020	0.018	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.599	0.052	0.057	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.039	0.050	0.087	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.412	0.078	2.022	0.004	0.028	0.026	0.032
South Dakota	Gasoline	MC	Motorcycles	12.561	2.584	0.645	0.003	0.024	0.021	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.091	0.186	0.096	0.002	0.005	0.005	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.343	0.174	0.147	0.002	0.007	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.672	0.615	0.638	0.006	0.023	0.020	0.050
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.285	0.075	0.058	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.813	0.066	0.088	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.337	0.084	2.022	0.004	0.026	0.024	0.032
Tennessee	Gasoline	MC	Motorcycles	12.699	2.073	0.753	0.003	0.024	0.021	0.057
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.051	0.177	0.085	0.002	0.004	0.003	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.377	0.182	0.138	0.003	0.005	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.761	0.743	0.662	0.006	0.022	0.019	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.526	0.058	0.057	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.993	0.057	0.088	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.430	0.086	2.085	0.004	0.029	0.026	0.032
Texas	Gasoline	MC	Motorcycles	12.650	2.592	0.657	0.003	0.024	0.021	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.812	0.165	0.073	0.002	0.003	0.003	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.123	0.173	0.120	0.003	0.004	0.004	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.643	0.768	0.645	0.006	0.020	0.017	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.740	0.048	0.058	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.158	0.048	0.089	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.446	0.079	2.037	0.004	0.029	0.027	0.032
Utah	Gasoline	MC	Motorcycles	11.959	2.734	0.616	0.003	0.023	0.020	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.693	0.182	0.086	0.002	0.004	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	2.990	0.188	0.137	0.002	0.006	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.661	0.715	0.708	0.006	0.023	0.020	0.050
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.400	0.070	0.060	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.906	0.069	0.093	0.001	0.003	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.422	0.095	2.217	0.004	0.029	0.026	0.032
Vermont	Gasoline	MC	Motorcycles	12.245	2.537	0.746	0.003	0.022	0.020	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.475	0.169	0.081	0.002	0.006	0.005	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	2.691	0.159	0.124	0.002	0.007	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.089	0.603	0.629	0.006	0.024	0.021	0.050
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.201	0.076	0.057	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.740	0.066	0.087	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.330	0.087	2.013	0.004	0.027	0.024	0.032
Virgin Islands	Gasoline	MC	Motorcycles	12.588	1.916	0.747	0.003	0.024	0.021	0.057
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	3.797	0.261	0.084	0.002	0.004	0.003	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	4.116	0.235	0.132	0.003	0.005	0.004	0.024
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	13.386	0.975	0.662	0.006	0.020	0.018	0.050
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	3.336	0.046	0.068	0.001	0.003	0.003	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	2.552	0.041	0.093	0.001	0.004	0.003	0.008
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.404	0.065	1.743	0.004	0.028	0.026	0.031
Virgin Islands	Gasoline	MC	Motorcycles	12.608	3.262	0.563	0.003	0.024	0.021	0.056

**Table 5-22. On-Road Vehicle Criteria Pollutant Emission Factors – 2027 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Virginia	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.802	0.170	0.082	0.002	0.004	0.003	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.104	0.174	0.132	0.002	0.005	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.494	0.707	0.649	0.006	0.021	0.019	0.051
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.444	0.060	0.058	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.936	0.059	0.089	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.410	0.086	2.072	0.004	0.028	0.026	0.032
Washington	Gasoline	MC	Motorcycles	12.131	2.400	0.666	0.003	0.023	0.020	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.790	0.174	0.091	0.002	0.004	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.092	0.180	0.145	0.002	0.006	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.400	0.692	0.681	0.006	0.022	0.019	0.050
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.268	0.069	0.058	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.805	0.068	0.090	0.001	0.003	0.003	0.009
West Virginia	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.413	0.095	2.156	0.004	0.029	0.026	0.032
	Gasoline	MC	Motorcycles	12.250	2.282	0.721	0.003	0.022	0.020	0.055
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.902	0.174	0.088	0.002	0.004	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.195	0.171	0.139	0.002	0.006	0.005	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.351	0.671	0.639	0.006	0.022	0.020	0.050
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.334	0.064	0.057	0.001	0.002	0.002	0.008
Wisconsin	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.844	0.060	0.087	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.367	0.085	2.021	0.004	0.027	0.025	0.032
	Gasoline	MC	Motorcycles	12.707	2.272	0.699	0.003	0.024	0.021	0.056
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.897	0.177	0.089	0.002	0.005	0.004	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.133	0.174	0.137	0.002	0.007	0.006	0.025
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.421	0.639	0.649	0.006	0.024	0.021	0.050
Wyoming	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.269	0.074	0.057	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.788	0.068	0.087	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.369	0.093	2.065	0.004	0.028	0.025	0.032
	Gasoline	MC	Motorcycles	12.317	2.037	0.722	0.003	0.023	0.020	0.056
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	2.974	0.196	0.098	0.002	0.005	0.005	0.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	3.218	0.182	0.150	0.002	0.007	0.006	0.025
Wyoming	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	11.388	0.619	0.651	0.006	0.023	0.020	0.050
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	2.274	0.078	0.060	0.001	0.002	0.002	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	1.804	0.069	0.090	0.001	0.003	0.003	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.345	0.085	2.093	0.004	0.026	0.024	0.032
	Gasoline	MC	Motorcycles	12.301	2.176	0.779	0.003	0.022	0.020	0.057



**Table 5-23. On-Road Vehicle Speciated GHG Emission Factors – 2023**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
Alabama	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0149	0.0049	318.851	320.689
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0182	0.0073	410.136	412.764
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0676	0.0296	897.763	908.274
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0372	0.0007	330.632	331.761
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0264	0.0010	371.734	372.677
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0233	0.0031	1301.778	1303.269
Alaska	Gasoline	MC	Motorcycles	0.1092	0.0029	388.136	391.719
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0203	0.0049	313.951	315.912
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0233	0.0073	404.171	406.933
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0731	0.0296	890.679	901.306
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0624	0.0007	321.153	322.906
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0502	0.0009	362.128	363.661
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0414	0.0029	1325.492	1327.401
Arizona	Gasoline	MC	Motorcycles	0.0887	0.0029	390.634	393.716
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0140	0.0050	324.960	326.809
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0172	0.0078	419.031	421.783
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0775	0.0317	911.371	922.742
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0350	0.0007	337.674	338.751
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0253	0.0010	380.587	381.516
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0223	0.0032	1311.924	1313.432
Arkansas	Gasoline	MC	Motorcycles	0.1215	0.0031	388.600	392.585
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0160	0.0049	313.796	315.645
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0191	0.0071	404.711	407.310
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0683	0.0287	884.895	895.158
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0394	0.0006	325.055	326.231
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0280	0.0009	366.552	367.525
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0241	0.0029	1302.589	1304.060
Colorado	Gasoline	MC	Motorcycles	0.1102	0.0027	389.175	392.740
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0172	0.0050	312.311	314.216
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0201	0.0076	403.709	406.473
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0768	0.0308	886.984	898.071
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0490	0.0007	321.893	323.311
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0385	0.0010	364.116	365.360
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0325	0.0031	1300.996	1302.730
Connecticut	Gasoline	MC	Motorcycles	0.1148	0.0029	389.984	393.724
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0152	0.0051	316.880	318.780
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0187	0.0083	411.842	414.767
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0808	0.0335	894.919	906.915
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0482	0.0007	326.772	328.179
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0400	0.0010	371.715	373.020
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0358	0.0034	1285.029	1286.934
Delaware	Gasoline	MC	Motorcycles	0.1239	0.0031	390.597	394.617
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0148	0.0050	322.134	324.001
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0183	0.0078	414.457	417.222
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0777	0.0318	910.624	922.040
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0435	0.0007	332.935	334.231
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0334	0.0010	374.584	375.727
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0309	0.0034	1289.401	1291.183

**Table 5-23. On-Road Vehicle Speciated GHG Emission Factors – 2023 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
District of Columbia	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0151	0.0052	345.282	347.213
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0182	0.0084	441.659	444.624
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0941	0.0362	988.821	1001.962
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0421	0.0008	357.044	358.345
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0337	0.0013	398.978	400.192
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0392	0.0047	1288.577	1290.944
	Gasoline	MC	Motorcycles	0.1401	0.0038	381.401	386.031
Florida	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0146	0.0051	334.045	335.925
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0185	0.0080	429.693	432.542
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0752	0.0330	933.502	945.200
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0316	0.0007	347.372	348.376
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0222	0.0011	390.523	391.395
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0206	0.0035	1303.613	1305.163
	Gasoline	MC	Motorcycles	0.1159	0.0032	386.862	390.724
Georgia	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0143	0.0050	320.469	322.318
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0179	0.0077	413.384	416.128
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0715	0.0314	902.670	913.802
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0385	0.0007	332.110	333.276
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0286	0.0010	374.577	375.589
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0254	0.0032	1297.564	1299.158
	Gasoline	MC	Motorcycles	0.1116	0.0030	388.571	392.253
Hawaii	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0176	0.0050	326.295	328.227
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0221	0.0079	420.243	423.139
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0936	0.0326	919.933	931.971
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0291	0.0007	339.495	340.431
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0198	0.0010	382.128	382.932
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0185	0.0036	1273.444	1274.979
	Gasoline	MC	Motorcycles	0.1404	0.0032	386.462	390.916
Idaho	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0176	0.0049	308.298	310.180
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0200	0.0070	397.407	399.995
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0685	0.0282	877.012	887.104
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0497	0.0006	317.633	319.059
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0367	0.0009	358.328	359.509
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0300	0.0028	1318.464	1320.045
	Gasoline	MC	Motorcycles	0.1062	0.0027	390.256	393.714
Illinois	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0169	0.0050	319.422	321.344
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0204	0.0078	412.085	414.922
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0769	0.0318	903.228	914.625
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0475	0.0007	329.480	330.873
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0376	0.0010	371.854	373.092
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0331	0.0032	1305.116	1306.907
	Gasoline	MC	Motorcycles	0.1172	0.0031	388.992	392.834
Indiana	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0173	0.0050	315.615	317.524
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0205	0.0074	406.489	409.215
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0730	0.0301	893.074	903.862
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0467	0.0007	325.645	327.010
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0354	0.0010	366.896	368.068
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0306	0.0030	1307.599	1309.271
	Gasoline	MC	Motorcycles	0.1129	0.0029	389.105	392.790

**Table 5-23. On-Road Vehicle Speciated GHG Emission Factors – 2023 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
Iowa	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0191	0.0048	308.580	310.480
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0214	0.0068	397.363	399.921
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0694	0.0274	875.832	885.716
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0484	0.0006	317.930	319.324
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0348	0.0009	358.319	359.453
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0293	0.0028	1302.531	1304.103
	Gasoline	MC	Motorcycles	0.1090	0.0026	389.150	392.653
Kansas	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0176	0.0049	308.996	310.881
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0206	0.0071	399.413	402.049
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0704	0.0286	875.959	886.225
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0445	0.0006	319.286	320.581
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0326	0.0009	361.055	362.133
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0270	0.0028	1311.487	1313.003
	Gasoline	MC	Motorcycles	0.1118	0.0027	390.473	394.067
Kentucky	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0163	0.0049	310.818	312.693
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0194	0.0072	401.590	404.220
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0669	0.0287	878.901	889.121
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0436	0.0006	321.290	322.567
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0317	0.0009	363.123	364.184
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0260	0.0028	1324.857	1326.332
	Gasoline	MC	Motorcycles	0.1087	0.0027	390.991	394.511
Louisiana	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0141	0.0050	321.767	323.602
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0175	0.0075	414.707	417.379
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0681	0.0303	901.024	911.747
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0351	0.0007	334.137	335.213
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0247	0.0010	376.417	377.321
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0216	0.0030	1310.736	1312.180
	Gasoline	MC	Motorcycles	0.1095	0.0029	389.011	392.610
Maine	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0185	0.0048	304.474	306.350
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0205	0.0067	392.816	395.317
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0669	0.0268	866.941	876.595
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0514	0.0006	313.122	314.589
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0369	0.0009	353.781	354.963
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0305	0.0028	1299.322	1300.907
	Gasoline	MC	Motorcycles	0.1114	0.0025	389.684	393.217
Maryland	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0150	0.0051	318.912	320.797
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0186	0.0081	413.097	415.959
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0778	0.0327	899.457	911.142
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0443	0.0007	329.559	330.869
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0352	0.0010	373.489	374.673
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0314	0.0033	1290.789	1292.567
	Gasoline	MC	Motorcycles	0.1221	0.0031	389.640	393.605
Massachusetts	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0162	0.0051	321.893	323.830
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0204	0.0084	417.513	420.519
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0850	0.0344	911.748	924.117
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0494	0.0007	331.726	333.172
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0416	0.0011	376.495	377.854
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0390	0.0036	1284.771	1286.825
	Gasoline	MC	Motorcycles	0.1279	0.0033	389.020	393.190

**Table 5-23. On-Road Vehicle Speciated GHG Emission Factors – 2023 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
Michigan	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0191	0.0050	315.681	317.635
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0226	0.0075	406.826	409.634
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0777	0.0307	894.063	905.135
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0498	0.0007	325.131	326.577
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0390	0.0010	366.642	367.906
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0343	0.0032	1295.648	1297.448
Minnesota	Gasoline	MC	Motorcycles	0.1176	0.0029	388.887	392.702
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0195	0.0049	311.006	312.940
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0223	0.0072	401.020	403.721
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0713	0.0292	880.795	891.272
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0525	0.0006	319.694	321.197
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0403	0.0009	360.916	362.199
Mississippi	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0350	0.0030	1286.187	1287.965
	Gasoline	MC	Motorcycles	0.1046	0.0028	389.236	392.673
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0145	0.0048	313.067	314.858
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0174	0.0069	403.507	405.991
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0627	0.0278	883.115	892.951
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0363	0.0006	324.779	325.875
Missouri	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0247	0.0009	365.856	366.741
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0216	0.0029	1297.943	1299.339
	Gasoline	MC	Motorcycles	0.1053	0.0026	388.520	391.938
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0165	0.0050	309.089	310.981
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0198	0.0075	401.387	404.105
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0700	0.0296	871.682	882.237
Montana	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0450	0.0006	319.344	320.653
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0339	0.0009	362.929	364.044
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0270	0.0028	1321.835	1323.338
	Gasoline	MC	Motorcycles	0.1107	0.0027	392.739	396.305
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0193	0.0047	302.621	304.512
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0211	0.0066	390.710	393.205
Nebraska	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0654	0.0264	864.216	873.707
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0524	0.0006	311.185	312.671
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0375	0.0008	351.867	353.053
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0298	0.0026	1317.535	1319.068
	Gasoline	MC	Motorcycles	0.1029	0.0025	390.712	394.027
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0188	0.0048	307.117	309.021
Nevada	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0214	0.0070	396.622	399.224
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0695	0.0278	872.431	882.445
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0482	0.0006	316.601	317.988
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0353	0.0009	357.849	358.989
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0286	0.0027	1316.591	1318.124
	Gasoline	MC	Motorcycles	0.1089	0.0026	390.648	394.152
Nevada	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0168	0.0050	321.959	323.880
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0206	0.0079	415.445	418.300
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0914	0.0320	908.231	920.046
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0396	0.0007	333.690	334.884
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0300	0.0010	376.475	377.525
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0265	0.0032	1308.334	1309.962
Nevada	Gasoline	MC	Motorcycles	0.1351	0.0031	388.671	392.968

**Table 5-23. On-Road Vehicle Speciated GHG Emission Factors – 2023 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
New Hampshire	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0164	0.0049	311.149	313.023
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0192	0.0073	401.743	404.409
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0728	0.0296	880.663	891.298
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0506	0.0007	320.267	321.725
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0389	0.0009	361.985	363.235
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0330	0.0030	1294.665	1296.385
	Gasoline	MC	Motorcycles	0.1156	0.0028	389.882	393.598
New Jersey	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0151	0.0051	322.304	324.212
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0191	0.0084	417.990	420.954
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0827	0.0342	910.800	923.047
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0459	0.0007	332.792	334.149
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0378	0.0011	377.618	378.880
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0349	0.0036	1287.908	1289.841
	Gasoline	MC	Motorcycles	0.1269	0.0032	389.145	393.281
New Mexico	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0162	0.0049	311.882	313.742
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0190	0.0071	401.848	404.427
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0685	0.0284	882.811	892.964
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0425	0.0006	322.500	323.752
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0303	0.0009	363.389	364.419
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0252	0.0028	1316.557	1318.030
	Gasoline	MC	Motorcycles	0.1103	0.0027	389.621	393.183
New York	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0152	0.0051	317.669	319.559
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0178	0.0080	411.178	414.004
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0789	0.0325	897.859	909.491
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0486	0.0007	327.481	328.899
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0393	0.0010	370.923	372.206
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0348	0.0033	1295.552	1297.401
	Gasoline	MC	Motorcycles	0.1204	0.0031	389.779	393.700
North Carolina	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0143	0.0050	317.067	318.906
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0177	0.0076	409.059	411.753
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0700	0.0307	894.889	905.765
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0402	0.0007	328.276	329.481
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0299	0.0010	370.353	371.389
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0261	0.0031	1299.272	1300.853
	Gasoline	MC	Motorcycles	0.1101	0.0029	388.966	392.587
North Dakota	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0206	0.0047	303.418	305.324
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0221	0.0065	391.013	393.499
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0658	0.0262	865.603	875.033
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0545	0.0006	311.394	312.934
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0391	0.0008	351.609	352.836
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0321	0.0027	1301.326	1302.937
	Gasoline	MC	Motorcycles	0.1004	0.0025	389.554	392.807
Ohio	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0172	0.0050	314.286	316.203
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0207	0.0077	406.365	409.164
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0743	0.0310	888.829	899.903
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0476	0.0007	324.152	325.538
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0373	0.0010	366.746	367.964
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0319	0.0031	1303.154	1304.871
	Gasoline	MC	Motorcycles	0.1124	0.0029	390.156	393.833

**Table 5-23. On-Road Vehicle Speciated GHG Emission Factors – 2023 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
Oklahoma	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0161	0.0049	312.551	314.398
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0192	0.0071	403.416	406.002
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0679	0.0285	881.665	891.848
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0400	0.0006	323.674	324.862
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0284	0.0009	365.309	366.290
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0244	0.0029	1298.710	1300.184
	Gasoline	MC	Motorcycles	0.1095	0.0027	389.267	392.803
Oregon	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0160	0.0049	311.488	313.353
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0190	0.0074	401.396	404.065
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0724	0.0299	887.237	897.954
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0461	0.0007	321.522	322.871
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0349	0.0010	362.424	363.580
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0303	0.0031	1301.084	1302.752
	Gasoline	MC	Motorcycles	0.1129	0.0029	389.000	392.681
Pacific Islands	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0150	0.0050	315.754	317.612
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0183	0.0076	407.744	410.471
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0723	0.0309	893.170	904.170
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0419	0.0007	326.664	327.910
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0317	0.0010	368.931	370.012
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0280	0.0031	1301.626	1303.243
	Gasoline	MC	Motorcycles	0.1140	0.0029	389.335	393.059
Pennsylvania	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0157	0.0050	316.516	318.406
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0189	0.0077	408.521	411.273
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0737	0.0309	893.717	904.749
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0473	0.0007	326.494	327.877
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0366	0.0010	368.698	369.905
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0311	0.0031	1313.193	1314.878
	Gasoline	MC	Motorcycles	0.1139	0.0029	389.979	393.701
Puerto Rico	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0131	0.0041	335.151	336.713
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0170	0.0067	433.196	435.608
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0670	0.0277	933.940	943.875
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0241	0.0007	348.977	349.782
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0165	0.0010	394.199	394.914
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0181	0.0034	1290.234	1291.694
	Gasoline	MC	Motorcycles	0.1155	0.0031	387.286	391.100
Rhode Island	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0155	0.0051	318.959	320.868
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0187	0.0082	413.478	416.385
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0814	0.0334	902.183	914.153
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0485	0.0007	328.856	330.275
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0399	0.0010	373.051	374.358
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0358	0.0034	1292.871	1294.780
	Gasoline	MC	Motorcycles	0.1253	0.0031	389.772	393.839
South Carolina	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0150	0.0049	317.261	319.104
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0182	0.0073	408.493	411.115
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0667	0.0294	893.678	904.091
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0378	0.0007	328.893	330.035
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0268	0.0009	370.167	371.118
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0232	0.0029	1313.102	1314.560
	Gasoline	MC	Motorcycles	0.1084	0.0028	388.980	392.531

**Table 5-23. On-Road Vehicle Speciated GHG Emission Factors – 2023 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
South Dakota	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0186	0.0048	302.164	304.044
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0205	0.0067	391.049	393.545
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0630	0.0264	861.225	870.671
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0518	0.0006	310.813	312.280
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0371	0.0008	352.314	353.485
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0289	0.0026	1323.550	1325.045
	Gasoline	MC	Motorcycles	0.0991	0.0025	391.669	394.879
Tennessee	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0160	0.0050	317.998	319.887
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0195	0.0076	410.327	413.086
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0715	0.0308	896.572	907.541
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0414	0.0007	329.084	330.319
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0311	0.0010	371.355	372.421
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0268	0.0031	1308.137	1309.727
	Gasoline	MC	Motorcycles	0.1117	0.0029	389.368	393.036
Texas	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0139	0.0050	321.791	323.624
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0172	0.0077	415.371	418.084
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0729	0.0311	901.878	912.969
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0354	0.0007	334.117	335.202
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0256	0.0010	377.042	377.973
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0226	0.0032	1295.131	1296.645
	Gasoline	MC	Motorcycles	0.1188	0.0029	388.755	392.602
Utah	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0169	0.0050	313.665	315.572
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0201	0.0077	405.815	408.610
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0764	0.0311	888.884	900.048
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0486	0.0007	323.473	324.881
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0384	0.0010	366.202	367.445
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0323	0.0031	1310.453	1312.171
	Gasoline	MC	Motorcycles	0.1134	0.0029	390.529	394.241
Vermont	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0172	0.0047	303.206	305.046
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0189	0.0066	391.813	394.258
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0656	0.0264	863.141	872.647
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0519	0.0006	311.720	313.195
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0370	0.0009	352.842	354.021
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0300	0.0027	1305.968	1307.515
	Gasoline	MC	Motorcycles	0.1062	0.0025	390.376	393.762
Virgin Islands	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0160	0.0069	328.368	330.811
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0190	0.0093	420.096	423.328
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0767	0.0374	902.617	915.664
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0368	0.0007	342.616	343.745
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0214	0.0010	382.790	383.613
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0151	0.0034	1256.697	1258.083
	Gasoline	MC	Motorcycles	0.1047	0.0028	385.741	389.198
Virginia	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0156	0.0050	314.883	316.759
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0189	0.0076	406.881	409.604
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0710	0.0305	888.470	899.310
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0430	0.0007	325.556	326.828
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0324	0.0010	367.984	369.079
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0275	0.0030	1306.889	1308.475
	Gasoline	MC	Motorcycles	0.1146	0.0029	390.048	393.763

**Table 5-23. On-Road Vehicle Speciated GHG Emission Factors – 2023 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
Washington	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0171	0.0050	310.984	312.901
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0207	0.0077	402.554	405.368
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0730	0.0311	884.577	895.668
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0482	0.0007	320.745	322.145
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0380	0.0010	363.308	364.544
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0323	0.0031	1306.791	1308.513
	Gasoline	MC	Motorcycles	0.1100	0.0029	390.633	394.256
West Virginia	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0166	0.0049	308.917	310.779
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0195	0.0071	398.909	401.501
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0666	0.0284	875.541	885.658
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0450	0.0006	318.923	320.237
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0328	0.0009	360.330	361.420
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0276	0.0029	1300.856	1302.401
	Gasoline	MC	Motorcycles	0.1070	0.0027	389.810	393.276
Wisconsin	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0181	0.0048	309.105	310.997
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0206	0.0070	398.503	401.116
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0686	0.0284	876.932	887.109
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0510	0.0006	318.034	319.498
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0382	0.0009	358.950	360.174
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0323	0.0029	1296.658	1298.332
	Gasoline	MC	Motorcycles	0.1056	0.0027	389.516	392.956
Wyoming	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0197	0.0048	303.306	305.229
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0216	0.0068	392.165	394.716
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0660	0.0267	863.883	873.489
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0534	0.0006	311.789	313.299
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0385	0.0008	353.119	354.330
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0293	0.0026	1333.724	1335.224
	Gasoline	MC	Motorcycles	0.1028	0.0025	392.213	395.526



Table 5-24. On-Road Vehicle Speciated GHG Emission Factors – 2024

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
Alabama	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0136	0.0047	311.246	312.984
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0163	0.0069	401.515	403.962
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0640	0.0279	904.830	914.740
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0136	0.0047	311.246	312.984
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0262	0.0010	362.812	363.754
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0226	0.0031	1270.989	1272.465
Alaska	Gasoline	MC	Motorcycles	0.1077	0.0029	388.265	391.811
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0188	0.0047	306.616	308.471
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0212	0.0069	395.855	398.432
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0692	0.0279	897.999	908.019
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0617	0.0007	310.378	312.114
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0506	0.0009	353.469	355.014
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0410	0.0029	1294.010	1295.911
Arizona	Gasoline	MC	Motorcycles	0.0873	0.0029	390.770	393.819
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0128	0.0048	317.186	318.936
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0155	0.0073	410.214	412.782
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0738	0.0299	918.590	929.329
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0339	0.0007	326.251	327.300
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0251	0.0010	371.496	372.421
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0216	0.0032	1280.872	1282.364
Arkansas	Gasoline	MC	Motorcycles	0.1215	0.0031	388.727	392.676
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0146	0.0047	306.330	308.080
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0171	0.0067	396.218	398.641
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0648	0.0271	891.796	901.471
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0384	0.0006	314.077	315.228
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0279	0.0009	357.720	358.693
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0235	0.0029	1271.725	1273.182
Colorado	Gasoline	MC	Motorcycles	0.1088	0.0027	389.306	392.835
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0160	0.0047	304.938	306.744
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0184	0.0071	395.326	397.911
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0730	0.0290	894.342	904.809
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0481	0.0007	311.051	312.446
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0386	0.0010	355.385	356.633
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0320	0.0031	1270.164	1271.887
Connecticut	Gasoline	MC	Motorcycles	0.1132	0.0029	390.117	393.819
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0141	0.0049	309.390	311.191
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0170	0.0078	403.305	406.040
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0768	0.0316	902.463	913.797
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0472	0.0007	315.778	317.162
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0401	0.0010	362.870	364.179
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0352	0.0034	1254.652	1256.545
Delaware	Gasoline	MC	Motorcycles	0.1224	0.0031	390.730	394.711
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0136	0.0048	314.480	316.246
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0164	0.0073	405.797	408.373
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0737	0.0300	918.180	928.956
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0425	0.0007	321.709	322.981
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0335	0.0010	365.667	366.811
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0303	0.0034	1259.025	1260.793

**Table 5-24. On-Road Vehicle Speciated GHG Emission Factors – 2024 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
District of Columbia	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0137	0.0050	337.034	338.856
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0165	0.0079	432.401	435.167
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0893	0.0342	997.870	1010.291
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0411	0.0008	344.998	346.274
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0337	0.0013	389.687	390.901
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0385	0.0047	1258.787	1261.137
Florida	Gasoline	MC	Motorcycles	0.1383	0.0038	381.521	386.106
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0132	0.0049	326.033	327.807
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0165	0.0075	420.631	423.283
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0713	0.0311	940.955	951.996
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0304	0.0007	335.620	336.595
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0220	0.0011	381.263	382.129
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0198	0.0035	1272.903	1274.436
Georgia	Gasoline	MC	Motorcycles	0.1144	0.0032	386.988	390.811
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0130	0.0048	312.832	314.580
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0160	0.0072	404.718	407.275
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0677	0.0296	909.962	920.465
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0375	0.0007	320.895	322.035
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0286	0.0010	365.624	366.634
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0247	0.0032	1266.894	1268.473
Hawaii	Gasoline	MC	Motorcycles	0.1100	0.0030	388.700	392.345
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0161	0.0048	318.466	320.290
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0199	0.0074	411.377	414.075
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0891	0.0308	927.536	938.915
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0279	0.0007	327.998	328.904
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0195	0.0010	373.024	373.822
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0177	0.0036	1243.593	1245.110
Idaho	Gasoline	MC	Motorcycles	0.1386	0.0032	386.588	390.998
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0162	0.0046	301.027	302.810
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0182	0.0066	389.133	391.549
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0650	0.0265	884.013	893.526
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0488	0.0006	306.933	308.337
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0368	0.0009	349.677	350.863
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0294	0.0028	1287.139	1288.708
Illinois	Gasoline	MC	Motorcycles	0.1048	0.0027	390.390	393.812
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0155	0.0048	311.863	313.680
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0184	0.0073	403.512	406.158
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0730	0.0300	910.697	921.452
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0466	0.0007	318.384	319.753
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0377	0.0010	362.991	364.232
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0326	0.0032	1274.232	1276.012
Indiana	Gasoline	MC	Motorcycles	0.1157	0.0031	389.122	392.927
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0159	0.0047	308.146	309.952
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0186	0.0070	398.015	400.558
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0692	0.0284	900.304	910.477
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0457	0.0007	314.673	316.015
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0355	0.0010	358.105	359.279
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0300	0.0031	1276.620	1278.279
Indiana	Gasoline	MC	Motorcycles	0.1114	0.0029	389.237	392.884

**Table 5-24. On-Road Vehicle Speciated GHG Emission Factors – 2024 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
Iowa	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0176	0.0046	301.298	303.098
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0194	0.0064	389.075	391.461
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0658	0.0258	882.740	892.054
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0475	0.0006	307.221	308.594
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0350	0.0009	349.667	350.804
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0287	0.0028	1271.656	1273.215
	Gasoline	MC	Motorcycles	0.1075	0.0026	389.283	392.750
Kansas	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0162	0.0046	301.680	303.465
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0187	0.0067	391.072	393.532
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0668	0.0269	882.891	892.571
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0435	0.0006	308.513	309.784
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0326	0.0009	352.332	353.412
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0264	0.0028	1280.336	1281.840
	Gasoline	MC	Motorcycles	0.1103	0.0027	390.606	394.164
Kentucky	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0150	0.0047	303.453	305.228
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0175	0.0068	393.195	395.648
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0634	0.0270	885.751	895.382
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0426	0.0006	310.456	311.709
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0317	0.0009	354.362	355.424
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0254	0.0028	1293.351	1294.813
	Gasoline	MC	Motorcycles	0.1072	0.0027	391.124	394.608
Louisiana	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0128	0.0048	314.079	315.815
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0157	0.0070	405.980	408.469
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0645	0.0286	907.996	918.107
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0340	0.0007	322.841	323.888
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0245	0.0010	367.394	368.295
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0209	0.0030	1279.688	1281.117
	Gasoline	MC	Motorcycles	0.1080	0.0029	389.141	392.702
Maine	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0171	0.0045	297.311	299.089
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0186	0.0063	384.639	386.972
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0635	0.0252	873.794	882.890
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0506	0.0006	302.589	304.036
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0371	0.0009	345.222	346.409
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0300	0.0028	1268.505	1270.078
	Gasoline	MC	Motorcycles	0.1099	0.0025	389.818	393.315
Maryland	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0137	0.0048	311.347	313.131
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0167	0.0076	404.491	407.162
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0739	0.0309	906.907	917.942
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0433	0.0007	318.455	319.740
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0353	0.0010	364.590	365.775
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0308	0.0033	1260.280	1262.044
	Gasoline	MC	Motorcycles	0.1205	0.0031	389.771	393.697
Massachusetts	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0149	0.0049	314.282	316.114
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0183	0.0079	408.862	411.665
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0807	0.0325	919.607	931.297
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0485	0.0007	320.568	321.991
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0418	0.0011	367.586	368.950
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0385	0.0036	1254.501	1256.543
	Gasoline	MC	Motorcycles	0.1263	0.0033	389.151	393.281

**Table 5-24. On-Road Vehicle Speciated GHG Emission Factors – 2024 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
Michigan	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0176	0.0047	308.229	310.077
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0205	0.0071	398.373	400.993
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0737	0.0289	901.436	911.883
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0490	0.0007	314.189	315.612
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0391	0.0010	357.876	359.145
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0338	0.0032	1265.012	1266.801
Minnesota	Gasoline	MC	Motorcycles	0.1160	0.0029	389.019	392.795
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0180	0.0046	303.690	305.521
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0203	0.0068	392.703	395.225
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0676	0.0275	887.959	897.841
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0517	0.0006	308.944	310.426
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0405	0.0009	352.250	353.539
Mississippi	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0345	0.0030	1255.779	1257.547
	Gasoline	MC	Motorcycles	0.1032	0.0028	389.369	392.771
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0132	0.0046	305.601	307.296
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0156	0.0065	395.012	397.325
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0594	0.0261	889.908	899.174
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0353	0.0006	313.797	314.866
Missouri	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0246	0.0009	357.019	357.902
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0209	0.0029	1267.219	1268.599
	Gasoline	MC	Motorcycles	0.1038	0.0026	388.650	392.033
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0152	0.0047	301.779	303.571
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0179	0.0070	393.023	395.560
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0665	0.0279	878.492	888.446
Montana	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0440	0.0006	308.584	309.868
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0340	0.0009	354.173	355.289
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0264	0.0028	1290.361	1291.851
	Gasoline	MC	Motorcycles	0.1093	0.0027	392.874	396.404
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0179	0.0045	295.510	297.303
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0192	0.0062	382.583	384.913
Nebraska	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0620	0.0248	871.017	879.959
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0516	0.0006	300.711	302.176
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0377	0.0008	343.329	344.520
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0293	0.0026	1286.209	1287.730
	Gasoline	MC	Motorcycles	0.1015	0.0025	390.848	394.128
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0173	0.0046	299.871	301.675
Nevada	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0194	0.0065	388.359	390.788
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0659	0.0262	879.314	888.753
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0473	0.0006	305.933	307.297
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0354	0.0009	349.194	350.337
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0280	0.0028	1285.300	1286.821
	Gasoline	MC	Motorcycles	0.1074	0.0026	390.782	394.249
Nevada	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0154	0.0048	314.286	316.104
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0186	0.0074	406.740	409.403
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0870	0.0302	915.637	926.799
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0386	0.0007	322.419	323.587
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0299	0.0010	367.490	368.539
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0258	0.0033	1277.371	1278.985
Nevada	Gasoline	MC	Motorcycles	0.1334	0.0031	388.799	393.055

**Table 5-24. On-Road Vehicle Speciated GHG Emission Factors – 2024 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
New Hampshire	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0151	0.0047	303.816	305.590
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0173	0.0069	393.400	395.886
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0691	0.0279	887.794	897.825
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0497	0.0007	309.495	310.931
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0390	0.0009	353.294	354.549
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0325	0.0030	1264.000	1265.708
	Gasoline	MC	Motorcycles	0.1141	0.0028	390.016	393.694
New Jersey	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0139	0.0049	314.664	316.470
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0172	0.0078	409.301	412.067
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0786	0.0323	918.541	930.113
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0449	0.0007	321.586	322.918
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0379	0.0011	368.668	369.933
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0344	0.0036	1257.532	1259.452
	Gasoline	MC	Motorcycles	0.1253	0.0032	389.276	393.372
New Mexico	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0149	0.0047	304.482	306.242
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0171	0.0066	393.433	395.837
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0650	0.0267	889.720	899.288
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0415	0.0006	311.620	312.848
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0303	0.0009	354.627	355.657
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0246	0.0028	1285.302	1286.762
	Gasoline	MC	Motorcycles	0.1088	0.0027	389.752	393.278
New York	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0141	0.0048	310.160	311.952
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0163	0.0075	402.643	405.286
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0749	0.0306	905.341	916.325
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0476	0.0007	316.462	317.857
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0394	0.0010	362.088	363.375
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0343	0.0033	1264.904	1266.741
	Gasoline	MC	Motorcycles	0.1188	0.0031	389.912	393.793
North Carolina	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0130	0.0047	309.525	311.263
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0158	0.0071	400.493	403.004
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0663	0.0289	902.099	912.357
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0392	0.0007	317.196	318.375
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0298	0.0010	361.478	362.513
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0254	0.0031	1268.524	1270.091
	Gasoline	MC	Motorcycles	0.1086	0.0029	389.097	392.681
North Dakota	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0191	0.0045	296.305	298.111
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0202	0.0061	382.895	385.215
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0623	0.0246	872.463	881.347
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0538	0.0006	300.922	302.442
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0393	0.0008	343.088	344.321
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0316	0.0027	1270.459	1272.059
	Gasoline	MC	Motorcycles	0.0990	0.0025	389.689	392.907
Ohio	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0158	0.0048	306.857	308.671
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0187	0.0072	397.915	400.527
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0705	0.0292	896.091	906.539
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0467	0.0007	313.237	314.600
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0374	0.0010	357.964	359.185
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0314	0.0031	1272.261	1273.967
	Gasoline	MC	Motorcycles	0.1109	0.0029	390.288	393.928

**Table 5-24. On-Road Vehicle Speciated GHG Emission Factors – 2024 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
Oklahoma	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0148	0.0046	305.120	306.867
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0173	0.0066	394.954	397.364
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0644	0.0268	888.534	898.134
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0390	0.0006	312.744	313.906
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0284	0.0009	356.499	357.480
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0238	0.0029	1267.945	1269.405
Oregon	Gasoline	MC	Motorcycles	0.1081	0.0027	389.398	392.898
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0147	0.0047	304.113	305.878
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0171	0.0069	393.024	395.514
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0687	0.0282	894.567	904.677
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0452	0.0007	310.683	312.009
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0350	0.0010	353.718	354.876
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0297	0.0031	1270.267	1271.923
Pacific Islands	Gasoline	MC	Motorcycles	0.1114	0.0029	389.133	392.776
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0137	0.0048	308.253	310.011
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0165	0.0072	399.221	401.765
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0686	0.0292	900.442	910.822
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0409	0.0007	315.643	316.863
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0317	0.0010	360.090	361.171
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0273	0.0031	1270.799	1272.402
Pennsylvania	Gasoline	MC	Motorcycles	0.1125	0.0029	389.466	393.153
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0145	0.0048	309.029	310.818
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0170	0.0072	400.017	402.584
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0699	0.0291	900.942	911.348
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0464	0.0007	315.503	316.862
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0367	0.0010	359.880	361.091
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0305	0.0031	1282.042	1283.716
Puerto Rico	Gasoline	MC	Motorcycles	0.1124	0.0029	390.112	393.795
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0118	0.0039	327.053	328.522
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0151	0.0063	423.995	426.233
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0634	0.0262	941.376	950.750
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0231	0.0007	337.099	337.878
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0162	0.0010	384.798	385.507
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0173	0.0034	1259.861	1261.303
Rhode Island	Gasoline	MC	Motorcycles	0.1139	0.0031	387.410	391.184
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0143	0.0049	311.417	313.226
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0171	0.0077	404.900	407.620
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0773	0.0315	909.805	921.113
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0476	0.0007	317.791	319.187
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0401	0.0010	364.187	365.498
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0353	0.0034	1262.311	1264.209
South Carolina	Gasoline	MC	Motorcycles	0.1237	0.0031	389.904	393.932
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0136	0.0047	309.701	311.443
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0163	0.0068	399.912	402.355
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0632	0.0277	900.656	910.471
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0368	0.0007	317.782	318.898
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0267	0.0009	361.270	362.219
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0225	0.0030	1281.973	1283.416
South Carolina	Gasoline	MC	Motorcycles	0.1070	0.0028	389.110	392.624

**Table 5-24. On-Road Vehicle Speciated GHG Emission Factors – 2024 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
South Dakota	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0172	0.0045	295.066	296.848
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0187	0.0063	382.917	385.248
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0597	0.0249	867.923	876.819
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0509	0.0006	300.353	301.799
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0372	0.0008	343.757	344.933
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0284	0.0026	1292.047	1293.531
	Gasoline	MC	Motorcycles	0.0977	0.0025	391.805	394.981
Tennessee	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0146	0.0048	310.440	312.226
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0176	0.0072	401.743	404.315
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0678	0.0291	903.765	914.113
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0404	0.0007	317.981	319.191
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0310	0.0010	362.463	363.529
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0262	0.0031	1277.139	1278.715
	Gasoline	MC	Motorcycles	0.1102	0.0029	389.499	393.129
Texas	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0126	0.0048	314.105	315.838
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0154	0.0072	406.639	409.169
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0692	0.0294	909.000	919.467
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0343	0.0007	322.822	323.880
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0254	0.0010	368.019	368.947
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0219	0.0032	1264.524	1266.022
	Gasoline	MC	Motorcycles	0.1172	0.0029	388.884	392.693
Utah	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0156	0.0048	306.256	308.062
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0183	0.0072	397.385	399.997
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0725	0.0293	896.194	906.733
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0477	0.0007	312.576	313.962
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0385	0.0010	357.427	358.673
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0317	0.0031	1279.354	1281.060
	Gasoline	MC	Motorcycles	0.1119	0.0029	390.662	394.337
Vermont	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0159	0.0045	296.080	297.824
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0171	0.0062	383.661	385.940
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0622	0.0249	869.885	878.840
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0510	0.0006	301.237	302.692
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0372	0.0009	344.293	345.476
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0294	0.0027	1274.951	1276.487
	Gasoline	MC	Motorcycles	0.1047	0.0025	390.512	393.862
Virgin Islands	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0146	0.0066	320.572	322.892
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0169	0.0087	411.266	414.286
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0726	0.0352	908.957	921.260
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0351	0.0007	331.134	332.221
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0209	0.0010	373.684	374.498
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0143	0.0034	1227.405	1228.774
	Gasoline	MC	Motorcycles	0.1034	0.0028	385.872	389.295
Virginia	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0143	0.0048	307.412	309.189
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0170	0.0071	398.381	400.923
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0674	0.0287	895.579	905.803
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0420	0.0007	314.581	315.828
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0324	0.0010	359.156	360.252
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0269	0.0030	1275.893	1277.466
	Gasoline	MC	Motorcycles	0.1130	0.0029	390.180	393.858

**Table 5-24. On-Road Vehicle Speciated GHG Emission Factors – 2024 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
Washington	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0158	0.0048	303.636	305.451
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0187	0.0073	394.189	396.816
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0693	0.0294	891.937	902.406
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0473	0.0007	309.943	311.321
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0382	0.0010	354.594	355.834
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0317	0.0031	1275.774	1277.484
	Gasoline	MC	Motorcycles	0.1085	0.0029	390.767	394.353
West Virginia	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0153	0.0046	301.606	303.369
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0176	0.0066	390.578	392.995
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0631	0.0267	882.476	892.011
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0441	0.0006	308.175	309.465
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0329	0.0009	351.637	352.730
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0271	0.0029	1270.005	1271.538
	Gasoline	MC	Motorcycles	0.1056	0.0027	389.942	393.373
Wisconsin	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0167	0.0046	301.825	303.617
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0187	0.0066	390.220	392.658
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0650	0.0268	883.979	893.574
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0502	0.0006	307.333	308.776
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0384	0.0009	350.306	351.535
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0318	0.0029	1265.939	1267.602
	Gasoline	MC	Motorcycles	0.1042	0.0027	389.649	393.054
Wyoming	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0183	0.0046	296.187	298.012
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0197	0.0064	384.020	386.404
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0626	0.0252	870.593	879.643
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0526	0.0006	301.303	302.792
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0387	0.0008	344.553	345.769
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0288	0.0026	1301.959	1303.448
	Gasoline	MC	Motorcycles	0.1014	0.0025	392.349	395.628



