Air Emissions Guide for Air Force Mobile Sources

Methods for Estimating Emissions of Air Pollutants For Mobile Sources at U.S. Air Force Installations

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ACRONYMS AND ABBREVIATIONS

µg	Microgram(s)
µm	Micrometer(s)
AAFES	Army & Air Force Exchange Service
AB	Afterburner
AEI	Air Emissions Inventory
AFB	Air Force Base
AFI	Air Force Instruction
AFCEC	Air Force Civil Engineer Center
AFRL	Air Force Research Laboratory
AGE	Aerospace Ground Equipment
AGSE	Aerospace Ground Support Equipment
A-hr	Ampere-hours
ALAPCO	Association of Local Air Pollution Control Officials
AMX	Aircraft Maintenance Squadron
APU	Auxiliary Power Unit
AVGAS	Aviation Gasoline
BEE	Bioenvironmental Engineer
BMPs	Best Management Practices
BOOS	Burners Out Of Service
BSFC	Brake-Specific Fuel Consumption
Btu	British Thermal Unit
°C	Degrees Celsius
CAA	Clean Air Act
CAAA	Clean Air Act Amendments (of 1990)
CAIR	Clean Air Interstate Rule
CAS	Chemical Abstracts Service
CBPO	Consolidated Base Personnel Office
CE	Civil Engineering
CEMS	Continuous Emission Monitoring System
CEV	Civil Engineering Environmental
CFC	Chlorofluorocarbon
CFR	Code of Federal Regulations
CFRM	Continuous Flow Rate Monitor
CH_4	Methane
CI	Compression Ignition
CNG	Compressed Natural Gas
CO	Carbon Monoxide
Co	Cobalt
CONUS	Continental United States
Cr	Chromium
DAC	Defense Ammunition Center
DCA	Defense Commissary Agency
DESC	Defense Energy Support Center
DLA	Defense Logistics Agency
DNA	Defense Nuclear Agency
DOD	Department of Defense
DOE	Department of Energy
dscf	Dry Standard Cubic Feet
dscfm	Dry Standard Cubic Feet per Minute

EA	Environmental Assessment
EDMS	Emissions and Dispersion Modeling System
EDP	Electrodeposition
EF	Emission Factor
EGBE	Ethylene Glycol Monobutyl Ether
EIIP	Emissions Inventory Improvement Program
EIP	Emissions Inventory Plan
EIR	Emissions Inventory Report
EIS	Environmental Impact Statement
EtO	Ethylene Oxide
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
EPAct	Energy Policy Act
EPCRA	Emergency Planning and Community Right-to-Know
ERC	Emission Reduction Credit
ESP	Electrostatic Precipitator
ESTCP	Environmental Security Technology Certification Program
ºF	Degrees Fahrenheit
FAA	Federal Aviation Administration
FBC	Fluidized Bed Combustor
FCAW	Flux-Cored Arc Welding
FESOP	Federally Enforceable State Operating Permit
FF	Fabric Filter
FFV	Flexible Fuel Vehicles
FGD	Flue Gas Desulphurization
FGR	Flue Gas Recirculation
FIRE	Factor Information Retrieval System
FT	Fischer-Tropsch
ft.	Foot (Feet)
g/L	Grams per Liter
gal	Gallon(s)
GHG	Greenhouse Gas
GMAW	Gas Metal Arc Welding
GOV	Government Owned Vehicles
GSA	General Services Administration
GSE	Ground Support Equipment
GVW	Gross Vehicle Weight
HAP	Hazardous Air Pollutant
HAZMAT	Hazardous Materials
HBFC	Hydrobromofluorocarbons
HC	Hydrocarbon
HCFC	Hydrochlorofluorocarbons
HCl	Hydrochloric Acid
HCP	Hard Chrome Plating
HEI	High Explosive Incendiary
HEPA	High Efficiency Particulate Air
HEV	Hybrid Electric Vehicles
HHV	High Heat Value
HMA	Hot Mix Asphalt
hp	Horse Power
hr	Hour(s)

HVAC	Heating, Ventilating, and Air Conditioning
HVLP	High Volume Low Pressure
HVOF	High Velocity Oxy-Fuel
IC	Internal Combustion
ICAO	International Civil Aviation Organization
IPCC	Intergovernmental Panel on Climate Change
IRP	Installation Restoration Program
kW	Kilowatt(s)
lb	Pound(s)
LDF	Liquid Drift Factors
LEL	Lower Explosive Limit
LFB	Low Flyby
LFG	Landfill Gas
LFP	Low Flight Pattern
LGRVM	Vehicle Management Flight Vehicle Maintenance
LNB	Low NO_X Burner
LPG	Liquid Petroleum Gas
LTO	Landing and Takeoff
MAJCOM	Major Command
MB	Material Burned
MC	Medium Cure
MEK	Methyl Ethyl Ketone
MEM	Mass of Energetic Material
Mg	Megagram(s) [i.e., metric ton]
mg	Milligram(s)
MIDAS	Munitions Items Disposition Action System
MM	Minutemen Missiles
MMBtu	Million British Thermal Units
Mn	Manganese
MPF	Military Personnel Flight
MPO	Metropolitan Planning Office
MSDS	Material Safety Data Sheet
MSW	Municipal Solid Waste
NAAQS	National Ambient Air Quality Standards
NACAA	National Association of Clean Air Agencies
NAICS	North American Industry Classification System
NASA	National Aeronautics and Space Administration
NDI	Non-destructive Inspection
NEI	National Emission Inventory
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NH_3	Ammonia
Ni	Nickel
NMOC	Non-methane Organic Compounds
N_2O	Nitrous Oxide
NO_2	Nitrogen Dioxide
NO_X	Nitrogen Oxides
NSCR	Nonselective Catalytic Reduction
NSPS	New Source Performance Standard
NSR	New Source Review
OB/OD	Open Burning/Open Detonation

OBODM	Open Burning/Open Detonation Model
OCA	Off-Site Consequences Analysis
OCONUS	Outside Continental United States
ODS	Ozone Depleting Substances
OIAI	Once In Always In
OLVIMS	On-line Vehicle Interactive Management System
OTAG	Office of Transportation Quality
P2	Pollution Prevention
PAH	Polycyclic Aromatic Hydrocarbon
Pb	Lead
PBT	Persistent Bioaccumulative Toxic
PEMS	Predictive Emission Monitoring System
PM	Particulate Matter – Aerodynamic diameter unspecified
PM_{10}	Particulate Matter – Aerodynamic diameter < 10 micrometers
$PM_{2.5}$	Particulate Matter – Aerodynamic diameter < 2.5 micrometers
POM	Polycyclic Organic Matter
POTW	Publicly Owned Treatment Works
POV	Privately Owned Vehicles
ppm	Parts per Million
ppmv	Parts per Million by Volume
psi	Pounds per Square Inch
PTE	Potential-To-Emit
^oR	Degrees Rankin
RAP	Reclaimed Asphalt Pavement
RC	Rapid Cure
REO	Regional Environmental Offices
REEDM	Rocket Exhaust Effluent Diffusion Model
RMP	Risk Management Plan
RVP	Reid Vapor Pressure
SAR	Second Assessment Report
SAW	Submerged Arc Welding
SC	Slow Cure
SCC	Source Classification Code
scf	Standard Cubic Foot
SCR	Selective Catalytic Reduction
SI	Spark Ignition
SIC	Standard Industrial Classification
SIP	State Implementation Plan
SMAW	Shielded Metal Arc Welding
SO_2	Sulfur Dioxide
SOCMI	Synthetic Organic Chemical Manufacturing Industry
SO_X	Sulfur Oxides
STAPPA	State and Territorial Air Pollution Program Administrators
SVE	Soil Vapor Extraction
TAR	Third Assessment Report
TCLP	Toxicity Characteristics Leaching Procedure
TDS	Total Dissolved Solids
TGO	Touch-and-Go
THC	Total Hydrocarbons
TIM	Time In Mode
TLG	Total Landfill Gas

TNMOC	Total Non-methane Organic Compounds
T.O.	Technical Order
TOC	Total Organic Compounds
tpy	Tons per Year
TRI	Toxic Release Inventory
TSD	Technical Data Sheets
TSP	Total Suspended Particulate
ULSD	Ultra Low Sulfur Diesel
USAF	United States Air Force
U.S.	United States
UST	Underground Storage Tanks
VIN	Vehicle Identification Number
VKT	Vehicle Kilometers Traveled
VMIF	Vehicle Maintenance Index File
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compound
yr	Year(s)

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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 was to protect public health by addressing the risks posed by certain air pollutants. The EPA has established National Ambient Air Quality Standards (NAAQS) which require facility managers to know at all times if they are in compliance with air regulations. The EPA regulates most mobile sources of air pollution (e.g., automobiles at 40 CFR 85-86, airplanes at 40 CFR 87, etc.) under Title II of the CAA. Performance standards issued by EPA limit the emissions 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 (both mobile and stationary) 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 or protocols by which the installation must obey. An AEI must be periodically updated as required by federal, state, and local regulations. Each installation must record the collected data and calculations must be performed in the Air Program Information Management System (APIMS). Installations located in a foreign territory must abide by the requirements of the host government. If there is not a regulatory periodic emission inventory requirement, then APIMS must be updated no less than every three years to accurately reflect the current emissions. Additionally, 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 document is to provide a uniform approach to calculating air pollutant emissions for the most common mobile sources found at Air Force installations. This guide is the Air Force's single authoritative resource for mobile source emission estimating algorithms and emission factors.

Any questions concerning this document, and/or requests for additional information pertaining to Air Force air emission inventories, should be directed to the Air Quality Subject Matter Expert; AFCEC Compliance Technical Support Branch (AFCEC/CZTQ); 2261 Hughes Avenue, Suite 155; Lackland AFB, TX 78236-9853.

1.2 Mobile Sources

A mobile source is defined as any type of non-stationary equipment which 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. This document only addresses mobile emission sources typically found on Air Force installations. Description of stationary sources contributing to air emissions and the method for calculating these emissions may be found in the stationary source guide.

1.3 Air Emissions inventories (AEIs)

AFI 32-7040, Air Quality Compliance And Resource Management, states the following: "Prepare and periodically update an AEI of all installation stationary and Air Force owned or operated mobile sources

at the frequency required by federal, state and local regulations, via APIMS." If no periodic emission inventory requirements apply, it is recommended that APIMS be updated no less frequently than every three years to accurately reflect current emissions. Overseas installations shall conduct AEIs in accordance with Foreign Governing Standards or Host Nation agreements. Mandatory emissions reports will be provided to federal, state and local (including Metropolitan Planning Organization or other regional) regulatory agencies as required. GHG reporting mandated by Executive Order (E.O.) 13514, Federal Leadership in Environmental, Energy, and Economic Performance, will be accomplished at the SAF/HAF level. GHG reporting mandated by Title 40, Code of Federal Regulations, Part 98, Mandatory Reporting of Greenhouse Gases shall be accomplished by the affected installations. Installation AEI data must be stored in APIMS and available for use as needed by Air Force Civil Engineer Center (AFCEC) and higher headquarters.

This document is concerned with "actual emissions" (i.e., from existing sources) and projected emission (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 (e.g., automobiles at 40 CFR 85-86, airplanes at 40 CFR 87, etc.) under Title II of the CAA which sets the standards for motor vehicle and aircraft emissions. Under Title II the standards are set in order to control emissions which may endanger public health and welfare and that these standards may be amended, as needed, after being carefully considered. 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 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 insure that all aircraft emissions are in compliance with the established air pollution standards.

1.3.2 General Conformity

The general conformity program (found under 40 CFR 93) requires all significant Federal actions in nonattainment and maintenance areas to comply with the applicable State or Federal Implementation Plan. The Federal agency responsible for the action is required to perform a determination to verify that the action(s) conform. An emissions inventory is usually required as part of the conformity determination to identify/quantify air emissions associated with the Federal action(s). An air emissions inventory conducted as part of a conformity determination usually addresses both direct and indirect emissions from all pollutant sources (i.e., stationary and mobile) associated with the Federal action(s).

1.3.3 Implementation Plans

As specified under Section 110 of the Clean Air Act, all States are required to submit a plan to the EPA which provides for the protection and enhancement of air quality so as to promote public health and welfare. This plan, called a State Implementation Plan (SIP), provides for implementation, maintenance, and enforcement of the National Ambient Air Quality Standards (NAAQS). For areas in the State which are classified as nonattainment with any NAAQS, the SIP must provide strategies for obtaining attainment. For areas in the State which 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 a majority of the overall emissions, more control strategies targeting mobile sources are now being incorporated into implementation plans. Since air emission inventories 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 air emission inventories.

1.3.4 National Environmental Policy Act (NEPA)

NEPA requires Federal agencies to evaluate the environmental impacts associated with major actions that they either fund, support, permit, or implement. As part of the NEPA process, an Environmental Assessment (EA) is required if it's determined that the Federal action may potentially have a significant effect on the environment (i.e., cannot be categorically excluded).

The EA is a study that provides background information and preliminary analyses of the potential impact of the proposed Federal action. If the results of the EA indicate that further study of the proposed action is necessary (i.e., a Finding of No Significant Impact is not warranted), then a more comprehensive Environmental Impact Statement (EIS) must be prepared. The EIS addresses all possible impacts (both beneficial and adverse) which may result from the proposed action as well as possible alternatives to the action. Data from air emissions inventories can be used in EAs and EISs to help identify possible environmental consequences associated with air emissions from proposed Federal actions. Typically, all possible sources of air emissions (stationary and mobile) must be evaluated.

1.3.5 Other Inventory Uses

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

1.3.5.1 Pollution Prevention (P2) Opportunities

An air emissions inventory 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.

1.3.5.2 Emissions Trading

Some States have adopted emissions trading programs that apply to mobile sources. These programs are usually applicable to fleet vehicles in nonattainment areas. The emissions trading programs allow entities to generate emission reduction credits by converting to low emission vehicles. The credits may be banked, purchased, sold, or traded to meet clean air mandates for specified air programs. Mobile source air emissions inventories provide important data needed for calculating mobile emission reduction credits.

1.3.5.3 Risk Assessments

In certain cases it may be necessary to assess the risk(s) air emissions from a military installation pose to specific public receptors. Data from air emissions inventories can be used in conjunction with approved dispersion models to perform these risk assessments. Due to the large amount of emissions from mobile sources (especially from installations with a high amount of aircraft traffic), as well as the fact that many

Air Force installations are located near high population areas, some installations may have a need to conduct risk assessments which include mobile sources.

1.3.5.4 Environmental Auditing

An environmental audit is an objective review of a facility's operations and practices done in order to determine if the facility is meeting its environmental requirements. Audits can be designed to verify compliance with environmental requirements, evaluate the effectiveness of environmental management systems already in place, or assess risks from regulated and unregulated materials and practices. In addition, the audit can be used by management to plan environmental activities for the future. Data from air emissions inventories, including inventories for mobile sources, can be used in the audit process to help identify current and/or potential air pollution problems associated with a facility's operations and practices.

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 which 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 monitors are usually preferred for estimating a source's emissions because that 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, emission factors and/or material balance calculations are frequently the best or only method available for estimating emissions, despite their limitations.

An emission factor is a representative value that attempts to relate the quantity of a pollutant released with the activity associated with the release of that pollutant. These factors are usually expressed as the weight 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 1000 pounds of fuel burned). In most cases, these factors are simply averages 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 emission factor is:

$$\boldsymbol{E = A \times EF \times N} \qquad \textbf{Equation 1-1}$$

Where,

E	=	Emissions
A	=	Activity rate
EF	=	Emission factor
N	=	Number of engines/aircraft/equipment

For some sources, a material balance approach may provide a better estimate of emissions than emission tests would. In general, material 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 taken into account 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 air emissions inventory, this document focuses on criteria pollutants, hazardous air pollutants (HAPs), and volatile organic compounds (VOCs). The document also addresses greenhouse gases (GHGs) to a lesser degree.

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 carbon monoxide, nitrogen dioxide, ozone, sulfur dioxide, lead, and particulate matter. These pollutants can harm your health and the environment, and cause property damage. EPA calls these pollutants "criteria" air pollutants because it regulates them by developing human health-based and/or environmentally-based criteria (science-based guidelines) for setting permissible levels. These criteria pollutants are:

Particle Pollution (often referred to as particulate matter):

- Includes the very fine dust, soot, smoke, and droplets formed from chemical reactions and incomplete burning of fuels.
- The fine particles can get deep into the lung, causing increased respiratory illnesses and tens of thousands of deaths each year.
- Particulate matter is defined as any particle with an equivalent diameter ≤ 10 microns (**PM_{10}**) and is further subdivided to include a separate standard for particles with an equivalent aerodynamic diameter ≤ 2.5 microns (**$PM_{2.5}$**).

Ground-Level Ozone (O_3):

- A primary component of smog which can cause human health problems and damage forests and agricultural crops.
- Repeated exposure to ozone can make people more susceptible to respiratory infections and lung inflammation.
- Though there is a NAAQS, ozone is not emitted directly into the air.
- Two types of chemicals that are the main ingredients (precursors) in forming ground-level ozone
    - **Volatile organic compounds (VOCs):** Sources include cars burning gasoline, petroleum refineries, chemical manufacturing plants, industrial plants, solvents used in paints, and an assortment of consumer and business products containing VOCs.
    - **Nitrogen oxides (NO_X):** Produced when cars and other sources like power plants and industrial boilers burn fuels such as gasoline, coal, or oil. Nitrogen Oxides produce a reddish-brown tint to smog.

Carbon Monoxide (CO):

- Produced when fossil fuel burns incompletely due to insufficient oxygen.
- Wood, coal, and charcoal fires and gasoline engines always produce carbon monoxide.
- Nationally, and particularly in urban areas, the majority of CO air emissions are from mobile sources.
- Can cause harmful health effects by reducing oxygen delivery to the body's organs (like the heart and brain) and tissues.

Sulfur oxides (SO_X):

- A group of highly reactive gasses known as "oxides of sulfur".
- Emissions are produced from fossil fuel combustion at power plants (73%) and other industrial facilities (20%).
- SO_2 is linked with a number of adverse effects on the respiratory system.
- SO_2 in the ambient air is just one of several oxides of sulfur that contribute to air quality issues.

Nitrogen oxides (NO_X):

- A subgroup of nitrogen oxides, NO_2 is the component of greatest interest and the indicator for the larger group of nitrogen oxides.
- NO_2 forms quickly from emissions from vehicles, power plants, and off-road equipment.
- Also contribute to the formation of ground-level ozone, and fine particle pollution.
- Linked with a number of adverse effects on the respiratory system.
- NO_2 in the ambient air is just one of several oxides of nitrogen that contribute to air quality issues.

Lead (Pb):

- A metal found naturally in the environment as well as in manufactured products.
- Prior to 1980 the major source of Pb was cars and trucks; as a result EPA removed Pb from gasoline.
- Pb emissions from vehicles declined by 95% between 1980 and 1999.
- Today, the major sources of Pb are ore and metals processing (e.g. lead smelters) and leaded aviation gasoline.
- 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, "Toxic air pollutants, also known as HAPs, 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." Unlike criteria pollutants, HAPs are primarily chemical-specific pollutants (versus classes of pollutants) and many of the HAPs are actually constituent chemicals that are a subset of a criteria pollutant emission rate. This is found primarily with the VOCs (numerous constituent chemicals considered HAPs) and PM_{10} (primarily heavy metals). Pb is both a criteria pollutant and HAP.

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. There are established procedures for both "listing" and "delisting" compounds. In fact, when the amendments were originally promulgated in 1990, there were 189 chemical compounds listed as HAPs. Since then, four have been removed from this list: 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.

1.5.3 Greenhouse Gases (GHGs)

Global climate change is becoming one of the most important issues of the 21st century. Some GHGs, such as carbon dioxide, occur naturally and are emitted to the atmosphere through natural processes and 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 carbon dioxide (CO_2), methane (CH_4), Nitrous Oxide (N_2O), and fluorinated gases.

- CO_2 enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and also as a result of other chemical reactions (e.g., manufacture of cement). CO_2 is also removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle.

- CH_4 is emitted during the production and transport of coal, natural gas, and oil. CH_4 emissions also result from livestock and other agricultural practices and by the decay of organic waste in municipal solid waste landfills.

- N_2O is emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste.

- Hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride are synthetic, powerful GHGs that are emitted from a variety of industrial processes. Fluorinated gases are sometimes used as substitutes for ozone-depleting substances discussed earlier (i.e., CFCs, HCFCs, and halons). These gases are typically emitted in smaller quantities, but because they are potent GHGs, they are sometimes referred to as High Global Warming Potential gases ("High GWP gases").

The EPA is diligently attempting to have more accurate estimation and reporting of GHG emissions. The Emission Inventory Improvement Program, Technical Report Series Volume 8, "Estimating Greenhouse Gas Emissions" is undergoing revision to (1) increase consistency with the national inventory of GHG emissions and sinks, (2) incorporate state-level data sources, methods and emission factors where applicable, (3) update the text and examples for clarity, and (4) to include references to a MS Excel® based tool designed to assist states in the estimation of emissions. The revisions include a number of methodological improvements and improved compatibility with international inventory guidelines and the Good Practice Guidance published by the Intergovernmental Panel on Climate Change (IPCC).

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2.0 AIRCRAFT OPERATIONS

2.1 Introduction

Emissions from based aircraft and transient aircraft operations typically account for the bulk of the mobile source emissions associated with an Air Force base. Emissions from aircraft operations include emissions from aircraft training and flight operations, engine testing, and emissions from each aircraft's associated auxiliary power unit (APU).

2.2 Mobile Versus Stationary Aircraft emissions

Aircraft emissions can be classified as being either stationary or mobile in nature depending upon whether the engine is physically attached to the aircraft's wing, or removed from the aircraft and secured to another (stationary) device. Emissions from Air Force aircraft training and flight operations, as well as trim pad and on-wing engine testing, are considered mobile in nature because the engine is secured to a mobile source (the aircraft). Emissions from 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) are typically considered stationary in nature. Figures 2-1 and 2-2 are provided as examples for collecting data for on-wing testing and aircraft operations when calculating emissions.

2.3 Auxiliary Power units (APUs)

Additionally, Aircraft are also outfitted with small turbine engines known as auxiliary power units (APUs) which provide ancillary power to the aircraft while on the ground, and occasionally through takeoff and climb out. These APUs are air pollution emission sources and, unless physically removed from an aircraft and operated in a test cell or on an outdoor trim pad, emissions from the operation of APUs should be treated as mobile sources for inventory purposes. This section discusses emissions from aircraft operations in terms of mobile emissions only.

2.4 Global Climate Change Data

Although not currently regulated under the Clean Air Act, CO_2 emissions are also being recorded due to the increasing concern over global climate change. Specific requests to calculate and provide CO_2 emissions data to regulatory agencies as part of the emission inventory process should be coordinated with AFIOH/RSEQ, and reported through the appropriate MAJCOM channels to ensure a consistent Air Force response.

2.5 Aircraft Operating Modes

2.5.1 Landing and Takeoff (LTO) Cycle

The Environmental Protection Agency (EPA) has established formal procedures for calculating exhaust emissions associated with aircraft operations based on an landing and takeoff (LTO) cycle (Procedures for Emission Inventory Preparation-Volume IV: Mobile Sources, 1992). Under the EPA procedures, an emissions inventory for aircraft operations focuses on the emissions in the vertical column of air referred to as the "mixing zone" or "inversion layer". Exhaust emissions occurring within this area are calculated

for one complete LTO cycle for each aircraft type by applying aircraft engine-specific emission factors derived from fuel flow rates, the period of time (or time-in-mode, TIM) that each engine operates at a particular power setting during an LTO, and activity based operational data such as the number of aircraft, the number of engines per aircraft, the annual number of sorties or LTOs, etc. Emissions occurring above the mixing zone are typically not considered during the emissions inventory process.

Each LTO cycle is comprised of five operating modes: approach, taxi/idle-in, taxi/idle out, takeoff, and climb out. The TIM for each mode is measured as discussed below:

- **Approach:** The period of time from the moment the aircraft enters the mixing zone until the aircraft lands.
- **Taxi/Idle In:** The period of time spent after landing until the aircraft is parked and the engines are turned off.
- **Taxi/Idle Out:** The period of time from engine startup to takeoff.
- **Takeoff:** Characterized by full engine thrust, the period of time it takes the aircraft to reach between 500 and 1000 feet above ground level. This transition height is fairly standard and does not vary much from location to location or among aircraft categories.
- **Climb Out:** The period of time following takeoff that concludes when an aircraft exits the mixing zone and continues on to cruise altitude.

TIM is somewhat variable, and depends on the type of aircraft, site-specific meteorological conditions, and other operational factors that may differ among installations. Typical TIM estimates are provided in Table 2-4 for different types of commercial and military aircraft which may be used when base-specific data is unavailable.

Due to operational safety considerations, commercial aircraft may sometimes apply engine thrust reversal for 15-20 seconds upon landing as a means of quickly slowing down an aircraft to a safe taxi speed. Thus a sixth operating mode, reverse thrust, may need to be included when estimating emissions for an LTO cycle for commercial aircraft. Military aircraft do not typically employ reverse thrusters for deceleration, but use aerodynamic braking (keeping the aircraft nose high until it falls at a speed of 50 knots) and wheel brakes to slow down. Some aircraft may, however, employ reverse thrusters as a means of backing up when on the ground. Reverse thrust should only be included in emission calculation procedures as a sixth operating mode if the practice is commonly applied by the aircraft in question. Engine operating conditions for reverse thrust are similar to those occurring during takeoff, thus TIM for reverse thrust should be combined with takeoff mode emission factors and fuel flow as a means of accounting for reverse thrust mode emissions.

The fuel flow rate of each engine power setting is the fuel rate used during emissions sampling and emission factor development. Average power settings of Air Force turbofan engines used on high performance jet aircraft and turboprop engines used on transport and cargo aircraft vary slightly during the takeoff mode. While Air Force jet aircraft typically use 100% of the engine's rated thrust during takeoff, some high-performance aircraft will takeoff using the full afterburner setting, which introduces fuel at a substantially higher rate. By contrast, turboprop aircraft typically employ a derated takeoff procedure that uses less than full power. Commercial and Military LTO cycle modes and typical Air Force aircraft engine power settings are presented in Table 2-1.

Helicopter engines are typically operated at settings that, while similar, reflect operational differences between fixed-wing aircraft and rotorcraft - ground idle, flight idle, normal, and military (and sometimes over speed) power settings. APUs are operated under either a no load or a constant load (typically maximum load) power setting.

Table 2-1. Comparison of Commercial and Military LTO Cycle Modes[1]

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[(2)]
	Climb out	Intermediate	70-85[(2)]
	Approach	Approach	30
	Taxi/Idle-in	Idle	7
Turboprop	Taxi/Idle-out	Idle	7
	Takeoff	Military	90
	Climb out	Intermediate	70-85[(2)]
	Approach	Approach	30
	Taxi/Idle-in	Idle	7

1. SOURCE: *Airport Air Quality Manual*, International Civil Aviation Organization, 2011, except where noted.
2. 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.

2.5.2 Touch and Go (TGO) and Low Fly By (LFB) Cycles

Training operations and other contingencies at Air Force installations may dictate the need to conduct aircraft operations that deviate from a standard LTO cycle. For purposes of developing a comprehensive inventory, emissions should also be calculated for these military operations and training procedures. A Touch and Go (TGO) cycle is similar to an LTO cycle, but does not include taxi time. It includes the TIM when an aircraft enters the atmospheric mixing zone, briefly lands, then immediately takes off, and climbs out through the atmospheric mixing zone. A Low Fly By (LFB) cycle is similar to an LTO and TGO cycle, but less time is spent in the takeoff mode, and the aircraft stays in approach mode below the mixing zone height for a longer period of time. For the purpose of developing a base emission inventory, only that portion of an LFB cycle which occurs within the actual air space of the Air Force base is of concern. If, however, the emission inventory is being created as part of a "regional" inventory development effort by regulators, it may also be necessary to estimate aircraft emissions that occur outside of a base's air space but under the mixing zone height.

2.6 Mixing Zone Height

Under the EPA procedures, an emissions inventory for aircraft operations focuses on the emissions in the vertical column of air where pollutant chemical reactions occur. This portion of the atmosphere, which begins at the earth's surface and can range from several hundred to several thousand feet in altitude, is commonly referred to as the "mixing zone" or "inversion layer". Because estimating emissions using an LTO approach accounts for exhaust emissions associated with aircraft operations occurring both on the ground and up to the mixing zone height, the choice of a mixing zone height will have a direct impact on total emissions. Mixing zone height is used to adjust the TIM during the approach and climb out modes of an LTO when calculating emissions. Thus a shallow mixing zone height will result in a shorter TIM (and fewer emissions), and a high mixing zone height will result in a longer TIM (and more emissions). While emissions occurring anywhere within this zone will impact ground-level pollutant concentrations, emissions occurring above it will generally not be mixed to the ground. Because atmospheric stability (and hence inversions) is a function of temperature, mixing zone height depends on location, hour, and

season, and is affected by local topography, time of day, and time of year. Per EPA guidance, a default mixing zone height of 3000 feet should be used. However, if NO_X emissions are considered an important component of the emission inventory, specific mixing height data may be gathered and applied (Procedures for Emission Inventory Preparation-Volume IV: Mobile Sources, 1992). The Federal Aviation Administration (FAA) has adopted this EPA default value in its recommended procedures (Consideration of Air Quality Impacts of Airplane Operations at or Above 3000 Feet AGL, 2000). To maximize the accuracy of the inventory through use of specific mixing height data, contact the AFCEC Air Quality Subject Matter Expert to obtain approval and location-specific meteorological data for seasonal or annual average mixing heights.

2.7 Fuel Flow Rate

It is also important to note that emission factors are derived for specific fuel flow rates, not power settings, and that actual fuel flow rates used during aircraft operation and testing at different installations may vary from those used to derive emission factors. If available, aircraft- and base-specific TIM data and fuel flow rates (using the emission factor for the closest engine-specific fuel flow rate) should be used to enhance the accuracy of the emissions inventory. Once all necessary operating parameters are identified, total emissions from aggregated aircraft operations may be calculated.

2.7.1 Jet Fuel

Military turbofan and turboprop engines and APUs consume JP-8 fuel, while their commercial counterparts consume a nearly identical fuel known as Jet-A. While the vast majority of aircraft operations involve engines which use either JP-8 or Jet-A fuel, small, piston engine-driven planes that consume aviation grade gasoline, or AVGAS, may periodically operate on an Air Force installation. In addition, 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 process and burn much cleaner than fuels produced from crude oil. Regardless of fuel type, emissions of concern from aircraft operations include the criteria pollutants (VOC, CO, NO_X, $PM_{2.5}$ and PM_{10}, and SO_2), and HAPs that are commonly associated with fuel combustion processes (including, but not limited to, benzene, 1, 3-butadiene and naphthalene).

2.7.2 Synthetic Aviation Fuel

On-going DOD and Air Force initiatives to reduce dependency on foreign petroleum sources are developing battlefield fuels with essentially no sulfur and reduced aromatic content using Fischer-Tropsch (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 recently been completed by the Air Force Research Laboratory (AFRL), and data indicate the 50-50 blend reduces SO_2, CO_2, and PM emissions considerably (Air Force Alternative Fuels Program, 2007). When collecting information on aircraft operations, if synthetic fuel was blended with petroleum JP-8, then use the following emission reduction factors when calculating emissions:

Table 2-2. Fuel Emission Reduction Factors (FERFs)

Pollutant	Reduction Factor (%)
PM	35
SO_2	50
CO_2	1.8

2.8 Emission Calculations

Emission calculation procedures for different aircraft operations under various operational cycles and mobile testing conditions are described in the following paragraphs. Default data for calculating emissions for specific aircraft engines can be found in Table 2-8. For engine models not in Table 2-8, Contact the Air Quality Subject Mater Expert for assistance in selecting a representative surrogate engine.

2.8.1 Aircraft Emissions

Emissions from an aircraft engine are based on that engine's emission factors for each criteria pollutant. These emission factors 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*, International Civil Aviation Organization (ICAO) do not provide PM_{10} and $PM_{2.5}$ emission factors directly. For those sources, the total particulate matter was calculated and was conservatively assumed to be equal to PM_{10}. A similarly conservative estimate was made for $PM_{2.5}$ by making the assumption that 90% of the total PM_{10} is composed of $PM_{2.5}$. These assumptions are noted in the appropriate tables. Additionally, there are several engines for which some emission factor data may have been missing. For these engines, either the emission factors from a surrogate were used or the missing data was interpolated. These values are clearly marked in the tables with an (S) for emission factors in which a surrogate was used or a (C) when the values were calculated. The engines used as surrogates are clearly stated in the notes for that engine.

2.8.1.1 Land and Takeoff Cycle (LTO)

LTO emissions are calculated based on the type of aircraft, the engine model, the operational mode and TIM for each mode, the power setting associated with each operational mode, the fuel flow rate associated with each power setting, engine-specific emission factors, the mixing zone height, and the number of LTO cycles conducted during the course of a year. As TIM and fuel flow for each power setting varies among aircraft engines and airframes, the calculation procedure will need to be repeated for individual aircraft types.

To calculate LTO emissions using base- and aircraft-specific data, the following data is required: the average TIM spent in each LTO cycle mode, the average fuel flow rate associated with each mode (based on engine power setting), the fuel used (if synthetic fuel, apply fuel reduction factors), and the base's mixing zone height. Every effort should be made to use more accurate, base-specific data, however, in the absence of available data, default values such as EPA and Air Force established TIM (Table 2-4), fuel flow rates (Table 2-8), and an average mixing zone height of 3000 feet may be used.

Emissions are calculated using a three step approach that consists of: 1) calculating pollutant emissions for each applicable mode of the LTO cycle; 2) summing emissions from each mode to obtain a LTO cycle value; and 3) multiplying the LTO emissions by the number of annual LTO cycles to obtain annual emissions. The following equations are applied to each individual aircraft and pollutant for which emissions are being calculated:

Step 1 - Calculate pollutant emissions for individual LTO cycle modes:

$$EP(Pol)_{Mode} = \frac{TIM}{60} \times \frac{FFR}{1000} \times EF(Pol) \times \frac{FERF}{100} \times N \qquad \textbf{Equation 2-1}$$

Where,

$EP(Pol)_{Mode}$ = Pollutant emissions for the operational mode per cycle (lb/cycle).
TIM = Time spent in each mode (min/cycle).

60	=	Factor converting minutes into hours (min/hr).
FFR	=	Fuel flow rate per engine (lb_{fuel}/hr).
1000	=	Factor for converting lb_{fuel} to $1000lb_{fuel}$.
EF(Pol)	=	Emission factor for individual pollutant ($lb/1000lb_{fuel}$).
FERF	=	Fuel emission reduction factor. In cases where the vehicle does not use alternative fuel, then a value of 100% must be used.
100	=	Factor to convert percent to a fraction.
N	=	Number of engines per aircraft.

<u>Step 2</u> - Calculate the pollutant emissions for a single LTO:

$$EP_{LTO} = \sum_{n=1}^{i} EP_{mode} = \left[EP_{approach} + EP_{idle-in} + EP_{idle-out} + EP_{takeoff} + EP_{climb\,out} + \cdots\right]$$

Equation 2-2

Where,

EP_{LTO}	=	Emissions of each individual pollutant per LTO (lb/cycle).
$\sum EP_{mode}$	=	Sum of each pollutant emissions across operational modes (lb/cycle).
$EP_{approach}$	=	Emissions for each pollutant during the approach mode (lb/cycle).
$EP_{idle\text{-}in}$	=	Emissions for each pollutant during the taxi/idle-in mode (lb/cycle).
$EP_{idle\text{-}out}$	=	Emissions for each pollutant during the taxi/idle-out mode (lb/cycle).
$EP_{takeoff}$	=	Emissions for each pollutant during the takeoff mode (lb/cycle).
$EP_{climb\,out}$	=	Emissions for each pollutant during the climb out mode (lb/cycle).

<u>Step 3</u> – Calculate the total pollutant emissions from the annual operations of a particular aircraft:

$$EP(Pol)_{total} = EP(Pol)_{LTO} \times NC_{LTO}$$ **Equation 2-3**

Where,

$EP(Pol)_{total}$	=	Total annual emissions of each individual pollutant (lb/yr).
$EP(Pol)_{LTO}$	=	Emissions of each individual pollutant per LTO (lb/cycle).
NC_{LTO}	=	Number of LTO cycles conducted during the year (cycles/yr).

The standard values required to calculate emissions per LTO cycle may be found in the following tables:

- TIM spent in each LTO cycle mode in Table 2-4
- Fuel flow rates for each LTO cycle mode and associated engine-specific emission factors are found in Table 2-8

2.8.1.2 Touch and Go (TGO) and Low Fly By (LFB)

TGO and LFB emissions are calculated in essentially the same manner as LTO emissions. Due to the nature of the operational and training requirements for the cycle, however, the taxi/idle-in and taxi/idle-out modes are not included.

2.8.1.3 Low Flight Pattern (LFP)

LFP emissions that occur within the airspace of a base are calculated in essentially the same manner as TGO emissions. Due to the nature of the operational and training requirements for the cycle, however,

typically less time is spent in the takeoff mode and more time is spent in the approach mode. Some regulatory authorities may also require emissions from LFP operations to be calculated for that period of time when aircraft are operating outside of, but adjacent to, the airspace of the base. In such instances, the average time the aircraft spends under the mixing zone in the additional non-base airspace is used to adjust TIM. When calculating emissions in this manner, one must know both the number of flights per year and the average time each flight operates in the base's airspace. The following equation is used:

$$EP(Pol)_{Total} = \frac{AT}{60} \times NF_{LFP} \times \frac{FFR}{1000} \times EF(Pol) \times N \qquad \textbf{Equation 2-4}$$

Where,

$EP(Pol)_{Total}$ = Emissions for each individual pollutant from an aircraft's annual LFP operations within base airspace (lb/yr).
AT = Average time per LFP flight by applicable aircraft within base airspace (min/flight).
60 = Factor converting minutes into hours (min/hr).
NF_{LFP} = Number of LFP flights with base airspace by applicable aircraft (flight/yr).
FFR = Fuel flow rate per engine (lb_{fuel}/hr).
1000 = Factor for converting lb_{fuel} to $1000lb_{fuel}$.
$EF(Pol)$ = Emission factor ($lb/1000lb_{fuel}$).
N = Number of engines per aircraft.

The fuel flow rates and engine-specific emission factors required to calculate emissions using equation 2-4 may be found in table 2-8.

2.8.2 Auxiliary Power Units

APU emissions are based on the APU model associated with each aircraft type, emission factors, and the length of time the APU was operating during an LTO cycle. The emission factors for APUs are presented in units of lb/hr, so the operating time for each APU must be known. When conducting an AEI, one must gather specific information about the APU's used on each aircraft and the time each APU was in operation for the most accurate emissions calculations possible. In the absence of available data, common aircraft/APU combinations and the typical APU operating times are found in tables 2-5, 2-6, and 2-7.

Step 1 - Calculate pollutant emissions for a single LTO Cycle:

$$EP(Pol)_{APU} = OT \times EF(Pol) \times N \qquad \textbf{Equation 2-5}$$

Where,

$EP(Pol)_{APU}$ = Emissions for each individual pollutant produced by the APU model installed on each aircraft type for one LTO cycle (lb/cycle).
OT = Operating time per LTO cycle (hr/cycle).
$EF(Pol)$ = APU-specific emission factor for each pollutant (lb/hr).
N = Number of APUs on each aircraft.

Step 2 – Calculate the pollutant emissions from annual APU operations:

$$EP(Pol)_{total} = EP(Pol)_{APU} \times NC_{LTO} \qquad \textbf{Equation 2-6}$$

Where,

$EP(Pol)_{total}$ = Total annual emissions of each individual pollutant (lb/yr).
EP_{APU} = Emissions for each individual pollutant produced by the APU model installed on

each aircraft type for one LTO cycle (lb/cycle).

NC_{LTO} = Number of LTO cycles conducted during the year (cycles/yr).

2.8.3 Trim Pad and On-Wing Testing

Emissions associated with trim pad and on-wing testing are calculated based on the type of aircraft, engine model, testing times, the power settings and associated fuel flow rate, and engine-specific emission factors. 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 emission factors. After the emissions are calculated for a particular pollutant at each power setting, the values are summed to obtain the total annual emissions for that pollutant. For this method, one must know both the duration of the test at each power setting and the number of tests performed over the calculation period (i.e. over the course of one year). The following equations are used:

Step 1 - Calculate annual operating times:

$$T_{test} = N_{test} \times \sum \left(\frac{D_{test}}{60} \right) \qquad \textbf{Equation 2-7}$$

Where,

T_{test} = Total annual time engine testing occurred at specific power setting (hr/yr).

N_{test} = Number of tests (tests/yr).

D_{test} = Duration of tests at each power setting (min/test).

60 = Factor for converting minutes to hours (min/hr).

Step 2 – Calculate pollutant emissions:

$$EP(Pol)_{setting} = \frac{(FFR \times T_{test})}{1000} \times EF(Pol) \qquad \textbf{Equation 2-8}$$

Where,

$EP(Pol)_{setting}$ = Emissions of each individual pollutant from engine testing at a specific power setting (lb/yr).

FFR = Fuel flow rate per engine (lb_{fuel}/hr).

T_{test} = Total annual time engine testing occurred at specified power setting (hr/yr).

1000 = Factor for converting lb_{fuel} to $1000lb_{fuel}$.

EF = Emission factor (lb/1000lbfuel).

The fuel flow rate and engine-specific emission factors required to calculate emissions using equation 2-8 may be found in Table 2-8.

2.8.4 Calculating SO_2 Emissions

SO_2 emissions are created when sulfur in the fuel combines with oxygen during the combustion process. Fuels with higher sulfur contents will produce higher amounts of SO_2 than low-sulfur fuels. It is generally assumed that during combustion, all sulfur in the fuel reacts to form SO_2 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. The national average sulfur content for JP-8 is 0.053 wt. %, based on values obtained from Defense Logistics Agency, Defense Energy Support Center,

Petroleum Quality Information System Fuels Data (1998-2009). ***Based on this national weighted-average, a national emission factor was derived at 1.06 lb SO_X per 1,000 lb_{fuel} burned (1.06lb/1000lb_{fuel}), which is used as the default value for all aircraft engines within the continental United States.***

Table 2-3. Average Sulfur Content of JP-8

Geographic Region	States or Countries	Weighted-Average Sulfur Content (Weight %)	Emission Factor (lb/1000lb_{fuel})
National Average		**0.053**	**1.06**
1. East Coast U.S.	ME, VT, NH, MA, RI, CT, NY, PA, NJ, DE, MD, VA, WV, NC, SC, GA, FL	0.051	1.02
2. East Central U.S.	ND, SD, MN, IA, NE, WI, MI, OH, KY, TN, IN, IL, MO, KS, OK	0.080	1.60
3. Gulf Coast U.S.	AL, MS, AR, LA, TX, NM	0.048	0.96
4. West Central U.S.	MT, ID, WY, UT, CO	0.025	0.50
5. West Coast U.S.	WA, OR, CA, NV, AZ	0.055	1.10
Middle East	Kuwait, Bahrain, Pakistan, United Arab Emirates	0.090	1.80
European	Europe, Israel, Turkey	0.089	1.78
Pacific	Korea, Japan, HI, AK, Australia, Russia, Singapore	0.078	1.56
Caribbean	Coastal Aruba	0.045	0.90

For OCONUS AEIs and NEPA/General Conformity assessments it may be more appropriate to derive a SO_2 emission factor specific for the JP-8 at the installation's geographic location. Since the sulfur content varies from supplier to supplier and the geographic location where the fuel is produced, it is possible for one to calculate a more accurate sulfur emission factor in cases when greater accuracy is needed. In these instances, the national or regional average sulfur content value for the most appropriate geographic area listed in Table 2-3 may be used. For enhanced accuracy, the sulfur content of the fuel may also be obtained directly from the fuel supplier. With the sulfur content provided, and the assumption that all sulfur in the fuel is converted to SO_2 during the combustion process, the SO_X emission factor may be calculated using the following equation:

$$EF_{(SO_x)} = S \times 20 \qquad \textbf{Equation 2-9}$$

Where,

$EF_{(SOx)}$ = SO_X emission factor (lb SO_2/1000lb_{fuel})
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/1000lb, and then multiplying by the ratio of the molecular weight of SO_2 to the molecular weight of sulfur.

2.8.5 Calculating HAP Emissions

There is not an abundance of information available for aircraft engine-specific or APU-specific HAP emissions. This document provides HAP emission factors for several engines and APUs in Table 2-9. In instances where determination of a particular HAP is required for an engine or APU not listed in the table, then it is recommended that a thorough review of current data be made to determine if there exists any new documentation regarding HAPs emissions. In the absence of such data, then an appropriate engine or APU should be selected as a surrogate. The method for calculation is the same as outlined above using equations 2-1 and 2-8.

2.8.6 Lead (Pb) Emissions

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

2.8.7 Greenhouse Gas (GHG) Emissions

Since greenhouse gas (GHG) emissions are becoming increasingly more important, it is becoming more common to record the CO_2, CH_4, and N_2O produced when measuring emissions from mobile and stationary sources. It is also common practice to report GHG emissions in terms of equivalent CO_2 (CO_2e). Each greenhouse gas has a global warming potential (GWP) which is a measure of the heat that gas traps in the atmosphere over a determined time period. A carbon dioxide equivalent is the quantity of CO2 needed to equal the same GWP as the greenhouse gas in question. For CH_4 and N_2O, the GWP used to calculate CO_2e were 21 and 310 respectively for a 100 year time period. This document provides a total GHG composite emission factor consisting of CO_2, CH_4, and N_2O presented in CO_2e in Tables 2-8 and 2-10 for each aircraft engine and each APU. The total greenhouse gas emissions may then be calculated using either equation 2-1, 2-5, or 2-8.

2.9 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 organization should be contacted to obtain the information needed to calculate emissions from on-wing engine testing operations, including 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. Finally, the base's Weather Detachment should be contacted to obtain the average mixing zone height for the base.

2.10 Example Calculations

The following section provides example calculations for aircraft operations.

2.10.1 Problem 1 - Landing and Takeoff Cycle Emissions

Anytown AFB needs to calculate the annual CO and benzene 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 2500

Anytown AFB gathered the Time-in-Mode data for these aircraft so estimates from Table 2-4 are not needed. This data and the mode specific fuel flow rates and emission factors from table 2-8 for the F-100-PW-220 engine are presented below:

LTO Mode	Average TIM (min.)	Typical Power Setting	Average Fuel Flow Rate (lb/hr)	CO Emission Factor ($lb/1000lb_{fuel}$)
Taxi/Idle-out	30	Idle	1084	35.30
Takeoff	1.0	Military	9679	0.86
Climb out	0.5	Intermediate	5770	0.86
Approach	3.0	Approach	3837	1.92
Taxi/Idle-in	10	Idle	1084	35.30

<u>Step 1</u> – Using Equation 2-1 and the data above, calculate CO pollutant emissions for individual F-15D LTO cycle modes:

$$EP(Pol)_{mode} = \frac{TIM}{60} \times \frac{FFR}{1000} \times EF(Pol) \times N$$

$$EP(CO)_{Approach} = \frac{3.0\left(\frac{\cancel{min}}{cycle}\right)}{60\left(\frac{\cancel{min}}{\cancel{hr}}\right)} \times \frac{3837\left(\frac{\cancel{lb_{fuel}}}{\cancel{hr}}\right)}{1000\left(\frac{\cancel{lb_{fuel}}}{\cancel{1000lb_{fuel}}}\right)} \times 1.92\left(\frac{lb}{\cancel{1000lb_{fuel}}}\right) \times 2 = \mathbf{0.74}\ \boldsymbol{\frac{lb}{cycle}}$$

$$EP(CO)_{Idle-In} = \frac{10\left(\frac{\cancel{min}}{cycle}\right)}{60\left(\frac{\cancel{min}}{\cancel{hr}}\right)} \times \frac{1084\left(\frac{\cancel{lb_{fuel}}}{\cancel{hr}}\right)}{1000\left(\frac{\cancel{lb_{fuel}}}{\cancel{1000lb_{fuel}}}\right)} \times 35.30\left(\frac{lb}{\cancel{1000lb_{fuel}}}\right) \times 2 = \mathbf{12.76}\ \boldsymbol{\frac{lb}{cycle}}$$

$$EP(CO)_{Idle-Out} = \frac{30\left(\frac{\cancel{min}}{cycle}\right)}{60\left(\frac{\cancel{min}}{\cancel{hr}}\right)} \times \frac{1084\left(\frac{\cancel{lb_{fuel}}}{\cancel{hr}}\right)}{1000\left(\frac{\cancel{lb_{fuel}}}{\cancel{1000lb_{fuel}}}\right)} \times 35.30\left(\frac{lb}{\cancel{1000lb_{fuel}}}\right) \times 2 = \mathbf{38.27}\ \boldsymbol{\frac{lb}{cycle}}$$

$$EP(CO)_{Takeoff} = \frac{1.0\left(\frac{\cancel{min}}{cycle}\right)}{60\left(\frac{\cancel{min}}{\cancel{hr}}\right)} \times \frac{9679\left(\frac{\cancel{lb_{fuel}}}{\cancel{hr}}\right)}{1000\left(\frac{\cancel{lb_{fuel}}}{\cancel{1000lb_{fuel}}}\right)} \times 0.86\left(\frac{lb}{\cancel{1000lb_{fuel}}}\right) \times 2 = \mathbf{0.28}\ \boldsymbol{\frac{lb}{cycle}}$$

$$EP(CO)_{Climb\ out} = \frac{0.5\left(\frac{\cancel{min}}{cycle}\right)}{60\left(\frac{\cancel{min}}{\cancel{hr}}\right)} \times \frac{5770\left(\frac{\cancel{lb_{fuel}}}{\cancel{hr}}\right)}{1000\left(\frac{\cancel{lb_{fuel}}}{\cancel{1000lb_{fuel}}}\right)} \times 0.86\left(\frac{lb}{\cancel{1000lb_{fuel}}}\right) \times 2 = \mathbf{0.08}\ \boldsymbol{\frac{lb}{cycle}}$$

<u>Step 2</u>– Use Equation 2-2 and calculate the total CO pollutant emissions for a single F-15D LTO:

$$EP_{LTO} = \sum EP_{mode} = \left(EP_{app} + EP_{idle-in} + EP_{idle-out} + EP_{takeoff} + EP_{climbout} + \cdots\right)$$

$$EP(CO)_{LTO} = (0.74 + 12.76 + 38.27 + 0.28 + 0.08) = \mathbf{52.13}\ \frac{\boldsymbol{lb}}{\boldsymbol{cycle}}$$

<u>Step 3</u> – Use Equation 2-3 and calculate total CO pollutant emissions from annual F-15D operations:

$$EP(Pol)_{total} = EP(Pol)_{LTO} \times NC_{LTO}$$

$$EP(CO)_{Total} = 52.13\left(\frac{lb}{\cancel{cycle}}\right) \times 2500\left(\frac{\cancel{cycles}}{yr}\right)$$

$$\boxed{\boldsymbol{EP(CO)_{Total} = 130,325\frac{lb}{yr}}}$$

Next, calculate benzene emissions. Because not all aircraft engines have had HAP emission factors developed for them, when estimating HAP emissions it may be necessary to choose a surrogate engine with similar fuel flow rates. Table 2-9 does not provide the HAP speciation profile for the F100-PW-220 engine. For this example, the F100-PW-200 engine is selected since it: 1) is an engine made by the same manufacturer, 2) is in the same family as the F100-PW-220, 3) has similar fuel flow rates, and 4) is used on the same aircraft.

<u>Step 4</u> – Record the benzene emission factors for each LTO cycle mode. For idle, approach, intermediate, and military power settings, the emission factors are 0.047, 0.000387, 0.000189, and 0.000490lb/1000lb fuel respectively.

<u>Step 5</u> – Calculate benzene emissions for individual F-15D LTO cycle modes using the emission factors in step 4 and Equation 2-1:

$$EP(Pol)_{mode} = \frac{TIM}{60} \times \frac{FFR}{1000} \times EF(Pol) \times N$$

$$EP(Benzene)_{Approach} = \frac{3.0\left(\frac{\cancel{min}}{cycle}\right)}{60\left(\frac{\cancel{min}}{\cancel{hr}}\right)} \times \frac{3251\left(\frac{\cancel{lb_{fuel}}}{\cancel{hr}}\right)}{1000\left(\frac{\cancel{lb_{fuel}}}{\cancel{1000lb_{fuel}}}\right)} \times 0.000387\left(\frac{lb}{\cancel{1000lb_{fuel}}}\right) \times 2 = \mathbf{0.00013}\ \frac{\boldsymbol{lb}}{\boldsymbol{cycle}}$$

$$EP(Benzene)_{Idle-In} = \frac{10\left(\frac{\cancel{min}}{cycle}\right)}{60\left(\frac{\cancel{min}}{\cancel{hr}}\right)} \times \frac{1006\left(\frac{\cancel{lb_{fuel}}}{\cancel{hr}}\right)}{1000\left(\frac{\cancel{lb_{fuel}}}{\cancel{1000lb_{fuel}}}\right)} \times 0.047\left(\frac{lb}{\cancel{1000lb_{fuel}}}\right) \times 2 = \mathbf{0.0079}\frac{\boldsymbol{lb}}{\boldsymbol{cycle}}$$

$$EP(Benzene)_{Idle-Out} = \frac{30\left(\frac{\cancel{min}}{cycle}\right)}{60\left(\frac{\cancel{min}}{\cancel{hr}}\right)} \times \frac{1006\left(\frac{\cancel{lb_{fuel}}}{\cancel{hr}}\right)}{1000\left(\frac{\cancel{lb_{fuel}}}{\cancel{1000lb_{fuel}}}\right)} \times 0.047\left(\frac{lb}{1000\cancel{lb_{fuel}}}\right) \times 2 = \mathbf{0.047}\frac{\boldsymbol{lb}}{\boldsymbol{cycle}}$$

$$EP(Benzene)_{Military} = \frac{1\left(\frac{\cancel{min}}{cycle}\right)}{60\left(\frac{\cancel{min}}{\cancel{hr}}\right)} \times \frac{8888\left(\frac{\cancel{lb_{fuel}}}{\cancel{hr}}\right)}{1000\left(\frac{\cancel{lb_{fuel}}}{\cancel{1000lb_{fuel}}}\right)} \times 0.000490\left(\frac{lb}{\cancel{1000lb_{fuel}}}\right) \times 2 = \mathbf{0.00015}\frac{\boldsymbol{lb}}{\boldsymbol{cycle}}$$

$$EP(Benzene)_{Intermediate} = \frac{0.5\left(\frac{\cancel{min}}{cycle}\right)}{60\left(\frac{\cancel{min}}{\cancel{hr}}\right)} \times \frac{5651\left(\frac{\cancel{lb_{fuel}}}{\cancel{hr}}\right)}{1000\left(\frac{\cancel{lb_{fuel}}}{\cancel{1000lb_{fuel}}}\right)} \times 0.000189\left(\frac{lb}{\cancel{1000lb_{fuel}}}\right) \times 2$$

$$= \mathbf{0.000018}\,\frac{\boldsymbol{lb}}{\boldsymbol{cycle}}$$

<u>Step 5</u> – Use Equation 2-2 and calculate the total benzene pollutant emissions for a single F-15D LTO:

$$EP_{LTO} = \sum EP_{mode} = (EP_{app} + EP_{idle-in} + EP_{idle-out} + EP_{takeoff} + EP_{climbout})$$

$$EP_{LTO} = (0.00013 + 0.0079 + 0.047 + 0.00015 + 0.000018) = \mathbf{0.055}\,\frac{\boldsymbol{lb}}{\boldsymbol{cycle}}$$

<u>Step 6</u> – Use Equation 2-3 and calculate total benzene pollutant emissions from annual F-15D operations:

$$EP(Pol)_{Total} = EP(Pol)_{LTO} \times NC_{LTO}$$

$$EP(Benzene)_{Total} = 0.055\left(\frac{lb}{\cancel{cycle}}\right) \times 2500\left(\frac{\cancel{cycle}}{yr}\right)$$

$$\boxed{\boldsymbol{EP(Benzene)_{Total} = 137.5\,\frac{lb}{yr}}}$$

2.10.2 Problem 2 - Auxiliary Power Unit Emissions

Anytown AFB also needs to calculate the annual NO_X and styrene 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
Number of Aircraft	130

<u>Step 1</u> – The operating time is provided in units of minutes, so first convert this to units of hours as follows:

$$OT = 15\left(\frac{\cancel{min}}{cycle}\right) \times \frac{1}{60}\left(\frac{hr}{\cancel{min}}\right) = \mathbf{0.25}\ \frac{\boldsymbol{hr}}{\boldsymbol{cycle}}$$

<u>Step 2</u> – Record the NO_X emission factor for the GTCP165-1. Table 2-10 lists the NO_X emission factor as 1.22lb/hr.