**Table 5-25. On-Road Vehicle Speciated GHG Emission Factors – 2025**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
Alabama	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0127	0.0045	303.726	305.381
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0151	0.0065	393.317	395.616
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0607	0.0265	909.626	919.021
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0127	0.0045	303.726	305.381
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0257	0.0010	356.874	357.803
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0220	0.0031	1242.617	1244.082
Alaska	Gasoline	MC	Motorcycles	0.1062	0.0029	388.386	391.893
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0177	0.0045	299.370	301.138
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0198	0.0065	387.955	390.378
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0656	0.0264	903.074	912.571
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0607	0.0007	299.346	301.058
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0502	0.0009	347.778	349.314
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0407	0.0029	1264.986	1266.883
Arizona	Gasoline	MC	Motorcycles	0.0858	0.0029	390.897	393.910
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0120	0.0046	309.498	311.165
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0144	0.0069	401.828	404.242
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0703	0.0283	923.477	933.669
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0326	0.0007	314.547	315.565
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0246	0.0010	365.414	366.325
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0210	0.0032	1252.252	1253.732
Arkansas	Gasoline	MC	Motorcycles	0.1198	0.0031	388.847	392.755
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0137	0.0045	298.949	300.617
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0159	0.0063	388.144	390.421
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0616	0.0256	896.474	905.646
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0372	0.0006	302.831	303.953
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0275	0.0009	351.879	352.839
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0230	0.0029	1243.273	1244.718
Colorado	Gasoline	MC	Motorcycles	0.1072	0.0027	389.428	392.919
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0151	0.0045	297.653	299.376
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0172	0.0067	387.359	389.793
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0695	0.0275	899.442	909.376
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0470	0.0007	299.947	301.315
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0382	0.0010	349.623	350.860
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0315	0.0031	1241.756	1243.470
Connecticut	Gasoline	MC	Motorcycles	0.1117	0.0029	390.242	393.906
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0132	0.0047	301.988	303.705
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0159	0.0073	395.191	397.765
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0731	0.0300	907.691	918.458
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0461	0.0007	304.516	305.871
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0397	0.0010	357.001	358.298
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0348	0.0034	1226.679	1228.564
Delaware	Gasoline	MC	Motorcycles	0.1207	0.0031	390.855	394.795
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0127	0.0046	306.913	308.596
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0152	0.0069	397.561	399.982
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0701	0.0285	923.394	933.620
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0413	0.0007	310.207	311.450
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0330	0.0010	359.700	360.832
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0298	0.0034	1231.067	1232.825

**Table 5-25. On-Road Vehicle Speciated GHG Emission Factors – 2025 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
District of Columbia	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0129	0.0047	328.876	330.608
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0154	0.0074	423.590	426.187
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0848	0.0325	1004.288	1016.086
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0400	0.0008	332.648	333.894
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0332	0.0013	383.274	384.476
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0379	0.0047	1231.486	1233.824
Florida	Gasoline	MC	Motorcycles	0.1364	0.0038	381.633	386.171
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0123	0.0046	318.106	319.795
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0152	0.0071	412.011	414.501
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0676	0.0295	945.995	956.472
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0292	0.0007	323.574	324.517
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0214	0.0011	374.999	375.851
Georgia	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0191	0.0035	1244.624	1246.144
	Gasoline	MC	Motorcycles	0.1127	0.0032	387.105	390.888
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0122	0.0046	305.282	306.946
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0148	0.0068	396.478	398.880
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0643	0.0281	914.945	924.909
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0363	0.0007	309.405	310.514
Hawaii	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0280	0.0010	359.653	360.650
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0242	0.0032	1238.641	1240.209
	Gasoline	MC	Motorcycles	0.1085	0.0030	388.821	392.427
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0151	0.0046	310.722	312.458
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0185	0.0070	402.943	405.478
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0850	0.0292	932.752	943.563
Idaho	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0266	0.0007	316.215	317.090
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0190	0.0010	366.886	367.669
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0171	0.0036	1216.132	1217.634
	Gasoline	MC	Motorcycles	0.1368	0.0032	386.706	391.071
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0153	0.0044	293.843	295.544
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0170	0.0062	381.272	383.544
Illinois	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0618	0.0251	888.823	897.841
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0477	0.0006	295.976	297.354
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0364	0.0009	344.004	345.179
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0290	0.0028	1258.250	1259.811
	Gasoline	MC	Motorcycles	0.1033	0.0027	390.515	393.901
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0145	0.0046	304.391	306.123
Indiana	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0171	0.0069	395.362	397.849
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0694	0.0285	915.852	926.058
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0455	0.0007	307.017	308.358
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0372	0.0010	357.096	358.326
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0322	0.0032	1245.784	1247.555
	Gasoline	MC	Motorcycles	0.1140	0.0031	389.245	393.009
Indiana	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0150	0.0045	300.763	302.485
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0173	0.0066	389.961	392.352
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0657	0.0269	905.271	914.919
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0446	0.0007	303.435	304.748
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0351	0.0010	352.283	353.447
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0296	0.0031	1248.071	1249.721
Indiana	Gasoline	MC	Motorcycles	0.1098	0.0029	389.360	392.968

**Table 5-25. On-Road Vehicle Speciated GHG Emission Factors – 2025 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
Iowa	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0166	0.0044	294.102	295.818
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0182	0.0060	381.199	383.443
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0625	0.0244	887.466	896.293
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0464	0.0006	296.254	297.600
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0345	0.0009	343.980	345.108
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0283	0.0028	1243.195	1244.745
	Gasoline	MC	Motorcycles	0.1060	0.0026	389.407	392.836
Kansas	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0152	0.0044	294.450	296.152
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0174	0.0063	383.145	385.459
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0636	0.0255	887.628	896.807
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0424	0.0006	297.481	298.724
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0322	0.0009	346.604	347.673
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0259	0.0028	1251.609	1253.103
	Gasoline	MC	Motorcycles	0.1087	0.0027	390.730	394.250
Kentucky	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0141	0.0045	296.174	297.866
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0163	0.0064	385.216	387.522
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0603	0.0256	890.403	899.531
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0414	0.0006	299.360	300.584
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0312	0.0009	348.607	349.657
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0249	0.0028	1264.282	1265.733
	Gasoline	MC	Motorcycles	0.1057	0.0027	391.249	394.695
Louisiana	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0120	0.0045	306.477	308.130
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0145	0.0066	397.682	400.020
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0612	0.0271	912.686	922.273
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0327	0.0007	311.266	312.283
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0240	0.0010	361.383	362.270
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0203	0.0030	1251.064	1252.480
	Gasoline	MC	Motorcycles	0.1064	0.0029	389.261	392.784
Maine	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0161	0.0043	290.234	291.929
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0174	0.0059	376.870	379.064
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0604	0.0239	878.496	887.114
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0496	0.0006	291.803	293.224
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0367	0.0009	339.620	340.797
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0296	0.0028	1240.096	1241.661
	Gasoline	MC	Motorcycles	0.1084	0.0025	389.944	393.403
Maryland	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0129	0.0046	303.869	305.570
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0155	0.0071	396.310	398.821
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0703	0.0293	912.039	922.516
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0421	0.0007	307.078	308.334
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0348	0.0010	358.668	359.840
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0303	0.0033	1232.181	1233.936
	Gasoline	MC	Motorcycles	0.1189	0.0031	389.894	393.780
Massachusetts	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0139	0.0047	306.760	308.505
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0170	0.0074	400.636	403.272
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0769	0.0309	925.089	936.196
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0473	0.0007	309.135	310.530
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0413	0.0011	361.632	362.984
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0381	0.0036	1226.649	1228.683
	Gasoline	MC	Motorcycles	0.1246	0.0033	389.274	393.362

**Table 5-25. On-Road Vehicle Speciated GHG Emission Factors – 2025 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
Michigan	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0166	0.0045	300.864	302.626
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0191	0.0067	390.339	392.803
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0701	0.0274	906.532	916.444
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0479	0.0007	302.979	304.376
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0387	0.0010	352.067	353.325
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0334	0.0032	1236.797	1238.578
	Gasoline	MC	Motorcycles	0.1144	0.0029	389.143	392.879
Minnesota	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0170	0.0044	296.461	298.207
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0190	0.0064	384.801	387.173
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0643	0.0261	892.903	902.273
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0506	0.0006	297.934	299.390
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0401	0.0009	346.540	347.819
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0341	0.0030	1227.772	1229.532
	Gasoline	MC	Motorcycles	0.1017	0.0028	389.494	392.859
Mississippi	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0124	0.0044	298.219	299.834
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0144	0.0061	386.935	389.108
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0563	0.0248	894.493	903.273
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0341	0.0006	302.546	303.587
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0241	0.0009	351.172	352.043
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0204	0.0029	1238.897	1240.266
	Gasoline	MC	Motorcycles	0.1023	0.0026	388.772	392.117
Missouri	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0143	0.0045	294.554	296.264
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0166	0.0066	385.075	387.462
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0633	0.0264	883.115	892.556
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0429	0.0006	297.564	298.820
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0335	0.0009	348.442	349.547
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0260	0.0028	1261.316	1262.796
	Gasoline	MC	Motorcycles	0.1077	0.0027	393.000	396.493
Montana	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0169	0.0043	288.485	290.197
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0180	0.0059	374.863	377.056
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0590	0.0235	875.685	884.157
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0505	0.0006	289.988	291.428
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0373	0.0008	337.766	338.947
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0289	0.0027	1257.311	1258.824
	Gasoline	MC	Motorcycles	0.1000	0.0025	390.974	394.219
Nebraska	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0164	0.0044	292.712	294.433
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0181	0.0062	380.507	382.793
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0627	0.0248	884.024	892.971
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0462	0.0006	295.009	296.346
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0349	0.0009	343.528	344.661
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0276	0.0028	1256.438	1257.950
	Gasoline	MC	Motorcycles	0.1059	0.0026	390.907	394.337
Nevada	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0145	0.0046	306.700	308.432
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0173	0.0070	398.463	400.967
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0830	0.0287	920.710	931.311
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0374	0.0007	310.871	312.009
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0294	0.0010	361.491	362.527
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0253	0.0033	1248.844	1250.447
	Gasoline	MC	Motorcycles	0.1316	0.0031	388.920	393.131

**Table 5-25. On-Road Vehicle Speciated GHG Emission Factors – 2025 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
New Hampshire	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0142	0.0045	296.570	298.261
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0161	0.0065	385.471	387.808
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0658	0.0264	892.702	902.215
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0487	0.0007	298.462	299.872
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0386	0.0009	347.569	348.814
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0321	0.0030	1235.745	1237.445
	Gasoline	MC	Motorcycles	0.1125	0.0028	390.141	393.781
New Jersey	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0130	0.0047	307.111	308.832
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0160	0.0074	401.039	403.640
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0749	0.0307	923.910	934.904
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0437	0.0007	310.104	311.408
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0374	0.0011	362.685	363.937
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0339	0.0036	1229.573	1231.485
	Gasoline	MC	Motorcycles	0.1236	0.0032	389.398	393.452
New Mexico	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0140	0.0045	297.167	298.845
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0159	0.0063	385.433	387.693
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0618	0.0253	894.420	903.488
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0403	0.0006	300.475	301.674
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0299	0.0009	348.850	349.869
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0241	0.0028	1256.479	1257.928
	Gasoline	MC	Motorcycles	0.1072	0.0027	389.875	393.363
New York	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0132	0.0046	302.739	304.448
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0153	0.0071	394.529	397.017
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0713	0.0291	910.516	920.944
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0465	0.0007	305.173	306.540
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0389	0.0010	356.221	357.497
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0338	0.0033	1236.677	1238.506
	Gasoline	MC	Motorcycles	0.1172	0.0031	390.036	393.877
North Carolina	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0122	0.0045	302.069	303.724
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0146	0.0067	392.350	394.708
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0630	0.0274	907.030	916.761
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0380	0.0007	305.844	306.994
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0293	0.0010	355.582	356.605
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0249	0.0031	1240.194	1241.750
	Gasoline	MC	Motorcycles	0.1070	0.0029	389.219	392.764
North Dakota	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0181	0.0043	289.278	291.002
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0189	0.0058	375.184	377.367
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0592	0.0233	877.184	885.600
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0528	0.0006	290.200	291.695
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0390	0.0008	337.525	338.749
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0312	0.0027	1242.004	1243.596
	Gasoline	MC	Motorcycles	0.0976	0.0025	389.815	392.997
Ohio	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0149	0.0046	299.515	301.245
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0174	0.0068	389.884	392.341
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0670	0.0277	901.091	911.004
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0456	0.0007	302.056	303.392
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0369	0.0010	352.160	353.370
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0309	0.0031	1243.793	1245.490
	Gasoline	MC	Motorcycles	0.1093	0.0029	390.413	394.013

**Table 5-25. On-Road Vehicle Speciated GHG Emission Factors – 2025 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
Oklahoma	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0139	0.0044	297.773	299.439
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0160	0.0063	386.910	389.175
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0612	0.0254	893.191	902.292
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0378	0.0006	301.547	302.681
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0279	0.0009	350.680	351.648
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0232	0.0029	1239.584	1241.033
	Gasoline	MC	Motorcycles	0.1065	0.0027	389.521	392.983
Oregon	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0138	0.0045	296.824	298.508
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0159	0.0065	385.066	387.407
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0654	0.0267	899.645	909.235
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0441	0.0007	299.581	300.879
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0345	0.0010	347.963	349.110
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0293	0.0031	1241.877	1243.524
	Gasoline	MC	Motorcycles	0.1099	0.0029	389.256	392.861
Pacific Islands	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0129	0.0046	300.839	302.514
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0153	0.0068	391.118	393.509
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0652	0.0276	905.437	915.284
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0397	0.0007	304.353	305.544
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0312	0.0010	354.226	355.295
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0267	0.0031	1242.395	1243.987
	Gasoline	MC	Motorcycles	0.1109	0.0029	389.588	393.236
Pennsylvania	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0136	0.0046	301.630	303.335
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0158	0.0068	391.933	394.347
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0664	0.0276	905.896	915.767
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0453	0.0007	304.243	305.575
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0363	0.0010	354.043	355.242
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0301	0.0031	1253.329	1254.994
	Gasoline	MC	Motorcycles	0.1108	0.0029	390.236	393.880
Puerto Rico	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0110	0.0038	319.039	320.433
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0139	0.0059	415.239	417.335
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0601	0.0248	946.372	955.263
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0220	0.0007	324.921	325.673
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0157	0.0010	378.411	379.107
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0166	0.0034	1231.891	1233.318
	Gasoline	MC	Motorcycles	0.1123	0.0031	387.525	391.258
Rhode Island	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0135	0.0047	303.963	305.688
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0160	0.0073	396.746	399.306
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0736	0.0299	915.093	925.833
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0465	0.0007	306.455	307.823
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0396	0.0010	358.289	359.588
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0349	0.0034	1234.173	1236.062
	Gasoline	MC	Motorcycles	0.1220	0.0031	390.028	394.015
South Carolina	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0128	0.0045	302.226	303.886
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0151	0.0064	391.752	394.048
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0600	0.0262	905.382	914.685
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0356	0.0007	306.399	307.485
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0262	0.0009	355.367	356.304
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0220	0.0030	1253.274	1254.705
	Gasoline	MC	Motorcycles	0.1054	0.0028	389.232	392.708

**Table 5-25. On-Road Vehicle Speciated GHG Emission Factors – 2025 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
South Dakota	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0162	0.0044	288.053	289.754
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0175	0.0059	375.193	377.386
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0567	0.0236	872.498	880.926
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0499	0.0006	289.645	291.065
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0368	0.0008	338.196	339.362
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0280	0.0026	1262.975	1264.450
	Gasoline	MC	Motorcycles	0.0963	0.0025	391.933	395.073
Tennessee	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0137	0.0046	302.968	304.669
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0163	0.0068	393.582	395.999
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0644	0.0276	908.678	918.493
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0392	0.0007	306.607	307.787
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0305	0.0010	356.559	357.613
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0257	0.0031	1248.571	1250.137
	Gasoline	MC	Motorcycles	0.1086	0.0029	389.621	393.212
Texas	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0118	0.0046	306.502	308.154
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0143	0.0068	398.336	400.714
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0658	0.0278	913.820	923.752
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0331	0.0007	311.249	312.276
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0249	0.0010	361.998	362.912
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0213	0.0032	1236.323	1237.808
	Gasoline	MC	Motorcycles	0.1156	0.0029	389.005	392.774
Utah	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0147	0.0046	298.933	300.657
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0171	0.0068	389.374	391.832
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0691	0.0278	901.241	911.244
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0465	0.0007	301.417	302.774
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0381	0.0010	351.636	352.871
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0313	0.0031	1250.688	1252.386
	Gasoline	MC	Motorcycles	0.1103	0.0029	390.786	394.423
Vermont	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0149	0.0043	289.040	290.704
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0159	0.0059	375.915	378.058
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0591	0.0235	874.498	882.981
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0500	0.0006	290.503	291.932
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0368	0.0009	338.714	339.888
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0290	0.0027	1246.348	1247.875
	Gasoline	MC	Motorcycles	0.1033	0.0025	390.638	393.952
Virgin Islands	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0136	0.0063	312.860	315.077
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0156	0.0082	402.877	405.720
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0689	0.0334	913.078	924.747
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0333	0.0007	319.376	320.418
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0202	0.0010	367.603	368.399
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0137	0.0034	1200.434	1201.789
	Gasoline	MC	Motorcycles	0.1019	0.0028	385.994	389.382
Virginia	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0135	0.0046	300.027	301.721
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0158	0.0067	390.302	392.692
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0640	0.0272	900.434	910.132
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0409	0.0007	303.338	304.556
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0319	0.0010	353.317	354.401
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0264	0.0030	1247.320	1248.883
	Gasoline	MC	Motorcycles	0.1115	0.0029	390.303	393.942

**Table 5-25. On-Road Vehicle Speciated GHG Emission Factors – 2025 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
Washington	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0149	0.0046	296.374	298.105
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0175	0.0068	386.238	388.709
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0660	0.0278	897.042	906.976
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0462	0.0007	298.880	300.230
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0377	0.0010	348.850	350.079
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0313	0.0031	1247.190	1248.892
	Gasoline	MC	Motorcycles	0.1070	0.0029	390.892	394.440
West Virginia	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0144	0.0044	294.381	296.062
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0164	0.0063	382.659	384.931
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0600	0.0253	887.217	896.254
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0430	0.0006	297.166	298.429
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0325	0.0009	345.919	347.001
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0266	0.0029	1241.566	1243.089
	Gasoline	MC	Motorcycles	0.1040	0.0027	390.067	393.460
Wisconsin	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0158	0.0044	294.633	296.342
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0175	0.0062	382.349	384.642
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0618	0.0254	888.828	897.922
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0491	0.0006	296.374	297.791
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0380	0.0009	344.623	345.842
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0314	0.0029	1237.630	1239.285
	Gasoline	MC	Motorcycles	0.1027	0.0027	389.775	393.142
Wyoming	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0173	0.0044	289.155	290.897
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0185	0.0060	376.283	378.527
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0596	0.0238	875.175	883.750
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0515	0.0006	290.567	292.030
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0383	0.0008	338.988	340.195
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0284	0.0026	1272.637	1274.117
	Gasoline	MC	Motorcycles	0.0999	0.0025	392.477	395.720



Table 5-26. On-Road Vehicle Speciated GHG Emission Factors – 2026

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
Alabama	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0115	0.0044	296.535	298.118
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0130	0.0062	385.237	387.401
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0558	0.0261	913.613	922.791
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0115	0.0044	296.535	298.118
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0252	0.0010	351.549	352.465
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0216	0.0031	1216.045	1217.500
	Gasoline	MC	Motorcycles	0.1047	0.0028	388.491	391.959
Alaska	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0163	0.0043	292.404	294.096
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0175	0.0062	380.128	382.410
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0601	0.0261	907.334	916.600
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0583	0.0007	287.987	289.638
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0497	0.0009	342.653	344.176
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0405	0.0030	1237.819	1239.712
	Gasoline	MC	Motorcycles	0.0844	0.0029	391.005	393.979
Arizona	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0108	0.0044	302.151	303.745
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0125	0.0066	393.564	395.841
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0650	0.0280	927.548	937.515
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0300	0.0007	302.520	303.472
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0240	0.0010	359.961	360.858
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0205	0.0032	1225.461	1226.931
	Gasoline	MC	Motorcycles	0.1183	0.0030	388.951	392.817
Arkansas	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0125	0.0043	291.885	293.481
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0139	0.0060	380.185	382.330
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0568	0.0253	900.360	909.318
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0347	0.0006	291.270	292.328
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0269	0.0009	346.640	347.587
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0225	0.0029	1216.622	1218.059
	Gasoline	MC	Motorcycles	0.1058	0.0027	389.535	392.987
Colorado	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0139	0.0044	290.667	292.319
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0155	0.0064	379.483	381.788
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0644	0.0272	903.753	913.467
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0445	0.0007	288.524	289.829
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0376	0.0010	344.448	345.671
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0312	0.0031	1215.155	1216.863
	Gasoline	MC	Motorcycles	0.1102	0.0029	390.349	393.972
Connecticut	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0121	0.0045	294.893	296.539
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0141	0.0070	387.165	389.602
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0677	0.0297	912.129	922.672
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0435	0.0007	292.928	294.220
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0390	0.0010	351.722	353.003
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0345	0.0034	1200.483	1202.361
	Gasoline	MC	Motorcycles	0.1192	0.0031	390.961	394.860
Delaware	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0115	0.0044	299.671	301.280
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0131	0.0066	389.430	391.709
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0647	0.0282	927.785	937.785
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0388	0.0007	298.379	299.558
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0324	0.0010	354.343	355.461
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0294	0.0034	1204.884	1206.635
	Gasoline	MC	Motorcycles	0.1199	0.0031	387.708	391.625

**Table 5-26. On-Road Vehicle Speciated GHG Emission Factors – 2026 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
District of Columbia	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0116	0.0046	321.083	322.740
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0137	0.0071	414.884	417.339
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0781	0.0322	1009.796	1021.345
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0374	0.0008	319.951	321.132
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0326	0.0013	377.517	378.705
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0375	0.0047	1205.947	1208.275
Florida	Gasoline	MC	Motorcycles	0.1346	0.0038	381.730	386.220
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0110	0.0045	310.539	312.152
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0130	0.0068	403.518	405.860
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0621	0.0292	950.191	960.440
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0265	0.0007	311.198	312.075
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0208	0.0011	369.385	370.222
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0186	0.0035	1218.152	1219.661
Georgia	Gasoline	MC	Motorcycles	0.1112	0.0032	387.208	390.948
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0110	0.0044	298.059	299.652
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0127	0.0065	388.350	390.612
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0592	0.0278	919.120	928.864
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0337	0.0007	297.592	298.637
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0275	0.0010	354.295	355.279
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0238	0.0032	1212.183	1213.742
Hawaii	Gasoline	MC	Motorcycles	0.1070	0.0030	388.926	392.492
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0137	0.0044	303.328	304.986
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0160	0.0067	394.634	397.018
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0790	0.0289	937.153	947.727
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0240	0.0007	304.111	304.919
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0184	0.0010	361.391	362.160
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0166	0.0036	1190.407	1191.898
Idaho	Gasoline	MC	Motorcycles	0.1351	0.0032	386.808	391.127
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0141	0.0043	286.952	288.581
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0150	0.0059	373.507	375.650
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0571	0.0248	892.845	901.650
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0452	0.0006	284.705	286.020
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0359	0.0009	338.909	340.071
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0287	0.0028	1231.200	1232.754
Illinois	Gasoline	MC	Motorcycles	0.1019	0.0027	390.623	393.971
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0131	0.0045	297.232	298.886
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0148	0.0066	387.308	389.648
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0640	0.0282	920.191	930.171
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0429	0.0007	295.325	296.602
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0366	0.0010	351.798	353.014
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0318	0.0033	1219.150	1220.915
Indiana	Gasoline	MC	Motorcycles	0.1125	0.0031	389.351	393.074
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0137	0.0044	293.689	295.337
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0152	0.0063	382.006	384.260
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0605	0.0266	909.432	918.856
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0421	0.0007	291.875	293.125
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0345	0.0010	347.053	348.204
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0292	0.0031	1221.339	1222.982
Indiana	Gasoline	MC	Motorcycles	0.1083	0.0029	389.466	393.033

**Table 5-26. On-Road Vehicle Speciated GHG Emission Factors – 2026 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
Iowa	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0154	0.0042	287.200	288.843
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0161	0.0058	373.424	375.539
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0577	0.0241	891.403	900.016
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0440	0.0006	284.971	286.256
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0340	0.0009	338.875	339.990
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0280	0.0028	1216.533	1218.077
	Gasoline	MC	Motorcycles	0.1046	0.0026	389.515	392.905
Kansas	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0140	0.0043	287.521	289.151
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0154	0.0060	375.323	377.504
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0588	0.0252	891.587	900.552
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0399	0.0006	286.137	287.317
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0316	0.0009	341.464	342.519
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0256	0.0028	1224.706	1226.192
	Gasoline	MC	Motorcycles	0.1073	0.0027	390.838	394.318
Kentucky	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0129	0.0044	289.200	290.819
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0142	0.0061	377.345	379.518
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0555	0.0253	894.268	903.181
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0389	0.0006	287.948	289.108
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0307	0.0009	343.436	344.473
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0245	0.0028	1237.065	1238.509
	Gasoline	MC	Motorcycles	0.1043	0.0027	391.356	394.764
Louisiana	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0108	0.0044	299.208	300.790
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0124	0.0063	389.506	391.707
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0563	0.0268	916.566	925.936
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0301	0.0007	299.370	300.322
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0234	0.0010	355.992	356.866
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0199	0.0031	1224.261	1225.667
	Gasoline	MC	Motorcycles	0.1050	0.0029	389.367	392.851
Maine	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0148	0.0042	283.441	285.064
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0154	0.0057	369.197	371.265
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0558	0.0236	882.418	890.828
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0472	0.0006	280.703	282.064
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0362	0.0009	334.587	335.752
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0293	0.0028	1213.478	1215.037
	Gasoline	MC	Motorcycles	0.1070	0.0025	390.052	393.474
Maryland	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0116	0.0045	296.708	298.335
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0134	0.0068	388.228	390.594
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0650	0.0290	916.371	926.626
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0395	0.0007	295.377	296.569
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0342	0.0010	353.346	354.504
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0300	0.0034	1205.868	1207.615
	Gasoline	MC	Motorcycles	0.1173	0.0031	390.000	393.844
Massachusetts	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0127	0.0045	299.552	301.222
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0148	0.0071	392.498	394.982
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0712	0.0306	929.757	940.634
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0448	0.0007	297.373	298.704
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0407	0.0011	356.275	357.612
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0378	0.0036	1200.570	1202.598
	Gasoline	MC	Motorcycles	0.1230	0.0033	389.379	393.423

**Table 5-26. On-Road Vehicle Speciated GHG Emission Factors – 2026 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
Michigan	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0152	0.0044	293.802	295.488
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0169	0.0064	382.398	384.719
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0647	0.0271	910.822	920.508
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0454	0.0007	291.447	292.781
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0381	0.0010	346.847	348.092
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0331	0.0032	1210.372	1212.147
Minnesota	Gasoline	MC	Motorcycles	0.1128	0.0029	389.249	392.943
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0157	0.0043	289.523	291.195
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0169	0.0061	376.988	379.226
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0593	0.0258	897.054	906.209
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0482	0.0006	286.604	287.999
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0396	0.0009	341.409	342.675
Mississippi	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0339	0.0030	1201.530	1203.284
	Gasoline	MC	Motorcycles	0.1003	0.0027	389.602	392.928
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0112	0.0042	291.158	292.703
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0125	0.0058	378.980	381.026
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0518	0.0245	898.287	906.859
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0316	0.0006	290.984	291.961
Missouri	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0236	0.0009	345.932	346.790
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0200	0.0029	1212.362	1213.722
	Gasoline	MC	Motorcycles	0.1009	0.0026	388.879	392.186
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0130	0.0044	287.628	289.264
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0146	0.0063	377.229	379.480
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0585	0.0261	886.969	896.195
Montana	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0403	0.0006	286.229	287.421
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0329	0.0009	343.291	344.381
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0256	0.0028	1234.119	1235.592
	Gasoline	MC	Motorcycles	0.1063	0.0027	393.109	396.564
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0157	0.0042	281.740	283.380
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0161	0.0056	367.239	369.308
Nebraska	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0545	0.0232	879.579	887.846
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0481	0.0006	278.955	280.334
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0368	0.0008	332.769	333.938
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0286	0.0027	1230.246	1231.752
	Gasoline	MC	Motorcycles	0.0987	0.0025	391.083	394.292
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0151	0.0043	285.844	287.493
Nevada	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0161	0.0059	372.756	374.911
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0579	0.0245	887.955	896.688
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0438	0.0006	283.772	285.047
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0344	0.0009	338.441	339.561
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0273	0.0028	1229.409	1230.914
	Gasoline	MC	Motorcycles	0.1045	0.0026	391.015	394.407
Nevada	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0132	0.0045	299.443	301.099
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0150	0.0067	390.296	392.653
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0772	0.0283	924.971	935.335
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0348	0.0007	299.000	300.073
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0288	0.0010	356.108	357.129
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0249	0.0033	1222.140	1223.734
Nevada	Gasoline	MC	Motorcycles	0.1299	0.0031	389.024	393.191

**Table 5-26. On-Road Vehicle Speciated GHG Emission Factors – 2026 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
New Hampshire	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0127	0.0044	289.619	291.232
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0139	0.0062	377.634	379.832
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0608	0.0261	896.818	906.114
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0462	0.0007	287.109	288.457
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0381	0.0009	342.423	343.654
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0318	0.0030	1209.276	1210.970
	Gasoline	MC	Motorcycles	0.1111	0.0028	390.249	393.849
New Jersey	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0118	0.0045	299.878	301.524
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0138	0.0071	392.871	395.322
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0693	0.0304	928.469	939.235
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0412	0.0007	298.293	299.532
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0368	0.0011	357.306	358.543
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0336	0.0036	1203.395	1205.300
	Gasoline	MC	Motorcycles	0.1220	0.0032	389.503	393.514
New Mexico	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0128	0.0043	290.162	291.768
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0139	0.0060	377.544	379.672
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0570	0.0250	898.324	907.177
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0378	0.0006	289.015	290.151
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0293	0.0009	343.664	344.670
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0237	0.0028	1229.488	1230.929
	Gasoline	MC	Motorcycles	0.1058	0.0027	389.982	393.431
New York	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0122	0.0045	295.627	297.265
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0138	0.0068	386.506	388.866
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0659	0.0287	914.887	925.089
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0440	0.0007	293.560	294.863
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0384	0.0010	350.946	352.207
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0335	0.0033	1210.245	1212.068
	Gasoline	MC	Motorcycles	0.1157	0.0030	390.142	393.941
North Carolina	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0110	0.0044	294.933	296.517
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0126	0.0064	384.315	386.536
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0579	0.0271	911.161	920.673
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0355	0.0007	294.173	295.259
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0288	0.0010	350.291	351.300
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0245	0.0031	1213.662	1215.210
	Gasoline	MC	Motorcycles	0.1056	0.0029	389.325	392.830
North Dakota	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0168	0.0041	282.527	284.179
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0169	0.0055	367.564	369.623
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0546	0.0230	881.127	889.336
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0504	0.0006	279.165	280.601
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0385	0.0008	332.530	333.742
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0309	0.0027	1215.344	1216.931
	Gasoline	MC	Motorcycles	0.0962	0.0025	389.924	393.070
Ohio	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0136	0.0044	292.477	294.134
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0154	0.0065	381.948	384.266
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0618	0.0274	905.296	914.986
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0430	0.0007	290.555	291.828
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0363	0.0010	346.944	348.140
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0306	0.0031	1217.135	1218.825
	Gasoline	MC	Motorcycles	0.1078	0.0029	390.520	394.080

**Table 5-26. On-Road Vehicle Speciated GHG Emission Factors – 2026 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
Oklahoma	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0126	0.0043	290.740	292.334
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0140	0.0060	378.980	381.114
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0564	0.0251	897.061	905.950
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0353	0.0006	290.036	291.107
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0274	0.0009	345.460	346.416
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0228	0.0029	1213.016	1214.456
Oregon	Gasoline	MC	Motorcycles	0.1051	0.0027	389.628	393.051
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0126	0.0044	289.841	291.452
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0139	0.0062	377.208	379.413
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0605	0.0264	903.928	913.303
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0416	0.0007	288.162	289.397
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0340	0.0010	342.796	343.930
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0289	0.0031	1215.291	1216.931
Pacific Islands	Gasoline	MC	Motorcycles	0.1084	0.0029	389.362	392.928
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0117	0.0044	293.741	295.344
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0133	0.0065	383.121	385.375
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0601	0.0273	909.635	919.264
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0372	0.0007	292.743	293.870
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0306	0.0010	348.962	350.017
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0263	0.0031	1215.796	1217.380
Pennsylvania	Gasoline	MC	Motorcycles	0.1094	0.0029	389.694	393.302
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0124	0.0044	294.538	296.170
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0138	0.0065	383.947	386.223
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0612	0.0273	910.044	919.690
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0427	0.0007	292.660	293.928
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0357	0.0010	348.795	349.979
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0298	0.0031	1226.446	1228.104
Puerto Rico	Gasoline	MC	Motorcycles	0.1107	0.0031	387.627	391.318
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0098	0.0036	311.400	312.729
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0118	0.0056	406.628	408.593
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0550	0.0246	950.546	959.234
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0197	0.0007	312.425	313.120
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0152	0.0010	372.703	373.387
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0161	0.0034	1205.707	1207.122
Rhode Island	Gasoline	MC	Motorcycles	0.1204	0.0031	390.133	394.078
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0124	0.0045	296.820	298.474
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0144	0.0069	388.680	391.109
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0681	0.0296	919.576	930.089
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0439	0.0007	294.793	296.097
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0390	0.0010	352.984	354.268
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0345	0.0034	1207.826	1209.709
South Carolina	Gasoline	MC	Motorcycles	0.1040	0.0028	389.337	392.774
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0116	0.0044	295.075	296.663
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0131	0.0062	383.710	385.871
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0551	0.0259	909.303	918.390
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0330	0.0007	294.698	295.719
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0256	0.0009	350.072	350.995
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0215	0.0030	1226.399	1227.822

**Table 5-26. On-Road Vehicle Speciated GHG Emission Factors – 2026 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
South Dakota	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0150	0.0042	281.318	282.949
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0155	0.0057	367.565	369.635
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0523	0.0232	876.307	884.530
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0474	0.0006	278.626	279.985
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0363	0.0008	333.199	334.353
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0277	0.0026	1235.748	1237.217
	Gasoline	MC	Motorcycles	0.0950	0.0025	392.042	395.147
Tennessee	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0124	0.0044	295.815	297.443
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0142	0.0065	385.529	387.806
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0593	0.0272	912.786	922.379
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0367	0.0007	294.911	296.027
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0300	0.0010	351.257	352.298
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0253	0.0031	1221.821	1223.379
	Gasoline	MC	Motorcycles	0.1071	0.0029	389.727	393.278
Texas	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0106	0.0044	299.235	300.814
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0123	0.0065	390.152	392.394
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0607	0.0275	917.837	927.550
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0305	0.0007	299.355	300.317
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0243	0.0010	356.599	357.499
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0209	0.0032	1209.909	1211.386
	Gasoline	MC	Motorcycles	0.1141	0.0029	389.110	392.839
Utah	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0135	0.0044	291.913	293.563
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0151	0.0065	381.456	383.777
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0640	0.0275	905.496	915.279
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0440	0.0007	289.937	291.230
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0375	0.0010	346.433	347.654
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0310	0.0031	1223.851	1225.543
	Gasoline	MC	Motorcycles	0.1089	0.0029	390.893	394.490
Vermont	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0135	0.0042	282.280	283.868
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0139	0.0056	368.266	370.281
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0546	0.0232	878.336	886.610
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0476	0.0006	279.456	280.825
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0363	0.0009	333.699	334.861
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0287	0.0027	1219.550	1221.071
	Gasoline	MC	Motorcycles	0.1019	0.0024	390.747	394.023
Virgin Islands	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0122	0.0061	305.475	307.600
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0134	0.0079	394.608	397.293
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0635	0.0330	916.363	927.776
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0298	0.0007	307.272	308.226
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0195	0.0010	362.147	362.925
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0132	0.0034	1175.118	1176.463
	Gasoline	MC	Motorcycles	0.1005	0.0028	386.101	389.451
Virginia	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0123	0.0044	292.956	294.577
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0139	0.0064	382.327	384.582
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0591	0.0269	904.495	913.975
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0383	0.0007	291.775	292.929
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0313	0.0010	348.072	349.142
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0260	0.0030	1220.564	1222.119
	Gasoline	MC	Motorcycles	0.1100	0.0028	390.410	394.009

**Table 5-26. On-Road Vehicle Speciated GHG Emission Factors – 2026 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
Washington	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0136	0.0044	289.413	291.071
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0154	0.0065	378.380	380.712
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0610	0.0275	901.361	911.078
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0437	0.0007	287.498	288.785
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0371	0.0010	343.688	344.902
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0310	0.0031	1220.427	1222.122
	Gasoline	MC	Motorcycles	0.1055	0.0029	390.999	394.508
West Virginia	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0131	0.0043	287.457	289.065
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0144	0.0060	374.845	376.986
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0552	0.0250	891.175	899.999
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0405	0.0006	285.843	287.044
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0319	0.0009	340.785	341.853
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0263	0.0029	1214.925	1216.441
	Gasoline	MC	Motorcycles	0.1026	0.0026	390.174	393.529
Wisconsin	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0145	0.0043	287.731	289.366
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0154	0.0060	374.573	376.733
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0569	0.0251	892.888	901.769
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0467	0.0006	285.098	286.453
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0374	0.0009	339.518	340.724
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0311	0.0029	1211.110	1212.759
	Gasoline	MC	Motorcycles	0.1013	0.0027	389.882	393.212
Wyoming	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0161	0.0043	282.400	284.070
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0166	0.0057	368.640	370.759
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0551	0.0235	878.984	887.351
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0490	0.0006	279.519	280.921
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0378	0.0008	333.985	335.178
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0281	0.0026	1245.182	1246.655
	Gasoline	MC	Motorcycles	0.0986	0.0025	392.587	395.794



**Table 5-27. On-Road Vehicle Speciated GHG Emission Factors – 2027**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
Alabama	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0108	0.0043	289.659	291.201
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0120	0.0060	378.362	380.433
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0517	0.0247	915.020	923.664
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0108	0.0043	289.659	291.201
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0247	0.0010	347.252	348.156
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0212	0.0031	1186.706	1188.154
Alaska	Gasoline	MC	Motorcycles	0.1034	0.0029	388.586	392.020
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0155	0.0042	285.733	287.381
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0162	0.0060	373.465	375.650
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0555	0.0246	909.000	917.722
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0559	0.0007	277.226	278.816
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0492	0.0009	338.505	340.017
Arizona	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0404	0.0030	1207.691	1209.582
	Gasoline	MC	Motorcycles	0.0831	0.0029	391.101	394.043
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0102	0.0044	295.129	296.682
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0115	0.0064	386.533	388.714
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0605	0.0265	929.037	938.438
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0273	0.0007	291.129	292.015
Arkansas	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0235	0.0010	355.569	356.453
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0201	0.0032	1195.909	1197.371
	Gasoline	MC	Motorcycles	0.1169	0.0030	389.045	392.875
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0118	0.0042	285.130	286.684
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0128	0.0058	373.410	375.463
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0527	0.0239	901.677	910.116
Colorado	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0322	0.0006	280.320	281.315
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0265	0.0009	342.397	343.332
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0222	0.0029	1187.126	1188.557
	Gasoline	MC	Motorcycles	0.1044	0.0027	389.630	393.049
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0132	0.0043	283.982	285.592
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0145	0.0062	372.780	374.990
Connecticut	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0601	0.0258	905.487	914.652
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0419	0.0007	277.705	278.947
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0371	0.0010	340.263	341.474
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0309	0.0031	1185.780	1187.483
	Gasoline	MC	Motorcycles	0.1088	0.0029	390.444	394.034
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0115	0.0044	288.104	289.709
Delaware	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0131	0.0068	380.336	382.675
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0632	0.0281	914.015	923.971
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0410	0.0007	281.952	283.179
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0385	0.0010	347.471	348.740
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0342	0.0034	1171.705	1173.579
	Gasoline	MC	Motorcycles	0.1177	0.0031	391.057	394.920
Delaware	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0109	0.0044	292.745	294.314
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0121	0.0063	382.513	384.697
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0602	0.0266	929.585	939.013
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0362	0.0007	287.175	288.290
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0319	0.0010	350.044	351.149
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0291	0.0034	1176.144	1177.889
Delaware	Gasoline	MC	Motorcycles	0.1185	0.0031	387.801	391.682

**Table 5-27. On-Road Vehicle Speciated GHG Emission Factors – 2027 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
District of Columbia	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0110	0.0045	313.631	315.249
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0126	0.0068	407.490	409.841
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0724	0.0305	1012.599	1023.487
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0347	0.0008	307.923	309.039
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0321	0.0013	372.982	374.157
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0372	0.0047	1178.521	1180.842
	Gasoline	MC	Motorcycles	0.1330	0.0038	381.818	386.266
Florida	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0103	0.0044	303.306	304.878
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0119	0.0065	396.294	398.535
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0575	0.0276	951.793	961.453
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0238	0.0007	299.476	300.286
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0203	0.0011	364.889	365.713
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0182	0.0035	1189.117	1190.617
	Gasoline	MC	Motorcycles	0.1097	0.0032	387.299	391.005
Georgia	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0103	0.0043	291.154	292.705
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0117	0.0063	381.434	383.600
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0549	0.0262	920.719	929.903
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0311	0.0007	286.403	287.384
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0270	0.0010	349.981	350.952
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0234	0.0032	1183.044	1184.596
	Gasoline	MC	Motorcycles	0.1056	0.0030	389.020	392.552
Hawaii	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0128	0.0043	296.263	297.875
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0148	0.0064	387.568	389.849
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0739	0.0273	938.964	948.946
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0214	0.0007	292.646	293.389
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0179	0.0010	356.987	357.743
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0161	0.0036	1162.312	1163.793
	Gasoline	MC	Motorcycles	0.1335	0.0032	386.901	391.180
Idaho	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0134	0.0042	280.358	281.945
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0140	0.0057	366.896	368.950
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0532	0.0234	894.280	902.577
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0427	0.0006	274.029	275.282
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0354	0.0009	334.770	335.920
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0284	0.0028	1201.159	1202.708
	Gasoline	MC	Motorcycles	0.1006	0.0027	390.719	394.035
Illinois	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0124	0.0044	290.383	291.995
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0138	0.0064	380.455	382.698
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0594	0.0266	921.946	931.355
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0404	0.0007	284.249	285.462
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0361	0.0010	347.533	348.737
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0315	0.0033	1189.795	1191.555
	Gasoline	MC	Motorcycles	0.1111	0.0031	389.445	393.133
Indiana	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0130	0.0043	286.921	288.526
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0141	0.0061	375.237	377.395
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0562	0.0251	911.009	919.888
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0396	0.0007	280.925	282.113
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0341	0.0010	342.831	343.969
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0289	0.0031	1191.791	1193.429
	Gasoline	MC	Motorcycles	0.1069	0.0029	389.561	393.094

**Table 5-27. On-Road Vehicle Speciated GHG Emission Factors – 2027 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
Iowa	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0146	0.0042	280.596	282.196
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0150	0.0055	366.805	368.830
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0537	0.0227	892.762	900.872
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0415	0.0006	274.285	275.509
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0336	0.0009	334.731	335.835
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0277	0.0028	1186.983	1188.521
Kansas	Gasoline	MC	Motorcycles	0.1032	0.0026	389.611	392.968
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0132	0.0042	280.893	282.479
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0142	0.0058	368.663	370.752
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0547	0.0238	892.974	901.424
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0373	0.0006	275.392	276.509
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0312	0.0009	337.286	338.330
Kentucky	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0252	0.0028	1194.860	1196.340
	Gasoline	MC	Motorcycles	0.1059	0.0027	390.935	394.381
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0122	0.0043	282.528	284.105
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0132	0.0059	370.643	372.724
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0516	0.0239	895.558	903.954
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0364	0.0006	277.139	278.236
Louisiana	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0302	0.0009	339.237	340.262
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0242	0.0028	1206.810	1208.247
	Gasoline	MC	Motorcycles	0.1029	0.0027	391.453	394.827
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0102	0.0043	292.261	293.801
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0114	0.0061	382.548	384.655
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0521	0.0253	917.876	926.703
Maine	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0275	0.0007	288.103	288.990
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0230	0.0010	351.640	352.501
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0195	0.0031	1194.632	1196.030
	Gasoline	MC	Motorcycles	0.1036	0.0029	389.461	392.912
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0141	0.0041	276.939	278.519
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0143	0.0055	362.665	364.645
Maryland	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0519	0.0222	883.768	891.687
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0447	0.0006	270.189	271.490
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0358	0.0009	330.496	331.651
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0291	0.0028	1183.954	1185.508
	Gasoline	MC	Motorcycles	0.1056	0.0025	390.149	393.538
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0110	0.0044	289.859	291.444
Massachusetts	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0124	0.0066	381.351	383.620
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0605	0.0274	918.141	927.817
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0370	0.0007	284.294	285.421
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0337	0.0010	349.063	350.208
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0297	0.0034	1176.934	1178.677
	Gasoline	MC	Motorcycles	0.1159	0.0031	390.094	393.903
Massachusetts	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0118	0.0045	292.655	294.277
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0135	0.0068	385.575	387.952
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0664	0.0289	931.850	942.119
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0422	0.0007	286.230	287.497
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0402	0.0011	351.983	353.307
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0375	0.0036	1172.030	1174.054
Massachusetts	Gasoline	MC	Motorcycles	0.1215	0.0033	389.472	393.480

**Table 5-27. On-Road Vehicle Speciated GHG Emission Factors – 2027 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
Michigan	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0144	0.0043	287.045	288.687
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0157	0.0062	375.640	377.863
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0602	0.0256	912.533	921.662
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0429	0.0007	280.523	281.795
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0377	0.0010	342.638	343.870
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0329	0.0032	1181.242	1183.012
	Gasoline	MC	Motorcycles	0.1114	0.0029	389.343	393.003
Minnesota	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0150	0.0042	282.882	284.511
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0158	0.0059	370.338	372.481
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0551	0.0244	898.640	907.266
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0457	0.0006	275.872	277.206
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0391	0.0009	337.257	338.512
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0336	0.0031	1172.569	1174.320
	Gasoline	MC	Motorcycles	0.0990	0.0027	389.698	392.991
Mississippi	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0105	0.0042	284.408	285.912
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0115	0.0056	372.208	374.166
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0479	0.0231	899.512	907.582
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0291	0.0006	280.032	280.947
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0231	0.0009	341.686	342.532
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0196	0.0029	1182.997	1184.349
	Gasoline	MC	Motorcycles	0.0996	0.0026	388.974	392.249
Missouri	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0123	0.0043	281.003	282.595
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0135	0.0061	370.547	372.705
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0545	0.0247	888.270	896.970
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0378	0.0006	275.493	276.621
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0324	0.0009	339.099	340.177
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0253	0.0028	1203.882	1205.349
	Gasoline	MC	Motorcycles	0.1050	0.0027	393.207	396.629
Montana	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0149	0.0041	275.284	276.880
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0150	0.0054	360.745	362.727
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0508	0.0219	880.889	888.675
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0457	0.0006	268.504	269.822
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0364	0.0008	328.693	329.852
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0283	0.0027	1200.127	1201.629
	Gasoline	MC	Motorcycles	0.0974	0.0025	391.180	394.358
Nebraska	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0143	0.0042	279.274	280.878
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0150	0.0057	366.154	368.219
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0539	0.0231	889.308	897.536
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0413	0.0006	273.128	274.341
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0340	0.0009	334.301	335.409
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0270	0.0028	1199.378	1200.878
	Gasoline	MC	Motorcycles	0.1031	0.0026	391.112	394.471
Nevada	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0125	0.0044	292.505	294.118
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0140	0.0064	383.348	385.608
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0723	0.0268	926.645	936.427
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0322	0.0007	287.757	288.765
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0283	0.0010	351.776	352.784
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0245	0.0033	1192.709	1194.296
	Gasoline	MC	Motorcycles	0.1284	0.0031	389.118	393.246

**Table 5-27. On-Road Vehicle Speciated GHG Emission Factors – 2027 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
New Hampshire	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0121	0.0043	282.966	284.539
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0130	0.0060	370.963	373.072
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0566	0.0247	898.371	907.134
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0437	0.0007	276.355	277.641
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0376	0.0009	338.259	339.478
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0315	0.0030	1180.026	1181.716
	Gasoline	MC	Motorcycles	0.1097	0.0028	390.345	393.911
New Jersey	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0112	0.0045	292.958	294.563
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0128	0.0068	385.924	388.275
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0646	0.0287	930.457	940.620
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0386	0.0007	287.105	288.280
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0363	0.0011	352.991	354.216
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0333	0.0036	1174.713	1176.613
	Gasoline	MC	Motorcycles	0.1206	0.0032	389.597	393.571
New Mexico	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0121	0.0042	283.462	285.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0129	0.0058	370.828	372.866
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0529	0.0236	899.647	907.985
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0353	0.0006	278.160	279.233
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0289	0.0009	339.461	340.455
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0234	0.0029	1199.538	1200.972
	Gasoline	MC	Motorcycles	0.1044	0.0027	390.078	393.493
New York	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0116	0.0044	288.821	290.419
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0129	0.0065	379.680	381.944
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0614	0.0272	916.690	926.314
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0414	0.0007	282.558	283.798
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0379	0.0010	346.698	347.947
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0333	0.0033	1181.150	1182.968
	Gasoline	MC	Motorcycles	0.1142	0.0030	390.237	394.001
North Carolina	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0103	0.0043	288.109	289.653
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0116	0.0062	377.479	379.606
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0537	0.0256	912.719	921.683
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0329	0.0007	283.118	284.140
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0283	0.0010	346.022	347.019
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0242	0.0031	1184.390	1185.931
	Gasoline	MC	Motorcycles	0.1042	0.0029	389.419	392.891
North Dakota	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0160	0.0041	276.064	277.672
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0158	0.0053	361.074	363.047
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0508	0.0217	882.490	890.219
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0480	0.0006	268.714	270.089
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0381	0.0008	328.461	329.663
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0307	0.0027	1185.755	1187.338
	Gasoline	MC	Motorcycles	0.0950	0.0025	390.021	393.135
Ohio	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0129	0.0043	285.744	287.357
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0143	0.0063	375.194	377.414
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0574	0.0259	906.932	916.068
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0405	0.0007	279.660	280.869
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0359	0.0010	342.729	343.913
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0303	0.0031	1187.687	1189.372
	Gasoline	MC	Motorcycles	0.1064	0.0029	390.615	394.141

**Table 5-27. On-Road Vehicle Speciated GHG Emission Factors – 2027 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
Oklahoma	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0119	0.0042	284.015	285.567
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0130	0.0058	372.229	374.272
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0524	0.0237	898.367	906.740
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0328	0.0006	279.134	280.142
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0269	0.0009	341.230	342.174
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0225	0.0029	1183.615	1185.049
	Gasoline	MC	Motorcycles	0.1037	0.0027	389.724	393.114
Oregon	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0119	0.0043	283.160	284.730
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0129	0.0060	370.520	372.634
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0563	0.0250	905.623	914.461
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0391	0.0007	277.346	278.518
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0335	0.0010	338.622	339.744
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0286	0.0031	1185.924	1187.558
	Gasoline	MC	Motorcycles	0.1071	0.0029	389.457	392.989
Pacific Islands	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0110	0.0043	286.952	288.514
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0123	0.0062	376.315	378.475
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0559	0.0258	911.257	920.335
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0346	0.0007	281.746	282.810
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0301	0.0010	344.713	345.755
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0259	0.0031	1186.439	1188.017
	Gasoline	MC	Motorcycles	0.1080	0.0029	389.789	393.363
Pennsylvania	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0117	0.0044	287.753	289.344
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0128	0.0063	377.151	379.332
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0569	0.0258	911.615	920.707
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0402	0.0007	281.688	282.893
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0352	0.0010	344.558	345.731
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0295	0.0031	1196.712	1198.365
	Gasoline	MC	Motorcycles	0.1079	0.0029	390.437	394.007
Puerto Rico	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0092	0.0036	304.105	305.400
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0107	0.0054	399.304	401.181
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0507	0.0232	952.146	960.320
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0174	0.0007	300.591	301.229
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0147	0.0010	368.135	368.808
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0156	0.0034	1177.077	1178.482
	Gasoline	MC	Motorcycles	0.1093	0.0031	387.719	391.374
Rhode Island	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0118	0.0044	289.985	291.598
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0134	0.0067	381.820	384.149
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0635	0.0280	921.490	931.413
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0413	0.0007	283.745	284.985
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0385	0.0010	348.719	349.991
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0343	0.0034	1178.876	1180.755
	Gasoline	MC	Motorcycles	0.1190	0.0031	390.228	394.136
South Carolina	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0109	0.0043	288.238	289.784
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0120	0.0059	376.866	378.934
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0511	0.0245	910.644	919.201
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0305	0.0007	283.615	284.572
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0252	0.0009	345.791	346.702
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0212	0.0030	1196.646	1198.062
	Gasoline	MC	Motorcycles	0.1026	0.0028	389.432	392.836

**Table 5-27. On-Road Vehicle Speciated GHG Emission Factors – 2027 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
South Dakota	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0143	0.0041	274.872	276.459
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0145	0.0054	361.067	363.050
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0487	0.0219	877.538	885.282
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0450	0.0006	268.190	269.487
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0359	0.0008	329.115	330.258
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0274	0.0026	1205.407	1206.870
	Gasoline	MC	Motorcycles	0.0937	0.0025	392.140	395.214
Tennessee	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0117	0.0043	288.975	290.561
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0131	0.0062	378.676	380.856
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0550	0.0258	914.319	923.359
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0341	0.0007	283.833	284.885
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0295	0.0010	346.979	348.007
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0250	0.0031	1192.269	1193.821
	Gasoline	MC	Motorcycles	0.1058	0.0029	389.822	393.339
Texas	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0100	0.0043	292.287	293.827
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0114	0.0063	383.189	385.336
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0564	0.0260	919.289	928.448
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0279	0.0007	288.090	288.987
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0238	0.0010	352.246	353.134
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0205	0.0032	1180.813	1182.281
	Gasoline	MC	Motorcycles	0.1127	0.0029	389.204	392.898
Utah	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0128	0.0043	285.196	286.804
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0141	0.0063	374.716	376.942
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0597	0.0260	907.176	916.406
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0415	0.0007	279.063	280.293
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0370	0.0010	342.224	343.433
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0307	0.0031	1194.174	1195.861
	Gasoline	MC	Motorcycles	0.1075	0.0029	390.989	394.552
Vermont	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0129	0.0041	275.810	277.358
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0130	0.0054	361.752	363.684
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0507	0.0219	879.605	887.395
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0452	0.0006	268.993	270.301
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0359	0.0009	329.616	330.767
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0285	0.0027	1189.775	1191.291
	Gasoline	MC	Motorcycles	0.1006	0.0024	390.845	394.089
Virgin Islands	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0114	0.0060	298.414	300.482
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0123	0.0076	387.569	390.144
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0589	0.0312	917.110	927.878
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0263	0.0007	295.804	296.670
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0189	0.0010	357.728	358.490
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0128	0.0034	1147.307	1148.643
	Gasoline	MC	Motorcycles	0.0992	0.0028	386.196	389.515
Virginia	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0116	0.0043	286.191	287.771
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0128	0.0062	375.540	377.701
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0549	0.0254	905.988	914.924
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0358	0.0007	280.823	281.913
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0309	0.0010	343.832	344.890
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0257	0.0030	1190.972	1192.521
	Gasoline	MC	Motorcycles	0.1086	0.0029	390.506	394.071

**Table 5-27. On-Road Vehicle Speciated GHG Emission Factors – 2027 (cont.)**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
Washington	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0129	0.0043	282.752	284.367
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0143	0.0063	371.692	373.927
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0569	0.0260	903.104	912.270
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0411	0.0007	276.718	277.941
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0366	0.0010	339.514	340.716
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0307	0.0031	1190.839	1192.530
	Gasoline	MC	Motorcycles	0.1042	0.0029	391.095	394.571
West Virginia	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0124	0.0042	280.833	282.399
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0133	0.0058	368.193	370.243
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0513	0.0236	892.565	900.876
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0380	0.0006	275.118	276.257
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0315	0.0009	336.621	337.678
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0260	0.0029	1185.416	1186.926
	Gasoline	MC	Motorcycles	0.1013	0.0026	390.271	393.592
Wisconsin	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0137	0.0042	281.126	282.719
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0143	0.0058	367.952	370.022
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0529	0.0237	894.376	902.743
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0442	0.0006	274.417	275.711
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0370	0.0009	335.379	336.574
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0308	0.0029	1181.765	1183.410
	Gasoline	MC	Motorcycles	0.1000	0.0027	389.978	393.276
Wyoming	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0153	0.0042	275.934	277.560
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0155	0.0055	362.129	364.160
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0514	0.0222	880.210	888.091
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0466	0.0006	269.055	270.394
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0374	0.0008	329.896	331.079
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0278	0.0026	1214.549	1216.018
	Gasoline	MC	Motorcycles	0.0973	0.0025	392.685	395.861



Table 5-28. EMFAC County-Specific On-Road Vehicle Composite EFs – 2023 POV

County	Vehicle Type	Emission Factors (g/mi)						
		Criteria Pollutants and Ozone Precursors						
		NO <sub>x</sub>	SO <sub>2</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
ALAMEDA	All Vehicles	0.178	0.004	1.773	0.280	0.022	0.009	0.027
ALPINE	All Vehicles	0.241	0.004	2.220	0.312	0.025	0.010	0.027
AMADOR	All Vehicles	0.325	0.004	2.704	0.412	0.023	0.010	0.027
BUTTE	All Vehicles	0.253	0.004	2.294	0.367	0.024	0.010	0.027
CALAVERAS	All Vehicles	0.331	0.004	2.885	0.425	0.026	0.011	0.027
COLUSA	All Vehicles	0.211	0.004	1.955	0.304	0.022	0.009	0.027
CONTRA COSTA	All Vehicles	0.184	0.004	1.792	0.280	0.023	0.009	0.027
DEL NORTE	All Vehicles	0.318	0.004	2.575	0.396	0.024	0.010	0.027
EL DORADO	All Vehicles	0.235	0.004	2.149	0.342	0.024	0.010	0.026
FRESNO	All Vehicles	0.200	0.004	1.908	0.309	0.021	0.008	0.027
GLENN	All Vehicles	0.220	0.004	2.082	0.326	0.024	0.010	0.027
HUMBOLDT	All Vehicles	0.300	0.004	2.460	0.384	0.023	0.010	0.027
IMPERIAL	All Vehicles	0.224	0.004	2.168	0.325	0.021	0.008	0.027
INYO	All Vehicles	0.237	0.004	2.187	0.336	0.023	0.009	0.027
KERN	All Vehicles	0.201	0.004	1.879	0.298	0.021	0.009	0.027
KINGS	All Vehicles	0.205	0.004	1.869	0.298	0.019	0.008	0.027
LAKE	All Vehicles	0.333	0.004	2.848	0.441	0.024	0.010	0.027
LASSEN	All Vehicles	0.276	0.004	2.486	0.367	0.026	0.011	0.027
LOS ANGELES	All Vehicles	0.181	0.004	1.900	0.264	0.025	0.010	0.027
MADERA	All Vehicles	0.225	0.004	1.961	0.325	0.020	0.008	0.027
MARIN	All Vehicles	0.189	0.004	1.833	0.298	0.022	0.009	0.027
MARIPOSA	All Vehicles	0.356	0.004	3.068	0.461	0.026	0.011	0.027
MENDOCINO	All Vehicles	0.283	0.004	2.387	0.371	0.024	0.010	0.027
MERCED	All Vehicles	0.237	0.004	2.145	0.326	0.023	0.009	0.027
MODOC	All Vehicles	0.296	0.004	2.675	0.371	0.027	0.012	0.027
MONO	All Vehicles	0.254	0.004	2.302	0.334	0.023	0.009	0.027
MONTEREY	All Vehicles	0.240	0.004	2.065	0.323	0.022	0.009	0.027
NAPA	All Vehicles	0.212	0.004	1.933	0.299	0.024	0.009	0.027
NEVADA	All Vehicles	0.278	0.004	2.356	0.379	0.024	0.010	0.027

County	Vehicle Type	Emission Factors (g/mi)						
		Criteria Pollutants and Ozone Precursors						
		NO <sub>x</sub>	SO <sub>2</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
ORANGE	All Vehicles	0.161	0.004	1.706	0.250	0.024	0.009	0.027
PLACER	All Vehicles	0.198	0.004	1.911	0.295	0.024	0.010	0.027
PLUMAS	All Vehicles	0.328	0.004	2.929	0.417	0.028	0.012	0.027
RIVERSIDE	All Vehicles	0.187	0.004	1.806	0.269	0.021	0.008	0.027
SACRAMENTO	All Vehicles	0.205	0.004	1.985	0.315	0.024	0.009	0.027
SAN BENITO	All Vehicles	0.216	0.003	2.011	0.320	0.024	0.010	0.027
SAN BERNARDINO	All Vehicles	0.202	0.004	1.869	0.283	0.022	0.008	0.027
SAN DIEGO	All Vehicles	0.197	0.004	1.843	0.279	0.023	0.010	0.027
SAN FRANCISCO	All Vehicles	0.153	0.004	1.878	0.284	0.026	0.010	0.027
SAN JOAQUIN	All Vehicles	0.205	0.004	1.973	0.307	0.024	0.010	0.027
SAN LUIS OBISPO	All Vehicles	0.225	0.004	1.970	0.329	0.022	0.009	0.027
SAN MATEO	All Vehicles	0.158	0.004	1.663	0.267	0.022	0.009	0.027
SANTA BARBARA	All Vehicles	0.235	0.004	2.031	0.333	0.022	0.009	0.027
SANTA CLARA	All Vehicles	0.182	0.004	1.789	0.273	0.023	0.009	0.027
SANTA CRUZ	All Vehicles	0.264	0.004	2.347	0.364	0.026	0.010	0.027
SHASTA	All Vehicles	0.245	0.004	2.132	0.344	0.023	0.009	0.027
SIERRA	All Vehicles	0.292	0.004	2.586	0.364	0.027	0.012	0.027
SISKIYOU	All Vehicles	0.300	0.004	2.592	0.383	0.025	0.011	0.027
SOLANO	All Vehicles	0.203	0.004	1.797	0.289	0.021	0.008	0.027
SONOMA	All Vehicles	0.236	0.004	2.141	0.332	0.025	0.010	0.027
STANISLAUS	All Vehicles	0.216	0.003	2.052	0.320	0.025	0.010	0.027
SUTTER	All Vehicles	0.220	0.004	2.089	0.325	0.024	0.010	0.027
TEHAMA	All Vehicles	0.249	0.004	2.194	0.340	0.023	0.010	0.027
TRINITY	All Vehicles	0.307	0.004	2.749	0.386	0.027	0.012	0.027
TULARE	All Vehicles	0.230	0.004	2.074	0.320	0.023	0.009	0.027
TUOLUMNE	All Vehicles	0.324	0.004	2.820	0.436	0.026	0.011	0.027
VENTURA	All Vehicles	0.203	0.004	1.842	0.286	0.022	0.009	0.027
YOLO	All Vehicles	0.195	0.004	1.911	0.295	0.023	0.009	0.027
YUBA	All Vehicles	0.248	0.004	2.159	0.339	0.023	0.009	0.027

Table 5-29. EMFAC County-Specific On-Road Vehicle Composite EFs – 2024 POV

County	Vehicle Type	Emission Factors (g/mi)						
		Criteria Pollutants and Ozone Precursors						
		NO <sub>x</sub>	SO <sub>2</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
ALAMEDA	All Vehicles	0.154	0.003	1.576	0.255	0.021	0.008	0.027
ALPINE	All Vehicles	0.209	0.003	1.959	0.283	0.023	0.009	0.027
AMADOR	All Vehicles	0.292	0.003	2.451	0.383	0.022	0.009	0.027
BUTTE	All Vehicles	0.222	0.003	2.045	0.335	0.022	0.009	0.027
CALAVERAS	All Vehicles	0.296	0.004	2.600	0.393	0.025	0.010	0.027
COLUSA	All Vehicles	0.184	0.003	1.733	0.276	0.020	0.008	0.027
CONTRA COSTA	All Vehicles	0.161	0.003	1.598	0.256	0.021	0.008	0.027
DEL NORTE	All Vehicles	0.282	0.004	2.315	0.365	0.022	0.009	0.027
EL DORADO	All Vehicles	0.209	0.003	1.933	0.318	0.023	0.009	0.026
FRESNO	All Vehicles	0.175	0.003	1.701	0.282	0.020	0.008	0.027
GLENN	All Vehicles	0.192	0.003	1.844	0.296	0.022	0.009	0.027
HUMBOLDT	All Vehicles	0.267	0.003	2.219	0.357	0.022	0.009	0.027
IMPERIAL	All Vehicles	0.195	0.004	1.921	0.293	0.019	0.007	0.027
INYO	All Vehicles	0.207	0.004	1.937	0.307	0.021	0.009	0.027
KERN	All Vehicles	0.177	0.003	1.678	0.271	0.020	0.008	0.027
KINGS	All Vehicles	0.180	0.004	1.665	0.271	0.018	0.007	0.027
LAKE	All Vehicles	0.296	0.004	2.563	0.408	0.023	0.010	0.027
LASSEN	All Vehicles	0.242	0.004	2.214	0.337	0.024	0.010	0.027
LOS ANGELES	All Vehicles	0.155	0.003	1.661	0.236	0.023	0.009	0.027
MADERA	All Vehicles	0.197	0.003	1.747	0.296	0.019	0.007	0.027
MARIN	All Vehicles	0.164	0.003	1.621	0.271	0.020	0.008	0.027
MARIPOSA	All Vehicles	0.317	0.004	2.757	0.425	0.025	0.010	0.027
MENDOCINO	All Vehicles	0.249	0.003	2.135	0.342	0.022	0.009	0.027
MERCED	All Vehicles	0.210	0.003	1.921	0.297	0.022	0.009	0.027
MODOC	All Vehicles	0.260	0.004	2.377	0.337	0.025	0.011	0.027
MONO	All Vehicles	0.223	0.003	2.046	0.305	0.021	0.009	0.027
MONTEREY	All Vehicles	0.212	0.003	1.854	0.297	0.021	0.008	0.027
NAPA	All Vehicles	0.187	0.003	1.723	0.273	0.022	0.009	0.027
NEVADA	All Vehicles	0.246	0.003	2.129	0.354	0.022	0.009	0.027

County	Vehicle Type	Emission Factors (g/mi)						
		Criteria Pollutants and Ozone Precursors						
		NO <sub>x</sub>	SO <sub>2</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
ORANGE	All Vehicles	0.139	0.003	1.499	0.226	0.021	0.008	0.027
PLACER	All Vehicles	0.175	0.003	1.714	0.271	0.022	0.009	0.027
PLUMAS	All Vehicles	0.288	0.004	2.609	0.382	0.026	0.011	0.027
RIVERSIDE	All Vehicles	0.163	0.003	1.604	0.245	0.020	0.008	0.027
SACRAMENTO	All Vehicles	0.181	0.003	1.784	0.291	0.022	0.009	0.027
SAN BENITO	All Vehicles	0.190	0.003	1.806	0.295	0.023	0.009	0.027
SAN BERNARDINO	All Vehicles	0.176	0.003	1.653	0.257	0.020	0.008	0.027
SAN DIEGO	All Vehicles	0.172	0.004	1.637	0.253	0.022	0.009	0.027
SAN FRANCISCO	All Vehicles	0.134	0.004	1.671	0.258	0.024	0.009	0.027
SAN JOAQUIN	All Vehicles	0.180	0.003	1.768	0.280	0.023	0.009	0.027
SAN LUIS OBISPO	All Vehicles	0.199	0.003	1.768	0.303	0.020	0.008	0.027
SAN MATEO	All Vehicles	0.131	0.003	1.444	0.239	0.020	0.008	0.027
SANTA BARBARA	All Vehicles	0.207	0.003	1.823	0.306	0.021	0.008	0.027
SANTA CLARA	All Vehicles	0.158	0.003	1.590	0.248	0.021	0.008	0.027
SANTA CRUZ	All Vehicles	0.233	0.003	2.105	0.335	0.024	0.010	0.027
SHASTA	All Vehicles	0.214	0.003	1.893	0.314	0.021	0.009	0.027
SIERRA	All Vehicles	0.254	0.004	2.287	0.331	0.025	0.011	0.027
SISKIYOU	All Vehicles	0.262	0.004	2.301	0.350	0.023	0.010	0.027
SOLANO	All Vehicles	0.179	0.003	1.607	0.264	0.019	0.008	0.027
SONOMA	All Vehicles	0.206	0.003	1.900	0.302	0.023	0.009	0.027
STANISLAUS	All Vehicles	0.191	0.003	1.842	0.293	0.023	0.009	0.027
SUTTER	All Vehicles	0.194	0.003	1.863	0.297	0.022	0.009	0.027
TEHAMA	All Vehicles	0.218	0.003	1.948	0.309	0.022	0.009	0.027
TRINITY	All Vehicles	0.268	0.004	2.432	0.351	0.025	0.011	0.027
TULARE	All Vehicles	0.203	0.003	1.852	0.291	0.022	0.009	0.027
TUOLUMNE	All Vehicles	0.287	0.004	2.524	0.402	0.024	0.010	0.027
VENTURA	All Vehicles	0.177	0.003	1.626	0.259	0.021	0.008	0.027
YOLO	All Vehicles	0.173	0.003	1.716	0.272	0.022	0.009	0.027
YUBA	All Vehicles	0.218	0.003	1.931	0.311	0.022	0.009	0.027

Table 5-30. EMFAC County-Specific On-Road Vehicle Composite EFs – 2025 POV

County	Vehicle Type	Emission Factors (g/mi)						
		Criteria Pollutants and Ozone Precursors						
		NO <sub>x</sub>	SO <sub>2</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
ALAMEDA	All Vehicles	0.137	0.003	1.415	0.235	0.019	0.007	0.027
ALPINE	All Vehicles	0.184	0.003	1.748	0.261	0.021	0.008	0.027
AMADOR	All Vehicles	0.263	0.003	2.229	0.360	0.021	0.009	0.027
BUTTE	All Vehicles	0.196	0.003	1.835	0.311	0.021	0.008	0.027
CALAVERAS	All Vehicles	0.266	0.003	2.356	0.369	0.023	0.010	0.027
COLUSA	All Vehicles	0.162	0.003	1.552	0.255	0.019	0.007	0.027
CONTRA COSTA	All Vehicles	0.143	0.003	1.439	0.237	0.020	0.008	0.027
DEL NORTE	All Vehicles	0.251	0.003	2.091	0.341	0.021	0.009	0.027
EL DORADO	All Vehicles	0.186	0.003	1.755	0.299	0.021	0.008	0.026
FRESNO	All Vehicles	0.155	0.003	1.531	0.261	0.018	0.007	0.027
GLENN	All Vehicles	0.169	0.003	1.649	0.273	0.020	0.008	0.027
HUMBOLDT	All Vehicles	0.238	0.003	2.015	0.335	0.021	0.009	0.027
IMPERIAL	All Vehicles	0.171	0.003	1.714	0.270	0.018	0.007	0.027
INYO	All Vehicles	0.182	0.003	1.729	0.283	0.019	0.008	0.027
KERN	All Vehicles	0.157	0.003	1.510	0.251	0.019	0.007	0.027
KINGS	All Vehicles	0.160	0.003	1.498	0.251	0.017	0.007	0.027
LAKE	All Vehicles	0.264	0.003	2.321	0.383	0.022	0.009	0.027
LASSEN	All Vehicles	0.214	0.003	1.986	0.313	0.022	0.009	0.027
LOS ANGELES	All Vehicles	0.135	0.003	1.472	0.216	0.021	0.008	0.027
MADERA	All Vehicles	0.174	0.003	1.567	0.274	0.017	0.007	0.027
MARIN	All Vehicles	0.144	0.003	1.448	0.250	0.019	0.007	0.027
MARIPOSA	All Vehicles	0.284	0.003	2.493	0.397	0.023	0.010	0.027
MENDOCINO	All Vehicles	0.221	0.003	1.925	0.320	0.021	0.009	0.027
MERCED	All Vehicles	0.187	0.003	1.738	0.275	0.020	0.008	0.027
MODOC	All Vehicles	0.230	0.004	2.131	0.311	0.024	0.010	0.027
MONO	All Vehicles	0.197	0.003	1.837	0.282	0.020	0.008	0.027
MONTEREY	All Vehicles	0.189	0.003	1.680	0.278	0.020	0.008	0.027
NAPA	All Vehicles	0.166	0.003	1.550	0.252	0.021	0.008	0.027
NEVADA	All Vehicles	0.220	0.003	1.937	0.335	0.021	0.008	0.027

County	Vehicle Type	Emission Factors (g/mi)						
		Criteria Pollutants and Ozone Precursors						
		NO <sub>x</sub>	SO <sub>2</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
ORANGE	All Vehicles	0.122	0.003	1.335	0.207	0.020	0.007	0.027
PLACER	All Vehicles	0.156	0.003	1.550	0.252	0.021	0.008	0.027
PLUMAS	All Vehicles	0.254	0.003	2.338	0.355	0.024	0.010	0.027
RIVERSIDE	All Vehicles	0.144	0.003	1.440	0.226	0.018	0.007	0.027
SACRAMENTO	All Vehicles	0.161	0.003	1.616	0.272	0.021	0.008	0.027
SAN BENITO	All Vehicles	0.169	0.003	1.637	0.276	0.021	0.009	0.027
SAN BERNARDINO	All Vehicles	0.155	0.003	1.479	0.237	0.018	0.007	0.027
SAN DIEGO	All Vehicles	0.152	0.003	1.466	0.233	0.020	0.008	0.027
SAN FRANCISCO	All Vehicles	0.120	0.003	1.501	0.239	0.022	0.009	0.027
SAN JOAQUIN	All Vehicles	0.159	0.003	1.595	0.260	0.021	0.008	0.027
SAN LUIS OBISPO	All Vehicles	0.178	0.003	1.599	0.284	0.019	0.008	0.027
SAN MATEO	All Vehicles	0.114	0.003	1.274	0.219	0.018	0.007	0.027
SANTA BARBARA	All Vehicles	0.185	0.003	1.651	0.286	0.020	0.008	0.027
SANTA CLARA	All Vehicles	0.140	0.003	1.427	0.229	0.020	0.008	0.027
SANTA CRUZ	All Vehicles	0.206	0.003	1.903	0.313	0.023	0.009	0.027
SHASTA	All Vehicles	0.189	0.003	1.696	0.292	0.019	0.008	0.027
SIERRA	All Vehicles	0.223	0.003	2.040	0.305	0.023	0.010	0.027
SISKIYOU	All Vehicles	0.231	0.003	2.061	0.324	0.022	0.009	0.027
SOLANO	All Vehicles	0.159	0.003	1.449	0.245	0.018	0.007	0.027
SONOMA	All Vehicles	0.183	0.003	1.702	0.279	0.021	0.009	0.027
STANISLAUS	All Vehicles	0.169	0.003	1.663	0.272	0.022	0.009	0.027
SUTTER	All Vehicles	0.172	0.003	1.678	0.275	0.021	0.008	0.027
TEHAMA	All Vehicles	0.193	0.003	1.744	0.286	0.020	0.008	0.027
TRINITY	All Vehicles	0.236	0.003	2.170	0.324	0.023	0.010	0.027
TULARE	All Vehicles	0.180	0.003	1.669	0.270	0.020	0.008	0.027
TUOLUMNE	All Vehicles	0.255	0.003	2.272	0.375	0.023	0.009	0.027
VENTURA	All Vehicles	0.156	0.003	1.450	0.238	0.019	0.007	0.027
YOLO	All Vehicles	0.154	0.003	1.554	0.254	0.020	0.008	0.027
YUBA	All Vehicles	0.193	0.003	1.741	0.290	0.020	0.008	0.027

Table 5-31. EMFAC County-Specific On-Road Vehicle Composite EFs – 2026 POV

County	Vehicle Type	Emission Factors (g/mi)						
		Criteria Pollutants and Ozone Precursors						
		NO <sub>x</sub>	SO <sub>2</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
ALAMEDA	All Vehicles	0.123	0.003	1.285	0.220	0.018	0.007	0.027
ALPINE	All Vehicles	0.164	0.003	1.576	0.244	0.019	0.008	0.027
AMADOR	All Vehicles	0.238	0.003	2.042	0.339	0.020	0.008	0.027
BUTTE	All Vehicles	0.175	0.003	1.663	0.291	0.019	0.008	0.027
CALAVERAS	All Vehicles	0.240	0.003	2.151	0.348	0.022	0.009	0.027
COLUSA	All Vehicles	0.145	0.003	1.406	0.239	0.017	0.007	0.027
CONTRA COSTA	All Vehicles	0.128	0.003	1.308	0.222	0.018	0.007	0.027
DEL NORTE	All Vehicles	0.225	0.003	1.904	0.321	0.020	0.008	0.027
EL DORADO	All Vehicles	0.168	0.003	1.607	0.284	0.020	0.008	0.026
FRESNO	All Vehicles	0.139	0.003	1.392	0.245	0.017	0.007	0.027
GLENN	All Vehicles	0.151	0.003	1.490	0.255	0.019	0.008	0.027
HUMBOLDT	All Vehicles	0.214	0.003	1.843	0.318	0.019	0.008	0.027
IMPERIAL	All Vehicles	0.153	0.003	1.547	0.251	0.016	0.006	0.027
INYO	All Vehicles	0.162	0.003	1.560	0.265	0.018	0.007	0.027
KERN	All Vehicles	0.141	0.003	1.374	0.236	0.017	0.007	0.027
KINGS	All Vehicles	0.144	0.003	1.362	0.235	0.016	0.006	0.027
LAKE	All Vehicles	0.237	0.003	2.118	0.362	0.020	0.008	0.027
LASSEN	All Vehicles	0.190	0.003	1.799	0.294	0.020	0.008	0.027
LOS ANGELES	All Vehicles	0.120	0.003	1.322	0.200	0.019	0.007	0.027
MADERA	All Vehicles	0.156	0.003	1.421	0.256	0.016	0.006	0.027
MARIN	All Vehicles	0.129	0.003	1.308	0.233	0.017	0.007	0.027
MARIPOSA	All Vehicles	0.255	0.003	2.267	0.372	0.022	0.009	0.027
MENDOCINO	All Vehicles	0.198	0.003	1.752	0.301	0.019	0.008	0.027
MERCED	All Vehicles	0.168	0.003	1.588	0.258	0.019	0.008	0.027
MODOC	All Vehicles	0.205	0.003	1.930	0.291	0.022	0.009	0.027
MONO	All Vehicles	0.176	0.003	1.666	0.265	0.018	0.007	0.027
MONTEREY	All Vehicles	0.170	0.003	1.536	0.262	0.018	0.007	0.027
NAPA	All Vehicles	0.149	0.003	1.408	0.236	0.019	0.008	0.027
NEVADA	All Vehicles	0.198	0.003	1.776	0.319	0.019	0.008	0.027

County	Vehicle Type	Emission Factors (g/mi)						
		Criteria Pollutants and Ozone Precursors						
		NO <sub>x</sub>	SO <sub>2</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
ORANGE	All Vehicles	0.109	0.003	1.204	0.193	0.018	0.007	0.027
PLACER	All Vehicles	0.141	0.003	1.416	0.238	0.019	0.008	0.027
PLUMAS	All Vehicles	0.226	0.003	2.112	0.332	0.022	0.009	0.027
RIVERSIDE	All Vehicles	0.129	0.003	1.308	0.212	0.017	0.007	0.027
SACRAMENTO	All Vehicles	0.145	0.003	1.478	0.258	0.019	0.008	0.027
SAN BENITO	All Vehicles	0.151	0.003	1.500	0.261	0.020	0.008	0.027
SAN BERNARDINO	All Vehicles	0.139	0.003	1.339	0.221	0.017	0.007	0.027
SAN DIEGO	All Vehicles	0.136	0.003	1.322	0.217	0.018	0.007	0.027
SAN FRANCISCO	All Vehicles	0.108	0.003	1.360	0.224	0.020	0.008	0.027
SAN JOAQUIN	All Vehicles	0.143	0.003	1.454	0.244	0.020	0.008	0.027
SAN LUIS OBISPO	All Vehicles	0.160	0.003	1.459	0.268	0.018	0.007	0.027
SAN MATEO	All Vehicles	0.102	0.003	1.144	0.204	0.016	0.006	0.027
SANTA BARBARA	All Vehicles	0.166	0.003	1.490	0.269	0.018	0.007	0.027
SANTA CLARA	All Vehicles	0.125	0.003	1.297	0.215	0.018	0.007	0.027
SANTA CRUZ	All Vehicles	0.185	0.003	1.736	0.295	0.021	0.008	0.027
SHASTA	All Vehicles	0.169	0.003	1.534	0.273	0.018	0.007	0.027
SIERRA	All Vehicles	0.198	0.003	1.842	0.286	0.021	0.009	0.027
SISKIYOU	All Vehicles	0.206	0.003	1.864	0.304	0.020	0.008	0.027
SOLANO	All Vehicles	0.143	0.003	1.318	0.230	0.017	0.007	0.027
SONOMA	All Vehicles	0.163	0.003	1.540	0.260	0.020	0.008	0.027
STANISLAUS	All Vehicles	0.152	0.003	1.516	0.256	0.020	0.008	0.027
SUTTER	All Vehicles	0.154	0.003	1.527	0.258	0.019	0.008	0.027
TEHAMA	All Vehicles	0.172	0.003	1.579	0.267	0.018	0.008	0.027
TRINITY	All Vehicles	0.210	0.003	1.957	0.302	0.021	0.009	0.027
TULARE	All Vehicles	0.162	0.003	1.519	0.253	0.019	0.008	0.027
TUOLUMNE	All Vehicles	0.228	0.003	2.061	0.352	0.021	0.009	0.027
VENTURA	All Vehicles	0.139	0.003	1.307	0.222	0.017	0.007	0.027
YOLO	All Vehicles	0.139	0.003	1.421	0.240	0.019	0.007	0.027
YUBA	All Vehicles	0.172	0.003	1.584	0.273	0.019	0.008	0.027

Table 5-32. EMFAC County-Specific On-Road Vehicle Composite EFs – 2023 GOV

County	Vehicle Type	Emission Factors (g/mi)						
		Criteria Pollutants and Ozone Precursors						
		NO <sub>x</sub>	SO <sub>2</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
ALAMEDA	All Vehicles	0.454	0.005	1.085	0.146	0.044	0.020	0.026
ALPINE	All Vehicles	0.695	0.004	1.452	0.186	0.050	0.025	0.026
AMADOR	All Vehicles	0.922	0.004	1.907	0.260	0.052	0.028	0.026
BUTTE	All Vehicles	0.747	0.005	1.551	0.218	0.051	0.027	0.026
CALAVERAS	All Vehicles	0.948	0.005	2.070	0.268	0.055	0.030	0.026
COLUSA	All Vehicles	0.608	0.004	1.298	0.177	0.046	0.023	0.026
CONTRA COSTA	All Vehicles	0.515	0.005	1.108	0.148	0.045	0.022	0.026
DEL NORTE	All Vehicles	0.914	0.005	1.812	0.253	0.053	0.029	0.026
EL DORADO	All Vehicles	0.736	0.004	1.389	0.194	0.050	0.026	0.026
FRESNO	All Vehicles	0.583	0.004	1.237	0.171	0.044	0.022	0.026
GLENN	All Vehicles	0.672	0.005	1.394	0.192	0.049	0.025	0.026
HUMBOLDT	All Vehicles	0.867	0.004	1.671	0.235	0.051	0.028	0.026
IMPERIAL	All Vehicles	0.621	0.004	1.458	0.172	0.041	0.020	0.026
INYO	All Vehicles	0.699	0.005	1.467	0.200	0.049	0.025	0.026
KERN	All Vehicles	0.591	0.004	1.217	0.167	0.045	0.023	0.026
KINGS	All Vehicles	0.597	0.005	1.239	0.172	0.044	0.023	0.026
LAKE	All Vehicles	0.923	0.005	1.942	0.272	0.053	0.029	0.026
LASSEN	All Vehicles	0.828	0.005	1.710	0.229	0.053	0.028	0.026
LOS ANGELES	All Vehicles	0.440	0.004	1.208	0.135	0.044	0.019	0.026
MADERA	All Vehicles	0.674	0.005	1.287	0.190	0.045	0.023	0.026
MARIN	All Vehicles	0.494	0.004	1.113	0.156	0.043	0.021	0.026
MARIPOSA	All Vehicles	0.999	0.005	2.168	0.297	0.056	0.030	0.026
MENDOCINO	All Vehicles	0.832	0.004	1.641	0.228	0.051	0.028	0.026
MERCED	All Vehicles	0.692	0.004	1.476	0.195	0.047	0.024	0.026
MODOC	All Vehicles	0.879	0.005	1.864	0.235	0.056	0.031	0.026
MONO	All Vehicles	0.710	0.005	1.505	0.199	0.048	0.025	0.026
MONTEREY	All Vehicles	0.643	0.005	1.342	0.183	0.045	0.022	0.026
NAPA	All Vehicles	0.636	0.005	1.242	0.168	0.047	0.024	0.026
NEVADA	All Vehicles	0.857	0.004	1.561	0.220	0.051	0.027	0.026