Step 3 - Calculate NO_X pollutant emissions for a single LTO cycle using Equation 2-5 and the emission factor recorded in Step 2:

$$EP(Pol)_{APU} = OT \times EF(Pol) \times N$$

$$EP(NO_X)_{APU} = 0.25\left(\frac{\cancel{hr}}{cycle}\right) \times 1.22\left(\frac{\text{lb}}{\cancel{\text{hr}}}\right) \times 1 = \mathbf{0.305}\,\boldsymbol{\frac{lb}{cycle}}$$

Step 4 – Use Equation 2-6 and calculate the NO_X pollutant emissions from annual APU operations:

$$EP(Pol)_{Total} = \quad EP(Pol)_{APU} \times NC_{LTO}$$

$$EP(NO_X)_{Total} = 0.305\left(\frac{lb}{\cancel{cycle}}\right) \times 130\left(\frac{\cancel{cycles}}{yr}\right)$$

$$\boxed{\boldsymbol{EP(NO_X)_{Total} = 39.7\,\frac{lb}{yr}}}$$

Step 5 – Record the styrene emission factor and fuel flow rate for the GTCP165-1. Table 2-9 lists these as 0.00224lb/1000lb fuel and 273lb/hr respectively.

Step 6 – Use Equation 2-1 and calculate styrene emissions using the emission factor recorded in step 5 (Note that the APU operates in only one "mode", so use operating time in place of "TIM"):

$$EP(Pol)_{Mode} = \frac{TIM}{60} \times \frac{FFR}{1000} \times EF(Pol) \times N$$

$$EP(Styrene)_{APU} = \frac{15\left(\frac{\cancel{min}}{cycle}\right)}{60\left(\frac{\cancel{min}}{\cancel{hr}}\right)} \times \frac{273\left(\frac{\cancel{lb_{fuel}}}{\cancel{hr}}\right)}{1000\left(\frac{\cancel{lb_{fuel}}}{\cancel{1000lb_{fuel}}}\right)} \times 0.00224\left(\frac{lb}{\cancel{1000lb_{fuel}}}\right) \times 1 = \mathbf{0.00015}\,\boldsymbol{\frac{lb}{cycle}}$$

Step 7 – Use Equation 2-3 and calculate the styrene pollutant emissions from annual APU operations:

$$EP(Pol)_{Total} = \quad EP(Pol)_{APU} \times NC_{LTO}$$

$$EP(Styrene)_{Total} = 0.00015\left(\frac{lb}{\cancel{cycle}}\right) \times 130\left(\frac{\cancel{cycles}}{yr}\right)$$

$$\boxed{\boldsymbol{EP(Styrene)_{Total} = 0.02\,\frac{lb}{yr}}}$$

2.10.3 Problem 3 - On-Wing Engine Testing

Anytown AFB performs on-wing evaluations of the F110-GE-100 engines used on their F-16D aircraft. The base must calculate CO and SO_X emissions from on-wing testing operations for a NEPA assessment. The base and the fuel supplier are located in Louisiana and the state wants the SO_X emissions specific for

Louisiana sulfur content. According to records obtained from base personnel, 100 on-wing engine tests were conducted during the year with each test assessing performance at the Idle, Approach, Intermediate, Military, and Afterburner engine settings. The average operating time for each engine test cycle was approximately the same. The following information was obtained from the base:

Power Setting	Average Fuel Flow Rate (lb/hr)	Average Operating Time per Test (minutes)
Approach	4209.52	20
Idle	1147.66	45
Intermediate	6681.33	15
Military	10,070.45	15
Afterburner	16,532.47	5

Step 1 – Use Equation 2-7 and the information provided to calculate annual operating times:

$$T_{test} = N_{test} \times \sum \left(\frac{D_{test}}{60}\right)$$

$$T_{Test}(Idle) = 100\left(\frac{\cancel{test}}{yr}\right) \times 45\left(\frac{\cancel{min}}{\cancel{test}}\right) \times \frac{1}{60}\left(\frac{hr}{\cancel{min}}\right) = \mathbf{75}\ \frac{\boldsymbol{hr}}{\boldsymbol{yr}}$$

$$T_{Test}(Approach) = 100\left(\frac{\cancel{test}}{yr}\right) \times 20\left(\frac{\cancel{min}}{\cancel{test}}\right) \times \frac{1}{60}\left(\frac{hr}{\cancel{min}}\right) = \mathbf{33.33}\ \frac{\boldsymbol{hr}}{\boldsymbol{yr}}$$

$$T_{Test}(Intermediate) = 100\left(\frac{\cancel{test}}{yr}\right) \times 15\left(\frac{\cancel{min}}{\cancel{test}}\right) \times \frac{1}{60}\left(\frac{hr}{\cancel{min}}\right) = \mathbf{25}\ \frac{\boldsymbol{hr}}{\boldsymbol{yr}}$$

$$T_{Test}(Military) = 100\left(\frac{\cancel{test}}{yr}\right) \times 15\left(\frac{\cancel{min}}{\cancel{test}}\right) \times \frac{1}{60}\left(\frac{hr}{\cancel{min}}\right) = \mathbf{25}\ \frac{\boldsymbol{hr}}{\boldsymbol{yr}}$$

$$T_{Test}(Afterburner) = 100\left(\frac{\cancel{test}}{yr}\right) \times 5\left(\frac{\cancel{min}}{\cancel{test}}\right) \times \frac{1}{60}\left(\frac{hr}{\cancel{min}}\right) = \mathbf{8.33}\ \frac{\boldsymbol{hr}}{\boldsymbol{yr}}$$

Step 2 – Record the CO emission factor for each mode for the F110-GE-100. Table 2-8 gives the CO emission factors, in units of lb/1000lb fuel, as 24.11 for Idle, 5.77 for Approach, 3.47 for Intermediate, 3.38 for Military, and 67.41 for Afterburner.

Step 3 – Use the calculated times from Step 1, the fuel flow rates provided above, the emission factors from step 2, and Equation 2-8 to calculate CO pollutant emissions:

$$EP(Pol)_{Setting} = \frac{(FFR \times T_{test})}{1000} \times EF(Pol)$$

$$EP(CO)_{Idle} = \frac{1147.66\left(\frac{\cancel{lb_{fuel}}}{\cancel{hr}}\right) \times 75\left(\frac{\cancel{hr}}{yr}\right)}{1000\left(\frac{\cancel{lb_{fuel}}}{\cancel{1000lb_{fuel}}}\right)} \times 24.11\left(\frac{lb}{\cancel{1000lb_{fuel}}}\right) = \mathbf{2075.3}\ \frac{\boldsymbol{lb}}{\boldsymbol{yr}}$$

$$EP(CO)_{Approach} = \frac{4209.52\left(\frac{\cancel{lb_{fuel}}}{\cancel{hr}}\right) \times 33.33\left(\frac{\cancel{hr}}{yr}\right)}{1000\left(\frac{\cancel{lb_{fuel}}}{\cancel{1000lb_{fuel}}}\right)} \times 5.77\left(\frac{lb}{\cancel{1000lb_{fuel}}}\right) = \mathbf{809.6}\ \frac{\boldsymbol{lb}}{\boldsymbol{yr}}$$

$$EP(CO)_{Intermediate} = \frac{6681.33\left(\frac{lb_{fuel}}{hr}\right) \times 25\left(\frac{hr}{yr}\right)}{1000\left(\frac{lb_{fuel}}{1000lb_{fuel}}\right)} \times 3.47\left(\frac{lb}{1000lb_{fuel}}\right) = \mathbf{579.6}\ \frac{\mathbf{lb}}{\mathbf{yr}}$$

$$EP(CO)_{Military} = \frac{10070.45\left(\frac{lb_{fuel}}{hr}\right) \times 25\left(\frac{hr}{yr}\right)}{1000\left(\frac{lb_{fuel}}{1000lb_{fuel}}\right)} \times 3.38\left(\frac{lb}{1000lb_{fuel}}\right) = \mathbf{851.0}\ \frac{\mathbf{lb}}{\mathbf{yr}}$$

$$EP(CO)_{Afterburner} = \frac{16532.47\left(\frac{lb_{fuel}}{hr}\right) \times 8.33\left(\frac{hr}{yr}\right)}{1000\left(\frac{lb_{fuel}}{1000lb_{fuel}}\right)} \times 67.41\left(\frac{lb}{1000lb_{fuel}}\right) = \mathbf{9283.4}\ \frac{\mathbf{lb}}{\mathbf{yr}}$$

<u>Step 4</u> – Add the CO emissions from each mode for the total CO emissions:

$$EP(CO)_{Total} = 2075.3 + 809.6 + 579.6 + 851.0 + 9283.4$$

$$\boxed{\boldsymbol{EP(CO)_{Total} = 13,598.9\frac{lb}{yr}}}$$

<u>Step 5</u> – Record the SO_X Emission factor. Since the state is requesting that the base calculate the SO_X emissions more accurately using the average sulfur content of the fuel from that region, then the SO_X emission factor from Table 2-3 is used in place of the SO_X emission factor from table 2-8 which assumes a sulfur content national average. The emission factor based on the sulfur content of the JP-8 fuel as given in Table 2-3 is 0.96 lb/1000lb$_{fuel}$.

<u>Step 6</u> – Calculate the SO_X emissions for each mode using Equation 2-8, the SO_X emission factor recorded in step 5, the annual test times calculated in step 1 above, and the fuel flow rate provided in the table above:

$$EP(Pol)_{Setting} = \frac{(FFR \times T_{test})}{1000} \times EF(Pol)$$

$$EP(SO_X)_{Idle} = \frac{1147.66\left(\frac{lb_{fuel}}{hr}\right) \times 75\left(\frac{hr}{yr}\right)}{1000\left(\frac{lb_{fuel}}{1000lb_{fuel}}\right)} \times 0.96\left(\frac{lb}{1000lb_{fuel}}\right) = \mathbf{82.6}\ \frac{\mathbf{lb}}{\mathbf{yr}}$$

$$EP(SO_X)_{Approach} = \frac{4209.52\left(\frac{lb_{fuel}}{hr}\right) \times 33.33\left(\frac{hr}{yr}\right)}{1000\left(\frac{lb_{fuel}}{1000lb_{fuel}}\right)} \times 0.96\left(\frac{lb}{1000lb_{fuel}}\right) = \mathbf{134.7}\ \frac{\mathbf{lb}}{\mathbf{yr}}$$

$$EP(SO_X)_{Intermediate} = \frac{6681.33\left(\frac{lb_{fuel}}{hr}\right) \times 25\left(\frac{hr}{yr}\right)}{1000\left(\frac{lb_{fuel}}{1000lb_{fuel}}\right)} \times 0.96\left(\frac{lb}{1000lb_{fuel}}\right) = \mathbf{160.4}\ \frac{\mathbf{lb}}{\mathbf{yr}}$$

$$EP(SO_X)_{Military} = \frac{10070.45\left(\frac{lb_{fuel}}{hr}\right) \times 25\left(\frac{hr}{yr}\right)}{1000\left(\frac{lb_{fuel}}{1000lb_{fuel}}\right)} \times 0.96\left(\frac{lb}{1000lb_{fuel}}\right) = \mathbf{241.7}\ \frac{\boldsymbol{lb}}{\boldsymbol{yr}}$$

$$EP(SO_X)_{Afterburner} = \frac{16532.47\left(\frac{lb_{fuel}}{hr}\right) \times 8.33\left(\frac{hr}{yr}\right)}{1000\left(\frac{lb_{fuel}}{1000lb_{fuel}}\right)} \times 0.96\left(\frac{lb}{1000lb_{fuel}}\right) = \mathbf{132.2}\ \frac{\boldsymbol{lb}}{\boldsymbol{yr}}$$

<u>Step 7</u> – Sum the SOX emissions from each mode to calculate the total SOX emissions:

$$EP(SO_X)_{Total} = 82.6 + 134.7 + 160.4 + 241.7 + 132.2$$

$$\boxed{\boldsymbol{EP(SO_X)_{Total} = 751.6\frac{lb}{yr}}}$$

Table 2-4. Default Time-in-Mode for Various Aircraft Categories[1]

Aircraft Type	Typical Duration by Mode (Minutes)					
	Taxi/Idle-out	Takeoff	Climb out	Approach	Taxi/Idle-in	Total
Military Aircraft						
Combat:						
USAF	18.50	0.40	0.80	3.50	11.30	34.50
USN	6.50	0.40	0.50	1.60	6.50	15.50
Trainer-Turbine[2]:						
USAF T-38	12.80	0.40	0.90	3.80	6.40	24.30
USAF General	6.80	0.50	1.40	4.00	4.40	17.10
USN	6.50	0.40	0.50	1.60	6.50	15.50
Transport-Turbine[2]:						
USAF General	9.20	0.40	1.20	5.10	6.70	22.60
USN	19.00	0.50	2.50	4.50	7.00	33.50
USAF B-52 and KC-135	32.80	0.70	1.60	5.20	14.90	55.20
Military – Piston	6.50	0.60	5.00	4.60	6.50	23.20
Military – Helicopter	8.00	2.27[(3)]	4.53[(3)]	6.80	7.00	28.60
Civilian Aircraft						
Commercial Carrier:						
Jumbo, Long and Medium range jet	19.00	0.70	2.20	4.00	7.00	32.90
General Aviation:						
Business Jet	6.50	0.40	0.50	1.60	6.50	15.50
Turboprop	19.00	0.50	2.50	4.50	7.00	33.50
Piston	12.00	0.30	5.00	6.00	4.00	27.30

1. SOURCE (unless otherwise noted): *Procedures for Emission Inventory Preparation Volume IV: Mobile Sources*, EPA420-R-92-009, December 1992
2. Turbines include both turbofan and turboprop engines.
3. SOURCE: *Air Emissions Factor Guide to Air Force Mobile Sources*, December 2009. This document cites EDMS as the original source.

Table 2-5. Military Airframe/Engine/APU Combinations[1]

Aircraft Model	Time-In-Mode Category[2]	Engine Model(s) (Number of Engines)	APU Model(s) (Number of APUs)	APU Operating Time Per LTO (hrs)[3]	Notes:
A-3A	Combat: USN	J57-P-6B (2)	---	---	4, 9a
A-3B	Combat: USN	J57-P-10 (2)	---	---	9a
A-4	Combat: USN	J52-P-2 (1)	---	---	4, 9d
		J52-P-8 (1)	---	---	4, 9d
		J65-W-2 (1)	---	---	4, 9d
		J65-W-4 (1)	---	---	4, 9d
A-4C	Combat: USN	J65-W-16A (1)	---	---	4, 9a
		J65-W-20 (1)	---	---	9c
A-4E	Combat: USN	J52-P-6A (1)	---	---	4, 9a
		J52-P-8A, -8B (1)	---	---	4, 9a
A-4F	Combat: USN	J52-P-8A , -8B (1)	---	---	4, 9a
A-4L	Combat: USN	J65-W-20 (1)	---	---	9a
A-4M	Combat: USN	J52-P-408 (1)	---	---	9a
A-6A	Combat: USN	J52-P-6A, -6B (2)	---	---	4, 9a, 9c
		J52-P-8A, -8B (2)	---	---	4, 9a
A-6B	Combat: USN	J52-P-6A (2)	---	---	4, 9a
		J52-P-8A (2)	---	---	4, 9a
A-6C	Combat: USN	J52-P-8A (2)	---	---	4, 9a
A-6E	Combat: USN	J52-P-8A, -8B (2)	---	---	4, 9a
A-6F	Combat: USN	F404-GE-400D (2)	---	---	4, 9a
A-7A	Combat: USN	TF30-P-6B (1)	---	---	9c
A-7B, -7C	Combat: USN	TF30-P-8 (1)	---	---	4, 9a
		TF30-P-408 (1)	---	---	4, 9a
A-7D, -7K	Combat: USAF	TF41-A-1 (1)	---	---	9a, 9e
A-7E	Combat: USN	TF41-A-2 (1)	---	---	9a
A-10	Combat: USAF	TF34-GE-100A (2)	---	---	9b
		TF34-GE-400 (2)	---	---	9c
A-10A	Combat: USAF	TF34-GE-100 (2)	GTCP 36-50 (1)	1.00	3, 4, 9a
A-10C	Combat: USAF	TF34-GE-100 (2)	---	---	9f
A-37	Combat: USAF	J69-T-25 (2)	---	---	9c
AC-130A	Transport - Turbine: USAF general	T56-A-1A (4)	---	---	9a
		T56-A-9 (4)	---	---	9a
AC-130H	Transport - Turbine: USAF general	T56-A-15 (4)	GTCP 85-180L (1)	1.00	4, 6, 9a, 10a
AC-130U, -130W	Transport - Turbine: USAF general	T56-A-15 (4)	---	---	9a, 9f
AT-38B	Trainer - Turbine: USAF T-38	J85-GE-5, -5A, -5G, -5J (2)	---	---	4, 9a
AU-24	Combat: USAF	PT6A-27 (1)	---	---	9c
B-1A	Combat: USAF	F101-GE-100 (4)	---	---	9e
B-1B	Combat: USAF	F101-GE-102 (4)	GTCP 165-9 (1)	2.00	3, 4, 9a
B-2A	Combat: USAF	F118-GE-100 (4)	131-3A (2)	4.00	3, 4, 9a
B-52D	Transport - Turbine: USAF B-52	J57-P-19W (8)	---	---	9e
		J57-P/F-43WB (8)	---	---	9e
B-52G	Transport - Turbine: USAF B-52	J57-P-22 (8)	---	---	9c

Table 2-5. Military Airframe/Engine/APU Combinations (continued)[1]

Aircraft Model	Time-In-Mode Category[2]	Engine Model(s) (Number of Engines)	APU Model(s) (Number of APUs)	APU Operating Time Per LTO (hrs)[3]	Notes:
B-52H	Transport - Turbine: USAF B-52	TF33-P-3 (8)	---	---	9c
		TF33-P-5 (8)	---	---	9c
		TF33-P-7 (8)	---	---	9c
		TF33-P-103 (8)	---	---	9f
C-1	General Aviation: Piston	R-1820-82 (2)	---	---	9c
C-1A	General Aviation: Piston	R-1820-82, -82A (2)	---	---	4, 9a
C-2	Transport - Turbine: USN	T56-A-7 (2)	---	---	9c
C-2A	Transport - Turbine: USN	T56-A-8, -8A, -8B (2)	---	---	4, 9a
		T56-A-425 (2)	---	---	4, 9g
C-5A	Transport - Turbine: USAF general	TF39-GE-1, -1A, -1C (4)	GTCP 85-98d (1)	8.00	4, 6, 9a, 9c, 9i, 10a
C-5B, -5C	Transport - Turbine: USAF general	TF39-GE-1C (4)	GTCP 85-98d (1)	8.00	6, 9a, 10a
C-5M	Transport - Turbine: USAF general	CF6-80C2L1F (4)	---	---	4, 9a
		F138-GE-100 (4)	---	---	4, 9a, 13b
C-9	Transport - Turbine: USAF general	JT8D-17 (2)	---	---	8, 9c
C-9A	Transport - Turbine: USAF general	JT8D-9A (2)	GTCP 85-98d (1)	6.00	9a, 10a
C-9B	Transport - Turbine: USN	JT8D-9A (2)	---	---	4, 9a
C-9C	Transport - Turbine: USAF general	JT8D-9A (2)	---	---	4, 9a
C-11A	General Aviation: Business Jet	F113-RR-100 (2)	---	---	9a, 12, 13a
		SPEY Mk511-8 (2)	---	---	4, 9a
C-12	General Aviation: Turboprop	PT6A-27 (2)	---	---	9c
C-12A	General Aviation: Turboprop	PT6A-38 (2)	---	---	9a
		PT6A-41 (2)	---	---	9c
C-12C, -12D, -12L	General Aviation: Turboprop	PT6A-41 (2)	---	---	9a
C-12F, -12R, -12T, -12U	General Aviation: Turboprop	PT6A-42 (2)	---	---	9a, 9f
C-12J	General Aviation: Turboprop	PT6A-65B (2)	---	---	4, 9f
C-12S	General Aviation: Turboprop	PT6A-60A (2)	---	---	4, 9a
C-17A	Transport - Turbine: USAF general	F117-PW-100 (4)	331 250G (1)	0.50	3, 9a
		PW2040 (4)	331 250G (1)	0.50	3, 9a, 13b
C-18B	Transport - Turbine: USAF general	JT3D-7 (4)	T41M-9A (1)	0.50	3, 4, 9a
C-20A	General Aviation: Business Jet	F113-RR-100 (2)	GTCP 36-100 (1)	0.50	3, 9a, 13a
		SPEY Mk511-8 (2)	GTCP 36-100 (1)	0.50	3, 4, 9a
C-20B, -20C, -20D, -20E, -20J	General Aviation: Business Jet	F113-RR-100 (2)	---	---	9a, 12, 13a
		SPEY Mk511-8 (2)	---	---	4, 9a
C-20F, -20G, -20H	General Aviation: Business Jet	TAY Mk611-8 (2)	---	---	9a
C-21A	General Aviation: Business Jet	TFE731-2-2B (2)	---	---	9a
C-22A	Transport - Turbine: USAF general	JT8D-7A (3)	GTCP 85-98ck (1)	1.00	4, 9a, 10a
C-22B	Transport - Turbine: USAF general	JT8D-7 (3)	GTCP 85-98ck (1)	1.00	4, 9a, 10a
C-23A	General Aviation: Turboprop	PT6A-45R (2)	---	---	4, 9a
C-23B, -23C	General Aviation: Turboprop	PT6A-65AR (2)	---	---	4, 9a
C-26A	General Aviation: Turboprop	TPE331-11U (2)	---	---	4, 9a
C-26B	General Aviation: Turboprop	TPE331-12UA-701G (2)	---	---	4, 9a
C-26C	General Aviation: Turboprop	TPE331-12UA-701 (2)	---	---	4, 9a
C-27J	Transport - Turbine: USAF general	AE2100D2 (2)	---	---	4, 9f

Table 2-5. Military Airframe/Engine/APU Combinations (continued)[1]

Aircraft Model	Time-In-Mode Category[2]	Engine Model(s) (Number of Engines)	APU Model(s) (Number of APUs)	APU Operating Time Per LTO (hrs)[3]	Notes:
C-28A	General Aviation: Piston	GTSIO-520-M (2)	---	---	4, 9a
C-32A	Transport - Turbine: USAF general	F117-PW-100 (2)	331-49-7081 (1)	3.00	3, 9a, 12
		PW2040 (2)	331-49-7081 (1)	3.00	3, 9a
C-37A	General Aviation: Business Jet	BR700-710A1-10 (2)	---	---	9f
C-38	General Aviation: Business Jet	TFE731-40R-200G (2)	---	---	4, 9l
C-40A	Transport - Turbine: USN	CFM56-7B24 (2)	---	---	5, 9a
C-40B	Transport - Turbine: USAF general	CFM56-7B27 (2)	131-9 (1)	0.50	3, 4, 9a
		CFM56-7B3 (2)	131-9 (1)	0.50	3, 4, 9a
C-40C	Transport - Turbine: USAF general	CFM56-7B3 (2)	---	---	4, 5, 9a
		CFM56-7B27 (2)	---	---	5, 9a
C-123K	Transport - Turbine: USAF general	J85-GE-17 (2)	---	---	9a
		R-2800-99W (2)	---	---	4, 9a
C-130A, -130D	Transport - Turbine: USAF general	T56-A-9, -9A, -9B (4)	GTCP 85L (1)	1.00	3, 4, 9a
C-130B	Transport - Turbine: USAF general	T56-A-7, -7A (4)	GTCP71/71A (1)	1.00	3, 4, 9a
C-130E	Transport - Turbine: USAF general	T56-A-7, -7A (4)	GTCP71/71A (1)	1.00	3, 4, 9a
C-130F	Transport - Turbine: USN	T56-A-7, -7A (4)	GTCP71/71A (1)	1.00	3, 4, 9a
C-130H	Transport - Turbine: USAF general	T56-A-15 (4)	GTCP 85-180L (1)	1.00	4, 6, 9a, 10a
C-130J	Transport - Turbine: USAF general	T56-A-15 (4)	GTCP 85L (1)	1.00	3, 9a
		AE2100D3 (4)	---	---	4, 9f
C-130T	Transport - Turbine: USN	T56-A-16 (4)	---	---	9a
C-135A	Transport - Turbine: USAF general	J57-P/F-59W (4)	T41M-9A (1)	1.00 to 2.00	3, 4, 9e
			ASHG70-1 (1)	1.00 to 2.00	3, 4, 9e
C-135B, -135C	Transport - Turbine: USAF general	J57-P/F-59W (4)	T41M-9A (1)	1.00 to 2.00	3, 4, 9e
			ASHG70-1 (1)	1.00 to 2.00	3, 4, 9e
		TF33-P-5 (4)	T41M-9A (1)	1.00 to 2.00	3, 4, 9a
			ASHG70-1 (1)	1.00 to 2.00	3, 4, 9a
C-135E	Transport - Turbine: USAF general	TF33-P-102 (4)	T41M-9A (1)	1.00 to 2.00	3, 4, 9a
			ASHG70-1 (1)	1.00 to 2.00	3, 4, 9a
C-137B, -137C	Transport - Turbine: USAF general	JT3D-3B (4)	---	---	9a
C-140A	General Aviation: Business Jet	J60-P-5A, -5B (4)	---	---	9e
C-140B	General Aviation: Business Jet	J60-P-5 (4)	---	---	4, 9f
C-141	Transport - Turbine: USAF general	TF33-P-3 (4)	GTCP 165-1 (1)	3.00	9c, 10b
		TF33-P-5 (4)	GTCP 165-1 (1)	3.00	9c, 10b
C-141A, -141B, -141C	Transport - Turbine: USAF general	TF33-P-7 (4)	GTCP85-106/106A (1)	3.00	3, 4, 9a, 9c
CT-1B	General Aviation: Business Jet	JT15D-5 (2)	---	---	5, 9a
CT-39A	General Aviation: Business Jet	J60-P-3, -3A (2)	---	---	4, 9a
CT-39E, -39G	General Aviation: Business Jet	JT12A-8 (2)	---	---	4, 9a
CT-43A	Transport - Turbine: USAF general	JT8D-9A (2)	---	---	9a
CT-49A	Transport - Turbine: USAF general	JT3D-7 (4)	---	---	4, 5, 9a
CV-22, -22A	Transport - Turbine: USAF general	AE1107C (2)	---	---	7, 9a
		T406-AD-400 (2)	---	---	7, 9a, 13b
DC-130A	Transport - Turbine: USAF general	T56-A-9, -9A (4)	---	---	4, 9a
E-1B	General Aviation: Piston	R-1820-82A (2)	---	---	4, 9a

Table 2-5. Military Airframe/Engine/APU Combinations (continued)[1]

Aircraft Model	Time-In-Mode Category[2]	Engine Model(s) (Number of Engines)	APU Model(s) (Number of APUs)	APU Operating Time Per LTO (hrs)[3]	Notes:
E-2	Transport - Turbine: USN	T56-A-7 (2)	---	---	9c
E-2B	Transport - Turbine: USN	T56-A-8, -8A, -8B (2)	---	---	4, 9a
E-2C	Transport - Turbine: USN	T56-A-422 (2)	---	---	4, 9a
		T56-A-427 (2)	---	---	4, 9m
E-2D	Transport - Turbine: USN	T56-A-427 (2)	---	---	4, 9m
E-3A	Transport - Turbine: USAF general	TF33-P-3 (4)	---	---	5, 9c
		TF33-P-5 (4)	---	---	5, 9c
		TF33-P-7 (4)	---	---	5, 9c
		TF33-P-100A (4)	---	---	4, 5, 9a
E-3B, -3C	Transport - Turbine: USAF general	TF33-P-100A (4)	GTCP 165-1 (1)	2.00	4, 9a, 10a
E-4A	Transport - Turbine: USAF general	F103-GE-100 (4)	---	---	9e
E-4B	Transport - Turbine: USAF general	CF6-50E2 (4)	GTCP 660-4 (1)	2.00	9f, 10a
E-6B	Transport - Turbine: USN	CFM56-2A-2 (4)	---	---	4, 9g
E-8C	Transport - Turbine: USAF general	JT3D-3B (4)	GTCP 85 (1)	2.00	6, 9a, 12
		TF33-PW-102C (4)	GTCP 85 (1)	2.00	4, 6, 9a
EA-3B	Combat: USN	J57-P-10 (2)	---	---	9a
EA-4F	Combat: USN	J52-P-6A, -6B (1)	---	---	4, 9a
		J52-P-8A (1)	---	---	4, 9a
EA-6A	Combat: USN	J52-P-8A, -8B (2)	---	---	4, 9a
EA-6B	Combat: USN	J52-P-8A, -8B (2)	---	---	4, 9a
		J52-P-408 (2)	---	---	4, 9a
EA-7L	Combat: USN	TF41-A-2 (1)	---	---	9a
		TF30-P-408 (1)	---	---	4, 9a
EB-57B	Combat: USAF	J65-W-5, -5B (2)	---	---	4, 9a
EC-18B, -18D	Transport - Turbine: USAF general	JT3D-7 (4)	---	---	4, 9a
EC-24A	Transport - Turbine: USN	JT3D-3B (4)	---	---	9a
EC-130E	Transport - Turbine: USAF general	T56-A-7, -7A (4)	---	---	4, 9a
		T56-A-15 (4)	---	---	9e
EC-130H	Transport - Turbine: USAF general	T56-A-15 (4)	GTCP 85-180L (1)	1.00	9a, 10a
EC-130J, -130SJ	Transport - Turbine: USAF general	AE2100D3 (4)	---	---	4, 9f
EC-130V	Transport - Turbine: USN	T56-A-15 (4)	---	---	5, 9a
EC-135A, -135G, -135L	Transport - Turbine: USAF general	J57-P/F-59W (4)	---	---	9a, 9e
EC-135B	Transport - Turbine: USAF general	TF33-P-5 (4)	---	---	9a
EC-135C, -135J	Transport - Turbine: USAF general	TF33-P-9 (4)	---	---	9a
EC-135E	Transport - Turbine: USAF general	TF33-P-102 (4)	---	---	9a
EC-135H, -135K, -135P	Transport - Turbine: USAF general	J57-P/F-59W (4)	---	---	9a, 12
		TF33-P-102 (4)	---	---	9e
EC-135N	Transport - Turbine: USAF general	J57-P/F-43WB (4)	---	---	9a
EC-135Y	Transport - Turbine: USAF general	J57-P/F-43WB (4)	---	---	9a
		J57-P/F-59W (4)			
EC-137D	Transport - Turbine: USAF general	JT3D-3B (4)	---	---	9a
EF-4J	Combat: USN	J79-GE-8B (2)	---	---	4, 9a
EF-111A	Combat: USAF	TF30-P-109 (2)	---	---	9a

Table 2-5. Military Airframe/Engine/APU Combinations (continued)[1]

Aircraft Model	Time-In-Mode Category[2]	Engine Model(s) (Number of Engines)	APU Model(s) (Number of APUs)	APU Operating Time Per LTO (hrs)[3]	Notes:
EKA-3B	Combat: USN	J57-P-10 (2)	---	---	9a
EP-3B, -3J	Transport - Turbine: USN	T56-A-14 (4)	---	---	9a
ERA-3B	Combat: USN	J57-P-10 (2)	---	---	9a
ES-2D	General Aviation: Piston	R-1820-82A (2)	---	---	4, 9a
F-4	Combat: USN	J79-GE-10 (2)	---	---	4, 9c
F-4B, -4N	Combat: USN	J79-GE-8B, -8C (2)	---	---	4, 9a
F-4C, -4D	Combat: USAF	J79-GE-15 (2)	---	---	9a
F-4E, -4G	Combat: USAF	J79-GE-17 (2)	---	---	9a
F-4J	Combat: USN	J79-GE-8B (2)	---	---	4, 9a
F-4S	Combat: USN	J79-GE-10B (2)	---	---	4, 9a
F-5A, -5B	Combat: USAF	J85-GE-13 (2)	---	---	5, 9c
F-5E, -5F	Combat: USAF	J85-GE-21 (2)	---	---	5, 9a
F-8	Combat: USN	J57-P-22 (1)	---	---	4, 9c
F-8J	Combat: USN	J57-P-420 (1)	---	---	9a
F-14A	Combat: USN	TF30-P-412 (2)	---	---	4, 9a
		TF30-P-414A (2)	---	---	4, 9g
F-14C	Combat: USN	TF30-P-412 (2)	---	---	4, 9a
F-14B, -14D	Combat: USN	F110-GE-400 (2)	---	---	9a
F-15A, -15B	Combat: USAF	F100-PW-100 (2)	---	---	9a
F-15C, -15D	Combat: USAF	F100-PW-100 (2)	---	---	9a
		F100-PW-220 (2)	---	---	9a
		F100-PW-229 (2)	---	---	9f
F-15E	Combat: USAF	F100-PW-220 (2)	---	---	9a
		F100-PW-229 (2)	---	---	9a
F-16	Combat: USAF	F100-PW-100 (1)	T-62T-40-8 (1)	1.00	3, 4, 9c
F-16A, -16B	Combat: USAF	F100-PW-200 (1)	T-62T-40-8 (1)	1.00	3, 4, 9a
		F100-PW-220 (1)	T-62T-40-8 (1)	1.00	3, 4, 9g
F-16C, -16D	Combat: USAF	F100-PW-200 (1)	T-62T-40-8 (1)	1.00	3, 4, 9a
		F100-PW-220 (1)	T-62T-40-8 (1)	1.00	3, 4, 9f
		F100-PW-229 (1)	T-62T-40-8 (1)	1.00	3, 4, 9a
		F110-GE-100 (1)	T-62T-40-8 (1)	1.00	3, 4, 9a
		F110-GE-129 (1)	T-62T-40-8 (1)	1.00	3, 4, 9a
F-16N	Combat: USN	F110-GE-100 (1)	---	---	9a
F-22A, -22B	Combat: USAF	F119-PW-100 (2)	---	---	9a
F-35A	Combat: USAF	F135-PW-100 (1)	---	---	4, 9a
F-35B	Combat: USN	F135-PW-600 (1)	---	---	4, 5, 9n
F-35C	Combat: USN	F135-PW-100 (1)	---	---	4, 9n
F-100	Combat: USAF	J57-P-22 (1)	---	---	4, 9c
F-106A, -106B	Combat: USAF	J75-P-17 (1)	---	---	9a
F-111, -111F	Combat: USAF	TF30-P-100 (2)	---	---	9a, 9c
F-111A	Combat: USAF	TF30-P-3 (2)	---	---	9a
F-111D, -111E	Combat: USAF	TF30-P-3 (2)	---	---	9a
		TF30-P-9 (2)	---	---	9e

Table 2-5. Military Airframe/Engine/APU Combinations (continued)[1]

Aircraft Model	Time-In-Mode Category[2]	Engine Model(s) (Number of Engines)	APU Model(s) (Number of APUs)	APU Operating Time Per LTO (hrs)[3]	Notes:
F-117A	Combat: USAF	F404-GE-F1D2 (2)	3800100-4 (1)	2.00	3, 4, 9h
F/A-18A, -18B	Combat: USN	F404-GE-400 (2)	---	---	9a, 9g
F/A-18C, -18D	Combat: USN	F404-GE-400 (2)	---	---	9a
		F404-GE-402 (2)	---	---	4, 9g
F/A-18E	Combat: USN	F404-GE-400 (2)	---	---	9a
		F414-GE-400 (2)	---	---	4, 9g
F/A-18F	Combat: USN	F414-GE-400 (2)	---	---	4, 9g
FA-22A	Combat: USAF	F119-PW-100 (2)	---	---	9a
FB-22A	Combat: USAF	F119-PW-100 (2)	---	---	9a
FB-111A	Combat: USAF	TF30-P-7 (2)	---	---	9a
HC-130H	Transport - Turbine: USAF general	T56-A-15 (4)	GTCP 85-180L (1)	1.00	6, 9a, 10a
HC-130J	Transport - Turbine: USAF general	AE2100D3 (4)	---	---	4, 9f
HC-130N, -130P	Transport - Turbine: USN	T56-A-15 (4)	---	---	9a
HV-22A, -22B	Transport - Turbine: USN	AE1107C (2)	---	---	7, 9a, 12
		T406-AD-400 (2)	---	---	7, 9a, 13b
JA-6A	Combat: USN	J52-P-6A, -6B (2)	---	---	4, 9a
		J52-P-8A, -8B (2)	---	---	4, 9a
KA-3B	Combat: USN	J57-P-10 (2)	---	---	9a
KA-6D	Combat: USN	J52-P-6A (2)	---	---	4, 9a
		J52-P-8A (2)	---	---	4, 9a
KC-10, -10A	Transport - Turbine: USAF general	CF6-50C2 (3)	TSCP 700-4B (1)	6.00	9a, 10a
		F103-GE-100 (3)	TSCP 700-4B (1)	6.00	9e, 10a
		F103-GE-101 (3)	TSCP 700-4B (1)	6.00	9o, 10a
KC-46A	Transport - Turbine: USAF general	PW4062 (2)	GTCP 331-200 (1)	0.87	6, 9j, 11
			GTCP 331-200ER (1)	0.87	6, 9j, 11
KC-130F, -130R, -130T	Transport - Turbine: USN	T56-A-16 (4)	---	---	9a
KC-135	Transport - Turbine: USAF KC-135	J57-P-22 (4)	---	---	4, 9c
KC-135A	Transport - Turbine: USAF KC-135	J57-P/F-43WB (4)	---	---	9a
		J57-P/F-59W (4)	---	---	9a
KC-135D, -135Q	Transport - Turbine: USAF KC-135	J57-P/F-59W (4)	---	---	9a, 9e
KC-135E	Transport - Turbine: USAF KC-135	TF33-P-102 (4)	GTCP 85-180L (1)	1.00	4, 6, 9a, 10a
KC-135R, -135T	Transport - Turbine: USAF KC-135	CFM56-2B-1 (4)	---	---	9a, 12
		F108-CF-100 (4)	---	---	9a, 13b
KC-767A	Transport - Turbine: USAF general	CF6-80C2B6F (2)	---	---	9k
		CF6-80C2B7F (2)	---	---	9k
		PW4062 (2)	---	---	9k
LC-130F, -130R	Transport - Turbine: USN	T56-A-16 (4)	---	---	9a
LC-130H	Transport - Turbine: USAF general	T56-A-15 (4)	---	---	9a
MC-12W	General Aviation: Turboprop	PT6A-60 (2)	---	---	4, 9f
MC-130E	Transport - Turbine: USAF general	T56-A-7 (4)	---	---	9a
		T56-A-15, -15A (4)	---	---	4, 9a, 9f
MC-130H	Transport - Turbine: USAF general	T56-A-15 (4)	GTCP 85-180L (1)	1.00	6, 9a, 10a

Table 2-5. Military Airframe/Engine/APU Combinations (continued)[1]

Aircraft Model	Time-In-Mode Category[2]	Engine Model(s) (Number of Engines)	APU Model(s) (Number of APUs)	APU Operating Time Per LTO (hrs)[3]	Notes:
MC-130J	Transport - Turbine: USAF general	AE2100D3 (4)	---	---	4, 9f
MC-130P, -130W	Transport - Turbine: USAF general	T56-A-15 (4)	---	---	9a, 9f
MV-22A, -22B	Transport - Turbine: USN	AE1107C (2)	---	---	7, 9a, 12
		T406-AD-400 (2)	---	---	7, 9a, 13b
NA-3B	Combat: USN	J57-P-10 (2)	---	---	9a
NA-4E	Combat: USN	J52-P-6A (1)	---	---	4, 9a
		J52-P-8A, -8B (1)	---	---	4, 9a
NA-4F	Combat: USN	J52-P-8A (1)	---	---	4, 9a
NA-4M	Combat: USN	J52-P-408 (1)	---	---	9a
NA-6A	Combat: USN	J52-P-6A, -6B (2)	---	---	4, 9a
		J52-P-8A, -8B (2)	---	---	4, 9a
NA-6E	Combat: USN	J52-P-8B (2)	---	---	9a
NA-7A	Combat: USN	TF30-P-6 (1)	---	---	4, 9a
NA-7C	Combat: USN	TF30-P-8 (1)	---	---	4, 9a
NA-7E	Combat: USN	TF41-A-2 (1)	---	---	9a
NB-52B	Transport - Turbine: USAF B-52	J57-P-19W (8)	---	---	9a
NC-12B	General Aviation: Turboprop	PT6A-41 (2)	---	---	9a
NC-21A	General Aviation: Business Jet	TFE731-2-2B (2)	---	---	9a
NC-130A	Transport - Turbine: USAF general	T56-A-9, -9A, -9B (4)	---	---	4, 9a
NC-130B, -130E	Transport - Turbine: USAF general	T56-A-7, -7A (4)	---	---	4, 9a
NC-130H	Transport - Turbine: USAF general	T56-A-15 (4)	GTCP 85-180L (1)	1.00	4, 6, 9a, 10a
NC-135A	Transport - Turbine: USAF general	J57-P/F-43WB (4)	---	---	9e
NC-135W	Transport - Turbine: USAF general	TF33-P-5 (4)	---	---	9a
NC-141A	Transport - Turbine: USAF general	TF33-P-7 (4)	GTCP 85-106/106A (1)	3.00	3, 4, 9a
NF-4D	Combat: USAF	J79-GE-15 (2)	---	---	9a
		J79-GE-17 (2)	---	---	9a
NF-16A	Combat: USAF	F100-PW-200 (1)	---	---	9a
NF-16D	Combat: USAF	F100-PW-200 (1)	---	---	9a
		F100-PW-229 (1)	---	---	9a
		F110-GE-100 (1)	---	---	9a
		F110-GE-129 (1)	---	---	9a
NF-106B	Combat: USAF	J75-P-17 (1)	---	---	9e
NF/A-18A, -18B, -18C	Combat: USN	F404-GE-400 (2)	---	---	9a
NKC-135A	Transport - Turbine: USAF KC-135	J57-P/F-43WB (4)	---	---	9a
		J57-P/F-59W (4)	---	---	9a
NKC-135E	Transport - Turbine: USAF KC-135	TF33-P-102 (4)	GTCP 85-180L (1)	2.00	4, 9a, 10a
NP-3C, -3D	Transport - Turbine: USN	T56-A-14 (4)	---	---	9a
NRA-3B	Combat: USN	J57-P-10 (2)	---	---	9a
NT-33A	Trainer - Turbine: USAF General	J33-A-35 (1)	---	---	9a
NT-39A	General Aviation: Business Jet	J60-P-3, -3A (2)	---	---	4, 9a
NTA-4F, -4J	Combat: USN	J52-P-6A (1)	---	---	4, 9a
NUP-3A	Transport - Turbine: USN	T56-A-14 (4)	---	---	9a

Table 2-5. Military Airframe/Engine/APU Combinations (continued)[1]

Aircraft Model	Time-In-Mode Category[2]	Engine Model(s) (Number of Engines)	APU Model(s) (Number of APUs)	APU Operating Time Per LTO (hrs)[3]	Notes:
O-1	General Aviation: Piston	O-470C (1)	---	---	9c
O-2A, -2B	General Aviation: Piston	IO-360-C (1)	---	---	4, 9a, 9c
		IO-360-D (1)	---	---	9c
OA-4M	Combat: USN	J52-P-6A, -6B (1)	---	---	4, 9a
		J52-P-8A (1)	---	---	4, 9a
OA-10A	Combat: USAF	TF34-GE-100 (2)	---	---	9a
OA-37B	Combat: USAF	J85-GE-17A (2)	---	---	9a
OC-135B	Transport - Turbine: USAF general	TF33-P-5 (4)	---	---	9a
OT-47B	General Aviation: Business Jet	JT15D-5D (2)	---	---	4, 9a
OV-10A	General Aviation: Turboprop	T76-G-10A (2)	---	---	4, 8, 9a
		T76-G-12A (2)	---	---	4, 8, 9a
		T76-G-418 (2)	---	---	8, 9a
		T76-G-419 (2)	---	---	8, 9a
P-3B	Transport - Turbine: USN	T56-A-14 (4)	---	---	9a
P-3C	Transport - Turbine: USN	T56-A-7 (4)	---	---	9c
		T56-A-14 (4)	---	---	9a
QF-4B	Combat: USN	J79-GE-8B, -8C (2)	---	---	4, 9a
QF-4E	Combat: USAF	J79-GE-10 (2)	---	---	4, 9a
		J79-GE-17 (2)	---	---	9a
QF-4G	Combat: USAF	J79-GE-15 (2)	---	---	9a
		J79-GE-17 (2)	---	---	9a
QF-106A, -106B	Combat: USAF	J75-P-17 (1)	---	---	9a
QRF-4C	Combat: USAF	J79-GE-10 (2)	---	---	4, 9a
		J79-GE-17 (2)	---	---	9a
QT-33A	Trainer - Turbine: USN	J33-A-35 (1)	---	---	9a
RA-3B	Combat: USN	J57-P-10 (2)	---	---	9a
RA-5C	Combat: USN	J79-GE-8B, -8C (2)	---	---	4, 9a
		J79-GE-10 (2)	---	---	4, 9a
RC-12D, -12G, -12H	General Aviation: Turboprop	PT6A-41 (2)	---	---	9a
RC-135M, -135X	Transport - Turbine: USAF general	TF33-P-5 (4)	---	---	9a, 9e, 9f
RC-135S, -135W	Transport - Turbine: USAF general	TF33-P-5 (4)	---	---	9a
		CFM56-2B-1 (4)	---	---	9f, 12
		F108-CF-201 (4)	---	---	4, 9f, 13b
RC-135T	Transport - Turbine: USAF general	TF33-P-102 (4)	---	---	9e
RC-135U	Transport - Turbine: USAF general	TF33-P-9 (4)	---	---	9a
		CFM56-2B-1 (4)	---	---	9f, 12
		F108-CF-201 (4)	---	---	4, 9f, 13b
RC-135V	Transport - Turbine: USAF general	TF33-P-5 (4)	---	---	9a
		TF33-P-9 (4)	---	---	9e
		CFM56-2B-1 (4)	---	---	9f, 12
		F108-CF-201 (4)	---	---	4, 9f, 13b
RF-4B	Combat: USN	J79-GE-8B, -8C (2)	---	---	4, 9a
RF-4C	Combat: USAF	J79-GE-15 (2)	---	---	9a

Table 2-5. Military Airframe/Engine/APU Combinations (continued)[1]

Aircraft Model	Time-In-Mode Category[2]	Engine Model(s) (Number of Engines)	APU Model(s) (Number of APUs)	APU Operating Time Per LTO (hrs)[3]	Notes:
RF-8G	Combat: USN	J57-P-22 (1)	---	---	4, 9a
RF/A-18A	Combat: USN	F404-GE-400 (2)	---	---	9a
RP-3D	Transport - Turbine: USN	T56-A-14 (4)	---	---	9a
RQ-4	Combat: USAF	AE3007H (1)	---	---	4, 9a
		F137-RR-100 (1)	---	---	4, 9f
RQ-4A	Combat: USAF	AE3007 (1)	---	---	4, 9a
		F137-RR-100 (1)			4, 9f
RQ-4B	Combat: USAF	AE3007H (1)	---	---	4, 9a
RU-21J	General Aviation: Turboprop	PT6A-41 (2)	---	---	9a
S-2, -2G	General Aviation: Piston	R-1820-82 (2)	---	---	9a, 9c
S-2D, -2E	General Aviation: Piston	R-1820-82A (2)	---	---	4, 9a
S-3A	Combat: USN	TF34-GE-400 (2)	---	---	9c
SV-22A	Transport - Turbine: USN	AE1107C (2)	---	---	7, 9a, 12
		T406-AD-400 (2)	---	---	7, 9a, 13b
T-1A	Trainer - Turbine: USAF general	JT15D-5B (2)	---	---	9a
T-2	Trainer - Turbine: USN	J85-GE-5F (2)	---	---	9c
T-6A	Trainer - Turbine: USAF general	PT6A-68 (1)	---	---	8, 9a
T-28	General Aviation: Piston	R-1820-82 (1)	---	---	9c
T-33A	Trainer - Turbine: USAF general	J33-A-35 (1)	---	---	9a
T-34	General Aviation: Piston	O-470C (1)	---	---	9c
T-34C	General Aviation: Piston	PT6A-27 (1)	---	---	9c
T-37, -37B	Trainer - Turbine: USAF general	J69-T-25 (2)	---	---	9a, 9c
T-38	Trainer - Turbine: USAF T-38	J85-GE-5F (2)	---	---	9c
T-38A	Trainer - Turbine: USAF T-38	J85-GE-5, -5A, -5G, -5J, -5M (2)	---	---	4, 9a
T-38C	Trainer - Turbine: USAF T-38	J85-GE-5, -5A, -5G, -5J, -5R (2)	---	---	4, 9a
T-38N	Trainer - Turbine: USAF T-38	J85-GE-5H, -5N (2)	---	---	4, 9a
T-39A, -39D	General Aviation: Business Jet	J60-P-3A (2)	---	---	9a, 9e
T-39B	General Aviation: Business Jet	J60-P-3, -3A (2)	---	---	4,9a
T-41	General Aviation: Piston	IO-360-C (1)	---	---	4, 9c
T-41B	General Aviation: Piston	IO-360-D (1)	---	---	9a
T-41C, -41D	General Aviation: Piston	IO-360-D34 (1)	---	---	4, 9a
T-43A	Transport - Turbine: USAF general	JT8D-9 (2)	---	---	4, 9a
T-44	Trainer - Turbine: USN	PT6A-27 (2)	---	---	9c
T-47A	General Aviation: Business Jet	JT15D-5 (2)	---	---	9a
TA-3B	Combat: USN	J57-P-10 (2)	---	---	9a
TA-4B	Combat: USN	J65-W-20 (1)	---	---	9a
TA-4F	Combat: USN	J52-P-6A, -6B (1)	---	---	4, 9a
		J52-P-8A (1)	---	---	4, 9a
TA-7C	Combat: USN	TF30-P-8 (1)	---	---	4, 9a
TC-18E	Transport - Turbine: USAF general	TF33-P-100A (4)	---	---	4, 9a
TC-18F	Transport - Turbine: USAF general	JT3D-3B (4)	---	---	9a
TC-130H	Transport - Turbine: USAF general	T56-A-15 (4)	---	---	9a
TC-135S, -135W	Transport - Turbine: USAF general	TF33-P-5 (4)	---	---	9a

Table 2-5. Military Airframe/Engine/APU Combinations (continued)[1]

Aircraft Model	Time-In-Mode Category[2]	Engine Model(s) (Number of Engines)	APU Model(s) (Number of APUs)	APU Operating Time Per LTO (hrs)[3]	Notes:
TE-2A, -2C	Transport - Turbine: USN	T56-A-8, -8A, -8B (2)	---	---	4, 9a
TE-8A	Transport - Turbine: USAF general	JT3D-3B (4)	---	---	9a
TF-16N	Combat: USN	F110-GE-100 (1)	---	---	9a
TF-18A	Combat: USN	F404-GE-400 (2)	---	---	9a
TF/A-18A	Combat: USN	F404-GE-400 (2)	---	---	9a
TS-2A	General Aviation: Piston	R-1820-82 (2)	---	---	9a
TU-2S	Combat: USAF	F118-GE-101 (1)	---	---	4, 9f
U-2S	Combat: USAF	F118-GE-101 (1)	---	---	4, 9f
U-21	General Aviation: Turboprop	PT6A-27 (2)	---	---	9c
U-21J	General Aviation: Turboprop	PT6A-41 (2)	---	---	9a
U-28A	General Aviation: Turboprop	PT6A-67B (1)	---	---	9f
UA-3B	Combat: USN	J57-P-10 (2)	---	---	9a
UC-12B	General Aviation: Turboprop	PT6A-41 (2)	---	---	9a
UC-35A, -35C	General Aviation: Business Jet	JT15D-5D (2)	---	---	4, 9a
UC-123K	Transport - Turbine: USAF general	J85-GE-17 (2)	---	---	4, 9a
UP-3B	Transport - Turbine: USN	T56-A-14 (4)	---	---	9a
US-2A, -2B, -2C	General Aviation: Piston	R-1820-82 (2)	---	---	9a
US-2D	General Aviation: Piston	R-1820-82A (2)	---	---	4, 9a
UV-18B	Transport - Turbine: USAF general	PT6A-27 (2)	---	---	9a
UV-20A	General Aviation: Turboprop	PT6A-27 (2)	---	---	9a
VC-25A	Transport - Turbine: USAF general	CF6-80C2B1 (4)	GTCP 660-4 (1)	8.00	6, 9a
VC-137B, -137C	Transport - Turbine: USAF general	JT3D-3B (4)	---	---	9h
VC-140B	General Aviation: Business Jet	J60-P-5A, -5B (4)	---	---	9e
WC-130E	Transport - Turbine: USAF general	T56-A-7 (4)	---	---	9e
		T56-A-15 (4)	---	---	9e
WC-130H	Transport - Turbine: USAF general	T56-A-15 (4)	GTCP 85-180L (1)	1.00	4, 6, 9a, 10a
WC-130J	Transport - Turbine: USAF general	AE2100D3 (4)	---	---	4, 9f
WC-135B, -135W	Transport - Turbine: USAF general	TF33-P-5 (4)	---	---	9a
WC-135C	Transport - Turbine: USAF general	TF33-P-9 (4)	---	---	9a
X-29A	Combat: USAF	F404-GE-400 (1)	---	---	8, 9a
X-31A	Combat: USN	F404-GE-400 (1)	---	---	9a
X-44A	Combat: USAF	F119-PW-100 (2)	---	---	9a
YA-7D	Combat: USAF	TF41-A-1 (1)	---	---	9a
YC-14A	Transport - Turbine: USAF general	CF6-50A (2)	---	---	9a
YE-2C	Transport - Turbine: USN	T56-A-8, -8A, -8B (2)	---	---	4, 9a
YF-4J	Combat: USN	J79-GE-8B (2)	---	---	4, 9a
YF-15A, -15B	Combat: USAF	F100-PW-100 (2)	---	---	9a
YF-16A, -16B	Combat: USAF	F100-PW-200 (1)	---	---	9a
YOV-10D	General Aviation: Turboprop	T76-G-10, -10A (2)	---	---	4, 9a
		T76-G-12, -12A (2)	---	---	4, 9a
YP-3C	Transport - Turbine: USN	T56-A-14 (4)	---	---	9a
YS-2G	General Aviation: Piston	R-1820-82 (2)	---	---	9a

Notes for Table 2-5 follows Table 2-6

Table 2-6. Military Helicopter/Engine/APU Combinations[1]

Aircraft Model	Time-In-Mode Category[2]	Engine Model(s) (Number of Engines)	APU Model(s) (Number of APUs)	APU Operating Time Per LTO (hrs)[3]	Notes:
AH-1G	Military - Helicopter	T53-L-11D (1)	---	---	9c
		T53-L-13, -13A, -13B (1)	---	---	4, 9a
AH-1J	Military - Helicopter	T400-CP-400 (1)	---	---	9a
AH-64A	Military - Helicopter	T700-GE-700 (2)	---	---	9a
CH-3B	Military - Helicopter	T58-GE-8B (2)	---	---	4, 9a
CH-3E	Military - Helicopter	T58-GE-5 (2)	---	---	9f
CH-46	Military - Helicopter	T58-GE-5 (2)	---	---	9c
CH-46A	Military - Helicopter	T58-GE-8B, -8F (2)	---	---	4, 9a
CH-46E	Military - Helicopter	T58-GE-16 (2)	---	---	9a
CH-53A	Military - Helicopter	T64-GE-6B (2)	---	---	9a
CH-53D	Military - Helicopter	T64-GE-413 (2)	---	---	9a
EH-1H	Military - Helicopter	T53-L-13 (1)	---	---	9a
EH-1X	Military - Helicopter	T53-L-13 (1)	---	---	9a
EH-60A	Military - Helicopter	T700-GE-700 (2)	---	---	9a
HH-1H	Military - Helicopter	T53-L-13 (1)	---	---	9a
HH-1K	Military - Helicopter	T53-L-13, -13A, -13B (1)	---	---	4, 9a
HH-1N	Military - Helicopter	T400-CP-400 (1)	---	---	9g
HH-2D	Military - Helicopter	T58-GE-8B, -8F (2)	---	---	4, 9a
HH-3A	Military - Helicopter	T58-GE-8F (2)	---	---	9a
HH-3E	Military - Helicopter	T58-GE-5 (2)	---	---	9f
HH-3F	Military - Helicopter	T58-GE-8B, -8F (2)	---	---	4, 9a
HH-43	Military - Helicopter	T53-L-11D (1)	---	---	9c
HH-46A	Military - Helicopter	T58-GE-8B, -8F (2)	---	---	4, 9a
HH-52	Military - Helicopter	T58-GE-5 (2)	---	---	9c
HH-52A	Military - Helicopter	T58-GE-8B (2)	---	---	4, 9a
HH-53	Military - Helicopter	T64-GE-6B (2)	---	---	9c
HH-60G	Military - Helicopter	T700-GE-700 (2)	---	---	9f
MH-53J	Military - Helicopter	T64-GE-415 (2)	T-62T-27 (1)	4.00	9a, 10a
MH-53M	Military - Helicopter	T64-GE-100 (2)	---	---	9f
MH-60A	Military - Helicopter	T700-GE-700 (2)	---	---	9a
MH-60G	Military - Helicopter	T700-GE-700 (2)	---	---	9a
NCH-46A	Military - Helicopter	T58-GE-8B, -8F (2)	---	---	4, 9a

Table 2-6. Military Helicopter/Engine/APU Combinations (continued)[1]

Aircraft Model	Time-In-Mode Category[2]	Engine Model(s) (Number of Engines)	APU Model(s) (Number of APUs)	APU Operating Time Per LTO (hrs)[3]	Notes:
NRH-53D	Military - Helicopter	T64-GE-415 (2)	---	---	9a
NSH-3A	Military - Helicopter	T58-GE-8B (2)	---	---	4, 9a
NUH-1E	Military - Helicopter	T53-L-11D (1)	---	---	9a
NUH-1N	Military - Helicopter	T400-CP-400 (1)	---	---	9a
NVH-3A	Military - Helicopter	T58-GE-8F (2)	---	---	9a
OH-6A	Military - Helicopter	T63-A-5A (1)	---	---	9c
OH-58A	Military - Helicopter	T63-A-5A (1)	---	---	9c
RH-53D	Military - Helicopter	T64-GE-415A (2)	---	---	4, 9a
SH-2D	Military - Helicopter	T58-GE-5 (2)	---	---	9c
		T58-GE-8B (2)	---	---	4, 9a
SH-2F	Military - Helicopter	T58-GE-5 (2)	---	---	9c
		T58-GE-8F (2)	---	---	9a
SH-3A	Military - Helicopter	T58-GE-8B (2)	---	---	4, 9a
SH-3G	Military - Helicopter	T58-GE-8B, -8F (2)	---	---	4, 9a
SH-60	Military - Helicopter	T700-GE-700 (2)	---	---	9g
TH-1L	Military - Helicopter	T53-L-13, -13A, -13B (1)	---	---	4, 9a
TH-53A	Military - Helicopter	T64-GE-100 (2)	T-62T-27 (1)	4.00	3, 9a
UH-1E	Military - Helicopter	T53-L-11D (1)	---	---	9a
UH-1H	Military - Helicopter	T53-L-11D (1)	---	---	9c
		T53-L-13 (1)	---	---	9c
UH-1L	Military - Helicopter	T53-L-13, -13A, -13B (1)	---	---	4, 9a
UH-1N	Military - Helicopter	T400-CP-400 (1)	---	---	9f
UH-1V	Military - Helicopter	T53-L-13 (1)	---	---	9a
UH-2C	Military - Helicopter	T58-GE-8B, -8F (2)	---	---	4, 9a
UH-3A	Military - Helicopter	T58-GE-8B (2)	---	---	4, 9a
UH-46A	Military - Helicopter	T58-GE-8B, -8F (2)	---	---	4, 9a
UH-60A	Military - Helicopter	T700-GE-700 (2)	T-62T-40-1 (1)	1.00	3, 4, 9a
UH-60C	Military - Helicopter	T700-GE-700 (2)	---	---	9a
UH-60Q	Military - Helicopter	T700-GE-700 (2)	---	---	9a
YSH-2E	Military - Helicopter	T58-GE-8B, -8F (2)	---	---	4, 9a

Notes for Tables 2-5 and 2-6:

1. 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).
2. Time-in-Mode category selected for the aircraft based on that aircraft's expected flight pattern and not based on its mission designation. It is recommended that installation-specific TIM data is used when available.
3. 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. APU operating time provided as a guideline. If more accurate and verified APU operating times are available for the installation, those times may be used for emissions calculations.
4. This document does not have emission factors for at least one engine/APU listed for this aircraft.