County	Vehicle Type	Emission Factors (g/mi)						
		Criteria Pollutants and Ozone Precursors						
		NO <sub>x</sub>	SO <sub>2</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
ORANGE	All Vehicles	0.411	0.004	1.043	0.121	0.042	0.018	0.026
PLACER	All Vehicles	0.611	0.004	1.181	0.156	0.047	0.024	0.026
PLUMAS	All Vehicles	0.944	0.005	2.059	0.262	0.056	0.030	0.026
RIVERSIDE	All Vehicles	0.539	0.004	1.143	0.133	0.042	0.019	0.026
SACRAMENTO	All Vehicles	0.607	0.005	1.250	0.169	0.046	0.023	0.026
SAN BENITO	All Vehicles	0.625	0.004	1.303	0.182	0.048	0.024	0.026
SAN BERNARDINO	All Vehicles	0.583	0.004	1.187	0.145	0.042	0.019	0.026
SAN DIEGO	All Vehicles	0.578	0.005	1.225	0.161	0.046	0.023	0.026
SAN FRANCISCO	All Vehicles	0.292	0.005	1.097	0.132	0.047	0.020	0.026
SAN JOAQUIN	All Vehicles	0.596	0.005	1.276	0.169	0.047	0.023	0.026
SAN LUIS OBISPO	All Vehicles	0.659	0.004	1.235	0.181	0.047	0.024	0.026
SAN MATEO	All Vehicles	0.376	0.005	0.983	0.129	0.042	0.019	0.026
SANTA BARBARA	All Vehicles	0.617	0.004	1.311	0.186	0.045	0.022	0.026
SANTA CLARA	All Vehicles	0.472	0.005	1.127	0.147	0.044	0.021	0.026
SANTA CRUZ	All Vehicles	0.718	0.005	1.516	0.203	0.049	0.025	0.026
SHASTA	All Vehicles	0.776	0.004	1.400	0.199	0.049	0.026	0.026
SIERRA	All Vehicles	0.855	0.005	1.794	0.228	0.054	0.029	0.026
SISKIYOU	All Vehicles	0.907	0.005	1.776	0.238	0.054	0.030	0.026
SOLANO	All Vehicles	0.594	0.005	1.119	0.161	0.044	0.022	0.026
SONOMA	All Vehicles	0.670	0.005	1.398	0.191	0.050	0.025	0.026
STANISLAUS	All Vehicles	0.643	0.004	1.357	0.184	0.049	0.025	0.026
SUTTER	All Vehicles	0.628	0.004	1.375	0.185	0.047	0.024	0.026
TEHAMA	All Vehicles	0.759	0.005	1.468	0.201	0.050	0.026	0.026
TRINITY	All Vehicles	0.900	0.005	1.924	0.240	0.055	0.030	0.026
TULARE	All Vehicles	0.668	0.004	1.411	0.190	0.048	0.025	0.026
TUOLUMNE	All Vehicles	0.921	0.005	1.946	0.267	0.054	0.029	0.026
VENTURA	All Vehicles	0.571	0.004	1.145	0.146	0.043	0.020	0.026
YOLO	All Vehicles	0.583	0.004	1.216	0.161	0.046	0.023	0.026
YUBA	All Vehicles	0.762	0.004	1.463	0.203	0.048	0.025	0.026

Table 5-33. EMFAC County-Specific On-Road Vehicle Composite EFs – 2024 GOV

County	Vehicle Type	Emission Factors (g/mi)						
		Criteria Pollutants and Ozone Precursors						
		NO <sub>x</sub>	SO <sub>2</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
ALAMEDA	All Vehicles	0.396	0.004	0.964	0.131	0.041	0.019	0.026
ALPINE	All Vehicles	0.612	0.004	1.282	0.167	0.046	0.023	0.026
AMADOR	All Vehicles	0.839	0.004	1.726	0.239	0.049	0.026	0.026
BUTTE	All Vehicles	0.666	0.004	1.376	0.196	0.047	0.024	0.026
CALAVERAS	All Vehicles	0.856	0.004	1.864	0.246	0.051	0.028	0.026
COLUSA	All Vehicles	0.540	0.004	1.147	0.160	0.043	0.021	0.026
CONTRA COSTA	All Vehicles	0.453	0.004	0.988	0.134	0.042	0.020	0.026
DEL NORTE	All Vehicles	0.820	0.004	1.626	0.231	0.049	0.027	0.026
EL DORADO	All Vehicles	0.658	0.004	1.253	0.179	0.046	0.024	0.026
FRESNO	All Vehicles	0.518	0.004	1.100	0.154	0.041	0.020	0.026
GLENN	All Vehicles	0.597	0.004	1.228	0.172	0.045	0.023	0.026
HUMBOLDT	All Vehicles	0.778	0.004	1.506	0.216	0.047	0.025	0.026
IMPERIAL	All Vehicles	0.542	0.004	1.285	0.153	0.038	0.018	0.026
INYO	All Vehicles	0.617	0.004	1.298	0.181	0.045	0.023	0.026
KERN	All Vehicles	0.529	0.004	1.088	0.151	0.042	0.021	0.026
KINGS	All Vehicles	0.532	0.004	1.101	0.155	0.041	0.021	0.026
LAKE	All Vehicles	0.830	0.004	1.739	0.248	0.050	0.027	0.026
LASSEN	All Vehicles	0.735	0.004	1.520	0.207	0.049	0.026	0.026
LOS ANGELES	All Vehicles	0.378	0.004	1.053	0.119	0.040	0.018	0.026
MADERA	All Vehicles	0.601	0.004	1.142	0.171	0.041	0.021	0.026
MARIN	All Vehicles	0.432	0.004	0.988	0.141	0.040	0.019	0.026
MARIPOSA	All Vehicles	0.903	0.004	1.944	0.271	0.052	0.028	0.026
MENDOCINO	All Vehicles	0.740	0.004	1.466	0.207	0.047	0.025	0.026
MERCED	All Vehicles	0.625	0.004	1.314	0.176	0.044	0.023	0.026
MODOC	All Vehicles	0.782	0.005	1.654	0.212	0.052	0.028	0.026
MONO	All Vehicles	0.628	0.004	1.338	0.180	0.044	0.023	0.026
MONTEREY	All Vehicles	0.577	0.004	1.207	0.168	0.042	0.021	0.026
NAPA	All Vehicles	0.570	0.004	1.108	0.153	0.044	0.022	0.026
NEVADA	All Vehicles	0.766	0.004	1.413	0.204	0.047	0.025	0.026

County	Vehicle Type	Emission Factors (g/mi)						
		Criteria Pollutants and Ozone Precursors						
		NO <sub>x</sub>	SO <sub>2</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
ORANGE	All Vehicles	0.357	0.004	0.915	0.108	0.038	0.017	0.026
PLACER	All Vehicles	0.546	0.004	1.060	0.142	0.044	0.022	0.026
PLUMAS	All Vehicles	0.839	0.004	1.831	0.237	0.052	0.027	0.026
RIVERSIDE	All Vehicles	0.475	0.004	1.011	0.120	0.039	0.018	0.026
SACRAMENTO	All Vehicles	0.540	0.004	1.121	0.155	0.043	0.021	0.026
SAN BENITO	All Vehicles	0.558	0.004	1.166	0.165	0.045	0.022	0.026
SAN BERNARDINO	All Vehicles	0.514	0.004	1.045	0.130	0.039	0.018	0.026
SAN DIEGO	All Vehicles	0.509	0.004	1.086	0.145	0.043	0.021	0.026
SAN FRANCISCO	All Vehicles	0.263	0.005	0.984	0.120	0.044	0.019	0.026
SAN JOAQUIN	All Vehicles	0.531	0.004	1.139	0.152	0.043	0.021	0.026
SAN LUIS OBISPO	All Vehicles	0.592	0.004	1.111	0.166	0.043	0.022	0.026
SAN MATEO	All Vehicles	0.300	0.004	0.862	0.115	0.038	0.017	0.026
SANTA BARBARA	All Vehicles	0.554	0.004	1.180	0.171	0.042	0.021	0.026
SANTA CLARA	All Vehicles	0.412	0.004	1.001	0.132	0.041	0.019	0.026
SANTA CRUZ	All Vehicles	0.638	0.004	1.359	0.185	0.046	0.023	0.026
SHASTA	All Vehicles	0.690	0.004	1.238	0.179	0.045	0.023	0.026
SIERRA	All Vehicles	0.750	0.004	1.584	0.204	0.050	0.026	0.026
SISKIYOU	All Vehicles	0.802	0.004	1.574	0.215	0.050	0.027	0.026
SOLANO	All Vehicles	0.531	0.004	0.998	0.146	0.041	0.021	0.026
SONOMA	All Vehicles	0.598	0.004	1.237	0.172	0.046	0.023	0.026
STANISLAUS	All Vehicles	0.576	0.004	1.214	0.167	0.046	0.023	0.026
SUTTER	All Vehicles	0.563	0.004	1.222	0.167	0.044	0.022	0.026
TEHAMA	All Vehicles	0.676	0.004	1.297	0.180	0.046	0.024	0.026
TRINITY	All Vehicles	0.794	0.005	1.700	0.216	0.051	0.027	0.026
TULARE	All Vehicles	0.598	0.004	1.254	0.171	0.044	0.023	0.026
TUOLUMNE	All Vehicles	0.827	0.004	1.738	0.244	0.050	0.027	0.026
VENTURA	All Vehicles	0.503	0.004	1.006	0.130	0.040	0.018	0.026
YOLO	All Vehicles	0.523	0.004	1.091	0.146	0.043	0.021	0.026
YUBA	All Vehicles	0.684	0.004	1.296	0.183	0.045	0.023	0.026

**Table 5-34. EMFAC County-Specific On-Road Vehicle Composite EFs – 2025 GOV**

County	Vehicle Type	Emission Factors (g/mi)						
		Criteria Pollutants and Ozone Precursors						
		NO <sub>x</sub>	SO <sub>2</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
ALAMEDA	All Vehicles	0.351	0.004	0.866	0.120	0.038	0.017	0.026
ALPINE	All Vehicles	0.541	0.004	1.143	0.153	0.042	0.021	0.026
AMADOR	All Vehicles	0.760	0.004	1.565	0.221	0.045	0.024	0.026
BUTTE	All Vehicles	0.593	0.004	1.228	0.179	0.043	0.022	0.026
CALAVERAS	All Vehicles	0.769	0.004	1.684	0.226	0.047	0.025	0.026
COLUSA	All Vehicles	0.480	0.004	1.023	0.145	0.039	0.020	0.026
CONTRA COSTA	All Vehicles	0.404	0.004	0.889	0.123	0.039	0.018	0.026
DEL NORTE	All Vehicles	0.734	0.004	1.465	0.212	0.046	0.025	0.026
EL DORADO	All Vehicles	0.587	0.004	1.138	0.166	0.043	0.022	0.026
FRESNO	All Vehicles	0.462	0.004	0.988	0.141	0.038	0.019	0.026
GLENN	All Vehicles	0.531	0.004	1.091	0.156	0.042	0.021	0.026
HUMBOLDT	All Vehicles	0.697	0.004	1.363	0.200	0.044	0.023	0.026
IMPERIAL	All Vehicles	0.478	0.004	1.141	0.139	0.035	0.016	0.026
INYO	All Vehicles	0.545	0.004	1.157	0.165	0.041	0.021	0.026
KERN	All Vehicles	0.474	0.004	0.979	0.138	0.039	0.019	0.026
KINGS	All Vehicles	0.477	0.004	0.991	0.141	0.038	0.019	0.026
LAKE	All Vehicles	0.743	0.004	1.565	0.228	0.046	0.025	0.026
LASSEN	All Vehicles	0.651	0.004	1.360	0.190	0.045	0.024	0.026
LOS ANGELES	All Vehicles	0.330	0.004	0.933	0.108	0.037	0.016	0.026
MADERA	All Vehicles	0.537	0.004	1.020	0.156	0.038	0.020	0.026
MARIN	All Vehicles	0.382	0.004	0.885	0.129	0.037	0.018	0.026
MARIPOSA	All Vehicles	0.814	0.004	1.752	0.250	0.048	0.026	0.026
MENDOCINO	All Vehicles	0.658	0.004	1.318	0.191	0.043	0.023	0.026
MERCED	All Vehicles	0.565	0.004	1.182	0.161	0.042	0.021	0.026
MODOC	All Vehicles	0.698	0.004	1.482	0.193	0.047	0.025	0.026
MONO	All Vehicles	0.558	0.004	1.200	0.166	0.041	0.021	0.026
MONTEREY	All Vehicles	0.519	0.004	1.094	0.155	0.039	0.019	0.026
NAPA	All Vehicles	0.512	0.004	0.994	0.140	0.041	0.020	0.026
NEVADA	All Vehicles	0.684	0.004	1.285	0.190	0.044	0.023	0.026

County	Vehicle Type	Emission Factors (g/mi)						
		Criteria Pollutants and Ozone Precursors						
		NO <sub>x</sub>	SO <sub>2</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
ORANGE	All Vehicles	0.315	0.004	0.814	0.099	0.036	0.015	0.026
PLACER	All Vehicles	0.489	0.004	0.961	0.131	0.041	0.020	0.026
PLUMAS	All Vehicles	0.744	0.004	1.637	0.217	0.047	0.025	0.026
RIVERSIDE	All Vehicles	0.421	0.004	0.906	0.109	0.036	0.016	0.026
SACRAMENTO	All Vehicles	0.482	0.004	1.013	0.143	0.040	0.020	0.026
SAN BENITO	All Vehicles	0.498	0.004	1.053	0.152	0.041	0.020	0.026
SAN BERNARDINO	All Vehicles	0.455	0.004	0.931	0.119	0.036	0.016	0.026
SAN DIEGO	All Vehicles	0.453	0.004	0.972	0.132	0.040	0.019	0.026
SAN FRANCISCO	All Vehicles	0.239	0.004	0.891	0.112	0.042	0.018	0.026
SAN JOAQUIN	All Vehicles	0.475	0.004	1.026	0.140	0.040	0.020	0.026
SAN LUIS OBISPO	All Vehicles	0.531	0.004	1.006	0.153	0.040	0.021	0.026
SAN MATEO	All Vehicles	0.260	0.004	0.770	0.104	0.035	0.015	0.026
SANTA BARBARA	All Vehicles	0.498	0.004	1.070	0.158	0.039	0.019	0.026
SANTA CLARA	All Vehicles	0.366	0.004	0.900	0.122	0.038	0.017	0.026
SANTA CRUZ	All Vehicles	0.567	0.004	1.226	0.170	0.043	0.021	0.026
SHASTA	All Vehicles	0.615	0.004	1.105	0.163	0.042	0.021	0.026
SIERRA	All Vehicles	0.660	0.004	1.408	0.185	0.046	0.024	0.026
SISKIYOU	All Vehicles	0.709	0.004	1.406	0.196	0.045	0.024	0.026
SOLANO	All Vehicles	0.477	0.004	0.898	0.134	0.039	0.019	0.026
SONOMA	All Vehicles	0.534	0.004	1.103	0.157	0.042	0.021	0.026
STANISLAUS	All Vehicles	0.517	0.004	1.093	0.153	0.043	0.021	0.026
SUTTER	All Vehicles	0.504	0.004	1.096	0.153	0.041	0.020	0.026
TEHAMA	All Vehicles	0.603	0.004	1.157	0.164	0.042	0.022	0.026
TRINITY	All Vehicles	0.702	0.004	1.515	0.196	0.046	0.025	0.026
TULARE	All Vehicles	0.537	0.004	1.124	0.156	0.041	0.021	0.026
TUOLUMNE	All Vehicles	0.740	0.004	1.559	0.224	0.046	0.025	0.026
VENTURA	All Vehicles	0.447	0.004	0.892	0.118	0.037	0.017	0.026
YOLO	All Vehicles	0.472	0.004	0.989	0.135	0.040	0.020	0.026
YUBA	All Vehicles	0.614	0.004	1.157	0.167	0.042	0.022	0.026

Table 5-35. EMFAC County-Specific On-Road Vehicle Composite EFs – 2026 GOV

County	Vehicle Type	Emission Factors (g/mi)						
		Criteria Pollutants and Ozone Precursors						
		NO <sub>x</sub>	SO <sub>2</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
ALAMEDA	All Vehicles	0.317	0.004	0.787	0.112	0.036	0.016	0.026
ALPINE	All Vehicles	0.482	0.003	1.029	0.141	0.039	0.019	0.026
AMADOR	All Vehicles	0.683	0.004	1.424	0.205	0.042	0.022	0.026
BUTTE	All Vehicles	0.527	0.004	1.104	0.164	0.040	0.020	0.026
CALAVERAS	All Vehicles	0.692	0.004	1.531	0.210	0.044	0.023	0.026
COLUSA	All Vehicles	0.429	0.004	0.923	0.134	0.036	0.018	0.026
CONTRA COSTA	All Vehicles	0.364	0.004	0.808	0.114	0.036	0.017	0.026
DEL NORTE	All Vehicles	0.656	0.004	1.327	0.196	0.042	0.023	0.026
EL DORADO	All Vehicles	0.526	0.004	1.040	0.156	0.040	0.020	0.026
FRESNO	All Vehicles	0.415	0.004	0.898	0.131	0.035	0.017	0.026
GLENN	All Vehicles	0.473	0.004	0.980	0.144	0.038	0.019	0.026
HUMBOLDT	All Vehicles	0.624	0.004	1.241	0.186	0.040	0.021	0.026
IMPERIAL	All Vehicles	0.426	0.003	1.025	0.127	0.033	0.015	0.026
INYO	All Vehicles	0.485	0.004	1.042	0.152	0.038	0.019	0.026
KERN	All Vehicles	0.428	0.004	0.891	0.128	0.036	0.018	0.026
KINGS	All Vehicles	0.431	0.004	0.901	0.131	0.035	0.018	0.026
LAKE	All Vehicles	0.666	0.004	1.419	0.211	0.043	0.023	0.026
LASSEN	All Vehicles	0.577	0.004	1.227	0.175	0.041	0.021	0.026
LOS ANGELES	All Vehicles	0.294	0.003	0.838	0.099	0.034	0.015	0.026
MADERA	All Vehicles	0.481	0.004	0.921	0.144	0.036	0.018	0.026
MARIN	All Vehicles	0.342	0.003	0.802	0.120	0.034	0.016	0.026
MARIPOSA	All Vehicles	0.732	0.004	1.583	0.231	0.045	0.024	0.026
MENDOCINO	All Vehicles	0.587	0.004	1.195	0.177	0.040	0.021	0.026
MERCED	All Vehicles	0.513	0.004	1.074	0.149	0.039	0.020	0.026
MODOC	All Vehicles	0.624	0.004	1.338	0.177	0.044	0.023	0.026
MONO	All Vehicles	0.498	0.004	1.086	0.153	0.037	0.019	0.026
MONTEREY	All Vehicles	0.469	0.004	1.000	0.145	0.037	0.018	0.026
NAPA	All Vehicles	0.461	0.004	0.900	0.129	0.038	0.019	0.026
NEVADA	All Vehicles	0.611	0.004	1.175	0.178	0.040	0.021	0.026

County	Vehicle Type	Emission Factors (g/mi)						
		Criteria Pollutants and Ozone Precursors						
		NO <sub>x</sub>	SO <sub>2</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
ORANGE	All Vehicles	0.282	0.003	0.734	0.091	0.033	0.014	0.026
PLACER	All Vehicles	0.440	0.004	0.878	0.122	0.038	0.019	0.026
PLUMAS	All Vehicles	0.659	0.004	1.471	0.199	0.043	0.023	0.026
RIVERSIDE	All Vehicles	0.376	0.003	0.821	0.101	0.033	0.015	0.026
SACRAMENTO	All Vehicles	0.433	0.004	0.924	0.134	0.037	0.018	0.026
SAN BENITO	All Vehicles	0.446	0.004	0.961	0.141	0.038	0.019	0.026
SAN BERNARDINO	All Vehicles	0.407	0.003	0.841	0.110	0.033	0.015	0.026
SAN DIEGO	All Vehicles	0.407	0.004	0.875	0.121	0.036	0.018	0.026
SAN FRANCISCO	All Vehicles	0.221	0.004	0.815	0.105	0.039	0.017	0.026
SAN JOAQUIN	All Vehicles	0.428	0.004	0.936	0.130	0.038	0.018	0.026
SAN LUIS OBISPO	All Vehicles	0.478	0.004	0.918	0.143	0.037	0.019	0.026
SAN MATEO	All Vehicles	0.231	0.003	0.699	0.097	0.032	0.014	0.026
SANTA BARBARA	All Vehicles	0.452	0.004	0.965	0.147	0.036	0.018	0.026
SANTA CLARA	All Vehicles	0.329	0.004	0.818	0.113	0.035	0.016	0.026
SANTA CRUZ	All Vehicles	0.508	0.004	1.116	0.158	0.040	0.020	0.026
SHASTA	All Vehicles	0.549	0.004	0.995	0.150	0.038	0.020	0.026
SIERRA	All Vehicles	0.584	0.004	1.268	0.171	0.042	0.022	0.026
SISKIYOU	All Vehicles	0.628	0.004	1.267	0.180	0.041	0.022	0.026
SOLANO	All Vehicles	0.432	0.004	0.815	0.124	0.036	0.018	0.026
SONOMA	All Vehicles	0.480	0.004	0.993	0.144	0.039	0.020	0.026
STANISLAUS	All Vehicles	0.466	0.004	0.994	0.142	0.040	0.020	0.026
SUTTER	All Vehicles	0.453	0.004	0.994	0.141	0.038	0.019	0.026
TEHAMA	All Vehicles	0.538	0.004	1.041	0.150	0.039	0.020	0.026
TRINITY	All Vehicles	0.623	0.004	1.362	0.179	0.042	0.023	0.026
TULARE	All Vehicles	0.484	0.004	1.019	0.144	0.038	0.020	0.026
TUOLUMNE	All Vehicles	0.662	0.004	1.407	0.208	0.043	0.023	0.026
VENTURA	All Vehicles	0.400	0.003	0.800	0.109	0.034	0.015	0.026
YOLO	All Vehicles	0.426	0.004	0.903	0.126	0.037	0.018	0.026
YUBA	All Vehicles	0.551	0.004	1.043	0.154	0.039	0.020	0.026



Table 5-36. EMFAC County-Specific On-Road Vehicle EFs – 2023

County	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				NO <sub>x</sub>	SO <sub>x</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Alameda	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.093	0.003	1.336	0.160	0.018	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.141	0.004	1.580	0.177	0.019	0.007	0.027
	Gasoline	HDTV	Heavy-Duty Vehicles (8,501 + lbs)	0.247	0.006	1.898	0.235	0.031	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.291	0.003	0.402	0.036	0.040	0.028	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.079	0.003	0.166	0.018	0.026	0.014	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.662	0.008	0.466	0.156	0.127	0.064	0.033
	Gasoline	MC	Motorcycles	0.745	0.002	18.703	5.486	0.021	0.009	0.053
Alpine	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.105	0.003	1.537	0.156	0.020	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.195	0.004	2.134	0.220	0.022	0.008	0.027
	Gasoline	HDTV	Heavy-Duty Vehicles (8,501 + lbs)	0.351	0.006	2.532	0.311	0.034	0.012	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.273	0.002	0.435	0.037	0.040	0.026	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.071	0.003	0.203	0.022	0.028	0.014	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.661	0.007	0.719	0.232	0.149	0.085	0.033
	Gasoline	MC	Motorcycles	0.868	0.002	22.552	5.906	0.021	0.009	0.053
Amador	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.131	0.003	1.781	0.208	0.018	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.299	0.004	2.929	0.331	0.020	0.007	0.027
	Gasoline	HDTV	Heavy-Duty Vehicles (8,501 + lbs)	0.417	0.006	3.040	0.453	0.033	0.012	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.538	0.002	0.434	0.037	0.041	0.028	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.197	0.003	0.213	0.026	0.034	0.022	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	3.372	0.007	0.884	0.277	0.157	0.094	0.033
	Gasoline	MC	Motorcycles	0.926	0.002	22.527	6.903	0.020	0.009	0.053
Butte	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.104	0.003	1.540	0.183	0.019	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.214	0.004	2.322	0.275	0.021	0.008	0.027
	Gasoline	HDTV	Heavy-Duty Vehicles (8,501 + lbs)	0.329	0.006	2.515	0.350	0.032	0.012	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.342	0.002	0.440	0.037	0.040	0.027	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.166	0.003	0.241	0.030	0.036	0.023	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.790	0.007	0.744	0.235	0.147	0.084	0.033
	Gasoline	MC	Motorcycles	0.853	0.002	21.970	6.698	0.021	0.009	0.053
Calaveras	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.128	0.003	1.856	0.217	0.020	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.311	0.004	3.198	0.340	0.023	0.009	0.027
	Gasoline	HDTV	Heavy-Duty Vehicles (8,501 + lbs)	0.425	0.006	3.168	0.453	0.035	0.013	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.482	0.003	0.559	0.048	0.047	0.033	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.180	0.003	0.306	0.039	0.039	0.024	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	3.479	0.007	0.923	0.285	0.161	0.097	0.033
	Gasoline	MC	Motorcycles	0.920	0.002	23.537	7.100	0.021	0.009	0.053
Colusa	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	1.342	0.149	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.175	0.004	1.915	0.218	0.019	0.007	0.027
	Gasoline	HDTV	Heavy-Duty Vehicles (8,501 + lbs)	0.277	0.006	2.158	0.277	0.029	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.336	0.002	0.434	0.035	0.037	0.025	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.087	0.003	0.193	0.023	0.027	0.015	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.306	0.007	0.651	0.209	0.139	0.077	0.033
	Gasoline	MC	Motorcycles	0.780	0.002	19.414	5.832	0.021	0.009	0.053
Contra Costa	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.090	0.003	1.320	0.155	0.018	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.140	0.004	1.593	0.171	0.020	0.007	0.027
	Gasoline	HDTV	Heavy-Duty Vehicles (8,501 + lbs)	0.252	0.006	1.930	0.235	0.030	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.244	0.002	0.355	0.028	0.034	0.021	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.068	0.003	0.157	0.017	0.026	0.013	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.964	0.007	0.556	0.182	0.131	0.070	0.033
	Gasoline	MC	Motorcycles	0.771	0.002	19.509	5.671	0.021	0.009	0.053
Del Norte	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.125	0.003	1.636	0.191	0.018	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.296	0.004	2.744	0.329	0.021	0.008	0.027
	Gasoline	HDTV	Heavy-Duty Vehicles (8,501 + lbs)	0.371	0.006	2.571	0.347	0.031	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.443	0.003	0.605	0.052	0.045	0.033	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.210	0.003	0.379	0.046	0.040	0.027	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	3.345	0.007	0.879	0.268	0.156	0.092	0.033
	Gasoline	MC	Motorcycles	0.918	0.002	24.023	6.713	0.021	0.009	0.053

Table 5-36. EMFAC County-Specific On-Road Vehicle EFs – 2023 (cont.)

County	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				NO <sub>x</sub>	SO <sub>x</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
El Dorado	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.097	0.003	1.470	0.158	0.019	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.175	0.004	2.005	0.229	0.021	0.008	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.307	0.006	2.392	0.323	0.032	0.012	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.288	0.003	0.407	0.031	0.036	0.022	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.050	0.003	0.168	0.017	0.025	0.012	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.924	0.007	0.794	0.252	0.152	0.089	0.033
Fresno	Gasoline	MC	Motorcycles	0.904	0.002	23.404	7.029	0.021	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.082	0.003	1.285	0.145	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.163	0.004	1.837	0.212	0.018	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.263	0.006	2.084	0.272	0.027	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.290	0.002	0.362	0.032	0.036	0.025	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.108	0.003	0.169	0.020	0.027	0.016	0.009
Glenn	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.204	0.007	0.598	0.192	0.133	0.073	0.033
	Gasoline	MC	Motorcycles	0.808	0.002	20.188	6.221	0.021	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.091	0.003	1.433	0.157	0.019	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.174	0.004	2.034	0.235	0.021	0.008	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.296	0.006	2.400	0.314	0.031	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.248	0.002	0.453	0.036	0.037	0.024	0.008
Humboldt	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.097	0.003	0.240	0.028	0.031	0.018	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.599	0.007	0.713	0.225	0.145	0.081	0.033
	Gasoline	MC	Motorcycles	0.801	0.002	20.513	6.225	0.021	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.126	0.003	1.635	0.193	0.018	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.263	0.004	2.497	0.299	0.020	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.360	0.006	2.533	0.336	0.032	0.011	0.052
Imperial	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.674	0.003	0.637	0.058	0.054	0.040	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.251	0.003	0.296	0.036	0.038	0.025	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	3.158	0.007	0.832	0.256	0.149	0.087	0.033
	Gasoline	MC	Motorcycles	0.942	0.002	23.964	6.794	0.021	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	1.448	0.161	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.210	0.004	2.330	0.248	0.018	0.007	0.027
Inyo	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.279	0.006	2.365	0.279	0.027	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.355	0.003	0.448	0.041	0.043	0.031	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.108	0.003	0.169	0.022	0.028	0.017	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.270	0.006	0.420	0.108	0.119	0.059	0.033
	Gasoline	MC	Motorcycles	0.720	0.002	18.515	6.020	0.021	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.098	0.003	1.497	0.163	0.018	0.006	0.025
Kern	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.193	0.004	2.146	0.244	0.019	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.333	0.006	2.593	0.331	0.032	0.012	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.438	0.003	0.568	0.049	0.046	0.034	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.087	0.003	0.230	0.026	0.028	0.015	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.675	0.007	0.744	0.236	0.149	0.085	0.033
	Gasoline	MC	Motorcycles	0.828	0.002	21.382	6.354	0.021	0.009	0.053
Kings	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.086	0.003	1.320	0.146	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.159	0.004	1.795	0.201	0.018	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.261	0.006	2.063	0.259	0.028	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.267	0.002	0.350	0.029	0.035	0.023	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.085	0.003	0.146	0.017	0.025	0.013	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.268	0.007	0.631	0.205	0.138	0.077	0.033
Kings	Gasoline	MC	Motorcycles	0.788	0.002	19.674	5.982	0.021	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.081	0.003	1.215	0.136	0.015	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.176	0.004	1.845	0.213	0.016	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.251	0.006	1.979	0.264	0.025	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.300	0.003	0.408	0.034	0.036	0.025	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.108	0.003	0.204	0.026	0.029	0.018	0.009
Kings	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.244	0.007	0.617	0.200	0.136	0.075	0.033
	Gasoline	MC	Motorcycles	0.789	0.002	19.797	5.944	0.021	0.009	0.053

**Table 5-36. EMFAC County-Specific On-Road Vehicle EFs – 2023 (cont.)**

County	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				NO <sub>x</sub>	SO <sub>x</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Lake	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.155	0.003	2.046	0.234	0.019	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.293	0.004	2.893	0.350	0.021	0.008	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.437	0.006	3.155	0.438	0.033	0.012	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.687	0.003	0.669	0.064	0.059	0.046	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.262	0.003	0.328	0.038	0.039	0.026	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	3.319	0.007	0.882	0.273	0.158	0.094	0.033
Lassen	Gasoline	MC	Motorcycles	0.939	0.002	24.334	7.314	0.021	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.110	0.003	1.630	0.176	0.020	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.231	0.004	2.513	0.280	0.022	0.008	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.399	0.006	3.080	0.392	0.034	0.013	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.350	0.003	0.583	0.045	0.041	0.027	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.123	0.003	0.302	0.036	0.034	0.020	0.009
Los Angeles	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	3.154	0.007	0.857	0.267	0.157	0.092	0.033
	Gasoline	MC	Motorcycles	0.893	0.002	23.977	6.640	0.021	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	1.400	0.145	0.021	0.008	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.162	0.004	1.852	0.180	0.022	0.008	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.270	0.006	2.147	0.238	0.033	0.012	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.281	0.003	0.513	0.050	0.051	0.036	0.008
Madera	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.070	0.003	0.209	0.025	0.029	0.015	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.559	0.006	0.329	0.099	0.114	0.054	0.033
	Gasoline	MC	Motorcycles	0.680	0.002	17.407	5.016	0.022	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.084	0.003	1.233	0.143	0.015	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.188	0.004	1.915	0.240	0.016	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.302	0.006	2.170	0.297	0.026	0.009	0.052
Marin	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.289	0.002	0.349	0.028	0.032	0.021	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.080	0.003	0.135	0.016	0.023	0.013	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.589	0.007	0.699	0.223	0.143	0.081	0.033
	Gasoline	MC	Motorcycles	0.861	0.002	21.858	6.415	0.021	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.103	0.003	1.412	0.179	0.018	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.142	0.004	1.594	0.188	0.019	0.007	0.027
Mariposa	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.252	0.006	1.910	0.241	0.031	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.259	0.003	0.377	0.032	0.037	0.025	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.059	0.003	0.152	0.015	0.024	0.011	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.858	0.007	0.539	0.174	0.126	0.068	0.033
	Gasoline	MC	Motorcycles	0.780	0.002	19.574	5.683	0.021	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.146	0.003	2.001	0.226	0.020	0.007	0.025
Mendocino	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.322	0.004	3.285	0.391	0.023	0.009	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.538	0.006	3.863	0.510	0.037	0.014	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.588	0.003	0.663	0.057	0.051	0.036	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.134	0.003	0.334	0.043	0.041	0.027	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	3.697	0.007	0.951	0.288	0.160	0.096	0.033
	Gasoline	MC	Motorcycles	0.989	0.002	26.084	7.450	0.021	0.009	0.053
Merced	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.118	0.003	1.596	0.184	0.019	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.244	0.004	2.434	0.288	0.020	0.008	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.369	0.006	2.643	0.352	0.033	0.012	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.662	0.003	0.636	0.062	0.058	0.044	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.307	0.003	0.322	0.036	0.039	0.025	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.996	0.007	0.801	0.249	0.149	0.086	0.033
Merced	Gasoline	MC	Motorcycles	0.888	0.002	22.472	6.579	0.021	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.086	0.003	1.349	0.142	0.018	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.213	0.004	2.260	0.251	0.020	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.320	0.006	2.429	0.301	0.028	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.296	0.002	0.360	0.029	0.034	0.022	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.118	0.003	0.190	0.025	0.031	0.019	0.009
Merced	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.584	0.007	0.678	0.213	0.139	0.079	0.033
	Gasoline	MC	Motorcycles	0.823	0.002	20.508	6.233	0.020	0.009	0.053

**Table 5-36. EMFAC County-Specific On-Road Vehicle EFs – 2023 (cont.)**

County	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				NO <sub>x</sub>	SO <sub>x</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Modoc	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.118	0.004	1.770	0.180	0.021	0.008	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.252	0.004	2.711	0.282	0.024	0.010	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.448	0.007	3.419	0.416	0.037	0.014	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.435	0.003	0.826	0.066	0.051	0.037	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.142	0.004	0.448	0.056	0.046	0.031	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	3.316	0.007	0.890	0.269	0.156	0.092	0.033
Mono	Gasoline	MC	Motorcycles	0.892	0.003	25.127	6.625	0.022	0.010	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.111	0.003	1.537	0.164	0.018	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.214	0.004	2.204	0.244	0.019	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.381	0.006	2.739	0.346	0.032	0.012	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.415	0.003	0.540	0.042	0.040	0.028	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.115	0.003	0.249	0.025	0.026	0.013	0.009
Monterey	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.640	0.007	0.733	0.229	0.146	0.083	0.033
	Gasoline	MC	Motorcycles	0.902	0.002	24.504	6.231	0.021	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	1.442	0.174	0.018	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.211	0.004	2.014	0.235	0.019	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.336	0.006	2.250	0.291	0.030	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.319	0.003	0.421	0.038	0.042	0.030	0.008
Napa	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.087	0.003	0.166	0.018	0.026	0.014	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.371	0.008	0.596	0.187	0.132	0.072	0.033
	Gasoline	MC	Motorcycles	0.808	0.002	20.388	5.833	0.021	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.092	0.003	1.343	0.149	0.019	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.161	0.004	1.796	0.198	0.021	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.301	0.006	2.195	0.282	0.033	0.012	0.052
Nevada	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.330	0.002	0.434	0.042	0.047	0.033	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.079	0.003	0.168	0.017	0.027	0.014	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.464	0.007	0.677	0.214	0.140	0.078	0.033
	Gasoline	MC	Motorcycles	0.824	0.002	20.852	6.026	0.021	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.113	0.003	1.585	0.195	0.018	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.221	0.004	2.269	0.265	0.020	0.007	0.027
Orange	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.376	0.006	2.630	0.358	0.033	0.012	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.412	0.002	0.474	0.038	0.040	0.027	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.191	0.003	0.261	0.027	0.031	0.019	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	3.259	0.007	0.859	0.266	0.153	0.091	0.033
	Gasoline	MC	Motorcycles	0.961	0.002	24.820	7.243	0.021	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.079	0.003	1.270	0.136	0.020	0.007	0.025
Placer	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.131	0.004	1.589	0.162	0.021	0.008	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.220	0.006	1.824	0.203	0.033	0.012	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.188	0.003	0.378	0.030	0.036	0.023	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.056	0.003	0.170	0.018	0.026	0.013	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.513	0.006	0.305	0.092	0.111	0.053	0.033
	Gasoline	MC	Motorcycles	0.680	0.002	17.186	5.038	0.021	0.009	0.053
Plumas	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.092	0.003	1.433	0.154	0.019	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.131	0.004	1.655	0.172	0.021	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.248	0.006	2.064	0.246	0.032	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.331	0.003	0.447	0.038	0.041	0.028	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.075	0.003	0.180	0.018	0.026	0.013	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.423	0.007	0.675	0.215	0.140	0.078	0.033
Plumas	Gasoline	MC	Motorcycles	0.826	0.002	21.176	6.271	0.021	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.130	0.003	1.912	0.205	0.022	0.008	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.288	0.004	3.073	0.328	0.025	0.010	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.477	0.006	3.687	0.457	0.037	0.014	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.428	0.003	0.726	0.063	0.054	0.039	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.211	0.004	0.416	0.043	0.035	0.020	0.009
Plumas	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	3.474	0.007	0.937	0.283	0.161	0.096	0.033
	Gasoline	MC	Motorcycles	0.944	0.003	26.244	7.236	0.022	0.010	0.053

Table 5-36. EMFAC County-Specific On-Road Vehicle EFs – 2023 (cont.)