5. Time-in-Mode category for this aircraft was selected as the recommended category for calculating emissions though this aircraft is actually operated by another military branch.
6. APU operating time an estimate based on similar APUs on similar aircraft.
7. 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.
8. This aircraft is operated by multiple military branches.
9. The Airframe/Engine combination source was reported in the following documents:
    a. SOURCE: *Model Designation of Military Aerospace Vehicles*, Department of Defense, May 2004
    b. SOURCE: AF Reserve Website (www.afreserve.com)
    c. SOURCE: *Air Pollutant Emission Factors for Military and Civil Aircraft*, EPA-450/3-78-117, October 1978.
    d. SOURCE: Smithsonian National Air and Space Museum website (www.airandspace.si.edu)
    e. SOURCE: *Aircraft Engine Emissions Estimator*, AFESC, November 1985.
    f. SOURCE: US Air Force fact sheets accessed via official Air Force website (www.af.mil)
    g. SOURCE: US Navy fact sheets accessed via official navy website (www.navy.mil)
    h. SOURCE: National Museum of the Air Force accessed via official website (www.nationalmuseum.af.mil)
    i. SOURCE: GE Aviation website (www.geaviation.com)
    j. SOURCE: *National Environmental Policy ACT (NEPA) Facilitation Report*, April 2012
10. The Airframe/APU combination was reported in the following documents:
    a. SOURCE: *Air Emissions Factor Guide to Air Force Mobile Sources*, AFCEE, 2009
    b. SOURCE: EDMS input from Paine Field
11. APU operating time assumes worst case scenario. The actual operating time may range between 0.23-0.26 if there is gate power or 0.87 if there is no gate power. The value provided assumes no gate power.
12. 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.
13. 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:
    a. SOURCE: *Air Force One*, Robert F. Dorr, 2002.
    b. The Federal Business Opportunities website (www.fbo.gov)

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

Table 2-7. Commercial Airframe/Engine/APU Combinations[1]

Aircraft Model	Time-In-Mode Category	Engine Model(s) (Number of Engines)	APU Model(s) (Number of APUs)	APU Operating Time Per LTO (hrs)[2] [Without Gate Power]	Notes:
A300 Series	**Commercial Carrier:** 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]	3, 4b, 4c, 5b
A310 Series	**Commercial Carrier:** 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]	3, 4b, 4c, 5b
A318 Series	**Commercial Carrier:** Jumbo, long, and medium range jet	CFM56-5B8, -5B9 (2) PW6122A (2) PW6124A (2)	GTCP 36-300 (1)	0.23 - 0.26 [0.87]	3, 4c, 4d, 5b
A319 Series	**Commercial Carrier:** 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]	3, 4c, 4d, 4e, 5b
A320 Series	**Commercial Carrier:** Jumbo, long, and medium range jet	CFM56-5-A1, -5A3, -5B4, -5B5, -5B6 (2) V2500-A1 (2) V2527-A5 (2)	GTCP 36-300 (1)	0.23 - 0.26 [0.87]	3, 4c, 4d, 4e, 5b
A321 Series	**Commercial Carrier:** 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]	3, 4c, 4d, 4e, 5b
A330 Series	**Commercial Carrier:** 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]	3, 4c, 4d, 4e, 5b
A340 Series	**Commercial Carrier:** 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)	---	---	3, 4d, 4e
A380 Series	**Commercial Carrier:** Jumbo, long, and medium range jet	GP7270 (4) Trent 970B-84 (4) Trent 972B-84 (4)	---	---	3, 4b, 4d
ACJ318	**General Aviation:** Business Jet	CFM56-5B9/3 (2)	---	---	4e
ACJ319	**General Aviation:** Business Jet	CFM56-5B7/3 (2)	---	---	4e
ACJ320	**General Aviation:** Business Jet	CFM56-5B4/3 (2)	---	---	4e
ACJ330	**General Aviation:** Business Jet	Trent 772B-60 (2)	---	---	3, 4e
ACJ340	**General Aviation:** Business Jet	Trent 553-61 (4)	---	---	4e
ACJ380	**General Aviation:** Business Jet	Trent 970-84 (4)	---	---	4e
B707 Series	**Commercial Carrier:** Jumbo, long, and medium range jet	JT3D-3, -3B (4) JT3D-7 (4)	GTCP 85 (1)	0.23 - 0.26 [0.87]	3, 4a, 4b, 4f, 5a
B717 Series	**Commercial Carrier:** Jumbo,	BR700-715A1-30, -715C1-30 (2)	---	---	4b
B727 Series	**Commercial Carrier:** 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]	3, 4a, 4b, 4f, 5a

Table 2-7 Commercial Airframe/Engine/APU Combinations (continued)[1]

Aircraft Model	Time-In-Mode Category	Engine Model(s) (Number of Engines)	APU Model(s) (Number of APUs)	APU Operating Time Per LTO (hrs)[2] [Without Gate Power]	Notes:
B737 Series	**Commercial Carrier:** 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]	3, 4d, 5c
B747 Series	**Commercial Carrier:** 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]	3, 4b, 4d, 5c
B757 Series	**Commercial Carrier:** 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]	3, 4b, 4d, 5c
B767 Series	**Commercial Carrier:** 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]	3, 4b, 4d, 5a, 5c
B777 Series	**Commercial Carrier:** 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, -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]	3, 4b, 4d, 4f, 5c
B787 Series	**Commercial Carrier:** Jumbo, long, and medium range jet	Genx-1B64, -1864/P1, -1867, -1867/P1, -1870, -1870/P1, -1870/75/P1 (2) Trent 1000-A, -1000-C, -1000-E (2)	---	---	3, 4b, 4d
BAe 146-100A, -200A	**General Aviation:** Business Jet	ALF 502R-3, -3A, -5 (4)	---	---	3, 4b
BAe 146-300A	**General Aviation:** Business Jet	ALF 502R-3A, -5 (4)	---	---	3, 4b
BAe Avro 146-RJ100A	**General Aviation:** Business Jet	LF507-1F (4)	---	---	4b
BAe Avro 146-RJ70A	**General Aviation:** Business Jet	LF507-1F (4)	---	---	4b
BAe Avro 146-RJ85A	**General Aviation:** Business Jet	LF507-1F (4)	---	---	4b
BD-100-1A10	**General Aviation:** Business Jet	AS907-1-1A (2)	---	---	4b
BD-700-1A10, -1A11	**General Aviation:** Business Jet	BR700-710A2-20 (2)	---	---	4b
Beechcraft 76	**General Aviation:** Turboprop	PT6A-27 (2)	---	---	4a
Beechcraft 99A, -99B, -A99A, -B99	**General Aviation:** Turboprop	PT6A-27 (2)	---	---	4b
BH.125 Series 400A	**General Aviation:** Business Jet	TFE731-3, -3R (2)	---	---	3, 4b
BH.125 Series 600A	**General Aviation:** Business Jet	TFE731-3, -3R (2)	---	---	3, 4b
Cessna 150, -150A, -150B, -150C, -150D, -150E, -150F, -150G, -150H, -150J, -150K, -150L, -150M	**General Aviation:** Piston	O-200-A (1)	---	---	3, 4b
Cessna 172I, -172K, -172L, -172M	**General Aviation:** Piston	O-320-E2D (1)	---	---	3, 4b
Cessna 172N	**General Aviation:** Piston	O-320-H2AD (1)	---	---	3, 4b
Cessna 172P	**General Aviation:** Piston	O-320-D2J (1)	---	---	3, 4b
Cessna 336	**General Aviation:** Piston	IO-360-A (2) TSIO-360-C (2)	---	---	3, 4a, 4b, 4f
Cessna 337, -337A, -337B	**General Aviation:** Piston	IO-360-C, -360-CB, -360-D, -360-DB, -360-G, -360-GB (2)	---	---	3,4b

Table 2-7 Commercial Airframe/Engine/APU Combinations (continued)[1]

Aircraft Model	Time-In-Mode Category	Engine Model(s) (Number of Engines)	APU Model(s) (Number of APUs)	APU Operating Time Per LTO (hrs)[2] [Without Gate Power]	Notes:
Cessna 337C, -337D, -337E, -337F, -337G	**General Aviation:** Piston	IO-360-C, -360-CB, -360-G, -360-GB (2)	---	---	3, 4b
Cessna 337H	**General Aviation:** Piston	IO-360-G, -360-GB (2)	---	---	3, 4b
Cessna Citation I	**General Aviation:** Business Jet	JT15D-1, -1A, -1B (2)	---	---	4a, 4c
Cessna Citation II, -II/S	**General Aviation:** Business Jet	JT15D-4, -4B (2)	---	---	4c
Cessna Citation Ultra	**General Aviation:** Business Jet	JT15D-5D (2)	---	---	3, 4c
Cessna Citation V	**General Aviation:** Business Jet	JT15D-5A (2)	---	---	4c
Cessna M337B	**General Aviation:** Piston	IO-360-D, -360-DB (2)	---	---	3, 4b
Cessna P337H	**General Aviation:** Piston	TSIO-360-C, -360-CB (2)	---	---	3, 4b
Cessna T337B	**General Aviation:** Piston	TSIO-360-A, -360-AB, -360-B, -360-BB (2)	---	---	3, 4b
Cessna T337C, -T337D, -T337E, -T337F	**General Aviation:** Piston	TSIO-360-A, -360-AB (2)	---	---	3, 4b
Cessna T337H	**General Aviation:** Piston	IO-360-G, -360-GB (2) TSIO-360-JB (2)	---	---	3, 4b
Cheyenne III, -IIIA	**General Aviation:** Turboprop	PT6A-41 (2)	---	---	4c
CL-600-1A11	**General Aviation:** Business Jet	ALF 502L, -502L-2 (2)	---	---	3, 4b
CL-600-2A12	**General Aviation:** Business Jet	CF34-3A, -3A2 (2)	---	---	3, 4b
CL-600-2B16	**General Aviation:** Business Jet	CF34-3A, -3A1, -3A2, -3B (2)	---	---	3, 4b
CL-600-2B19	**General Aviation:** Business Jet	CF34-3A1, -3B1 (2)	---	---	3, 4b
CL-600-2C10	**General Aviation:** Business Jet	CF34-8C1, -8C5B1 (2)	---	---	4b
CL-600-2D15	**General Aviation:** Business Jet	CF34-8C5, -8C5A1 (2)	---	---	4b
CL-600-2D24	**General Aviation:** Business Jet	CF34-8C5, -8C5A1 (2)	---	---	4b
CL-600-2E25	**General Aviation:** Business Jet	CF34-8C5, -8C5A1, -8C5A2 (2)	---	---	4b
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]	3, 4a, 4b, 5b
DC-8 Series	**Commercial Carrier:** Jumbo, long, and medium range jet	CFM56-2-C1, -2-C3, -2-C5 (4) JT3D-3, -3B, -7 (4)	---	---	3, 4b
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, -217, -217A, -217C, -219 (2)	GTCP 85-98D (1)	0.23 - 0.26 [0.87]	3, 4a, 4b, 5a, 5b
DH.125 Series 1A, -3A, -3A/RA, -400A	**General Aviation:** Business Jet	TFE731-3, -3R (2)	---	---	3, 4b
DHC-6-300, -400	**General Aviation:** Turboprop	PT6A-27 (2)	---	---	4b
F.27 Mark 100, -200, -300, -400, -600, -700	**General Aviation:** Turboprop	SPEY Mk511, -Mk511-7E (2)	---	---	3, 4b
F.28 Mark 0070	**General Aviation:** Business Jet	TAY Mk650-15 (2)	---	---	4b
F.28 Mark 0100	**General Aviation:** Business Jet	TAY Mk620-15 (2) TAY Mk650-15 (2)	---	---	4b
F.28 Mark 1000, -2000	**General Aviation:** Business Jet	SPEY MK555-15 (2)	---	---	3, 4b
F.28 Mark 3000, -4000	**General Aviation:** Business Jet	SPEY Mk555-15H (2)	---	---	3, 4b
Falcon 20	**General Aviation:** Business Jet	CF700-2D (2)	---	---	4a
G-1159, -1159A, -1159B	**General Aviation:** Business Jet	SPEY Mk511-8 (2)	GTCP 36-6 (1)	0.23 - 0.26 [0.87]	3, 4b, 5b
G200	**General Aviation:** Business Jet	PW306A (2)	---	---	4c
G-21	**General Aviation:** Turboprop	PT6A-27 (2)	---	---	4a
G280	**General Aviation:** Business Jet	AS907-2-1G (2)	---	---	4b
GIV	**General Aviation:** Business Jet	TAY Mk611-8 (2)	---	---	4b
GIV-X	**General Aviation:** Business Jet	TAY Mk611-8C (2)	---	---	3, 4b

Table 2-7 Commercial Airframe/Engine/APU Combinations (continued)[1]

Aircraft Model	Time-In-Mode Category	Engine Model(s) (Number of Engines)	APU Model(s) (Number of APUs)	APU Operating Time Per LTO (hrs)[2] [Without Gate Power]	Notes:
GV	**General Aviation:** Business Jet	BR700-710A1-10 (2)	---	---	4b
GVI	**General Aviation:** Business Jet	BR725A1-12 (2)	---	---	4b
GV-SP	**General Aviation:** Business Jet	BR700-710C4-11 (2)	---	---	4b
Hawker 4000	**General Aviation:** Business Jet	PW308A (2)	---	---	4c
Hawker 400A, -400XP	**General Aviation:** Business Jet	JT15D-5, -5R (2)	---	---	3, 4c
HS.125 Series 403B, -600A, -700A, -700B, -F3B, -F3B/RA, -F400B, -F600B	**General Aviation:** Business Jet	TFE731-3, -3R (2)	---	---	3, 4b
JetStar 1329-25	**General Aviation:** Business Jet	TFE731-3-1F (4)	---	---	3, 4b
King Air B200	**General Aviation:** Turboprop	PT6A-41 (2)	---	---	4c
L-1011-385-1	**Commercial Carrier:** Jumbo, long, and medium range jet	RB211-22C-02, -22B-02 (3)	---	---	3, 4b
L-1011-385-1-14	**Commercial Carrier:** Jumbo, long, and medium range jet	RB211-22B-02, -524B-02, -524B4-02, -524B3-02 (3)	---	---	3, 4b
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)	---	---	3, 4b
Learjet 31, -31A	**General Aviation:** Business Jet	TFE731-2-3B (2)	---	---	3, 4b
Learjet 35, -36	**General Aviation:** Business Jet	TFE731-2, -2-2B (2)	---	---	4a
Learjet 35A, -36A	**General Aviation:** Business Jet	TFE731-2-2B (2)	---	---	4a
Learjet 55	**General Aviation:** Business Jet	TFE731-3A-2B1, -3A-2B, -3AR-2B1, -3AR-2B (2)	---	---	3, 4b
Learjet 55B	**General Aviation:** Business Jet	TFE731-3AR-2B1, -3AR-2B (2)	---	---	3, 4b
Learjet 55C	**General Aviation:** Business Jet	TFE731-3AR-3B1, -3AR-3B, -3AR-2B1, -3AR-2B (2)	---	---	3, 4b
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]	4b, 5b
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]	4b, 5b
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]	4b, 5b
MD-88	**Commercial Carrier:** Jumbo, long, and medium range jet	JT8D-217A, -217C, -219 (2)	---	---	4b
MD-90, -90-30	**Commercial Carrier:** Jumbo, long, and medium range jet	V2525-D5 (2) V2528-D5 (2)	---	---	4b
MU-300, -300-10	**General Aviation:** Business Jet	JT15D-4, -4D (2)	---	---	3, 4b
NA-265-80	**General Aviation:** Business Jet	CF700-2D-2 (2)	---	---	3, 4b
PA-18A	**General Aviation:** Piston	O-320 (1)	---	---	4b
PA-23, -23-160	**General Aviation:** Piston	O-320 (2)	---	---	4b
PA-28-140	**General Aviation:** Piston	O-320-E2A (1)	---	---	3, 4b
PA-28-150	**General Aviation:** Piston	O-320-A2B, -E2A (1)	---	---	3, 4b
PA-28-151	**General Aviation:** Piston	O-320-E3D (1)	---	---	3, 4b
PA-28-160	**General Aviation:** Piston	O-320-B2B, -D2A (1)	---	---	3, 4b
PA-28-161	**General Aviation:** Piston	O-320-D2A, -D3G (1)	---	---	3, 4b
PA-28-201T	**General Aviation:** Piston	TSIO-360-FB (1)	---	---	3, 4b
PA-28R-180	**General Aviation:** Piston	IO-360-B1E (1)	---	---	3, 4b
PA-28R-200	**General Aviation:** Piston	IO-360-C1C, -C1C6 (1)	---	---	3, 4b
PA-28R-201, -28RT-201	**General Aviation:** Piston	IO-360-C1C6 (1)	---	---	3, 4b
PA-28R-201T	**General Aviation:** Piston	TSIO-360-F, -360-FB (1)	---	---	3, 4b
PA-28RT-201T	**General Aviation:** Piston	TSIO-360-FB (1)	---	---	3, 4b
PA-28S-160	**General Aviation:** Piston	O-320-D2A (1)	---	---	3, 4b

Table 2-7 Commercial Airframe/Engine/APU Combinations (continued)[1]

Aircraft Model	Time-In-Mode Category	Engine Model(s) (Number of Engines)	APU Model(s) (Number of APUs)	APU Operating Time Per LTO (hrs)[2] [Without Gate Power]	Notes:
PA-31	**General Aviation:** Piston	TIO-540, -540-A1A, -540-A1B, -540-A2A, -540-A2B, -540-A2C (2)	---	---	3, 4a
PA-31-325	**General Aviation:** Piston	TIO-540-F2BD (2)	---	---	3, 4b
PA-31-350	**General Aviation:** Piston	TIO-540-J2BD, -540-J2B (2)	---	---	3, 4b
PA-32-301T	**General Aviation:** Piston	TIO-540-S1AD (1)	---	---	3, 4b
PA-32-301XTC	**General Aviation:** Piston	TIO-540-AH1A (1)	---	---	3, 4b
PA-32R-301T	**General Aviation:** Piston	TIO-540-S1AD, 540-AH1A (1)	---	---	3, 4b
PA-32RT-300T	**General Aviation:** Piston	TIO-540-S1AD (1)	---	---	3, 4b
PA-36-285	**General Aviation:** Turboprop	6-285-B, -285-BA, -285-C, -285-CA (1)	---	---	3, 4b
PA-42	**General Aviation:** Turboprop	PT6A-41 (2)	---	---	4b
PA-46-350P, -46R-350T	**General Aviation:** Turboprop	TIO-540-AE2A (1)	---	---	3, 4b
SA226-AT	**General Aviation:** Turboprop	TPE331-3U-303G, -3U-304G, -3UW-303G (2)	---	---	3, 4b
SA226-T	**General Aviation:** Turboprop	TPE331-3U-303G, -3U-304G (2)	---	---	3, 4b
SA226-TC	**General Aviation:** Turboprop	TPE331-3U-303G, -3U-304G, -3UW-303G, -3UW-304G (2)	---	---	3, 4b
SC-7	**General Aviation:** Turboprop	TPE331-2-201A (2)	---	---	3, 4a
Super King Air A100-1, -200, -200C, -200CT, -200T, -A200, -A200C, -A200CT, -B200, -B200C, -B200CT, -B200T	**General Aviation:** Turboprop	PT6A-41 (2)	---	---	4b
TU-154-B	**Commercial Carrier:** Jumbo, long, and medium range jet	NK-8-2U (3)	---	---	4g
Twin Commander 685	**General Aviation:** Piston	GTSIO-520-F, -520-K (2)	---	---	3, 4b

1. 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).
2. 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.
3. This document does not have emission factors for at least one engine/APU listed for this aircraft.
4. The Aircraft/Engine combination source was reported in one of the following documents:
    a. SOURCE: *Air Pollutant Emission Factors for Military and Civil Aircraft*, EPA-450/3-78-117, October 1978.
    b. SOURCE: The FAA Certificate Data Sheet for the airframe model listed.
    c. SOURCE: Pratt & Whitney website (www.pw.utc.com)
    d. SOURCE: The EASA Certificate Data Sheet for the airframe model listed.
    e. Airbus website (www.airbus.com)
    f. Boeing Website (www.boeing.com)
    g. Tupolev website (www.tupolev.ru/english/)
5. Airframe/APU combination source was reported in one of the following:
    a. SOURCE: EDMS Input from Paine Field
    b. SOURCE: FAA Certificate data sheet for the listed airframe
    c. SOURCE: EASA Certificate data sheet for the listed airframe

Table 2-8. Criteria Pollutants, Ozone Precursors, and Total HAPs

Aircraft Engine	Power Setting	Percent Thrust/hp	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)							
				NO_X	SO_X[1]	CO	VOC	HAP's	PM_{10}	$PM_{2.5}$	GHG[2]
6-285-B	Idle (Taxi)	<40%	72	0.46	1.06	363.70	12.33	---	60.00**(S)**	54.00**(S)**	3252.46
	Approach	40%	84	4.72	1.06	1022.64	18.50	---	47.95**(S)**	43.16**(S)**	3252.46
	Climb out	75-100%	166	5.50	1.06	668.07	9.63	---	40.00**(S)**	36.00**(S)**	3252.46
	Takeoff	100%	153	5.88	1.06	998.04	13.38	---	20.00**(S)**	18.00**(S)**	3252.46
Notes: 3a, 4b (for PM_{10} and $PM_{2.5}$ data at all power settings), 5, 8, 11, 12h											
AE1107C	Idle	---	362	4.15	1.06	8.35	0.12	---	1.58	1.42	3252.46
	Flight Idle	---	663	6.05	1.06	3.47	0.02	---	1.58	1.42	3252.46
	Intermediate	---	948	7.87	1.06	1.82	0.02	---	1.58	1.42	3252.46
	Max Continuous	---	2507	18.03	1.06	0.29	0.01	---	1.58	1.42	3252.46
Notes: 3f (this is the civilian designation of the T406-AD-400), 8, 12d											
CF700-2D	Idle (Taxi)	<30%	460	0.89	1.06	155.00	20.70	---	0.00**(S)**	0.00**(S)**	3252.46
	Approach	30%	919	1.80	1.06	62.00	1.61	---	0.01**(S)**	0.01**(S)**	3252.46
	Climb out	90 - 100%	2322	4.30	1.06	11.34	0.11	---	0.01**(S)**	0.01**(S)**	3252.46
	Takeoff	>100%	2607	5.60	1.06	9.98	0.11	---	0.02**(S)**	0.02**(S)**	3252.46
Notes: 3a, 4c (for PM_{10} and $PM_{2.5}$ at all power settings), 5, 11, 12h											
CT7-5	Idle (Taxi)	7%	131	2.20	1.06	35.33	3.78	---	0.18	0.16	3252.46
	Approach	30%	364	6.88	1.06	5.29	1.42	---	0.37	0.33	3252.46
	Climb out	70%	756	13.17	1.06	2.59	0.95	---	0.57	0.51	3252.46
	Takeoff	100%	809	13.77	1.06	2.59	0.95	---	0.69	0.62	3252.46
Notes: 3m, 11, 12h											
F100-PW-100	Idle (Taxi)	3%	1127	4.64	1.06	49.58	3.79	1.630	3.13	2.82	3252.46
	Approach	13%	2765	12.52	1.06	3.99	1.06	0.858	1.57	1.41	3252.46
	Intermediate	45%	7685	27.09	1.06	0.72	0.14	0.073	0.72	0.65	3252.46
	Military	100%	10996	35.01	1.06	0.70	0.12	0.074	1.24	1.12	3252.46
	Afterburner-1	134%	54007	6.62	1.06	9.57	0.13	0.031	0.87	0.78	3252.46
Notes: 3n, 8, 10, 12e											
F100-PW-200	Idle (Taxi)	3%	1006	6.21	1.06	24.06	2.05	1.314	2.49	2.24	3252.46
	Approach	13%	3251	17.93	1.06	1.22	0.05	0.020	2.37	2.13	3252.46
	Intermediate	45%	5651	26.55	1.06	0.38	0.07	0.030	1.58	1.42	3252.46
	Military	100%	8888	34.32	1.06	0.56	0.11	0.031	1.58	1.42	3252.46
	Afterburner-5	134%	40123	6.63	1.06	10.42	0.69	0.053	3.04	2.74	3252.46
Notes: 3e, 8, 10, 12e											
F100-PW-220	Idle (Taxi)	---	1084	4.61	1.06	35.30	7.94	---	2.06	1.85	3252.46
	Approach	---	3837	12.53	1.06	1.92	5.12	---	2.63	2.37	3252.46
	Intermediate	---	5770	22.18	1.06	0.86	2.89	---	2.06	1.85	3252.46
	Military	---	9679	29.32	1.06	0.86	1.79	---	1.33	1.20	3252.46
	Afterburner-5	---	41682	8.37	1.06	11.99	1.53	---	1.15	1.04	3252.46
Notes: 3f, 8, 12e											
F100-PW-229	Idle (Taxi)	5%	1087	3.80	1.06	10.17	0.45	---	2.06**(S)**	1.85**(S)**	3252.46
	Approach	21%	3098	15.08	1.06	1.17	0.24	---	2.63**(S)**	2.37**(S)**	3252.46
	Intermediate	49%	5838	17.54	1.06	0.15	0.35	---	2.06**(S)**	1.85**(S)**	3252.46
	Military	86%	11490	29.29	1.06	0.33	0.31	---	1.33**(S)**	1.20**(S)**	3252.46
	Afterburner-1	102%	20793	14.30	1.06	21.51	5.26	---	1.15**(S)**	1.04**(S)**	3252.46
Notes: 3c, 4d ($PM_{2.5}$ and PM_{10} data at all power settings), 5, 8, 10, 12e											
F101-GE-100	Idle (Taxi)	---	476	7.30	1.06	120.10	28.98	---	0.09	0.08	3252.46
	Approach	---	4533**(S)**	9.16**(S)**	1.06	1.03**(S)**	0.02**(S)**	---	4.21**(S)**	3.74**(S)**	3252.46
	Intermediate	---	6557**(S)**	13.15**(S)**	1.06	0.85**(S)**	0.04**(S)**	---	1.35**(S)**	0.72**(S)**	3252.46
	Military	---	10000	2.30	1.06	7.60	0.46	---	0.03	0.03	3252.46
	Afterburner	---	66747	4.60	1.06	16.70	0.12	---	0.05	0.05	3252.46
Notes: 3g, 4e (all emission factors and fuel flow rates for Approach and Intermediate Power settings), 5, 8, 12h											

Table 2-8. Criteria Pollutants, Ozone Precursors, and Total HAPs (continued)

Aircraft Engine	Power Setting	Percent Thrust/hp	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)							
				NO_X	SO_X[1]	CO	VOC	HAP's	PM_{10}	$PM_{2.5}$	GHG[2]
F101-GE-102	Idle (Taxi)	5%	1117	4.10	1.06	24.46	0.16	0.256	2.18	0.96	3252.46
	Approach	47%	4533	9.16	1.06	1.03	0.02	0.092	4.21	3.74	3252.46
	Intermediate	66%	6557	13.15	1.06	0.85	0.04	0.082	1.35	0.72	3252.46
	Military	77%	7828	12.83	1.06	0.83	0.12	0.266	1.68	1.20	3252.46
	Afterburner-1	106%	15314	16.92	1.06	43.49	1.46	1.111	2.87	2.40	3252.46
Notes: 3c, 10, 12e											
F103-GE-100, -101	Idle (Taxi)	7%	1706	3.60	1.06	61.79	21.80	---	2.80**(S)**	2.49**(S)**	3252.46
	Approach	30%	5238	9.50	1.06	4.30	1.00	---	1.20**(S)**	0.44**(S)**	3252.46
	Intermediate	70%	15675	29.79	1.06	0.50	0.70	---	0.89**(S)**	0.37**(S)**	3252.46
	Military	100%	19738	36.54	1.06	0.50	0.60	---	1.18**(S)**	0.77**(S)**	3252.46
Notes: 3f, 4f (PM_{10} and $PM_{2.5}$ data at all power settings), 8, 12g											
F108-CF-100	Idle (Taxi)	9%	1136	3.88	1.06	23.65	0.19	0.208	2.07	0.16	3252.46
	Approach	30%	2547	5.73	1.06	8.57	0.06	0.084	1.55	0.76	3252.46
	Intermediate	70%	5650	11.04	1.06	2.32	0.03	0.069	0.65	0.36	3252.46
	Military	78%	6458	12.05	1.06	0.36	0.03	0.018	1.59	1.02	3252.46
Notes: 3c, 10, 12e											
F108-CF-201	Idle (Taxi)	7%	1016	4.00	1.06	30.70	2.10	---	0.06	0.06	3252.46
	Approach	30%	2468	8.20	1.06	4.20	0.09	---	0.06	0.05	3252.46
	Climb out	70%	6500	16.00	1.06	0.90	0.06	---	0.05	0.05	3252.46
	Takeoff	100%	7818	18.50	1.06	0.90	0.05	---	0.07	0.06	3252.46
Notes: 3b (This is the military designation of the CFM56-2B-1 Engine), 5, 6, 8, 10, 12a											
F110-GE-100	Idle (Taxi)	3%	1111	3.77	1.06	24.11	0.22	0.184	2.60	1.12	3252.46
	Approach	44%	5080	9.78	1.06	5.77	0.03	0.029	1.37	0.91	3252.46
	Intermediate	66%	7332	16.92	1.06	3.47	0.05	0.054	0.58	0.41	3252.46
	Military	100%	11358	29.00	1.06	3.38	0.04	0.050	0.14	0.00	3252.46
	Afterburner-1	113%	18088	14.26	1.06	67.41	1.21	0.808	3.35	2.98	3252.46
Notes: 3c, 10, 12e											
F110-GE-129	Idle (Taxi)	4%	961	2.62	1.06	45.04	4.90	---	2.60**(S)**	1.12**(S)**	3252.46
	Approach	45%	4832	13.42	1.06	1.93	0.03**(S)**	---	1.37**(S)**	0.91**(S)**	3252.46
	Intermediate	65%	6939	17.82	1.06	1.53	0.05**(S)**	---	0.58**(S)**	0.41**(S)**	3252.46
	Military	76%	8611	20.34	1.06	1.17	0.93	---	0.14**(S)**	0.00**(S)**	3252.46
	Afterburner-1	99%	15564	7.09	1.06	63.28	53.46	---	3.35**(S)**	2.98**(S)**	3252.46
Notes: 3c, 4g (for VOC data for Approach and Intermediate settings and PM_{10} and $PM_{2.5}$ for all power settings), 5, 10, 12e											
F110-GE-400	Idle (Taxi)	7%	1287	2.76	1.06	16.57	3.48	---	0.02	0.02	3252.46
	Approach	30%	5809	12.41	1.06	0.96	0.44	---	0.02	0.02	3252.46
	Climb out	70%	11868	58.57	1.06	0.84	0.38	---	0.26	0.23	3252.46
	Takeoff	100%	11833	28.47	1.06	0.84	0.38	---	0.31	0.28	3252.46
Notes: 3m, 11, 12h											
F113-RR-100	Idle (Taxi)	7%	1008	3.60	1.06	31.77	4.24	---	0.16	0.15	3252.46
	Approach	30%	2206	7.20	1.06	2.65	0.21	---	0.22	0.20	3252.46
	Climb out	85%	5762	17.30	1.06	0.63	0.14	---	0.24	0.22	3252.46
	Takeoff	100%	7071	22.70	1.06	0.12	0.10	---	0.23	0.21	3252.46
Notes: 3b (This is the military designation of the SPEY Mk511 engine), 5, 6, 8, 10, 12h											
F117-PW-100	Idle (Taxi)	4%	978	3.76	1.06	22.70	0.37	0.311	10.67	8.75	3252.46
	Approach	31%	4645	15.49	1.06	0.51	0.05	0.033	5.53	5.10	3252.46
	Intermediate	68%	10408	32.72	1.06	0.32	0.04	0.026	2.31	1.42	3252.46
	Takeoff	---	13905**(S)**	35.04**(S)**	1.06	0.32**(S)**	0.01**(S)**	0.015**(C)**	0.06**(S)**	0.05**(S)**	3252.46
Notes: 3c, 4a (HAPs at Takeoff setting only), 4h (All remaining Emission Factors at Takeoff setting), 10, 12e											

Table 2-8. Criteria Pollutants, Ozone Precursors, and Total HAPs (continued)

Aircraft Engine	Power Setting	Percent Thrust/hp	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)							
				NO_X	SO_X[1]	CO	VOC	HAP's	PM_{10}	$PM_{2.5}$	GHG^2
F118-GE-100	Idle (Taxi)	---	1097	4.30	1.06	20.98	0.29	0.249	1.25	1.03	3252.46
	Approach	---	3773	11.09	1.06	2.02	0.05	0.031	4.70	2.32	3252.46
	Intermediate	---	6350	18.01	1.06	0.85	0.03	0.022	3.05	2.72	3252.46
	Military	---	10887	33.12	1.06	0.65	0.03	0.008	1.64	1.48	3252.46
Notes: 3c, 10, 12e											
F119-PW-100	Idle (Taxi)	10%	1377	3.01	1.06	48.15	1.67	1.493	2.42	1.76	3252.46
	Approach	20%	2740	6.59	1.06	7.92	0.05	0.048	1.96	1.73	3252.46
	Intermediate	70%	10110	12.40	1.06	2.14	0.03	0.030	1.40	1.09	3252.46
	Military	100%	18612	19.81	1.06	0.75	0.01	0.010	1.12	0.97	3252.46
	Afterburner	150%	50170	7.37	1.06	16.10	0.00**(C)**	0.024**(C)**	0.40**(C)**	0.89**(C)**	3252.46
Notes: 3d, 4a (VOC, HAP, PM_{10}, and $PM_{2.5}$ Emission factors for afterburner setting only), 10, 12e											
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)	7%	1251	1.80	1.06	106.08	18.75	---	0.49	0.44	3252.46
	Approach	30%	3735	4.99	1.06	21.46	1.05	---	0.30	0.27	3252.46
	Intermediate	70%	7125	9.48	1.06	8.35	0.43	---	0.30	0.27	3252.46
	Military	100%	8094	10.78	1.06	6.93	0.43	---	0.32	0.29	3252.46
Notes: 3m, 11, 12h											
F402-RR-408	Idle (Taxi)	7%	1449	2.20	1.06	39.72	2.41	---	0.16	0.14	3252.46
	Approach	30%	3974	5.02	1.06	16.57	0.46	---	0.19	0.17	3252.46
	Intermediate	70%	7290	7.55	1.06	9.79	0.20	---	0.02	0.02	3252.46
	Military	100%	8494	8.38	1.06	8.58	0.20	---	0.21	0.19	3252.46
Notes: 3m, 11, 12h											
F404-GE-400, -F1D2	Idle (Taxi)	6%	685	1.70	1.06	110.18	3.39	2.925	4.47	3.10	3252.46
	Approach	38%	3111	7.86	1.06	2.02	0.04	0.038	1.46	0.87	3252.46
	Intermediate	79%	6464	17.03	1.06	1.54	0.07	0.042	1.57	0.90	3252.46
	Military	91%	7739	25.83	1.06	1.48	0.02	0.016	1.61	0.89	3252.46
	Afterburner-3	114%	15851	5.43	1.06	50.31	1.85	1.183	3.57	3.21	3252.46
Notes: 3c, 10, 12e, 13											
IO-360-B	Idle (Taxi)	5-10%	8	1.16	1.06	897.40	56.58	---	60.00**(S)**	54.00**(S)**	3252.46
	Approach	30%	37	10.16	1.06	691.26	11.15	---	47.95**(S)**	43.16**(S)**	3252.46
	Climb out	75%	72	4.59	1.06	983.26	9.38	---	40.00**(S)**	36.00**(S)**	3252.46
	Takeoff	100%	103	1.99	1.06	1199.03	11.50	---	20.00**(S)**	18.00**(S)**	3252.46
Notes: 3a, 4b (for PM_{10} and $PM_{2.5}$ at all power settings), 5, 11, 12h											
IO-360-D	Idle (Taxi)	---	30	1.10	1.06	848.00	166.75	---	60.00	54.00	3252.46
	Approach	---	50	4.00	1.06	912.45	54.17	---	47.95	43.16	3252.46
	Intermediate	---	70	6.60	1.06	972.00	20.01	---	40.00	36.00	3252.46
	Military	---	90	5.80	1.06	1030.00	25.88	---	20.00	18.00	3252.46
Notes: 3g, 5, 12h											
J33-A-35	Idle (Taxi)	---	1190	1.50	1.06	127.00	22.43	---	0.73	0.66	3252.46
	Approach	---	1984	1.90	1.06	84.60	7.48	---	0.57	0.51	3252.46
	Intermediate	---	4762	2.70	1.06	49.10	1.50	---	0.02	0.02	3252.46
	Military	---	5556	3.60	1.06	31.30	0.58	---	0.02	0.02	3252.46
Notes: 3g, 5, 7, 8, 12h											

Table 2-8. Criteria Pollutants, Ozone Precursors, and Total HAPs (continued)

Aircraft Engine	Power Setting	Percent Thrust/hp	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)							
				NO_X	SO_X[1]	CO	VOC	HAP's	PM_{10}	$PM_{2.5}$	GHG^2
J52-P-6B	Idle (Taxi)	<35%	714	2.07	1.06	86.37	27.46	---	19.94	17.95	3252.46
	3000lb Thrust	35% **(C)**	2301	3.91	1.06	16.57	0.94	---	0.18**(S)**	0.16**(S)**	3252.46
	75% Thrust	75%	3977	5.84	1.06	6.00	0.75	---	0.18**(S)**	0.16**(S)**	3252.46
	Military	>75%	6328	9.00	1.06	3.01	0.38	---	7.75	6.98	3252.46
Notes: 3i, 4i (for PM_{10} and $PM_{2.5}$ at 3000lb and 75% thrust power settings only), 5, 7, 8, 11 (percent thrust for 3000lb setting assumes maximum thrust of 8500lb for this engine), 12h											
J52-P-8B	Idle (Taxi)	<32%	680	1.79	1.06	63.78	48.53	---	0.18**(S)**	0.16**(S)**	3252.46
	3000lb Thrust	32% **(C)**	2300	6.34	1.06	10.54	1.98	---	0.18**(S)**	0.16**(S)**	3252.46
	75% Thrust	75%	4320	10.10	1.06	3.00	0.67	---	0.13**(S)**	0.12**(S)**	3252.46
	Military	>75%	7370	13.05	1.06	0.71	1.07	---	0.13**(S)**	0.12**(S)**	3252.46
Notes: 3i, 4i (for PM_{10} and $PM_{2.5}$ at all power settings), 5, 11 (percent thrust for 3000lb setting assumes maximum thrust of 9300lb for this engine), 12h											
J52-P-408	Idle (Taxi)	7%	1466	2.79	1.06	50.10	3.62	---	0.18	0.16	3252.46
	Approach	30%	3325	7.25	1.06	16.07	0.29	---	0.18	0.16	3252.46
	Intermediate	70%	6502	7.53	1.06	7.70	0.03	---	0.13	0.12	3252.46
	Military	100%	6483	7.53	1.06	7.70	0.03	---	0.13	0.12	3252.46
Notes: 3m, 5, 11, 12h											
J57-P-10	Idle (Taxi)	<75%	1100	1.87	1.06	80.52	111.09	---	0.16**(S)**	0.14**(S)**	3252.46
	75% Thrust	75%	5670	7.40	1.06	3.21	0.87	---	0.93**(S)**	0.84**(S)**	3252.46
	Normal Rated	76-99%	7250	9.00	1.06	1.79	1.15	---	1.92**(S)**	1.73**(S)**	3252.46
	Military	100%	8370	10.37	1.06	1.16	0.99	---	1.72**(S)**	1.55**(S)**	3252.46
Notes: 3i, 4j (for PM_{10} and $PM_{2.5}$ at all power settings), 5, 11 (assumes 100% thrust at Military setting), 12h											
J57-P-19W	Idle (Taxi)	---	952	2.20	1.06	79.00	88.55	---	0.16	0.14	3252.46
	Approach	---	3333	5.80	1.06	7.90	1.61	---	0.93	0.84	3252.46
	Intermediate	---	6508	9.50	1.06	2.40	0.23	---	1.92	1.73	3252.46
	Military	---	7460	11.00	1.06	1.90	0.12	---	1.72	1.55	3252.46
Notes: 3g, 5, 7, 8, 12h											
J57-P-420	Idle (Taxi)	<30%	1322	1.53	1.06	80.74	87.93	---	0.16**(S)**	0.14**(S)**	3252.46
	30% Thrust	30%	3413	4.45	1.06	14.83	5.22	---	0.93**(S)**	0.84**(S)**	3252.46
	75% Thrust	75%	5767	6.99	1.06	4.32	1.25	---	1.92**(S)**	1.73**(S)**	3252.46
	Intermediate	75-100%	10570	12.97	1.06	0.34	0.56	---	1.72**(S)**	1.55**(S)**	3252.46
	Afterburner	>100%	39721	5.16	1.06	14.20	2.92	---	3.10**(C)**	2.79**(C)**	3252.46
Notes: 3i, 4a (for PM_{10} and $PM_{2.5}$ at Afterburner setting), 4j (for PM_{10} and $PM_{2.5}$ at all other settings), 5, 11, 12h											
J57-P/F-43WB	Idle (Taxi)	---	952	2.20	1.06	78.00	86.25	---	0.14	0.13	3252.46
	Approach	---	1825	4.45	1.06	16.85	6.33	---	0.41	0.37	3252.46
	Intermediate	---	6667	9.90	1.06	2.30	0.12	---	1.23	1.11	3252.46
	Military	---	7778	11.00	1.06	1.50	0.12	---	1.74	1.57	3252.46
Notes: 3g, 5, 7, 8, 12h											
J57-P/F-59W	Idle (Taxi)	---	1270	2.40	1.06	65.00	60.84	---	0.13	0.12	3252.46
	Approach	---	1825	3.30	1.06	32.50	16.33	---	0.22	0.20	3252.46
	Intermediate	---	3889	6.10	1.06	8.90	1.27	---	0.60	0.54	3252.46
	Military	---	7937	11.30	1.06	2.40	0.23	---	0.84	0.76	3252.46
Notes: 3g, 5, 7, 8, 12h											
J60-P-3A	Idle (Taxi)	---	556	1.50	1.06	70.00	10.58	---	0.02	0.02	3252.46
	Approach	---	556	1.70	1.06	50.50	6.44	---	0.02	0.02	3252.46
	Intermediate	---	1429	4.00	1.06	5.80	0.23	---	0.23	0.21	3252.46
	Military	---	3413	4.60	1.06	4.00	0.12	---	0.17	0.15	3252.46
Notes: 3g, 5, 7, 8, 12h											

Table 2-8. Criteria Pollutants, Ozone Precursors, and Total HAPs (continued)

Aircraft Engine	Power Setting	Percent Thrust/hp	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)							
				NO_X	SO_X[1]	CO	VOC	HAP's	PM_{10}	$PM_{2.5}$	GHG[2]
J60-P-5A, -5B	Idle (Taxi)	---	476	1.50	1.06	70.00	10.58	---	0.02	0.02	3252.46
	Approach	---	556	1.70	1.06	50.50	6.44	---	0.02	0.02	3252.46
	Intermediate	---	1429	4.00	1.06	5.80	0.23	---	0.23	0.21	3252.46
	Military	---	2460	4.60	1.06	4.00	0.12	---	0.17	0.15	3252.46
Notes: 3g, 5, 7, 8, 12h											
J65-W-5F	Idle (Taxi)	---	1320	2.46	1.06	47.16	11.25	---	0.18**(S)**	0.16**(S)**	3252.46
	7450 rpm	---	4370	7.30	1.06	12.61	1.09	---	0.18**(S)**	0.16**(S)**	3252.46
	8000 rpm	---	5970	5.71	1.06	7.39	0.83	---	0.13**(S)**	0.12**(S)**	3252.46
	8300 rpm	---	7040	5.15	1.06	4.57	0.38	---	0.13**(S)**	0.12**(S)**	3252.46
	Military	---	6946	5.23	1.06	5.31	0.70	---	0.13**(S)**	0.12**(S)**	3252.46
Notes: 3i, 4i (PM_{10} and $PM_{2.5}$ at all power settings), 5, 12h											
J65-W-20	Idle (Taxi)	---	1333	2.78	1.06	50.19	4.31	---	0.18**(S)**	0.16**(S)**	3252.46
	75% rpm	---	2346	4.82	1.06	21.82	1.57	---	0.18**(S)**	0.16**(S)**	3252.46
	85% rpm	---	3260	7.27	1.06	16.14	0.32	---	0.18**(S)**	0.16**(S)**	3252.46
	90% rpm	---	3951	7.97	1.06	14.30	0.15	---	0.13**(S)**	0.12**(S)**	3252.46
	Intermediate (Mil)	---	6421	7.55	1.06	7.72	0.04	---	0.13**(S)**	0.12**(S)**	3252.46
Notes: 3a, 4i (PM_{10} and $PM_{2.5}$ at all power settings), 5, 12h											
J69-T-25	Idle (Taxi)	4%	167	0.80	1.06	160.08	2.33	1.773	3.15	1.47	3252.46
	Approach	30%	473**(C)**	1.41**(C)**	1.06	89.40**(C)**	0.50**(C)**	0.500**(C)**	1.87**(C)**	0.87**(C)**	3252.46
	Intermediate	63%	872	2.92	1.06	38.27	0.06	0.072	0.94	0.39	3252.46
	Military	84%	1085	4.53	1.06	32.86	0.03	0.069	0.67	0.38	3252.46
Notes: 3c, 4a (for all values for Approach power setting only), 7, 8, 10, 12e											
J75-P-17	Idle (Taxi)	---	1700	2.20	1.06	129.50	111.21	---	0.47	0.42	3252.46
	Approach	---	11300	134.50	1.06	15.80	1.27	---	0.10	0.09	3252.46
	Intermediate	---	12386**(C)**	124.83**(C)**	1.06	11.06**(C)**	2.52**(C)**	---	0.64**(C)**	0.58**(C)**	3252.46
	Military	---	13200	108.20	1.06	7.90	3.45	---	1.05	0.95	3252.46
	Afterburner	---	53700	220.20	1.06	644.40	7.36	---	1.43**(C)**	1.29**(C)**	3252.46
Notes: 3a, 4a (for all values for Intermediate setting and PM_{10} and $PM_{2.5}$ at Afterburner setting), 5, 7, 8, 11 (assumes military setting has maximum percent thrust of 100%), 12h											
J79-GE-8D	Idle (Taxi)	7%	1325	2.36	1.06	55.59	16.14	---	0.44	0.40	3252.46
	75% rpm	30%	1550	2.97	1.06	30.55	4.20	---	0.90	0.81	3252.46
	87% rpm	70%	8310	8.44	1.06	2.56	0.12	---	0.15	0.14	3252.46
	Military	100%	9544	10.42	1.06	2.56	0.12	---	0.18	0.16	3252.46
	Afterburner	110-150%	34647	4.71	1.06	8.14	0.19	---	0.56	0.50	3252.46
Notes: 3m, 5, 11, 12h											
J79-GE-10D	Idle (Taxi)	7%	1375	1.33	1.06	111.18	37.37	---	0.88	0.79	3252.46
	Approach	30%	3490	4.22	1.06	20.00	2.80	---	0.63	0.57	3252.46
	Intermediate	70%	7674	8.24	1.06	4.69	1.34	---	0.72	0.65	3252.46
	Military	100%	10097	10.24	1.06	2.83	1.34	---	0.72	0.65	3252.46
	Afterburner	110-150%	35339	4.50	1.06	8.63	1.01	---	0.37	0.33	3252.46
Notes: 3m, 5, 11, 12h											
J79-GE-15	Idle (Taxi)	---	1111	2.50	1.06	57.00	13.80	---	0.50	0.45	3252.46
	Approach	---	3492	4.80	1.06	9.40	1.27	---	1.80	1.62	3252.46
	Intermediate	---	5397	5.60	1.06	4.60	0.35	---	2.80	2.52	3252.46
	Military	---	8889	8.90	1.06	2.20	0.23	---	2.20	1.98	3252.46
	Afterburner	---	32223	9.10	1.06	4.00	0.01	---	0.15	0.14	3252.46
Notes: 3g, 5, 7, 8, 12h											
J79-GE-17	Idle (Taxi)	---	1032	2.70	1.06	66.00	26.57	---	0.18	0.16	3252.46
	Approach	---	3492	4.50	1.06	15.40	0.58	---	0.51	0.46	3252.46
	Intermediate	---	6984	5.80	1.06	7.80	0.12	---	0.72	0.65	3252.46
	Military	---	9841	10.60	1.06	5.20	0.12	---	0.92	0.83	3252.46
	Afterburner	---	34921	8.10	1.06	4.00	0.01	---	0.15	0.14	3252.46
Notes: 3g, 5, 7, 8, 12h											

Table 2-8. Criteria Pollutants, Ozone Precursors, and Total HAPs (continued)

Aircraft Engine	Power Setting	Percent Thrust/hp	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)							
				NO_X	SO_X[1]	CO	VOC	HAP's	PM_{10}	$PM_{2.5}$	GHG[2]
J85-GE-5A	Idle (Taxi)	4%	434	1.34	1.06	250.22	2.00	1.535	4.70	4.02	3252.46
	Approach	13%**(C)**	864**(C)**	1.42**(C)**	1.06	154.82**(C)**	1.29**(C)**	1.127**(C)**	2.80**(C)**	1.85**(C)**	3252.46
	Intermediate	15%	950	1.47	1.06	104.02	0.92	0.909	1.79	0.69	3252.46
	Military	88%	2740	2.64	1.06	32.91	0.12	0.125	1.13	0.04	3252.46
	Afterburner-1	116%	8138	1.98	1.06	13.46	0.05	0.045	0.25	0.09	3252.46
Notes: 3c, 4a (for all values for Approach power setting), 10, 12e											
J85-GE-5F	Idle (Taxi)	---	524	1.34	1.06	178.05	34.46	---	4.70**(S)**	4.02**(S)**	3252.46
	75% rpm	---	798	2.13	1.06	78.20	2.59	---	3.01**(C)**	1.84**(C)**	3252.46
	85% rpm	---	1098	2.73	1.06	58.01	1.36	---	2.15**(C)**	1.20**(C)**	3252.46
	Intermediate	---	1297	2.31	1.06	43.02	3.99	---	1.79**(S)**	0.69**(S)**	3252.46
	Afterburner	---	8470	2.60	1.06	29.00	0.92	---	0.25**(S)**	0.09**(S)**	3252.46
Notes: 3a, 4a (for PM_{10} and $PM_{2.5}$ at 75% rpm and 85% rpm power settings), 4k (PM_{10} and $PM_{2.5}$ for remaining power settings), 5, 12h											
J85-GE-5H	Idle (Taxi)	---	434	1.14	1.06	211.97	39.12	---	4.70**(S)**	4.02**(S)**	3252.46
	Approach	---	864**(C)**	1.53**(C)**	1.06	154.2**(C)**	17.84**(C)**	---	2.80**(S)**	1.85**(S)**	3252.46
	Intermediate	---	950	1.74	1.06	123.43	6.51	---	1.79**(S)**	0.69**(S)**	3252.46
	Military	---	2740	2.92	1.06	36.40	0.67	---	1.13**(S)**	0.04**(S)**	3252.46
	Afterburner	---	8138	2.09	1.06	14.19	2.63	---	0.25**(S)**	0.09**(S)**	3252.46
Notes: 3j, 4a (for fuel flow rate, NO_X, CO and VOC values at Approach power setting), 4k (PM_{10} and $PM_{2.5}$ at all power settings), 10, 12h											
J85-GE-5M	Idle (Taxi)	---	525	0.79	1.06	191.41	4.01	3.112	7.02	4.90	3252.46
	Approach	---	871**(C)**	1.47**(C)**	1.06	96.59**(C)**	1.70**(C)**	1.34**(C)**	10.53**(C)**	8.05**(C)**	3252.46
	Intermediate	---	1045	1.81	1.06	48.90	0.54	0.452	12.30	9.63	3252.46
	Military	---	2550	1.65	1.06	25.35	0.04	0.033	4.25	2.43	3252.46
	Afterburner	---	7695	1.21	1.06	10.19	0.05**(S)**	0.045**(S)**	0.25**(S)**	0.09**(S)**	3252.46
Notes: 3j, 4a (for all values for Approach setting), 4k (for VOC, HAPs, PM_{10} and $PM_{2.5}$ at Afterburner power setting only), 10, 12f											
J85-GE-5R	Idle (Taxi)	---	520	1.08	1.06	177.45	16.80	---	4.70**(S)**	4.02**(S)**	3252.46
	Approach	---	854**(C)**	0.84**(C)**	1.06	106.29**(C)**	7.84**(C)**	---	2.80**(S)**	1.85**(S)**	3252.46
	Intermediate	---	1030	0.70	1.06	65.07	2.78	---	1.79**(S)**	0.69**(S)**	3252.46
	Military	---	2220	1.92	1.06	30.99	0.75	---	1.13**(S)**	0.04**(S)**	3252.46
	Afterburner	---	7695	6.23	1.06	53.43	6.97	---	0.25**(S)**	0.09**(S)**	3252.46
Notes: 3j, 4a (for fuel flow rate, NO_X, CO, and VOC values at Approach power setting), 4k (PM_{10} and $PM_{2.5}$ at all power settings), 5, 10, 12f											
J85-GE-13	Idle (Taxi)	---	556	1.30	1.06	178.00	34.50	---	0.00	0.00	3252.46
	Approach	---	1230	2.05	1.06	58.30	5.69	---	0.01	0.01	3252.46
	Intermediate	---	2222	2.30	1.06	43.00	4.03	---	0.01	0.01	3252.46
	Military	---	2778	2.60	1.06	29.00	0.92	---	0.02	0.02	3252.46
	Afterburner	---	8968	2.00	1.06	26.00	0.08	---	0.01	0.01	3252.46
Notes: 3g, 5, 7, 8, 9, 12h											
J85-GE-17A	Idle (Taxi)	---	556	1.30	1.06	178.00	34.50	---	0.00**(S)**	0.00**(S)**	3252.46
	Approach	---	1230	2.05	1.06	58.30	5.69	---	0.01**(S)**	0.01**(S)**	3252.46
	Intermediate	---	2222	2.30	1.06	43.00	4.03	---	0.01**(S)**	0.01**(S)**	3252.46
	Military	---	3810	2.60	1.06	29.00	0.92	---	0.02**(S)**	0.02**(S)**	3252.46
Notes: 3g, 4c (PM_{10} and $PM_{2.5}$ for all power settings), 5, 7, 8, 10, 12h											
J85-GE-21	Idle (Taxi)	---	400	1.25	1.06	159.00	27.89	---	0.00**(S)**	0.00**(S)**	3252.46
	75% rpm	---	700	2.00	1.06	92.14	14.29	---	0.01**(S)**	0.01**(S)**	3252.46
	85% rpm	---	1200	2.92	1.06	46.17	2.97	---	0.01**(S)**	0.01**(S)**	3252.46
	Intermediate (Military)	---	3200	5.00	1.06	21.56	0.29	---	0.02**(S)**	0.02**(S)**	3252.46
	Afterburner	---	10650	5.60	1.06	36.40	0.12	---	0.01**(S)**	0.01**(S)**	3252.46
Notes: 3a, 4c (PM_{10} and $PM_{2.5}$ at all power settings), 5, 7, 8, 12h											
JT8D-9A	Idle (Taxi)	7%	1155	2.89	1.06	14.11	2.95	---	0.21	0.19	3252.46
	Approach	30%	2409	5.99	1.06	2.14	0.57	---	0.25	0.23	3252.46
	Intermediate	70%	6794	14.47	1.06	1.07	0.16	---	0.27	0.24	3252.46
	Military	100%	8334	19.26	1.06	1.07	0.16	---	0.27	0.24	3252.46
Notes: 3m, 11, 12h											

Table 2-8. Criteria Pollutants, Ozone Precursors, and Total HAPs (continued)

Aircraft Engine	Power Setting	Percent Thrust/hp	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)							
				NO_X	SO_X[1]	CO	VOC	HAP's	PM_{10}	$PM_{2.5}$	GHG[2]
LF507-1F	Idle (Taxi)	7%	360	3.28	1.06	37.83	5.43	---	0.13	0.12	3252.46
	Approach	30%	860	6.39	1.06	4.43	0.14	---	0.09	0.08	3252.46
	Climb out	85%	2350	12.02	1.06	0.30	0.01	---	0.09	0.08	3252.46
	Takeoff	100%	2840	14.52	1.06	0.20	0.01	---	0.08	0.08	3252.46
Notes: 3b, 5, 6, 8, 10, 12b											
O-200	Idle (Taxi)	<40%	8	1.58	1.06	644.42	33.36	---	60.00**(S)**	54.00**(S)**	3252.46
	Approach	40%	26	1.14	1.06	1187.84	38.20	---	47.95**(S)**	43.16**(S)**	3252.46
	Climb out	75-100%	45	4.87	1.06	974.10	23.93	---	40.00**(S)**	36.00**(S)**	3252.46
	Takeoff	100%	45	4.87	1.06	974.10	23.93	---	20.00**(S)**	18.00**(S)**	3252.46
Notes: 3a, 4b (PM_{10} and $PM_{2.5}$ at all power settings), 5, 11, 12h											
O-320	Idle (Taxi)	<40%	9	0.52	1.06	1077.00	42.46	---	60.00**(S)**	54.00**(S)**	3252.46
	Approach	40%	47	0.95	1.06	1221.51	22.13	---	47.95**(S)**	43.16**(S)**	3252.46
	Climb out	75-100%	67	3.97	1.06	989.51	14.24	---	40.00**(S)**	36.00**(S)**	3252.46
	Takeoff	100%	89	2.19	1.06	1077.44	13.55	---	20.00**(S)**	18.00**(S)**	3252.46
Notes: 3a, 4b (PM_{10} and $PM_{2.5}$ at all power settings), 5, 11, 12h											
O-470C	Idle (Taxi)	5-10%	15	1.32	1.06	736.84	219.41	---	60.00**(S)**	54.00**(S)**	3252.46
	Approach	30%	86	9.35	1.06	691.59	10.75	---	40.00**(S)**	36.00**(S)**	3252.46
	Intermediate	70%**(C)**	111.71**(C)**	4.44**(C)**	1.06	956.61**(C)**	6.61**(C)**	---	40.00**(S)**	36.00**(S)**	3252.46
	Military	100%	131	0.76	1.06	1155.37	3.50	---	20.00**(S)**	18.00**(S)**	3252.46
Notes: 3a, 4a(for all values at Intermediate power setting), 4b (PM_{10} and $PM_{2.5}$ at all power settings), 5, 11, 12h											
PT6A-27	Idle (Taxi)	<30%	115	2.43	1.06	64.00	57.70	---	0.50**(S)**	0.45**(S)**	3252.46
	Approach	30%	215	8.37	1.06	23.26	2.51	---	0.10**(S)**	0.09**(S)**	3252.46
	Climb out	90%	400	7.00	1.06	1.20	0.00	---	0.25**(S)**	0.23**(S)**	3252.46
	Takeoff	100%	425	7.81	1.06	1.01	0.00	---	0.24**(S)**	0.22**(S)**	3252.46
Notes: 3a, 4l (PM_{10} and $PM_{2.5}$ at all power settings), 5, 11, 12h											
PT6A-38	Idle (Taxi)	7%	103	2.09	1.06	82.44	2.09	---	0.50	0.45	3252.46
	Approach	30%	275	4.79	1.06	7.29	0.00	---	0.10	0.09	3252.46
	Climb out	70%	450	6.69	1.06	2.17	0.00	---	0.25	0.23	3252.46
	Takeoff	90%	489	7.08	1.06	2.05	0.00	---	0.24	0.22	3252.46
Notes: 3m, 11, 12h											
PT6A-41	Idle (Taxi)	<30%	147	1.97	1.06	115.31	116.88	---	0.50**(S)**	0.45**(S)**	3252.46
	Approach	30%	273	4.65	1.06	34.80	26.12	---	0.10**(S)**	0.09**(S)**	3252.46
	Climb out	90%	473	7.57	1.06	6.49	2.33	---	0.25**(S)**	0.23**(S)**	3252.46
	Takeoff	100%	510	7.98	1.06	5.10	2.01	---	0.24**(S)**	0.22**(S)**	3252.46
Notes: 3a, 4l (PM_{10} and $PM_{2.5}$ for all power settings), 5, 11, 12h											
PT6A-42	Idle (Taxi)	7%	103	2.16	1.06	76.55	16.61	---	0.45	0.41	3252.46
	Approach	30%	275	4.89	1.06	6.89	0.00	---	0.10	0.09	3252.46
	Intermediate	70%	466	6.88	1.06	1.95	0.00	---	0.24	0.22	3252.46
	Military	90%	513	7.28	1.06	1.95	0.00	---	0.23	0.21	3252.46
Notes: 3m, 11, 12h											
PT6A-65	Idle (Taxi)	7%	131	1.89	1.06	166.43	53.66	---	1.23	1.11	3252.46
	Approach	30%	340	4.59	1.06	20.86	3.31	---	0.74	0.67	3252.46
	Intermediate	70%	571	6.69	1.06	6.72	0.72	---	0.29	0.26	3252.46
	Military	90%	633	7.08	1.06	5.36	0.53	---	0.26	0.23	3252.46
Notes: 3m, 11, 12h											

Table 2-8. Criteria Pollutants, Ozone Precursors, and Total HAPs (continued)

Aircraft Engine	Power Setting	Percent Thrust/hp	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)							
				NO_X	SO_X[1]	CO	VOC	HAP's	PM_{10}	$PM_{2.5}$	GHG[2]
PT6A-67B	Idle (Taxi)	7%	143	1.83	1.06	183.80	61.52	---	1.38	1.24	3252.46
	Approach	30%	364	4.59	1.06	20.96	3.24	---	0.72	0.65	3252.46
	Intermediate	70%	619	6.59	1.06	6.12	0.61	---	0.32	0.29	3252.46
	Military	90%	681	6.98	1.06	5.73	0.45	---	0.25	0.23	3252.46
Notes: 3m, 11, 12h											
PT6A-67D	Idle (Taxi)	7%	149	1.83	1.06	177.91	57.94	---	1.31	1.18	3252.46
	Approach	30%	372	4.69	1.06	19.76	2.93	---	0.66	0.59	3252.46
	Intermediate	70%	643	6.69	1.06	5.35	0.50	---	0.28	0.25	3252.46
	Military	90%	713	7.18	1.06	5.09	0.35	---	0.24	0.22	3252.46
Notes: 3m, 11, 12h											
PT6A-68	Ground Idle	2%	156	1.77	1.06	117.85	7.89	6.802	3.95	2.16	3252.46
	Flight Idle	3%	180	1.95	1.06	94.99	1.33	1.327	4.18	1.96	3252.46
	Descend	19%	328	5.03	1.06	33.69	3.29	3.212	4.15	1.23	3252.46
	Approach	46%	449	4.73	1.06	10.91	0.71	0.698	3.34	0.70	3252.46
	Max. Continuous	88%	612	8.18	1.06	3.88	0.20	0.105	4.30	0.61	3252.46
Notes: 3k, 10, 11 (percent hp calculated assuming maximum hp of 1250 per manufacturer's stated specifications), 12f											
PW2040	Idle (Taxi)	7%	1262	4.37	1.06	19.95	1.90	---	0.05	0.05	3252.46
	Approach	30%	3937	10.49	1.06	1.42	0.12	---	0.07	0.06	3252.46
	Climb out	85%	11468	26.62	1.06	0.41	0.02	---	0.08	0.08	3252.46
	Takeoff	100%	13905	35.04	1.06	0.32	0.01	---	0.06	0.05	3252.46
Notes: 3b, 5, 6, 8, 10, 12a											
PW2041	Idle (Taxi)	7%	1388	4.49	1.06	23.05	2.13	---	0.15	0.14	3252.46
	Approach	30%	4184	10.98	1.06	2.49	0.15	---	0.13	0.12	3252.46
	Climb out	70%	12345	28.94	1.06	0.20	0.03	---	0.12	0.11	3252.46
	Takeoff	100%	15362	36.92	1.06	0.20	0.03	---	0.12	0.11	3252.46
Notes: 3m, 11, 12h											
R-1820-82	Idle (Taxi)	---	89	0.00	1.06	474.16	173.15	---	60.00**(S)**	54.00**(S)**	3252.46
	Approach	---	323	6.50	1.06	384.83	6.41	---	47.95**(S)**	43.16**(S)**	3252.46
	Climb out	---	862	2.09	1.06	435.03	55.77	---	40.00**(S)**	36.00**(S)**	3252.46
	Takeoff	---	1166	1.72	1.06	531.73	108.89	---	20.00**(S)**	18.00**(S)**	3252.46
Notes: 3a, 4b (for PM_{10} and $PM_{2.5}$ at all power settings), 5, 12h											
T53-L-11D	Ground Idle	---	145	1.58	1.06	31.51	66.80	---	1.44**(S)**	1.30**(S)**	3252.46
	Flight Idle	---	222	2.53	1.06	37.79	15.61	---	2.95**(S)**	2.66**(S)**	3252.46
	Normal Rated	---	645	6.43	1.06	6.83	0.66	---	0.31**(S)**	0.28**(S)**	3252.46
	Military	---	685	6.34	1.06	3.34	0.30	---	0.36**(S)**	0.32**(S)**	3252.46
	Takeoff		690	7.75	1.06	3.85	0.31	---	0.36**(S)**	0.32**(S)**	3252.46
Notes: 3i, 4m (for PM_{10} and $PM_{2.5}$ for all power settings), 5, 12h											
T53-L-13	Idle (Taxi)	7%	160	1.58	1.06	31.45	64.28	---	1.44	1.30	3252.46
	Approach	30%	227	2.52	1.06	37.71	15.02	---	2.95	2.66	3252.46
	Climb out	70%	694	6.33	1.06	3.59	0.30	---	0.31	0.28	3252.46
	Takeoff	90%	696	7.73	1.06	3.59	0.30	---	0.36	0.32	3252.46
Notes: 3m, 11, 12h											
T56 Series I	Idle (Taxi)	7%	829	7.33	1.06	5.73	0.86	---	0.12	0.11	3252.46
	Approach	30%	1036	7.12	1.06	4.70	0.61	---	0.22	0.20	3252.46
	Intermediate	70%	1824	9.61	1.06	2.84	0.31	---	0.28	0.25	3252.46
	Military	90%	2059	9.87	1.06	2.82	0.31	---	0.28	0.25	3252.46
Notes: 3m, 11, 12h											

Table 2-8. Criteria Pollutants, Ozone Precursors, and Total HAPs (continued)

Aircraft Engine	Power Setting	Percent Thrust/hp	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)							
				NO_X	SO_X[1]	CO	VOC	HAP's	PM_{10}	$PM_{2.5}$	GHG[2]
T56 Series III	Idle (Taxi)	7%	986	6.05	1.06	6.50	0.90	---	0.12	0.11	3252.46
	Approach	30%	1262	9.10	1.06	2.79	0.44	---	0.19	0.17	3252.46
	Intermediate	70%	2210	12.19	1.06	1.47	0.26	---	0.24	0.22	3252.46
	Military	90%	2476	12.76	1.06	1.47	0.26	---	0.26	0.23	3252.46
Notes: 3m, 11, 12h											
T56-A-7	Idle (Taxi)	5%	724	7.58	1.06	5.06	0.08	0.070	3.64	1.88	3252.46
	Approach	15%	880	7.54	1.06	3.89	0.06	0.052	3.85	2.18	3252.46
	Intermediate	61%	1742	9.15	1.06	1.94	0.02	0.018	1.46	0.56	3252.46
	Military	90%	2262	12.46	1.06	2.30	0.01	0.005	1.22	0.33	3252.46
Notes: 3c, 10, 12e											
T56-A-9	Idle	7%	794	3.90	1.06	32.00	24.15	---	0.83	0.75	3252.46
	Approach	30%	830	4.40	1.06	22.20	14.26	---	0.97	0.87	3252.46
	Intermediate	70%	1825	9.20	1.06	2.40	0.58	---	0.51	0.46	3252.46
	Military	100%	1905	9.30	1.06	2.10	0.46	---	0.50	0.45	3252.46
Notes: 3g, 5, 12d											
T56-A-14	Idle (Taxi)	5%	324	3.72	1.06	30.39	15.85	---	0.43	0.39	3252.46
	Approach	15%	839	6.79	1.06	3.49	0.92	---	0.28	0.25	3252.46
	Intermediate	61%	1409	10.30	1.06	1.07	0.04	---	0.17	0.15	3252.46
	Military	90%	1563	12.05	1.06	0.95	0.04	---	0.16	0.14	3252.46
Notes: 3m, 12h											
T56-A-15	Idle (Taxi)	7%	794	3.90	1.06	32.00	24.15	---	0.83	0.75	3252.46
	Approach	30%	1185(**C**)	4.40	1.06	22.20	14.26	---	0.97	0.87	3252.46
	Intermediate	70%	1825	9.20	1.06	2.40	0.58	---	0.51	0.46	3252.46
	Military	90%	2302	9.30	1.06	2.10	0.46	---	0.50	0.45	3252.46
Notes: 3g, 5, 8, 12h											
T56-A-16	Ground Idle	---	756	6.35	1.06	5.65	1.40	---	0.83**(S)**	0.75**(S)**	3252.46
	Flight Idle	---	836	6.52	1.06	4.54	1.09	---	0.97**(S)**	0.87**(S)**	3252.46
	75%	---	1996	9.93	1.06	0.42	0.20	---	0.51**(S)**	0.46**(S)**	3252.46
	100%	---	2136	10.29	1.06	0.68	0.14	---	0.50**(S)**	0.45**(S)**	3252.46
	Military	---	2219	10.45	1.06	0.65	0.16	---	0.50**(S)**	0.45**(S)**	3252.46
Notes: 3i, 4n (for PM_{10} and $PM_{2.5}$ for all power settings), 5, 12h											
T58-GE-5	Idle	---	133	1.50	1.06	169.17	111.54	---	0.75	0.68	3252.46
	Normal Cruise	---	757	6.34	1.06	7.66	1.82	---	0.79	0.71	3252.46
	Intermediate (Military)	---	821	6.70	1.06	6.82	3.78	---	0.97	0.88	3252.46
	Power Takeoff	---	886	7.22	1.06	5.64	0.91	---	0.90	0.81	3252.46
Notes: 3a, 5, 12d											
T58-GE-8F	Idle	---	132	1.43	1.06	178.44	149.98	---	0.75**(S)**	0.68**(S)**	3252.46
	Approach	---	581	4.47	1.06	17.28	1.29	---	0.79**(S)**	0.71**(S)**	3252.46
	Cruise	---	627	4.68	1.06	14.13	0.92	---	0.79**(S)**	0.71**(S)**	3252.46
	Max Continuous	---	685	4.90	1.06	12.96	0.84	---	0.79**(S)**	0.71**(S)**	3252.46
	Takeoff	---	786	5.47	1.06	9.03	0.46	---	0.97**(S)**	0.88**(S)**	3252.46
Notes: 3i, 4s (PM_{10} and $PM_{2.5}$ at all power settings), 5, 12h											
T58-GE-16	Ground Idle	---	150	3.03	1.06	139.73	47.05	---	0.75**(S)**	0.68**(S)**	3252.46
	60% Normal	---	656	7.88	1.06	14.56	0.44	---	0.79**(S)**	0.71**(S)**	3252.46
	75% Normal	---	779	9.47	1.06	10.89	0.72	---	0.79**(S)**	0.71**(S)**	3252.46
	90% Normal	---	890	10.07	1.06	9.10	0.96	---	0.90**(S)**	0.81**(S)**	3252.46
	Military	---	1020	11.60	1.06	7.73	1.52	---	0.90**(S)**	0.81**(S)**	3252.46
Notes: 3i, 4o (PM_{10} and $PM_{2.5}$ at all power settings), 5, 12d											

Table 2-8. Criteria Pollutants, Ozone Precursors, and Total HAPs (continued)

Aircraft Engine	Power Setting	Percent Thrust/hp	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)							
				NO_X	SO_X[1]	CO	VOC	HAP's	PM_{10}	$PM_{2.5}$	GHG[2]
T63-A-5A	Ground Idle	---	61	1.42	1.06	79.15	23.35	---	0.83**(S)**	0.75**(S)**	3252.46
	Flight Idle	---	70	1.89	1.06	61.83	12.02	---	0.83**(S)**	0.75**(S)**	3252.46
	30%	---	105	2.90	1.06	38.59	3.76	---	0.97**(S)**	0.87**(S)**	3252.46
	60%	---	157	4.11	1.06	20.79	0.78	---	0.51**(S)**	0.46**(S)**	3252.46
	Military	---	215	5.07	1.06	7.54	0.09	---	0.50**(S)**	0.45**(S)**	3252.46
Notes: 3i, 4n (PM_{10} and $PM_{2.5}$ at all power settings), 5, 12h											
T64-GE-6B	Idle	---	337	3.86	1.06	48.66	15.01	---	2.36**(S)**	2.14**(S)**	3252.46
	75% hp	---	1039	8.95	1.06	4.72	0.89	---	1.97**(S)**	0.45**(S)**	3252.46
	Normal Rated	---	1257	10.42	1.06	2.86	0.82	---	1.61**(S)**	0.88**(S)**	3252.46
	Intermediate (Military)	---	1390	11.15	1.06	2.30	0.74	---	1.61**(S)**	0.88**(S)**	3252.46
Notes: 3a, 4p (PM_{10} and $PM_{2.5}$ at all power settings), 5, 12h											
T64-GE-100	Ground Idle	2%	298	1.11	1.06	76.46	1.26	0.853	2.36	2.14	3252.46
	75% Normal	34%	941	6.85	1.06	7.85	0.05	0.037	1.97	0.45	3252.46
	Normal	81%	1698	9.46	1.06	2.21	0.01	0.008	1.61	0.88	3252.46
	Military	90%	1848	11.30	1.06	2.17	0.01	0.010	0.92	0.09	3252.46
Notes: 3c, 5, 12e											
T64-GE-413	Idle	---	260	2.62	1.06	51.83	19.87	---	2.36**(S)**	2.14**(S)**	3252.46
	75% hp	---	1287	8.54	1.06	1.94	0.40	---	1.97**(S)**	0.45**(S)**	3252.46
	Normal Rated	---	1511	9.65	1.06	1.20	0.38	---	1.61**(S)**	0.88**(S)**	3252.46
	Intermediate	---	1661	10.92	1.06	0.67	0.39	---	1.61**(S)**	0.88**(S)**	3252.46
	Maximum	---	1721	11.42	1.06	0.49	0.31	---	1.61**(S)**	0.88**(S)**	3252.46
Notes: 3i, 4p (PM_{10} and $PM_{2.5}$ at all power settings), 5, 12h											
T64-GE-415	Idle	---	269	2.12	1.06	74.33	28.00	---	2.36**(S)**	2.14**(S)**	3252.46
	75%	---	1493	8.09	1.06	2.10	0.15	---	1.61**(S)**	0.88**(S)**	3252.46
	Normal Rated	---	1730	9.29	1.06	1.50	0.09	---	1.61**(S)**	0.88**(S)**	3252.46
	Military	---	1916	9.99	1.06	1.29	0.32	---	0.92**(S)**	0.09**(S)**	3252.46
	Max. Rated	---	2005	10.83	1.06	1.47	0.22	---	0.92**(S)**	0.09**(S)**	3252.46
Notes: 3i, 4p (PM_{10} and $PM_{2.5}$ at all power settings), 5, 12h											
T76-G-10	Idle (Taxi)	---	238	7.40	1.06	23.80	8.51	---	0.38	0.34	3252.46
	Approach	---	476	8.50	1.06	17.20	0.92	---	0.50	0.45	3252.46
	Intermediate	---	794	9.90	1.06	5.90	0.12	---	0.63	0.57	3252.46
	Military	---	873	10.30	1.06	2.30	0.12	---	0.71	0.64	3252.46
Notes: 3g, 5, 7, 8, 12h											
T76-G-12	Idle (Taxi)	---	397	7.40	1.06	23.80	8.51	---	0.38	0.34	3252.46
	Approach	---	476	8.50	1.06	17.20	0.92	---	0.50	0.45	3252.46
	Intermediate	---	794	9.90	1.06	5.90	0.12	---	0.63	0.57	3252.46
	Military	---	857**(C)**	10.30	1.06	2.30	0.12	---	0.71	0.64	3252.46
Notes: 3g, 5, 7, 8, 12h											
T76-G-418	Idle (Taxi)	---	238	7.40	1.06	23.80	8.51	---	0.38	0.34	3252.46
	Approach	---	476	8.50	1.06	17.20	0.92	---	0.50	0.45	3252.46
	Intermediate	---	794	9.90	1.06	5.90	0.12	---	0.63	0.57	3252.46
	Military	---	873	10.30	1.06	2.30	0.12	---	0.71	0.64	3252.46
Notes: 3g, 5, 7, 8, 12h											
T76-G-419	Idle (Taxi)	---	397	7.40	1.06	23.80	8.51	---	0.38	0.34	3252.46
	Approach	---	476	8.50	1.06	17.20	0.92	---	0.50	0.45	3252.46
	Intermediate	---	794	9.90	1.06	5.90	0.12	---	0.63	0.57	3252.46
	Military	---	857**(C)**	10.30	1.06	2.30	0.12	---	0.71	0.64	3252.46
Notes: 3g, 5, 7, 8, 12h											

Table 2-8. Criteria Pollutants, Ozone Precursors, and Total HAPs (continued)

Aircraft Engine	Power Setting	Percent Thrust/hp	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)							
				NO_X	SO_X[1]	CO	VOC	HAP's	PM_{10}	$PM_{2.5}$	GHG[2]
T400-CP-400	Ground Idle	---	136	2.21	1.06	27.94	10.99	---	0.44	0.40	3252.46
	Flight Idle	---	141	2.84	1.06	29.08	8.97	---	0.44**(C)**	0.40**(C)**	3252.46
	Cruise	---	279	4.66	1.06	1.79	0.00	---	0.36	0.32	3252.46
	Intermediate (Military)	---	406	5.91	1.06	0.00	0.00	---	0.25	0.22	3252.46
	Maximum	---	1069	11.51	1.06	0.00	0.22	---	0.28	0.25	3252.46
Notes: 3a, 4a (for PM_{10} and $PM_{2.5}$ at Flight Idle power setting only), 5, 12h											
T406-AD-400	Idle	---	362	4.15	1.06	8.35	0.12	---	1.58	1.42	3252.46
	Flight Idle	---	663	6.05	1.06	3.47	0.02	---	1.58	1.42	3252.46
	Intermediate	---	948	7.87	1.06	1.82	0.02	---	1.58	1.42	3252.46
	Max Continuous	---	2507	18.03	1.06	0.29	0.01	---	1.58	1.42	3252.46
Notes: 3f, 8, 12d											
T700-GE-401, -401C	Idle	---	432	5.36	1.06	10.46	0.54	---	0.12	0.11	3252.46
	Approach	---	348	5.36	1.06	10.46	0.54	---	0.21	0.19	3252.46
	Climb out	---	443	5.60	1.06	10.11	0.53	---	0.46	0.41	3252.46
	Takeoff	---	442	5.59	1.06	10.15	0.53	---	0.53	0.48	3252.46
Notes: 3m, 12h											
T700-GE-700	Ground Idle	4%	134	3.36	1.06	46.24	0.50	0.471	1.48	0.98	3252.46
	Flight Idle	56%	469	10.95	1.06	5.12	0.02	0.014	1.26	0.07	3252.46
	Flight Max	82%	626	11.87	1.06	3.51	0.01	0.009	2.22	0.93	3252.46
	Overspeed	100%	725	11.43	1.06	2.81	0.01	0.015	2.61	1.21	3252.46
Notes: 3c, 10, 12e											
TAY Mk611-8, -Mk620-15	Idle (Taxi)	7%	873	2.50	1.06	24.10	3.91	---	0.16	0.15	3252.46
	Approach	30%	1825	5.70	1.06	3.90	1.04	---	0.52	0.47	3252.46
	Climb out	85%	5000	16.80	1.06	0.80	0.35	---	0.48	0.43	3252.46
	Takeoff	100%	6032	21.10	1.06	0.70	0.92	---	0.56	0.50	3252.46
Notes: 3b, 5, 6, 8, 10, 12h											
TF30-P-3	Idle (Taxi)	---	873	2.30	1.06	72.00	71.30	---	0.01	0.01	3252.46
	Approach	---	2064	4.80	1.06	9.20	2.42	---	0.05	0.05	3252.46
	Intermediate	---	4921	9.40	1.06	1.30	0.12	---	0.45	0.41	3252.46
	Military	---	6191	12.00	1.06	0.80	0.03	---	0.40	0.36	3252.46
	Afterburner	---	38413	3.10	1.06	4.06	0.01	---	0.15	0.14	3252.46
Notes: 3g, 5, 7, 8, 12h											
TF30-P-6B	Idle (Taxi)	<75%	689	1.31	1.06	68.21	21.53	---	0.02**(S)**	0.02**(S)**	3252.46
	75% Thrust	75%	3550	6.68	1.06	6.31	3.40	---	0.12**(S)**	0.11**(S)**	3252.46
	Normal Rated	75-99%	4700	8.06	1.06	5.55	1.61	---	0.44**(S)**	0.40**(S)**	3252.46
	Intermediate (Military)	100%	6835	12.04	1.06	3.09	1.16	---	0.35**(S)**	0.32**(S)**	3252.46
Notes: 3a, 4q (for PM_{10} and $PM_{2.5}$ at all power settings), 5, 11 (assumes 100% thrust at Intermediate setting), 12h											
TF30-P-7	Idle (Taxi)	---	952	3.00	1.06	53.00	34.50	---	0.02	0.02	3252.46
	Approach	---	2064	6.10	1.06	11.50	3.68	---	0.12	0.11	3252.46
	Intermediate	---	5714	14.00	1.06	1.20	0.23	---	0.44	0.40	3252.46
	Military	---	7222	20.00	1.06	0.80	0.12	---	0.35	0.32	3252.46
	Afterburner	---	38413	3.10	1.06	4.00	0.01	---	0.15	0.14	3252.46
Notes: 3g, 5, 7, 8, 12h											
TF30-P-9	Idle (Taxi)	---	952	3.00	1.06	53.00	34.50	---	0.02	0.02	3252.46
	Approach	---	2064	6.10	1.06	11.50	3.68	---	0.12	0.11	3252.46
	Intermediate	---	5714	14.00	1.06	1.20	0.23	---	0.44	0.40	3252.46
	Military	---	8730	20.00	1.06	0.80	0.12	---	0.35	0.32	3252.46
	Afterburner	---	545525	3.10	1.06	4.00	0.01	---	0.15	0.14	3252.46
Notes: 3g, 5, 12h											

Table 2-8. Criteria Pollutants, Ozone Precursors, and Total HAPs (continued)

Aircraft Engine	Power Setting	Percent Thrust/hp	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)							
				NO_X	SO_X[1]	CO	VOC	HAP's	PM_{10}	$PM_{2.5}$	GHG[2]
TF30-P-100	Idle (Taxi)	---	1260	2.86	1.06	47.62	21.72	---	26.27	23.64	3252.46
	Approach	---	2849**(C)**	7.91**(C)**	1.06	33.79**(C)**	15.35**(C)**	---	25.60**(C)**	23.04**(C)**	3252.46
	Intermediate	---	6650	20.00	1.06	0.71	0.12	---	24.00	21.60	3252.46
	Military	---	7120	28.01	1.06	0.70	0.11	---	8.34	7.51	3252.46
	Afterburner	---	42850	4.47	1.06	24.80	2.30	---	5.36	4.82	3252.46
Notes: 3a, 4a (for all values for Approach setting), 5, 11 (assumes 100% thrust at Takeoff power setting), 12h											
TF30-P-103	Idle (Taxi)	<30%	827	4.00	1.06	100.00	88.44	---	0.51	0.46	3252.46
	30%	30%	2003	7.00	1.06	36.20	12.54	---	0.82	0.74	3252.46
	75%	75%	4119	15.10	1.06	5.50	0.36	---	0.20	0.18	3252.46
	100%	100%	5541	20.10	1.06	2.10	0.10	---	16.34	14.70	3252.46
	Afterburner-1	>100%	14292	11.20	1.06	77.20	32.20	---	14.63**(C)**	13.17**(C)**	3252.46
Notes: 3o, 4a (PM_{10} and $PM_{2.5}$ at afterburner setting only), 5, 6, 8, 10, 12c											
TF30-P-109	Idle (Taxi)	5%	761	2.93	1.06	48.49	9.77	4.292	1.24	1.11	3252.46
	Approach	23%	1727	6.19	1.06	20.73	1.36	0.756	1.52	1.37	3252.46
	Intermediate	47%	2921	9.58	1.06	5.17	0.27	0.027	1.64	1.47	3252.46
	Military	99%	6263	23.63	1.06	0.71	0.14	0.005	0.92	0.82	3252.46
	Afterburner-5	>99%	38460	4.89	1.06	6.19	0.07	0.001	0.51	0.46	3252.46
Notes: 3l, 8, 12e											
TF30-P-412A	Idle (Taxi)	---	999	2.40	1.06	68.17	44.20	---	26.53	23.87	3252.46
	75% rpm	---	1448	3.66	1.06	38.60	11.12	---	24.03	21.63	3252.46
	90% rpm	---	3597	9.62	1.06	6.34	0.19	---	15.01	13.51	3252.46
	Intermediate (Military)	---	7394	16.66	1.06	2.12	0.11	---	8.34	7.51	3252.46
	Afterburner	---	40000	6.75	1.06	15.00	1.15	---	17.33	15.60	3252.46
Notes: 3a, 5, 12h											
TF33-P-3, -P-5	Idle (Taxi)	<30%	846	1.77	1.06	88.53	105.76	---	5.20	4.68	3252.46
	Approach	30%	3797	7.30	1.06	9.01	4.36	---	13.98	12.59	3252.46
	Climb out	85%	7323	9.00	1.06	1.80	0.46	---	14.00	12.60	3252.46
	Takeoff	100%	9979	11.00	1.06	1.30	0.35	---	8.00	7.20	3252.46
Notes: 3a, 5, 8, 11, 12h											
TF33-P-7	Idle (Taxi)	4%	1093	0.78	1.06	134.96	5.32	4.913	6.13	3.80	3252.46
	Approach	45%	4884	7.12	1.06	9.67	0.24	0.220	3.68	1.46	3252.46
	Intermediate	58%	6356	8.10	1.06	4.16	0.06	0.080	5.28	1.72	3252.46
	Military	73%	8264	10.29	1.06	1.49	0.02	0.044	3.58	1.23	3252.46
Notes: 3c, 5, 12e											
TF33-P-9	Idle (Taxi)	---	1120	1.39	1.06	95.06	90.91	---	4.98	4.48	3252.46
	Approach	---	4140	6.37	1.06	5.24	1.37	---	3.55	3.20	3252.46
	Intermediate	---	8960	7.88	1.06	2.11	1.50	---	3.15	2.84	3252.46
	Military	---	9630	12.08	1.06	0.00	0.55	---	3.67	3.30	3252.46
Notes: 3f, 5, 8, 12d											
TF33-P-100	Idle (Taxi)	---	1108	1.50	1.06	136.96	131.16	---	6.13	5.52	3252.46
	Approach	---	2794	6.22	1.06	14.60	3.62	---	5.46	4.91	3252.46
	Intermediate	---	8069	8.47	1.06	2.96	0.39	---	5.29	4.76	3252.46
	Military	---	10856	11.49	1.06	1.19	0.25	---	2.93	2.64	3252.46
Notes: 3f, 8, 12h											
TF33-P-102	Idle (Taxi)	5%	1114	1.39	1.06	95.02	3.42	3.006	4.96	4.06	3252.46
	Approach	49%	4737	6.37	1.06	5.24	0.11	0.166	3.55	1.66	3252.46
	Intermediate	59%	5782	7.88	1.06	2.11	0.06	0.098	3.15	1.42	3252.46
	Military	75%	7561	12.08	1.06	0.00	0.02	0.099	2.52	1.02	3252.46
Notes: 3c, 5, 12e											

Table 2-8. Criteria Pollutants, Ozone Precursors, and Total HAPs (continued)

Aircraft Engine	Power Setting	Percent Thrust/hp	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)							
				NO_X	SO_X[1]	CO	VOC	HAP's	PM_{10}	$PM_{2.5}$	GHG[2]
TF33-P-102A	Idle (Taxi)	7%	1065	1.80	1.06	117.03	106.96	---	4.98	4.48	3252.46
	Approach	30%	3912	5.84	1.06	12.37	1.74	---	3.55	3.20	3252.46
	Intermediate	70%	6985	8.74	1.06	2.01	0.95	---	3.15	2.84	3252.46
	Military	100%	8756	12.39	1.06	0.45	0.53	---	3.67	3.30	3252.46
Notes: 3f, 8, 11, 12h											
TF33-P-103	Idle (Taxi)	---	900	1.39	1.06	95.06	90.91	---	4.98	4.48	3252.46
	Approach	---	3800	6.37	1.06	5.24	1.37	---	3.55	3.20	3252.46
	Intermediate	---	6240	7.88	1.06	2.11	1.50	---	3.15	2.84	3252.46
	Military	---	7440	12.08	1.06	0.00	0.55	---	3.67	3.30	3252.46
Notes: 3f, 5, 8, 12d											
TF34-GE-100	Idle (Taxi)	---	390	2.10	1.06	106.70	39.45	---	8.13**(S)**	3.60**(S)**	3252.46
	Approach	---	920	5.70	1.06	16.30	2.19	---	6.21**(S)**	2.12**(S)**	3252.46
	Intermediate	---	460	2.60	1.06	78.00	23.35	---	8.93**(S)**	6.95**(S)**	3252.46
	Military	---	2710	10.70	1.06	2.20	0.12	---	2.66**(S)**	1.68**(S)**	3252.46
Notes: 3g, 4r (PM_{10} and $PM_{2.5}$ at all power settings), 5, 12h											
TF34-GE-100A	Idle (Taxi)	7%	498	0.32	1.06	65.62	2.24	2.052	8.13	3.60	3252.46
	Approach	28%	933	3.09	1.06	27.92	1.44	1.371	6.21	2.12	3252.46
	Intermediate	46%	1512	5.61	1.06	8.88	0.13	0.095	8.93	6.95	3252.46
	Military	78%	2628	9.11	1.06	3.94	0.07	0.098	2.66	1.68	3252.46
Notes: 3c, 10, 12e											
TF34-GE-400	Idle (Taxi)	10%**(C)**	458	1.69	1.06	90.98	17.24	---	8.13**(S)**	3.60**(S)**	3252.46
	Approach	30%**(C)**	1201**(C)**	2.98**(C)**	1.06	72.08**(C)**	13.51**(C)**	---	6.21**(S)**	2.12**(S)**	3252.46
	Intermediate	70%**(C)**	2686**(C)**	5.57**(C)**	1.06	34.29**(C)**	6.05**(C)**	---	2.66**(S)**	1.68**(S)**	3252.46
	Military	100%**(C)**	3800	7.51	1.06	5.95	0.45	---	2.66**(S)**	1.68**(S)**	3252.46
Notes: 3i, 4a (for fuel flow rate, NO_X, CO and VOC values at Approach and Intermediate settings), 4r (PM_{10} and $PM_{2.5}$ at all power settings), 5, 12h											
TF39-GE-1C	Idle (Taxi)	7%	1448	3.37	1.06	58.43	3.44	2.615	2.80	2.49	3252.46
	Approach	76%	10477	24.91	1.06	0.77	0.03	0.022	1.20	0.44	3252.46
	Intermediate	87%	12541	28.16	1.06	1.53	0.03	0.015	0.89	0.37	3252.46
	Military	94%	13862	32.66	1.06	1.29	0.03	0.022	1.18	0.77	3252.46
Notes: 3c, 10, 12e											
TF41-A-1	Idle (Taxi)	---	1032	1.50	1.06	119.00	105.80	---	0.15	0.14	3252.46
	Approach	---	3492	6.80	1.06	10.20	2.53	---	0.36	0.32	3252.46
	Intermediate	---	5873	12.00	1.06	3.70	0.46	---	0.52	0.47	3252.46
	Military	---	8413	21.00	1.06	1.80	0.23	---	0.67	0.60	3252.46
Notes: 3g, 5, 12h											
TF41-A-2	Idle (Taxi)	<30%	1047	4.00	1.06	176.00	114.54	---	0.65	0.59	3252.46
	30%	30%	2704	8.90	1.06	45.00	11.62	---	0.73	0.66	3252.46
	75%	75%	5810	23.80	1.06	4.70	0.10	---	16.94	15.25	3252.46
	100%	100%	8086	32.90	1.06	3.20	0.09	---	28.60	25.74	3252.46
Notes: 3o, 5, 6, 8, 10, 12c											
TFE731-2, -2A	Idle (Taxi)	---	206	3.50	1.06	47.80	8.54	---	0.13**(S)**	0.12**(S)**	3252.46
	Approach	---	571	6.90	1.06	15.56	1.41	---	0.13**(S)**	0.12**(S)**	3252.46
	Intermediate	---	1476	16.08	1.06	1.62	0.07	---	0.09**(S)**	0.08**(S)**	3252.46
	Military	---	1786	19.15	1.06	1.13	0.06	---	0.09**(S)**	0.08**(S)**	3252.46
Notes: 3f, 4s (PM_{10} and $PM_{2.5}$ at all power settings), 12h											

Table 2-8. Criteria Pollutants, Ozone Precursors, and Total HAPs (continued)

Aircraft Engine	Power Setting	Percent Thrust/hp	Fuel Flow Rate (lb/hr)	Emission Factors (lb/1000lb fuel)							
				NO_X	SO_X[1]	CO	VOC	HAP's	PM_{10}	$PM_{2.5}$	GHG[2]
TIO-540-J2B2	Idle (Taxi)	<40%	25	0.39	1.06	1293.70	78.29	---	60.00**(S)**	54.00**(S)**	3252.46
	Approach	40%	99	1.39	1.06	1261.57	15.39	---	47.95**(S)**	43.16**(S)**	3252.46
	Climb out	75-100%	205	0.24	1.06	1470.90	19.12	---	40.00**(S)**	36.00**(S)**	3252.46
	Takeoff	100%	260	0.36	1.06	1442.05	14.21	---	20.00**(S)**	18.00**(S)**	3252.46
Notes: 3a, 4b (PM_{10} and $PM_{2.5}$ at all power settings), 5, 11, 12h											
TPE331-2	Idle (Taxi)	<30%	105	2.57	1.06	64.10	104.92	---	0.50**(S)**	0.45**(S)**	3252.46
	Approach	30%	220	8.27	1.06	16.59	3.08	---	0.10**(S)**	0.09**(S)**	3252.46
	Climb out	90%	372	9.92	1.06	1.37	0.46	---	0.25**(S)**	0.23**(S)**	3252.46
	Takeoff	100%	405	10.22	1.06	0.94	0.45	---	0.24**(S)**	0.22**(S)**	3252.46
Notes: 3a, 4l (PM_{10} and $PM_{2.5}$ at all power settings), 5, 11, 12h											
TPE331-3	Idle (Taxi)	<30%	112	2.86	1.06	61.52	90.97	---	0.50**(S)**	0.45**(S)**	3252.46
	Approach	30%	250	9.92	1.06	6.96	0.74	---	0.10**(S)**	0.09**(S)**	3252.46
	Climb out	90%	409	11.86	1.06	0.98	0.17	---	0.25**(S)**	0.23**(S)**	3252.46
	Takeoff	100%	458	12.36	1.06	0.76	0.13	---	0.24**(S)**	0.22**(S)**	3252.46
Notes: 3a, 4l (PM_{10} and $PM_{2.5}$ at all power settings), 5, 11, 12h											
TSIO-360-C	Idle (Taxi)	7%	12	1.91	1.06	592.17	159.00	---	60.00**(S)**	54.00**(S)**	3252.46
	Approach	30%	61	3.77	1.06	995.08	13.01	---	47.95**(S)**	43.16**(S)**	3252.46
	Climb out	85%	100	4.32	1.06	960.80	10.98	---	40.00**(S)**	36.00**(S)**	3252.46
	Takeoff	100%	133	2.71	1.06	1081.95	10.55	---	20.00**(S)**	18.00**(S)**	3252.46
Notes: 3a, 4b (PM_{10} and $PM_{2.5}$ at all power settings), 5, 10, 12h											

1. The Emission Factors for Sulfur assume JP-8 used as the fuel. The value is a national average for sulfur in JP-8.
2. The Greenhouse gas (GHG) emission factors are the total of CO2, CH4, and N2O with individual emission factors of 9.75kg/gal, 0.27g/gal, and 0.31 g/gal respectively. CH4 and N2O were converted to equivalent CO2 (CO2e) using a global warming potential (GWP) value of 21 for CH4 and 310 for N2O. These were added to the CO2 and are presented as the GHG emission factors in units of lb/1000lb fuel. JP-8 with a density of 6.67lb/gal was used for unit conversion.
3. The Emission factors were found in the following sources:
    a. SOURCE: *Air Pollutant Emission Factors for Military and Civil Aircraft*, EPA-450/3-78-117, October 1978.
    b. SOURCE: *Airport Air Quality Manual*, International Civil Aviation Organization, 2011.
    c. SOURCE: *Aircraft Engine and Auxiliary Power Unit Emissions* Volumes I-III, March 1999, IERA-RS-BR-TR-1999-0006.
    d. SOURCE: *Aircraft Engine and Auxiliary Power Unit Emissions Testing Final Report Addendum F119-PW-100* June 2002, IERA-RS-BR-SR-2002-0006.
    e. SOURCE: *Engine and Hush House Emissions from a F100-PW-200 Jet Engine Tested at Kelly AFB*, TX Final Volume I February 1997.
    f. SOURCE: Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations January 2002, IERA-RS-BR-SR-2001-0010.
    g. SOURCE: *Aircraft Engine Emissions Estimator*, AFESC, September 1985.
    h. SOURCE: *Collection and Assessment of Aircraft Emissions*, US EPA, October 1971.
    i. SOURCE: *Summary Tables of Gaseous and Particulate Emissions from Aircraft Engines*, Aircraft Environmental Support Office.
    j. SOURCE: *Clean Air Act Emission Testing of the T-38C Aircraft Engines* September 2002, IERA-RS-BR-SR-2003-001.
    k. SOURCE *PT6A-68 Emissions Measurement Program Summary, September 2002*, IERA-RS-BR-SR-2003-0003.
    l. SOURCE: *Engine and Hush House Emissions from a TF30-P-109 Jet Engine Tested at Canon AFB*, NM Final Volume I June 1996.
    m. SOURCE: *Air Emissions Factor Guide to Air Force Mobile Sources*, December 2009.
    n. SOURCE: *Engine and Hush House Emissions from a F100-PW-100 Jet Tested at Langley Air Force Base, VA*, November 1996.
    o. SOURCE: *Aircraft Emissions Characterization: TF41-A2, TF30-P-103, and TF30-P109 Engines*, December 1987.
4. Surrogate data was used for this engine. The surrogate data was found in the following sources:
    a. Data was calculated using values provided in the source document.
    b. IO-360-D
    c. J85-GE-13

d. F100-PW-200
e. F101-GE-102
f. TF39-GE-1C
g. F110-GE-100
h. PW2040
i. J52-P-408
j. J57-P-19W
k. J85-GE-5A
l. PT6A-38
m. T53-L-13
n. T56-A-15
o. T58-GE-5
p. T64-GE-100
q. TF30-P-7
r. TF34-GE-100A
s. LF507-1F

5. Source Document provided emission factors for total hydrocarbons (THC) or non-methane total organic gas (NMTOG). These values converted to volatile organic compounds (VOC's) 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.
6. PM data calculated using smoke numbers and the ICAO method. The PM calculated was assumed to be PM_{10}.
7. PM reported in the source document was assumed to be PM_{10}.
8. $PM_{2.5}$ calculated at 90% of $PM_{10.}$
9. For at least one setting, the emission factors reported are an average of values provided in the source document.
10. Emission factors calculated and validated 6/1/2012.
11. Percent thrust is an estimate based on tables provided in the source document.
12. Fuel used for emissions testing:
    a. Jet A
    b. Jet A-1
    c. JP-4
    d. JP-5
    e. JP-8
    f. JP-8+100
    g. Unknown, but probably Jet A
    h. No data on fuel used in tests
13. F404-GE-F1D2 is a non-afterburning version of the F404-GE-400 and has the same emissions (without the afterburning setting) as the F400-GE-400 engine.