County	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				NO <sub>x</sub>	SO <sub>x</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Riverside	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.077	0.003	1.248	0.130	0.018	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.152	0.004	1.758	0.179	0.019	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.239	0.005	1.943	0.226	0.028	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.210	0.002	0.346	0.028	0.034	0.021	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.082	0.003	0.166	0.019	0.026	0.014	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.049	0.006	0.395	0.109	0.120	0.060	0.033
Sacramento	Gasoline	MC	Motorcycles	0.724	0.002	18.496	5.620	0.021	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.093	0.003	1.466	0.168	0.019	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.149	0.004	1.799	0.200	0.021	0.008	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.276	0.006	2.202	0.276	0.033	0.012	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.300	0.002	0.423	0.033	0.036	0.023	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.073	0.003	0.179	0.019	0.026	0.013	0.009
San Benito	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.363	0.007	0.639	0.202	0.136	0.075	0.033
	Gasoline	MC	Motorcycles	0.812	0.002	20.754	6.315	0.021	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.092	0.003	1.384	0.147	0.020	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.171	0.004	1.919	0.226	0.021	0.008	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.281	0.006	2.162	0.284	0.031	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.248	0.002	0.393	0.031	0.036	0.023	0.008
San Bernardino	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.073	0.003	0.178	0.019	0.027	0.013	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.401	0.007	0.676	0.213	0.140	0.078	0.033
	Gasoline	MC	Motorcycles	0.830	0.002	21.160	6.413	0.021	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.081	0.003	1.260	0.132	0.018	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.166	0.004	1.831	0.202	0.019	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.270	0.005	2.074	0.251	0.029	0.010	0.052
San Diego	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.258	0.003	0.373	0.031	0.036	0.024	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.080	0.003	0.149	0.017	0.025	0.013	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.215	0.006	0.422	0.111	0.120	0.060	0.033
	Gasoline	MC	Motorcycles	0.761	0.002	19.404	5.703	0.021	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.082	0.003	1.278	0.140	0.019	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.157	0.004	1.771	0.191	0.021	0.008	0.027
San Francisco	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.244	0.006	1.944	0.234	0.031	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.214	0.003	0.581	0.041	0.036	0.023	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.079	0.004	0.306	0.033	0.028	0.015	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.219	0.007	0.624	0.194	0.133	0.073	0.033
	Gasoline	MC	Motorcycles	0.731	0.002	18.918	5.454	0.021	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.093	0.003	1.460	0.164	0.021	0.008	0.025
San Joaquin	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.129	0.004	1.634	0.170	0.023	0.009	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.219	0.006	1.863	0.194	0.038	0.014	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.227	0.003	0.529	0.043	0.043	0.028	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.066	0.004	0.264	0.028	0.030	0.015	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.943	0.009	0.292	0.106	0.126	0.055	0.033
	Gasoline	MC	Motorcycles	0.766	0.002	20.307	5.842	0.022	0.009	0.053
San Luis Obispo	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.086	0.003	1.373	0.145	0.020	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.160	0.004	1.868	0.203	0.021	0.008	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.274	0.006	2.210	0.280	0.030	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.273	0.002	0.448	0.033	0.036	0.022	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.066	0.003	0.202	0.023	0.027	0.014	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.296	0.007	0.632	0.200	0.135	0.074	0.033
San Luis Obispo	Gasoline	MC	Motorcycles	0.802	0.002	20.638	6.303	0.021	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.097	0.003	1.337	0.163	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.173	0.004	1.780	0.218	0.018	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.296	0.006	2.095	0.280	0.030	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.255	0.003	0.366	0.030	0.035	0.023	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.101	0.003	0.187	0.021	0.028	0.016	0.009
San Luis Obispo	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.528	0.007	0.687	0.218	0.142	0.080	0.033
	Gasoline	MC	Motorcycles	0.909	0.002	23.178	6.691	0.021	0.009	0.053

**Table 5-36. EMFAC County-Specific On-Road Vehicle EFs – 2023 (cont.)**

County	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				NO <sub>x</sub>	SO <sub>x</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
San Mateo	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.095	0.003	1.378	0.171	0.019	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.118	0.004	1.434	0.155	0.019	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.182	0.006	1.622	0.181	0.031	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.244	0.003	0.363	0.028	0.034	0.021	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.057	0.003	0.143	0.016	0.024	0.012	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.373	0.008	0.380	0.134	0.121	0.057	0.033
Santa Barbara	Gasoline	MC	Motorcycles	0.672	0.002	16.475	5.184	0.022	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	1.439	0.182	0.018	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.201	0.004	1.951	0.237	0.019	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.328	0.006	2.246	0.297	0.031	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.282	0.002	0.357	0.029	0.035	0.022	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.091	0.003	0.166	0.019	0.026	0.014	0.009
Santa Clara	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.261	0.008	0.607	0.192	0.132	0.073	0.033
	Gasoline	MC	Motorcycles	0.834	0.002	20.289	6.064	0.021	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.089	0.003	1.332	0.149	0.019	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.147	0.004	1.669	0.181	0.020	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.245	0.006	1.939	0.236	0.031	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.257	0.002	0.374	0.032	0.037	0.024	0.008
Santa Cruz	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.067	0.003	0.158	0.018	0.027	0.014	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.746	0.008	0.480	0.158	0.125	0.064	0.033
	Gasoline	MC	Motorcycles	0.710	0.002	17.713	5.270	0.021	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.123	0.003	1.680	0.192	0.021	0.008	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.219	0.004	2.258	0.256	0.023	0.009	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.353	0.006	2.481	0.318	0.035	0.013	0.052
Shasta	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.431	0.003	0.542	0.053	0.053	0.038	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.107	0.003	0.223	0.026	0.033	0.019	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.672	0.007	0.688	0.210	0.137	0.077	0.033
	Gasoline	MC	Motorcycles	0.893	0.002	23.216	6.848	0.022	0.010	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.094	0.003	1.421	0.164	0.018	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.185	0.004	2.038	0.239	0.019	0.007	0.027
Sierra	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.316	0.006	2.401	0.324	0.031	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.322	0.002	0.404	0.033	0.036	0.024	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.126	0.003	0.194	0.022	0.028	0.016	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	3.029	0.007	0.788	0.247	0.150	0.087	0.033
	Gasoline	MC	Motorcycles	0.901	0.002	23.038	6.810	0.021	0.009	0.053
	Siskiyou	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.113	0.004	1.687	0.171	0.022	0.008
Gasoline		LDGT	Light-Duty Trucks (0-8,500 lbs)	0.247	0.004	2.615	0.271	0.024	0.009	0.027
Gasoline		HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.432	0.006	3.396	0.401	0.036	0.014	0.052
Diesel		LDDV	Light-Duty Vehicles (Passenger Cars)	0.416	0.003	0.781	0.064	0.051	0.036	0.008
Diesel		LDDT	Light-Duty Trucks (0-8,500 lbs)	0.076	0.004	0.365	0.039	0.030	0.016	0.009
Diesel		HDDV	Heavy-Duty Vehicles (8,501 + lbs)	3.265	0.007	0.899	0.276	0.160	0.095	0.033
Solano	Gasoline	MC	Motorcycles	0.903	0.003	24.833	6.712	0.022	0.010	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.117	0.003	1.693	0.184	0.020	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.247	0.004	2.588	0.288	0.022	0.009	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.416	0.006	3.169	0.399	0.034	0.013	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.562	0.003	0.750	0.062	0.052	0.038	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.187	0.004	0.381	0.045	0.038	0.025	0.009
Solano	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	3.425	0.007	0.905	0.278	0.159	0.094	0.033
	Gasoline	MC	Motorcycles	0.940	0.003	25.945	6.999	0.022	0.010	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.090	0.003	1.251	0.145	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.151	0.004	1.611	0.190	0.017	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.262	0.006	1.918	0.259	0.029	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.306	0.003	0.394	0.033	0.037	0.025	0.008
Solano	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.060	0.003	0.130	0.014	0.022	0.011	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.311	0.007	0.634	0.204	0.139	0.077	0.033
	Gasoline	MC	Motorcycles	0.818	0.002	20.746	5.837	0.021	0.009	0.053

**Table 5-36. EMFAC County-Specific On-Road Vehicle EFs – 2023 (cont.)**

County	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				NO <sub>x</sub>	SO <sub>x</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Sonoma	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.103	0.003	1.484	0.168	0.020	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.190	0.004	2.067	0.235	0.022	0.008	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.316	0.006	2.342	0.302	0.036	0.013	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.375	0.003	0.453	0.040	0.044	0.030	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.114	0.003	0.209	0.025	0.034	0.019	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.524	0.007	0.689	0.218	0.142	0.080	0.033
Stanislaus	Gasoline	MC	Motorcycles	0.849	0.002	21.795	6.315	0.021	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.085	0.003	1.388	0.150	0.020	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.174	0.004	2.028	0.227	0.022	0.008	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.278	0.006	2.252	0.291	0.032	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.258	0.002	0.352	0.028	0.036	0.022	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.081	0.003	0.164	0.020	0.030	0.016	0.009
Sutter	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.475	0.007	0.678	0.218	0.142	0.080	0.033
	Gasoline	MC	Motorcycles	0.823	0.002	20.570	6.333	0.021	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.093	0.003	1.461	0.163	0.019	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.180	0.004	2.048	0.229	0.021	0.008	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.282	0.006	2.272	0.297	0.031	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.271	0.002	0.413	0.033	0.036	0.023	0.008
Tehama	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.073	0.003	0.187	0.022	0.028	0.015	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.393	0.007	0.662	0.210	0.139	0.077	0.033
	Gasoline	MC	Motorcycles	0.804	0.002	20.398	6.243	0.021	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.097	0.003	1.431	0.157	0.018	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.202	0.004	2.161	0.245	0.020	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.318	0.006	2.415	0.323	0.031	0.011	0.052
Trinity	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.320	0.003	0.494	0.039	0.038	0.025	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.153	0.003	0.274	0.033	0.034	0.021	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.887	0.007	0.764	0.238	0.147	0.084	0.033
	Gasoline	MC	Motorcycles	0.889	0.002	23.100	6.645	0.021	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.119	0.004	1.793	0.180	0.021	0.008	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.269	0.005	2.864	0.297	0.024	0.010	0.027
Tulare	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.398	0.007	3.062	0.374	0.036	0.013	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.525	0.003	0.899	0.084	0.066	0.051	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.167	0.004	0.487	0.056	0.044	0.029	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	3.358	0.007	0.889	0.266	0.153	0.090	0.033
	Gasoline	MC	Motorcycles	0.905	0.003	25.643	7.070	0.022	0.010	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.082	0.003	1.291	0.139	0.018	0.006	0.025
Tuolumne	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.205	0.004	2.158	0.241	0.020	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.293	0.005	2.266	0.286	0.028	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.307	0.002	0.363	0.030	0.037	0.024	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.103	0.003	0.175	0.022	0.031	0.019	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.507	0.007	0.683	0.219	0.141	0.080	0.033
	Gasoline	MC	Motorcycles	0.820	0.002	20.868	6.245	0.021	0.009	0.053
Ventura	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.134	0.003	1.873	0.225	0.020	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.281	0.004	2.899	0.340	0.023	0.009	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.488	0.006	3.589	0.464	0.036	0.013	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.496	0.003	0.623	0.054	0.049	0.035	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.257	0.003	0.344	0.037	0.036	0.022	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	3.339	0.007	0.884	0.275	0.159	0.094	0.033
Ventura	Gasoline	MC	Motorcycles	0.976	0.002	25.845	7.450	0.021	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	1.272	0.149	0.018	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.165	0.004	1.742	0.196	0.020	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.274	0.005	2.004	0.262	0.031	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.245	0.003	0.372	0.030	0.035	0.023	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.081	0.003	0.171	0.019	0.027	0.014	0.009
Ventura	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.155	0.006	0.409	0.114	0.120	0.060	0.033
	Gasoline	MC	Motorcycles	0.782	0.002	19.866	5.613	0.021	0.009	0.053

**Table 5-36. EMFAC County-Specific On-Road Vehicle EFs – 2023 (cont.)**

County	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				NO <sub>x</sub>	SO <sub>x</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Yolo	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.081	0.003	1.323	0.134	0.019	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.147	0.004	1.781	0.194	0.021	0.008	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.237	0.006	1.993	0.236	0.032	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.306	0.003	0.419	0.032	0.037	0.023	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.072	0.003	0.180	0.020	0.027	0.014	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.271	0.007	0.629	0.200	0.134	0.074	0.033
Yuba	Gasoline	MC	Motorcycles	0.817	0.002	20.955	6.293	0.021	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.091	0.003	1.382	0.146	0.018	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.203	0.004	2.185	0.255	0.020	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.334	0.006	2.519	0.332	0.029	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.322	0.002	0.401	0.034	0.038	0.025	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.160	0.003	0.193	0.022	0.028	0.016	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.894	0.007	0.756	0.237	0.147	0.084	0.033
Gasoline	MC	Motorcycles	0.871	0.002	21.876	6.598	0.021	0.009	0.053	



**Table 5-37. EMFAC County-Specific On-Road Vehicle EFs – 2024**

County	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				NO <sub>x</sub>	SO <sub>x</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Alameda	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.081	0.003	1.177	0.143	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.122	0.004	1.402	0.159	0.018	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.211	0.005	1.675	0.211	0.029	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.242	0.002	0.357	0.031	0.035	0.024	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.068	0.003	0.154	0.017	0.024	0.013	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.454	0.008	0.423	0.141	0.119	0.059	0.033
	Gasoline	MC	Motorcycles	0.672	0.002	16.925	5.059	0.019	0.008	0.053
Alpine	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.090	0.003	1.339	0.138	0.018	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.168	0.003	1.877	0.198	0.020	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.303	0.005	2.235	0.283	0.031	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.225	0.002	0.388	0.032	0.035	0.022	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.061	0.003	0.192	0.020	0.025	0.013	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.354	0.007	0.649	0.209	0.136	0.077	0.033
	Gasoline	MC	Motorcycles	0.779	0.002	20.342	5.450	0.019	0.008	0.053
Amador	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.114	0.003	1.587	0.188	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.268	0.004	2.647	0.304	0.019	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.370	0.006	2.725	0.418	0.031	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.458	0.002	0.384	0.031	0.035	0.023	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.176	0.003	0.199	0.024	0.032	0.020	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	3.086	0.007	0.821	0.258	0.147	0.088	0.033
	Gasoline	MC	Motorcycles	0.867	0.002	21.176	6.609	0.019	0.008	0.053
Butte	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.090	0.003	1.365	0.163	0.018	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.185	0.004	2.048	0.247	0.020	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.285	0.005	2.216	0.317	0.030	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.286	0.002	0.395	0.032	0.036	0.023	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.142	0.003	0.221	0.027	0.033	0.020	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.513	0.007	0.684	0.216	0.137	0.077	0.033
	Gasoline	MC	Motorcycles	0.782	0.002	20.216	6.305	0.020	0.008	0.053
Calaveras	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.111	0.003	1.639	0.195	0.019	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.277	0.004	2.875	0.311	0.022	0.008	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.375	0.006	2.829	0.418	0.033	0.012	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.414	0.002	0.505	0.042	0.042	0.028	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.156	0.003	0.287	0.034	0.035	0.021	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	3.160	0.007	0.852	0.263	0.150	0.090	0.033
	Gasoline	MC	Motorcycles	0.858	0.002	22.043	6.786	0.019	0.008	0.053
Colusa	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.076	0.003	1.188	0.134	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.150	0.004	1.680	0.194	0.017	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.239	0.005	1.905	0.252	0.027	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.281	0.002	0.388	0.031	0.033	0.022	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.073	0.003	0.177	0.019	0.025	0.013	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.064	0.006	0.597	0.191	0.129	0.071	0.033
	Gasoline	MC	Motorcycles	0.706	0.002	17.624	5.404	0.019	0.008	0.053
Contra Costa	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.078	0.003	1.168	0.139	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.121	0.004	1.416	0.155	0.018	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.218	0.005	1.714	0.213	0.028	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.201	0.002	0.314	0.024	0.030	0.018	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.060	0.003	0.147	0.015	0.024	0.012	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.734	0.007	0.507	0.165	0.122	0.065	0.033
	Gasoline	MC	Motorcycles	0.697	0.002	17.688	5.238	0.019	0.008	0.053
Del Norte	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	1.440	0.170	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.261	0.004	2.453	0.299	0.020	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.328	0.006	2.323	0.323	0.030	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.371	0.002	0.550	0.045	0.040	0.028	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.184	0.003	0.353	0.042	0.037	0.025	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	3.019	0.006	0.809	0.246	0.145	0.085	0.033
	Gasoline	MC	Motorcycles	0.856	0.002	22.441	6.410	0.020	0.008	0.053

Table 5-37. EMFAC County-Specific On-Road Vehicle EFs – 2024 (cont.)

County	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				NO <sub>x</sub>	SO <sub>x</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
El Dorado	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.084	0.003	1.288	0.141	0.018	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.155	0.004	1.808	0.213	0.020	0.007	0.027
	Gasoline	HDLV	Heavy-Duty Vehicles (8,501 + lbs)	0.271	0.005	2.154	0.300	0.030	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.238	0.002	0.362	0.027	0.032	0.020	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.045	0.003	0.163	0.016	0.024	0.011	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.620	0.007	0.725	0.230	0.140	0.081	0.033
Fresno	Gasoline	MC	Motorcycles	0.832	0.002	21.645	6.664	0.019	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.072	0.003	1.147	0.131	0.015	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.141	0.004	1.628	0.191	0.017	0.006	0.027
	Gasoline	HDLV	Heavy-Duty Vehicles (8,501 + lbs)	0.225	0.005	1.845	0.248	0.025	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.237	0.002	0.318	0.027	0.032	0.021	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.090	0.003	0.154	0.017	0.025	0.014	0.009
Glenn	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.973	0.007	0.547	0.175	0.123	0.067	0.033
	Gasoline	MC	Motorcycles	0.728	0.002	18.247	5.764	0.019	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.079	0.003	1.270	0.141	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.148	0.004	1.775	0.208	0.019	0.007	0.027
	Gasoline	HDLV	Heavy-Duty Vehicles (8,501 + lbs)	0.254	0.005	2.102	0.284	0.029	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.206	0.002	0.413	0.031	0.033	0.021	0.008
Humboldt	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.082	0.003	0.222	0.025	0.028	0.016	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.331	0.007	0.653	0.205	0.134	0.075	0.033
	Gasoline	MC	Motorcycles	0.728	0.002	18.709	5.802	0.019	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.109	0.003	1.446	0.173	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.233	0.004	2.244	0.275	0.019	0.007	0.027
	Gasoline	HDLV	Heavy-Duty Vehicles (8,501 + lbs)	0.319	0.005	2.286	0.313	0.030	0.011	0.052
Imperial	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.564	0.002	0.563	0.050	0.047	0.035	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.221	0.003	0.276	0.033	0.035	0.023	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.848	0.007	0.764	0.234	0.138	0.080	0.033
	Gasoline	MC	Motorcycles	0.876	0.002	22.345	6.496	0.019	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.077	0.003	1.288	0.145	0.015	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.180	0.004	2.050	0.221	0.017	0.006	0.027
Inyo	Gasoline	HDLV	Heavy-Duty Vehicles (8,501 + lbs)	0.239	0.005	2.081	0.252	0.025	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.301	0.002	0.400	0.036	0.038	0.028	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.084	0.003	0.146	0.017	0.024	0.013	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.999	0.006	0.374	0.097	0.110	0.054	0.033
	Gasoline	MC	Motorcycles	0.647	0.002	16.642	5.535	0.019	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.085	0.003	1.312	0.146	0.016	0.006	0.025
Kern	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.166	0.004	1.891	0.220	0.018	0.007	0.027
	Gasoline	HDLV	Heavy-Duty Vehicles (8,501 + lbs)	0.288	0.006	2.280	0.301	0.029	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.366	0.002	0.503	0.042	0.040	0.028	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.074	0.003	0.216	0.023	0.025	0.014	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.373	0.006	0.675	0.214	0.137	0.078	0.033
	Gasoline	MC	Motorcycles	0.750	0.002	19.405	5.915	0.019	0.008	0.053
Kings	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.074	0.003	1.171	0.131	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.138	0.004	1.596	0.180	0.017	0.006	0.027
	Gasoline	HDLV	Heavy-Duty Vehicles (8,501 + lbs)	0.226	0.005	1.839	0.237	0.026	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.223	0.002	0.312	0.025	0.031	0.020	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.073	0.003	0.137	0.015	0.023	0.012	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.045	0.007	0.580	0.188	0.128	0.071	0.033
Kings	Gasoline	MC	Motorcycles	0.712	0.002	17.828	5.544	0.019	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.070	0.003	1.080	0.122	0.014	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.152	0.004	1.633	0.190	0.015	0.005	0.027
	Gasoline	HDLV	Heavy-Duty Vehicles (8,501 + lbs)	0.216	0.005	1.752	0.241	0.023	0.008	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.246	0.002	0.358	0.029	0.031	0.021	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.087	0.003	0.181	0.021	0.025	0.015	0.009
Kings	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.020	0.007	0.567	0.183	0.126	0.070	0.033
	Gasoline	MC	Motorcycles	0.714	0.002	17.899	5.508	0.019	0.008	0.053

**Table 5-37. EMFAC County-Specific On-Road Vehicle EFs – 2024 (cont.)**

County	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				NO <sub>x</sub>	SO <sub>x</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Lake	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.136	0.003	1.819	0.211	0.018	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.257	0.004	2.580	0.319	0.020	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.386	0.006	2.823	0.405	0.031	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.599	0.002	0.611	0.058	0.054	0.041	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.229	0.003	0.306	0.035	0.036	0.023	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	3.006	0.007	0.813	0.251	0.146	0.087	0.033
Lassen	Gasoline	MC	Motorcycles	0.878	0.002	22.822	7.020	0.020	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.094	0.003	1.432	0.157	0.018	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.200	0.004	2.222	0.253	0.021	0.008	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.351	0.006	2.746	0.360	0.032	0.012	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.288	0.002	0.525	0.038	0.035	0.023	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.107	0.003	0.289	0.033	0.031	0.018	0.009
Los Angeles	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.813	0.007	0.780	0.243	0.145	0.084	0.033
	Gasoline	MC	Motorcycles	0.819	0.002	22.034	6.249	0.020	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.075	0.003	1.212	0.129	0.019	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.138	0.004	1.613	0.159	0.021	0.008	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.228	0.005	1.862	0.211	0.031	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.235	0.002	0.454	0.042	0.044	0.031	0.008
Madera	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.060	0.003	0.193	0.022	0.027	0.013	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.339	0.006	0.289	0.088	0.106	0.050	0.033
	Gasoline	MC	Motorcycles	0.607	0.002	15.628	4.568	0.019	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.074	0.003	1.103	0.129	0.014	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.161	0.004	1.685	0.215	0.015	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.260	0.005	1.917	0.271	0.025	0.009	0.052
Marin	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.236	0.002	0.306	0.024	0.028	0.018	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.067	0.003	0.123	0.013	0.021	0.011	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.332	0.007	0.643	0.204	0.133	0.075	0.033
	Gasoline	MC	Motorcycles	0.780	0.002	19.816	5.966	0.019	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	1.228	0.159	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.123	0.004	1.415	0.170	0.018	0.006	0.027
Mariposa	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.216	0.005	1.690	0.217	0.029	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.216	0.002	0.335	0.027	0.033	0.022	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.052	0.003	0.143	0.014	0.022	0.011	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.632	0.007	0.486	0.157	0.117	0.062	0.033
	Gasoline	MC	Motorcycles	0.699	0.002	17.593	5.238	0.019	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.126	0.003	1.763	0.202	0.019	0.007	0.025
Mendocino	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.284	0.004	2.933	0.357	0.022	0.008	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.481	0.006	3.474	0.471	0.035	0.013	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.507	0.002	0.606	0.051	0.046	0.033	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.117	0.003	0.317	0.039	0.038	0.024	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	3.363	0.007	0.881	0.266	0.149	0.089	0.033
	Gasoline	MC	Motorcycles	0.927	0.002	24.491	7.094	0.020	0.009	0.053
Merced	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.101	0.003	1.402	0.165	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.214	0.004	2.169	0.262	0.019	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.324	0.005	2.364	0.325	0.030	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.559	0.002	0.563	0.053	0.051	0.038	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.266	0.003	0.294	0.032	0.035	0.022	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.681	0.007	0.731	0.226	0.137	0.079	0.033
Merced	Gasoline	MC	Motorcycles	0.817	0.002	20.767	6.242	0.019	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.076	0.003	1.218	0.129	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.184	0.004	1.997	0.224	0.019	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.277	0.005	2.153	0.274	0.026	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.247	0.002	0.314	0.024	0.031	0.019	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.100	0.003	0.170	0.021	0.029	0.016	0.009
Merced	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.363	0.007	0.630	0.198	0.131	0.074	0.033
	Gasoline	MC	Motorcycles	0.752	0.002	18.712	5.787	0.019	0.008	0.053

**Table 5-37. EMFAC County-Specific On-Road Vehicle EFs – 2024 (cont.)**

County	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				NO <sub>x</sub>	SO <sub>x</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Modoc	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.101	0.003	1.554	0.160	0.020	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.218	0.004	2.391	0.253	0.023	0.009	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.393	0.006	3.025	0.380	0.035	0.013	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.366	0.003	0.752	0.059	0.045	0.032	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.115	0.004	0.419	0.047	0.039	0.024	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.977	0.007	0.815	0.245	0.144	0.084	0.033
Mono	Gasoline	MC	Motorcycles	0.818	0.002	23.045	6.185	0.020	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.095	0.003	1.346	0.145	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.186	0.004	1.953	0.221	0.018	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.330	0.006	2.409	0.315	0.030	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.347	0.002	0.481	0.036	0.035	0.024	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.100	0.003	0.235	0.023	0.024	0.012	0.009
Monterey	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.349	0.007	0.666	0.208	0.135	0.076	0.033
	Gasoline	MC	Motorcycles	0.819	0.002	22.281	5.804	0.020	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.094	0.003	1.281	0.157	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.185	0.004	1.807	0.215	0.018	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.294	0.005	2.013	0.267	0.028	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.273	0.002	0.380	0.033	0.037	0.026	0.008
Napa	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.078	0.003	0.159	0.017	0.025	0.013	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.139	0.007	0.549	0.171	0.123	0.067	0.033
	Gasoline	MC	Motorcycles	0.735	0.002	18.598	5.446	0.019	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.080	0.003	1.190	0.134	0.018	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.139	0.004	1.592	0.178	0.019	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.260	0.005	1.944	0.257	0.031	0.011	0.052
Nevada	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.281	0.002	0.390	0.037	0.041	0.029	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.069	0.003	0.160	0.016	0.025	0.013	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.226	0.007	0.623	0.197	0.130	0.073	0.033
	Gasoline	MC	Motorcycles	0.746	0.002	18.946	5.584	0.019	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.097	0.003	1.387	0.173	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.197	0.004	2.058	0.248	0.019	0.007	0.027
Orange	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.334	0.006	2.378	0.334	0.031	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.334	0.002	0.412	0.032	0.034	0.022	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.169	0.003	0.247	0.025	0.029	0.017	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.923	0.006	0.785	0.243	0.141	0.083	0.033
	Gasoline	MC	Motorcycles	0.894	0.002	23.175	6.951	0.019	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.068	0.003	1.102	0.120	0.018	0.006	0.025
Placer	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.112	0.004	1.392	0.145	0.019	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.188	0.005	1.604	0.183	0.030	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.155	0.002	0.335	0.026	0.031	0.019	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.049	0.003	0.159	0.017	0.024	0.012	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.319	0.006	0.271	0.082	0.104	0.049	0.033
	Gasoline	MC	Motorcycles	0.609	0.002	15.475	4.608	0.019	0.008	0.053
Plumas	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.080	0.003	1.260	0.138	0.018	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.115	0.004	1.482	0.157	0.019	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.217	0.005	1.848	0.225	0.030	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.278	0.002	0.400	0.034	0.036	0.024	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.066	0.003	0.171	0.017	0.024	0.012	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.176	0.007	0.620	0.197	0.131	0.073	0.033
Plumas	Gasoline	MC	Motorcycles	0.757	0.002	19.493	5.874	0.019	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.112	0.003	1.677	0.182	0.020	0.008	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.251	0.004	2.719	0.297	0.023	0.009	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.420	0.006	3.275	0.418	0.034	0.013	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.363	0.003	0.661	0.055	0.047	0.033	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.184	0.003	0.397	0.040	0.033	0.018	0.009
Plumas	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	3.105	0.006	0.854	0.257	0.148	0.088	0.033
	Gasoline	MC	Motorcycles	0.870	0.002	24.259	6.833	0.020	0.009	0.053

**Table 5-37. EMFAC County-Specific On-Road Vehicle EFs – 2024 (cont.)**

County	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				NO <sub>x</sub>	SO <sub>x</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Riverside	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.067	0.003	1.109	0.118	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.131	0.004	1.551	0.160	0.018	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.206	0.005	1.719	0.206	0.026	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.178	0.002	0.308	0.024	0.030	0.019	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.069	0.003	0.149	0.017	0.024	0.013	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.812	0.006	0.353	0.098	0.111	0.055	0.033
	Gasoline	MC	Motorcycles	0.649	0.002	16.618	5.166	0.019	0.008	0.053
Sacramento	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.081	0.003	1.307	0.153	0.018	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.130	0.004	1.608	0.183	0.019	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.239	0.006	1.957	0.253	0.031	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.245	0.002	0.376	0.028	0.032	0.020	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.064	0.003	0.171	0.018	0.024	0.012	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.111	0.007	0.583	0.184	0.126	0.069	0.033
	Gasoline	MC	Motorcycles	0.743	0.002	19.073	5.916	0.019	0.008	0.053
San Benito	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.081	0.003	1.243	0.134	0.019	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.147	0.004	1.705	0.204	0.020	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.242	0.005	1.927	0.261	0.029	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.210	0.002	0.360	0.028	0.033	0.020	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.063	0.003	0.171	0.018	0.025	0.012	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.158	0.007	0.620	0.194	0.129	0.072	0.033
	Gasoline	MC	Motorcycles	0.756	0.002	19.404	6.026	0.019	0.008	0.053
San Bernardino	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.070	0.003	1.113	0.119	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.143	0.004	1.605	0.180	0.018	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.232	0.005	1.823	0.227	0.027	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.215	0.002	0.330	0.027	0.032	0.021	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.068	0.003	0.137	0.015	0.023	0.012	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.964	0.006	0.378	0.100	0.111	0.056	0.033
	Gasoline	MC	Motorcycles	0.685	0.002	17.497	5.254	0.019	0.008	0.053
San Diego	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.072	0.003	1.130	0.125	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.135	0.004	1.560	0.171	0.019	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.208	0.006	1.701	0.209	0.029	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.178	0.002	0.528	0.036	0.032	0.020	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.069	0.003	0.291	0.030	0.026	0.013	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.965	0.007	0.566	0.176	0.124	0.068	0.033
	Gasoline	MC	Motorcycles	0.663	0.002	17.210	5.040	0.020	0.008	0.053
San Francisco	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.080	0.003	1.265	0.144	0.019	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.113	0.004	1.465	0.155	0.022	0.008	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.188	0.006	1.661	0.173	0.035	0.013	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.188	0.002	0.469	0.037	0.037	0.024	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.059	0.003	0.251	0.026	0.028	0.014	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.861	0.009	0.274	0.100	0.121	0.052	0.033
	Gasoline	MC	Motorcycles	0.694	0.002	18.505	5.425	0.020	0.009	0.053
San Joaquin	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.075	0.003	1.232	0.132	0.019	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.138	0.004	1.659	0.182	0.020	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.235	0.005	1.958	0.255	0.028	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.224	0.002	0.401	0.029	0.032	0.019	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.057	0.003	0.191	0.021	0.025	0.012	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.062	0.007	0.579	0.182	0.125	0.069	0.033
	Gasoline	MC	Motorcycles	0.726	0.002	18.777	5.846	0.019	0.008	0.053
San Luis Obispo	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.084	0.003	1.180	0.146	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.151	0.004	1.598	0.200	0.017	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.259	0.005	1.870	0.257	0.028	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.215	0.002	0.329	0.026	0.031	0.020	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.089	0.003	0.176	0.019	0.026	0.015	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.284	0.007	0.633	0.200	0.132	0.074	0.033
	Gasoline	MC	Motorcycles	0.829	0.002	21.173	6.273	0.019	0.008	0.053

**Table 5-37. EMFAC County-Specific On-Road Vehicle EFs – 2024 (cont.)**

County	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				NO <sub>x</sub>	SO <sub>x</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
San Mateo	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.079	0.003	1.160	0.150	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.102	0.003	1.266	0.140	0.018	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.155	0.005	1.439	0.161	0.028	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.188	0.002	0.303	0.023	0.028	0.017	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.048	0.003	0.131	0.014	0.022	0.011	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.077	0.007	0.331	0.115	0.110	0.052	0.033
Santa Barbara	Gasoline	MC	Motorcycles	0.589	0.002	14.548	4.717	0.019	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.093	0.003	1.268	0.164	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.177	0.004	1.754	0.217	0.018	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.286	0.005	2.004	0.273	0.029	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.237	0.002	0.323	0.026	0.031	0.020	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.082	0.003	0.161	0.017	0.025	0.013	0.009
Santa Clara	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.043	0.007	0.559	0.176	0.124	0.067	0.033
	Gasoline	MC	Motorcycles	0.762	0.002	18.634	5.697	0.019	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.077	0.003	1.172	0.133	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.127	0.004	1.482	0.164	0.019	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.210	0.005	1.715	0.212	0.029	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.211	0.002	0.330	0.027	0.033	0.021	0.008
Santa Cruz	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.058	0.003	0.148	0.016	0.025	0.012	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.530	0.007	0.432	0.142	0.116	0.059	0.033
	Gasoline	MC	Motorcycles	0.638	0.002	16.015	4.855	0.019	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.106	0.003	1.489	0.173	0.019	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.191	0.004	2.020	0.234	0.022	0.008	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.307	0.005	2.209	0.289	0.032	0.012	0.052
Shasta	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.367	0.002	0.490	0.047	0.048	0.034	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.095	0.003	0.214	0.024	0.032	0.017	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.381	0.007	0.626	0.190	0.127	0.071	0.033
	Gasoline	MC	Motorcycles	0.816	0.002	21.312	6.443	0.020	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.081	0.003	1.248	0.146	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.159	0.004	1.794	0.214	0.018	0.007	0.027
Sierra	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.272	0.005	2.113	0.294	0.029	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.266	0.002	0.357	0.028	0.032	0.021	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.105	0.003	0.177	0.019	0.025	0.014	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.716	0.007	0.720	0.225	0.138	0.080	0.033
	Gasoline	MC	Motorcycles	0.823	0.002	21.082	6.396	0.019	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.097	0.003	1.479	0.153	0.020	0.007	0.025
Siskiyou	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.212	0.004	2.296	0.243	0.022	0.009	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.371	0.006	2.944	0.359	0.033	0.012	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.348	0.003	0.705	0.056	0.045	0.031	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.068	0.003	0.353	0.036	0.028	0.014	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.879	0.006	0.811	0.248	0.146	0.086	0.033
	Gasoline	MC	Motorcycles	0.822	0.002	22.628	6.259	0.020	0.009	0.053
Solano	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.100	0.003	1.482	0.164	0.018	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.214	0.004	2.285	0.261	0.021	0.008	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.362	0.006	2.800	0.363	0.031	0.012	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.466	0.003	0.667	0.054	0.045	0.033	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.158	0.003	0.353	0.040	0.034	0.021	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	3.046	0.006	0.821	0.251	0.146	0.086	0.033
Solano	Gasoline	MC	Motorcycles	0.859	0.002	23.712	6.555	0.020	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.078	0.003	1.116	0.131	0.015	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.131	0.004	1.428	0.171	0.016	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.225	0.005	1.698	0.235	0.027	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.258	0.002	0.352	0.029	0.033	0.022	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.051	0.003	0.121	0.013	0.021	0.010	0.009
Solano	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.083	0.007	0.584	0.188	0.130	0.071	0.033
	Gasoline	MC	Motorcycles	0.745	0.002	18.891	5.420	0.019	0.008	0.053

**Table 5-37. EMFAC County-Specific On-Road Vehicle EFs – 2024 (cont.)**

County	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				NO <sub>x</sub>	SO <sub>x</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Sonoma	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.089	0.003	1.316	0.151	0.019	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.163	0.004	1.816	0.211	0.020	0.007	0.027
	Gasoline	HDBGV	Heavy-Duty Vehicles (8,501 + lbs)	0.272	0.006	2.060	0.273	0.033	0.012	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.315	0.002	0.405	0.035	0.039	0.026	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.097	0.003	0.191	0.022	0.030	0.017	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.273	0.007	0.631	0.199	0.131	0.073	0.033
Stanislaus	Gasoline	MC	Motorcycles	0.766	0.002	19.751	5.853	0.019	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.075	0.003	1.249	0.136	0.019	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.150	0.004	1.803	0.204	0.021	0.007	0.027
	Gasoline	HDBGV	Heavy-Duty Vehicles (8,501 + lbs)	0.240	0.005	2.001	0.265	0.030	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.212	0.002	0.317	0.025	0.032	0.019	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.071	0.003	0.158	0.019	0.028	0.015	0.009
Sutter	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.237	0.007	0.626	0.200	0.132	0.074	0.033
	Gasoline	MC	Motorcycles	0.748	0.002	18.784	5.898	0.019	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.081	0.003	1.298	0.146	0.018	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.155	0.004	1.805	0.204	0.020	0.007	0.027
	Gasoline	HDBGV	Heavy-Duty Vehicles (8,501 + lbs)	0.245	0.005	2.017	0.272	0.029	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.226	0.002	0.375	0.029	0.033	0.021	0.008
Tehama	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.066	0.003	0.180	0.021	0.027	0.014	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.164	0.007	0.612	0.193	0.129	0.072	0.033
	Gasoline	MC	Motorcycles	0.735	0.002	18.730	5.840	0.019	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.083	0.003	1.265	0.140	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.173	0.004	1.897	0.218	0.019	0.007	0.027
	Gasoline	HDBGV	Heavy-Duty Vehicles (8,501 + lbs)	0.274	0.005	2.126	0.292	0.028	0.010	0.052
Trinity	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.266	0.002	0.445	0.034	0.034	0.022	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.128	0.003	0.251	0.029	0.030	0.018	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.598	0.007	0.701	0.218	0.136	0.077	0.033
	Gasoline	MC	Motorcycles	0.810	0.002	21.098	6.204	0.020	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.102	0.003	1.568	0.160	0.019	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.232	0.004	2.516	0.266	0.023	0.009	0.027
Tulare	Gasoline	HDBGV	Heavy-Duty Vehicles (8,501 + lbs)	0.345	0.006	2.701	0.340	0.033	0.012	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.448	0.003	0.820	0.074	0.058	0.044	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.145	0.004	0.457	0.051	0.039	0.025	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.981	0.007	0.806	0.240	0.140	0.082	0.033
	Gasoline	MC	Motorcycles	0.826	0.002	23.424	6.607	0.020	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.072	0.003	1.161	0.126	0.017	0.006	0.025
Tuolumne	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.177	0.004	1.903	0.215	0.019	0.007	0.027
	Gasoline	HDBGV	Heavy-Duty Vehicles (8,501 + lbs)	0.254	0.005	2.011	0.262	0.026	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.250	0.002	0.318	0.026	0.033	0.021	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.087	0.003	0.159	0.019	0.028	0.016	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.267	0.007	0.630	0.202	0.132	0.075	0.033
	Gasoline	MC	Motorcycles	0.745	0.002	18.972	5.795	0.019	0.008	0.053
Ventura	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.115	0.003	1.646	0.201	0.019	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.247	0.004	2.578	0.309	0.021	0.008	0.027
	Gasoline	HDBGV	Heavy-Duty Vehicles (8,501 + lbs)	0.432	0.006	3.207	0.428	0.033	0.012	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.417	0.002	0.564	0.047	0.044	0.031	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.220	0.003	0.320	0.034	0.033	0.020	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	3.024	0.007	0.815	0.253	0.147	0.087	0.033
Ventura	Gasoline	MC	Motorcycles	0.906	0.002	24.046	7.081	0.020	0.009	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.076	0.003	1.118	0.133	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.141	0.004	1.524	0.174	0.018	0.007	0.027
	Gasoline	HDBGV	Heavy-Duty Vehicles (8,501 + lbs)	0.234	0.005	1.750	0.235	0.028	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.204	0.002	0.330	0.026	0.031	0.020	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.069	0.003	0.158	0.017	0.025	0.013	0.009
Ventura	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.915	0.006	0.367	0.103	0.112	0.055	0.033
	Gasoline	MC	Motorcycles	0.705	0.002	17.949	5.177	0.019	0.008	0.053

**Table 5-37. EMFAC County-Specific On-Road Vehicle EFs – 2024 (cont.)**

County	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				NO <sub>x</sub>	SO <sub>x</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Yolo	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.070	0.003	1.167	0.120	0.018	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.128	0.004	1.592	0.176	0.019	0.007	0.027
	Gasoline	HGCV	Heavy-Duty Vehicles (8,501 + lbs)	0.208	0.005	1.784	0.218	0.030	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.252	0.002	0.374	0.028	0.032	0.020	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.063	0.003	0.173	0.018	0.025	0.013	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.050	0.007	0.581	0.184	0.125	0.069	0.033
Yuba	Gasoline	MC	Motorcycles	0.752	0.002	19.372	5.936	0.019	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.079	0.003	1.239	0.132	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.173	0.004	1.915	0.227	0.019	0.007	0.027
	Gasoline	HGCV	Heavy-Duty Vehicles (8,501 + lbs)	0.290	0.005	2.232	0.302	0.027	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.269	0.002	0.364	0.030	0.033	0.022	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.134	0.003	0.180	0.020	0.026	0.014	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.629	0.007	0.699	0.219	0.137	0.078	0.033
	Gasoline	MC	Motorcycles	0.806	0.002	20.302	6.246	0.019	0.008	0.053



Table 5-38. EMFAC County-Specific On-Road Vehicle EFs – 2025

County	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				NO <sub>x</sub>	SO <sub>x</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Alameda	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.071	0.003	1.047	0.131	0.015	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.108	0.003	1.257	0.147	0.017	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.183	0.005	1.495	0.191	0.027	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.198	0.002	0.314	0.026	0.031	0.020	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.059	0.003	0.143	0.015	0.022	0.011	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.296	0.007	0.387	0.129	0.111	0.055	0.033
Alpine	Gasoline	MC	Motorcycles	0.610	0.002	15.439	4.715	0.018	0.007	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.078	0.003	1.182	0.126	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.147	0.003	1.671	0.182	0.019	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.263	0.005	1.981	0.257	0.029	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.184	0.002	0.344	0.027	0.030	0.019	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.053	0.003	0.181	0.018	0.023	0.011	0.009
Amador	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.086	0.006	0.586	0.188	0.124	0.070	0.033
	Gasoline	MC	Motorcycles	0.702	0.002	18.503	5.093	0.017	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.102	0.003	1.428	0.173	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.241	0.003	2.397	0.283	0.018	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.329	0.005	2.456	0.388	0.029	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.393	0.002	0.343	0.027	0.032	0.021	0.008
Butte	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.158	0.003	0.186	0.022	0.030	0.018	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.801	0.006	0.756	0.237	0.136	0.081	0.033
	Gasoline	MC	Motorcycles	0.808	0.002	19.833	6.339	0.018	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.079	0.003	1.224	0.149	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.161	0.003	1.819	0.225	0.018	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.248	0.005	1.968	0.290	0.027	0.010	0.052
Calaveras	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.236	0.002	0.351	0.028	0.031	0.020	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.121	0.003	0.203	0.024	0.030	0.018	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.248	0.006	0.623	0.196	0.125	0.071	0.033
	Gasoline	MC	Motorcycles	0.715	0.002	18.579	5.965	0.018	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.098	0.003	1.468	0.180	0.018	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.249	0.004	2.594	0.288	0.021	0.008	0.027
Colusa	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.332	0.005	2.538	0.389	0.031	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.352	0.002	0.454	0.037	0.037	0.025	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.133	0.003	0.269	0.030	0.031	0.018	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.849	0.006	0.780	0.240	0.138	0.082	0.033
	Gasoline	MC	Motorcycles	0.798	0.002	20.606	6.510	0.018	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.067	0.003	1.062	0.123	0.015	0.005	0.025
Contra Costa	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.130	0.003	1.491	0.177	0.016	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.207	0.005	1.690	0.231	0.025	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.231	0.002	0.344	0.027	0.029	0.019	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.062	0.003	0.164	0.018	0.023	0.012	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.846	0.006	0.547	0.174	0.119	0.065	0.033
	Gasoline	MC	Motorcycles	0.641	0.002	16.087	5.058	0.017	0.007	0.053
Del Norte	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.069	0.003	1.045	0.128	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.107	0.003	1.270	0.143	0.017	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.190	0.005	1.535	0.195	0.026	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.165	0.002	0.277	0.021	0.026	0.016	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.052	0.003	0.138	0.014	0.022	0.011	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.553	0.007	0.464	0.151	0.113	0.060	0.033
Del Norte	Gasoline	MC	Motorcycles	0.633	0.002	16.147	4.889	0.018	0.007	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.094	0.003	1.282	0.156	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.232	0.004	2.202	0.276	0.018	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.292	0.005	2.105	0.303	0.028	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.303	0.002	0.492	0.039	0.035	0.024	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.163	0.003	0.331	0.038	0.034	0.022	0.009
Del Norte	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.707	0.006	0.739	0.224	0.133	0.078	0.033
	Gasoline	MC	Motorcycles	0.794	0.002	20.908	6.109	0.018	0.008	0.053

Table 5-38. EMFAC County-Specific On-Road Vehicle EFs – 2025 (cont.)

County	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				NO <sub>x</sub>	SO <sub>x</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
El Dorado	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.074	0.003	1.147	0.129	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.138	0.003	1.643	0.201	0.019	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.242	0.005	1.959	0.281	0.028	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.192	0.002	0.316	0.023	0.027	0.017	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.041	0.003	0.157	0.015	0.022	0.010	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.341	0.006	0.659	0.208	0.128	0.074	0.033
	Gasoline	MC	Motorcycles	0.766	0.002	20.033	6.351	0.018	0.008	0.053
Fresno	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.064	0.003	1.033	0.121	0.014	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.123	0.003	1.457	0.175	0.016	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.195	0.005	1.640	0.228	0.023	0.008	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.194	0.002	0.279	0.023	0.028	0.018	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.077	0.003	0.144	0.016	0.023	0.013	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.769	0.006	0.500	0.159	0.114	0.062	0.033
	Gasoline	MC	Motorcycles	0.657	0.002	16.564	5.386	0.017	0.007	0.053
Glenn	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.069	0.003	1.138	0.130	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.128	0.003	1.567	0.189	0.018	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.219	0.005	1.851	0.259	0.026	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.168	0.002	0.373	0.027	0.029	0.018	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.071	0.003	0.208	0.023	0.026	0.014	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.083	0.006	0.596	0.186	0.123	0.068	0.033
	Gasoline	MC	Motorcycles	0.661	0.002	17.114	5.436	0.018	0.008	0.053
Humboldt	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.095	0.003	1.295	0.159	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.208	0.003	2.028	0.256	0.018	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.283	0.005	2.072	0.294	0.028	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.465	0.002	0.493	0.044	0.041	0.030	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.195	0.003	0.259	0.030	0.032	0.021	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.559	0.006	0.699	0.213	0.127	0.074	0.033
	Gasoline	MC	Motorcycles	0.813	0.002	20.840	6.225	0.018	0.008	0.053
Imperial	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.068	0.003	1.152	0.134	0.014	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.157	0.004	1.817	0.200	0.016	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.207	0.005	1.841	0.230	0.023	0.008	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.255	0.002	0.356	0.032	0.034	0.024	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.072	0.003	0.135	0.015	0.022	0.012	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.770	0.005	0.335	0.087	0.102	0.050	0.033
	Gasoline	MC	Motorcycles	0.584	0.002	15.074	5.152	0.017	0.007	0.053
Inyo	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.074	0.003	1.161	0.133	0.015	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.145	0.003	1.680	0.201	0.017	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.252	0.005	2.025	0.275	0.027	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.304	0.002	0.443	0.036	0.034	0.024	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.064	0.003	0.202	0.021	0.023	0.012	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.104	0.006	0.610	0.193	0.125	0.071	0.033
	Gasoline	MC	Motorcycles	0.679	0.002	17.680	5.546	0.018	0.008	0.053
Kern	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.066	0.003	1.047	0.121	0.014	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.121	0.003	1.433	0.166	0.016	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.197	0.005	1.644	0.218	0.024	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.186	0.002	0.277	0.022	0.027	0.018	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.061	0.003	0.127	0.014	0.021	0.011	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.843	0.006	0.532	0.171	0.119	0.066	0.033
	Gasoline	MC	Motorcycles	0.646	0.002	16.248	5.186	0.017	0.007	0.053
Kings	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.062	0.003	0.970	0.113	0.013	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.134	0.003	1.464	0.174	0.014	0.005	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.187	0.005	1.554	0.221	0.021	0.008	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.002	0.313	0.025	0.027	0.018	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.077	0.003	0.170	0.019	0.023	0.014	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.819	0.006	0.520	0.167	0.117	0.064	0.033
	Gasoline	MC	Motorcycles	0.647	0.002	16.271	5.156	0.017	0.007	0.053

Table 5-38. EMFAC County-Specific On-Road Vehicle EFs – 2025 (cont.)