"(**S**)" – Indicates that this emission factor is from a recommended surrogate engine. See note 4 for details.
"(**C**)" – Indicates this value was calculated using data provided by the source document.
"---" Indicates No Data Available

Table 2-9. VOC and HAP Emission Factors for Select Engines

F100-PW-100

Power Setting			Idle	Approach	Intermediate	Military	Afterburner-5
Fuel Flowrate (lb/hr)[1]			1127	2765	7685	10996	54007
Percent Thrust/hp[1]			3%	13%	45%	100%	134%
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**				
Acenaphthene	83-32-9	X	---	---	---	---	---
Acenaphthylene	208-96-8	X	2.85E-03	ND	ND	ND	ND
Acetaldehyde	75-07-0	X	2.35E-01	1.50E-01	1.00E-02	1.00E-02	1.00E-02
Acetone	67-64-1		3.20E-02	5.00E-02	4.00E-02	2.00E-02	0.00E+00
Acrolein	107-02-8	X	1.11E-01	6.00E-02	ND	ND	ND
Anthracene	120-12-7	X	---	---	---	---	---
Benzaldehyde	100-52-7		---	---	---	---	---
Benz(a)anthracene	56-55-3	X	---	---	---	---	---
Benzene	71-43-2	X	4.50E-02	2.45E-03	5.25E-04	5.01E-04	2.85E-04
Benzenemethanol	100-51-6		1.42E-02	ND	ND	ND	ND
Benzo(b)fluoranthene	205-99-2	X	---	---	---	---	---
Benzo(k)fluoranthene	207-08-9	X	---	---	---	---	---
Benzo(g,h,i)perylene	191-24-2	X	---	---	---	---	---
Benzo(a)pyrene	50-32-8	X	---	---	---	---	---
Benzoic Acid	65-85-0		8.41E-01	2.07E-03	6.80E-03	2.75E-03	9.60E-03
Bromodichloromethane	75-27-4		---	---	---	---	---
Bromoform	75-25-2	X	ND	ND	ND	ND	6.94E-05
Bromomethane	74-83-9	X	---	---	---	---	---
4-Bromophenyl-phenyl Ether	101-55-3		---	---	---	---	---
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
Butyl benzyl phthalate	85-68-7		---	---	---	---	---
Carbon Disulfide	75-15-0	X	---	---	---	---	---
Carbon Tetrachloride	56-23-5	X	ND	4.03E-04	ND	ND	ND
4-Chloroaniline	106-47-8		---	---	---	---	---
Chlorobenzene	108-90-7	X	---	---	---	---	---
Chlorodibromomethane	124-48-1		---	---	---	---	---
Chloroethane	75-00-3	X	---	---	---	---	---
bis(2-Chloroethoxy) Methane	111-91-1		---	---	---	---	---
bis(2-Chloroethyl) Ether	111-44-4	X	---	---	---	---	---
Chloroform	67-66-3	X	---	---	---	---	---
bis(2-Choroisopropyl) Ether	39638-32-9		---	---	---	---	---
Chloromethane	74-87-3	X	ND	9.58E-04	ND	ND	ND
4-Chloro-3-methylphenol	59-50-7		---	---	---	---	---
2-Chloronaphthalene	91-58-7		---	---	---	---	---
2-Chlorophenol	95-57-8		---	---	---	---	---
1-chloro-4-phenoxybenzene	7005-72-3		---	---	---	---	---
Chrysene	218-01-9	X	---	---	---	---	---
o-Cresol	95-48-7	X	1.15E-03	ND	ND	ND	4.19E-04
p-Cresol	106-44-5	X	8.64E-03	ND	ND	ND	ND
Crotonaldehyde	4170-30-3		3.40E-02	2.00E-02	ND	ND	ND
Dibenzofuran	132-64-9	X	2.89E-03	ND	ND	5.00E-05	ND
Dibutyl Phthalate	84-74-2	X	6.96E-04	1.59E-04	2.05E-04	1.12E-04	8.81E-05
1,2-Dichlorobenzene	95-50-1		---	---	---	---	---
1,3-Dichlorobenzene	541-73-1		ND	ND	2.99E-04	ND	ND
1,4-Dichlorobenzene	106-46-7	X	---	---	---	---	---
3,3'-Dichlorobenzidine	91-94-1	X	---	---	---	---	---
1,1-Dichloroethane	75-34-3	X	---	---	---	---	---
1,2-Dichloroethane	107-06-2	X	---	---	---	---	---
1,1-Dichloroethene	75-35-4	X	---	---	---	---	---
cis-1,2-Dicholorethene	156-59-2		---	---	---	---	---
trans-1,2-Dichloroethene	156-60-5		ND	ND	ND	ND	1.66E-04
2,4-Dichlorophenol	120-83-2		---	---	---	---	---
1,2-Dichloropropane	78-87-5	X	---	---	---	---	---
cis-1,3-Dichloropropene	10061-01-5		---	---	---	---	---
trans-1,3-Dichloropropene	10061-02-6		---	---	---	---	---
Diethyl Phthalate	84-66-2		9.12E-03	3.13E-03	4.05E-03	1.80E-03	4.03E-03

Power Setting			Idle	Approach	Intermediate	Military	Afterburner-5
Fuel Flowrate (lb/hr)[1]			1127	2765	7685	10996	54007
Percent Thrust/hp[1]			3%	13%	45%	100%	134%
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**				
2,4-Dimethylphenol	105-67-9		---	---	---	---	---
Dimethyl phthalate	131-11-3	X	---	---	---	---	---
4,6-Dinitro-o-cresol	534-52-1	X	---	---	---	---	---
2,4-Dinitrophenol	51-28-5	X	---	---	---	---	---
2,4-Dinitrotoluene	121-14-2	X	---	---	---	---	---
2,6-Dinitrotoluene	606-20-2		---	---	---	---	---
Di(2-Ethylhexyl) Phthalate (DEHP)	117-81-7	X	5.09E-02	3.38E-03	1.97E-03	6.21E-03	2.89E-03
Di-n-Octyl phthalate	117-84-0		---	---	---	---	---
Ethylbenzene	100-41-4	X	5.93E-03	4.44E-04	ND	3.99E-04	8.38E-05
Fluoranthene	206-44-0	X	4.69E-04	ND	ND	ND	ND
Fluorene	86-73-7	X	1.45E-03	ND	ND	ND	ND
Formaldehyde	50-00-0	X	8.61E-01	6.10E-01	2.00E-02	1.00E-02	1.00E-02
Hexachlorobenzene	118-74-1	X	---	---	---	---	---
Hexachlorobutadiene	87-68-3	X	---	---	---	---	---
Hexachlorocyclopentadiene	77-47-4	X	---	---	---	---	---
Hexachloroethane	67-72-1	X	---	---	---	---	---
Hexanal	66-25-1		2.50E-02	3.00E-02	3.00E-02	1.00E-02	0.00E+00
2-Hexanone	591-78-6		---	---	---	---	---
Indeno(1,2,3-cd)pyrene	193-39-5	X	---	---	---	---	---
Isophorone	78-59-1	X	---	---	---	---	---
Isovaleraldehyde	590-86-3		1.90E-02	6.00E-02	1.00E-02	ND	1.00E-02
Methylene Chloride	75-09-2	X	ND	4.47E-04	2.60E-02	2.84E-04	ND
2-Methylnaphthalene	91-57-6		6.03E-02	5.10E-04	3.12E-04	2.20E-04	5.08E-05
4-Methyl-2-pentanone (MIBK)	108-10-1	X	---	---	---	---	---
Naphthalene	91-20-3	X	9.50E-02	7.49E-04	4.91E-04	3.43E-04	5.40E-04
m-Nitroaniline	99-09-2		---	---	---	---	---
o-Nitroaniline	88-74-4		---	---	---	---	---
4-Nitrobenzenamine	100-01-6		---	---	---	---	---
Nitrobenzene	98-95-3	X	---	---	---	---	---
2-Nitrophenol	88-75-5		5.87E-03	ND	ND	ND	ND
4-Nitrophenol	100-02-7	X	6.96E-03	ND	ND	ND	ND
N-Nitrosodiphenylamine	86-30-6		---	---	---	---	---
N-Nitrosodi-n-propylamine	621-64-7		---	---	---	---	---
Pentachlorophenol	87-86-5	X	---	---	---	---	---
Pentanal	110-62-3		9.00E-03	0.00E+00	1.00E-02	2.00E-02	ND
Phenanthrene	85-01-8	X	1.71E-03	ND	ND	ND	ND
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
Pyrene	129-00-0	X	6.35E-04	ND	ND	ND	ND
Styrene	100-42-5	X	4.09E-03	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	79-34-5	X	---	---	---	---	---
Tetrachloroethene	127-18-4	X	---	---	---	---	---
m-Tolualdehyde	620-23-5		5.00E-03	0.00E+00	1.00E-02	ND	ND
o-Tolualdehyde	529-20-4		1.00E-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
1,2,4-Trichlorobenzene	120-82-1	X	---	---	---	---	---
1,1,1-Trichloroethane	71-55-6	X	ND	ND	8.66E-04	ND	ND
1,1,2-Trichloroethane	79-00-5	X	---	---	---	---	---
Trichloroethene	79-01-6	X	---	---	---	---	---
Trichlorofluoromethane	75-69-4		ND	ND	1.60E-03	ND	ND
2,4,5-Trichlorophenol	95-95-4	X	---	---	---	---	---
2,4,6-Trichlorophenol	88-06-2	X	---	---	---	---	---
Vinyl Acetate	108-05-4	X	---	---	---	---	---
Vinyl Chloride	75-01-4	X	---	---	---	---	---
m,p-Xylene	1330-20-7	X	4.09E-02	6.15E-03	1.61E-03	3.59E-03	7.58E-04
o-Xylene	95-47-6	X	1.01E-02	1.20E-03	3.09E-04	9.60E-04	1.84E-04

1. Data obtained from *Engine and Hush House Emissions from F100-PW-100 Jet Engine Tested at Langley Air Force Base, VA Volumes I-III, November 1996*

"---" 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 2-9. VOC and HAP Emission Factors for Select Engines

F100-PW-200

Power Setting			Idle	Approach	Intermediate	Military	Afterburner-5
Fuel Flowrate (lb/hr)[1]			1006	3251	5651	8888	40123
Percent Thrust/hp[1]			3%	13%	45%	100%	134%
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**				
Acenaphthene	83-32-9	X	---	---	---	---	---
Acenaphthylene	208-96-8	X	5.38E-04	ND	ND	ND	ND
Acetaldehyde	75-07-0	X	2.41E-01	ND	7.00E-03	1.30E-02	1.60E-02
Acetone	67-64-1		8.70E-02	6.20E-02	3.00E-03	ND	2.70E-02
Acrolein	107-02-8	X	8.40E-02	ND	ND	ND	ND
Anthracene	120-12-7	X	---	---	---	---	---
Benzaldehyde	100-52-7		ND	ND	ND	ND	ND
Benz(a)anthracene	56-55-3	X	---	---	---	---	---
Benzene	71-43-2	X	4.70E-02	3.87E-04	1.89E-04	4.90E-04	1.82E-04
Benzenemethanol	100-51-6		4.18E-03	ND	ND	ND	ND
Benzo(b)fluoranthene	205-99-2	X	---	---	---	---	---
Benzo(k)fluoranthene	207-08-9	X	---	---	---	---	---
Benzo(g,h,i)perylene	191-24-2	X	---	---	---	---	---
Benzo(a)pyrene	50-32-8	X	---	---	---	---	---
Benzoic Acid	65-85-0		4.97E-02	5.66E-03	3.80E-03	3.52E-03	7.62E-03
Bromodichloromethane	75-27-4		---	---	---	---	---
Bromoform	75-25-2	X	---	---	---	---	---
Bromomethane	74-83-9	X	---	---	---	---	---
4-Bromophenyl-phenyl Ether	101-55-3		---	---	---	---	---
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
Butyl benzyl phthalate	85-68-7		ND	ND	1.43E-04	1.08E-04	2.48E-04
Carbon Disulfide	75-15-0	X	---	---	---	---	---
Carbon Tetrachloride	56-23-5	X	2.31E-04	3.02E-04	3.09E-04	1.85E-04	2.23E-05
4-Chloroaniline	106-47-8		---	---	---	---	---
Chlorobenzene	108-90-7	X	ND	ND	2.14E-04	1.03E-04	ND
Chlorodibromomethane	124-48-1		---	---	---	---	---
Chloroethane	75-00-3	X	---	---	---	---	---
bis(2-Chloroethoxy) Methane	111-91-1		---	---	---	---	---
bis(2-Chloroethyl) Ether	111-44-4	X	---	---	---	---	---
Chloroform	67-66-3	X	ND	ND	ND	ND	ND
bis(2-Choroisopropyl) Ether	39638-32-9		---	---	---	---	---
Chloromethane	74-87-3	X	ND	ND	ND	ND	ND
4-Chloro-3-methylphenol	59-50-7		---	---	---	---	---
2-Chloronaphthalene	91-58-7		---	---	---	---	---
2-Chlorophenol	95-57-8		---	---	---	---	---
1-chloro-4-phenoxybenzene	7005-72-3		---	---	---	---	---
Chrysene	218-01-9	X	---	---	---	---	---
o-Cresol	95-48-7	X	---	---	---	---	---
p-Cresol	106-44-5	X	---	---	---	---	---
Crotonaldehyde	4170-30-3		3.20E-02	ND	ND	ND	ND
Dibenzofuran	132-64-9	X	6.49E-04	ND	ND	ND	ND
Dibutyl Phthalate	84-74-2	X	2.23E-04	2.14E-04	1.77E-04	1.47E-04	8.33E-04
1,2-Dichlorobenzene	95-50-1		ND	1.94E-04	9.29E-04	3.40E-04	ND
1,3-Dichlorobenzene	541-73-1		ND	ND	7.25E-04	2.52E-04	ND
1,4-Dichlorobenzene	106-46-7	X	ND	4.90E-05	3.90E-04	1.77E-04	3.16E-06
3,3'-Dichlorobenzidine	91-94-1	X	---	---	---	---	---
1,1-Dichloroethane	75-34-3	X	---	---	---	---	---
1,2-Dichloroethane	107-06-2	X	---	---	---	---	---
1,1-Dichloroethene	75-35-4	X	---	---	---	---	---
cis-1,2-Dicholorethene	156-59-2		---	---	---	---	---
trans-1,2-Dichloroethene	156-60-5		---	---	---	---	---
2,4-Dichlorophenol	120-83-2		---	---	---	---	---
1,2-Dichloropropane	78-87-5	X	---	---	---	---	---
cis-1,3-Dichloropropene	10061-01-5		---	---	---	---	---
trans-1,3-Dichloropropene	10061-02-6		---	---	---	---	---
Diethyl Phthalate	84-66-2		9.09E-03	1.10E-02	3.07E-03	3.92E-03	1.79E-02

Power Setting			Idle	Approach	Intermediate	Military	Afterburner-5
Fuel Flowrate (lb/hr)[1]			1006	3251	5651	8888	40123
Percent Thrust/hp[1]			3%	13%	45%	100%	134%
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**				
2,4-Dimethylphenol	105-67-9		---	---	---	---	---
Dimethyl phthalate	131-11-3	X	---	---	---	---	---
4,6-Dinitro-o-cresol	534-52-1	X	---	---	---	---	---
2,4-Dinitrophenol	51-28-5	X	---	---	---	---	---
2,4-Dinitrotoluene	121-14-2	X	---	---	---	---	---
2,6-Dinitrotoluene	606-20-2		---	---	---	---	---
Di(2-Ethylhexyl) Phthalate (DEHP)	117-81-7	X	1.35E-03	2.83E-03	2.04E-03	2.35E-03	3.93E-03
Di-n-Octyl phthalate	117-84-0		---	---	---	---	---
Ethylbenzene	100-41-4	X	2.99E-03	1.93E-04	2.70E-04	3.44E-04	4.01E-05
Fluoranthene	206-44-0	X	---	---	---	---	---
Fluorene	86-73-7	X	3.35E-04	ND	ND	ND	8.76E-05
Formaldehyde	50-00-0	X	7.77E-01	ND	ND	2.00E-03	2.00E-02
Hexachlorobenzene	118-74-1	X	---	---	---	---	---
Hexachlorobutadiene	87-68-3	X	ND	4.06E-04	1.40E-03	5.74E-04	ND
Hexachlorocyclopentadiene	77-47-4	X	---	---	---	---	---
Hexachloroethane	67-72-1	X	---	---	---	---	---
Hexanal	66-25-1		ND	ND	ND	ND	ND
2-Hexanone	591-78-6		---	---	---	---	---
Indeno(1,2,3-cd)pyrene	193-39-5	X	---	---	---	---	---
Isophorone	78-59-1	X	---	---	---	---	---
Isovaleraldehyde	590-86-3		1.70E-02	ND	ND	3.00E-03	1.00E-03
Methylene Chloride	75-09-2	X	6.94E-04	1.35E-03	3.06E-03	3.16E-03	1.07E-03
2-Methylnaphthalene	91-57-6		2.59E-02	3.30E-04	2.60E-04	3.53E-04	4.51E-04
4-Methyl-2-pentanone (MIBK)	108-10-1	X	---	---	---	---	---
Naphthalene	91-20-3	X	3.42E-02	2.13E-04	3.96E-04	4.01E-04	4.12E-04
m-Nitroaniline	99-09-2		---	---	---	---	---
o-Nitroaniline	88-74-4		---	---	---	---	---
4-Nitrobenzenamine	100-01-6		---	---	---	---	---
Nitrobenzene	98-95-3	X	---	---	---	---	---
2-Nitrophenol	88-75-5		5.91E-03	ND	ND	ND	ND
4-Nitrophenol	100-02-7	X	5.57E-03	ND	ND	ND	ND
N-Nitrosodiphenylamine	86-30-6		---	---	---	---	---
N-Nitrosodi-n-propylamine	621-64-7		---	---	---	---	---
Pentachlorophenol	87-86-5	X	---	---	---	---	---
Pentanal	110-62-3		ND	ND	ND	ND	ND
Phenanthrene	85-01-8	X	4.48E-04	ND	ND	ND	1.33E-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
Pyrene	129-00-0	X	1.79E-04	ND	ND	ND	ND
Styrene	100-42-5	X	5.02E-04	ND	2.78E-04	ND	ND
1,1,2,2-Tetrachloroethane	79-34-5	X	ND	ND	6.96E-04	2.52E-04	ND
Tetrachloroethene	127-18-4	X	ND	ND	2.40E-03	8.96E-04	ND
m-Tolualdehyde	620-23-5		ND	ND	ND	ND	ND
o-Tolualdehyde	529-20-4		ND	ND	ND	ND	ND
Toluene	108-88-3	X	1.65E-02	7.62E-04	4.34E-04	1.08E-03	8.75E-04
1,2,4-Trichlorobenzene	120-82-1	X	ND	3.43E-04	2.04E-03	7.29E-04	3.22E-05
1,1,1-Trichloroethane	71-55-6	X	1.38E-03	5.02E-04	3.36E-04	5.61E-04	7.21E-05
1,1,2-Trichloroethane	79-00-5	X	---	---	---	---	---
Trichloroethene	79-01-6	X	ND	ND	9.17E-05	ND	ND
Trichlorofluoromethane	75-69-4		ND	ND	4.32E-04	ND	ND
2,4,5-Trichlorophenol	95-95-4	X	---	---	---	---	---
2,4,6-Trichlorophenol	88-06-2	X	---	---	---	---	---
Vinyl Acetate	108-05-4	X	---	---	---	---	---
Vinyl Chloride	75-01-4	X	---	---	---	---	---
m,p-Xylene	1330-20-7	X	1.47E-02	1.40E-03	1.43E-03	2.11E-03	2.59E-04
o-Xylene	95-47-6	X	3.61E-03	2.81E-04	3.51E-04	4.73E-04	5.80E-05

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

"---" 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 2-9. VOC and HAP Emission Factors for Select Engines

F101-GE-102

Power Setting			Idle	Approach	Intermediate	Military	Afterburner-1
Fuel Flowrate (lb/hr)[1]			1117	4533	6557	7828	15314
Percent Thrust/hp[1]			5%	47%	66%	77%	106%
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**				
Acenaphthene	83-32-9	X	ND	ND	ND	ND	ND
Acenaphthylene	208-96-8	X	ND	ND	ND	ND	ND
Acetaldehyde	75-07-0	X	ND	ND	ND	ND	1.77E-02
Acetone	67-64-1		4.13E-02	2.04E-01	3.30E-02	1.89E-02	3.41E-02
Acrolein	107-02-8	X	ND	ND	ND	ND	8.23E-02
Anthracene	120-12-7	X	ND	ND	ND	ND	ND
Benzaldehyde	100-52-7		ND	ND	ND	1.93E-03	4.98E-02
Benz(a)anthracene	56-55-3	X	ND	ND	ND	ND	ND
Benzene	71-43-2	X	1.18E-02	7.89E-04	1.32E-03	5.48E-03	2.28E-01
Benzenemethanol	100-51-6		ND	ND	ND	ND	ND
Benzo(b)fluoranthene	205-99-2	X	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	207-08-9	X	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	191-24-2	X	ND	ND	ND	ND	ND
Benzo(a)pyrene	50-32-8	X	ND	ND	ND	ND	ND
Benzoic Acid	65-85-0		1.65E-02	6.33E-03	6.76E-03	7.84E-03	ND
Bromodichloromethane	75-27-4		ND	ND	ND	ND	ND
Bromoform	75-25-2	X	ND	ND	ND	ND	ND
Bromomethane	74-83-9	X	7.07E-04	4.66E-04	1.52E-02	6.47E-02	8.84E-02
4-Bromophenyl-phenyl Ether	101-55-3		ND	ND	ND	ND	ND
1,3-Butadiene	106-99-0	X	---	---	---	---	---
2-Butanone (MEK)	78-93-3		2.18E-03	ND	ND	ND	3.30E-02
Butyl benzyl phthalate	85-68-7		4.72E-04	3.07E-04	3.19E-04	ND	ND
Carbon Disulfide	75-15-0	X	ND	4.38E-04	8.99E-04	1.60E-03	ND
Carbon Tetrachloride	56-23-5	X	ND	ND	3.36E-04	ND	ND
4-Chloroaniline	106-47-8		ND	ND	ND	ND	ND
Chlorobenzene	108-90-7	X	ND	ND	ND	ND	ND
Chlorodibromomethane	124-48-1		ND	ND	ND	ND	ND
Chloroethane	75-00-3	X	ND	ND	ND	ND	ND
bis(2-Chloroethoxy) Methane	111-91-1		ND	ND	ND	ND	ND
bis(2-Chloroethyl) Ether	111-44-4	X	ND	ND	ND	ND	ND
Chloroform	67-66-3	X	1.99E-03	1.04E-03	1.42E-03	1.21E-03	ND
bis(2-Choroisopropyl) Ether	39638-32-9		ND	ND	ND	ND	ND
Chloromethane	74-87-3	X	5.05E-04	6.90E-04	4.72E-03	1.57E-02	1.28E-02
4-Chloro-3-methylphenol	59-50-7		ND	ND	ND	ND	ND
2-Chloronaphthalene	91-58-7		ND	ND	ND	ND	ND
2-Chlorophenol	95-57-8		ND	ND	ND	ND	ND
1-chloro-4-phenoxybenzene	7005-72-3		ND	ND	ND	ND	ND
Chrysene	218-01-9	X	ND	ND	ND	ND	ND
o-Cresol	95-48-7	X	ND	ND	ND	ND	ND
p-Cresol	106-44-5	X	ND	ND	ND	ND	ND
Crotonaldehyde	4170-30-3		ND	ND	ND	ND	3.59E-02
Dibenzofuran	132-64-9	X	ND	ND	ND	ND	3.49E-03
Dibutyl Phthalate	84-74-2	X	1.68E-03	AA	4.16E-04	AA	ND
1,2-Dichlorobenzene	95-50-1		ND	ND	ND	ND	ND
1,3-Dichlorobenzene	541-73-1		ND	ND	ND	ND	ND
1,4-Dichlorobenzene	106-46-7	X	ND	ND	ND	ND	ND
3,3'-Dichlorobenzidine	91-94-1	X	ND	ND	ND	ND	ND
1,1-Dichloroethane	75-34-3	X	ND	ND	ND	ND	ND
1,2-Dichloroethane	107-06-2	X	ND	ND	ND	ND	ND
1,1-Dichloroethene	75-35-4	X	ND	ND	ND	ND	ND
cis-1,2-Dicholorethene	156-59-2		ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	156-60-5		ND	ND	ND	ND	ND
2,4-Dichlorophenol	120-83-2		ND	ND	ND	ND	ND
1,2-Dichloropropane	78-87-5	X	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	10061-01-5		ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	10061-02-6		ND	ND	ND	ND	ND
Diethyl Phthalate	84-66-2		7.81E-04	ND	2.38E-04	ND	ND

Power Setting			Idle	Approach	Intermediate	Military	Afterburner-1
Fuel Flowrate (lb/hr)[1]			1117	4533	6557	7828	15314
Percent Thrust/hp[1]			5%	47%	66%	77%	106%
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**				
2,4-Dimethylphenol	105-67-9		ND	ND	ND	ND	ND
Dimethyl phthalate	131-11-3	X	ND	ND	ND	ND	ND
4,6-Dinitro-o-cresol	534-52-1	X	ND	ND	ND	ND	ND
2,4-Dinitrophenol	51-28-5	X	ND	ND	ND	ND	ND
2,4-Dinitrotoluene	121-14-2	X	ND	ND	ND	ND	ND
2,6-Dinitrotoluene	606-20-2		ND	ND	ND	ND	ND
Di(2-Ethylhexyl) Phthalate (DEHP)	117-81-7	X	5.76E-03	1.52E-03	1.43E-03	1.09E-03	ND
Di-n-Octyl phthalate	117-84-0		ND	ND	ND	ND	ND
Ethylbenzene	100-41-4	X	ND	ND	ND	ND	8.60E-02
Fluoranthene	206-44-0	X	ND	ND	ND	ND	ND
Fluorene	86-73-7	X	ND	ND	ND	ND	ND
Formaldehyde	50-00-0	X	1.04E-01	5.12E-03	4.64E-03	4.43E-03	3.89E-02
Hexachlorobenzene	118-74-1	X	ND	ND	ND	ND	ND
Hexachlorobutadiene	87-68-3	X	ND	ND	ND	ND	ND
Hexachlorocyclopentadiene	77-47-4	X	ND	ND	ND	ND	ND
Hexachloroethane	67-72-1	X	ND	ND	ND	ND	ND
Hexanal	66-25-1		ND	ND	ND	ND	1.80E-02
2-Hexanone	591-78-6		ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	193-39-5	X	ND	ND	ND	ND	ND
Isophorone	78-59-1	X	ND	ND	ND	ND	ND
Isovaleraldehyde	590-86-3		ND	ND	ND	ND	ND
Methylene Chloride	75-09-2	X	1.13E-01	7.58E-02	4.44E-02	1.58E-01	2.19E-02
2-Methylnaphthalene	91-57-6		2.63E-04	ND	ND	ND	1.69E-01
4-Methyl-2-pentanone (MIBK)	108-10-1	X	ND	ND	ND	ND	ND
Naphthalene	91-20-3	X	1.79E-03	AA	ND	ND	1.27E-01
m-Nitroaniline	99-09-2		ND	ND	ND	ND	ND
o-Nitroaniline	88-74-4		ND	ND	ND	ND	ND
4-Nitrobenzenamine	100-01-6		ND	ND	ND	ND	ND
Nitrobenzene	98-95-3	X	ND	ND	ND	ND	ND
2-Nitrophenol	88-75-5		ND	ND	ND	ND	ND
4-Nitrophenol	100-02-7	X	ND	ND	ND	ND	ND
N-Nitrosodiphenylamine	86-30-6		ND	ND	ND	ND	ND
N-Nitrosodi-n-propylamine	621-64-7		ND	ND	ND	ND	ND
Pentachlorophenol	87-86-5	X	ND	ND	ND	ND	ND
Pentanal	110-62-3		ND	ND	ND	ND	1.16E-02
Phenanthrene	85-01-8	X	ND	ND	ND	ND	ND
Phenol	108-95-2	X	2.29E-03	1.22E-03	ND	ND	2.71E-02
Propanal	123-38-6	X	---	---	---	---	---
Pyrene	129-00-0	X	ND	ND	ND	ND	ND
Styrene	100-42-5	X	1.08E-03	ND	3.36E-04	ND	1.21E-02
1,1,2,2-Tetrachloroethane	79-34-5	X	ND	ND	ND	ND	ND
Tetrachloroethene	127-18-4	X	ND	4.83E-04	1.02E-03	1.24E-03	ND
m-Tolualdehyde	620-23-5		ND	ND	ND	ND	1.48E-02
o-Tolualdehyde	529-20-4		ND	ND	ND	ND	8.42E-03
Toluene	108-88-3	X	5.55E-03	1.50E-03	1.69E-03	1.29E-03	1.26E-01
1,2,4-Trichlorobenzene	120-82-1	X	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	71-55-6	X	ND	ND	4.05E-04	ND	ND
1,1,2-Trichloroethane	79-00-5	X	ND	ND	ND	ND	ND
Trichloroethene	79-01-6	X	7.07E-04	4.66E-04	3.39E-04	ND	ND
Trichlorofluoromethane	75-69-4		6.90E-02	3.23E-02	2.09E-02	6.44E-02	5.65E-03
2,4,5-Trichlorophenol	95-95-4	X	ND	ND	ND	ND	ND
2,4,6-Trichlorophenol	88-06-2	X	ND	ND	ND	ND	ND
Vinyl Acetate	108-05-4	X	3.53E-03	2.32E-03	2.47E-03	8.66E-03	1.53E-02
Vinyl Chloride	75-01-4	X	ND	ND	ND	ND	ND
m,p-Xylene	1330-20-7	X	9.22E-04	4.34E-04	6.65E-04	2.45E-03	1.55E-01
o-Xylene	95-47-6	X	ND	ND	ND	ND	6.90E-02

1. Data obtained from *Aircraft Engine and APU Emissions Testing Volumes I-III March 1999*, IERA-RS-BR-TR-1999-0006
2. Emission Factors derived using the test results provided in reference above.

"---" 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 2-9. VOC and HAP Emission Factors for Select Engines

F108-CF-100

			Power Setting	Idle	Approach	Intermediate	Military	---
			Fuel Flowrate (lb/hr)[1]	1136	2547	5650	6458	---
			Percent Thrust/hp[1]	9%	30%	70%	78%	---
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**					
Acenaphthene	83-32-9	X		ND	ND	ND	ND	---
Acenaphthylene	208-96-8	X		ND	ND	ND	ND	---
Acetaldehyde	75-07-0	X		AA	ND	ND	ND	---
Acetone	67-64-1			1.98E-01	8.44E-02	3.68E-02	4.28E-02	---
Acrolein	107-02-8	X		ND	ND	ND	ND	---
Anthracene	120-12-7	X		ND	ND	ND	ND	---
Benzaldehyde	100-52-7			ND	ND	ND	4.09E-03	---
Benz(a)anthracene	56-55-3	X		ND	ND	ND	ND	---
Benzene	71-43-2	X		1.39E-02	3.39E-03	8.30E-04	5.10E-04	---
Benzenemethanol	100-51-6			ND	ND	ND	ND	---
Benzo(b)fluoranthene	205-99-2	X		ND	ND	ND	ND	---
Benzo(k)fluoranthene	207-08-9	X		ND	ND	ND	ND	---
Benzo(g,h,i)perylene	191-24-2	X		ND	ND	ND	ND	---
Benzo(a)pyrene	50-32-8	X		ND	ND	ND	ND	---
Benzoic Acid	65-85-0			3.38E-02	8.64E-03	1.14E-02	8.89E-03	---
Bromodichloromethane	75-27-4			ND	ND	ND	ND	---
Bromoform	75-25-2	X		ND	ND	ND	ND	---
Bromomethane	74-83-9	X		ND	ND	ND	ND	---
4-Bromophenyl-phenyl Ether	101-55-3			ND	ND	ND	ND	---
1,3-Butadiene	106-99-0	X		---	---	---	---	---
2-Butanone (MEK)	78-93-3			5.35E-03	ND	ND	ND	---
Butyl benzyl phthalate	85-68-7			7.26E-04	ND	2.71E-04	ND	---
Carbon Disulfide	75-15-0	X		ND	ND	ND	ND	---
Carbon Tetrachloride	56-23-5	X		ND	5.28E-04	4.23E-04	ND	---
4-Chloroaniline	106-47-8			ND	ND	ND	ND	---
Chlorobenzene	108-90-7	X		ND	ND	ND	ND	---
Chlorodibromomethane	124-48-1			ND	ND	ND	ND	---
Chloroethane	75-00-3	X		ND	ND	ND	ND	---
bis(2-Chloroethoxy) Methane	111-91-1			ND	ND	ND	ND	---
bis(2-Chloroethyl) Ether	111-44-4	X		ND	ND	ND	ND	---
Chloroform	67-66-3	X		2.31E-03	1.85E-03	1.76E-03	1.18E-03	---
bis(2-Choroisopropyl) Ether	39638-32-9			ND	ND	ND	ND	---
Chloromethane	74-87-3	X		9.13E-04	8.63E-04	7.94E-04	3.37E-04	---
4-Chloro-3-methylphenol	59-50-7			ND	ND	ND	ND	---
2-Chloronaphthalene	91-58-7			ND	ND	ND	ND	---
2-Chlorophenol	95-57-8			ND	ND	ND	ND	---
1-chloro-4-phenoxybenzene	7005-72-3			ND	ND	ND	ND	---
Chrysene	218-01-9	X		ND	ND	ND	ND	---
o-Cresol	95-48-7	X		ND	ND	ND	ND	---
p-Cresol	106-44-5	X		ND	ND	ND	ND	---
Crotonaldehyde	4170-30-3			ND	ND	ND	ND	---
Dibenzofuran	132-64-9	X		ND	ND	ND	ND	---
Dibutyl Phthalate	84-74-2	X		AA	AA	AA	AA	---
1,2-Dichlorobenzene	95-50-1			ND	ND	ND	ND	---
1,3-Dichlorobenzene	541-73-1			ND	ND	ND	ND	---
1,4-Dichlorobenzene	106-46-7	X		ND	ND	ND	ND	---
3,3'-Dichlorobenzidine	91-94-1	X		ND	ND	ND	ND	---
1,1-Dichloroethane	75-34-3	X		ND	ND	ND	ND	---
1,2-Dichloroethane	107-06-2	X		ND	ND	ND	ND	---
1,1-Dichloroethene	75-35-4	X		ND	ND	ND	ND	---
cis-1,2-Dicholorethene	156-59-2			ND	ND	ND	ND	---
trans-1,2-Dichloroethene	156-60-5			ND	ND	ND	ND	---
2,4-Dichlorophenol	120-83-2			ND	ND	ND	ND	---
1,2-Dichloropropane	78-87-5	X		ND	ND	ND	ND	---
cis-1,3-Dichloropropene	10061-01-5			ND	ND	ND	ND	---
trans-1,3-Dichloropropene	10061-02-6			9.68E-04	7.63E-04	5.09E-04	4.84E-04	---
Diethyl Phthalate	84-66-2			8.78E-04	5.14E-04	ND	ND	---

			Power Setting	Idle	Approach	Intermediate	Military	---
			Fuel Flowrate (lb/hr)[1]	1136	2547	5650	6458	---
			Percent Thrust/hp[1]	9%	30%	70%	78%	---
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**					
2,4-Dimethylphenol	105-67-9			ND	ND	ND	ND	---
Dimethyl phthalate	131-11-3	X		ND	ND	ND	ND	---
4,6-Dinitro-o-cresol	534-52-1	X		ND	ND	ND	ND	---
2,4-Dinitrophenol	51-28-5	X		ND	ND	ND	ND	---
2,4-Dinitrotoluene	121-14-2	X		ND	ND	ND	ND	---
2,6-Dinitrotoluene	606-20-2			ND	ND	ND	ND	---
Di(2-Ethylhexyl) Phthalate (DEHP)	117-81-7	X		5.53E-03	1.54E-03	4.51E-03	1.95E-03	---
Di-n-Octyl phthalate	117-84-0			ND	ND	ND	ND	---
Ethylbenzene	100-41-4	X		6.84E-04	5.53E-04	ND	ND	---
Fluoranthene	206-44-0	X		ND	ND	ND	ND	---
Fluorene	86-73-7	X		ND	ND	ND	ND	---
Formaldehyde	50-00-0	X		9.51E-02	1.50E-02	5.58E-03	7.01E-03	---
Hexachlorobenzene	118-74-1	X		ND	ND	ND	ND	---
Hexachlorobutadiene	87-68-3	X		ND	ND	ND	ND	---
Hexachlorocyclopentadiene	77-47-4	X		ND	ND	ND	ND	---
Hexachloroethane	67-72-1	X		ND	ND	ND	ND	---
Hexanal	66-25-1			ND	9.66E-03	ND	ND	---
2-Hexanone	591-78-6			ND	ND	ND	ND	---
Indeno(1,2,3-cd)pyrene	193-39-5	X		ND	ND	ND	ND	---
Isophorone	78-59-1	X		ND	ND	ND	ND	---
Isovaleraldehyde	590-86-3			ND	ND	ND	ND	---
Methylene Chloride	75-09-2	X		6.75E-02	4.46E-02	5.06E-02	1.96E-03	---
2-Methylnaphthalene	91-57-6			7.68E-04	ND	ND	ND	---
4-Methyl-2-pentanone (MIBK)	108-10-1	X		ND	ND	ND	ND	---
Naphthalene	91-20-3	X		2.90E-03	AA	ND	ND	---
m-Nitroaniline	99-09-2			ND	ND	ND	ND	---
o-Nitroaniline	88-74-4			ND	ND	ND	ND	---
4-Nitrobenzenamine	100-01-6			ND	ND	ND	ND	---
Nitrobenzene	98-95-3	X		ND	ND	ND	ND	---
2-Nitrophenol	88-75-5			ND	ND	ND	ND	---
4-Nitrophenol	100-02-7	X		ND	ND	ND	ND	---
N-Nitrosodiphenylamine	86-30-6			ND	ND	ND	ND	---
N-Nitrosodi-n-propylamine	621-64-7			ND	ND	ND	ND	---
Pentachlorophenol	87-86-5	X		ND	ND	ND	ND	---
Pentanal	110-62-3			ND	ND	ND	ND	---
Phenanthrene	85-01-8	X		ND	ND	ND	ND	---
Phenol	108-95-2	X		ND	ND	ND	ND	---
Propanal	123-38-6	X		---	---	---	---	---
Pyrene	129-00-0	X		ND	ND	ND	ND	---
Styrene	100-42-5	X		1.48E-03	ND	ND	ND	---
1,1,2,2-Tetrachloroethane	79-34-5	X		ND	ND	ND	ND	---
Tetrachloroethene	127-18-4	X		1.90E-03	3.22E-03	4.25E-04	1.11E-03	---
m-Tolualdehyde	620-23-5			ND	ND	ND	ND	---
o-Tolualdehyde	529-20-4			ND	4.67E-03	ND	ND	---
Toluene	108-88-3	X		8.97E-03	6.23E-03	1.42E-03	1.11E-03	---
1,2,4-Trichlorobenzene	120-82-1	X		ND	ND	ND	ND	---
1,1,1-Trichloroethane	71-55-6	X		7.69E-04	8.15E-04	ND	3.21E-04	---
1,1,2-Trichloroethane	79-00-5	X		ND	ND	ND	ND	---
Trichloroethene	79-01-6	X		ND	ND	ND	ND	---
Trichlorofluoromethane	75-69-4			1.71E-02	1.66E-02	1.75E-02	4.60E-03	---
2,4,5-Trichlorophenol	95-95-4	X		ND	ND	ND	ND	---
2,4,6-Trichlorophenol	88-06-2	X		ND	ND	ND	ND	---
Vinyl Acetate	108-05-4	X		4.85E-03	3.81E-03	2.54E-03	2.42E-03	---
Vinyl Chloride	75-01-4	X		ND	ND	ND	ND	---
m,p-Xylene	1330-20-7	X		1.65E-03	1.61E-03	5.42E-04	3.36E-04	---
o-Xylene	95-47-6	X		ND	ND	ND	ND	---

1. Data obtained from *Aircraft Engine and APU Emissions Testing Volumes I-III March 1999*, IERA-RS-BR-TR-1999-0006
2. Emission Factors derived using the test results provided in reference above.

"---" 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 2-9. VOC and HAP Emission Factors for Select Engines

F110-GE-100

Power Setting			Idle	Approach	Intermediate	Military	Afterburner-1
Fuel Flowrate (lb/hr)[1]			1111	5080	7332	11358	18088
Percent Thrust/hp[1]			3%	44%	66%	100%	113%
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**				
Acenaphthene	83-32-9	X	ND	ND	ND	ND	ND
Acenaphthylene	208-96-8	X	ND	ND	ND	ND	ND
Acetaldehyde	75-07-0	X	6.62E-03	ND	1.65E-04	1.44E-04	1.24E-02
Acetone	67-64-1		6.89E-02	2.19E-02	3.93E-02	1.66E-02	9.24E-02
Acrolein	107-02-8	X	ND	ND	ND	ND	3.90E-02
Anthracene	120-12-7	X	ND	ND	ND	ND	ND
Benzaldehyde	100-52-7		3.48E-02	ND	4.26E-03	3.06E-03	7.13E-02
Benz(a)anthracene	56-55-3	X	ND	ND	ND	ND	ND
Benzene	71-43-2	X	2.93E-02	1.77E-03	1.59E-03	1.61E-03	1.88E-01
Benzenemethanol	100-51-6		ND	ND	ND	ND	ND
Benzo(b)fluoranthene	205-99-2	X	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	207-08-9	X	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	191-24-2	X	ND	ND	ND	ND	ND
Benzo(a)pyrene	50-32-8	X	ND	ND	ND	ND	ND
Benzoic Acid	65-85-0		1.66E-02	9.23E-03	9.93E-03	5.70E-03	1.37E-01
Bromodichloromethane	75-27-4		ND	ND	ND	1.69E-04	8.15E-04
Bromoform	75-25-2	X	ND	ND	ND	1.69E-04	8.15E-04
Bromomethane	74-83-9	X	ND	ND	ND	1.69E-04	1.03E-03
4-Bromophenyl-phenyl Ether	101-55-3		ND	ND	ND	ND	ND
1,3-Butadiene	106-99-0	X	---	---	---	---	---
2-Butanone (MEK)	78-93-3		2.44E-03	ND	ND	4.55E-04	2.02E-02
Butyl benzyl phthalate	85-68-7		AA	ND	ND	ND	ND
Carbon Disulfide	75-15-0	X	ND	ND	2.48E-04	1.69E-04	8.15E-04
Carbon Tetrachloride	56-23-5	X	ND	ND	ND	1.69E-04	8.15E-04
4-Chloroaniline	106-47-8		ND	ND	ND	ND	ND
Chlorobenzene	108-90-7	X	ND	ND	ND	1.69E-04	8.15E-04
Chlorodibromomethane	124-48-1		ND	ND	ND	1.69E-04	8.15E-04
Chloroethane	75-00-3	X	ND	ND	ND	1.69E-04	8.15E-04
bis(2-Chloroethoxy) Methane	111-91-1		ND	ND	ND	ND	ND
bis(2-Chloroethyl) Ether	111-44-4	X	ND	ND	ND	ND	ND
Chloroform	67-66-3	X	1.88E-03	1.95E-03	1.19E-03	1.09E-03	8.15E-04
bis(2-Choroisopropyl) Ether	39638-32-9		ND	ND	ND	ND	ND
Chloromethane	74-87-3	X	3.89E-04	2.84E-04	ND	2.26E-04	1.84E-03
4-Chloro-3-methylphenol	59-50-7		ND	ND	ND	ND	ND
2-Chloronaphthalene	91-58-7		ND	ND	ND	ND	ND
2-Chlorophenol	95-57-8		ND	ND	ND	ND	ND
1-chloro-4-phenoxybenzene	7005-72-3		ND	ND	ND	ND	ND
Chrysene	218-01-9	X	ND	ND	ND	ND	ND
o-Cresol	95-48-7	X	ND	ND	ND	ND	ND
p-Cresol	106-44-5	X	ND	ND	ND	ND	1.17E-02
Crotonaldehyde	4170-30-3		ND	ND	ND	ND	6.08E-02
Dibenzofuran	132-64-9	X	ND	ND	ND	ND	1.27E-03
Dibutyl Phthalate	84-74-2	X	AA	AA	8.62E-04	AA	ND
1,2-Dichlorobenzene	95-50-1		ND	ND	ND	ND	ND
1,3-Dichlorobenzene	541-73-1		ND	ND	ND	ND	ND
1,4-Dichlorobenzene	106-46-7	X	ND	ND	ND	ND	ND
3,3'-Dichlorobenzidine	91-94-1	X	ND	ND	ND	ND	ND
1,1-Dichloroethane	75-34-3	X	ND	ND	ND	1.69E-04	8.15E-04
1,2-Dichloroethane	107-06-2	X	ND	ND	ND	1.69E-04	8.15E-04
1,1-Dichloroethene	75-35-4	X	ND	ND	ND	1.69E-04	8.15E-04
cis-1,2-Dicholorethene	156-59-2		ND	ND	ND	1.69E-04	8.15E-04
trans-1,2-Dichloroethene	156-60-5		ND	ND	ND	1.69E-04	8.15E-04
2,4-Dichlorophenol	120-83-2		ND	ND	ND	ND	ND
1,2-Dichloropropane	78-87-5	X	ND	ND	ND	1.69E-04	8.15E-04
cis-1,3-Dichloropropene	10061-01-5		ND	ND	ND	1.69E-04	8.15E-04
trans-1,3-Dichloropropene	10061-02-6		ND	ND	ND	1.69E-04	1.52E-03
Diethyl Phthalate	84-66-2		1.36E-03	4.41E-04	4.04E-04	1.07E-04	ND

Power Setting			Idle	Approach	Intermediate	Military	Afterburner-1
Fuel Flowrate (lb/hr)[1]			1111	5080	7332	11358	18088
Percent Thrust/hp[1]			3%	44%	66%	100%	113%
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**				
2,4-Dimethylphenol	105-67-9		ND	ND	ND	ND	ND
Dimethyl phthalate	131-11-3	X	ND	ND	ND	ND	ND
4,6-Dinitro-o-cresol	534-52-1	X	ND	ND	ND	ND	ND
2,4-Dinitrophenol	51-28-5	X	ND	ND	ND	ND	ND
2,4-Dinitrotoluene	121-14-2	X	ND	ND	ND	ND	ND
2,6-Dinitrotoluene	606-20-2		ND	ND	ND	ND	ND
Di(2-Ethylhexyl) Phthalate (DEHP)	117-81-7	X	AA	AA	2.52E-03	AA	ND
Di-n-Octyl phthalate	117-84-0		4.21E-04	ND	ND	ND	ND
Ethylbenzene	100-41-4	X	2.00E-03	3.93E-04	3.68E-04	1.69E-04	4.47E-02
Fluoranthene	206-44-0	X	ND	ND	ND	ND	ND
Fluorene	86-73-7	X	ND	ND	ND	ND	ND
Formaldehyde	50-00-0	X	1.01E-01	1.00E-02	1.94E-02	1.53E-02	1.53E-02
Hexachlorobenzene	118-74-1	X	ND	ND	ND	ND	ND
Hexachlorobutadiene	87-68-3	X	ND	ND	ND	ND	ND
Hexachlorocyclopentadiene	77-47-4	X	ND	ND	ND	ND	ND
Hexachloroethane	67-72-1	X	ND	ND	ND	ND	ND
Hexanal	66-25-1		ND	ND	ND	ND	1.14E-02
2-Hexanone	591-78-6		ND	ND	ND	8.45E-04	3.95E-03
Indeno(1,2,3-cd)pyrene	193-39-5	X	ND	ND	ND	ND	ND
Isophorone	78-59-1	X	ND	ND	ND	ND	ND
Isovaleraldehyde	590-86-3		ND	ND	2.32E-03	1.12E-03	ND
Methylene Chloride	75-09-2	X	1.79E-02	1.16E-02	2.39E-02	2.52E-02	3.79E-02
2-Methylnaphthalene	91-57-6		1.58E-04	AA	3.59E-05	1.19E-04	5.15E-02
4-Methyl-2-pentanone (MIBK)	108-10-1	X	ND	ND	ND	8.45E-04	3.95E-03
Naphthalene	91-20-3	X	3.31E-03	AA	AA	3.31E-04	9.73E-02
m-Nitroaniline	99-09-2		ND	ND	ND	ND	ND
o-Nitroaniline	88-74-4		ND	ND	ND	ND	ND
4-Nitrobenzenamine	100-01-6		ND	ND	ND	ND	ND
Nitrobenzene	98-95-3	X	ND	ND	ND	ND	ND
2-Nitrophenol	88-75-5		ND	ND	ND	ND	2.83E-02
4-Nitrophenol	100-02-7	X	ND	ND	ND	ND	3.23E-02
N-Nitrosodiphenylamine	86-30-6		ND	ND	ND	ND	ND
N-Nitrosodi-n-propylamine	621-64-7		ND	ND	ND	ND	ND
Pentachlorophenol	87-86-5	X	ND	ND	ND	ND	ND
Pentanal	110-62-3		ND	ND	ND	ND	ND
Phenanthrene	85-01-8	X	ND	ND	ND	ND	ND
Phenol	108-95-2	X	2.95E-03	ND	ND	ND	6.63E-02
Propanal	123-38-6	X	---	---	---	---	---
Pyrene	129-00-0	X	ND	ND	ND	ND	ND
Styrene	100-42-5	X	3.69E-03	2.98E-04	4.91E-04	2.65E-04	5.71E-03
1,1,2,2-Tetrachloroethane	79-34-5	X	ND	ND	ND	1.69E-04	8.15E-04
Tetrachloroethene	127-18-4	X	ND	ND	ND	1.69E-04	8.15E-04
m-Tolualdehyde	620-23-5		ND	ND	ND	ND	1.62E-02
o-Tolualdehyde	529-20-4		ND	ND	ND	ND	1.43E-02
Toluene	108-88-3	X	1.10E-02	1.34E-03	1.90E-03	7.41E-04	1.40E-01
1,2,4-Trichlorobenzene	120-82-1	X	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	71-55-6	X	ND	2.71E-04	3.46E-04	1.69E-04	8.15E-04
1,1,2-Trichloroethane	79-00-5	X	ND	ND	ND	1.69E-04	8.15E-04
Trichloroethene	79-01-6	X	ND	ND	ND	1.69E-04	8.15E-04
Trichlorofluoromethane	75-69-4		4.25E-03	5.13E-03	5.93E-03	5.70E-03	1.15E-02
2,4,5-Trichlorophenol	95-95-4	X	ND	ND	ND	ND	ND
2,4,6-Trichlorophenol	88-06-2	X	ND	ND	ND	ND	ND
Vinyl Acetate	108-05-4	X	ND	ND	ND	8.45E-04	7.34E-03
Vinyl Chloride	75-01-4	X	ND	ND	ND	1.69E-04	8.15E-04
m,p-Xylene	1330-20-7	X	2.84E-03	8.26E-04	9.70E-04	3.38E-04	6.05E-02
o-Xylene	95-47-6	X	1.38E-03	2.98E-04	ND	1.69E-04	2.84E-02

1. Data obtained from *Aircraft Engine and APU Emissions Testing Volumes I-III March 1999*, IERA-RS-BR-TR-1999-0006
2. Emission Factors derived using the test results provided in reference above

"---" 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 2-9. VOC and HAP Emission Factors for Select Engines

F117-PW-100

Power Setting			Idle	Approach	Intermediate	---	---
Fuel Flowrate (lb/hr)[1]			978	4645	10408	---	---
Percent Thrust/hp[1]			4%	31%	68%	---	---
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**				
Acenaphthene	83-32-9	X	ND	ND	ND	---	---
Acenaphthylene	208-96-8	X	ND	ND	ND	---	---
Acetaldehyde	75-07-0	X	1.20E-02	ND	ND	---	---
Acetone	67-64-1		3.93E-03	5.35E-03	2.54E-02	---	---
Acrolein	107-02-8	X	ND	ND	ND	---	---
Anthracene	120-12-7	X	ND	ND	ND	---	---
Benzaldehyde	100-52-7		ND	3.16E-03	3.68E-03	---	---
Benz(a)anthracene	56-55-3	X	ND	ND	ND	---	---
Benzene	71-43-2	X	2.25E-02	8.90E-04	6.25E-04	---	---
Benzenemethanol	100-51-6		ND	ND	ND	---	---
Benzo(b)fluoranthene	205-99-2	X	ND	ND	ND	---	---
Benzo(k)fluoranthene	207-08-9	X	ND	ND	ND	---	---
Benzo(g,h,i)perylene	191-24-2	X	ND	ND	ND	---	---
Benzo(a)pyrene	50-32-8	X	ND	ND	ND	---	---
Benzoic Acid	65-85-0		1.28E-02	ND	7.36E-03	---	---
Bromodichloromethane	75-27-4		ND	ND	ND	---	---
Bromoform	75-25-2	X	ND	ND	ND	---	---
Bromomethane	74-83-9	X	ND	ND	ND	---	---
4-Bromophenyl-phenyl Ether	101-55-3		ND	ND	ND	---	---
1,3-Butadiene	106-99-0	X	---	---	---	---	---
2-Butanone (MEK)	78-93-3		ND	ND	ND	---	---
Butyl benzyl phthalate	85-68-7		ND	ND	2.92E-04	---	---
Carbon Disulfide	75-15-0	X	ND	ND	3.76E-04	---	---
Carbon Tetrachloride	56-23-5	X	ND	ND	ND	---	---
4-Chloroaniline	106-47-8		ND	ND	ND	---	---
Chlorobenzene	108-90-7	X	ND	ND	ND	---	---
Chlorodibromomethane	124-48-1		ND	ND	ND	---	---
Chloroethane	75-00-3	X	ND	ND	ND	---	---
bis(2-Chloroethoxy) Methane	111-91-1		ND	ND	ND	---	---
bis(2-Chloroethyl) Ether	111-44-4	X	ND	ND	ND	---	---
Chloroform	67-66-3	X	1.23E-03	1.16E-03	6.14E-04	---	---
bis(2-Choroisopropyl) Ether	39638-32-9		ND	ND	ND	---	---
Chloromethane	74-87-3	X	ND	4.23E-04	ND	---	---
4-Chloro-3-methylphenol	59-50-7		ND	ND	ND	---	---
2-Chloronaphthalene	91-58-7		ND	ND	ND	---	---
2-Chlorophenol	95-57-8		ND	ND	ND	---	---
1-chloro-4-phenoxybenzene	7005-72-3		ND	ND	ND	---	---
Chrysene	218-01-9	X	ND	ND	ND	---	---
o-Cresol	95-48-7	X	ND	ND	ND	---	---
p-Cresol	106-44-5	X	ND	NO	ND	---	---
Crotonaldehyde	4170-30-3		1.20E-02	ND	ND	---	---
Dibenzofuran	132-64-9	X	ND	ND	ND	---	---
Dibutyl Phthalate	84-74-2	X	6.81E-04	8.16E-04	2.30E-04	---	---
1,2-Dichlorobenzene	95-50-1		ND	ND	ND	---	---
1,3-Dichlorobenzene	541-73-1		ND	ND	ND	---	---
1,4-Dichlorobenzene	106-46-7	X	ND	ND	ND	---	---
3,3'-Dichlorobenzidine	91-94-1	X	ND	ND	ND	---	---
1,1-Dichloroethane	75-34-3	X	ND	ND	ND	---	---
1,2-Dichloroethane	107-06-2	X	ND	ND	ND	---	---
1,1-Dichloroethene	75-35-4	X	ND	ND	ND	---	---
cis-1,2-Dicholorethene	156-59-2		ND	ND	ND	---	---
trans-1,2-Dichloroethene	156-60-5		ND	ND	ND	---	---
2,4-Dichlorophenol	120-83-2		ND	ND	ND	---	---
1,2-Dichloropropane	78-87-5	X	2.23E-03	1.59E-03	6.30E-04	---	---
cis-1,3-Dichloropropene	10061-01-5		ND	ND	ND	---	---
trans-1,3-Dichloropropene	10061-02-6		ND	ND	ND	---	---
Diethyl Phthalate	84-66-2		8.47E-03	5.36E-03	2.44E-03	---	---

Power Setting			Idle	Approach	Intermediate	---	---
Fuel Flowrate (lb/hr)[1]			978	4645	10408	---	---
Percent Thrust/hp[1]			4%	31%	68%	---	---
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**				
2,4-Dimethylphenol	105-67-9		ND	ND	ND	---	---
Dimethyl phthalate	131-11-3	X	ND	ND	ND	---	---
4,6-Dinitro-o-cresol	534-52-1	X	ND	ND	ND	---	---
2,4-Dinitrophenol	51-28-5	X	7.36E-03	5.64E-03	3.56E-03	---	---
2,4-Dinitrotoluene	121-14-2	X	ND	ND	ND	---	---
2,6-Dinitrotoluene	606-20-2		ND	ND	ND	---	---
Di(2-Ethylhexyl) Phthalate (DEHP)	117-81-7	X	3.03E-03	1.87E-03	1.69E-03	---	---
Di-n-Octyl phthalate	117-84-0		ND	ND	ND	---	---
Ethylbenzene	100-41-4	X	2.82E-03	ND	ND	---	---
Fluoranthene	206-44-0	X	ND	ND	ND	---	---
Fluorene	86-73-7	X	ND	ND	ND	---	---
Formaldehyde	50-00-0	X	2.36E-01	1.65E-02	9.50E-03	---	---
Hexachlorobenzene	118-74-1	X	ND	ND	ND	---	---
Hexachlorobutadiene	87-68-3	X	ND	ND	ND	---	---
Hexachlorocyclopentadiene	77-47-4	X	ND	ND	ND	---	---
Hexachloroethane	67-72-1	X	ND	ND	ND	---	---
Hexanal	66-25-1		ND	ND	ND	---	---
2-Hexanone	591-78-6		ND	ND	ND	---	---
Indeno(1,2,3-cd)pyrene	193-39-5	X	ND	ND	ND	---	---
Isophorone	78-59-1	X	ND	ND	ND	---	---
Isovaleraldehyde	590-86-3		ND	1.84E-03	ND	---	---
Methylene Chloride	75-09-2	X	7.74E-04	AA	6.25E-03	---	---
2-Methylnaphthalene	91-57-6		1.56E-03	ND	ND	---	---
4-Methyl-2-pentanone (MIBK)	108-10-1	X	ND	ND	ND	---	---
Naphthalene	91-20-3	X	2.39E-03	ND	ND	---	---
m-Nitroaniline	99-09-2		ND	ND	ND	---	---
o-Nitroaniline	88-74-4		ND	ND	ND	---	---
4-Nitrobenzenamine	100-01-6		ND	ND	ND	---	---
Nitrobenzene	98-95-3	X	ND	ND	ND	---	---
2-Nitrophenol	88-75-5		ND	ND	ND	---	---
4-Nitrophenol	100-02-7	X	ND	ND	ND	---	---
N-Nitrosodiphenylamine	86-30-6		ND	ND	ND	---	---
N-Nitrosodi-n-propylamine	621-64-7		ND	ND	ND	---	---
Pentachlorophenol	87-86-5	X	ND	ND	ND	---	---
Pentanal	110-62-3		ND	ND	ND	---	---
Phenanthrene	85-01-8	X	ND	ND	ND	---	---
Phenol	108-95-2	X	3.79E-03	ND	ND	---	---
Propanal	123-38-6	X	---	---	---	---	---
Pyrene	129-00-0	X	ND	ND	ND	---	---
Styrene	100-42-5	X	1.55E-03	ND	ND	---	---
1,1,2,2-Tetrachloroethane	79-34-5	X	3.32E-03	1.87E-03	9.99E-04	---	---
Tetrachloroethene	127-18-4	X	ND	ND	ND	---	---
m-Tolualdehyde	620-23-5		1.75E-02	4.22E-03	2.14E-03	---	---
o-Tolualdehyde	529-20-4		ND	ND	ND	---	---
Toluene	108-88-3	X	6.68E-03	1.41E-03	1.12E-03	---	---
1,2,4-Trichlorobenzene	120-82-1	X	ND	ND	ND	---	---
1,1,1-Trichloroethane	71-55-6	X	ND	3.72E-04	ND	---	---
1,1,2-Trichloroethane	79-00-5	X	ND	ND	ND	---	---
Trichloroethene	79-01-6	X	8.62E-04	AA	AA	---	---
Trichlorofluoromethane	75-69-4		4.43E-03	4.34E-03	3.08E-03	---	---
2,4,5-Trichlorophenol	95-95-4	X	ND	ND	ND	---	---
2,4,6-Trichlorophenol	88-06-2	X	ND	ND	ND	---	---
Vinyl Acetate	108-05-4	X	ND	ND	ND	---	---
Vinyl Chloride	75-01-4	X	ND	ND	ND	---	---
m,p-Xylene	1330-20-7	X	2.29E-03	6.21E-04	5.47E-04	---	---
o-Xylene	95-47-6	X	9.80E-04	ND	ND	---	---

1. Data obtained from *Aircraft Engine and APU Emissions Testing Volumes I-III March 1999*, IERA-RS-BR-TR-1999-0006
2. Emission Factors derived using the test results provided in reference above.

"---" 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 2-9. VOC and HAP Emission Factors for Select Engines

F118-GE-100

	Power Setting		Idle	Approach	Intermediate	Military	---
	Fuel Flowrate (lb/hr)[1]		1097	3773	6350	10887	---
	Percent Thrust/hp		---	---	---	---	---
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**				
Acenaphthene	83-32-9	X	ND	ND	ND	ND	---
Acenaphthylene	208-96-8	X	ND	ND	ND	ND	---
Acetaldehyde	75-07-0	X	7.86E-03	ND	ND	ND	---
Acetone	67-64-1		1.31E-02	2.39E-02	4.61E-03	4.64E-03	---
Acrolein	107-02-8	X	ND	ND	ND	ND	---
Anthracene	120-12-7	X	ND	ND	ND	ND	---
Benzaldehyde	100-52-7		6.59E-03	1.59E-03	1.65E-03	1.94E-03	---
Benz(a)anthracene	56-55-3	X	ND	ND	ND	ND	---
Benzene	71-43-2	X	2.70E-02	8.58E-04	3.71E-04	3.38E-04	---
Benzenemethanol	100-51-6		ND	ND	ND	ND	---
Benzo(b)fluoranthene	205-99-2	X	ND	ND	ND	ND	---
Benzo(k)fluoranthene	207-08-9	X	ND	ND	ND	ND	---
Benzo(g,h,i)perylene	191-24-2	X	ND	ND	ND	ND	---
Benzo(a)pyrene	50-32-8	X	ND	ND	ND	ND	---
Benzoic Acid	65-85-0		2.49E-02	1.68E-02	7.76E-03	1.22E-02	---
Bromodichloromethane	75-27-4		ND	ND	ND	ND	---
Bromoform	75-25-2	X	ND	ND	ND	ND	---
Bromomethane	74-83-9	X	ND	ND	ND	ND	---
4-Bromophenyl-phenyl Ether	101-55-3		ND	ND	ND	ND	---
1,3-Butadiene	106-99-0	X	---	---	---	---	---
2-Butanone (MEK)	78-93-3		3.01E-03	ND	ND	ND	---
Butyl benzyl phthalate	85-68-7		ND	ND	ND	ND	---
Carbon Disulfide	75-15-0	X	5.53E-04	ND	ND	ND	---
Carbon Tetrachloride	56-23-5	X	ND	ND	ND	ND	---
4-Chloroaniline	106-47-8		ND	ND	ND	ND	---
Chlorobenzene	108-90-7	X	ND	ND	ND	ND	---
Chlorodibromomethane	124-48-1		ND	ND	ND	ND	---
Chloroethane	75-00-3	X	ND	ND	ND	ND	---
bis(2-Chloroethoxy) Methane	111-91-1		ND	ND	ND	ND	---
bis(2-Chloroethyl) Ether	111-44-4	X	ND	ND	ND	ND	---
Chloroform	67-66-3	X	1.22E-03	5.29E-04	4.29E-04	1.86E-04	---
bis(2-Choroisopropyl) Ether	39638-32-9		ND	ND	ND	ND	---
Chloromethane	74-87-3	X	4.67E-04	ND	ND	ND	---
4-Chloro-3-methylphenol	59-50-7		ND	ND	ND	ND	---
2-Chloronaphthalene	91-58-7		ND	ND	ND	ND	---
2-Chlorophenol	95-57-8		ND	ND	ND	ND	---
1-chloro-4-phenoxybenzene	7005-72-3		ND	ND	ND	ND	---
Chrysene	218-01-9	X	ND	ND	ND	ND	---
o-Cresol	95-48-7	X	ND	ND	ND	ND	---
p-Cresol	106-44-5	X	ND	ND	ND	ND	---
Crotonaldehyde	4170-30-3		ND	ND	ND	ND	---
Dibenzofuran	132-64-9	X	ND	ND	ND	ND	---
Dibutyl Phthalate	84-74-2	X	AA	1.04E-04	4.22E-05	AA	---
1,2-Dichlorobenzene	95-50-1		ND	ND	ND	ND	---
1,3-Dichlorobenzene	541-73-1		ND	ND	ND	ND	---
1,4-Dichlorobenzene	106-46-7	X	ND	ND	ND	ND	---
3,3'-Dichlorobenzidine	91-94-1	X	ND	ND	ND	ND	---
1,1-Dichloroethane	75-34-3	X	ND	ND	ND	ND	---
1,2-Dichloroethane	107-06-2	X	ND	ND	ND	ND	---
1,1-Dichloroethene	75-35-4	X	ND	ND	ND	ND	---
cis-1,2-Dicholorethene	156-59-2		ND	ND	ND	ND	---
trans-1,2-Dichloroethene	156-60-5		ND	ND	ND	ND	---
2,4-Dichlorophenol	120-83-2		2.01E-03	1.73E-03	1.31E-03	1.07E-03	---
1,2-Dichloropropane	78-87-5	X	ND	ND	ND	ND	---
cis-1,3-Dichloropropene	10061-01-5		ND	ND	ND	ND	---
trans-1,3-Dichloropropene	10061-02-6		ND	ND	ND	ND	---
Diethyl Phthalate	84-66-2		AA	AA	AA	AA	---

	Power Setting		Idle	Approach	Intermediate	Military	---
	Fuel Flowrate (lb/hr)[1]		1097	3773	6350	10887	---
	Percent Thrust/hp		---	---	---	---	---
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000 ls fuel burned)[2]**				
2,4-Dimethylphenol	105-67-9		ND	ND	ND	ND	---
Dimethyl phthalate	131-11-3	X	ND	ND	ND	ND	---
4,6-Dinitro-o-cresol	534-52-1	X	ND	ND	ND	ND	---
2,4-Dinitrophenol	51-28-5	X	ND	ND	ND	ND	---
2,4-Dinitrotoluene	121-14-2	X	ND	ND	ND	ND	---
2,6-Dinitrotoluene	606-20-2		ND	ND	ND	ND	---
Di(2-Ethylhexyl) Phthalate (DEHP)	117-81-7	X	AA	2.47E-03	3.17E-04	AA	---
Di-n-Octyl phthalate	117-84-0		ND	ND	ND	ND	---
Ethylbenzene	100-41-4	X	1.23E-03	3.72E-04	ND	ND	---
Fluoranthene	206-44-0	X	ND	ND	ND	ND	---
Fluorene	86-73-7	X	ND	ND	ND	ND	---
Formaldehyde	50-00-0	X	1.80E-01	1.22E-02	1.17E-02	6.55E-03	---
Hexachlorobenzene	118-74-1	X	ND	ND	ND	ND	---
Hexachlorobutadiene	87-68-3	X	ND	ND	ND	ND	---
Hexachlorocyclopentadiene	77-47-4	X	ND	ND	ND	ND	---
Hexachloroethane	67-72-1	X	ND	ND	ND	ND	---
Hexanal	66-25-1		ND	ND	ND	ND	---
2-Hexanone	591-78-6		2.79E-03	1.96E-03	1.35E-03	9.98E-04	---
Indeno(1,2,3-cd)pyrene	193-39-5	X	ND	ND	ND	ND	---
Isophorone	78-59-1	X	ND	ND	ND	ND	---
Isovaleraldehyde	590-86-3		ND	1.41E-03	1.34E-03	8.08E-04	---
Methylene Chloride	75-09-2	X	1.22E-02	1.09E-02	8.04E-03	AA	---
2-Methylnaphthalene	91-57-6		AA	ND	ND	ND	---
4-Methyl-2-pentanone (MIBK)	108-10-1	X	ND	ND	ND	ND	---
Naphthalene	91-20-3	X	AA	ND	ND	ND	---
m-Nitroaniline	99-09-2		ND	ND	ND	ND	---
o-Nitroaniline	88-74-4		ND	ND	ND	ND	---
4-Nitrobenzenamine	100-01-6		ND	ND	ND	NO	---
Nitrobenzene	98-95-3	X	ND	ND	ND	ND	---
2-Nitrophenol	88-75-5		ND	ND	ND	NO	---
4-Nitrophenol	100-02-7	X	ND	ND	ND	ND	---
N-Nitrosodiphenylamine	86-30-6		ND	ND	ND	ND	---
N-Nitrosodi-n-propylamine	621-64-7		ND	ND	ND	ND	---
Pentachlorophenol	87-86-5	X	ND	ND	ND	ND	---
Pentanal	110-62-3		ND	ND	ND	ND	---
Phenanthrene	85-01-8	X	ND	ND	ND	ND	---
Phenol	108-95-2	X	1.20E-03	ND	ND	ND	---
Propanal	123-38-6	X	---	---	---	---	---
Pyrene	129-00-0	X	ND	ND	ND	ND	---
Styrene	100-42-5	X	2.25E-03	ND	ND	ND	---
1,1,2,2-Tetrachloroethane	79-34-5	X	5.58E-04	3.93E-04	2.70E-04	1.99E-04	---
Tetrachloroethene	127-18-4	X	ND	ND	ND	ND	---
m-Tolualdehyde	620-23-5		1.14E-02	4.77E-03	3.95E-03	3.01E-03	---
o-Tolualdehyde	529-20-4		ND	ND	ND	ND	---
Toluene	108-88-3	X	9.88E-03	1.35E-03	2.98E-04	3.85E-04	---
1,2,4-Trichlorobenzene	120-82-1	X	ND	ND	ND	ND	---
1,1,1-Trichloroethane	71-55-6	X	ND	ND	ND	ND	---
1,1,2-Trichloroethane	79-00-5	X	ND	ND	ND	ND	---
Trichloroethene	79-01-6	X	ND	ND	ND	ND	---
Trichlorofluoromethane	75-69-4		1.92E-02	7.24E-03	6.88E-03	2.15E+01	---
2,4,5-Trichlorophenol	95-95-4	X	ND	ND	ND	ND	---
2,4,6-Trichlorophenol	88-06-2	X	ND	ND	ND	ND	---
Vinyl Acetate	108-05-4	X	ND	ND	ND	ND	---
Vinyl Chloride	75-01-4	X	ND	ND	ND	ND	---
m,p-Xylene	1330-20-7	X	3.82E-03	1.47E-03	2.87E-04	2.05E-04	---
o-Xylene	95-47-6	X	1.43E-03	4.98E-04	ND	ND	---

1. Data obtained from *Aircraft Engine and APU Emissions Testing Volumes I-III March 1999*, IERA-RS-BR-TR-1999-0006
2. Emission Factors derived using the test results provided in the reference above.

"---" 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 2-9. VOC and HAP Emission Factors for Select Engines

F119-PW-100

Power Setting			Idle	Approach	Intermediate	Military	Afterburner
Fuel Flowrate (lb/hr)[1]			1377	2740	10110	18612	50170
Percent Thrust/hp			10%	20%	70%	100%	150%
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**				
Acenaphthene	83-32-9	X	---	---	---	---	---
Acenaphthylene	208-96-8	X	---	---	---	---	---
Acetaldehyde	75-07-0	X	1.11E-01	6.75E-03	2.61E-03	8.33E-04	---
Acetone	67-64-1		1.17E-01	2.14E-01	3.10E-02	2.67E-02	---
Acrolein	107-02-8	X	3.60E-02	ND	ND	ND	---
Anthracene	120-12-7	X	---	---	---	---	---
Benzaldehyde	100-52-7		4.15E-02	ND	ND	ND	---
Benz(a)anthracene	56-55-3	X	---	---	---	---	---
Benzene	71-43-2	X	1.06E-01	3.33E-03	6.86E-04	4.88E-04	---
Benzenemethanol	100-51-6		---	---	---	---	---
Benzo(b)fluoranthene	205-99-2	X	---	---	---	---	---
Benzo(k)fluoranthene	207-08-9	X	---	---	---	---	---
Benzo(g,h,i)perylene	191-24-2	X	---	---	---	---	---
Benzo(a)pyrene	50-32-8	X	---	---	---	---	---
Benzoic Acid	65-85-0		---	---	---	---	---
Bromodichloromethane	75-27-4		ND	ND	ND	ND	---
Bromoform	75-25-2	X	ND	ND	ND	ND	---
Bromomethane	74-83-9	X	ND	ND	ND	ND	---
4-Bromophenyl-phenyl Ether	101-55-3		---	---	---	---	---
1,3-Butadiene	106-99-0	X	4.99E-02	ND	4.27E-04	ND	---
2-Butanone (MEK)	78-93-3		3.33E-02	ND	ND	ND	---
Butyl benzyl phthalate	85-68-7		---	---	---	---	---
Carbon Disulfide	75-15-0	X	ND	ND	ND	7.01E-05	---
Carbon Tetrachloride	56-23-5	X	3.22E-04	3.92E-04	2.55E-04	1.62E-04	---
4-Chloroaniline	106-47-8		---	---	---	---	---
Chlorobenzene	108-90-7	X	ND	ND	ND	ND	---
Chlorodibromomethane	124-48-1		ND	ND	ND	ND	---
Chloroethane	75-00-3	X	ND	ND	ND	ND	---
bis(2-Chloroethoxy) Methane	111-91-1		---	---	---	---	---
bis(2-Chloroethyl) Ether	111-44-4	X	---	---	---	---	---
Chloroform	67-66-3	X	ND	ND	1.03E-04	ND	---
bis(2-Choroisopropyl) Ether	39638-32-9		---	---	---	---	---
Chloromethane	74-87-3	X	ND	AA	AA	AA	---
4-Chloro-3-methylphenol	59-50-7		---	---	---	---	---
2-Chloronaphthalene	91-58-7		---	---	---	---	---
2-Chlorophenol	95-57-8		---	---	---	---	---
1-chloro-4-phenoxybenzene	7005-72-3		---	---	---	---	---
Chrysene	218-01-9	X	---	---	---	---	---
o-Cresol	95-48-7	X	---	---	---	---	---
p-Cresol	106-44-5	X	---	---	---	---	---
Crotonaldehyde	4170-30-3		2.66E-02	ND	ND	ND	---
Dibenzofuran	132-64-9	X	---	---	---	---	---
Dibutyl Phthalate	84-74-2	X	---	---	---	---	---
1,2-Dichlorobenzene	95-50-1		---	---	---	---	---
1,3-Dichlorobenzene	541-73-1		---	---	---	---	---
1,4-Dichlorobenzene	106-46-7	X	---	---	---	---	---
3,3'-Dichlorobenzidine	91-94-1	X	---	---	---	---	---
1,1-Dichloroethane	75-34-3	X	ND	ND	ND	ND	---
1,2-Dichloroethane	107-06-2	X	ND	ND	ND	ND	---
1,1-Dichloroethene	75-35-4	X	ND	ND	ND	ND	---
cis-1,2-Dicholorethene	156-59-2		ND	ND	ND	ND	---
trans-1,2-Dichloroethene	156-60-5		ND	ND	ND	ND	---
2,4-Dichlorophenol	120-83-2		---	---	---	---	---
1,2-Dichloropropane	78-87-5	X	ND	ND	ND	ND	---
cis-1,3-Dichloropropene	10061-01-5		ND	ND	ND	ND	---
trans-1,3-Dichloropropene	10061-02-6		ND	ND	ND	ND	---
Diethyl Phthalate	84-66-2		---	---	---	---	---

Power Setting			Idle	Approach	Intermediate	Military	Afterburner
Fuel Flowrate (lb/hr)[1]			1377	2740	10110	18612	50170
Percent Thrust/hp			10%	20%	70%	100%	150%
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**				
2,4-Dimethylphenol	105-67-9		---	---	---	---	---
Dimethyl phthalate	131-11-3	X	---	---	---	---	---
4,6-Dinitro-o-cresol	534-52-1	X	---	---	---	---	---
2,4-Dinitrophenol	51-28-5	X	---	---	---	---	---
2,4-Dinitrotoluene	121-14-2	X	---	---	---	---	---
2,6-Dinitrotoluene	606-20-2		---	---	---	---	---
Di(2-Ethylhexyl) Phthalate (DEHP)	117-81-7	X	---	---	---	---	---
Di-n-Octyl phthalate	117-84-0		---	---	---	---	---
Ethylbenzene	100-41-4	X	1.64E-02	2.55E-04	4.99E-04	1.34E-04	---
Fluoranthene	206-44-0	X	---	---	---	---	---
Fluorene	86-73-7	X	---	---	---	---	---
Formaldehyde	50-00-0	X	9.95E-01	3.56E-02	2.44E-02	7.58E-03	---
Hexachlorobenzene	118-74-1	X	---	---	---	---	---
Hexachlorobutadiene	87-68-3	X	---	---	---	---	---
Hexachlorocyclopentadiene	77-47-4	X	---	---	---	---	---
Hexachloroethane	67-72-1	X	---	---	---	---	---
Hexanal	66-25-1		ND	ND	ND	ND	---
2-Hexanone	591-78-6		ND	ND	ND	ND	---
Indeno(1,2,3-cd)pyrene	193-39-5	X	---	---	---	---	---
Isophorone	78-59-1	X	---	---	---	---	---
Isovaleraldehyde	590-86-3		ND	ND	ND	ND	---
Methylene Chloride	75-09-2	X	5.03E-04	AA	AA	AA	---
2-Methylnaphthalene	91-57-6		---	---	---	---	---
4-Methyl-2-pentanone (MIBK)	108-10-1	X	ND	ND	ND	ND	---
Naphthalene	91-20-3	X	---	---	---	---	---
m-Nitroaniline	99-09-2		---	---	---	---	---
o-Nitroaniline	88-74-4		---	---	---	---	---
4-Nitrobenzenamine	100-01-6		---	---	---	---	---
Nitrobenzene	98-95-3	X	---	---	---	---	---
2-Nitrophenol	88-75-5		---	---	---	---	---
4-Nitrophenol	100-02-7	X	---	---	---	---	---
N-Nitrosodiphenylamine	86-30-6		---	---	---	---	---
N-Nitrosodi-n-propylamine	621-64-7		---	---	---	---	---
Pentachlorophenol	87-86-5	X	---	---	---	---	---
Pentanal	110-62-3		ND	ND	ND	ND	---
Phenanthrene	85-01-8	X	---	---	---	---	---
Phenol	108-95-2	X	---	---	---	---	---
Propanal	123-38-6	X	1.60E-02	ND	9.78E-04	4.10E-04	---
Pyrene	129-00-0	X	---	---	---	---	---
Styrene	100-42-5	X	3.12E-02	2.55E-04	ND	ND	---
1,1,2,2-Tetrachloroethane	79-34-5	X	ND	ND	ND	ND	---
Tetrachloroethene	127-18-4	X	3.02E-04	2.89E-04	ND	ND	---
m-Tolualdehyde	620-23-5		1.91E-02	ND	1.18E-03	1.64E-04	---
o-Tolualdehyde	529-20-4		2.77E-02	ND	ND	4.31E-04	---
Toluene	108-88-3	X	6.37E-02	2.68E-04	AA	AA	---
1,2,4-Trichlorobenzene	120-82-1	X	---	---	---	---	---
1,1,1-Trichloroethane	71-55-6	X	ND	ND	ND	ND	---
1,1,2-Trichloroethane	79-00-5	X	ND	ND	ND	ND	---
Trichloroethene	79-01-6	X	ND	ND	ND	ND	---
Trichlorofluoromethane	75-69-4		1.86E-03	1.61E-03	AA	1.12E-03	---
2,4,5-Trichlorophenol	95-95-4	X	---	---	---	---	---
2,4,6-Trichlorophenol	88-06-2	X	---	---	---	---	---
Vinyl Acetate	108-05-4	X	ND	ND	ND	ND	---
Vinyl Chloride	75-01-4	X	ND	ND	ND	ND	---
m,p-Xylene	1330-20-7	X	3.92E-02	5.60E-04	AA	2.57E-04	---
o-Xylene	95-47-6	X	2.79E-02	3.21E-04	4.89E-04	1.20E-04	---

1. Data obtained from *Aircraft Engine and APU Emissions Testing Final Report Addendum F119-PW-100 Engine June 2002*, IERA-RS-BR-SR-2002-0006
2. Emission Factors derived using the test results provided in the reference above.

"---" 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 2-9. VOC and HAP Emission Factors for Select Engines
F404-GE-400, -F1D2

Power Setting			Idle	Approach	Intermediate	Military	Afterburner-3
Fuel Flowrate (lb/hr)[1]			685	3111	6464	7739	15851
Percent Thrust/hp[1]			6%	38%	79%	91%	114%
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**				
Acenaphthene	83-32-9	X	ND	ND	ND	ND	ND
Acenaphthylene	208-96-8	X	1.20E-02	ND	ND	ND	ND
Acetaldehyde	75-07-0	X	5.69E-02	ND	ND	ND	3.38E-02
Acetone	67-64-1		5.76E-02	1.72E-02	2.93E-02	1.65E-02	5.43E-02
Acrolein	107-02-8	X	1.71E-01	ND	ND	ND	1.44E-01
Anthracene	120-12-7	X	ND	ND	ND	ND	ND
Benzaldehyde	100-52-7		1.31E-01	ND	1.70E-03	ND	1.32E-01
Benz(a)anthracene	56-55-3	X	ND	ND	ND	ND	ND
Benzene	71-43-2	X	5.12E-01	7.56E-04	6.45E-04	7.38E-04	3.70E-01
Benzenemethanol	100-51-6		3.45E-02	ND	ND	ND	2.84E-02
Benzo(b)fluoranthene	205-99-2	X	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	207-08-9	X	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	191-24-2	X	ND	ND	ND	ND	ND
Benzo(a)pyrene	50-32-8	X	ND	ND	ND	ND	ND
Benzoic Acid	65-85-0		ND	1.59E-02	1.62E-02	7.56E-03	1.41E-01
Bromodichloromethane	75-27-4		2.49E-03	ND	ND	ND	2.00E-03
Bromoform	75-25-2	X	2.49E-03	ND	ND	ND	2.00E-03
Bromomethane	74-83-9	X	2.49E-03	ND	ND	ND	2.13E-03
4-Bromophenyl-phenyl Ether	101-55-3		ND	ND	ND	ND	ND
1,3-Butadiene	106-99-0	X	---	---	---	---	---
2-Butanone (MEK)	78-93-3		2.31E-02	ND	ND	ND	2.74E-02
Butyl benzyl phthalate	85-68-7		ND	ND	ND	ND	ND
Carbon Disulfide	75-15-0	X	2.49E-03	ND	ND	ND	2.00E-03
Carbon Tetrachloride	56-23-5	X	2.49E-03	2.37E-04	1.91E-04	ND	2.00E-03
4-Chloroaniline	106-47-8		ND	ND	NO	ND	ND
Chlorobenzene	108-90-7	X	2.49E-03	ND	ND	ND	2.00E-03
Chlorodibromomethane	124-48-1		2.49E-03	ND	ND	ND	2.00E-03
Chloroethane	75-00-3	X	2.49E-03	ND	ND	ND	2.00E-03
bis(2-Chloroethoxy) Methane	111-91-1		ND	ND	ND	ND	ND
bis(2-Chloroethyl) Ether	111-44-4	X	ND	ND	ND	ND	ND
Chloroform	67-66-3	X	2.49E-03	4.67E-04	3.38E-04	3.84E-04	2.00E-03
bis(2-Choroisopropyl) Ether	39638-32-9		ND	ND	ND	ND	ND
Chloromethane	74-87-3	X	2.65E-03	3.28E-04	4.82E-04	2.89E-04	2.00E-03
4-Chloro-3-methylphenol	59-50-7		ND	ND	ND	ND	ND
2-Chloronaphthalene	91-58-7		ND	ND	ND	ND	ND
2-Chlorophenol	95-57-8		ND	ND	ND	ND	ND
1-chloro-4-phenoxybenzene	7005-72-3		ND	ND	ND	ND	ND
Chrysene	218-01-9	X	ND	ND	ND	ND	ND
o-Cresol	95-48-7	X	ND	ND	ND	ND	ND
p-Cresol	106-44-5	X	2.58E-02	ND	ND	ND	1.94E-02
Crotonaldehyde	4170-30-3		9.14E-02	ND	ND	ND	8.45E-02
Dibenzofuran	132-64-9	X	ND	ND	ND	ND	ND
Dibutyl Phthalate	84-74-2	X	ND	ND	1.89E-03	1.60E-04	ND
1,2-Dichlorobenzene	95-50-1		ND	ND	ND	ND	ND
1,3-Dichlorobenzene	541-73-1		ND	ND	ND	ND	ND
1,4-Dichlorobenzene	106-46-7	X	ND	ND	ND	ND	ND
3,3'-Dichlorobenzidine	91-94-1	X	ND	ND	ND	ND	ND
1,1-Dichloroethane	75-34-3	X	2.49E-03	ND	ND	ND	2.00E-03
1,2-Dichloroethane	107-06-2	X	2.49E-03	ND	ND	ND	2.00E-03
1,1-Dichloroethene	75-35-4	X	2.49E-03	ND	ND	ND	2.00E-03
cis-1,2-Dicholorethene	156-59-2		2.49E-03	ND	ND	ND	2.00E-03
trans-1,2-Dichloroethene	156-60-5		2.49E-03	ND	ND	ND	2.00E-03
2,4-Dichlorophenol	120-83-2		ND	ND	ND	ND	ND
1,2-Dichloropropane	78-87-5	X	2.49E-03	ND	ND	ND	2.00E-03
cis-1,3-Dichloropropene	10061-01-5		2.49E-03	ND	ND	ND	2.00E-03
trans-1,3-Dichloropropene	10061-02-6		2.49E-03	ND	ND	ND	2.00E-03
Diethyl Phthalate	84-66-2		ND	AA	1.14E-04	AA	ND

Power Setting			Idle	Approach	Intermediate	Military	Afterburner-3
Fuel Flowrate (lb/hr)[1]			685	3111	6464	7739	15851
Percent Thrust/hp[1]			6%	38%	79%	91%	114%
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**				
2,4-Dimethylphenol	105-67-9		ND	ND	ND	ND	ND
Dimethyl phthalate	131-11-3	X	ND	ND	ND	ND	ND
4,6-Dinitro-o-cresol	534-52-1	X	ND	ND	ND	ND	ND
2,4-Dinitrophenol	51-28-5	X	ND	ND	ND	ND	ND
2,4-Dinitrotoluene	121-14-2	X	ND	ND	ND	ND	ND
2,6-Dinitrotoluene	606-20-2		ND	ND	ND	ND	ND
Di(2-Ethylhexyl) Phthalate (DEHP)	117-81-7	X	2.54E-03	5.11E-04	2.20E-03	8.68E-04	ND
Di-n-Octyl phthalate	117-84-0		ND	ND	ND	ND	ND
Ethylbenzene	100-41-4	X	7.48E-02	4.84E-04	3.53E-04	ND	4.86E-02
Fluoranthene	206-44-0	X	ND	ND	ND	ND	NO
Fluorene	86-73-7	X	2.57E-03	ND	ND	ND	ND
Formaldehyde	50-00-0	X	1.14E+00	1.67E-02	2.17E-02	9.02E-03	3.74E-02
Hexachlorobenzene	118-74-1	X	ND	ND	ND	ND	ND
Hexachlorobutadiene	87-68-3	X	ND	ND	ND	ND	ND
Hexachlorocyclopentadiene	77-47-4	X	ND	ND	ND	ND	ND
Hexachloroethane	67-72-1	X	ND	ND	ND	ND	ND
Hexanal	66-25-1		ND	ND	ND	ND	1.26E-02
2-Hexanone	591-78-6		1.24E-02	ND	ND	ND	1.01E-02
Indeno(1,2,3-cd)pyrene	193-39-5	X	ND	ND	ND	ND	ND
Isophorone	78-59-1	X	ND	ND	ND	ND	ND
Isovaleraldehyde	590-86-3		ND	1.14E-03	1.84E-02	ND	1.32E-02
Methylene Chloride	75-09-2	X	1.19E-02	1.47E-02	1.14E-02	3.09E-03	8.39E-03
2-Methylnaphthalene	91-57-6		1.10E-01	1.77E-04	1.78E-05	1.05E-05	6.69E-02
4-Methyl-2-pentanone (MIBK)	108-10-1	X	1.24E-02	ND	ND	ND	1.01E-02
Naphthalene	91-20-3	X	1.31E-01	3.10E-04	7.04E-05	1.03E-04	7.32E-02
m-Nitroaniline	99-09-2		ND	ND	ND	ND	ND
o-Nitroaniline	88-74-4		ND	ND	ND	ND	ND
4-Nitrobenzenamine	100-01-6		ND	ND	ND	ND	ND
Nitrobenzene	98-95-3	X	ND	ND	ND	ND	ND
2-Nitrophenol	88-75-5		ND	ND	ND	ND	2.45E-02
4-Nitrophenol	100-02-7	X	ND	ND	ND	ND	ND
N-Nitrosodiphenylamine	86-30-6		ND	ND	ND	ND	ND
N-Nitrosodi-n-propylamine	621-64-7		ND	ND	ND	ND	ND
Pentachlorophenol	87-86-5	X	ND	ND	ND	ND	ND
Pentanal	110-62-3		ND	ND	ND	ND	ND
Phenanthrene	85-01-8	X	2.57E-03	ND	ND	ND	ND
Phenol	108-95-2	X	1.15E-01	ND	ND	ND	6.69E-02
Propanal	123-38-6	X	---	---	---	---	---
Pyrene	129-00-0	X	ND	ND	ND	ND	ND
Styrene	100-42-5	X	8.66E-02	ND	ND	ND	4.90E-03
1,1,2,2-Tetrachloroethane	79-34-5	X	2.49E-03	ND	ND	ND	2.00E-03
Tetrachloroethene	127-18-4	X	2.49E-03	ND	ND	ND	2.00E-03
m-Tolualdehyde	620-23-5		6.80E-02	ND	ND	ND	9.65E-02
o-Tolualdehyde	529-20-4		ND	ND	ND	ND	5.61E-03
Toluene	108-88-3	X	2.60E-01	8.73E-04	1.07E-03	6.61E-04	1.78E-01
1,2,4-Trichlorobenzene	120-82-1	X	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	71-55-6	X	2.49E-03	ND	ND	ND	2.00E-03
1,1,2-Trichloroethane	79-00-5	X	2.49E-03	ND	ND	ND	2.00E-03
Trichloroethene	79-01-6	X	2.49E-03	ND	ND	ND	2.00E-03
Trichlorofluoromethane	75-69-4		3.64E-03	1.08E-02	6.73E-03	1.24E-02	2.31E-03
2,4,5-Trichlorophenol	95-95-4	X	ND	ND	ND	ND	ND
2,4,6-Trichlorophenol	88-06-2	X	ND	ND	ND	ND	ND
Vinyl Acetate	108-05-4	X	1.24E-02	ND	ND	ND	1.01E-02
Vinyl Chloride	75-01-4	X	2.49E-03	ND	ND	ND	2.00E-03
m,p-Xylene	1330-20-7	X	1.68E-01	1.76E-03	1.38E-03	7.45E-04	9.29E-02
o-Xylene	95-47-6	X	8.07E-02	8.75E-04	5.90E-04	2.65E-04	4.86E-02

1. Data obtained from *Aircraft Engine and APU Emissions Testing Volumes I-III March 1999*, IERA-RS-BR-TR-1999-0006
2. Emission Factors derived using the test results provided in the reference above.

"---" 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 2-9. VOC and HAP Emission Factors for Select Engines

GTCP85-180

			Power Setting	Constant	---	---	---	---
			Fuel Flowrate (lb/hr)[1]	270	---	---	---	---
Compound Name	CAS Number	HAP	Emission Factors (lb/1000lb fuel burned)[2]					
Acenaphthene	83-32-9	X	ND	---	---	---	---	
Acenaphthylene	208-96-8	X	ND	---	---	---	---	
Acetaldehyde	75-07-0	X	2.09E-03	---	---	---	---	
Acetone	67-64-1		1.08E-02	---	---	---	---	
Acrolein	107-02-8	X	3.04E-04	---	---	---	---	
Anthracene	120-12-7	X	ND	---	---	---	---	
Benzaldehyde	100-52-7		ND	---	---	---	---	
Benz(a)anthracene	56-55-3	X	ND	---	---	---	---	
Benzene	71-43-2	X	1.50E-02	---	---	---	---	
Benzenemethanol	100-51-6		ND	---	---	---	---	
Benzo(b)fluoranthene	205-99-2	X	ND	---	---	---	---	
Benzo(k)fluoranthene	207-08-9	X	ND	---	---	---	---	
Benzo(g,h,i)perylene	191-24-2	X	ND	---	---	---	---	
Benzo(a)pyrene	50-32-8	X	ND	---	---	---	---	
Benzoic Acid	65-85-0		4.14E-03	---	---	---	---	
Bromodichloromethane	75-27-4		ND	---	---	---	---	
Bromoform	75-25-2	X	ND	---	---	---	---	
Bromomethane	74-83-9	X	8.76E-05	---	---	---	---	
4-Bromophenyl-phenyl Ether	101-55-3		ND	---	---	---	---	
1,3-Butadiene	106-99-0	X	---	---	---	---	---	
2-Butanone (MEK)	78-93-3		9.96E-04	---	---	---	---	
Butyl benzyl phthalate	85-68-7		7.77E-05	---	---	---	---	
Carbon Disulfide	75-15-0	X	7.79E-05	---	---	---	---	
Carbon Tetrachloride	56-23-5	X	ND	---	---	---	---	
4-Chloroaniline	106-47-8		ND	---	---	---	---	
Chlorobenzene	108-90-7	X	4.59E-04	---	---	---	---	
Chlorodibromomethane	124-48-1		ND	---	---	---	---	
Chloroethane	75-00-3	X	ND	---	---	---	---	
bis(2-Chloroethoxy) Methane	111-91-1		ND	---	---	---	---	
bis(2-Chloroethyl) Ether	111-44-4	X	ND	---	---	---	---	
Chloroform	67-66-3	X	2.07E-04	---	---	---	---	
bis(2-Choroisopropyl) Ether	39638-32-9		ND	---	---	---	---	
Chloromethane	74-87-3	X	ND	---	---	---	---	
4-Chloro-3-methylphenol	59-50-7		ND	---	---	---	---	
2-Chloronaphthalene	91-58-7		ND	---	---	---	---	
2-Chlorophenol	95-57-8		ND	---	---	---	---	
1-chloro-4-phenoxybenzene	7005-72-3		ND	---	---	---	---	
Chrysene	218-01-9	X	ND	---	---	---	---	
o-Cresol	95-48-7	X	ND	---	---	---	---	
p-Cresol	106-44-5	X	ND	---	---	---	---	
Crotonaldehyde	4170-30-3		5.25E-04	---	---	---	---	
Dibenzofuran	132-64-9	X	ND	---	---	---	---	
Dibutyl Phthalate	84-74-2	X	2.68E-04	---	---	---	---	
1,2-Dichlorobenzene	95-50-1		ND	---	---	---	---	
1,3-Dichlorobenzene	541-73-1		ND	---	---	---	---	
1,4-Dichlorobenzene	106-46-7	X	ND	---	---	---	---	
3,3'-Dichlorobenzidine	91-94-1	X	ND	---	---	---	---	
1,1-Dichloroethane	75-34-3	X	ND	---	---	---	---	
1,2-Dichloroethane	107-06-2	X	ND	---	---	---	---	
1,1-Dichloroethene	75-35-4	X	ND	---	---	---	---	
cis-1,2-Dicholorethene	156-59-2		ND	---	---	---	---	
trans-1,2-Dichloroethene	156-60-5		ND	---	---	---	---	
2,4-Dichlorophenol	120-83-2		ND	---	---	---	---	
1,2-Dichloropropane	78-87-5	X	ND	---	---	---	---	
cis-1,3-Dichloropropene	10061-01-5		ND	---	---	---	---	
trans-1,3-Dichloropropene	10061-02-6		ND	---	---	---	---	
Diethyl Phthalate	84-66-2		5.29E-04	---	---	---	---	

			Power Setting	Constant	---	---	---	---
			Fuel Flowrate (lb/hr)[1]	270	---	---	---	---
Compound Name	CAS Number	HAP	Emission Factors (lb/1000lb fuel burned)[2]					
2,4-Dimethylphenol	105-67-9		ND	---	---	---	---	
Dimethyl phthalate	131-11-3	X	ND	---	---	---	---	
4,6-Dinitro-o-cresol	534-52-1	X	ND	---	---	---	---	
2,4-Dinitrophenol	51-28-5	X	ND	---	---	---	---	
2,4-Dinitrotoluene	121-14-2	X	ND	---	---	---	---	
2,6-Dinitrotoluene	606-20-2		ND	---	---	---	---	
Di(2-Ethylhexyl) Phthalate (DEHP)	117-81-7	X	4.59E-04	---	---	---	---	
Di-n-Octyl phthalate	117-84-0		ND	---	---	---	---	
Ethylbenzene	100-41-4	X	1.20E-04	---	---	---	---	
Fluoranthene	206-44-0	X	4.44E-05	---	---	---	---	
Fluorene	86-73-7	X	ND	---	---	---	---	
Formaldehyde	50-00-0	X	2.03E-02	---	---	---	---	
Hexachlorobenzene	118-74-1	X	ND	---	---	---	---	
Hexachlorobutadiene	87-68-3	X	ND	---	---	---	---	
Hexachlorocyclopentadiene	77-47-4	X	ND	---	---	---	---	
Hexachloroethane	67-72-1	X	ND	---	---	---	---	
Hexanal	66-25-1		ND	---	---	---	---	
2-Hexanone	591-78-6		ND	---	---	---	---	
Indeno(1,2,3-cd)pyrene	193-39-5	X	ND	---	---	---	---	
Isophorone	78-59-1	X	ND	---	---	---	---	
Isovaleraldehyde	590-86-3		ND	---	---	---	---	
Methylene Chloride	75-09-2	X	2.60E-03	---	---	---	---	
2-Methylnaphthalene	91-57-6		AA	---	---	---	---	
4-Methyl-2-pentanone (MIBK)	108-10-1	X	ND	---	---	---	---	
Naphthalene	91-20-3	X	AA	---	---	---	---	
m-Nitroaniline	99-09-2		ND	---	---	---	---	
o-Nitroaniline	88-74-4		ND	---	---	---	---	
4-Nitrobenzenamine	100-01-6		ND	---	---	---	---	
Nitrobenzene	98-95-3	X	ND	---	---	---	---	
2-Nitrophenol	88-75-5		ND	---	---	---	---	
4-Nitrophenol	100-02-7	X	ND	---	---	---	---	
N-Nitrosodiphenylamine	86-30-6		ND	---	---	---	---	
N-Nitrosodi-n-propylamine	621-64-7		ND	---	---	---	---	
Pentachlorophenol	87-86-5	X	1.55E-03	---	---	---	---	
Pentanal	110-62-3		ND	---	---	---	---	
Phenanthrene	85-01-8	X	2.31E-05	---	---	---	---	
Phenol	108-95-2	X	1.44E-04	---	---	---	---	
Propanal	123-38-6	X	---	---	---	---	---	
Pyrene	129-00-0	X	ND	---	---	---	---	
Styrene	100-42-5	X	1.91E-04	---	---	---	---	
1,1,2,2-Tetrachloroethane	79-34-5	X	ND	---	---	---	---	
Tetrachloroethene	127-18-4	X	ND	---	---	---	---	
m-Tolualdehyde	620-23-5		ND	---	---	---	---	
o-Tolualdehyde	529-20-4		ND	---	---	---	---	
Toluene	108-88-3	X	2.94E-03	---	---	---	---	
1,2,4-Trichlorobenzene	120-82-1	X	ND	---	---	---	---	
1,1,1-Trichloroethane	71-55-6	X	ND	---	---	---	---	
1,1,2-Trichloroethane	79-00-5	X	ND	---	---	---	---	
Trichloroethene	79-01-6	X	ND	---	---	---	---	
Trichlorofluoromethane	75-69-4		5.54E-04	---	---	---	---	
2,4,5-Trichlorophenol	95-95-4	X	ND	---	---	---	---	
2,4,6-Trichlorophenol	88-06-2	X	ND	---	---	---	---	
Vinyl Acetate	108-05-4	X	ND	---	---	---	---	
Vinyl Chloride	75-01-4	X	ND	---	---	---	---	
m,p-Xylene	1330-20-7	X	2.32E-03	---	---	---	---	
o-Xylene	95-47-6	X	3.27E-04	---	---	---	---	

1. Data obtained from *Aircraft Engine and APU Emissions Testing Volumes I-III March 1999*, IERA-RS-BR-TR-1999-0006
2. Emission Factors derived using the test results provided in the reference above.

"---" 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 2-9. VOC and HAP Emission Factors for Select Engines

GTCP165-1

			Power Setting	Constant	---	---	---	---
			Fuel Flowrate (lb/hr)[1]	273	---	---	---	---
Compound Name	CAS Number	HAP	Emission Factors (lb/1000lb fuel burned)[2]					
Acenaphthene	83-32-9	X	ND	---	---	---	---	
Acenaphthylene	208-96-8	X	ND	---	---	---	---	
Acetaldehyde	75-07-0	X	5.61E-03	---	---	---	---	
Acetone	67-64-1		1.27E-02	---	---	---	---	
Acrolein	107-02-8	X	1.21E-02	---	---	---	---	
Anthracene	120-12-7	X	ND	---	---	---	---	
Benzaldehyde	100-52-7		1.26E-02	---	---	---	---	
Benz(a)anthracene	56-55-3	X	ND	---	---	---	---	
Benzene	71-43-2	X	3.79E-02	---	---	---	---	
Benzenemethanol	100-51-6		1.94E-03	---	---	---	---	
Benzo(b)fluoranthene	205-99-2	X	ND	---	---	---	---	
Benzo(k)fluoranthene	207-08-9	X	ND	---	---	---	---	
Benzo(g,h,i)perylene	191-24-2	X	ND	---	---	---	---	
Benzo(a)pyrene	50-32-8	X	ND	---	---	---	---	
Benzoic Acid	65-85-0		1.65E+00	---	---	---	---	
Bromodichloromethane	75-27-4		ND	---	---	---	---	
Bromoform	75-25-2	X	ND	---	---	---	---	
Bromomethane	74-83-9	X	3.45E-04	---	---	---	---	
4-Bromophenyl-phenyl Ether	101-55-3		ND	---	---	---	---	
1,3-Butadiene	106-99-0	X	---	---	---	---	---	
2-Butanone (MEK)	78-93-3		2.77E-03	---	---	---	---	
Butyl benzyl phthalate	85-68-7		ND	---	---	---	---	
Carbon Disulfide	75-15-0	X	2.28E-04	---	---	---	---	
Carbon Tetrachloride	56-23-5	X	ND	---	---	---	---	
4-Chloroaniline	106-47-8		ND	---	---	---	---	
Chlorobenzene	108-90-7	X	4.16E-04	---	---	---	---	
Chlorodibromomethane	124-48-1		ND	---	---	---	---	
Chloroethane	75-00-3	X	ND	---	---	---	---	
bis(2-Chloroethoxy) Methane	111-91-1		ND	---	---	---	---	
bis(2-Chloroethyl) Ether	111-44-4	X	ND	---	---	---	---	
Chloroform	67-66-3	X	4.71E-04	---	---	---	---	
bis(2-Choroisopropyl) Ether	39638-32-9		ND	---	---	---	---	
Chloromethane	74-87-3	X	3.90E-04	---	---	---	---	
4-Chloro-3-methylphenol	59-50-7		ND	---	---	---	---	
2-Chloronaphthalene	91-58-7		ND	---	---	---	---	
2-Chlorophenol	95-57-8		ND	---	---	---	---	
1-chloro-4-phenoxybenzene	7005-72-3		ND	---	---	---	---	
Chrysene	218-01-9	X	ND	---	---	---	---	
o-Cresol	95-48-7	X	ND	---	---	---	---	
p-Cresol	106-44-5	X	ND	---	---	---	---	
Crotonaldehyde	4170-30-3		5.83E-03	---	---	---	---	
Dibenzofuran	132-64-9	X	2.57E-04	---	---	---	---	
Dibutyl Phthalate	84-74-2	X	ND	---	---	---	---	
1,2-Dichlorobenzene	95-50-1		ND	---	---	---	---	
1,3-Dichlorobenzene	541-73-1		ND	---	---	---	---	
1,4-Dichlorobenzene	106-46-7	X	ND	---	---	---	---	
3,3'-Dichlorobenzidine	91-94-1	X	ND	---	---	---	---	
1,1-Dichloroethane	75-34-3	X	ND	---	---	---	---	
1,2-Dichloroethane	107-06-2	X	ND	---	---	---	---	
1,1-Dichloroethene	75-35-4	X	ND	---	---	---	---	
cis-1,2-Dicholorethene	156-59-2		ND	---	---	---	---	
trans-1,2-Dichloroethene	156-60-5		ND	---	---	---	---	
2,4-Dichlorophenol	120-83-2		ND	---	---	---	---	
1,2-Dichloropropane	78-87-5	X	ND	---	---	---	---	
cis-1,3-Dichloropropene	10061-01-5		ND	---	---	---	---	
trans-1,3-Dichloropropene	10061-02-6		ND	---	---	---	---	
Diethyl Phthalate	84-66-2		4.55E-04	---	---	---	---	

			Power Setting	Constant	---	---	---	---
			Fuel Flowrate (lb/hr)[1]	273	---	---	---	---
Compound Name	CAS Number	HAP	Emission Factors (lb/1000lb] fuel burned)[2]					
2,4-Dimethylphenol	105-67-9		ND	---	---	---	---	
Dimethyl phthalate	131-11-3	X	ND	---	---	---	---	
4,6-Dinitro-o-cresol	534-52-1	X	ND	---	---	---	---	
2,4-Dinitrophenol	51-28-5	X	ND	---	---	---	---	
2,4-Dinitrotoluene	121-14-2	X	ND	---	---	---	---	
2,6-Dinitrotoluene	606-20-2		ND	---	---	---	---	
Di(2-Ethylhexyl) Phthalate (DEHP)	117-81-7	X	2.35E-04	---	---	---	---	
Di-n-Octyl phthalate	117-84-0		ND	---	---	---	---	
Ethylbenzene	100-41-4	X	8.63E-04	---	---	---	---	
Fluoranthene	206-44-0	X	ND	---	---	---	---	
Fluorene	86-73-7	X	ND	---	---	---	---	
Formaldehyde	50-00-0	X	1.88E-02	---	---	---	---	
Hexachlorobenzene	118-74-1	X	ND	---	---	---	---	
Hexachlorobutadiene	87-68-3	X	ND	---	---	---	---	
Hexachlorocyclopentadiene	77-47-4	X	ND	---	---	---	---	
Hexachloroethane	67-72-1	X	ND	---	---	---	---	
Hexanal	66-25-1		ND	---	---	---	---	
2-Hexanone	591-78-6		ND	---	---	---	---	
Indeno(1,2,3-cd)pyrene	193-39-5	X	ND	---	---	---	---	
Isophorone	78-59-1	X	ND	---	---	---	---	
Isovaleraldehyde	590-86-3		ND	---	---	---	---	
Methylene Chloride	75-09-2	X	6.24E-03	---	---	---	---	
2-Methylnaphthalene	91-57-6		2.35E-03	---	---	---	---	
4-Methyl-2-pentanone (MIBK)	108-10-1	X	ND	---	---	---	---	
Naphthalene	91-20-3	X	5.54E-03	---	---	---	---	
m-Nitroaniline	99-09-2		ND	---	---	---	---	
o-Nitroaniline	88-74-4		ND	---	---	---	---	
4-Nitrobenzenamine	100-01-6		ND	---	---	---	---	
Nitrobenzene	98-95-3	X	ND	---	---	---	---	
2-Nitrophenol	88-75-5		1.24E-03	---	---	---	---	
4-Nitrophenol	100-02-7	X	1.24E-03	---	---	---	---	
N-Nitrosodiphenylamine	86-30-6		ND	---	---	---	---	
N-Nitrosodi-n-propylamine	621-64-7		ND	---	---	---	---	
Pentachlorophenol	87-86-5	X	ND	---	---	---	---	
Pentanal	110-62-3		5.39E-03	---	---	---	---	
Phenanthrene	85-01-8	X	ND	---	---	---	---	
Phenol	108-95-2	X	4.48E-03	---	---	---	---	
Propanal	123-38-6	X	--	---	---	---	---	
Pyrene	129-00-0	X	ND	---	---	---	---	
Styrene	100-42-5	X	2.24E-03	---	---	---	---	
1,1,2,2-Tetrachloroethane	79-34-5	X	ND	---	---	---	---	
Tetrachloroethene	127-18-4	X	ND	---	---	---	---	
m-Tolualdehyde	620-23-5		5.61E-03	---	---	---	---	
o-Tolualdehyde	529-20-4		3.89E-03	---	---	---	---	
Toluene	108-88-3	X	1.87E-02	---	---	---	---	
1,2,4-Trichlorobenzene	120-82-1	X	ND	---	---	---	---	
1,1,1-Trichloroethane	71-55-6	X	ND	---	---	---	---	
1,1,2-Trichloroethane	79-00-5	X	ND	---	---	---	---	
Trichloroethene	79-01-6	X	ND	---	---	---	---	
Trichlorofluoromethane	75-69-4		8.11E-04	---	---	---	---	
2,4,5-Trichlorophenol	95-95-4	X	ND	---	---	---	---	
2,4,6-Trichlorophenol	88-06-2	X	ND	---	---	---	---	
Vinyl Acetate	108-05-4	X	ND	---	---	---	---	
Vinyl Chloride	75-01-4	X	ND	---	---	---	---	
m,p-Xylene	1330-20-7	X	4.84E-03	---	---	---	---	
o-Xylene	95-47-6	X	1.17E-03	---	---	---	---	

1. Data obtained from *Aircraft Engine and APU Emissions Testing Volumes I-III March 1999*, IERA-RS-BR-TR-1999-0006
2. Emission Factors derived using the test results provided in the reference above.