County	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				NO <sub>x</sub>	SO <sub>x</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Lake	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.120	0.003	1.637	0.195	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.227	0.004	2.312	0.294	0.019	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.343	0.005	2.548	0.378	0.029	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.518	0.002	0.553	0.051	0.048	0.036	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.197	0.003	0.285	0.031	0.033	0.020	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.706	0.006	0.744	0.229	0.134	0.080	0.033
	Gasoline	MC	Motorcycles	0.819	0.002	21.388	6.761	0.018	0.008	0.053
Lassen	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.082	0.003	1.273	0.144	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.176	0.004	1.980	0.233	0.019	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.310	0.005	2.464	0.334	0.030	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.234	0.002	0.471	0.033	0.030	0.019	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.090	0.003	0.273	0.029	0.028	0.016	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.499	0.006	0.706	0.219	0.132	0.077	0.033
	Gasoline	MC	Motorcycles	0.750	0.002	20.281	5.909	0.018	0.008	0.053
Los Angeles	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.065	0.003	1.060	0.117	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.120	0.003	1.427	0.144	0.019	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.196	0.005	1.638	0.189	0.028	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.195	0.002	0.404	0.037	0.038	0.027	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.052	0.003	0.182	0.020	0.024	0.012	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.173	0.005	0.260	0.079	0.099	0.046	0.033
	Gasoline	MC	Motorcycles	0.546	0.002	14.182	4.223	0.017	0.008	0.053
Madera	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.065	0.003	0.996	0.119	0.013	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.140	0.003	1.496	0.196	0.014	0.005	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.225	0.005	1.700	0.248	0.023	0.008	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.190	0.002	0.267	0.020	0.025	0.016	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.056	0.003	0.115	0.012	0.019	0.010	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.095	0.006	0.589	0.186	0.122	0.069	0.033
	Gasoline	MC	Motorcycles	0.707	0.002	18.009	5.587	0.017	0.007	0.053
Marin	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.077	0.003	1.081	0.144	0.015	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.109	0.003	1.268	0.157	0.016	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.188	0.005	1.512	0.198	0.027	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.178	0.002	0.294	0.024	0.028	0.019	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.045	0.003	0.134	0.012	0.020	0.010	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.446	0.006	0.442	0.142	0.108	0.057	0.033
	Gasoline	MC	Motorcycles	0.630	0.002	15.946	4.874	0.018	0.008	0.053
Mariposa	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.110	0.003	1.577	0.184	0.018	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.252	0.004	2.628	0.329	0.021	0.008	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.434	0.006	3.174	0.442	0.033	0.012	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.424	0.002	0.543	0.045	0.040	0.028	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.103	0.003	0.301	0.036	0.035	0.022	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	3.044	0.006	0.810	0.244	0.138	0.082	0.033
	Gasoline	MC	Motorcycles	0.865	0.002	22.931	6.787	0.019	0.008	0.053
Mendocino	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	1.248	0.151	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.190	0.003	1.948	0.242	0.018	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.286	0.005	2.130	0.303	0.028	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.470	0.002	0.497	0.047	0.045	0.034	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.229	0.003	0.269	0.028	0.031	0.019	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.392	0.006	0.664	0.205	0.125	0.072	0.033
	Gasoline	MC	Motorcycles	0.752	0.002	19.235	5.947	0.018	0.008	0.053
Merced	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.068	0.003	1.113	0.120	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.160	0.003	1.785	0.205	0.018	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.241	0.005	1.911	0.250	0.025	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.204	0.002	0.282	0.021	0.027	0.017	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.085	0.003	0.160	0.019	0.027	0.015	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.155	0.007	0.585	0.183	0.122	0.069	0.033
	Gasoline	MC	Motorcycles	0.689	0.002	17.234	5.421	0.017	0.007	0.053

**Table 5-38. EMFAC County-Specific On-Road Vehicle EFs – 2025 (cont.)**

County	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				NO <sub>x</sub>	SO <sub>x</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Modoc	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	1.379	0.146	0.018	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.191	0.004	2.128	0.231	0.021	0.008	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.348	0.006	2.728	0.351	0.032	0.012	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.306	0.002	0.679	0.051	0.039	0.027	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.101	0.003	0.399	0.043	0.035	0.022	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.665	0.006	0.743	0.223	0.132	0.077	0.033
	Gasoline	MC	Motorcycles	0.751	0.002	21.216	5.810	0.019	0.008	0.053
Mono	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.083	0.003	1.195	0.132	0.015	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.163	0.003	1.749	0.204	0.017	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.290	0.005	2.154	0.289	0.027	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.287	0.002	0.424	0.031	0.031	0.021	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.088	0.003	0.222	0.021	0.022	0.011	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.093	0.006	0.606	0.188	0.123	0.069	0.033
	Gasoline	MC	Motorcycles	0.746	0.002	20.378	5.446	0.018	0.008	0.053
Monterey	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.083	0.003	1.151	0.146	0.015	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.163	0.003	1.635	0.201	0.017	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.260	0.005	1.813	0.247	0.026	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.232	0.002	0.343	0.030	0.034	0.023	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.068	0.003	0.151	0.015	0.024	0.012	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.932	0.007	0.504	0.156	0.114	0.062	0.033
	Gasoline	MC	Motorcycles	0.671	0.002	17.080	5.142	0.018	0.008	0.053
Napa	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.070	0.003	1.067	0.123	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.122	0.003	1.422	0.164	0.018	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.227	0.005	1.731	0.235	0.028	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.237	0.002	0.347	0.033	0.037	0.026	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.061	0.003	0.151	0.015	0.023	0.012	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.011	0.007	0.572	0.180	0.121	0.067	0.033
	Gasoline	MC	Motorcycles	0.679	0.002	17.325	5.218	0.018	0.008	0.053
Nevada	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.084	0.003	1.234	0.158	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.176	0.003	1.874	0.235	0.018	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.299	0.005	2.167	0.314	0.029	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.267	0.002	0.356	0.027	0.029	0.019	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.149	0.003	0.232	0.023	0.027	0.016	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.612	0.006	0.714	0.220	0.129	0.076	0.033
	Gasoline	MC	Motorcycles	0.830	0.002	21.637	6.687	0.018	0.008	0.053
Orange	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.059	0.003	0.969	0.109	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.098	0.003	1.236	0.132	0.018	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.163	0.005	1.427	0.167	0.027	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.126	0.002	0.294	0.022	0.027	0.016	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.043	0.003	0.150	0.015	0.022	0.011	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.165	0.005	0.244	0.074	0.097	0.045	0.033
	Gasoline	MC	Motorcycles	0.548	0.002	14.062	4.267	0.017	0.007	0.053
Placer	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.070	0.003	1.121	0.126	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.102	0.003	1.341	0.146	0.018	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.191	0.005	1.669	0.209	0.027	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.232	0.002	0.355	0.030	0.032	0.021	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.058	0.003	0.163	0.016	0.023	0.011	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.955	0.006	0.569	0.180	0.121	0.067	0.033
	Gasoline	MC	Motorcycles	0.695	0.002	17.988	5.547	0.018	0.008	0.053
Plumas	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.098	0.003	1.485	0.166	0.019	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.220	0.004	2.420	0.272	0.022	0.008	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.372	0.005	2.947	0.387	0.032	0.012	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.304	0.002	0.594	0.047	0.040	0.028	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.162	0.003	0.378	0.037	0.031	0.017	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.757	0.006	0.773	0.232	0.134	0.080	0.033
	Gasoline	MC	Motorcycles	0.800	0.002	22.405	6.471	0.018	0.008	0.053

**Table 5-38. EMFAC County-Specific On-Road Vehicle EFs – 2025 (cont.)**

County	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				NO <sub>x</sub>	SO <sub>x</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Riverside	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.060	0.003	0.995	0.109	0.015	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.115	0.003	1.387	0.146	0.016	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.179	0.005	1.535	0.190	0.024	0.008	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.148	0.002	0.275	0.021	0.027	0.017	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.060	0.003	0.139	0.015	0.022	0.011	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.611	0.005	0.317	0.088	0.102	0.050	0.033
	Gasoline	MC	Motorcycles	0.585	0.002	15.057	4.804	0.017	0.007	0.053
Sacramento	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.072	0.003	1.177	0.142	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.115	0.003	1.452	0.171	0.018	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.208	0.005	1.745	0.232	0.028	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.197	0.002	0.330	0.024	0.027	0.017	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.056	0.003	0.164	0.017	0.023	0.011	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.890	0.006	0.532	0.167	0.116	0.064	0.033
	Gasoline	MC	Motorcycles	0.680	0.002	17.576	5.591	0.018	0.008	0.053
San Benito	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.073	0.003	1.128	0.126	0.018	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.128	0.003	1.534	0.188	0.019	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.211	0.005	1.726	0.241	0.027	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.178	0.002	0.327	0.025	0.030	0.018	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.056	0.003	0.166	0.017	0.024	0.011	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.933	0.006	0.566	0.176	0.119	0.066	0.033
	Gasoline	MC	Motorcycles	0.689	0.002	17.839	5.695	0.018	0.008	0.053
San Bernardino	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.062	0.003	0.995	0.110	0.015	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.125	0.003	1.428	0.164	0.016	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.201	0.005	1.618	0.207	0.025	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.178	0.002	0.292	0.023	0.028	0.018	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.058	0.003	0.127	0.014	0.021	0.011	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.747	0.005	0.339	0.090	0.103	0.051	0.033
	Gasoline	MC	Motorcycles	0.618	0.002	15.859	4.890	0.017	0.007	0.053
San Diego	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.063	0.003	1.006	0.115	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.118	0.003	1.388	0.156	0.018	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.179	0.005	1.501	0.189	0.027	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.146	0.002	0.473	0.032	0.027	0.017	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.060	0.003	0.276	0.028	0.024	0.012	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.752	0.006	0.517	0.160	0.115	0.062	0.033
	Gasoline	MC	Motorcycles	0.602	0.002	15.719	4.691	0.018	0.008	0.053
San Francisco	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.069	0.003	1.107	0.130	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.101	0.003	1.327	0.144	0.020	0.008	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.165	0.005	1.501	0.158	0.033	0.012	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.155	0.002	0.412	0.032	0.032	0.021	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.053	0.003	0.238	0.024	0.026	0.013	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.791	0.009	0.259	0.094	0.116	0.050	0.033
	Gasoline	MC	Motorcycles	0.630	0.002	16.925	5.068	0.018	0.008	0.053
San Joaquin	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.067	0.003	1.113	0.122	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.121	0.003	1.487	0.167	0.019	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.203	0.005	1.743	0.233	0.026	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.181	0.002	0.360	0.025	0.028	0.017	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.049	0.003	0.184	0.019	0.024	0.011	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.853	0.006	0.530	0.166	0.115	0.063	0.033
	Gasoline	MC	Motorcycles	0.658	0.002	17.144	5.469	0.018	0.008	0.053
San Luis Obispo	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.074	0.003	1.054	0.134	0.015	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.134	0.003	1.446	0.187	0.016	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.228	0.005	1.686	0.238	0.026	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.182	0.002	0.295	0.023	0.028	0.018	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.079	0.003	0.166	0.018	0.025	0.014	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.057	0.006	0.581	0.183	0.122	0.068	0.033
	Gasoline	MC	Motorcycles	0.758	0.002	19.437	5.931	0.018	0.008	0.053

Table 5-38. EMFAC County-Specific On-Road Vehicle EFs – 2025 (cont.)

County	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				NO <sub>x</sub>	SO <sub>x</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
San Mateo	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.067	0.002	0.989	0.134	0.014	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.090	0.003	1.136	0.129	0.016	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.136	0.005	1.298	0.148	0.026	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.144	0.002	0.253	0.018	0.023	0.014	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.041	0.003	0.120	0.013	0.020	0.009	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.930	0.006	0.298	0.103	0.101	0.047	0.033
Santa Barbara	Gasoline	MC	Motorcycles	0.522	0.002	13.074	4.378	0.017	0.007	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.081	0.003	1.130	0.150	0.015	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.157	0.003	1.591	0.202	0.017	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.250	0.005	1.799	0.252	0.027	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.195	0.002	0.289	0.022	0.028	0.017	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.072	0.003	0.153	0.016	0.024	0.012	0.009
Santa Clara	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.849	0.007	0.514	0.161	0.115	0.062	0.033
	Gasoline	MC	Motorcycles	0.699	0.002	17.186	5.399	0.018	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.067	0.003	1.042	0.122	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.112	0.003	1.329	0.151	0.018	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.182	0.005	1.535	0.193	0.027	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.171	0.002	0.290	0.023	0.028	0.018	0.008
Santa Cruz	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.051	0.003	0.139	0.015	0.023	0.011	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.361	0.007	0.395	0.129	0.108	0.054	0.033
	Gasoline	MC	Motorcycles	0.577	0.002	14.606	4.530	0.017	0.007	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.094	0.003	1.335	0.159	0.018	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.169	0.003	1.820	0.218	0.021	0.008	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.269	0.005	1.982	0.266	0.030	0.011	0.052
Shasta	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.307	0.002	0.437	0.041	0.042	0.030	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.085	0.003	0.204	0.022	0.030	0.016	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.124	0.006	0.569	0.172	0.116	0.065	0.033
	Gasoline	MC	Motorcycles	0.746	0.002	19.614	6.094	0.018	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.071	0.003	1.109	0.133	0.015	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.139	0.003	1.595	0.196	0.017	0.006	0.027
Sierra	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.236	0.005	1.873	0.269	0.026	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.217	0.002	0.313	0.025	0.028	0.018	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.090	0.003	0.165	0.017	0.024	0.013	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.431	0.006	0.655	0.205	0.127	0.073	0.033
	Gasoline	MC	Motorcycles	0.751	0.002	19.343	6.048	0.018	0.008	0.053
	Siskiyou	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.085	0.003	1.312	0.140	0.018	0.007
Gasoline		LDGT	Light-Duty Trucks (0-8,500 lbs)	0.185	0.004	2.034	0.222	0.021	0.008	0.027
Gasoline		HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.321	0.005	2.559	0.324	0.031	0.011	0.052
Diesel		LDDV	Light-Duty Vehicles (Passenger Cars)	0.289	0.002	0.633	0.049	0.039	0.027	0.008
Diesel		LDDT	Light-Duty Trucks (0-8,500 lbs)	0.061	0.003	0.341	0.034	0.026	0.013	0.009
Diesel		HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.538	0.006	0.730	0.223	0.133	0.078	0.033
Solano	Gasoline	MC	Motorcycles	0.748	0.002	20.707	5.876	0.018	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.087	0.003	1.314	0.150	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.187	0.004	2.035	0.239	0.019	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.318	0.005	2.499	0.334	0.029	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.382	0.002	0.588	0.047	0.039	0.028	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.136	0.003	0.331	0.036	0.031	0.019	0.009
Solano	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.703	0.006	0.742	0.227	0.133	0.078	0.033
	Gasoline	MC	Motorcycles	0.785	0.002	21.754	6.184	0.018	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.069	0.003	1.004	0.121	0.014	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.114	0.003	1.277	0.156	0.015	0.005	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.196	0.005	1.515	0.215	0.025	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.214	0.002	0.311	0.025	0.029	0.019	0.008
Solano	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.045	0.003	0.116	0.012	0.019	0.009	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.880	0.007	0.537	0.172	0.121	0.066	0.033
	Gasoline	MC	Motorcycles	0.680	0.002	17.285	5.078	0.017	0.007	0.053

**Table 5-38. EMFAC County-Specific On-Road Vehicle EFs – 2025 (cont.)**

County	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				NO <sub>x</sub>	SO <sub>x</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Sonoma	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.079	0.003	1.182	0.139	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.142	0.003	1.611	0.192	0.019	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.236	0.005	1.830	0.248	0.030	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.261	0.002	0.359	0.030	0.034	0.022	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.082	0.003	0.176	0.019	0.027	0.015	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.043	0.006	0.577	0.181	0.121	0.067	0.033
Stanislaus	Gasoline	MC	Motorcycles	0.693	0.002	17.981	5.467	0.018	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.066	0.003	1.131	0.126	0.018	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.131	0.003	1.615	0.188	0.020	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.208	0.005	1.780	0.243	0.028	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.172	0.002	0.283	0.021	0.028	0.017	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.061	0.003	0.152	0.017	0.026	0.013	0.009
Sutter	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.018	0.006	0.574	0.183	0.122	0.068	0.033
	Gasoline	MC	Motorcycles	0.680	0.002	17.214	5.529	0.017	0.007	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.072	0.003	1.167	0.135	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.135	0.003	1.610	0.187	0.018	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.213	0.005	1.799	0.251	0.026	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.183	0.002	0.335	0.025	0.029	0.018	0.008
Tehama	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.059	0.003	0.173	0.019	0.025	0.013	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.948	0.006	0.561	0.177	0.119	0.066	0.033
	Gasoline	MC	Motorcycles	0.671	0.002	17.225	5.502	0.018	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.073	0.003	1.130	0.129	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.150	0.003	1.681	0.198	0.018	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.238	0.005	1.888	0.268	0.026	0.009	0.052
Trinity	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.220	0.002	0.397	0.030	0.030	0.019	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.110	0.003	0.235	0.026	0.028	0.016	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.330	0.006	0.640	0.198	0.125	0.071	0.033
	Gasoline	MC	Motorcycles	0.739	0.002	19.324	5.838	0.018	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	1.385	0.146	0.018	0.007	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.203	0.004	2.231	0.242	0.021	0.008	0.027
Tulare	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.300	0.006	2.398	0.312	0.030	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.381	0.002	0.744	0.066	0.051	0.039	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.127	0.003	0.431	0.047	0.036	0.023	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.644	0.006	0.730	0.217	0.128	0.075	0.033
	Gasoline	MC	Motorcycles	0.755	0.002	21.470	6.214	0.019	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.064	0.003	1.054	0.117	0.016	0.006	0.025
Tuolumne	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.155	0.003	1.697	0.196	0.018	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.220	0.005	1.790	0.241	0.024	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.202	0.002	0.278	0.022	0.029	0.018	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.076	0.003	0.147	0.017	0.026	0.015	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.046	0.006	0.578	0.184	0.122	0.069	0.033
	Gasoline	MC	Motorcycles	0.677	0.002	17.312	5.423	0.017	0.007	0.053
Ventura	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.101	0.003	1.465	0.183	0.018	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.218	0.004	2.302	0.286	0.020	0.008	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.386	0.005	2.900	0.398	0.031	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.347	0.002	0.507	0.042	0.039	0.027	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.190	0.003	0.299	0.030	0.030	0.017	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.721	0.006	0.745	0.231	0.135	0.080	0.033
Ventura	Gasoline	MC	Motorcycles	0.838	0.002	22.345	6.765	0.018	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.066	0.003	0.993	0.122	0.015	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.123	0.003	1.349	0.158	0.017	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.202	0.004	1.541	0.213	0.026	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.168	0.002	0.292	0.022	0.027	0.017	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.059	0.003	0.146	0.015	0.023	0.012	0.009
Ventura	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.710	0.005	0.331	0.094	0.104	0.051	0.033
	Gasoline	MC	Motorcycles	0.637	0.002	16.317	4.820	0.017	0.007	0.053

**Table 5-38. EMFAC County-Specific On-Road Vehicle EFs – 2025 (cont.)**

County	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				NO <sub>x</sub>	SO <sub>x</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Yolo	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.062	0.003	1.042	0.110	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.113	0.003	1.439	0.164	0.018	0.007	0.027
	Gasoline	HGCV	Heavy-Duty Vehicles (8,501 + lbs)	0.183	0.005	1.604	0.202	0.028	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.204	0.002	0.330	0.024	0.028	0.017	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.056	0.003	0.167	0.017	0.024	0.012	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.854	0.006	0.535	0.169	0.116	0.064	0.033
Yuba	Gasoline	MC	Motorcycles	0.692	0.002	17.934	5.620	0.018	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.070	0.003	1.124	0.122	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.149	0.003	1.696	0.207	0.018	0.006	0.027
	Gasoline	HGCV	Heavy-Duty Vehicles (8,501 + lbs)	0.254	0.005	1.994	0.278	0.025	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.220	0.002	0.327	0.026	0.030	0.019	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.114	0.003	0.170	0.018	0.025	0.013	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.380	0.006	0.643	0.201	0.127	0.072	0.033
Gasoline	MC	Motorcycles	0.743	0.002	18.832	5.940	0.018	0.007	0.053	



Table 5-39. EMFAC County-Specific On-Road Vehicle EFs – 2026

County	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				NO <sub>x</sub>	SO <sub>x</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Alameda	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.063	0.002	0.942	0.122	0.014	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.096	0.003	1.139	0.137	0.016	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.162	0.004	1.358	0.178	0.025	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.160	0.002	0.274	0.022	0.026	0.017	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.051	0.003	0.134	0.014	0.021	0.010	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.173	0.007	0.359	0.119	0.104	0.051	0.033
Alpine	Gasoline	MC	Motorcycles	0.557	0.002	14.236	4.450	0.016	0.007	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.069	0.002	1.056	0.117	0.015	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.130	0.003	1.500	0.169	0.017	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.233	0.004	1.789	0.241	0.026	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.147	0.002	0.302	0.023	0.026	0.016	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.047	0.002	0.171	0.017	0.022	0.010	0.009
Amador	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.862	0.006	0.531	0.170	0.114	0.064	0.033
	Gasoline	MC	Motorcycles	0.638	0.002	17.000	4.816	0.016	0.007	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.092	0.002	1.300	0.161	0.015	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.219	0.003	2.181	0.264	0.017	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.296	0.005	2.237	0.364	0.027	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.339	0.002	0.307	0.024	0.028	0.019	0.008
Butte	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.121	0.003	0.161	0.017	0.025	0.014	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.532	0.006	0.693	0.216	0.126	0.075	0.033
	Gasoline	MC	Motorcycles	0.754	0.002	18.617	6.097	0.017	0.007	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.071	0.003	1.110	0.138	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.143	0.003	1.632	0.208	0.017	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.219	0.004	1.765	0.269	0.025	0.009	0.052
Calaveras	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.189	0.002	0.307	0.023	0.027	0.017	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.097	0.003	0.183	0.020	0.026	0.015	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.010	0.006	0.567	0.177	0.115	0.065	0.033
	Gasoline	MC	Motorcycles	0.657	0.002	17.194	5.696	0.016	0.007	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	1.329	0.167	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.225	0.003	2.354	0.269	0.019	0.007	0.027
Colusa	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.298	0.005	2.313	0.366	0.028	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.293	0.002	0.403	0.031	0.031	0.021	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.120	0.003	0.257	0.028	0.029	0.017	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.559	0.006	0.711	0.218	0.126	0.075	0.033
	Gasoline	MC	Motorcycles	0.743	0.002	19.319	6.278	0.017	0.007	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.060	0.002	0.959	0.115	0.014	0.005	0.025
Contra Costa	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.115	0.003	1.340	0.163	0.015	0.005	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.182	0.004	1.518	0.215	0.023	0.008	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.185	0.002	0.301	0.022	0.025	0.016	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.054	0.003	0.154	0.016	0.021	0.011	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.656	0.006	0.501	0.158	0.109	0.060	0.033
	Gasoline	MC	Motorcycles	0.587	0.002	14.856	4.810	0.016	0.007	0.053
Del Norte	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.062	0.002	0.943	0.119	0.014	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.095	0.003	1.152	0.134	0.016	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.168	0.004	1.391	0.181	0.024	0.008	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.133	0.002	0.242	0.017	0.023	0.013	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.045	0.003	0.130	0.013	0.020	0.010	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.404	0.006	0.428	0.138	0.106	0.056	0.033
Del Norte	Gasoline	MC	Motorcycles	0.579	0.002	14.885	4.619	0.016	0.007	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.083	0.003	1.156	0.144	0.015	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.208	0.003	1.990	0.257	0.017	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.262	0.005	1.924	0.286	0.026	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.241	0.002	0.437	0.033	0.029	0.020	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.145	0.003	0.312	0.035	0.032	0.020	0.009
Del Norte	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.421	0.006	0.672	0.203	0.122	0.071	0.033
	Gasoline	MC	Motorcycles	0.740	0.002	19.581	5.898	0.017	0.007	0.053

**Table 5-39. EMFAC County-Specific On-Road Vehicle EFs – 2026 (cont.)**

County	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				NO <sub>x</sub>	SO <sub>x</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
El Dorado	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.066	0.002	1.035	0.119	0.015	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.125	0.003	1.505	0.192	0.018	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.219	0.005	1.800	0.268	0.026	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.151	0.002	0.273	0.019	0.023	0.014	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.037	0.003	0.151	0.014	0.021	0.010	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.091	0.006	0.599	0.188	0.117	0.068	0.033
	Gasoline	MC	Motorcycles	0.708	0.002	18.662	6.100	0.017	0.007	0.053
Fresno	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.06	0.00	0.94	0.11	0.01	0.00	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.11	0.00	1.32	0.16	0.01	0.01	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.17	0.00	1.47	0.21	0.02	0.01	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.15	0.00	0.24	0.02	0.02	0.01	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.07	0.00	0.14	0.01	0.02	0.01	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.60	0.01	0.46	0.15	0.11	0.06	0.033
	Gasoline	MC	Motorcycles	0.60	0.00	15.21	5.10	0.02	0.01	0.053
Glenn	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.062	0.003	1.030	0.121	0.015	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.112	0.003	1.401	0.174	0.016	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.192	0.004	1.650	0.239	0.024	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.002	0.335	0.024	0.025	0.015	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.061	0.003	0.196	0.021	0.024	0.013	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.863	0.006	0.542	0.169	0.112	0.063	0.033
	Gasoline	MC	Motorcycles	0.605	0.002	15.777	5.154	0.016	0.007	0.053
Humboldt	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.085	0.003	1.171	0.148	0.015	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.188	0.003	1.845	0.242	0.017	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.255	0.005	1.902	0.280	0.026	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.373	0.002	0.425	0.036	0.034	0.025	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.173	0.003	0.244	0.027	0.030	0.019	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.292	0.006	0.636	0.193	0.116	0.067	0.033
	Gasoline	MC	Motorcycles	0.758	0.002	19.540	6.023	0.017	0.007	0.053
Imperial	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.061	0.003	1.040	0.124	0.013	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.140	0.003	1.628	0.183	0.014	0.005	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.183	0.004	1.653	0.212	0.022	0.008	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.203	0.002	0.309	0.026	0.029	0.020	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.060	0.003	0.125	0.013	0.020	0.011	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.579	0.005	0.301	0.079	0.094	0.046	0.033
	Gasoline	MC	Motorcycles	0.532	0.002	13.826	4.869	0.016	0.007	0.053
Inyo	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.066	0.003	1.039	0.123	0.013	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.129	0.003	1.510	0.187	0.015	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.224	0.005	1.831	0.257	0.025	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.247	0.002	0.387	0.030	0.029	0.020	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.054	0.003	0.189	0.019	0.021	0.011	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.874	0.006	0.554	0.174	0.115	0.064	0.033
	Gasoline	MC	Motorcycles	0.621	0.002	16.271	5.267	0.016	0.007	0.053
Kern	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.059	0.002	0.945	0.112	0.013	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.108	0.003	1.302	0.154	0.015	0.005	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.174	0.004	1.483	0.203	0.022	0.008	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.151	0.002	0.243	0.019	0.023	0.015	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.053	0.003	0.121	0.013	0.020	0.010	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.671	0.006	0.494	0.158	0.110	0.061	0.033
	Gasoline	MC	Motorcycles	0.591	0.002	14.967	4.914	0.016	0.007	0.053
Kings	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.056	0.003	0.878	0.105	0.012	0.004	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.119	0.003	1.328	0.162	0.013	0.005	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.164	0.004	1.397	0.206	0.020	0.007	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.159	0.002	0.271	0.020	0.023	0.015	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.069	0.003	0.161	0.018	0.022	0.013	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.649	0.006	0.483	0.154	0.108	0.059	0.033
	Gasoline	MC	Motorcycles	0.591	0.002	14.957	4.886	0.016	0.007	0.053

Table 5-39. EMFAC County-Specific On-Road Vehicle EFs – 2026 (cont.)

County	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				NO <sub>x</sub>	SO <sub>x</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Lake	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	1.489	0.182	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.203	0.003	2.088	0.274	0.018	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.308	0.005	2.325	0.355	0.027	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.438	0.002	0.494	0.044	0.041	0.031	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.172	0.003	0.268	0.028	0.030	0.018	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.433	0.006	0.678	0.208	0.123	0.073	0.033
	Gasoline	MC	Motorcycles	0.766	0.002	20.097	6.531	0.017	0.008	0.053
Lassen	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.073	0.003	1.145	0.133	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.156	0.003	1.780	0.216	0.018	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.278	0.005	2.248	0.313	0.027	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.190	0.002	0.419	0.028	0.026	0.016	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.077	0.003	0.259	0.027	0.026	0.014	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.217	0.005	0.638	0.197	0.120	0.070	0.033
	Gasoline	MC	Motorcycles	0.690	0.002	18.786	5.645	0.017	0.007	0.053
Los Angeles	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.057	0.002	0.937	0.107	0.015	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.107	0.003	1.281	0.132	0.017	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.171	0.004	1.464	0.173	0.026	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.157	0.002	0.355	0.030	0.032	0.022	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.046	0.003	0.171	0.018	0.022	0.011	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.048	0.005	0.238	0.072	0.092	0.042	0.033
	Gasoline	MC	Motorcycles	0.496	0.002	13.031	3.969	0.016	0.007	0.053
Madera	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.059	0.003	0.906	0.111	0.012	0.004	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.123	0.003	1.343	0.180	0.013	0.005	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.196	0.005	1.520	0.229	0.021	0.007	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.152	0.002	0.232	0.017	0.021	0.013	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.049	0.003	0.109	0.011	0.018	0.009	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.887	0.006	0.544	0.171	0.113	0.064	0.033
	Gasoline	MC	Motorcycles	0.646	0.002	16.525	5.287	0.016	0.007	0.053
Marin	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.068	0.002	0.963	0.132	0.013	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.097	0.003	1.148	0.147	0.015	0.005	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.166	0.004	1.374	0.185	0.025	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.146	0.002	0.257	0.020	0.024	0.016	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.040	0.003	0.124	0.011	0.019	0.009	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.298	0.006	0.406	0.130	0.100	0.053	0.033
	Gasoline	MC	Motorcycles	0.573	0.002	14.621	4.597	0.016	0.007	0.053
Mariposa	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.099	0.003	1.428	0.170	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.225	0.003	2.359	0.304	0.019	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.394	0.005	2.908	0.415	0.030	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.351	0.002	0.483	0.038	0.035	0.024	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.092	0.003	0.287	0.033	0.032	0.020	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.746	0.006	0.742	0.223	0.127	0.075	0.033
	Gasoline	MC	Motorcycles	0.809	0.002	21.528	6.519	0.017	0.008	0.053
Mendocino	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.079	0.002	1.123	0.139	0.015	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.170	0.003	1.765	0.227	0.017	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.255	0.005	1.940	0.286	0.026	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.384	0.002	0.431	0.039	0.037	0.027	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.202	0.003	0.250	0.025	0.029	0.018	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.134	0.006	0.602	0.185	0.114	0.066	0.033
	Gasoline	MC	Motorcycles	0.696	0.002	17.922	5.720	0.016	0.007	0.053
Merced	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.061	0.003	1.024	0.114	0.015	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.142	0.003	1.611	0.188	0.017	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.211	0.004	1.714	0.230	0.023	0.008	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.165	0.002	0.252	0.018	0.024	0.014	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.075	0.003	0.154	0.018	0.025	0.014	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.971	0.006	0.547	0.170	0.114	0.064	0.033
	Gasoline	MC	Motorcycles	0.635	0.002	16.008	5.147	0.016	0.007	0.053

**Table 5-39. EMFAC County-Specific On-Road Vehicle EFs – 2026 (cont.)**

County	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				NO <sub>x</sub>	SO <sub>x</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Modoc	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.078	0.003	1.239	0.134	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.170	0.004	1.913	0.213	0.020	0.008	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.310	0.005	2.465	0.326	0.030	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.253	0.002	0.609	0.045	0.034	0.023	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.090	0.003	0.382	0.040	0.032	0.020	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.386	0.006	0.676	0.202	0.121	0.070	0.033
	Gasoline	MC	Motorcycles	0.694	0.002	19.710	5.525	0.017	0.008	0.053
Mono	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.074	0.002	1.074	0.122	0.014	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.146	0.003	1.580	0.191	0.016	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.259	0.005	1.951	0.270	0.025	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.236	0.002	0.373	0.027	0.026	0.017	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.077	0.003	0.210	0.019	0.021	0.010	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.870	0.006	0.551	0.171	0.113	0.063	0.033
	Gasoline	MC	Motorcycles	0.684	0.002	18.816	5.173	0.016	0.007	0.053
Monterey	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.074	0.002	1.045	0.136	0.014	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.146	0.003	1.493	0.189	0.016	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.231	0.005	1.647	0.231	0.024	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.189	0.002	0.303	0.025	0.029	0.019	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.060	0.003	0.144	0.014	0.022	0.011	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.752	0.006	0.465	0.142	0.106	0.057	0.033
	Gasoline	MC	Motorcycles	0.617	0.002	15.813	4.902	0.016	0.007	0.053
Napa	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.063	0.002	0.967	0.114	0.015	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.108	0.003	1.282	0.152	0.017	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.200	0.005	1.560	0.218	0.026	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.192	0.002	0.304	0.027	0.031	0.021	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.052	0.003	0.141	0.013	0.022	0.011	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.819	0.006	0.526	0.165	0.112	0.062	0.033
	Gasoline	MC	Motorcycles	0.622	0.002	15.988	4.940	0.016	0.007	0.053
Nevada	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.075	0.002	1.111	0.146	0.015	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.159	0.003	1.716	0.224	0.017	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.270	0.005	1.997	0.299	0.027	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.211	0.002	0.306	0.022	0.024	0.015	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.133	0.003	0.220	0.021	0.026	0.014	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.329	0.005	0.647	0.198	0.118	0.069	0.033
	Gasoline	MC	Motorcycles	0.773	0.002	20.282	6.479	0.017	0.007	0.053
Orange	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.052	0.002	0.862	0.100	0.015	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.088	0.003	1.114	0.123	0.016	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.144	0.004	1.284	0.155	0.025	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.101	0.002	0.259	0.018	0.023	0.014	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.038	0.003	0.142	0.014	0.020	0.010	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.047	0.005	0.225	0.068	0.090	0.042	0.033
	Gasoline	MC	Motorcycles	0.499	0.002	12.954	4.018	0.016	0.007	0.053
Placer	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.063	0.002	1.008	0.116	0.015	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.091	0.003	1.226	0.137	0.017	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.171	0.005	1.525	0.196	0.025	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.189	0.002	0.312	0.025	0.027	0.018	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.051	0.003	0.155	0.015	0.021	0.010	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.761	0.006	0.522	0.164	0.112	0.062	0.033
	Gasoline	MC	Motorcycles	0.642	0.002	16.755	5.301	0.016	0.007	0.053
Plumas	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.086	0.003	1.332	0.152	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.195	0.003	2.163	0.251	0.020	0.008	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.334	0.005	2.687	0.363	0.029	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.253	0.002	0.532	0.041	0.035	0.024	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.143	0.003	0.359	0.034	0.029	0.016	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.444	0.005	0.697	0.208	0.122	0.072	0.033
	Gasoline	MC	Motorcycles	0.739	0.002	20.834	6.205	0.017	0.008	0.053

Table 5-39. EMFAC County-Specific On-Road Vehicle EFs – 2026 (cont.)

County	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				NO <sub>x</sub>	SO <sub>x</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Riverside	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.054	0.002	0.901	0.102	0.014	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.103	0.003	1.258	0.136	0.015	0.005	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.158	0.004	1.387	0.177	0.022	0.008	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.120	0.002	0.243	0.018	0.023	0.014	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.052	0.003	0.130	0.014	0.021	0.010	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.441	0.005	0.286	0.080	0.095	0.047	0.033
Sacramento	Gasoline	MC	Motorcycles	0.531	0.002	13.780	4.527	0.015	0.007	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.065	0.003	1.070	0.134	0.015	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.103	0.003	1.323	0.161	0.017	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.184	0.005	1.579	0.217	0.026	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.158	0.002	0.288	0.020	0.023	0.014	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.050	0.003	0.158	0.016	0.022	0.010	0.009
San Benito	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.702	0.006	0.488	0.152	0.107	0.059	0.033
	Gasoline	MC	Motorcycles	0.628	0.002	16.350	5.356	0.016	0.007	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.066	0.002	1.035	0.119	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.114	0.003	1.396	0.177	0.018	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.185	0.004	1.555	0.225	0.025	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.152	0.002	0.297	0.023	0.027	0.016	0.008
San Bernardino	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.051	0.003	0.161	0.016	0.023	0.011	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.733	0.006	0.516	0.160	0.109	0.060	0.033
	Gasoline	MC	Motorcycles	0.632	0.002	16.522	5.450	0.016	0.007	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.056	0.002	0.897	0.102	0.014	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.111	0.003	1.289	0.152	0.015	0.005	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.176	0.004	1.455	0.192	0.023	0.008	0.052
San Diego	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.144	0.002	0.256	0.019	0.024	0.015	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.049	0.003	0.120	0.012	0.020	0.010	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.566	0.005	0.306	0.082	0.095	0.047	0.033
	Gasoline	MC	Motorcycles	0.562	0.002	14.530	4.610	0.016	0.007	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.056	0.003	0.901	0.106	0.014	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.105	0.003	1.244	0.145	0.016	0.006	0.027
San Francisco	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.156	0.005	1.339	0.174	0.024	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.118	0.002	0.415	0.027	0.023	0.014	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.052	0.003	0.258	0.025	0.021	0.011	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.579	0.006	0.476	0.146	0.107	0.058	0.033
	Gasoline	MC	Motorcycles	0.550	0.002	14.454	4.412	0.016	0.007	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.061	0.002	0.980	0.119	0.015	0.006	0.025
San Joaquin	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.091	0.003	1.212	0.136	0.019	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.148	0.005	1.378	0.148	0.030	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.126	0.002	0.359	0.027	0.027	0.018	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.048	0.003	0.224	0.022	0.024	0.012	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.738	0.008	0.248	0.089	0.111	0.048	0.033
	Gasoline	MC	Motorcycles	0.575	0.002	15.582	4.789	0.016	0.007	0.053
San Luis Obispo	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.060	0.003	1.014	0.115	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.107	0.003	1.350	0.156	0.018	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.178	0.004	1.567	0.216	0.024	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.146	0.002	0.321	0.021	0.024	0.014	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.044	0.003	0.180	0.018	0.023	0.011	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.675	0.006	0.490	0.152	0.107	0.058	0.033
San Luis Obispo	Gasoline	MC	Motorcycles	0.601	0.002	15.798	5.177	0.016	0.007	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.066	0.002	0.950	0.124	0.013	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.120	0.003	1.320	0.176	0.015	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.203	0.005	1.534	0.223	0.024	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.150	0.002	0.260	0.020	0.024	0.016	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.069	0.003	0.156	0.016	0.023	0.013	0.009
San Luis Obispo	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.853	0.006	0.532	0.167	0.112	0.063	0.033
	Gasoline	MC	Motorcycles	0.697	0.002	17.961	5.659	0.016	0.007	0.053

Table 5-39. EMFAC County-Specific On-Road Vehicle EFs – 2026 (cont.)