"---" 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 2-9. VOC and HAP Emission Factors for Select Engines

J69-T-25

			Power Setting	Idle	Intermediate	Military	---	---
			Fuel Flowrate (lb/hr)[1]	167	872	1085	---	---
			Percent Thrust/hp[1]	4%	63%	84%	---	---
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**					
Acenaphthene	83-32-9	X	ND	ND	ND	---	---
Acenaphthylene	208-96-8	X	7.25E-04	ND	ND	---	---
Acetaldehyde	75-07-0	X	9.76E-02	2.12E-03	ND	---	---
Acetone	67-64-1		9.27E-03	ND	5.81E-04	---	---
Acrolein	107-02-8	X	1.96E-01	ND	ND	---	---
Anthracene	120-12-7	X	ND	ND	ND	---	---
Benzaldehyde	100-52-7		1.04E-01	ND	ND	---	---
Benz(a)anthracene	56-55-3	X	ND	ND	ND	---	---
Benzene	71-43-2	X	1.89E-01	3.47E-03	1.86E-03	---	---
Benzenemethanol	100-51-6		4.74E-03	ND	ND	---	---
Benzo(b)fluoranthene	205-99-2	X	ND	ND	ND	---	---
Benzo(k)fluoranthene	207-08-9	X	ND	ND	ND	---	---
Benzo(g,h,i)perylene	191-24-2	X	ND	ND	ND	---	---
Benzo(a)pyrene	50-32-8	X	ND	ND	ND	---	---
Benzoic Acid	65-85-0		3.52E-02	1.23E-02	1.03E-02	---	---
Bromodichloromethane	75-27-4		ND	ND	ND	---	---
Bromoform	75-25-2	X	ND	ND	ND	---	---
Bromomethane	74-83-9	X	4.99E-04	ND	ND	---	---
4-Bromophenyl-phenyl Ether	101-55-3		ND	ND	ND	---	---
1,3-Butadiene	106-99-0	X	---	---	---	---	---
2-Butanone (MEK)	78-93-3		2.41E-02	8.70E-04	8.79E-04	---	---
Butyl benzyl phthalate	85-68-7		ND	1.90E-04	ND	---	---
Carbon Disulfide	75-15-0	X	1.04E-03	6.64E-04	1.09E-03	---	---
Carbon Tetrachloride	56-23-5	X	ND	ND	ND	---	---
4-Chloroaniline	106-47-8		ND	ND	ND	---	---
Chlorobenzene	108-90-7	X	ND	ND	ND	---	---
Chlorodibromomethane	124-48-1		ND	ND	ND	---	---
Chloroethane	75-00-3	X	ND	ND	ND	---	---
bis(2-Chloroethoxy) Methane	111-91-1		ND	ND	ND	---	---
bis(2-Chloroethyl) Ether	111-44-4	X	ND	ND	ND	---	---
Chloroform	67-66-3	X	ND	6.10E-04	7.26E-04	---	---
bis(2-Chloroisopropyl) Ether	39638-32-9		ND	ND	ND	---	---
Chloromethane	74-87-3	X	5.68E-04	6.40E-04	ND	---	---
4-Chloro-3-methylphenol	59-50-7		ND	ND	ND	---	---
2-Chloronaphthalene	91-58-7		ND	ND	ND	---	---
2-Chlorophenol	95-57-8		ND	ND	ND	---	---
1-chloro-4-phenoxybenzene	7005-72-3		ND	ND	ND	---	---
Chrysene	218-01-9	X	ND	ND	ND	---	---
o-Cresol	95-48-7	X	5.56E-03	ND	ND	---	---
p-Cresol	106-44-5	X	6.47E-03	ND	ND	---	---
Crotonaldehyde	4170-30-3		1.22E-01	ND	ND	---	---
Dibenzofuran	132-64-9	X	2.44E-03	ND	ND	---	---
Dibutyl Phthalate	84-74-2	X	AA	3.81E-04	4.44E-04	---	---
1,2-Dichlorobenzene	95-50-1		ND	ND	ND	---	---
1,3-Dichlorobenzene	541-73-1		ND	ND	ND	---	---
1,4-Dichlorobenzene	106-46-7	X	ND	ND	ND	---	---
3,3'-Dichlorobenzidine	91-94-1	X	ND	ND	ND	---	---
1,1-Dichloroethane	75-34-3	X	ND	ND	ND	---	---
1,2-Dichloroethane	107-06-2	X	ND	ND	ND	---	---
1,1-Dichloroethene	75-35-4	X	ND	ND	ND	---	---
cis-1,2-Dicholorethene	156-59-2		ND	ND	ND	---	---
trans-1,2-Dichloroethene	156-60-5		ND	ND	ND	---	---
2,4-Dichlorophenol	120-83-2		ND	ND	ND	---	---
1,2-Dichloropropane	78-87-5	X	ND	ND	ND	---	---
cis-1,3-Dichloropropene	10061-01-5		ND	ND	ND	---	---
trans-1,3-Dichloropropene	10061-02-6		ND	ND	ND	---	---
Diethyl Phthalate	84-66-2		ND	2.02E-04	ND	---	---

			Power Setting	Idle	Intermediate	Military	---	---
			Fuel Flowrate (lb/hr)[1]	167	872	1085	---	---
			Percent Thrust/hp[1]	4%	63%	84%	---	---
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**					
2,4-Dimethylphenol	105-67-9		ND	ND	ND	---	---
Dimethyl phthalate	131-11-3	X	ND	ND	ND	---	---
4,6-Dinitro-o-cresol	534-52-1	X	ND	ND	ND	---	---
2,4-Dinitrophenol	51-28-5	X	ND	ND	ND	---	---
2,4-Dinitrotoluene	121-14-2	X	ND	ND	ND	---	---
2,6-Dinitrotoluene	606-20-2		ND	ND	ND	---	---
Di(2-Ethylhexyl) Phthalate (DEHP)	117-81-7	X	6.89E-04	2.08E-03	5.47E-04	---	---
Di-n-Octyl phthalate	117-84-0		ND	ND	ND	---	---
Ethylbenzene	100-41-4	X	2.03E-02	ND	ND	---	---
Fluoranthene	206-44-0	X	ND	ND	ND	---	---
Fluorene	86-73-7	X	9.52E-04	ND	ND	---	---
Formaldehyde	50-00-0	X	9.16E-01	2.72E-02	1.16E-02	---	---
Hexachlorobenzene	118-74-1	X	ND	NO	ND	---	---
Hexachlorobutadiene	87-68-3	X	ND	ND	ND	---	---
Hexachlorocyclopentadiene	77-47-4	X	ND	ND	ND	---	---
Hexachloroethane	67-72-1	X	ND	ND	ND	---	---
Hexanal	66-25-1		ND	ND	ND	---	---
2-Hexanone	591-78-6		2.08E-03	1.62E-03	1.69E-03	---	---
Indeno(1,2,3-cd)pyrene	193-39-5	X	ND	ND	ND	---	---
Isophorone	78-59-1	X	ND	ND	ND	---	---
Isovaleraldehyde	590-86-3		2.00E-02	ND	ND	---	---
Methylene Chloride	75-09-2	X	3.86E-02	2.56E-02	4.80E-02	---	---
2-Methylnaphthalene	91-57-6		4.21E-02	1.34E-04	8.41E-05	---	---
4-Methyl-2-pentanone (MIBK)	108-10-1	X	2.08E-03	1.62E-03	1.69E-03	---	---
Naphthalene	91-20-3	X	3.54E-02	3.41E-04	2.22E-04	---	---
m-Nitroaniline	99-09-2		ND	ND	ND	---	---
o-Nitroaniline	88-74-4		ND	ND	ND	---	---
4-Nitrobenzenamine	100-01-6		ND	ND	ND	---	---
Nitrobenzene	98-95-3	X	ND	ND	ND	---	---
2-Nitrophenol	88-75-5		ND	ND	ND	---	---
4-Nitrophenol	100-02-7	X	ND	ND	ND	---	---
N-Nitrosodiphenylamine	86-30-6		ND	ND	ND	---	---
N-Nitrosodi-n-propylamine	621-64-7		ND	ND	ND	---	---
Pentachlorophenol	87-86-5	X	ND	ND	ND	---	---
Pentanal	110-62-3		3.70E-02	ND	ND	---	---
Phenanthrene	85-01-8	X	ND	ND	ND	---	---
Phenol	108-95-2	X	2.85E-02	9.86E-04	ND	---	---
Propanal	123-38-6	X	---	---	---	---	---
Pyrene	129-00-0	X	ND	ND	ND	---	---
Styrene	100-42-5	X	2.72E-02	ND	ND	---	---
1,1,2,2-Tetrachloroethane	79-34-5	X	ND	ND	ND	---	---
Tetrachloroethene	127-18-4	X	2.08E-03	1.62E-03	1.69E-03	---	---
m-Tolualdehyde	620-23-5		1.19E-01	ND	ND	---	---
o-Tolualdehyde	529-20-4		6.11E-02	ND	ND	---	---
Toluene	108-88-3	X	1.12E-01	1.56E-03	8.29E-04	---	---
1,2,4-Trichlorobenzene	120-82-1	X	ND	ND	ND	---	---
1,1,1-Trichloroethane	71-55-6	X	ND	ND	ND	---	---
1,1,2-Trichloroethane	79-00-5	X	ND	ND	ND	---	---
Trichloroethene	79-01-6	X	ND	ND	ND	---	---
Trichlorofluoromethane	75-69-4		9.03E-03	1.23E-02	1.92E-02	---	---
2,4,5-Trichlorophenol	95-95-4	X	ND	ND	ND	---	---
2,4,6-Trichlorophenol	88-06-2	X	ND	ND	ND	---	---
Vinyl Acetate	108-05-4	X	ND	ND	ND	---	---
Vinyl Chloride	75-01-4	X	ND	ND	ND	---	---
m,p-Xylene	1330-20-7	X	6.45E-02	2.13E-03	4.94E-04	---	---
o-Xylene	95-47-6	X	2.51E-02	6.62E-04	ND	---	---

1. Data obtained from *Aircraft Engine and APU Emissions Testing Volumes I-III March 1999*, IERA-RS-BR-TR-1999-0006
2. Emission Factors derived using the test results provided in the reference above.

"---" 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 2-9. VOC and HAP Emission Factors for Select Engines

J85-GE-5A

Power Setting			Idle	Intermediate	Military	Afterburner-1	---
Fuel Flowrate (lb/hr)[1]			434	950	2740	8138	---
Percent Thrust/hp[1]			4%	15%	88%	116%	---
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**				
Acenaphthene	83-32-9	X	ND	ND	ND	ND	---
Acenaphthylene	208-96-8	X	2.70E-03	4.11E-04	ND	ND	---
Acetaldehyde	75-07-0	X	1.18E-01	ND	ND	ND	---
Acetone	67-64-1		2.47E-02	1.25E-02	ND	2.63E-04	---
Acrolein	107-02-8	X	2.70E-01	ND	ND	ND	---
Anthracene	120-12-7	X	ND	ND	ND	ND	---
Benzaldehyde	100-52-7		1.10E-01	ND	ND	ND	---
Benz(a)anthracene	56-55-3	X	ND	ND	ND	ND	---
Benzene	71-43-2	X	1.48E-01	1.34E-01	1.14E-02	6.84E-03	---
Benzenemethanol	100-51-6		3.64E-02	7.56E-03	6.09E-04	1.36E-04	---
Benzo(b)fluoranthene	205-99-2	X	ND	ND	ND	ND	---
Benzo(k)fluoranthene	207-08-9	X	ND	ND	ND	ND	---
Benzo(g,h,i)perylene	191-24-2	X	ND	ND	ND	ND	---
Benzo(a)pyrene	50-32-8	X	ND	ND	ND	ND	---
Benzoic Acid	65-85-0		ND	2.84E-02	1.82E-02	8.90E-03	---
Bromodichloromethane	75-27-4		6.61E-03	ND	ND	ND	---
Bromoform	75-25-2	X	6.61E-03	ND	ND	ND	---
Bromomethane	74-83-9	X	6.41E-03	ND	ND	ND	---
4-Bromophenyl-phenyl Ether	101-55-3		ND	ND	ND	ND	---
1,3-Butadiene	106-99-0	X	---	---	---	---	---
2-Butanone (MEK)	78-93-3		2.88E-02	9.09E-03	ND	3.27E-04	---
Butyl benzyl phthalate	85-68-7		ND	ND	1.12E-04	3.06E-05	---
Carbon Disulfide	75-15-0	X	6.77E-03	5.40E-03	6.40E-04	1.24E-04	---
Carbon Tetrachloride	56-23-5	X	6.27E-03	5.36E-03	ND	ND	---
4-Chloroaniline	106-47-8		ND	ND	ND	ND	---
Chlorobenzene	108-90-7	X	6.61E-03	ND	ND	ND	---
Chlorodibromomethane	124-48-1		6.61E-03	ND	ND	ND	---
Chloroethane	75-00-3	X	6.61E-03	ND	ND	ND	---
bis(2-Chloroethoxy) Methane	111-91-1		ND	ND	ND	ND	---
bis(2-Chloroethyl) Ether	111-44-4	X	ND	ND	ND	ND	---
Chloroform	67-66-3	X	6.61E-03	5.80E-03	7.03E-04	2.29E-04	---
bis(2-Choroisopropyl) Ether	39638-32-9		ND	ND	ND	ND	---
Chloromethane	74-87-3	X	1.19E-02	1.10E-02	2.42E-04	1.67E-04	---
4-Chloro-3-methylphenol	59-50-7		ND	ND	ND	ND	---
2-Chloronaphthalene	91-58-7		ND	ND	ND	ND	---
2-Chlorophenol	95-57-8		ND	ND	ND	ND	---
1-chloro-4-phenoxybenzene	7005-72-3		ND	ND	ND	ND	---
Chrysene	218-01-9	X	ND	ND	ND	ND	---
o-Cresol	95-48-7	X	8.04E-03	1.31E-03	ND	ND	---
p-Cresol	106-44-5	X	2.70E-02	4.42E-03	ND	1.71E-04	---
Crotonaldehyde	4170-30-3		1.34E-01	ND	ND	ND	---
Dibenzofuran	132-64-9	X	1.10E-02	1.07E-03	ND	7.14E-05	---
Dibutyl Phthalate	84-74-2	X	1.48E-03	3.47E-04	2.23E-04	6.93E-05	---
1,2-Dichlorobenzene	95-50-1		ND	ND	ND	ND	---
1,3-Dichlorobenzene	541-73-1		ND	ND	ND	ND	---
1,4-Dichlorobenzene	106-46-7	X	ND	ND	ND	ND	---
3,3'-Dichlorobenzidine	91-94-1	X	ND	ND	ND	ND	---
1,1-Dichloroethane	75-34-3	X	6.61E-03	ND	ND	ND	---
1,2-Dichloroethane	107-06-2	X	6.61E-03	ND	ND	ND	---
1,1-Dichloroethene	75-35-4	X	6.61E-03	ND	ND	ND	---
cis-1,2-Dicholorethene	156-59-2		6.61E-03	ND	ND	ND	---
trans-1,2-Dichloroethene	156-60-5		6.61E-03	ND	ND	ND	---
2,4-Dichlorophenol	120-83-2		ND	ND	ND	ND	---
1,2-Dichloropropane	78-87-5	X	6.61E-03	ND	ND	ND	---
cis-1,3-Dichloropropene	10061-01-5		6.61E-03	ND	ND	ND	---
trans-1,3-Dichloropropene	10061-02-6		6.61E-03	ND	ND	ND	---
Diethyl Phthalate	84-66-2		ND	9.53E-04	1.61E-03	1.01E-03	---

Power Setting			Idle	Intermediate	Military	Afterburner-1	---
Fuel Flowrate (lb/hr)[1]			434	950	2740	8138	---
Percent Thrust/hp[1]			4%	15%	88%	116%	---
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**				
2,4-Dimethylphenol	105-67-9		ND	ND	ND	ND	---
Dimethyl phthalate	131-11-3	X	ND	ND	ND	ND	---
4,6-Dinitro-o-cresol	534-52-1	X	ND	ND	ND	ND	---
2,4-Dinitrophenol	51-28-5	X	ND	ND	ND	ND	---
2,4-Dinitrotoluene	121-14-2	X	ND	ND	ND	ND	---
2,6-Dinitrotoluene	606-20-2		ND	ND	ND	ND	---
Di(2-Ethylhexyl) Phthalate (DEHP)	117-81-7	X	1.63E-03	7.54E-04	3.87E-04	1.33E-04	---
Di-n-Octyl phthalate	117-84-0		ND	ND	ND	ND	---
Ethylbenzene	100-41-4	X	3.06E-02	8.80E-03	3.75E-04	5.24E-04	---
Fluoranthene	206-44-0	X	ND	ND	ND	ND	---
Fluorene	86-73-7	X	5.37E-03	3.62E-04	ND	ND	---
Formaldehyde	50-00-0	X	2.26E-01	5.45E-01	7.37E-02	2.40E-02	---
Hexachlorobenzene	118-74-1	X	ND	ND	ND	ND	---
Hexachlorobutadiene	87-68-3	X	ND	ND	ND	ND	---
Hexachlorocyclopentadiene	77-47-4	X	ND	ND	ND	ND	---
Hexachloroethane	67-72-1	X	ND	ND	ND	ND	---
Hexanal	66-25-1		ND	ND	ND	ND	---
2-Hexanone	591-78-6		6.61E-03	5.73E-03	ND	1.94E-04	---
Indeno(1,2,3-cd)pyrene	193-39-5	X	ND	ND	ND	ND	---
Isophorone	78-59-1	X	ND	ND	ND	ND	---
Isovaleraldehyde	590-86-3		ND	ND	ND	ND	---
Methylene Chloride	75-09-2	X	3.28E-02	5.53E-02	2.85E-02	6.44E-03	---
2-Methylnaphthalene	91-57-6		1.24E-01	1.35E-02	1.07E-03	1.21E-03	---
4-Methyl-2-pentanone (MIBK)	108-10-1	X	6.61E-03	ND	ND	ND	---
Naphthalene	91-20-3	X	9.65E-02	1.28E-02	1.27E-03	8.16E-04	---
m-Nitroaniline	99-09-2		ND	ND	ND	ND	---
o-Nitroaniline	88-74-4		ND	ND	ND	ND	---
4-Nitrobenzenamine	100-01-6		ND	ND	ND	ND	---
Nitrobenzene	98-95-3	X	ND	ND	ND	ND	---
2-Nitrophenol	88-75-5		ND	2.21E-03	ND	ND	---
4-Nitrophenol	100-02-7	X	ND	ND	ND	ND	---
N-Nitrosodiphenylamine	86-30-6		ND	ND	ND	ND	---
N-Nitrosodi-n-propylamine	621-64-7		ND	ND	ND	ND	---
Pentachlorophenol	87-86-5	X	ND	ND	ND	ND	---
Pentanal	110-62-3		ND	ND	ND	ND	---
Phenanthrene	85-01-8	X	1.48E-03	6.03E-04	ND	ND	---
Phenol	108-95-2	X	7.17E-02	1.24E-02	1.52E-03	9.39E-04	---
Propanal	123-38-6	X	---	---	---	---	---
Pyrene	129-00-0	X	ND	1.89E-04	ND	ND	---
Styrene	100-42-5	X	4.17E-02	1.29E-02	5.02E-04	2.85E-04	---
1,1,2,2-Tetrachloroethane	79-34-5	X	6.61E-03	ND	ND	ND	---
Tetrachloroethene	127-18-4	X	6.61E-03	5.73E-03	ND	ND	---
m-Tolualdehyde	620-23-5		ND	ND	ND	ND	---
o-Tolualdehyde	529-20-4		ND	ND	ND	ND	---
Toluene	108-88-3	X	1.67E-01	4.91E-02	3.23E-03	1.74E-03	---
1,2,4-Trichlorobenzene	120-82-1	X	ND	ND	ND	ND	---
1,1,1-Trichloroethane	71-55-6	X	6.61E-03	ND	ND	ND	---
1,1,2-Trichloroethane	79-00-5	X	6.61E-03	ND	ND	ND	---
Trichloroethene	79-01-6	X	6.61E-03	ND	ND	ND	---
Trichlorofluoromethane	75-69-4		8.99E-03	2.22E-02	1.17E-02	2.25E-03	---
2,4,5-Trichlorophenol	95-95-4	X	ND	ND	ND	ND	---
2,4,6-Trichlorophenol	88-06-2	X	ND	ND	ND	ND	---
Vinyl Acetate	108-05-4	X	6.61E-03	ND	ND	ND	---
Vinyl Chloride	75-01-4	X	6.61E-03	ND	ND	ND	---
m,p-Xylene	1330-20-7	X	9.89E-02	2.55E-02	1.29E-03	1.88E-03	---
o-Xylene	95-47-6	X	3.85E-02	1.07E-02	4.90E-04	9.04E-04	---

1. Data obtained from *Aircraft Engine and APU Emissions Testing Volumes I-III March 1999*, IERA-RS-BR-TR-1999-0006
2. Emission Factors derived using the test results provided in reference above.

"---" 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 2-9. VOC and HAP Emission Factors for Select Engines

J85-GE-5M

Power Setting			Idle	Intermediate	Military	Afterburner	---
Fuel Flowrate (lb/hr)[1]			525	1045	2550	7695	---
Percent Thrust/hp[1]			50%	86%	99%	100%	---
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**				
Acenaphthene	83-32-9	X	ND	ND	ND	---	---
Acenaphthylene	208-96-8	X	ND	ND	ND	---	---
Acetaldehyde	75-07-0	X	2.44E-01	1.91E-02	1.57E-03	---	---
Acetone	67-64-1		9.33E-03	2.22E-03	ND	---	---
Acrolein	107-02-8	X	3.14E-01	1.24E-02	1.18E-03	---	---
Anthracene	120-12-7	X	ND	ND	ND	---	---
Benzaldehyde	100-52-7		7.81E-02	1.24E-02	1.18E-03	---	---
Benz(a)anthracene	56-55-3	X	ND	ND	ND	---	---
Benzene	71-43-2	X	3.05E-02	2.34E-02	2.56E-03	---	---
Benzenemethanol	100-51-6		---	---	---	---	---
Benzo(b)fluoranthene	205-99-2	X	ND	ND	ND	---	---
Benzo(k)fluoranthene	207-08-9	X	ND	ND	ND	---	---
Benzo(g,h,i)perylene	191-24-2	X	ND	ND	ND	---	---
Benzo(a)pyrene	50-32-8	X	ND	ND	ND	---	---
Benzoic Acid	65-85-0		---	---	---	---	---
Bromodichloromethane	75-27-4		ND	ND	ND	---	---
Bromoform	75-25-2	X	ND	ND	ND	---	---
Bromomethane	74-83-9	X	ND	6.62E-05	ND	---	---
4-Bromophenyl-phenyl Ether	101-55-3		---	---	---	---	---
1,3-Butadiene	106-99-0	X	1.20E-02	6.02E-03	ND	---	---
2-Butanone (MEK)	78-93-3		3.94E-02	6.77E-03	9.29E-04	---	---
Butyl benzyl phthalate	85-68-7		---	---	---	---	---
Carbon Disulfide	75-15-0	X	ND	ND	ND	---	---
Carbon Tetrachloride	56-23-5	X	1.09E-04	3.18E-04	1.47E-04	---	---
4-Chloroaniline	106-47-8		---	---	---	---	---
Chlorobenzene	108-90-7	X	ND	ND	ND	---	---
Chlorodibromomethane	124-48-1		ND	ND	ND	---	---
Chloroethane	75-00-3	X	ND	9.44E-05	ND	---	---
bis(2-Chloroethoxy) Methane	111-91-1		---	---	---	---	---
bis(2-Chloroethyl) Ether	111-44-4	X	---	---	---	---	---
Chloroform	67-66-3	X	ND	ND	ND	---	---
bis(2-Choroisopropyl) Ether	39638-32-9		---	---	---	---	---
Chloromethane	74-87-3	X	2.69E-04	3.12E-04	7.77E-05	---	---
4-Chloro-3-methylphenol	59-50-7		---	---	---	---	---
2-Chloronaphthalene	91-58-7		ND	ND	ND	---	---
2-Chlorophenol	95-57-8		---	---	---	---	---
1-chloro-4-phenoxybenzene	7005-72-3		---	---	---	---	---
Chrysene	218-01-9	X	ND	ND	ND	---	---
o-Cresol	95-48-7	X	---	---	---	---	---
p-Cresol	106-44-5	X	---	---	---	---	---
Crotonaldehyde	4170-30-3		1.18E-01	1.24E-02	1.18E-03	---	---
Dibenzofuran	132-64-9	X	---	---	---	---	---
Dibutyl Phthalate	84-74-2	X	---	---	---	---	---
1,2-Dichlorobenzene	95-50-1		---	---	---	---	---
1,3-Dichlorobenzene	541-73-1		---	---	---	---	---
1,4-Dichlorobenzene	106-46-7	X	---	---	---	---	---
3,3'-Dichlorobenzidine	91-94-1	X	---	---	---	---	---
1,1-Dichloroethane	75-34-3	X	ND	ND	ND	---	---
1,2-Dichloroethane	107-06-2	X	ND	ND	ND	---	---
1,1-Dichloroethene	75-35-4	X	ND	ND	ND	---	---
cis-1,2-Dicholorethene	156-59-2		ND	ND	ND	---	---
trans-1,2-Dichloroethene	156-60-5		ND	ND	ND	---	---
2,4-Dichlorophenol	120-83-2		---	---	---	---	---
1,2-Dichloropropane	78-87-5	X	---	---	---	---	---
cis-1,3-Dichloropropene	10061-01-5		ND	7.91E-05	ND	---	---
trans-1,3-Dichloropropene	10061-02-6		ND	9.44E-05	ND	---	---
Diethyl Phthalate	84-66-2		---	---	---	---	---

Power Setting			Idle	Intermediate	Military	Afterburner	---
Fuel Flowrate (lb/hr)[1]			525	1045	2550	7695	---
Percent Thrust/hp[1]			50%	86%	99%	100%	---
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**				
2,4-Dimethylphenol	105-67-9		---	---	---	---	---
Dimethyl phthalate	131-11-3	X	---	---	---	---	---
4,6-Dinitro-o-cresol	534-52-1	X	---	---	---	---	---
2,4-Dinitrophenol	51-28-5	X	---	---	---	---	---
2,4-Dinitrotoluene	121-14-2	X	---	---	---	---	---
2,6-Dinitrotoluene	606-20-2		---	---	---	---	---
Di(2-Ethylhexyl) Phthalate (DEHP)	117-81-7	X	---	---	---	---	---
Di-n-Octyl phthalate	117-84-0		---	---	---	---	---
Ethylbenzene	100-41-4	X	7.36E-03	2.38E-03	8.21E-05	---	---
Fluoranthene	206-44-0	X	ND	ND	ND	---	---
Fluorene	86-73-7	X	ND	ND	ND	---	---
Formaldehyde	50-00-0	X	2.27E+00	3.48E-01	2.39E-02	---	---
Hexachlorobenzene	118-74-1	X	---	---	---	---	---
Hexachlorobutadiene	87-68-3	X	---	---	---	---	---
Hexachlorocyclopentadiene	77-47-4	X	---	---	---	---	---
Hexachloroethane	67-72-1	X	---	---	---	---	---
Hexanal	66-25-1		7.81E-02	1.24E-02	1.18E-03	---	---
2-Hexanone	591-78-6		ND	ND	ND	---	---
Indeno(1,2,3-cd)pyrene	193-39-5	X	ND	ND	ND	---	---
Isophorone	78-59-1	X	---	---	---	---	---
Isovaleraldehyde	590-86-3		7.81E-02	1.24E-02	1.18E-03	---	---
Methylene Chloride	75-09-2	X	1.32E-04	5.53E-04	2.53E-04	---	---
2-Methylnaphthalene	91-57-6		1.29E-01	ND	ND	---	---
4-Methyl-2-pentanone (MIBK)	108-10-1	X	ND	ND	ND	---	---
Naphthalene	91-20-3	X	8.29E-02	ND	ND	---	---
m-Nitroaniline	99-09-2		---	---	---	---	---
o-Nitroaniline	88-74-4		---	---	---	---	---
4-Nitrobenzenamine	100-01-6		---	---	---	---	---
Nitrobenzene	98-95-3	X	---	---	---	---	---
2-Nitrophenol	88-75-5		---	---	---	---	---
4-Nitrophenol	100-02-7	X	---	---	---	---	---
N-Nitrosodiphenylamine	86-30-6		---	---	---	---	---
N-Nitrosodi-n-propylamine	621-64-7		---	---	---	---	---
Pentachlorophenol	87-86-5	X	---	---	---	---	---
Pentanal	110-62-3		2.44E-01	1.24E-02	1.18E-03	---	---
Phenanthrene	85-01-8	X	ND	ND	ND	---	---
Phenol	108-95-2	X	---	---	---	---	---
Propanal	123-38-6	X	7.81E-02	1.24E-02	1.18E-03	---	---
Pyrene	129-00-0	X	ND	ND	ND	---	---
Styrene	100-42-5	X	7.88E-03	2.44E-03	1.08E-04	---	---
1,1,2,2-Tetrachloroethane	79-34-5	X	ND	ND	ND	---	---
Tetrachloroethene	127-18-4	X	ND	ND	ND	---	---
m-Tolualdehyde	620-23-5		---	---	---	---	---
o-Tolualdehyde	529-20-4		9.33E-02	1.24E-02	1.18E-03	---	---
Toluene	108-88-3	X	2.76E-02	1.14E-02	9.14E-04	---	---
1,2,4-Trichlorobenzene	120-82-1	X	---	---	---	---	---
1,1,1-Trichloroethane	71-55-6	X	ND	ND	ND	---	---
1,1,2-Trichloroethane	79-00-5	X	ND	ND	ND	---	---
Trichloroethene	79-01-6	X	---	---	---	---	---
Trichlorofluoromethane	75-69-4		3.09E-04	1.10E-03	3.76E-04	---	---
2,4,5-Trichlorophenol	95-95-4	X	---	---	---	---	---
2,4,6-Trichlorophenol	88-06-2	X	---	---	---	---	---
Vinyl Acetate	108-05-4	X	ND	ND	ND	---	---
Vinyl Chloride	75-01-4	X	---	---	---	---	---
m,p-Xylene	1330-20-7	X	2.44E-02	7.63E-03	4.33E-04	---	---
o-Xylene	95-47-6	X	1.59E-02	4.83E-03	2.33E-04	---	---

1. Data obtained from *Clean Air Act Emissions Testing of the T-38C Aircraft Engines September 2002*, IERA-RS-BR-TR-2003-0001
2. Emission Factors derived using the test results provided in the reference above.

"---" 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 2-9. VOC and HAP Emission Factors for Select Engines
PT6A-68

Power Setting			Ground Idle	Flight Idle	Descend	Approach	Max. Continuous
Fuel Flowrate (lb/hr)[1]			156	180	328	449	612
Percent Thrust/hp[1]			2%	3%	19%	46%	88%
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**				
Acenaphthene	83-32-9	X	ND	ND	ND	ND	ND
Acenaphthylene	208-96-8	X	ND	ND	ND	ND	ND
Acetaldehyde	75-07-0	X	2.99E-01	3.47E-01	8.78E-02	1.04E-02	2.17E-03
Acetone	67-64-1		1.94E-02	ND	7.39E-03	1.26E-03	8.80E-04
Acrolein	107-02-8	X	7.16E-01	6.00E-01	5.06E-02	ND	ND
Anthracene	120-12-7	X	ND	ND	ND	ND	ND
Benzaldehyde	100-52-7		2.34E-02	1.73E-01	4.45E-02	8.01E-03	ND
Benz(a)anthracene	56-55-3	X	ND	ND	ND	ND	ND
Benzene	71-43-2	X	1.67E-01	5.22E-01	8.49E-02	1.04E-02	8.63E-04
Benzenemethanol	100-51-6		---	---	---	---	---
Benzo(b)fluoranthene	205-99-2	X	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	207-08-9	X	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	191-24-2	X	ND	ND	ND	ND	ND
Benzo(a)pyrene	50-32-8	X	ND	ND	ND	ND	ND
Benzoic Acid	65-85-0		---	---	---	---	---
Bromodichloromethane	75-27-4		ND	ND	ND	ND	ND
Bromoform	75-25-2	X	ND	ND	ND	ND	ND
Bromomethane	74-83-9	X	ND	ND	ND	ND	1.53E-04
4-Bromophenyl-phenyl Ether	101-55-3		---	---	---	---	---
1,3-Butadiene	106-99-0	X	1.49E-01	2.67E-01	1.10E-02	ND	ND
2-Butanone (MEK)	78-93-3		1.32E-02	ND	2.65E-03	ND	ND
Butyl benzyl phthalate	85-68-7		---	---	---	---	---
Carbon Disulfide	75-15-0	X	ND	ND	ND	ND	ND
Carbon Tetrachloride	56-23-5	X	ND	ND	ND	ND	ND
4-Chloroaniline	106-47-8		---	---	---	---	---
Chlorobenzene	108-90-7	X	ND	ND	ND	ND	ND
Chlorodibromomethane	124-48-1		ND	ND	ND	ND	ND
Chloroethane	75-00-3	X	ND	ND	ND	ND	ND
bis(2-Chloroethoxy) Methane	111-91-1		---	---	---	---	---
bis(2-Chloroethyl) Ether	111-44-4	X	---	---	---	---	---
Chloroform	67-66-3	X	ND	ND	ND	ND	ND
bis(2-Choroisopropyl) Ether	39638-32-9		---	---	---	---	---
Chloromethane	74-87-3	X	1.55E-03	ND	1.47E-03	1.21E-04	5.72E-04
4-Chloro-3-methylphenol	59-50-7		---	---	---	---	---
2-Chloronaphthalene	91-58-7		ND	ND	ND	ND	ND
2-Chlorophenol	95-57-8		---	---	---	---	---
1-chloro-4-phenoxybenzene	7005-72-3		---	---	---	---	---
Chrysene	218-01-9	X	ND	ND	ND	ND	ND
o-Cresol	95-48-7	X	---	---	---	---	---
p-Cresol	106-44-5	X	---	---	---	---	---
Crotonaldehyde	4170-30-3		2.08E-01	1.73E-01	ND	ND	ND
Dibenzofuran	132-64-9	X	---	---	---	---	---
Dibutyl Phthalate	84-74-2	X	---	---	---	---	---
1,2-Dichlorobenzene	95-50-1		---	---	---	---	---
1,3-Dichlorobenzene	541-73-1		---	---	---	---	---
1,4-Dichlorobenzene	106-46-7	X	---	---	---	---	---
3,3'-Dichlorobenzidine	91-94-1	X	---	---	---	---	---
1,1-Dichloroethane	75-34-3	X	ND	ND	ND	ND	ND
1,2-Dichloroethane	107-06-2	X	ND	ND	ND	ND	ND
1,1-Dichloroethene	75-35-4	X	ND	ND	ND	ND	ND
cis-1,2-Dicholorethene	156-59-2		ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	156-60-5		ND	ND	ND	ND	ND
2,4-Dichlorophenol	120-83-2		---	---	---	---	---
1,2-Dichloropropane	78-87-5	X	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	10061-01-5		ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	10061-02-6		ND	ND	ND	ND	ND
Diethyl Phthalate	84-66-2		---	---	---	---	---

Power Setting			Ground Idle	Flight Idle	Descend	Approach	Max. Continuous
Fuel Flowrate (lb/hr)[1]			156	180	328	449	612
Percent Thrust/hp[1]			2%	3%	19%	46%	88%
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**				
2,4-Dimethylphenol	105-67-9		---	---	---	---	---
Dimethyl phthalate	131-11-3	X	---	---	---	---	---
4,6-Dinitro-o-cresol	534-52-1	X	---	---	---	---	---
2,4-Dinitrophenol	51-28-5	X	---	---	---	---	---
2,4-Dinitrotoluene	121-14-2	X	---	---	---	---	---
2,6-Dinitrotoluene	606-20-2		---	---	---	---	---
Di(2-Ethylhexyl) Phthalate (DEHP)	117-81-7	X	---	---	---	---	---
Di-n-Octyl phthalate	117-84-0		---	---	---	---	---
Ethylbenzene	100-41-4	X	4.76E-02	4.94E-02	2.52E-03	2.09E-04	1.07E-04
Fluoranthene	206-44-0	X	ND	ND	ND	ND	ND
Fluorene	86-73-7	X	ND	ND	ND	ND	ND
Formaldehyde	50-00-0	X	4.81E+00	5.27E+00	2.93E+00	6.73E-01	2.21E-02
Hexachlorobenzene	118-74-1	X	---	---	---	---	---
Hexachlorobutadiene	87-68-3	X	---	---	---	---	---
Hexachlorocyclopentadiene	77-47-4	X	---	---	---	---	---
Hexachloroethane	67-72-1	X	---	---	---	---	---
Hexanal	66-25-1		1.56E-01	ND	ND	ND	ND
2-Hexanone	591-78-6		1.52E-02	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	193-39-5	X	ND	ND	ND	ND	ND
Isophorone	78-59-1	X	---	---	---	---	---
Isovaleraldehyde	590-86-3		ND	ND	ND	ND	ND
Methylene Chloride	75-09-2	X	ND	ND	1.93E-03	3.42E-04	1.72E-04
2-Methylnaphthalene	91-57-6		ND	ND	ND	ND	9.04E-02
4-Methyl-2-pentanone (MIBK)	108-10-1	X	1.52E-02	ND	ND	ND	ND
Naphthalene	91-20-3	X	ND	1.16E-02	ND	ND	7.68E-02
m-Nitroaniline	99-09-2		---	---	---	---	---
o-Nitroaniline	88-74-4		---	---	---	---	---
4-Nitrobenzenamine	100-01-6		---	---	---	---	---
Nitrobenzene	98-95-3	X	---	---	---	---	---
2-Nitrophenol	88-75-5		---	---	---	---	---
4-Nitrophenol	100-02-7	X	---	---	---	---	---
N-Nitrosodiphenylamine	86-30-6		---	---	---	---	---
N-Nitrosodi-n-propylamine	621-64-7		---	---	---	---	---
Pentachlorophenol	87-86-5	X	---	---	---	---	---
Pentanal	110-62-3		9.61E-02	6.83E-02	3.32E-02	ND	ND
Phenanthrene	85-01-8	X	ND	ND	ND	ND	ND
Phenol	108-95-2	X	---	---	---	---	---
Propanal	123-38-6	X	---	---	---	---	---
Pyrene	129-00-0	X	ND	ND	ND	ND	ND
Styrene	100-42-5	X	4.68E-02	3.80E-02	8.05E-03	ND	ND
1,1,2,2-Tetrachloroethane	79-34-5	X	ND	ND	ND	ND	ND
Tetrachloroethene	127-18-4	X	ND	ND	ND	ND	ND
m-Tolualdehyde	620-23-5		1.56E-01	8.83E-02	ND	7.20E-03	ND
o-Tolualdehyde	529-20-4		ND	ND	ND	ND	ND
Toluene	108-88-3	X	1.65E-01	2.42E-01	2.46E-02	2.37E-03	5.18E-04
1,2,4-Trichlorobenzene	120-82-1	X	---	---	---	---	---
1,1,1-Trichloroethane	71-55-6	X	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	79-00-5	X	ND	ND	ND	ND	ND
Trichloroethene	79-01-6	X	ND	ND	ND	ND	ND
Trichlorofluoromethane	75-69-4		1.60E-03	ND	ND	1.69E-04	1.34E-04
2,4,5-Trichlorophenol	95-95-4	X	---	---	---	---	---
2,4,6-Trichlorophenol	88-06-2	X	---	---	---	---	---
Vinyl Acetate	108-05-4	X	1.52E-02	ND	ND	ND	ND
Vinyl Chloride	75-01-4	X	---	---	---	---	---
m,p-Xylene	1330-20-7	X	1.13E-01	1.31E-01	6.03E-03	6.01E-04	1.29E-03
o-Xylene	95-47-6	X	5.98E-02	6.60E-02	2.92E-03	2.59E-04	1.54E-04

1. Data obtained from *PT6A-68 Emissions Measurement Program Summary September 2002, IERA-RS-BR-SR-2003-0003*
2. Emission Factors derived using the test results provided in the reference above.

"---" 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 2-9. VOC and HAP Emission Factors for Select Engines

T56-A-7

Power Setting			Idle	Approach	Intermediate	Military	---
Fuel Flowrate (lb/hr)[1]			724	880	1742	2262	---
Percent Thrust/hp[1]			5%	15%	61%	90%	---
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**				
Acenaphthene	83-32-9	X	ND	ND	ND	ND	---
Acenaphthylene	208-96-8	X	ND	ND	ND	ND	---
Acetaldehyde	75-07-0	X	1.04E-02	AA	5.43E-04	1.64E-04	---
Acetone	67-64-1		7.35E-03	2.89E-02	2.00E-02	1.03E-02	---
Acrolein	107-02-8	X	ND	ND	ND	ND	---
Anthracene	120-12-7	X	ND	ND	ND	ND	---
Benzaldehyde	100-52-7		1.13E-03	8.76E-04	4.67E-04	ND	---
Benz(a)anthracene	56-55-3	X	ND	ND	ND	ND	---
Benzene	71-43-2	X	4.77E-03	4.45E-03	1.34E-03	7.84E-04	---
Benzenemethanol	100-51-6		ND	ND	ND	ND	---
Benzo(b)fluoranthene	205-99-2	X	ND	ND	ND	ND	---
Benzo(k)fluoranthene	207-08-9	X	ND	ND	ND	ND	---
Benzo(g,h,i)perylene	191-24-2	X	ND	ND	ND	ND	---
Benzo(a)pyrene	50-32-8	X	ND	ND	ND	ND	---
Benzoic Acid	65-85-0		6.44E-03	8.87E-03	3.83E-03	2.03E-03	---
Bromodichloromethane	75-27-4		ND	ND	ND	ND	---
Bromoform	75-25-2	X	ND	ND	ND	ND	---
Bromomethane	74-83-9	X	ND	ND	ND	ND	---
4-Bromophenyl-phenyl Ether	101-55-3		ND	ND	ND	ND	---
1,3-Butadiene	106-99-0	X	---	---	---	---	---
2-Butanone (MEK)	78-93-3		4.63E-04	3.62E-04	ND	1.75E-04	---
Butyl benzyl phthalate	85-68-7		ND	ND	ND	ND	---
Carbon Disulfide	75-15-0	X	7.20E-04	1.63E-03	1.04E-03	2.87E-04	---
Carbon Tetrachloride	56-23-5	X	ND	5.24E-04	1.43E-04	2.35E-04	---
4-Chloroaniline	106-47-8		ND	ND	ND	ND	---
Chlorobenzene	108-90-7	X	ND	ND	ND	ND	---
Chlorodibromomethane	124-48-1		ND	ND	ND	ND	---
Chloroethane	75-00-3	X	ND	ND	ND	ND	---
bis(2-Chloroethoxy) Methane	111-91-1		ND	ND	ND	ND	---
bis(2-Chloroethyl) Ether	111-44-4	X	ND	ND	ND	ND	---
Chloroform	67-66-3	X	2.23E-03	5.40E-04	9.66E-04	5.15E-04	---
bis(2-Choroisopropyl) Ether	39638-32-9		ND	ND	ND	ND	---
Chloromethane	74-87-3	X	ND	4.54E-04	3.14E-04	3.62E-04	---
4-Chloro-3-methylphenol	59-50-7		ND	ND	ND	ND	---
2-Chloronaphthalene	91-58-7		ND	ND	ND	ND	---
2-Chlorophenol	95-57-8		ND	ND	ND	ND	---
1-chloro-4-phenoxybenzene	7005-72-3		ND	ND	ND	ND	---
Chrysene	218-01-9	X	ND	ND	ND	ND	---
o-Cresol	95-48-7	X	ND	ND	ND	ND	---
p-Cresol	106-44-5	X	ND	ND	ND	ND	---
Crotonaldehyde	4170-30-3		ND	ND	ND	ND	---
Dibenzofuran	132-64-9	X	ND	ND	ND	ND	---
Dibutyl Phthalate	84-74-2	X	5.03E-04	3.32E-04	1.11E-04	1.05E-04	---
1,2-Dichlorobenzene	95-50-1		ND	ND	ND	ND	---
1,3-Dichlorobenzene	541-73-1		ND	ND	ND	ND	---
1,4-Dichlorobenzene	106-46-7	X	ND	ND	ND	ND	---
3,3'-Dichlorobenzidine	91-94-1	X	ND	ND	ND	ND	---
1,1-Dichloroethane	75-34-3	X	ND	ND	ND	ND	---
1,2-Dichloroethane	107-06-2	X	ND	ND	ND	ND	---
1,1-Dichloroethene	75-35-4	X	ND	ND	ND	ND	---
cis-1,2-Dicholorethene	156-59-2		ND	ND	ND	ND	---
trans-1,2-Dichloroethene	156-60-5		ND	ND	ND	ND	---
2,4-Dichlorophenol	120-83-2		ND	ND	ND	ND	---
1,2-Dichloropropane	78-87-5	X	ND	ND	ND	ND	---
cis-1,3-Dichloropropene	10061-01-5		ND	ND	ND	ND	---
trans-1,3-Dichloropropene	10061-02-6		ND	ND	ND	ND	---
Diethyl Phthalate	84-66-2		9.66E-04	2.58E-04	ND	4.25E-04	---

Power Setting			Idle	Approach	Intermediate	Military	---
Fuel Flowrate (lb/hr)[1]			724	880	1742	2262	---
Percent Thrust/hp[1]			5%	15%	61%	90%	---
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**				
2,4-Dimethylphenol	105-67-9		ND	ND	ND	ND	---
Dimethyl phthalate	131-11-3	X	ND	ND	ND	ND	---
4,6-Dinitro-o-cresol	534-52-1	X	ND	ND	ND	ND	---
2,4-Dinitrophenol	51-28-5	X	ND	ND	ND	ND	---
2,4-Dinitrotoluene	121-14-2	X	ND	ND	ND	ND	---
2,6-Dinitrotoluene	606-20-2		ND	ND	ND	ND	---
Di(2-Ethylhexyl) Phthalate (DEHP)	117-81-7	X	2.42E-03	3.32E-03	1.19E-03	AA	---
Di-n-Octyl phthalate	117-84-0		ND	ND	ND	ND	---
Ethylbenzene	100-41-4	X	ND	4.06E-04	2.07E-04	1.80E-04	---
Fluoranthene	206-44-0	X	ND	ND	ND	ND	---
Fluorene	86-73-7	X	ND	ND	ND	ND	---
Formaldehyde	50-00-0	X	4.10E-02	3.34E-02	9.30E-03	3.81E-04	---
Hexachlorobenzene	118-74-1	X	ND	ND	ND	ND	---
Hexachlorobutadiene	87-68-3	X	ND	ND	ND	ND	---
Hexachlorocyclopentadiene	77-47-4	X	ND	ND	ND	ND	---
Hexachloroethane	67-72-1	X	ND	ND	ND	ND	---
Hexanal	66-25-1		ND	ND	ND	ND	---
2-Hexanone	591-78-6		ND	ND	ND	ND	---
Indeno(1,2,3-cd)pyrene	193-39-5	X	ND	ND	ND	ND	---
Isophorone	78-59-1	X	ND	ND	ND	ND	---
Isovaleraldehyde	590-86-3		ND	ND	ND	ND	---
Methylene Chloride	75-09-2	X	7.14E-04	9.81E-04	7.83E-04	4.23E-04	---
2-Methylnaphthalene	91-57-6		7.27E-04	6.81E-04	1.03E-04	3.45E-05	---
4-Methyl-2-pentanone (MIBK)	108-10-1	X	ND	ND	ND	ND	---
Naphthalene	91-20-3	X	1.16E-03	1.03E-03	1.77E-04	1.34E-04	---
m-Nitroaniline	99-09-2		ND	ND	ND	ND	---
o-Nitroaniline	88-74-4		ND	ND	ND	ND	---
4-Nitrobenzenamine	100-01-6		ND	ND	ND	ND	---
Nitrobenzene	98-95-3	X	ND	ND	ND	ND	---
2-Nitrophenol	88-75-5		ND	ND	ND	ND	---
4-Nitrophenol	100-02-7	X	ND	ND	ND	ND	---
N-Nitrosodiphenylamine	86-30-6		ND	ND	ND	ND	---
N-Nitrosodi-n-propylamine	621-64-7		ND	ND	ND	ND	---
Pentachlorophenol	87-86-5	X	ND	ND	ND	ND	---
Pentanal	110-62-3		ND	ND	ND	ND	---
Phenanthrene	85-01-8	X	ND	ND	ND	ND	---
Phenol	108-95-2	X	ND	ND	ND	ND	---
Propanal	123-38-6	X	---	---	---	---	---
Pyrene	129-00-0	X	ND	ND	ND	ND	---
Styrene	100-42-5	X	7.09E-04	3.67E-04	ND	ND	---
1,1,2,2-Tetrachloroethane	79-34-5	X	ND	ND	ND	ND	---
Tetrachloroethene	127-18-4	X	ND	ND	ND	2.15E-04	---
m-Tolualdehyde	620-23-5		ND	ND	ND	ND	---
o-Tolualdehyde	529-20-4		ND	ND	ND	ND	---
Toluene	108-88-3	X	2.71E-03	2.29E-03	9.61E-04	2.53E-05	---
1,2,4-Trichlorobenzene	120-82-1	X	ND	ND	ND	ND	---
1,1,1-Trichloroethane	71-55-6	X	ND	ND	ND	ND	---
1,1,2-Trichloroethane	79-00-5	X	1.58E-03	1.30E-03	6.30E-04	4.78E-04	---
Trichloroethene	79-01-6	X	ND	ND	ND	ND	---
Trichlorofluoromethane	75-69-4		4.64E-04	8.17E-04	4.57E-04	4.24E-04	---
2,4,5-Trichlorophenol	95-95-4	X	ND	ND	ND	ND	---
2,4,6-Trichlorophenol	88-06-2	X	ND	ND	ND	ND	---
Vinyl Acetate	108-05-4	X	ND	ND	ND	ND	---
Vinyl Chloride	75-01-4	X	ND	ND	ND	ND	---
m,p-Xylene	1330-20-7	X	6.70E-04	7.31E-04	4.14E-04	6.26E-04	---
o-Xylene	95-47-6	X	6.56E-04	3.23E-04	1.68E-04	2.48E-04	---

1. Data obtained from *Aircraft Engine and APU Emissions Testing Volumes I-III March 1999*, IERA-RS-BR-TR-1999-0006
2. Emission Factors derived using the test results provided in the reference above.