County	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				NO <sub>x</sub>	SO <sub>x</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
San Mateo	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.058	0.002	0.858	0.122	0.012	0.004	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.082	0.003	1.037	0.122	0.015	0.005	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.122	0.004	1.191	0.139	0.023	0.008	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.110	0.002	0.210	0.014	0.019	0.011	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.036	0.002	0.111	0.011	0.018	0.009	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.824	0.006	0.274	0.093	0.093	0.043	0.033
Santa Barbara	Gasoline	MC	Motorcycles	0.469	0.002	11.946	4.137	0.015	0.007	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.072	0.002	1.003	0.139	0.014	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.140	0.003	1.434	0.190	0.016	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.222	0.005	1.615	0.235	0.025	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.157	0.002	0.243	0.018	0.023	0.014	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.064	0.003	0.137	0.014	0.022	0.011	0.009
Santa Clara	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.685	0.006	0.474	0.147	0.106	0.058	0.033
	Gasoline	MC	Motorcycles	0.643	0.002	15.891	5.142	0.016	0.007	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.060	0.002	0.937	0.113	0.014	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.101	0.003	1.207	0.142	0.016	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.161	0.004	1.395	0.180	0.025	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.135	0.002	0.252	0.019	0.024	0.015	0.008
Santa Cruz	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.045	0.003	0.131	0.013	0.021	0.010	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.227	0.006	0.365	0.118	0.100	0.050	0.033
	Gasoline	MC	Motorcycles	0.526	0.002	13.478	4.286	0.016	0.007	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.084	0.003	1.211	0.148	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.151	0.003	1.655	0.205	0.019	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.239	0.005	1.798	0.248	0.028	0.010	0.052
Shasta	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.250	0.002	0.385	0.034	0.036	0.025	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.074	0.003	0.193	0.020	0.027	0.015	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.904	0.006	0.519	0.156	0.107	0.059	0.033
	Gasoline	MC	Motorcycles	0.686	0.002	18.158	5.815	0.017	0.007	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.063	0.002	0.996	0.123	0.014	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.123	0.003	1.432	0.181	0.016	0.006	0.027
Sierra	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.208	0.004	1.682	0.250	0.024	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.168	0.002	0.267	0.019	0.023	0.014	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.078	0.003	0.154	0.016	0.022	0.012	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.176	0.006	0.595	0.185	0.116	0.067	0.033
	Gasoline	MC	Motorcycles	0.690	0.002	17.875	5.778	0.016	0.007	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.076	0.003	1.176	0.129	0.016	0.006	0.025
Siskiyou	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.164	0.003	1.823	0.205	0.019	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.286	0.005	2.327	0.302	0.028	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.239	0.002	0.565	0.043	0.034	0.023	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.055	0.003	0.328	0.032	0.024	0.012	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.246	0.005	0.658	0.200	0.121	0.070	0.033
	Gasoline	MC	Motorcycles	0.686	0.002	19.114	5.589	0.017	0.007	0.053
Solano	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.077	0.003	1.178	0.138	0.015	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.167	0.003	1.829	0.221	0.018	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.284	0.005	2.267	0.312	0.027	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.308	0.002	0.514	0.040	0.033	0.023	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.116	0.003	0.309	0.032	0.028	0.016	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.397	0.005	0.669	0.204	0.121	0.070	0.033
Solano	Gasoline	MC	Motorcycles	0.722	0.002	20.119	5.898	0.017	0.007	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.062	0.002	0.911	0.113	0.013	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.102	0.003	1.155	0.146	0.014	0.005	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.173	0.004	1.364	0.199	0.023	0.008	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.174	0.002	0.272	0.021	0.025	0.016	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.040	0.003	0.110	0.011	0.018	0.009	0.009
Solano	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.707	0.006	0.497	0.158	0.112	0.062	0.033
	Gasoline	MC	Motorcycles	0.624	0.002	15.942	4.809	0.016	0.007	0.053

**Table 5-39. EMFAC County-Specific On-Road Vehicle EFs – 2026 (cont.)**

County	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				NO <sub>x</sub>	SO <sub>x</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Sonoma	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.071	0.002	1.073	0.129	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.126	0.003	1.443	0.177	0.018	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.208	0.005	1.648	0.230	0.028	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.214	0.002	0.316	0.026	0.030	0.019	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.071	0.003	0.163	0.017	0.025	0.014	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.842	0.006	0.529	0.165	0.111	0.062	0.033
Stanislaus	Gasoline	MC	Motorcycles	0.632	0.002	16.502	5.163	0.016	0.007	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.060	0.002	1.032	0.118	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.117	0.003	1.462	0.175	0.018	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.182	0.004	1.597	0.226	0.026	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.002	0.250	0.018	0.025	0.014	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.054	0.003	0.147	0.016	0.025	0.012	0.009
Sutter	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.827	0.006	0.532	0.168	0.113	0.063	0.033
	Gasoline	MC	Motorcycles	0.623	0.002	15.899	5.245	0.016	0.007	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.064	0.003	1.061	0.125	0.015	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.120	0.003	1.454	0.173	0.017	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.188	0.004	1.620	0.234	0.024	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.151	0.002	0.300	0.022	0.025	0.015	0.008
Tehama	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.054	0.003	0.167	0.018	0.024	0.012	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.753	0.006	0.514	0.161	0.110	0.061	0.033
	Gasoline	MC	Motorcycles	0.618	0.002	15.989	5.248	0.016	0.007	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.065	0.003	1.021	0.120	0.015	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.133	0.003	1.507	0.182	0.016	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.209	0.004	1.694	0.247	0.024	0.009	0.052
Trinity	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.173	0.002	0.348	0.024	0.025	0.016	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.092	0.003	0.218	0.023	0.025	0.014	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.087	0.006	0.583	0.180	0.114	0.065	0.033
	Gasoline	MC	Motorcycles	0.679	0.002	17.857	5.550	0.016	0.007	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.078	0.003	1.238	0.134	0.016	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.181	0.004	1.997	0.222	0.019	0.008	0.027
Tulare	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.266	0.005	2.166	0.290	0.028	0.010	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.313	0.002	0.665	0.056	0.043	0.032	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.113	0.003	0.407	0.043	0.033	0.020	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.348	0.006	0.660	0.195	0.116	0.068	0.033
	Gasoline	MC	Motorcycles	0.694	0.002	19.857	5.905	0.017	0.008	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.058	0.002	0.965	0.110	0.015	0.005	0.025
Tuolumne	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.137	0.003	1.531	0.181	0.017	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.193	0.004	1.607	0.223	0.022	0.008	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.159	0.002	0.240	0.018	0.025	0.015	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.066	0.003	0.138	0.016	0.025	0.013	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.853	0.006	0.537	0.170	0.113	0.064	0.033
	Gasoline	MC	Motorcycles	0.620	0.002	15.960	5.151	0.016	0.007	0.053
Ventura	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.089	0.003	1.320	0.169	0.017	0.006	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.194	0.003	2.068	0.267	0.019	0.007	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.349	0.005	2.652	0.375	0.029	0.011	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.286	0.002	0.454	0.036	0.034	0.023	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.163	0.003	0.280	0.027	0.027	0.015	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.441	0.006	0.679	0.210	0.124	0.073	0.033
Ventura	Gasoline	MC	Motorcycles	0.777	0.002	20.813	6.468	0.017	0.007	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.059	0.002	0.890	0.113	0.014	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.109	0.003	1.209	0.146	0.015	0.006	0.027
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.176	0.004	1.373	0.196	0.023	0.008	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.136	0.002	0.255	0.019	0.023	0.014	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.050	0.003	0.135	0.013	0.021	0.010	0.009
Ventura	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.537	0.005	0.300	0.085	0.097	0.048	0.033
	Gasoline	MC	Motorcycles	0.581	0.002	14.984	4.544	0.016	0.007	0.053

**Table 5-39. EMFAC County-Specific On-Road Vehicle EFs – 2026 (cont.)**

County	Fuel Type	Vehicle Type		Emission Factors (g/mi)						
				Criteria Pollutants and Ozone Precursors						
				NO <sub>x</sub>	SO <sub>x</sub>	CO	ROG	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
Yolo	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.055	0.002	0.939	0.102	0.015	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.102	0.003	1.312	0.154	0.017	0.006	0.027
	Gasoline	HGCV	Heavy-Duty Vehicles (8,501 + lbs)	0.163	0.005	1.457	0.190	0.026	0.009	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.167	0.002	0.292	0.021	0.025	0.015	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.051	0.003	0.161	0.016	0.022	0.011	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	1.679	0.006	0.493	0.155	0.107	0.059	0.033
Yuba	Gasoline	MC	Motorcycles	0.641	0.002	16.737	5.377	0.016	0.007	0.053
	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.063	0.003	1.029	0.115	0.015	0.005	0.025
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.131	0.003	1.518	0.190	0.017	0.006	0.027
	Gasoline	HGCV	Heavy-Duty Vehicles (8,501 + lbs)	0.224	0.004	1.793	0.257	0.023	0.008	0.052
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.177	0.002	0.292	0.022	0.026	0.016	0.008
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.098	0.003	0.162	0.017	0.023	0.012	0.009
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	2.147	0.006	0.589	0.183	0.118	0.067	0.033
	Gasoline	MC	Motorcycles	0.689	0.002	17.576	5.715	0.016	0.007	0.053

Notes for Table 5-36 through Table 5-39

The values in the NH<sub>3</sub> column reflect statewide values as calculated by MOVES3 for the state of California due to EMFAC lacking NH<sub>3</sub> as a pollutant output.



**Table 5-40. California On-Road Vehicle Speciated GHG Emission Factors – 2023**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
California	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0112	0.0051	314.018	315.802
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0143	0.0081	407.494	410.249
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0668	0.0326	891.499	902.887
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0382	0.0007	325.476	326.631
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0293	0.0010	369.443	370.471
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0252	0.0033	1295.219	1296.823
	Gasoline	MC	Motorcycles	0.1110	0.0030	390.189	393.872

**Table 5-41. California On-Road Vehicle Speciated GHG Emission Factors – 2024**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
California	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0102	0.0048	306.543	308.234
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0129	0.0076	398.974	401.549
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0637	0.0308	898.982	909.742
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0372	0.0007	314.485	315.613
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0292	0.0010	360.596	361.622
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0245	0.0033	1264.536	1266.125
	Gasoline	MC	Motorcycles	0.1097	0.0031	390.320	393.972

**Table 5-42. California On-Road Vehicle Speciated GHG Emission Factors – 2025**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
California	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0095	0.0046	299.153	300.766
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0119	0.0071	390.872	393.292
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0606	0.0292	904.163	914.379
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0359	0.0007	303.226	304.324
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0287	0.0010	354.726	355.739
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0240	0.0033	1236.270	1237.848
	Gasoline	MC	Motorcycles	0.1082	0.0031	390.443	394.057

**Table 5-43. California On-Road Vehicle Speciated GHG Emission Factors – 2026**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
California	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0085	0.0045	292.082	293.627
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0101	0.0068	382.876	385.162
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0558	0.0289	908.565	918.571
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0334	0.0007	291.650	292.683
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0281	0.0010	349.458	350.457
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0236	0.0033	1209.804	1211.373
	Gasoline	MC	Motorcycles	0.1068	0.0030	390.549	394.124

**Table 5-44. California On-Road Vehicle Speciated GHG Emission Factors – 2027**

State	Fuel Type	Vehicle Type		Emission Factors (g/mi)			
				Greenhouse Gas Species			
				CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub> e
California	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.0080	0.0044	285.321	286.828
	Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.0093	0.0066	376.073	378.265
	Gasoline	HDGV	Heavy-Duty Vehicles (8,501 + lbs)	0.0517	0.0274	910.399	919.841
	Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.0308	0.0007	280.686	281.654
	Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.0275	0.0010	345.210	346.195
	Diesel	HDDV	Heavy-Duty Vehicles (8,501 + lbs)	0.0232	0.0033	1180.656	1182.217
	Gasoline	MC	Motorcycles	0.1054	0.0030	390.643	394.186

Notes for Table 5-40 through Table 5-44

The values in the GHG EF tables reflect statewide values as calculated by MOVES3 for the state of California.

**Table 5-45. OCONUS On-Road Composite Vehicle Emission Factors – POV**

Year	Vehicle Type	Emission Factors (g/mi)							
		Criteria Pollutants and Ozone Precursors							
		NO <sub>x</sub>	SO <sub>x</sub>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>	NH <sub>3</sub>
2022	All Vehicles	0.338	0.003	4.438	0.314	0.008	0.008	414.296	0.027
2023	All Vehicles	0.307	0.003	4.240	0.301	0.008	0.007	406.269	0.027
2024	All Vehicles	0.269	0.002	4.053	0.286	0.008	0.007	398.394	0.027
2025	All Vehicles	0.243	0.002	3.859	0.276	0.007	0.007	390.748	0.026
2026	All Vehicles	0.214	0.002	3.621	0.252	0.007	0.006	383.309	0.026

**Table 5-46. OCONUS On-Road Composite Vehicle Emission Factors – GOV**

Year	Vehicle Type	Emission Factors (g/mi)							
		Criteria Pollutants and Ozone Precursors							
		NO <sub>x</sub>	SO <sub>x</sub>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>	NH <sub>3</sub>
2022	All Vehicles	0.661	0.003	4.187	0.255	0.015	0.014	539.927	0.025
2023	All Vehicles	0.595	0.003	3.945	0.238	0.013	0.012	529.669	0.025
2024	All Vehicles	0.523	0.003	3.684	0.216	0.012	0.011	519.171	0.025
2025	All Vehicles	0.480	0.003	3.505	0.205	0.011	0.010	509.608	0.025
2026	All Vehicles	0.433	0.003	3.270	0.184	0.010	0.009	500.426	0.024

**Table 5-47. On-Road Vehicle Speciated VOC Weight Fractions**

VOC	HAP	LDGV <sup>a</sup>	LDDV <sup>b</sup>	LDGT <sup>a</sup>	LDDT <sup>b</sup>	HDGV <sup>a</sup>	HDDV <sup>b</sup>	MC <sup>c</sup>
Acetylene		4.05%	8.02%	3.61%	8.52%	2.90%	---	---
Acetaldehyde	X	0.29%	---	1.64%	---	---	---	---
Acrolein	X	0.24%	---	0.40%	---	---	---	---
Alpha-pinene		0.06%	---	0.08%	---	---	---	---
Benzaldehyde		0.29%	---	1.19%	---	---	---	---
Benzene	X	5.89%	2.23%	5.61%	2.91%	1.91%	---	3.99%
Beta-pinene		0.03%	---	0.02%	---	---	---	---
1,3-Butadiene	X	0.57%	1.08%	0.62%	1.44%	---	---	---
Butane		0.37%	0.46%	0.41%	0.32%	24.42%	---	0.65%
1-Butene		2.22%	1.68%	2.47%	2.01%	1.21%	---	2.32%
cis-2-Butene		0.14%	0.61%	0.14%	0.77%	0.73%	---	0.48%
trans-2-Butene		0.35%	2.25%	0.30%	0.24%	0.97%	---	0.29%
Butylbenzene		---	---	---	---	0.23%	---	---
o-tert-Butyloluene		---	---	---	0.19%	---	1.09%	---
tert-Butyl-m-Xylene		---	---	---	---	---	0.74%	---
Butyraldehyde		0.04%	---	0.42%	---	---	---	---
C6 olefin		---	2.80%	---	2.23%	---	---	---
Crotonaldehyde		0.02%	---	0.06%	---	---	---	---
Cyclohexane		0.50%	---	0.32%	---	---	1.72%	0.19%
Cyclohexene		0.07%	---	0.04%	---	1.72%	0.32%	---
Cyclopentadiene		---	0.53%	---	0.24%	---	---	---
Cyclopentane		0.22%	0.57%	0.20%	0.44%	0.52%	1.09%	1.09%
Cyclopentene		0.12%	0.53%	0.12%	0.39%	0.32%	0.51%	0.31%
Cyclopentylcyclopentane		---	---	---	---	0.50%	---	---
Decane		0.25%	1.30%	0.17%	1.65%	0.12%	1.39%	---
Diethylbenzene		---	0.31%	---	0.39%	---	1.46%	---
1,2-Diethylbenzene		0.09%	0.15%	0.05%	---	0.33%	---	---
1,3-Diethylbenzene		0.29%	---	0.30%	---	0.25%	---	---
1,4-Diethylbenzene		0.12%	---	0.07%	---	---	---	---
Dimethyl Ethylbenzene		---	0.23%	---	0.29%	---	2.30%	---
2,2-Dimethylbutane		0.55%	---	0.49%	---	0.24%	1.13%	1.70%
2,3-Dimethylbutane		0.88%	0.69%	0.87%	0.53%	1.07%	0.61%	1.78%
3,3-Dimethyl-1-butene		---	0.53%	---	---	---	---	---
1,1-Dimethylcyclohexane		0.06%	---	0.06%	---	---	---	---
cis-1,2-Dimethylcyclohexane		---	---	---	---	0.32%	---	---
trans-1,2-Dimethylcyclohexane		---	0.15%	---	0.39%	---	1.50%	---
cis-1,3-Dimethylcyclohexane		---	---	---	---	---	2.07%	---
Cis-1,4-Dimethylcyclohexane		---	---	---	---	0.09%	0.23%	---
cis-1,3-Dimethylcyclopentane		---	---	---	0.68%	---	0.72%	---
Dimethylheptane		0.08%	0.88%	0.08%	1.11%	0.09%	---	---
2,5-Dimethylheptane		---	0.15%	---	0.19%	---	---	---
2,6-Dimethylheptane		---	0.23%	---	0.58%	---	---	---
2,3-Dimethylheptane		---	---	---	---	0.65%	---	---
2,5-Dimethylheptane		0.19%	---	0.18%	---	0.14%	---	---
2,6-Dimethylheptane		---	---	---	---	---	---	---
3,3-Dimethylheptane		0.05%	---	0.04%	---	---	---	---
3,5-Dimethylheptane		---	---	---	---	---	---	---
4,4-Dimethylheptane		---	0.08%	---	---	---	---	---
2,3-Dimethylhexane		0.29%	---	0.36%	---	---	0.38%	---
2,4-Dimethylhexane		0.58%	0.46%	0.68%	0.23%	0.46%	0.25%	---
2,5-Dimethylhexane		0.39%	---	0.45%	---	---	0.21%	---
3,3-Dimethylhexane		---	---	---	---	---	0.11%	---
Dimethyloctane		0.08%	0.31%	0.05%	0.39%	0.08%	---	---
2,2-Dimethyloctane		---	---	---	---	---	0.43%	---
2,3-Dimethyloctane		---	---	---	---	0.57%	---	---
2,4-Dimethyloctane		---	0.15%	---	0.19%	---	2.56%	---
2,4-Dimethylpentane		0.85%	0.08%	0.90%	---	0.70%	0.22%	2.29%
2,2-Dimethylpentane		---	0.08%	---	---	---	---	---
2,3-Dimethylpentane		1.25%	0.15%	1.32%	0.44%	---	1.36%	0.95%
3,3-Dimethylpentane		---	---	---	---	---	0.59%	---
2,2-Dimethylpropane		---	0.33%	---	0.68%	---	---	---
Dipente		0.42%	---	0.33%	---	---	---	---
Dodecane		0.48%	0.50%	0.22%	0.61%	---	3.01%	---
Ethene		---	28.13%	---	30.07%	---	---	---
Ethyl tert-butyl ether		---	---	---	0.39%	---	2.98%	---
Ethylbenzene	X	2.56%	0.38%	2.28%	0.48%	0.73%	1.29%	1.99%
Ethylcyclohexane		---	---	---	---	---	7.69%	---
Ethylene		7.39%	---	6.59%	---	4.74%	---	---
3-Ethylhexane		---	0.15%	---	0.29%	---	0.70%	---
cis-1-Ethyl-2-Methylcyclopentane		---	0.15%	---	---	---	---	---
3-Ethylpentane		0.31%	---	0.27%	---	---	---	---
3-Ethyloluene		2.02%	---	1.71%	---	0.17%	---	---
Formaldehyde	X	1.06%	---	3.37%	---	---	---	---
Glyoxal		0.03%	---	0.01%	---	---	---	---
Heptane		1.11%	0.08%	1.06%	0.19%	0.79%	0.77%	2.19%
1-Heptene		0.16%	---	0.08%	---	---	---	---
cis-2-Heptene		---	0.15%	---	---	---	---	---
trans-2-Heptene		---	0.15%	---	---	---	---	---
Trans-3-Heptene		0.03%	---	0.04%	---	---	---	---
Hexaldehyde		0.09%	---	0.11%	---	---	---	---
Hexane	X	1.51%	---	1.83%	0.19%	1.67%	2.40%	1.42%
1-Hexene		0.16%	0.94%	0.16%	0.83%	0.30%	1.77%	---
cis-2-Hexene		0.08%	0.23%	0.08%	---	0.12%	---	0.06%
trans-2-Hexene		0.14%	0.46%	0.14%	---	---	---	0.10%
cis-3-Hexene		0.02%	---	0.02%	---	---	---	---
Hexyne		---	---	---	---	0.02%	---	---
Indan		0.24%	---	0.17%	---	0.35%	---	---
Isohexane		---	---	2.66%	---	3.06%	---	---
Isopropylcyclohexane		0.04%	---	0.02%	---	---	---	---
Methylbenzaldehyde		0.02%	---	0.17%	---	---	---	---
2-Methyl-1,3-Butadiene		---	0.54%	---	0.58%	0.11%	---	---
2-Methylbutane		0.27%	0.31%	0.24%	0.39%	12.02%	---	14.59%

Table 5-47. On-Road Vehicle Speciated VOC Weight Fractions

VOC	HAP	LDGV <sup>a</sup>	LDDV <sup>b</sup>	LDGT <sup>a</sup>	LDDT <sup>b</sup>	HDGV <sup>a</sup>	HDV <sup>b</sup>	MC <sup>c</sup>
2-Methyl-1-Butene		1.71%	4.20%	1.53%	2.27%	---	---	---
2-Methyl-2-Butene		0.32%	0.23%	0.39%	---	0.12%	---	1.08%
3-Methyl-1-Butene		6.54%	---	5.86%	---	0.15%	---	0.14%
Methyl-tert-Butyl Ether	X	0.02%	---	0.05%	---	---	---	---
Methylcyclohexane		0.44%	0.28%	0.40%	0.43%	0.28%	1.62%	0.43%
Methylcyclooctane		---	---	---	---	0.36%	---	---
Methylcyclopentane		1.10%	0.08%	1.04%	0.10%	1.21%	0.44%	1.83%
1-Methylcyclopentene		---	0.23%	---	---	0.03%	---	---
2-Methyldecane		---	---	---	---	0.69%	---	---
Methylethylbenzene	X	0.19%	0.53%	0.15%	0.68%	---	2.39%	0.40%
1-Methyl-2-Ethylbenzene		0.75%	---	0.62%	---	---	---	---
cis-1-Methyl-3-Ethylcyclopentane		---	1.22%	---	0.74%	---	---	---
1-Methyl-4-Ethylbenzene		0.92%	---	0.78%	---	---	---	---
Methyl ethyl ketone		0.05%	---	0.07%	---	---	---	---
2-Methylheptane		0.67%	0.15%	0.53%	---	0.28%	0.44%	1.61%
3-Methylheptane		0.75%	---	0.69%	---	0.38%	0.44%	1.67%
4-Methylheptane		0.28%	0.08%	0.28%	---	0.27%	---	---
2-Methylhexane		1.39%	---	1.34%	---	---	0.52%	3.18%
3-Methylhexane		1.54%	0.61%	1.38%	---	---	1.72%	2.57%
3-Methyl-1-Hexene		---	---	---	0.58%	---	---	---
4-Methyl-1-Hexene		0.03%	---	0.03%	---	---	---	---
1-Methyl-2-Isopropylbenzene		0.03%	---	0.02%	---	---	---	---
1-Methyl-3-isopropylbenzene		0.09%	---	0.06%	---	---	---	---
1-Methyl-4-Isopropylbenzene		0.02%	---	0.02%	---	---	---	---
2-Methyloctane		0.38%	0.15%	0.23%	---	0.04%	0.92%	---
3-Methyloctane		0.34%	0.08%	0.29%	---	0.34%	1.81%	---
4-Methyloctane		---	---	---	---	0.42%	---	---
2-Methylpentane		2.68%	0.28%	---	0.32%	---	3.80%	5.81%
3-Methylpentane		1.85%	0.53%	1.80%	1.21%	1.68%	1.20%	3.48%
2-Methyl-cis-2-Pentene		0.09%	---	0.09%	---	---	---	---
2-Methyl-1-Pentene		0.11%	1.30%	0.11%	0.74%	---	---	0.22%
2-Methyl-2-Pentene		0.10%	0.08%	0.08%	---	0.37%	---	---
3-Methyl-trans-2-Pentene		0.10%	---	0.08%	---	---	0.23%	---
4-Methyl-1-Pentene		---	0.79%	---	0.90%	---	---	---
4-Methyl-trans-2-Pentene		---	---	---	---	2.62%	---	---
2-Methylpropane		0.30%	0.15%	0.31%	0.19%	3.74%	---	0.20%
2-Methyl-2-Propenal		0.04%	---	0.17%	---	---	---	---
2-Methylpropene		---	2.29%	---	2.01%	---	---	---
(1-methylpropyl)benzene		0.06%	---	0.04%	---	0.05%	---	---
(2-methylpropyl)benzene		0.06%	---	0.05%	---	---	---	---
1-Methyl-3-propylbenzene		0.16%	---	0.11%	---	0.17%	---	---
Methylpyrene		---	---	---	---	1.11%	---	---
Methylfluoranthene		---	---	---	---	---	---	---
Methylpyrene		---	---	---	---	---	---	---
Naphthalene	X	0.07%	---	0.03%	---	---	---	---
Nonanal		0.53%	---	0.29%	---	---	---	---
Nonane		0.33%	0.64%	0.24%	0.77%	0.12%	0.98%	0.56%
Nonene		---	0.73%	---	0.92%	---	---	---
1-Nonene		0.11%	0.69%	0.10%	0.29%	---	1.22%	---
trans-2-Nonene		---	---	---	0.19%	---	---	---
Octanal		0.03%	---	0.02%	---	---	---	---
Octane		0.60%	0.20%	0.51%	0.45%	0.26%	1.55%	0.89%
1-Octene		0.03%	---	0.05%	---	---	---	---
Pentane		0.06%	1.91%	0.08%	1.52%	5.29%	---	8.14%
1-Pentene		0.37%	2.98%	0.38%	3.23%	0.45%	---	0.27%
cis-2-Pentene		0.20%	0.15%	0.20%	---	1.06%	---	0.35%
trans-2-Pentene		0.39%	1.30%	0.37%	0.97%	0.89%	---	0.58%
Pentylbenzene		---	---	---	---	---	1.62%	---
Pentyne		---	---	---	---	0.21%	---	---
trans-1-Phenylbutene		---	---	---	---	0.25%	---	---
4-Phenyl-1-Butene		---	---	---	---	0.28%	---	---
1,2-Propadiene		---	---	---	---	0.12%	---	---
Propane		0.24%	0.31%	0.23%	3.00%	---	---	---
Propene		4.23%	9.08%	4.56%	8.79%	1.71%	---	1.11%
Propionaldehyde	X	0.04%	---	0.11%	---	---	---	---
Propylbenzene		0.59%	0.20%	0.49%	0.29%	0.34%	0.51%	0.65%
Propylcyclopentane		---	---	---	---	---	---	---
Propyltoluene		---	---	---	---	---	3.37%	---
Propyne		---	0.38%	---	0.10%	0.26%	---	---
Styrene	X	0.13%	0.84%	0.10%	---	---	2.04%	0.23%
Tetramethylbenzene		0.26%	0.27%	0.18%	0.42%	---	14.53%	---
1,2,3,4-Tetramethylbenzene		0.18%	---	0.09%	---	---	---	---
1,2,4,5-Tetramethylbenzene		0.20%	---	0.13%	---	---	---	---
Toluene	X	11.19%	1.62%	10.57%	2.06%	3.25%	---	12.52%
Trimethylbenzene		3.28%	0.31%	2.55%	0.39%	1.57%	4.27%	1.43%
1,2,3-Trimethylbenzene		0.34%	0.23%	0.30%	---	0.28%	---	---
1,3,5-Trimethylbenzene		0.89%	---	0.78%	0.39%	1.32%	---	1.99%
2,2,3-Trimethylbutane		0.03%	---	0.03%	---	---	0.23%	---
1,2,3-Trimethylcyclopentane		---	0.61%	---	---	---	---	---
2,2,5-Trimethylhexane		0.38%	0.15%	0.43%	---	0.26%	0.46%	---
2,3,5-Trimethylhexane		---	0.15%	---	---	0.19%	0.09%	---
2,2,4-Trimethylpentane	X	2.25%	0.94%	4.04%	0.77%	1.63%	0.24%	1.45%
2,3,3-Trimethylpentane		---	---	---	0.10%	0.46%	---	---
2,3,4-Trimethylpentane		0.67%	0.46%	0.92%	0.24%	0.28%	0.33%	0.71%
2,4,4-Trimethyl-1-pentene		0.02%	0.08%	0.04%	---	1.88%	---	---
2,4,4-Trimethyl-2-pentene		---	0.31%	---	---	---	---	---
Undecane		0.13%	1.11%	0.09%	1.40%	0.15%	2.64%	---
1-Undecene		---	---	---	---	0.15%	---	---
Valeraldehyde		0.01%	---	0.01%	---	---	---	---
Xylenes (Mixed Isomers)	X	9.50%	1.90%	8.20%	2.08%	3.02%	---	10.11%

- a. SOURCE: Data provided by the EPA's SPECIATE database version 4.4.
- b. SOURCE: Diesel Unregulated Emissions Characterization. CRC Report No. E-75-2, Coordinating Research Council, Inc., July 2010.
- c. SOURCE: Air Pollutant Emission Factors from New and In-Use Motorcycles. Atmospheric Environment, April 2000.

"X" Indicates compound is a HAP  
 "---" Indicates No Data Available

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USEPA 2007, “Guidance on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, PM2.5, and Regional Haze (EPA454/B-07-002),” U.S. Environmental Protection Agency, April 2007

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USEPA, Mobile 6, MOBILE6 Vehicle Emission Modeling Software, United States Environmental Protection Agency

VEMSO, “Air Force Vehicle and Equipment Management Office”

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## 6.0 FUEL TRANSFER (FDSP, FLD) – EXCLUDES ON-ROAD VEHICLE REFUELING

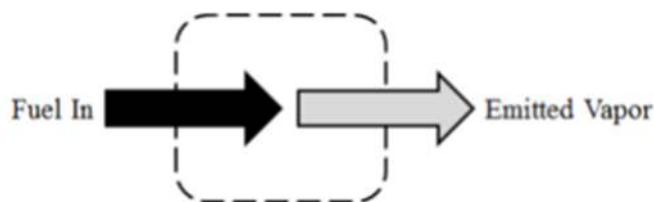
- *Fugitive Source*
- *Mobile Source* – When fuel is dispensed to mobile equipment.
- *Stationary Source* – Fuel spills and when dispensed to stationary equipment.

**\*The USAF recommends that most emissions generated during the transfer (dispensing) of fuel into *on-road* vehicles be classified as mobile emissions. However, if the regulator insists this category be included as a stationary source, subtract those emissions from the Mobile AEI, and add them to the Stationary AEI to avoid duplicate reporting. This is accomplished by manually calculating emissions generated from on-road vehicle refueling using the procedures given in this section, then subtracting those values from the emissions generated by on-road vehicles covered in the previous section. \***

### 6.1 Introduction

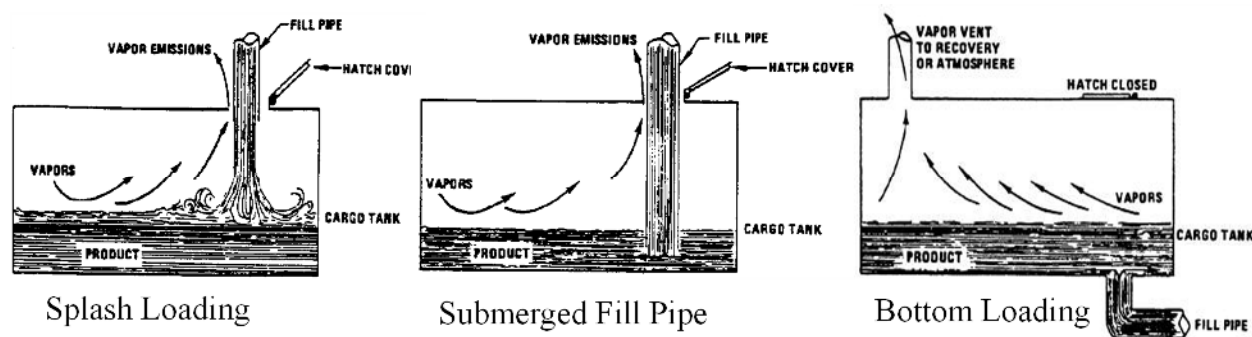
Fuel transfer includes the dispensing of fuel into non-road engines and equipment, aircraft, and fuel trucks. **Note that the emissions from the refueling of *VEHEs* are not addressed here since those emissions are accounted for in the EFs generated by the MOVES3 model as explained in the previous chapter.** Emissions from fuel dispensing are the result of vapors being displaced as fuel is added to the fuel tank. The amount of vapor released to the atmosphere is a function of the gas and fuel tank temperatures, the vapor pressure of the fuel, the dispensing rate, and the presence of vapor emission control devices. **The vapor that is emitted into the atmosphere is composed of both VOCs and HAPs and is considered fugitive in nature.**

Minor fuel spills are an inevitable consequence of fuel dispensing. Typically, these spills are individually insignificant though may collectively result in a substantial release of VOC and HAP emissions. **Emissions from minor spills are accounted for in the “Fuel Transfer” section of the Stationary Guide to produce a conservative emissions calculation. Emissions from significant spills, which are those spills that are reported to the Environmental or Civil Engineering Environmental office, are not addressed here but described in the “Fuel Spills” section of the Transitory Guide.** The vapor emissions of concern from fuel dispensing operations are described by the simple control volume given in Figure 6-1.



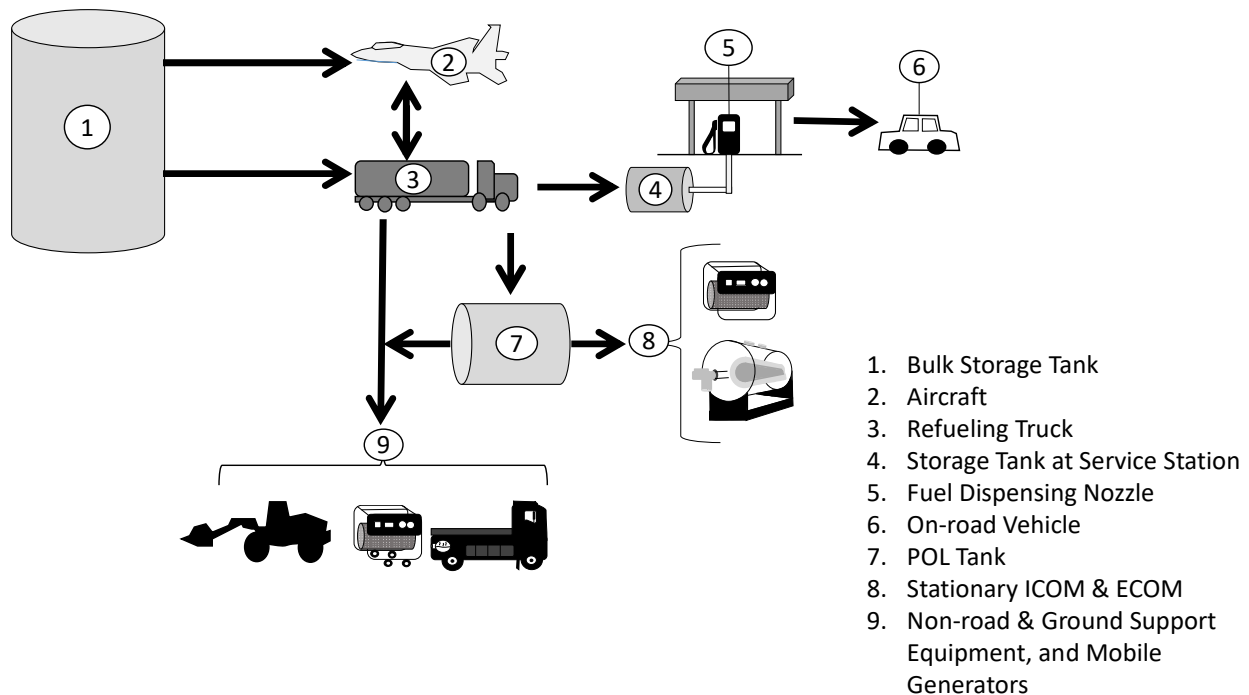
**Figure 6-1. Simple Fuel Dispensing Control Volume**

The loading method used in the fuel transfer process has a significant effect on the amount of vapor emissions generated during the transfer activity. There are two main fuel loading methods: splash loading and submerged loading. The splash loading method involves the lowering of the fill pipe into the tank and **above the liquid level**. The loading of the fuel using the splash method results in significant turbulence, which increases the amount of vapor released into the atmosphere. The alternative method, submerged loading, may be further subdivided into two techniques: the submerged fill pipe method and the bottom-loading method. In the submerged fill pipe method, the fill pipe extends almost to the bottom of the storage tank. In the bottom loading method, a fill pipe is permanently attached to the bottom of the storage tank. In both cases, the fill pipe is **below the liquid level**. Therefore, turbulence is minimized, and vapor emissions are greatly reduced when compared to the splash loading method. Each method is shown in Figure 6-2.



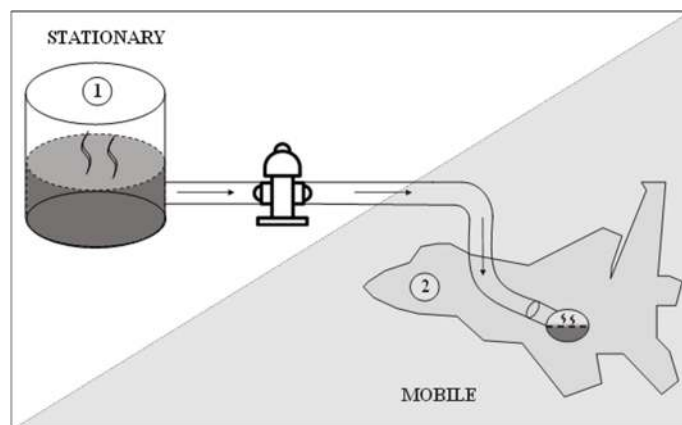
**Figure 6-2. Splash Loading, Submerged Fill Pipe, and Bottom Loading Methods**

There are several challenges to calculating evaporative emissions from fuel transfer activities. These challenges include the use of several different fuels used on base, such as gasoline, diesel, or JP-8 fuel, and their different vapor pressures. Furthermore, there are multiple destinations for fuels on base that may make it more difficult to gather data or determine what emissions are classified as mobile or stationary. To simplify how each base should calculate fuel transfer emissions, a diagram of the typical transfer methods and destinations of fuel on base is provided in Figure 6-3.



**Figure 6-3. Typical On-Base Fuel Transfer Activities and Destinations**

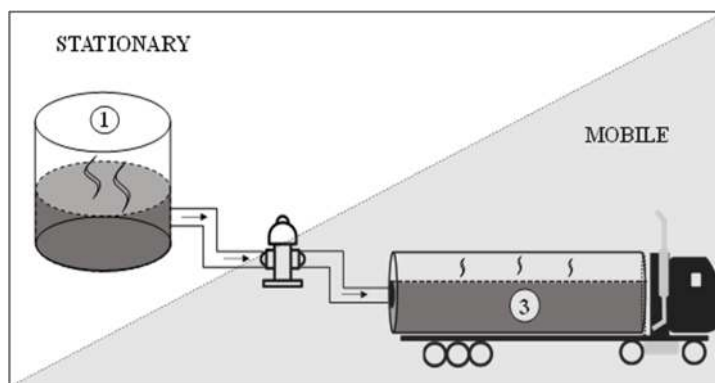
Figure 6-3 shows the typical fuel transfer paths that fuel may go through at a USAF installation. The transfer of the fuel into different equipment results in the generation and release of pollutant emissions. The classification (mobile vs. stationary) of this equipment determines whether the generated emissions are regarded as mobile or stationary source emissions. It is important to note that **significant** fuel spills may occur at any point in the fuel transfer process, which will contribute to VOC and HAP emissions as the fuel evaporates. However, since these are uncommon occurrences, emissions from fuel spills are addressed in the *Air Emissions Guide for Air Force Transitory Sources*. The specific pathways illustrated in Figure 6-3 are described below and categorized as either mobile (shaded) or stationary (not shaded) sources of emissions.



### 1 (Bulk Storage Tank) → 2 (Aircraft)

The figure above illustrates fuel transferred to refuel an aircraft from a bulk storage tank via a hydrant system. The vapors displaced within the storage tank as the liquid level lowers or rises are known as “working losses.” The vapors generated in the space above the stored liquid are known as “breathing losses.” These are **stationary emissions** and are calculated using the equations provided in Chapter 7 of AP-42. Refer to the *Air Emissions Guide for Air Force Stationary Sources* for more information regarding the calculation of these emissions.

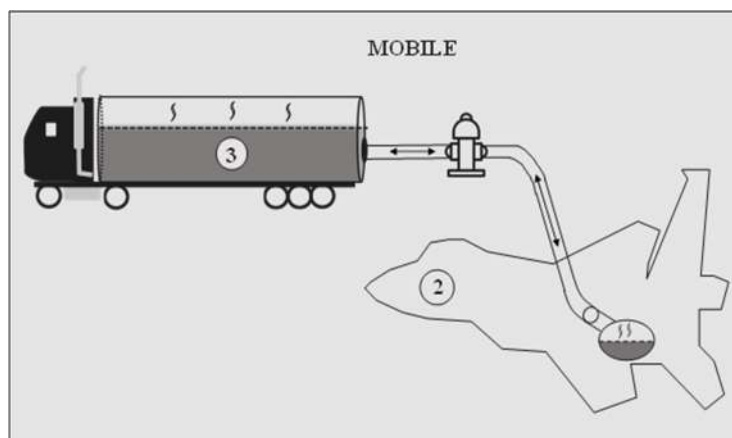
**Mobile emissions** are generated from the displaced vapor in the aircraft fuel tank. These emissions should be reported in the mobile AEI and are calculated as described later in this chapter.



### 1 (Bulk Storage Tank) → 3 (Refueling Truck)

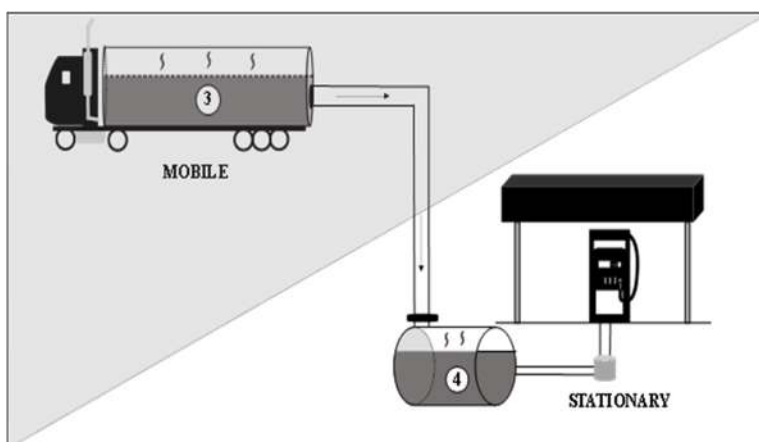
The **stationary source of emissions** is the bulk storage tank producing working losses and breathing losses from the liquid fuel. The methodology for calculating these emissions is provided in the *Air Emissions Guide for Air Force Stationary Sources*.

The **mobile emissions** from loading fuel into refueling trucks are generated from the displaced vapor in the fuel truck. These emissions should be reported in the mobile AEI and are calculated as described later in this chapter.



### 2 (Refueling Truck) ↔ 3 (Aircraft)

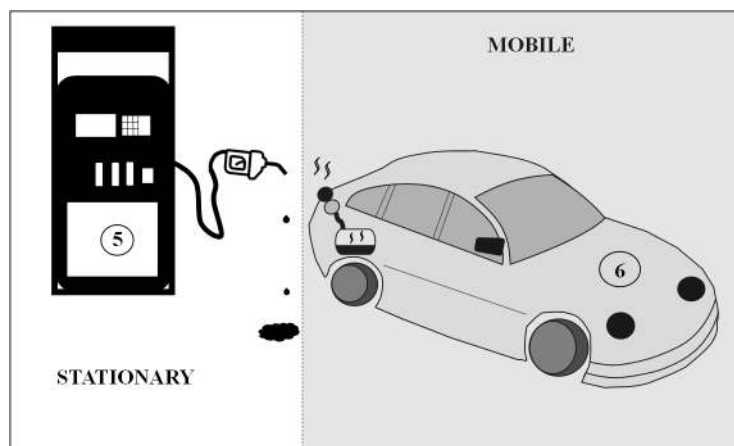
The figure above illustrates the fueling and defueling of aircraft via a refueling truck. Both pieces of equipment are classified as **mobile**, therefore all emissions generated from these activities should be reported in the mobile AEI and are calculated as described later in this chapter. Emissions from both mobile pieces of equipment come from displaced vapors in the refueling truck and aircraft fuel tanks.



### 3 (Refueling Truck) → 4 (Storage Tank and Service Station)

The figure above illustrates the loading of a refueling truck into a storage tank at a fuel service station. The **stationary emissions** from refilling of a storage tank at a fuel dispensing location include breathing and working losses from the storage tank. The methodology for calculating these emissions is provided in the *Air Emissions Guide for Air Force Stationary Sources*.

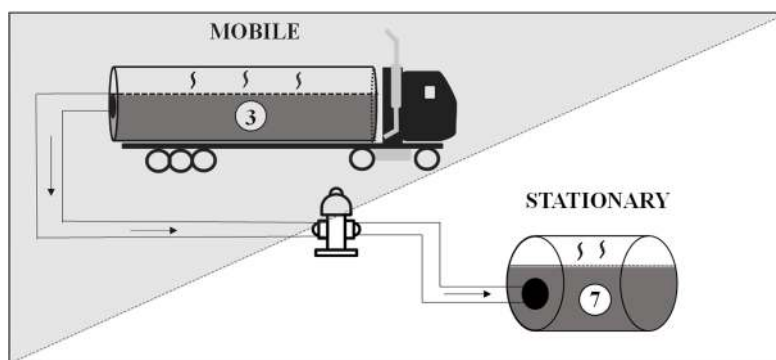
The only substantial **mobile emissions** from the fueling of the tank via the refueling truck are generated from any significant fuel spills which are addressed in the *Air Emissions Guide for Air Force Transitory Sources*.



### 5 (Fuel Dispensing Nozzle) → 6 (On-Road Vehicle)

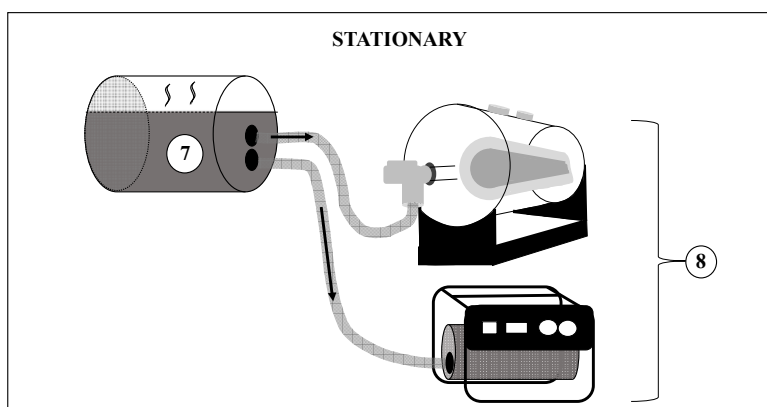
The figure above illustrates the refueling of a vehicle at a service station. The **stationary emissions** are the result of the evaporation of spilled fuel from the fuel nozzle whose calculations are described in the *Air Emissions Guide for Air Force Stationary Sources*.

The **mobile emissions** are generated from the displaced vapors in the vehicle fuel tank. The displaced vapor emissions should be included in a mobile AEI and are already accounted for in the MOVES model used to calculate VEHE emissions. AP-42 states that the motor vehicle refueling emissions equation is incorporated into the MOBILE model, which has been integrated into the MOVES model. The MOVES3 model is the model used for estimating emissions for VEHEs. This version of the model allows for disabling the refueling emissions calculations if these emissions are included in a stationary AEI, rather than in a mobile AEI. **This should only be done if the regulator insists that this category be included as a stationary source. Otherwise, these emissions are already accounted for in the EFs found in the “ON-ROAD VEHICLES (VEHE)” chapter of this guide.**

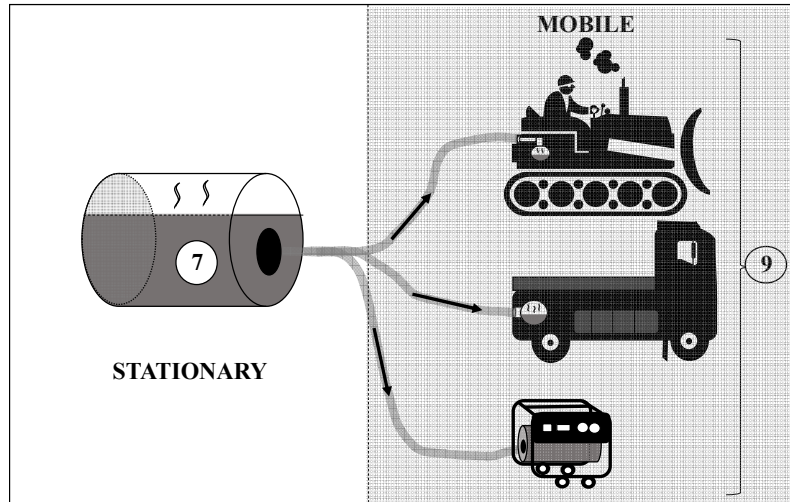


**3 (Refueling Truck) → 7 (POL Tank)** This fuel transfer pathway illustrates the loading of fuel from a refueling truck into a Petroleum, Oil, and Lubricants (POL) storage tank. The **stationary emissions** include the breathing and working losses from smaller storage tanks on base. The methodology for calculating these emissions is provided in the *Air Emissions Guide for Air Force Stationary Sources*.

Likely, the only **mobile emissions** generated from this pathway are from any significant fuel spills associated with the refueling truck (a mobile source). Such emissions would be considered transitory in nature and are addressed in the *Air Emissions Guide for Air Force Transitory Sources*.



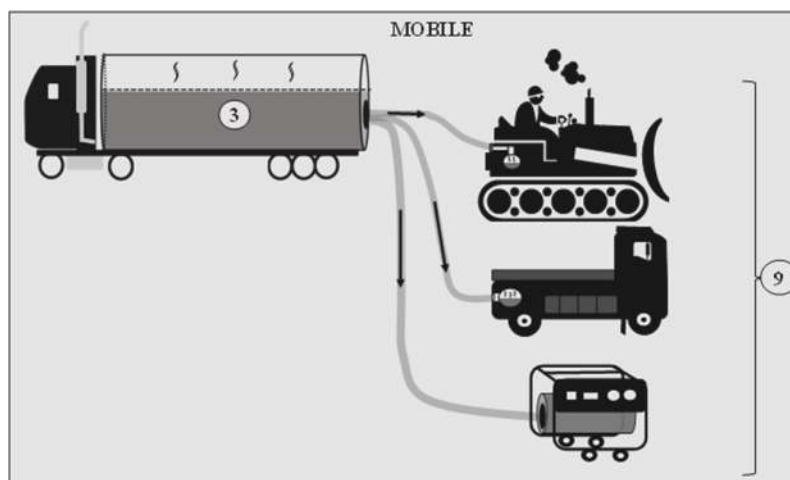
**7 (POL Tank) → 8 (Stationary ICOM/ECOM)** The figure above illustrates the loading of fuel from a storage tank into a stationary Internal Combustion (ICOM) equipment, such as a generator, or External Combustion (ECOM) equipment, such as a boiler. The **stationary emissions** from the fuel outlet (of the storage tank) are the result of any significant fuel spills and breathing or working losses. The breathing/working losses are calculated using the methodology described in Chapter 7 of AP-42 while emissions from significant fuel spills are described in the *Air Emissions Guide for Air Force Transitory Sources*. The **stationary emissions** from the fuel loading inlet (of the stationary ICOM or ECOM unit) are generated from the displaced vapor in the fuel tanks. The methodology for calculating these emissions is provided in the *Air Emissions Guide for Air Force Stationary Sources*.



### 7 (POL Tank) → 9 (Non-Road & Ground Support Equipment / Mobile Generators)

During this fuel transfer process, fuel is moved from a storage tank to a mobile piece of equipment, such as non-road equipment, Ground Support Equipment (GSE), or a mobile generator. The **stationary emissions** from the storage tank are the result of any significant fuel spills and the working and breathing losses from the tank. The methodology for calculating these emissions is provided in Chapter 7 of AP-42 and in the *Air Emissions Guide for Air Force Stationary Sources*, while fuel spill emissions are addressed in the *Air Emissions Guide for Air Force Transitory Sources*.

The **mobile emissions** from the fuel loading inlet (of the non-road and ground support equipment or mobile generator) are produced by the displaced vapor in the fuel tanks and should be reported in a mobile AEI. Emissions are calculated as described later in this chapter.



### 3 (Refueling Trucks) → 9 (Non-Road & Ground Support Equipment / Mobile Generators)



The figure illustrates the transfer of fuel from a mobile fuel loading outlet (refueling truck) into either non-road equipment, GSE, or a mobile generator, **all of which are considered mobile sources**. These emissions should be reported in a mobile AEI, the calculation methodology for which is described later in this chapter.

## 6.2 Emission Factors

Section 5.2 of AP-42 describes both the emissions from the loading of fuel into fuel trucks and the evaporative emissions from the fueling of a gasoline vehicle. Since the emissions from fueling gasoline vehicles is covered in the MOVES3 model, the EFs for vehicle refueling are not provided here, but may be found in Table 5.2-7 of AP-42. For non-road engines and fuel trucks, the most appropriate method for calculating emissions from fuel dispensing is to calculate the loading loss. The loading loss is the primary source of evaporative emissions from the loading of fuel. These losses are the result of organic vapors within a fuel tank that are displaced into the atmosphere as the tank is loaded with fuel. To calculate these losses, the saturation factor, vapor pressure of the fuel molecular weight of the vapors, and the temperature of the bulk liquid must be known. A detailed description of how to calculate these losses is provided in the next section.

The saturation factor refers to the ratio of the saturated value of the expelled vapor to the unsaturated value. These values vary based on the method of fuel loading. A tank that is filled with only one fuel, or fuels with similar characteristics, is said to be practicing “dedicated normal service.” When loading vapors are returned to the loading terminal after the fuel is unloaded to a storage tank, it is known as “dedicated vapor balance service.” Section 5.2 of AP-42 provides the saturation factors, which are included below in Table 6-1.

**Table 6-1. Fuel Loading Saturation Factors**

Loading Method	Loading Parameters	S Factor
Submerged Loading	Clean Tank	0.50
	Dedicated Normal Service	0.60
	Dedicated Vapor Balance Service	1.00
Splash Loading	Clean Tank	1.45
	Dedicated Normal Service	1.45
	Dedicated Vapor Balance Service	1.00

SOURCE: U.S. EPA. “Transportation and Marketing of Petroleum Liquids.” *Compilation of Air Pollutant Emission Factors – Volume I: Stationary Point and Area Sources*. Fifth Edition. 1995. Section 5.2.

The vapor emissions resulting from fuel transfer is a function of the vapor pressure of the fuel. The vapor pressure is indicative of the evaporation rate of a liquid. Vapor pressures for select fuels and their respective vapor molecular weights are provided in Table 6-2.

**Table 6-2. Vapor Pressures for Various Fuels**

Petroleum Liquid	Vapor Molecular Weight (lb/lb-Mol)	True Vapor Pressure (psia)						
		40°F	50°F	60°F	70°F	80°F	90°F	100°F
Crude Oil RVP 5 <sup>a</sup>	50	1.80	2.30	2.80	3.40	4.00	4.80	5.70
Gas RVP 6	69	1.90	2.37	2.93	3.60	4.38	5.29	6.35
Gas RVP 7	68	2.30	2.90	3.50	4.30	5.20	6.20	7.40
Gas RVP 7.8	68	2.59	3.21	3.94	4.79	5.79	6.96	8.30
Gas RVP 8	68	2.67	3.30	4.04	4.92	5.94	7.13	8.50
Gas RVP 8.3	68	2.79	3.44	4.22	5.13	6.19	7.42	8.83
Gas RVP 9	67	3.06	3.77	4.61	5.59	6.74	8.06	9.58
Gas RVP 10	66	3.40	4.20	5.20	6.20	7.40	8.80	10.50
Gas RVP 11	65	3.87	4.75	5.77	6.96	8.34	9.92	11.74
Gas RVP 11.5	65	4.09	5.00	6.07	7.31	8.75	10.41	12.29
Gas RVP 12	64	4.29	5.24	6.36	7.65	9.15	10.86	12.82
Gas RVP 13	62	4.70	5.70	6.90	8.30	9.90	11.70	13.80
Gas RVP 13.5	62	4.93	6.01	7.26	8.71	10.38	12.29	14.46
Gas RVP 15	60	5.58	6.77	8.16	9.77	11.61	13.71	16.09
Diesel	130	3.10E-03	4.50E-03	6.50E-03	9.00E-03	1.20E-02	1.60E-02	2.20E-02
JP-8/Jet A <sup>b</sup>	130	1.58E-02	2.19E-02	3.01E-02	4.08E-02	5.48E-02	7.27E-02	9.54E-02

SOURCE: (unless otherwise stated): Data taken from TANKS version 4.0.9d.

- a. SOURCE: U.S. EPA. "Organic Liquid Storage Tanks." Compilation of Air Pollutant Emission Factors – Volume I: Stationary Point and Area Sources. Fifth Edition. 1997. Section 7.1.
- b. SOURCE: USAF Environmental Analysis Division. JP-8 Volatility Study, IERA-RS-BR-SR-2001-0002. San Antonio, 2001. Vapor pressures calculated using the composite data calculation, an average flash point temperature of 118.238 °F, and atmospheric pressure of 760mm Hg. Flash point temperature the average provided by Defense Energy Support Center. "Petroleum Quality Information System." Defense Logistics Agency, 1996.

### 6.3 Control and Capture Efficiencies

Emissions from fuel dispensing may be controlled using a variety of techniques. Estimating emissions in which a control device is utilized is more challenging since the capture efficiency must also be considered. Additionally, since portions of fuel transfer are regarded as either stationary or mobile sources, using the control and capture efficiencies appropriately may be confusing. For example, in Step 1-2 from Figure 6-3, fuel is loaded from a loading terminal storage tank and into a fuel truck. The displaced vapor may be captured with a blower system and run through a vapor recovery unit before being returned to the storage tank. In this case, the capture efficiency of the truck and the control efficiency of the vapor recovery unit are used to determine the emissions from this process. The control efficiency is taken from the stationary

unit, although the emissions are classified as mobile since the emissions are the result of displaced vapor in the mobile fuel truck. Typical capture and control efficiencies can be found in Table 6-3 and Table 6-4 respectively.

**Table 6-3. Typical Fuel Truck Capture Efficiencies**

Fuel Truck Capture System	Capture Efficiency (%)
Untested	70.0
EPA standards (NSPS Subpart XX) leak test	98.7
MACT-level annual leak test	99.2
Trucks with installed blower system	100.0 <sup>a</sup>

SOURCE (unless otherwise stated): U.S. EPA. "Transportation and Marketing of Petroleum Liquids." Compilation of Air Pollutant Emission Factors – Volume I: Stationary Point and Area Sources. Fifth Edition. 1995. Section 5.2.

a. SOURCE: TCEQ. "Tank Truck Loading of Crude Oil or Condensate." 2013. 14 December 2013.

<<http://www.tceq.texas.gov/assets/public/permitting/air/NewSourceReview/oilgas/tank-truck-load.pdf>>.

**Table 6-4. Typical Fuel Transfer Control Efficiencies**

Control Techniques		Control Efficiency (%)
Flares <sup>1</sup>	Compounds $\leq$ 3 Carbon atoms	99.0
	Other Organic Compounds	98.0
Thermal Oxidizers <sup>2</sup>		99.0
Carbon Systems <sup>3</sup>		98.0
Vapor Recovery Units		100.0

SOURCE: TCEQ. "Tank Truck Loading of Crude Oil or Condensate." 2013. 14 December 2013.

<<http://www.tceq.texas.gov/assets/public/permitting/air/NewSourceReview/oilgas/tank-truck-load.pdf>>.

a. Flares must meet 40 CFR 60.18 requirements of minimum heating value of waste gas and a maximum flare tip velocity.

b. Must be designed for the variability of the waste gas stream and basic monitoring which consists of a temperature monitor that indicates the device is achieving a satisfactory minimum temperature.

c. Must have an alarm system that will prevent break through.

Alternatively, EFs for the loading of fuel trucks have been developed for several fuels likely to be distributed on base. These EFs are based on an assumed temperature of 60°F and may be used as an alternative to calculate the loading loss. Table 5.2-5 of AP-42 provides these EFs, which have been reproduced here in Table 6-5.

**Table 6-5. VOC Emission Factors for Fuel Dispensing/Loading**

Loading Method	Loading Parameters	Emission Factors (lb/10 <sup>3</sup> gal)		
		Gasoline <sup>a</sup>	Diesel/No. 2 Fuel Oil	JP-8/Jet A
Submerged Loading	Dedicated Normal Service	5	0.014	0.016
	Vapor Balance Service	8	---	---
Splash Loading	Dedicated Normal Service	12	0.03	0.04
	Vapor Balance Service	8	---	---

SOURCE: U.S. EPA. "Transportation and Marketing of Petroleum Liquids." *Compilation of Air Pollutant Emission Factors – Volume I: Stationary Point and Area Sources*. Fifth Edition. 1995. Section 5.2.

a. Gasoline has an RVP of 10 psia.

"---" Indicates No Data Available

## 6.4 Emission Calculations

Emissions of concern from fuel transfer operations are VOCs and HAPs. The volumes of VOCs and HAPs emitted are related to the amount of VOC and HAP constituents within the fuel.

Calculations of emissions of VOCs and HAPs from fuel transfer are outlined below.

### 6.4.1 VOC Emissions Calculations (Preferred Method)

The preferred method for calculating VOC emissions from the transfer of fuel is to use the fuel vapor pressure, saturation factor, temperature, and total throughput to estimate the loading loss. VOCs are calculated as follows:

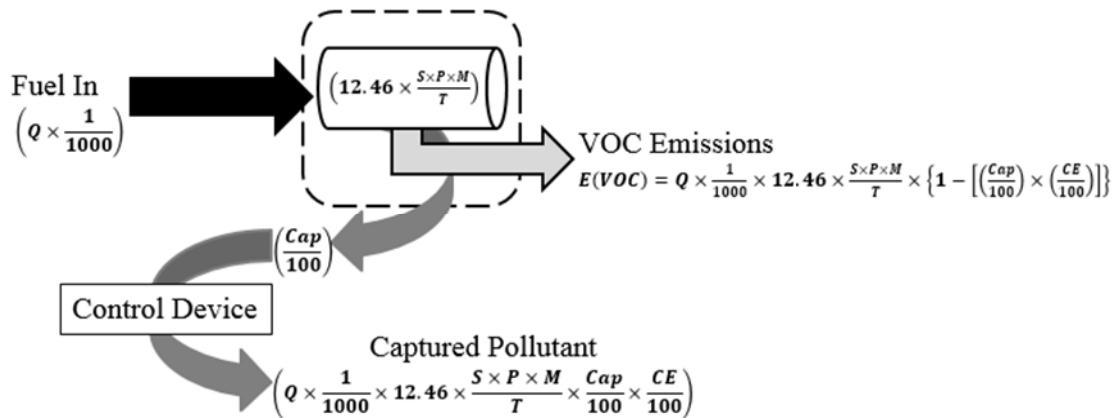
$$E(\text{VOC}) = Q \times \frac{1}{1000} \times 12.46 \times \frac{S \times P \times M}{T} \times \left\{ 1 - \left[ \left( \frac{\text{Cap}}{100} \right) \times \left( \frac{\text{CE}}{100} \right) \right] \right\}$$

Equation 6-1

Where,

- E(VOC)** = Annual emissions of VOCs (lb/yr)
- Q** = Annual quantity of fuel transferred (gal/yr)
- 1000** = Factor converting gallons to 10<sup>3</sup> gallons (gal/10<sup>3</sup> gal)
- 12.46** = Equation constant (°R lb-mol/psia 10<sup>3</sup> gal)
- S** = Saturation factor. Provided in Table 6-1
- P** = True vapor pressure of fuel (psia). Provided in Table 6-2
- M** = Vapor molecular weight of the fuel (lb/lb-mol). (Table 6-2)
- T** = Temperature of bulk liquid loaded (°R)
- Cap** = Capture efficiency of the loading terminal (%). (Table 6-3)
- CE** = Efficiency of the control device (%). Provided in Table 6-4
- 100** = Factor for converting a percent to a fraction (%)

A detailed control volume outlining the emissions from fuel transfer operations is provided in Figure 6-4.



**Figure 6-4. Fuel Transfer Control Volume – Preferred Method**

#### 6.4.2 VOC Emissions Calculations (Emission Factor Alternative Method)

Using the EF method, the appropriate EF selected from Table 6-5 and the total quantity of fuel transferred, the emissions are calculated as follows:

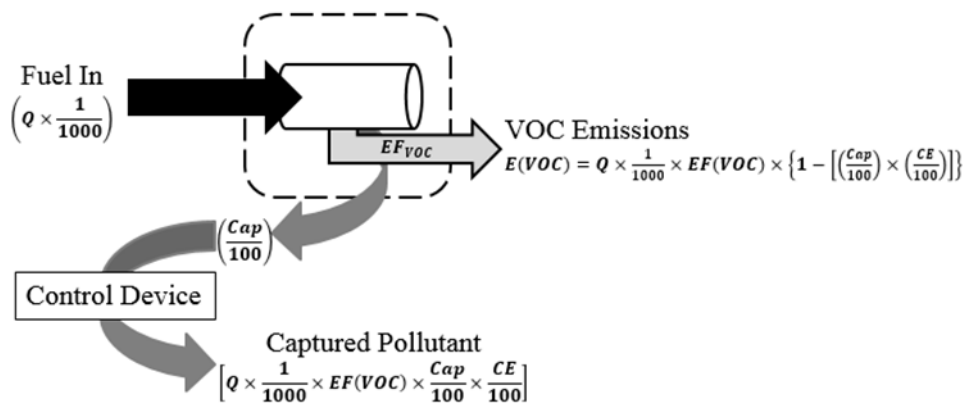
$$E(VOC) = Q \times \frac{1}{1000} \times EF(VOC) \times \left\{ 1 - \left[ \left( \frac{Cap}{100} \right) \times \left( \frac{CE}{100} \right) \right] \right\}$$

**Equation 6-2**

Where,

**EF(VOC)**= VOC emission factor as provided in Table 6-5 (lb/10<sup>3</sup> gal)

A detailed control volume is provided in Figure 6-5.



**Figure 6-5. Fuel Transfer Control Volume – Emission Factor Method**

### 6.4.3 HAP Emissions Calculation

The number of HAPs released into the environment from fuel transfer operations may be estimated using the total VOCs emitted, as calculated above, and the weight percent of HAPs in the fuel itself (APIMS and the Air Conformity Applicability Model, or ACAM, automatically calculate these values). Contact the fuel supplier for specific information regarding the weight percent of HAPs in fuels commonly used at USAF installations. In the absence of available data, Table 6-6 provides the typical weight percent of individual HAPs found in several fuels used at USAF installations. Using the total VOCs and weight percent HAP in the fuel, the total HAP emissions from fuel transfer operations is calculated using Equation 6-3 below.

$$E(HAP) = E(VOC) \times \frac{WP(HAP)}{100}$$

**Equation 6-3**

Where,

**E(HAP)** = HAP emissions from fuel dispensing (lb/yr)  
**WP(HAP)** = Weight percent HAP in the fuel (%)

**Table 6-6. Weight Percent of HAPs in Fuels commonly used at Air Force Installations**

Compound	Molecular Weight	Vapor Pressure (psi) <sup>a</sup>	Typical wt. %					
			Diesel		Gasoline		JP-8/Jet A <sup>b</sup>	
			Liquid Phase	Vapor Phase <sup>c</sup>	Liquid Phase	Vapor Phase <sup>c</sup>	Liquid Phase	Vapor Phase <sup>c</sup>
Anthracene	178.22	1.27E-07	2.82E-03 <sup>d</sup>	5.76E-08	---	---	---	---
Benzene	78.11	1.51E+00	8.00E-04	1.94E-01	1.80E+00	6.10E-01	3.36E-02	1.55E+00
1,3-Butadiene	54.09	3.61E+01	---	---	2.19E-04 <sup>d</sup>	1.78E-03	---	---
Cumene (Isopropylbenzene)	120.20	6.93E-02	---	---	5.00E-01	7.79E-03	1.80E-01	3.81E-01
Dibenzofuran	168.20	4.80E-05	1.64E-02 <sup>d</sup>	1.26E-04	---	---	---	---
Ethylbenzene	106.17	1.48E-01	1.30E-02	3.10E-01	1.40E+00	4.67E-02	1.58E-01	7.16E-01
Fluorene	166.21	1.16E-05	2.94E-02 <sup>d</sup>	5.48E-05	---	---	3.42E-03	1.21E-06
Hexane	86.17	2.44E+00	1.00E-04	3.91E-02	1.00E+00	5.48E-01	---	---
Isooctane (2,2,4-Trimethyl Pentane)	114.23	5.38E-02	---	---	4.00E+00	4.84E-02	1.22E-03	2.00E-03
Naphthalene	128.20	3.94E-03	3.39E-01 <sup>d</sup>	2.15E-01	1.74E-01 <sup>d</sup>	1.54E-04	2.66E-01	3.20E-02
Phenanthrene	178.22	2.34E-06	3.22E-02 <sup>d</sup>	1.21E-05	---	---	---	---
Phenylbenzene (1,1'-biphenyl)	154.21	3.78E-04	---	---	---	---	6.74E-02	7.79E-04
Pyrene	202.24	8.70E-08	3.62E-02 <sup>d</sup>	5.06E-07	---	---	1.24E-05	3.31E-11
Toluene	92.13	4.25E-01	3.20E-02	2.19E+00	7.00E+00	6.69E-01	2.18E-01	2.83E+00
Xylenes	106.17	1.30E-01	2.90E-01	6.06E+00	7.00E+00	2.05E-01	1.18E+00	4.69E+00

SOURCE (unless otherwise stated): Data taken from USEPA 2005, TANKS, Version 4.09d, U.S. Environmental Protection Agency, October 2005. wt% = weight percent

- Vapor pressure of pure species used in calculations were taken at 70°F and provided either by TANKS, the Hazardous Substance Data Bank (HSDB), or were calculated using Antoine equation constants provided either by the National Institute of Standards and Technology (NIST) or Perry's Chemical Engineer's Handbook Seventh Ed., Perry, Robert H, 1997.
- SOURCE: "JP-8 Composition and Variability," Armstrong Laboratory, Environics Directorate, Environmental Research Division, May 1996. An average density of 6.71 pounds per gallon (lb/gal) was used for unit conversion.
- The vapor phase speciation data was estimated using the liquid phase speciation data and equations found in Section 7.1.4 of AP-42, Fifth Edition, Volume I last updated November 2006. Physical properties for fuels used for calculations can be found in Table 6-7.
- SOURCE: SPECIATE, Version 4.4, U.S. Environmental Protection Agency, February 2014. For diesel, profile 4673 was referenced. For gasoline, profile 8748 was referenced. "---" Indicates No Data Available

**Table 6-7. Fuel Properties**

Fuel	Liquid Molecular Weight	Vapor Molecular Weight	Vapor Pressure (psia) <sup>b</sup>
JP-8/Jet A	162	130	4.08E-02 <sup>c</sup>
Diesel	188	130	9.00E-03
Gasoline <sup>a</sup>	92	66	6.20E+00

SOURCE (unless otherwise stated): Data taken from USEPA 2005, TANKS, Version 4.09d, U.S. Environmental Protection Agency, October 2005.

a. Based on gasoline with a Reid Vapor Pressure of 10.

b. Based on temperature of 70°F

c. SOURCE: “JP-8 Volatility Study,” Southwest Research Institute (SWRI), March 2001. Vapor pressures calculated using the composite data calculations, an average flash point temperature of 118.238°F, and atmospheric pressure of 760mmHg. Flash point temperature average provided by “Petroleum Quality Information System Fuels Data (2005),” Defense Logistics Agency (DLA), Defense Energy Support Center, Technology and Standardization Division, 2006.

## 6.5 Information Resources

Information regarding the annual fuel throughput may be collected from the fuel service station supervisor. The supervisor may also be able to provide specific information regarding the fuel vapor pressure and HAP constituent data. If this information is unavailable, contact the fuel supplier to gather this data for more precise emissions calculations.

## 6.6 Example Problems

### 6.6.1 Problem 1 – Preferred Method

A total of 150,000 gal of gasoline and 85,000 gal of diesel were dispensed from a POL tank into non-road equipment during the previous year. Based on the location of the installation, the gasoline used has an average Reid Vapor Pressure (RVP) of 10 and the average fuel temperature at the installation is 60°F. Calculate the total VOCs and xylene emissions.

**Step 1 – Convert the temperature to the correct units.** The temperature was given in terms of °F; however, to calculate the EFs needed, the temperature must be converted to the correct units (degrees Rankin [°R]) as follows:

$$T(^{\circ}R) = T(^{\circ}F) + 460.67$$

$$T(^{\circ}R) = 60 + 460.67 = \mathbf{520.67^{\circ}R}$$

**Step 2 – Record the vapor pressures and vapor molecular weights.** These values are needed for EF calculations and are given in Table 6-2. For RVP 10 gasoline, the molecular weight and



vapor pressure at 60°F are given as **66 lb/lb-mol** and **5.20 psia**, respectively. Similarly, for diesel, the vapor molecular weight and vapor pressure at 60°F are given as **130 lb/lb-mol** and **6.50E-03 psia**, respectively.

**Step 3 – Select and record the saturation factor.** The saturation factor is a function of the load method employed. Knowing that this fuel was loaded into non-road equipment from a POL tank, it may be assumed that the fuel was splash loaded without vapor balance. This gives a saturation factor of **1.45**.

**Step 4 – Calculate emissions.** Using the data from the previous steps and Equation 6-1, the total VOCs are calculated as follows:

$$E(VOC) = Q \times \frac{1}{1000} \times 12.46 \times \frac{S \times P \times M}{T} \times \left\{ 1 - \left[ \left( \frac{Cap}{100} \right) \times \left( \frac{CE}{100} \right) \right] \right\}$$

For Gasoline:

$$E(VOC) = 150,000 \frac{gal}{yr} \times \frac{1}{1000} \left( \frac{10^3 gal}{gal} \right) \times 12.46 \left( \frac{^{\circ}R lb-mol}{psia 10^3 gal} \right) \times \frac{1.45 \times 5.20 (psia) \times 66 \left( \frac{lb}{lb-mol} \right)}{520.67^{\circ}R} \left\{ 1 - \left[ \left( \frac{0\%}{100\%} \right) \times \left( \frac{0\%}{100\%} \right) \right] \right\}$$

$$E(VOC) = 150 \left( \frac{10^3 gal}{yr} \right) \times 12.46 \left( \frac{^{\circ}R lb-mol}{psia 10^3 gal} \right) \times \frac{1.45 \times 5.20 (psia) \times 66 \left( \frac{lb}{lb-mol} \right)}{520.67^{\circ}R} \{1\}$$

$$E(VOC) = 1869 \left( \frac{^{\circ}R lb-mol}{psia yr} \right) \times 0.956 \left( \frac{psia lb}{^{\circ}R lb-mol} \right) = \mathbf{1,786.8 \frac{lb}{yr}}$$

For Diesel:

$$E(VOC) = 85,000 \frac{gal}{yr} \times \frac{1}{1000} \left( \frac{10^3 gal}{gal} \right) \times 12.46 \left( \frac{^{\circ}R lb-mol}{psia 10^3 gal} \right) \times \frac{1.45 \times 0.0065 (psia) \times 130 \left( \frac{lb}{lb-mol} \right)}{520.67^{\circ}R} \left\{ 1 - \left[ \left( \frac{0\%}{100\%} \right) \times \left( \frac{0\%}{100\%} \right) \right] \right\}$$

$$E(VOC) = 85 \left( \frac{10^3 gal}{yr} \right) \times 12.46 \left( \frac{^{\circ}R lb-mol}{psia 10^3 gal} \right) \times \frac{1.45 \times 0.0065 (psia) \times 130 \left( \frac{lb}{lb-mol} \right)}{520.67^{\circ}R} \{1\}$$

$$E(VOC) = 1059.1 \left( \frac{^{\circ}R lb-mol}{psia yr} \right) \times 0.002 \left( \frac{psia lb}{^{\circ}R lb-mol} \right) = \mathbf{2.12 \frac{lb}{yr}}$$

**Step 5 – Record xylene weight percent.** Table 6-6 states that the vapor weight percent xylene in gasoline and diesel fuel is **0.205%** and **6.06%** respectively.

**Step 6 – Calculate xylene emissions.** Using the VOC emissions for gasoline and diesel fuel calculated in Step 4 and the vapor weight percent xylene in each fuel as recorded in Step 5, the total xylene emissions are calculated using Equation 6-3 as shown:

$$E(HAP) = E(VOC) \times \frac{WP(HAP)}{100}$$

For Gasoline:

$$E(Xylene) = 1786.8 \frac{lb}{yr} \times \frac{.205\%}{100\%}$$

$$E(Xylene) = 1786.8 \frac{lb}{yr} \times 0.00205 = \mathbf{3.66 \frac{lb}{yr}}$$

For Diesel:

$$E(Xylene) = 2.12 \frac{lb}{yr} \times \frac{6.06\%}{100\%}$$

$$E(Xylene) = 2.12 \frac{lb}{yr} \times 0.0606 = \mathbf{0.13 \frac{lb}{yr}}$$

**Step 7 – Calculate total VOC emissions.** The total VOC emissions from fuel dispensing are the sum of evaporative emissions from each fuel calculated in Step 4.

$$E(VOC) = \sum_{i=1}^n [E(VOC)_i]$$

$$E(VOC) = \left( 1786.8 \frac{lb}{yr} + 2.12 \frac{lb}{yr} \right)$$

$$\boxed{E(VOC) = \mathbf{1,788.9 \frac{lb}{yr}}}$$

**Step 8 – Calculate total xylene emissions.** The total xylene emissions from fuel dispensing are the sum of evaporative emissions from each fuel calculated in Step 6.

$$E(HAP) = \sum_{i=1}^n [E(HAP)_i]$$

$$E(Xylene) = \left( 3.66 \frac{lb}{yr} + 0.13 \frac{lb}{yr} \right)$$

$$E(\text{Xylene}) = 3.79 \frac{\text{lb}}{\text{yr}}$$

### 6.6.2 Problem 2 – Emission Factor Method

Using the same throughput for gasoline and diesel as given in Problem 1, re-calculate the VOC emissions using the EF method.

**Step 1 – Select and record appropriate EF.** Again, since the fuel was loaded into non-road equipment, the loading method is assumed to be splash loading without vapor balance. The EFs for gasoline and diesel are **12** and **0.03 lb/10<sup>3</sup> gal**, respectively.

**Step 2 – Calculate VOC emissions.** Using Equation 6-2 and the EFs as recorded in Step 1, the total VOCs emitted are calculated as follows:

$$E(\text{VOC}) = Q \times \frac{1}{1000} \times EF(\text{VOC}) \times \left\{ 1 - \left[ \left( \frac{\text{Cap}}{100} \right) \times \left( \frac{\text{CE}}{100} \right) \right] \right\}$$

For Gasoline:

$$E(\text{VOC}) = 150,000 \frac{\text{gal}}{\text{yr}} \times \frac{1}{1000} \left( \frac{10^3 \text{ gal}}{\text{gal}} \right) \times 12 \frac{\text{lb}}{10^3 \text{ gal}} \times \left\{ 1 - \left[ \left( \frac{0\%}{100\%} \right) \times \left( \frac{0\%}{100\%} \right) \right] \right\}$$

$$E(\text{VOC}) = 150 \frac{10^3 \text{ gal}}{\text{yr}} \times 12 \frac{\text{lb}}{10^3 \text{ gal}} \times \{1\} = \mathbf{1,800 \frac{\text{lb}}{\text{yr}}}$$

For Diesel:

$$E(\text{VOC}) = 85,000 \frac{\text{gal}}{\text{yr}} \times \frac{1}{1000} \left( \frac{10^3 \text{ gal}}{\text{gal}} \right) \times 0.03 \frac{\text{lb}}{10^3 \text{ gal}} \times \left\{ 1 - \left[ \left( \frac{0\%}{100\%} \right) \times \left( \frac{0\%}{100\%} \right) \right] \right\}$$

$$E(\text{VOC}) = 85 \frac{10^3 \text{ gal}}{\text{yr}} \times 0.03 \frac{\text{lb}}{10^3 \text{ gal}} \times \{1\} = \mathbf{2.55 \frac{\text{lb}}{\text{yr}}}$$

**Step 3 – Sum the VOC emissions.** Adding the calculated emissions from Step 2, the total VOCs, as determined by the EF method is calculated as follows:

$$E(\text{VOC}) = \sum_{i=1}^n [E(\text{VOC})_i]$$

$$E(\text{VOC}) = \left( 1800 \frac{\text{lb}}{\text{yr}} + 2.55 \frac{\text{lb}}{\text{yr}} \right)$$

$$E(\text{VOC}) = \mathbf{1,802.55 \frac{\text{lb}}{\text{yr}}}$$

## 6.7 References

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## APPENDIX A – EPA HAP LIST

CAS No.	Chemical/Compound
75070	Acetaldehyde
60355	Acetamine
75058	Acetonitrile
98862	Acetophenone
53963	2-Acetylaminofluorene
107028	Acrolein
79061	Acrylamide
79107	Acrylic Acid
107131	Acrylonitrile
107051	Allyl Chloride
92671	4-Aminobiphenyl
62533	Aniline
90040	o-Anisidine
1332214	Asbestos
71432	Benzene
92875	Benzidine
98077	Benzotrithloride
100447	Benzyl Chloride
92524	Biphenyl
117817	Bis(2-ethylhexyl)phthalate
542881	Bis(chloromethyl)ether
75252	Bromoform
106945	1-Bromopropane
106990	1,3-Butadiene
156627	Calcium Cyanamide
133062	Captan
63252	Carbaryl
75150	Carbon Disulfide
56235	Carbon Tetrachloride
463581	Carbonyl Sulfide
120809	Catechol
133904	Chloramben
57749	Chlordane
7782505	Chlorine
79118	Chloroacetic Acid
532274	2-Chloroacetophenone
108907	Chlorobenzene
510156	Chlorobenzilate
67663	Chloroform
107302	Chloromethyl methyl ether
126998	Chloroprene
1319773	Cresylic Acid
95487	o-Cresol
108394	m-Cresol
106445	p-Cresol
98828	Cumene
94757	2,4-D
3547044	DDE

CAS No.	Chemical/Compound
334883	Diazomethane
132649	Dibenzofurans
96128	1,2-Dibromo-3-chloropropane
84742	Dibutylphthalate
106467	1,4-Dichlorobenzene
91941	3,3-Dichlorobenzidine
111444	Dichloroethyl ether
542756	1,3-Dichloropropene
62737	Dichlorvos
111422	Diethanolamine
121697	N,N-Dimethylaniline
64675	Diethyl Sulfate
119904	3,3-Dimethoxybenzidine
60117	Dimethyl Aminoazobenzene
119937	3,3'-Dimethyl Benzidine
79447	Dimethyl Carbamoyl Chloride
68122	Dimethyl Formamide
57147	1,1-Dimethyl Hydrazine
13113	Dimethyl Phthalate
77781	Dimethyl Sulfate
534521	4,6-Dinitro-o-cresol
51285	2,4-Dinitrophenol
121142	2,4-Dinitrotoluene
123911	1,4-Dioxane
122667	1,2-Diphenylhydrazine
106898	Epichlorohydrin
106887	1,2-Epoxybutane
140885	Ethyl Acrylate
100414	Ethyl Benzene
51796	Ethyl Carbamate
75003	Ethyl Chloride
106934	Ethylene Dibromide
107062	Ethylene Dichloride
107211	Ethylene Glycol
151564	Ethylene Imine
75218	Ethylene Oxide
96457	Ethylene Thiourea
75343	Ethylidene Dichloride
50000	Formaldehyde
76448	Heptachlor
118741	Hexachlorobenzene
87683	Hexachlorobutadiene
77474	Hexachlorocyclopentadiene
67721	Hexachloroethane
822060	Hexamethylene-1,6-diisocyanate
680319	Hexamethylphosphoramide
110543	Hexane
302012	Hydrazine

CAS No.	Chemical/Compound
7647010	Hydrochloric Acid
7664393	Hydrogen Fluoride
123319	Hydroquinone
78591	Isophorone
58899	Lindane
108316	Maleic Anhydride
67561	Methanol
72435	Methoxychlor
74839	Methyl Bromide
74839	Methyl Chloride
74873	Methyl Chloroform
71556	Methyl Ethyl Ketone
60344	Methyl Hydrazine
74884	Methyl Iodide
108101	Methyl Isobutyl Ketone
624839	Methyl Isocyanate
80626	Methyl Methacrylate
1634044	Methyl tert Butyl Ether
101144	4,4-Methylene bis(2-Chloroaniline)
75092	Methylene Chloride
101688	Methylene Diphenyl Diisocyanate
101779	4,4'-Methylenedianiline
91203	Naphthalene
98953	Nitrobenzene
92933	4-Nitrobiphenyl
100027	4-Nitrophenol
79469	2-Nitropropane
684935	N-Nitroso-N-Methylurea
62759	N-Nitrosodimethylamine
59892	N-Nitrosomorpholine
56382	Parathion
82688	Pentachloronitrobenzene
87865	Pentachlorophenol
108952	Phenol
106503	p-Phenylenediamine
75445	Phosgene
7803512	Phosphine
7723140	Phosphorus
85449	Phthalic Anhydride
1336363	Polychlorinated Biphenyls
1120714	1,3-Propane Sultone
57578	beta-Propiolactone
123386	Propionaldehyde
114261	Propoxur
78875	Propylene Dichloride
75569	Propylene Oxide
75558	1,2-Proplennimine
91225	Quinoline

## Appendix A – EPA HAP List

CAS No.	Chemical/Compound
106514	Quinone
100425	Styrene
96093	Styrene Oxide
1746016	2,3,7,8-Tetrachlorodibenzo-p-dioxin
79345	1,1,2,2-Tetrachloroethane
127184	Tetrachloroethylene
7550450	Titanium Tetrachloride
108883	Toluene
95807	2,4-Toluene Diamine
584849	2,4-Toluene Diisocyanate
95534	o-Toluidine
8001352	Toxaphene
120821	1,2,4-Trichlorobenzene
79005	1,1,2-Trichloroethane
79016	Trichloroethylene

CAS No.	Chemical/Compound
95954	2,4,5-Trichlorophenol
88062	2,4,6-Trichlorophenol
121448	Triethylamine
1582098	Trifluralin
540841	2,2,4-Trimethylpentane
108054	Vinyl Acetate
593602	Vinyl Bromide
75014	Vinyl Chloride
75354	Vinylidene Chloride
1330207	Xylenes
95476	o-Xylene
108383	m-Xylene
106423	p-Xylene
---	Antimony Compounds
---	Arsenic Compounds

CAS No.	Chemical/Compound
---	Beryllium Compounds
---	Cadmium Compounds
---	Chromium Compounds
---	Cobalt Compounds
---	Coke Oven Emissions
---	Cyanide Compounds <sup>1</sup>
---	Glycol Ethers <sup>2</sup>
---	Lead Compounds
---	Manganese Compounds
---	Mercury Compounds
---	Fine Mineral Fibers <sup>3</sup>
---	Nickel Compounds
---	Polycyclic Organic Matter <sup>4</sup>
---	Radionuclides (including Radon) <sup>5</sup>
---	Selenium Compounds

1. X'CN where X=H' or any other group where a formal dissociation may occur. For example, KCN or Ca(CN)<sub>2</sub>.
2. Includes mono- and di-ethers of ethylene glycol, diethylene glycol, and triethylene glycol R-(OCH<sub>2</sub>CH<sub>2</sub>)-OR', where:  
n = 1, 2, or 3;  
R = alkyl C7 or less; or R = phenyl or alkyl-substituted phenyl;  
R' = H or alkyl C7 or less; or OR' consisting of carboxylic acid ester, sulfate, phosphate, nitrate, or sulfonate.
3. Includes mineral fiber emissions from facilities manufacturing or processing glass, rock, or slag fibers (or other mineral derived fibers) of average diameter 1 micrometer or less.
4. Includes organic compounds with more than one benzene ring, and which have a boiling point greater than or equal to 100°C.
5. A type of atom which spontaneously undergoes radioactive decay.