"---" 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 2-9. VOC and HAP Emission Factors for Select Engines

T64-GE-100

			Power Setting	Ground Idle	75% Normal	Normal	Military	---
			Fuel Flowrate (lb/hr)[1]	298	941	1698	1848	---
			Percent Thrust/hp[1]	2%	34%	81%	90%	---
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**					
Acenaphthene	83-32-9	X		7.92E-04	ND	ND	ND	---
Acenaphthylene	208-96-8	X		3.59E-03	ND	ND	2.13E-04	---
Acetaldehyde	75-07-0	X		5.07E-02	1.20E-03	ND	ND	---
Acetone	67-64-1			3.31E-02	2.32E-04	ND	ND	---
Acrolein	107-02-8	X		1.14E-01	1.37E-03	ND	ND	---
Anthracene	120-12-7	X		4.97E-04	ND	ND	ND	---
Benzaldehyde	100-52-7			5.91E-02	1.86E-03	ND	ND	---
Benz(a)anthracene	56-55-3	X		4.97E-04	ND	ND	ND	---
Benzene	71-43-2	X		2.16E-01	1.26E-02	4.00E-03	3.88E-03	---
Benzenemethanol	100-51-6			2.48E-03	ND	ND	ND	---
Benzo(b)fluoranthene	205-99-2	X		4.97E-04	ND	ND	ND	---
Benzo(k)fluoranthene	207-08-9	X		4.97E-04	ND	ND	ND	---
Benzo(g,h,i)perylene	191-24-2	X		4.97E-04	ND	ND	ND	---
Benzo(a)pyrene	50-32-8	X		4.97E-04	ND	ND	ND	---
Benzoic Acid	65-85-0			4.93E-02	7.14E-03	3.22E-03	ND	---
Bromodichloromethane	75-27-4			1.13E-03	ND	ND	ND	---
Bromoform	75-25-2	X		1.13E-03	ND	ND	ND	---
Bromomethane	74-83-9	X		1.13E-03	ND	ND	ND	---
4-Bromophenyl-phenyl Ether	101-55-3			4.97E-04	ND	ND	ND	---
1,3-Butadiene	106-99-0	X		---	---	---	---	---
2-Butanone (MEK)	78-93-3			2.96E-02	2.33E-04	ND	ND	---
Butyl benzyl phthalate	85-68-7			4.97E-04	ND	ND	ND	---
Carbon Disulfide	75-15-0	X		1.13E-03	ND	ND	ND	---
Carbon Tetrachloride	56-23-5	X		1.13E-03	ND	ND	ND	---
4-Chloroaniline	106-47-8			4.97E-03	ND	ND	ND	---
Chlorobenzene	108-90-7	X		1.13E-03	ND	ND	ND	---
Chlorodibromomethane	124-48-1			1.13E-03	ND	ND	ND	---
Chloroethane	75-00-3	X		1.13E-03	ND	ND	ND	---
bis(2-Chloroethoxy) Methane	111-91-1			4.97E-04	ND	ND	NO	---
bis(2-Chloroethyl) Ether	111-44-4	X		4.97E-04	ND	ND	ND	---
Chloroform	67-66-3	X		1.13E-03	7.45E-05	4.00E-05	3.70E-05	---
bis(2-Choroisopropyl) Ether	39638-32-9			4.97E-04	ND	ND	ND	---
Chloromethane	74-87-3	X		1.21E-03	ND	ND	ND	---
4-Chloro-3-methylphenol	59-50-7			2.48E-03	ND	ND	NO	---
2-Chloronaphthalene	91-58-7			4.97E-04	ND	ND	ND	---
2-Chlorophenol	95-57-8			2.48E-03	ND	ND	ND	---
1-chloro-4-phenoxybenzene	7005-72-3			4.97E-04	ND	ND	ND	---
Chrysene	218-01-9	X		4.97E-04	ND	ND	ND	---
o-Cresol	95-48-7	X		2.35E-03	ND	ND	ND	---
p-Cresol	106-44-5	X		2.66E-03	ND	ND	NO	---
Crotonaldehyde	4170-30-3			5.07E-02	1.01E-03	ND	ND	---
Dibenzofuran	132-64-9	X		1.86E-03	ND	ND	ND	---
Dibutyl Phthalate	84-74-2	X		4.97E-04	ND	2.81E-05	2.13E-04	---
1,2-Dichlorobenzene	95-50-1			4.97E-04	ND	ND	ND	---
1,3-Dichlorobenzene	541-73-1			4.97E-04	ND	ND	ND	---
1,4-Dichlorobenzene	106-46-7	X		4.97E-04	ND	ND	ND	---
3,3'-Dichlorobenzidine	91-94-1	X		4.97E-04	ND	ND	ND	---
1,1-Dichloroethane	75-34-3	X		1.13E-03	ND	ND	ND	---
1,2-Dichloroethane	107-06-2	X		1.13E-03	ND	ND	ND	---
1,1-Dichloroethene	75-35-4	X		1.13E-03	ND	ND	ND	---
cis-1,2-Dicholorethene	156-59-2			1.13E-03	ND	ND	ND	---
trans-1,2-Dichloroethene	156-60-5			1.13E-03	ND	ND	ND	---
2,4-Dichlorophenol	120-83-2			2.48E-03	ND	ND	ND	---
1,2-Dichloropropane	78-87-5	X		1.13E-03	ND	ND	ND	---
cis-1,3-Dichloropropene	10061-01-5			1.13E-03	ND	ND	ND	---
trans-1,3-Dichloropropene	10061-02-6			1.13E-03	ND	ND	ND	---
Diethyl Phthalate	84-66-2			4.97E-04	ND	ND	2.32E-04	---

			Power Setting	Ground Idle	75% Normal	Normal	Military	---
			Fuel Flowrate (lb/hr)[1]	298	941	1698	1848	---
			Percent Thrust/hp[1]	2%	34%	81%	90%	---
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**					
2,4-Dimethylphenol	105-67-9			2.48E-03	ND	ND	ND	---
Dimethyl phthalate	131-11-3	X		4.97E-04	ND	ND	ND	---
4,6-Dinitro-o-cresol	534-52-1	X		9.90E-03	ND	ND	ND	---
2,4-Dinitrophenol	51-28-5	X		9.90E-03	ND	ND	ND	---
2,4-Dinitrotoluene	121-14-2	X		4.97E-03	ND	ND	ND	---
2,6-Dinitrotoluene	606-20-2			4.97E-04	ND	ND	ND	---
Di(2-Ethylhexyl) Phthalate (DEHP)	117-81-7	X		4.97E-04	7.14E-04	1.06E-04	2.13E-04	---
Di-n-Octyl phthalate	117-84-0			4.97E-04	ND	ND	ND	---
Ethylbenzene	100-41-4	X		2.24E-02	3.07E-04	ND	ND	---
Fluoranthene	206-44-0	X		8.19E-04	ND	ND	ND	---
Fluorene	86-73-7	X		2.44E-03	ND	ND	2.90E-04	---
Formaldehyde	50-00-0	X		7.15E-02	1.17E-02	3.18E-04	1.83E-04	---
Hexachlorobenzene	118-74-1	X		4.97E-04	ND	ND	ND	---
Hexachlorobutadiene	87-68-3	X		4.97E-04	ND	ND	ND	---
Hexachlorocyclopentadiene	77-47-4	X		4.97E-03	ND	ND	ND	---
Hexachloroethane	67-72-1	X		4.97E-04	ND	ND	ND	---
Hexanal	66-25-1			1.81E-02	3.83E-05	ND	ND	---
2-Hexanone	591-78-6			5.63E-03	ND	ND	ND	---
Indeno(1,2,3-cd)pyrene	193-39-5	X		4.97E-04	ND	ND	ND	---
Isophorone	78-59-1	X		4.97E-04	ND	ND	ND	---
Isovaleraldehyde	590-86-3			7.15E-03	3.83E-05	ND	ND	---
Methylene Chloride	75-09-2	X		2.65E-03	2.91E-03	3.13E-03	1.92E-03	---
2-Methylnaphthalene	91-57-6			6.41E-02	3.60E-04	ND	6.82E-04	---
4-Methyl-2-pentanone (MIBK)	108-10-1	X		5.63E-03	ND	ND	ND	---
Naphthalene	91-20-3	X		5.44E-02	1.52E-03	4.96E-06	2.50E-03	---
m-Nitroaniline	99-09-2			4.97E-04	ND	ND	ND	---
o-Nitroaniline	88-74-4			4.97E-04	ND	ND	ND	---
4-Nitrobenzenamine	100-01-6			4.97E-04	ND	ND	ND	---
Nitrobenzene	98-95-3	X		4.97E-04	ND	ND	ND	---
2-Nitrophenol	88-75-5			2.48E-03	ND	ND	ND	---
4-Nitrophenol	100-02-7	X		5.94E-03	ND	ND	ND	---
N-Nitrosodiphenylamine	86-30-6			4.97E-04	ND	ND	ND	---
N-Nitrosodi-n-propylamine	621-64-7			4.97E-04	1.49E-04	2.16E-05	1.93E-04	---
Pentachlorophenol	87-86-5	X		4.97E-03	ND	ND	ND	---
Pentanal	110-62-3			2.10E-02	3.83E-05	ND	ND	---
Phenanthrene	85-01-8	X		2.82E-03	ND	ND	4.45E-04	---
Phenol	108-95-2	X		8.26E-03	ND	ND	ND	---
Propanal	123-38-6	X		---	---	---	---	---
Pyrene	129-00-0	X		1.01E-03	ND	ND	ND	---
Styrene	100-42-5	X		4.11E-02	5.12E-04	ND	ND	---
1,1,2,2-Tetrachloroethane	79-34-5	X		1.13E-03	ND	ND	ND	---
Tetrachloroethene	127-18-4	X		1.13E-03	ND	ND	ND	---
m-Tolualdehyde	620-23-5			2.44E-02	3.83E-05	ND	ND	---
o-Tolualdehyde	529-20-4			1.59E-02	1.75E-04	ND	ND	---
Toluene	108-88-3	X		1.02E-01	2.88E-03	1.33E-04	1.27E-04	---
1,2,4-Trichlorobenzene	120-82-1	X		4.97E-04	ND	ND	ND	---
1,1,1-Trichloroethane	71-55-6	X		1.13E-03	ND	ND	ND	---
1,1,2-Trichloroethane	79-00-5	X		1.13E-03	ND	ND	ND	---
Trichloroethene	79-01-6	X		1.13E-03	ND	ND	ND	---
Trichlorofluoromethane	75-69-4			1.13E-03	7.28E-03	4.99E-03	4.65E-03	---
2,4,5-Trichlorophenol	95-95-4	X		2.48E-03	ND	ND	ND	---
2,4,6-Trichlorophenol	88-06-2	X		2.48E-03	ND	ND	NO	---
Vinyl Acetate	108-05-4	X		5.63E-03	ND	ND	ND	---
Vinyl Chloride	75-01-4	X		1.13E-03	ND	ND	ND	---
m,p-Xylene	1330-20-7	X		4.38E-02	6.83E-04	ND	ND	---
o-Xylene	95-47-6	X		2.07E-02	2.85E-04	ND	ND	---

1. Data obtained from *Aircraft Engine and APU Emissions Testing Volumes I-III March 1999*, IERA-RS-BR-TR-1999-0006
2. Emission Factors derived using the test results provided in the reference above.

"---" 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 2-9. VOC and HAP Emission Factors for Select Engines

T700-GE-700

Power Setting			Ground Idle	Flight Idle	Flight Max	Overspeed	---
Fuel Flowrate (lb/hr)[1]			134	469	626	725	---
Percent Thrust/hp[1]			4%	56%	82%	100%	---
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**				
Acenaphthene	83-32-9	X	ND	ND	ND	ND	---
Acenaphthylene	208-96-8	X	ND	ND	ND	ND	---
Acetaldehyde	75-07-0	X	1.81E-02	3.03E-04	2.00E-04	ND	---
Acetone	67-64-1		4.04E-03	5.46E-05	6.44E-05	1.94E-04	---
Acrolein	107-02-8	X	7.23E-03	9.68E-05	1.10E-05	ND	---
Anthracene	120-12-7	X	ND	ND	ND	ND	---
Benzaldehyde	100-52-7		ND	9.00E-04	4.15E-04	ND	---
Benz(a)anthracene	56-55-3	X	ND	ND	ND	ND	---
Benzene	71-43-2	X	4.87E-02	2.97E-04	3.12E-04	3.00E-04	---
Benzenemethanol	100-51-6		2.87E-03	ND	ND	ND	---
Benzo(b)fluoranthene	205-99-2	X	ND	ND	ND	ND	---
Benzo(k)fluoranthene	207-08-9	X	ND	ND	ND	ND	---
Benzo(g,h,i)perylene	191-24-2	X	ND	ND	ND	ND	---
Benzo(a)pyrene	50-32-8	X	ND	ND	ND	ND	---
Benzoic Acid	65-85-0		2.08E-02	5.52E-03	3.05E-03	9.09E-04	---
Bromodichloromethane	75-27-4		ND	ND	ND	ND	---
Bromoform	75-25-2	X	ND	ND	ND	ND	---
Bromomethane	74-83-9	X	ND	ND	ND	ND	---
4-Bromophenyl-phenyl Ether	101-55-3		ND	ND	ND	ND	---
1,3-Butadiene	106-99-0	X	---	---	---	---	---
2-Butanone (MEK)	78-93-3		2.00E-03	3.26E-04	ND	ND	---
Butyl benzyl phthalate	85-68-7		1.31E-04	1.86E-04	8.13E-05	ND	---
Carbon Disulfide	75-15-0	X	3.72E-04	3.00E-04	2.27E-04	4.69E-04	---
Carbon Tetrachloride	56-23-5	X	3.64E-04	ND	ND	ND	---
4-Chloroaniline	106-47-8		ND	ND	ND	ND	---
Chlorobenzene	108-90-7	X	ND	ND	ND	ND	---
Chlorodibromomethane	124-48-1		ND	ND	ND	ND	---
Chloroethane	75-00-3	X	ND	ND	ND	ND	---
bis(2-Chloroethoxy) Methane	111-91-1		ND	ND	ND	ND	---
bis(2-Chloroethyl) Ether	111-44-4	X	ND	ND	ND	ND	---
Chloroform	67-66-3	X	1.04E-03	3.44E-04	3.39E-04	3.06E-04	---
bis(2-Choroisopropyl) Ether	39638-32-9		ND	ND	ND	ND	---
Chloromethane	74-87-3	X	ND	ND	ND	ND	---
4-Chloro-3-methylphenol	59-50-7		ND	ND	ND	ND	---
2-Chloronaphthalene	91-58-7		ND	ND	ND	ND	---
2-Chlorophenol	95-57-8		ND	ND	ND	ND	---
1-chloro-4-phenoxybenzene	7005-72-3		ND	ND	ND	ND	---
Chrysene	218-01-9	X	ND	ND	ND	ND	---
o-Cresol	95-48-7	X	7.84E-04	ND	ND	ND	---
p-Cresol	106-44-5	X	1.21E-01	ND	ND	ND	---
Crotonaldehyde	4170-30-3		9.93E-03	ND	ND	ND	---
Dibenzofuran	132-64-9	X	2.08E-04	ND	ND	ND	---
Dibutyl Phthalate	84-74-2	X	3.74E-05	AA	AA	6.54E-05	---
1,2-Dichlorobenzene	95-50-1		ND	ND	ND	ND	---
1,3-Dichlorobenzene	541-73-1		ND	ND	ND	ND	---
1,4-Dichlorobenzene	106-46-7	X	ND	ND	ND	ND	---
3,3'-Dichlorobenzidine	91-94-1	X	ND	ND	ND	ND	---
1,1-Dichloroethane	75-34-3	X	ND	ND	ND	ND	---
1,2-Dichloroethane	107-06-2	X	ND	ND	ND	ND	---
1,1-Dichloroethene	75-35-4	X	ND	ND	ND	ND	---
cis-1,2-Dicholorethene	156-59-2		ND	ND	ND	ND	---
trans-1,2-Dichloroethene	156-60-5		ND	ND	ND	ND	---
2,4-Dichlorophenol	120-83-2		ND	ND	ND	ND	---
1,2-Dichloropropane	78-87-5	X	ND	ND	ND	ND	---
cis-1,3-Dichloropropene	10061-01-5		ND	ND	ND	ND	---
trans-1,3-Dichloropropene	10061-02-6		ND	ND	ND	ND	---
Diethyl Phthalate	84-66-2		2.37E-04	1.14E-04	3.02E-04	6.32E-05	---

Power Setting			Ground Idle	Flight Idle	Flight Max	Overspeed	---
Fuel Flowrate (lb/hr)[1]			134	469	626	725	---
Percent Thrust/hp[1]			4%	56%	82%	100%	---
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**				
2,4-Dimethylphenol	105-67-9		ND	ND	ND	ND	---
Dimethyl phthalate	131-11-3	X	ND	ND	ND	ND	---
4,6-Dinitro-o-cresol	534-52-1	X	ND	ND	ND	ND	---
2,4-Dinitrophenol	51-28-5	X	ND	ND	ND	ND	---
2,4-Dinitrotoluene	121-14-2	X	ND	ND	ND	ND	---
2,6-Dinitrotoluene	606-20-2		ND	ND	ND	ND	---
Di(2-Ethylhexyl) Phthalate (DEHP)	117-81-7	X	1.00E-03	1.46E-03	6.26E-04	2.28E-04	---
Di-n-Octyl phthalate	117-84-0		ND	ND	ND	ND	---
Ethylbenzene	100-41-4	X	2.25E-03	2.57E-04	ND	1.99E-04	---
Fluoranthene	206-44-0	X	ND	ND	ND	ND	---
Fluorene	86-73-7	X	ND	ND	ND	ND	---
Formaldehyde	50-00-0	X	2.19E-01	4.09E-03	2.09E-03	4.81E-03	---
Hexachlorobenzene	118-74-1	X	ND	ND	ND	ND	---
Hexachlorobutadiene	87-68-3	X	ND	ND	ND	ND	---
Hexachlorocyclopentadiene	77-47-4	X	ND	ND	ND	ND	---
Hexachloroethane	67-72-1	X	ND	ND	ND	ND	---
Hexanal	66-25-1		ND	ND	ND	ND	---
2-Hexanone	591-78-6		9.53E-04	6.35E-04	4.42E-04	ND	---
Indeno(1,2,3-cd)pyrene	193-39-5	X	ND	ND	ND	ND	---
Isophorone	78-59-1	X	ND	ND	ND	ND	---
Isovaleraldehyde	590-86-3		ND	ND	ND	ND	---
Methylene Chloride	75-09-2	X	1.06E-02	2.99E-03	3.30E-03	6.91E-03	---
2-Methylnaphthalene	91-57-6		4.89E-03	1.36E-04	3.90E-05	1.86E-05	---
4-Methyl-2-pentanone (MIBK)	108-10-1	X	9.38E-04	6.35E-04	4.42E-04	4.03E-04	---
Naphthalene	91-20-3	X	7.33E-03	1.56E-04	6.73E-05	2.91E-05	---
m-Nitroaniline	99-09-2		ND	ND	ND	ND	---
o-Nitroaniline	88-74-4		ND	ND	ND	ND	---
4-Nitrobenzenamine	100-01-6		ND	ND	ND	ND	---
Nitrobenzene	98-95-3	X	ND	ND	ND	ND	---
2-Nitrophenol	88-75-5		7.99E-04	ND	ND	ND	---
4-Nitrophenol	100-02-7	X	ND	ND	ND	ND	---
N-Nitrosodiphenylamine	86-30-6		ND	ND	ND	ND	---
N-Nitrosodi-n-propylamine	621-64-7		ND	ND	ND	ND	---
Pentachlorophenol	87-86-5	X	ND	ND	ND	ND	---
Pentanal	110-62-3		ND	9.00E-04	4.15E-04	ND	---
Phenanthrene	85-01-8	X	ND	ND	ND	ND	---
Phenol	108-95-2	X	6.24E-03	ND	ND	ND	---
Propanal	123-38-6	X	---	---	---	---	---
Pyrene	129-00-0	X	ND	ND	ND	ND	---
Styrene	100-42-5	X	5.16E-03	ND	ND	ND	---
1,1,2,2-Tetrachloroethane	79-34-5	X	ND	6.35E-04	4.42E-04	ND	---
Tetrachloroethene	127-18-4	X	ND	ND	ND	ND	---
m-Tolualdehyde	620-23-5		ND	ND	ND	ND	---
o-Tolualdehyde	529-20-4		ND	ND	ND	ND	---
Toluene	108-88-3	X	1.28E-02	1.24E-03	AA	2.92E-04	---
1,2,4-Trichlorobenzene	120-82-1	X	ND	ND	ND	ND	---
1,1,1-Trichloroethane	71-55-6	X	7.07E-04	2.26E-04	2.17E-04	1.92E-04	---
1,1,2-Trichloroethane	79-00-5	X	ND	ND	ND	ND	---
Trichloroethene	79-01-6	X	ND	5.10E-04	4.65E-04	ND	---
Trichlorofluoromethane	75-69-4		1.60E-03	2.00E-03	3.01E-03	1.19E-03	---
2,4,5-Trichlorophenol	95-95-4	X	ND	ND	ND	ND	---
2,4,6-Trichlorophenol	88-06-2	X	ND	ND	ND	ND	---
Vinyl Acetate	108-05-4	X	ND	ND	ND	ND	---
Vinyl Chloride	75-01-4	X	ND	ND	ND	ND	---
m,p-Xylene	1330-20-7	X	4.35E-03	3.17E-04	3.23E-04	8.36E-04	---
o-Xylene	95-47-6	X	2.80E-03	2.52E-04	1.85E-04	4.05E-04	---

1. Data obtained from *Aircraft Engine and APU Emissions Testing Volumes I-III March 1999*, IERA-RS-BR-TR-1999-0006
2. Emission Factors derived using the test results provided in the reference above.

"---" 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 2-9. VOC and HAP Emission Factors for Select Engines

TF33-P-7/7A

Power Setting			Idle	Approach	Intermediate	Military	---
Fuel Flowrate (lb/hr)[1]			1093	4884	6356	8264	---
Percent Thrust/hp[1]			4%	45%	58%	73%	---
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**				
Acenaphthene	83-32-9	X	ND	ND	ND	ND	---
Acenaphthylene	208-96-8	X	2.92E-02	ND	ND	ND	---
Acetaldehyde	75-07-0	X	ND	8.72E-03	ND	ND	---
Acetone	67-64-1		1.16E-01	3.36E-02	2.73E-02	5.22E-03	---
Acrolein	107-02-8	X	ND	ND	ND	ND	---
Anthracene	120-12-7	X	ND	ND	ND	ND	---
Benzaldehyde	100-52-7		ND	ND	ND	ND	---
Benz(a)anthracene	56-55-3	X	ND	ND	ND	ND	---
Benzene	71-43-2	X	5.23E-01	2.84E-02	6.49E-03	1.47E-03	---
Benzenemethanol	100-51-6		ND	ND	ND	ND	---
Benzo(b)fluoranthene	205-99-2	X	ND	ND	ND	ND	---
Benzo(k)fluoranthene	207-08-9	X	ND	ND	ND	ND	---
Benzo(g,h,i)perylene	191-24-2	X	ND	ND	ND	ND	---
Benzo(a)pyrene	50-32-8	X	ND	ND	ND	ND	---
Benzoic Acid	65-85-0		ND	1.71E-02	9.24E-03	4.44E-03	---
Bromodichloromethane	75-27-4		1.94E-03	ND	ND	ND	---
Bromoform	75-25-2	X	1.94E-03	ND	ND	ND	---
Bromomethane	74-83-9	X	3.45E-03	4.61E-04	4.15E-04	3.16E-04	---
4-Bromophenyl-phenyl Ether	101-55-3		ND	ND	ND	ND	---
1,3-Butadiene	106-99-0	X	---	---	---	---	---
2-Butanone (MEK)	78-93-3		1.89E-02	7.11E-03	ND	ND	---
Butyl benzyl phthalate	85-68-7		ND	ND	ND	ND	---
Carbon Disulfide	75-15-0	X	1.97E-03	ND	4.93E-04	2.10E-04	---
Carbon Tetrachloride	56-23-5	X	1.94E-03	5.26E-04	4.57E-04	4.09E-04	---
4-Chloroaniline	106-47-8		ND	ND	ND	ND	---
Chlorobenzene	108-90-7	X	1.94E-03	ND	ND	ND	---
Chlorodibromomethane	124-48-1		1.94E-03	ND	ND	ND	---
Chloroethane	75-00-3	X	1.94E-03	ND	ND	ND	---
bis(2-Chloroethoxy) Methane	111-91-1		ND	ND	ND	ND	---
bis(2-Chloroethyl) Ether	111-44-4	X	ND	ND	ND	ND	---
Chloroform	67-66-3	X	1.94E-03	2.08E-03	1.38E-03	1.17E-03	---
bis(2-Choroisopropyl) Ether	39638-32-9		ND	ND	ND	ND	---
Chloromethane	74-87-3	X	2.13E-03	4.10E-04	6.96E-04	5.01E-04	---
4-Chloro-3-methylphenol	59-50-7		ND	ND	ND	ND	---
2-Chloronaphthalene	91-58-7		ND	ND	ND	ND	---
2-Chlorophenol	95-57-8		ND	ND	ND	ND	---
1-chloro-4-phenoxybenzene	7005-72-3		ND	ND	ND	ND	---
Chrysene	218-01-9	X	ND	ND	ND	ND	---
o-Cresol	95-48-7	X	ND	ND	ND	ND	---
p-Cresol	106-44-5	X	4.17E-02	ND	ND	ND	---
Crotonaldehyde	4170-30-3		ND	ND	ND	ND	---
Dibenzofuran	132-64-9	X	1.10E-02	ND	ND	ND	---
Dibutyl Phthalate	84-74-2	X	ND	AA	1.45E-03	AA	---
1,2-Dichlorobenzene	95-50-1		ND	ND	ND	ND	---
1,3-Dichlorobenzene	541-73-1		ND	ND	ND	ND	---
1,4-Dichlorobenzene	106-46-7	X	ND	ND	ND	ND	---
3,3'-Dichlorobenzidine	91-94-1	X	ND	ND	ND	ND	---
1,1-Dichloroethane	75-34-3	X	1.94E-03	ND	ND	ND	---
1,2-Dichloroethane	107-06-2	X	1.94E-03	ND	ND	ND	---
1,1-Dichloroethene	75-35-4	X	1.94E-03	ND	ND	ND	---
cis-1,2-Dicholorethene	156-59-2		1.94E-03	ND	ND	ND	---
trans-1,2-Dichloroethene	156-60-5		1.94E-03	ND	ND	ND	---
2,4-Dichlorophenol	120-83-2		ND	ND	ND	ND	---
1,2-Dichloropropane	78-87-5	X	1.94E-03	ND	ND	ND	---
cis-1,3-Dichloropropene	10061-01-5		1.94E-03	ND	ND	ND	---
trans-1,3-Dichloropropene	10061-02-6		1.94E-03	ND	ND	ND	---
Diethyl Phthalate	84-66-2		ND	3.54E-04	1.07E-03	ND	---

Power Setting			Idle	Approach	Intermediate	Military	---
Fuel Flowrate (lb/hr)[1]			1093	4884	6356	8264	---
Percent Thrust/hp[1]			4%	45%	58%	73%	---
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**				
2,4-Dimethylphenol	105-67-9		ND	ND	ND	ND	---
Dimethyl phthalate	131-11-3	X	ND	ND	ND	ND	---
4,6-Dinitro-o-cresol	534-52-1	X	ND	ND	ND	ND	---
2,4-Dinitrophenol	51-28-5	X	ND	ND	ND	ND	---
2,4-Dinitrotoluene	121-14-2	X	ND	ND	ND	ND	---
2,6-Dinitrotoluene	606-20-2		ND	ND	ND	ND	---
Di(2-Ethylhexyl) Phthalate (DEHP)	117-81-7	X	ND	2.68E-03	1.79E-03	1.59E-03	---
Di-n-Octyl phthalate	117-84-0		ND	ND	ND	ND	---
Ethylbenzene	100-41-4	X	2.00E-01	2.04E-03	5.11E-04	3.88E-04	---
Fluoranthene	206-44-0	X	4.92E-03	ND	ND	ND	---
Fluorene	86-73-7	X	9.09E-03	ND	ND	ND	---
Formaldehyde	50-00-0	X	2.31E+00	1.26E-01	2.80E-02	5.28E-03	---
Hexachlorobenzene	118-74-1	X	ND	ND	ND	ND	---
Hexachlorobutadiene	87-68-3	X	ND	ND	ND	ND	---
Hexachlorocyclopentadiene	77-47-4	X	ND	ND	ND	ND	---
Hexachloroethane	67-72-1	X	ND	ND	ND	ND	---
Hexanal	66-25-1		ND	ND	ND	ND	---
2-Hexanone	591-78-6		9.73E-03	2.31E-03	2.07E-03	1.58E-03	---
Indeno(1,2,3-cd)pyrene	193-39-5	X	ND	ND	ND	ND	---
Isophorone	78-59-1	X	ND	ND	ND	ND	---
Isovaleraldehyde	590-86-3		ND	ND	ND	ND	---
Methylene Chloride	75-09-2	X	9.76E-02	2.11E-02	3.01E-02	2.72E-02	---
2-Methylnaphthalene	91-57-6		4.55E-01	2.48E-03	1.65E-04	ND	---
4-Methyl-2-pentanone (MIBK)	108-10-1	X	9.73E-03	2.31E-03	2.05E-03	1.58E-03	---
Naphthalene	91-20-3	X	3.71E-01	3.13E-03	3.54E-04	AA	---
m-Nitroaniline	99-09-2		ND	ND	ND	ND	---
o-Nitroaniline	88-74-4		ND	ND	ND	ND	---
4-Nitrobenzenamine	100-01-6		ND	ND	ND	ND	---
Nitrobenzene	98-95-3	X	ND	ND	ND	ND	---
2-Nitrophenol	88-75-5		ND	ND	ND	ND	---
4-Nitrophenol	100-02-7	X	ND	ND	ND	ND	---
N-Nitrosodiphenylamine	86-30-6		ND	ND	ND	ND	---
N-Nitrosodi-n-propylamine	621-64-7		ND	ND	ND	ND	---
Pentachlorophenol	87-86-5	X	ND	ND	ND	ND	---
Pentanal	110-62-3		ND	ND	ND	ND	---
Phenanthrene	85-01-8	X	1.25E-02	3.87E-04	ND	ND	---
Phenol	108-95-2	X	1.67E-01	3.54E-03	1.28E-03	ND	---
Propanal	123-38-6	X	---	---	---	---	---
Pyrene	129-00-0	X	7.20E-03	ND	ND	ND	---
Styrene	100-42-5	X	2.42E-01	3.43E-03	7.46E-04	ND	---
1,1,2,2-Tetrachloroethane	79-34-5	X	1.94E-03	ND	ND	ND	---
Tetrachloroethene	127-18-4	X	1.94E-03	ND	ND	ND	---
m-Tolualdehyde	620-23-5		ND	ND	ND	ND	---
o-Tolualdehyde	529-20-4		ND	ND	ND	ND	---
Toluene	108-88-3	X	3.73E-01	1.01E-02	2.54E-03	2.27E-03	---
1,2,4-Trichlorobenzene	120-82-1	X	ND	ND	ND	ND	---
1,1,1-Trichloroethane	71-55-6	X	1.94E-03	3.11E-04	2.79E-04	4.21E-04	---
1,1,2-Trichloroethane	79-00-5	X	1.94E-03	ND	ND	ND	---
Trichloroethene	79-01-6	X	1.94E-03	ND	ND	ND	---
Trichlorofluoromethane	75-69-4		2.57E-02	7.95E-03	1.05E-02	9.33E-03	---
2,4,5-Trichlorophenol	95-95-4	X	ND	ND	ND	ND	---
2,4,6-Trichlorophenol	88-06-2	X	ND	ND	ND	ND	---
Vinyl Acetate	108-05-4	X	9.73E-03	ND	ND	ND	---
Vinyl Chloride	75-01-4	X	1.94E-03	ND	ND	ND	---
m,p-Xylene	1330-20-7	X	3.35E-01	3.40E-03	1.04E-03	1.21E-03	---
o-Xylene	95-47-6	X	1.27E-01	1.42E-03	3.05E-04	4.31E-04	---

1. Data obtained from *Aircraft Engine and APU Emissions Testing Volumes I-III March 1999*, IERA-RS-BR-TR-1999-0006
2. Emission Factors derived using the test results provided in the reference above.

"---" 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 2-9. VOC and HAP Emission Factors for Select Engines

TF33-P-102

Power Setting			Idle	Approach	Intermediate	Military	---
Fuel Flowrate (lb/hr)[1]			1093	4884	6356	8264	---
Percent Thrust/hp[1]			4%	45%	58%	73%	---
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**				
Acenaphthene	83-32-9	X	ND	ND	ND	ND	---
Acenaphthylene	208-96-8	X	2.92E-02	ND	ND	ND	---
Acetaldehyde	75-07-0	X	ND	8.72E-03	ND	ND	---
Acetone	67-64-1		1.16E-01	3.36E-02	2.73E-02	5.22E-03	---
Acrolein	107-02-8	X	ND	ND	ND	ND	---
Anthracene	120-12-7	X	ND	ND	ND	ND	---
Benzaldehyde	100-52-7		ND	ND	ND	ND	---
Benz(a)anthracene	56-55-3	X	ND	ND	ND	ND	---
Benzene	71-43-2	X	5.23E-01	2.84E-02	6.49E-03	1.47E-03	---
Benzenemethanol	100-51-6		ND	ND	ND	ND	---
Benzo(b)fluoranthene	205-99-2	X	ND	ND	ND	ND	---
Benzo(k)fluoranthene	207-08-9	X	ND	ND	ND	ND	---
Benzo(g,h,i)perylene	191-24-2	X	ND	ND	ND	ND	---
Benzo(a)pyrene	50-32-8	X	ND	ND	ND	ND	---
Benzoic Acid	65-85-0		ND	1.71E-02	9.24E-03	4.44E-03	---
Bromodichloromethane	75-27-4		1.94E-03	ND	ND	ND	---
Bromoform	75-25-2	X	1.94E-03	ND	ND	ND	---
Bromomethane	74-83-9	X	3.45E-03	4.61E-04	4.15E-04	3.16E-04	---
4-Bromophenyl-phenyl Ether	101-55-3		ND	ND	ND	ND	---
1,3-Butadiene	106-99-0	X	---	---	---	---	---
2-Butanone (MEK)	78-93-3		1.89E-02	7.11E-03	ND	ND	---
Butyl benzyl phthalate	85-68-7		ND	ND	ND	ND	---
Carbon Disulfide	75-15-0	X	1.97E-03	ND	4.93E-04	2.10E-04	---
Carbon Tetrachloride	56-23-5	X	1.94E-03	5.26E-04	4.57E-04	4.09E-04	---
4-Chloroaniline	106-47-8		ND	ND	ND	ND	---
Chlorobenzene	108-90-7	X	1.94E-03	ND	ND	ND	---
Chlorodibromomethane	124-48-1		1.94E-03	ND	ND	ND	---
Chloroethane	75-00-3	X	1.94E-03	ND	ND	ND	---
bis(2-Chloroethoxy) Methane	111-91-1		ND	ND	ND	ND	---
bis(2-Chloroethyl) Ether	111-44-4	X	ND	ND	ND	ND	---
Chloroform	67-66-3	X	1.94E-03	2.08E-03	1.38E-03	1.17E-03	---
bis(2-Choroisopropyl) Ether	39638-32-9		ND	ND	ND	ND	---
Chloromethane	74-87-3	X	2.13E-03	4.10E-04	6.96E-04	5.01E-04	---
4-Chloro-3-methylphenol	59-50-7		ND	ND	ND	ND	---
2-Chloronaphthalene	91-58-7		ND	ND	ND	ND	---
2-Chlorophenol	95-57-8		ND	ND	ND	ND	---
1-chloro-4-phenoxybenzene	7005-72-3		ND	ND	ND	ND	---
Chrysene	218-01-9	X	ND	ND	ND	ND	---
o-Cresol	95-48-7	X	ND	ND	ND	ND	---
p-Cresol	106-44-5	X	4.17E-02	ND	ND	ND	---
Crotonaldehyde	4170-30-3		ND	ND	ND	ND	---
Dibenzofuran	132-64-9	X	1.10E-02	ND	ND	ND	---
Dibutyl Phthalate	84-74-2	X	ND	AA	1.45E-03	AA	---
1,2-Dichlorobenzene	95-50-1		ND	ND	ND	ND	---
1,3-Dichlorobenzene	541-73-1		ND	ND	ND	ND	---
1,4-Dichlorobenzene	106-46-7	X	ND	ND	ND	ND	---
3,3'-Dichlorobenzidine	91-94-1	X	ND	ND	ND	ND	---
1,1-Dichloroethane	75-34-3	X	1.94E-03	ND	ND	ND	---
1,2-Dichloroethane	107-06-2	X	1.94E-03	ND	ND	ND	---
1,1-Dichloroethene	75-35-4	X	1.94E-03	ND	ND	ND	---
cis-1,2-Dicholorethene	156-59-2		1.94E-03	ND	ND	ND	---
trans-1,2-Dichloroethene	156-60-5		1.94E-03	ND	ND	ND	---
2,4-Dichlorophenol	120-83-2		ND	ND	ND	ND	---
1,2-Dichloropropane	78-87-5	X	1.94E-03	ND	ND	ND	---
cis-1,3-Dichloropropene	10061-01-5		1.94E-03	ND	ND	ND	---
trans-1,3-Dichloropropene	10061-02-6		1.94E-03	ND	ND	ND	---
Diethyl Phthalate	84-66-2		ND	3.54E-04	1.07E-03	ND	---

Power Setting			Idle	Approach	Intermediate	Military	---
Fuel Flowrate (lb/hr)[1]			1093	4884	6356	8264	---
Percent Thrust/hp[1]			4%	45%	58%	73%	---
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**				
2,4-Dimethylphenol	105-67-9		ND	ND	ND	ND	---
Dimethyl phthalate	131-11-3	X	ND	ND	ND	ND	---
4,6-Dinitro-o-cresol	534-52-1	X	ND	ND	ND	ND	---
2,4-Dinitrophenol	51-28-5	X	ND	ND	ND	ND	---
2,4-Dinitrotoluene	121-14-2	X	ND	ND	ND	ND	---
2,6-Dinitrotoluene	606-20-2		ND	ND	ND	ND	---
Di(2-Ethylhexyl) Phthalate (DEHP)	117-81-7	X	ND	2.68E-03	1.79E-03	1.59E-03	---
Di-n-Octyl phthalate	117-84-0		ND	ND	ND	ND	---
Ethylbenzene	100-41-4	X	2.00E-01	2.04E-03	5.11E-04	3.88E-04	---
Fluoranthene	206-44-0	X	4.92E-03	ND	ND	ND	---
Fluorene	86-73-7	X	9.09E-03	ND	ND	ND	---
Formaldehyde	50-00-0	X	2.31E+00	1.26E-01	2.80E-02	5.28E-03	---
Hexachlorobenzene	118-74-1	X	ND	ND	ND	ND	---
Hexachlorobutadiene	87-68-3	X	ND	ND	ND	ND	---
Hexachlorocyclopentadiene	77-47-4	X	ND	ND	ND	ND	---
Hexachloroethane	67-72-1	X	ND	ND	ND	ND	---
Hexanal	66-25-1		ND	ND	ND	ND	---
2-Hexanone	591-78-6		9.73E-03	2.31E-03	2.07E-03	1.58E-03	---
Indeno(1,2,3-cd)pyrene	193-39-5	X	ND	ND	ND	ND	---
Isophorone	78-59-1	X	ND	ND	ND	ND	---
Isovaleraldehyde	590-86-3		ND	ND	ND	ND	---
Methylene Chloride	75-09-2	X	9.76E-02	2.11E-02	3.01E-02	2.72E-02	---
2-Methylnaphthalene	91-57-6		4.55E-01	2.48E-03	1.65E-04	ND	---
4-Methyl-2-pentanone (MIBK)	108-10-1	X	9.73E-03	2.31E-03	2.05E-03	1.58E-03	---
Naphthalene	91-20-3	X	3.71E-01	3.13E-03	3.54E-04	AA	---
m-Nitroaniline	99-09-2		ND	ND	ND	ND	---
o-Nitroaniline	88-74-4		ND	ND	ND	ND	---
4-Nitrobenzenamine	100-01-6		ND	ND	ND	ND	---
Nitrobenzene	98-95-3	X	ND	ND	ND	ND	---
2-Nitrophenol	88-75-5		ND	ND	ND	ND	---
4-Nitrophenol	100-02-7	X	ND	ND	ND	ND	---
N-Nitrosodiphenylamine	86-30-6		ND	ND	ND	ND	---
N-Nitrosodi-n-propylamine	621-64-7		ND	ND	ND	ND	---
Pentachlorophenol	87-86-5	X	ND	ND	ND	ND	---
Pentanal	110-62-3		ND	ND	ND	ND	---
Phenanthrene	85-01-8	X	1.25E-02	3.87E-04	ND	ND	---
Phenol	108-95-2	X	1.67E-01	3.54E-03	1.28E-03	ND	---
Propanal	123-38-6	X	---	---	---	---	---
Pyrene	129-00-0	X	7.20E-03	ND	ND	ND	---
Styrene	100-42-5	X	2.42E-01	3.43E-03	7.46E-04	ND	---
1,1,2,2-Tetrachloroethane	79-34-5	X	1.94E-03	ND	ND	ND	---
Tetrachloroethene	127-18-4	X	1.94E-03	ND	ND	ND	---
m-Tolualdehyde	620-23-5		ND	ND	ND	ND	---
o-Tolualdehyde	529-20-4		ND	ND	ND	ND	---
Toluene	108-88-3	X	3.73E-01	1.01E-02	2.54E-03	2.27E-03	---
1,2,4-Trichlorobenzene	120-82-1	X	ND	ND	ND	ND	---
1,1,1-Trichloroethane	71-55-6	X	1.94E-03	3.11E-04	2.79E-04	4.21E-04	---
1,1,2-Trichloroethane	79-00-5	X	1.94E-03	ND	ND	ND	---
Trichloroethene	79-01-6	X	1.94E-03	ND	ND	ND	---
Trichlorofluoromethane	75-69-4		2.57E-02	7.95E-03	1.05E-02	9.33E-03	---
2,4,5-Trichlorophenol	95-95-4	X	ND	ND	ND	ND	---
2,4,6-Trichlorophenol	88-06-2	X	ND	ND	ND	ND	---
Vinyl Acetate	108-05-4	X	9.73E-03	ND	ND	ND	---
Vinyl Chloride	75-01-4	X	1.94E-03	ND	ND	ND	---
m,p-Xylene	1330-20-7	X	3.35E-01	3.40E-03	1.04E-03	1.21E-03	---
o-Xylene	95-47-6	X	1.27E-01	1.42E-03	3.05E-04	4.31E-04	---

1. Data obtained from *Aircraft Engine and APU Emissions Testing Volumes I-III March 1999*, IERA-RS-BR-TR-1999-0006
2. Emission Factors derived using the test results provided in the reference above.

"---" 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 2-9. VOC and HAP Emission Factors for Select Engines

TF34-GE-100A

Power Setting			Idle	Approach	Intermediate	Military	---
Fuel Flowrate (lb/hr)[1]			498	933	1512	2628	---
Percent Thrust/hp[1]			7%	28%	46%	78%	---
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**				
Acenaphthene	83-32-9	X	ND	ND	ND	ND	---
Acenaphthylene	208-96-8	X	4.26E-03	ND	ND	ND	---
Acetaldehyde	75-07-0	X	1.27E-01	3.08E-02	ND	ND	---
Acetone	67-64-1		1.90E-01	4.42E-01	9.03E-02	1.16E-01	---
Acrolein	107-02-8	X	6.10E-02	1.36E-02	5.42E-03	2.96E-03	---
Anthracene	120-12-7	X	ND	ND	ND	ND	---
Benzaldehyde	100-52-7		5.10E-02	2.03E-02	7.80E-03	5.94E-03	---
Benz(a)anthracene	56-55-3	X	ND	ND	ND	ND	---
Benzene	71-43-2	X	2.81E-01	6.37E-02	9.57E-03	4.27E-03	---
Benzenemethanol	100-51-6		7.85E-03	ND	ND	ND	---
Benzo(b)fluoranthene	205-99-2	X	ND	ND	ND	ND	---
Benzo(k)fluoranthene	207-08-9	X	ND	ND	ND	ND	---
Benzo(g,h,i)perylene	191-24-2	X	ND	ND	ND	ND	---
Benzo(a)pyrene	50-32-8	X	ND	ND	ND	ND	---
Benzoic Acid	65-85-0		3.63E-02	3.02E-02	1.83E-02	1.48E-02	---
Bromodichloromethane	75-27-4		ND	ND	ND	ND	---
Bromoform	75-25-2	X	ND	ND	ND	ND	---
Bromomethane	74-83-9	X	ND	4.26E-03	ND	ND	---
4-Bromophenyl-phenyl Ether	101-55-3		ND	ND	ND	ND	---
1,3-Butadiene	106-99-0	X	---	---	---	---	---
2-Butanone (MEK)	78-93-3		1.50E-02	5.94E-03	ND	ND	---
Butyl benzyl phthalate	85-68-7		ND	ND	ND	ND	---
Carbon Disulfide	75-15-0	X	ND	ND	ND	ND	---
Carbon Tetrachloride	56-23-5	X	1.48E-03	1.14E-03	1.08E-03	7.07E-04	---
4-Chloroaniline	106-47-8		ND	ND	ND	ND	---
Chlorobenzene	108-90-7	X	ND	ND	ND	ND	---
Chlorodibromomethane	124-48-1		ND	ND	ND	ND	---
Chloroethane	75-00-3	X	ND	ND	ND	ND	---
bis(2-Chloroethoxy) Methane	111-91-1		ND	ND	ND	ND	---
bis(2-Chloroethyl) Ether	111-44-4	X	ND	ND	ND	ND	---
Chloroform	67-66-3	X	2.26E-03	1.17E-03	1.43E-03	7.33E-04	---
bis(2-Chloroisopropyl) Ether	39638-32-9		ND	ND	ND	ND	---
Chloromethane	74-87-3	X	ND	7.05E-03	1.38E-03	1.67E-03	---
4-Chloro-3-methylphenol	59-50-7		ND	ND	ND	ND	---
2-Chloronaphthalene	91-58-7		ND	ND	ND	ND	---
2-Chlorophenol	95-57-8		ND	ND	ND	ND	---
1-chloro-4-phenoxybenzene	7005-72-3		ND	ND	ND	ND	---
Chrysene	218-01-9	X	ND	ND	ND	ND	---
o-Cresol	95-48-7	X	ND	ND	ND	ND	---
p-Cresol	106-44-5	X	5.26E-03	3.42E-03	ND	ND	---
Crotonaldehyde	4170-30-3		5.10E-02	ND	ND	ND	---
Dibenzofuran	132-64-9	X	ND	ND	ND	ND	---
Dibutyl Phthalate	84-74-2	X	2.47E-03	5.27E-04	ND	ND	---
1,2-Dichlorobenzene	95-50-1		ND	ND	ND	ND	---
1,3-Dichlorobenzene	541-73-1		ND	ND	ND	ND	---
1,4-Dichlorobenzene	106-46-7	X	ND	ND	ND	ND	---
3,3'-Dichlorobenzidine	91-94-1	X	ND	ND	ND	ND	---
1,1-Dichloroethane	75-34-3	X	ND	ND	ND	ND	---
1,2-Dichloroethane	107-06-2	X	ND	ND	ND	ND	---
1,1-Dichloroethene	75-35-4	X	ND	ND	7.18E-04	ND	---
cis-1,2-Dicholorethene	156-59-2		ND	ND	ND	ND	---
trans-1,2-Dichloroethene	156-60-5		ND	ND	ND	ND	---
2,4-Dichlorophenol	120-83-2		ND	ND	ND	ND	---
1,2-Dichloropropane	78-87-5	X	ND	ND	ND	ND	---
cis-1,3-Dichloropropene	10061-01-5		ND	ND	ND	ND	---
trans-1,3-Dichloropropene	10061-02-6		ND	ND	ND	ND	---
Diethyl Phthalate	84-66-2		2.13E-05	AA	AA	AA	---

Power Setting			Idle	Approach	Intermediate	Military	---
Fuel Flowrate (lb/hr)[1]			498	933	1512	2628	---
Percent Thrust/hp[1]			7%	28%	46%	78%	---
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**				
2,4-Dimethylphenol	105-67-9		ND	ND	ND	ND	---
Dimethyl phthalate	131-11-3	X	ND	ND	ND	ND	---
4,6-Dinitro-o-cresol	534-52-1	X	ND	ND	ND	ND	---
2,4-Dinitrophenol	51-28-5	X	ND	ND	ND	ND	---
2,4-Dinitrotoluene	121-14-2	X	ND	ND	ND	ND	---
2,6-Dinitrotoluene	606-20-2		ND	ND	ND	ND	---
Di(2-Ethylhexyl) Phthalate (DEHP)	117-81-7	X	2.25E-03	3.20E-03	1.44E-03	1.73E-03	---
Di-n-Octyl phthalate	117-84-0		ND	ND	ND	ND	---
Ethylbenzene	100-41-4	X	2.62E-02	3.50E-03	ND	6.82E-04	---
Fluoranthene	206-44-0	X	6.55E-04	ND	ND	ND	---
Fluorene	86-73-7	X	1.49E-03	ND	ND	ND	---
Formaldehyde	50-00-0	X	1.22E+00	5.31E-01	6.61E-02	2.82E-02	---
Hexachlorobenzene	118-74-1	X	ND	ND	ND	ND	---
Hexachlorobutadiene	87-68-3	X	ND	ND	ND	ND	---
Hexachlorocyclopentadiene	77-47-4	X	ND	ND	ND	ND	---
Hexachloroethane	67-72-1	X	ND	ND	ND	ND	---
Hexanal	66-25-1		ND	ND	ND	ND	---
2-Hexanone	591-78-6		ND	ND	ND	ND	---
Indeno(1,2,3-cd)pyrene	193-39-5	X	ND	ND	ND	ND	---
Isophorone	78-59-1	X	ND	ND	ND	ND	---
Isovaleraldehyde	590-86-3		ND	1.47E-02	ND	ND	---
Methylene Chloride	75-09-2	X	AA	AA	AA	5.26E-02	---
2-Methylnaphthalene	91-57-6		2.79E-02	3.58E-03	ND	ND	---
4-Methyl-2-pentanone (MIBK)	108-10-1	X	ND	ND	ND	ND	---
Naphthalene	91-20-3	X	4.48E-02	8.51E-03	1.59E-03	3.20E-05	---
m-Nitroaniline	99-09-2		ND	ND	ND	ND	---
o-Nitroaniline	88-74-4		ND	ND	ND	ND	---
4-Nitrobenzenamine	100-01-6		ND	ND	ND	ND	---
Nitrobenzene	98-95-3	X	ND	ND	ND	ND	---
2-Nitrophenol	88-75-5		ND	ND	ND	ND	---
4-Nitrophenol	100-02-7	X	ND	4.00E-03	ND	ND	---
N-Nitrosodiphenylamine	86-30-6		ND	ND	ND	ND	---
N-Nitrosodi-n-propylamine	621-64-7		ND	ND	ND	ND	---
Pentachlorophenol	87-86-5	X	ND	ND	ND	ND	---
Pentanal	110-62-3		ND	ND	ND	ND	---
Phenanthrene	85-01-8	X	2.43E-03	ND	ND	ND	---
Phenol	108-95-2	X	2.73E-02	6.61E-01	ND	ND	---
Propanal	123-38-6	X	---	---	---	---	---
Pyrene	129-00-0	X	5.56E-04	ND	ND	ND	---
Styrene	100-42-5	X	4.41E-02	6.72E-03	ND	ND	---
1,1,2,2-Tetrachloroethane	79-34-5	X	ND	ND	ND	ND	---
Tetrachloroethene	127-18-4	X	ND	9.25E-04	ND	5.72E-04	---
m-Tolualdehyde	620-23-5		ND	ND	1.20E-02	7.80E-03	---
o-Tolualdehyde	529-20-4		ND	ND	ND	ND	---
Toluene	108-88-3	X	1.12E-01	1.40E-02	3.21E-03	1.34E-04	---
1,2,4-Trichlorobenzene	120-82-1	X	ND	ND	ND	ND	---
1,1,1-Trichloroethane	71-55-6	X	ND	ND	ND	ND	---
1,1,2-Trichloroethane	79-00-5	X	ND	ND	ND	ND	---
Trichloroethene	79-01-6	X	ND	1.33E-03	1.10E-03	7.35E-04	---
Trichlorofluoromethane	75-69-4		1.21E-02	2.95E-02	4.69E-02	2.89E-02	---
2,4,5-Trichlorophenol	95-95-4	X	ND	ND	ND	ND	---
2,4,6-Trichlorophenol	88-06-2	X	ND	ND	ND	ND	---
Vinyl Acetate	108-05-4	X	ND	ND	ND	ND	---
Vinyl Chloride	75-01-4	X	ND	ND	ND	ND	---
m,p-Xylene	1330-20-7	X	5.50E-02	7.95E-03	1.52E-03	2.41E-03	---
o-Xylene	95-47-6	X	2.67E-02	3.65E-03	ND	7.35E-04	---

1. Data obtained from *Aircraft Engine and APU Emissions Testing Volumes I-III March 1999*, IERA-RS-BR-TR-1999-0006
2. Emission Factors derived using the test results provided in the reference above.

"---" 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 2-9. VOC and HAP Emission Factors for Select Engines

TF39-GE-1C

Power Setting			Idle	Approach	Intermediate	Military	---
Fuel Flowrate (lb/hr)[1]			1448	10477	12541	13862	---
Percent Thrust/hp[1]			7%	76%	87%	94%	---
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**				
Acenaphthene	83-32-9	X	ND	ND	ND	ND	---
Acenaphthylene	208-96-8	X	ND	ND	ND	ND	---
Acetaldehyde	75-07-0	X	2.12E-01	3.16E-03	2.61E-04	6.17E-04	---
Acetone	67-64-1		2.49E-02	1.82E-02	1.47E-03	1.36E-03	---
Acrolein	107-02-8	X	2.06E-01	ND	ND	ND	---
Anthracene	120-12-7	X	ND	ND	ND	ND	---
Benzaldehyde	100-52-7		1.42E-01	1.15E-03	1.88E-03	1.70E-03	---
Benz(a)anthracene	56-55-3	X	ND	ND	ND	ND	---
Benzene	71-43-2	X	3.58E-01	1.56E-03	1.41E-03	2.16E-03	---
Benzenemethanol	100-51-6		ND	ND	ND	ND	---
Benzo(b)fluoranthene	205-99-2	X	ND	ND	ND	ND	---
Benzo(k)fluoranthene	207-08-9	X	ND	ND	ND	ND	---
Benzo(g,h,i)perylene	191-24-2	X	ND	ND	ND	ND	---
Benzo(a)pyrene	50-32-8	X	ND	ND	ND	ND	---
Benzoic Acid	65-85-0		ND	6.50E-03	7.02E-03	6.85E-03	---
Bromodichloromethane	75-27-4		ND	ND	ND	ND	---
Bromoform	75-25-2	X	ND	ND	ND	ND	---
Bromomethane	74-83-9	X	ND	ND	ND	ND	---
4-Bromophenyl-phenyl Ether	101-55-3		ND	ND	ND	ND	---
1,3-Butadiene	106-99-0	X	---	---	---	---	---
2-Butanone (MEK)	78-93-3		2.59E-02	ND	1.16E-03	2.46E-04	---
Butyl benzyl phthalate	85-68-7		ND	ND	ND	1.95E-04	---
Carbon Disulfide	75-15-0	X	ND	ND	ND	ND	---
Carbon Tetrachloride	56-23-5	X	ND	1.01E-03	3.15E-04	3.05E-04	---
4-Chloroaniline	106-47-8		ND	ND	ND	ND	---
Chlorobenzene	108-90-7	X	ND	ND	ND	ND	---
Chlorodibromomethane	124-48-1		ND	ND	ND	ND	---
Chloroethane	75-00-3	X	ND	ND	ND	ND	---
bis(2-Chloroethoxy) Methane	111-91-1		ND	ND	ND	ND	---
bis(2-Chloroethyl) Ether	111-44-4	X	ND	ND	ND	ND	---
Chloroform	67-66-3	X	3.68E-03	1.77E-03	1.52E-03	1.32E-03	---
bis(2-Choroisopropyl) Ether	39638-32-9		ND	ND	ND	ND	---
Chloromethane	74-87-3	X	1.05E-02	1.10E-03	6.14E-04	6.00E-04	---
4-Chloro-3-methylphenol	59-50-7		ND	ND	ND	ND	---
2-Chloronaphthalene	91-58-7		ND	ND	ND	ND	---
2-Chlorophenol	95-57-8		ND	ND	ND	ND	---
1-chloro-4-phenoxybenzene	7005-72-3		ND	ND	ND	ND	---
Chrysene	218-01-9	X	ND	ND	ND	ND	---
o-Cresol	95-48-7	X	ND	ND	ND	ND	---
p-Cresol	106-44-5	X	ND	ND	ND	ND	---
Crotonaldehyde	4170-30-3		8.77E-02	ND	ND	ND	---
Dibenzofuran	132-64-9	X	ND	ND	ND	ND	---
Dibutyl Phthalate	84-74-2	X	ND	6.50E-04	3.41E-04	3.90E-04	---
1,2-Dichlorobenzene	95-50-1		ND	ND	ND	ND	---
1,3-Dichlorobenzene	541-73-1		ND	ND	ND	ND	---
1,4-Dichlorobenzene	106-46-7	X	4.81E-03	1.80E-04	1.79E-04	1.62E-04	---
3,3'-Dichlorobenzidine	91-94-1	X	ND	ND	ND	ND	---
1,1-Dichloroethane	75-34-3	X	ND	ND	ND	ND	---
1,2-Dichloroethane	107-06-2	X	ND	ND	ND	ND	---
1,1-Dichloroethene	75-35-4	X	ND	ND	ND	ND	---
cis-1,2-Dicholorethene	156-59-2		ND	ND	ND	ND	---
trans-1,2-Dichloroethene	156-60-5		ND	ND	ND	ND	---
2,4-Dichlorophenol	120-83-2		ND	ND	ND	ND	---
1,2-Dichloropropane	78-87-5	X	ND	ND	ND	ND	---
cis-1,3-Dichloropropene	10061-01-5		ND	ND	ND	ND	---
trans-1,3-Dichloropropene	10061-02-6		ND	ND	ND	ND	---
Diethyl Phthalate	84-66-2		ND	2.89E-04	4.49E-04	5.86E-04	---

Power Setting			Idle	Approach	Intermediate	Military	---
Fuel Flowrate (lb/hr)[1]			1448	10477	12541	13862	---
Percent Thrust/hp[1]			7%	76%	87%	94%	---
Compound Name	**CAS Number**	**HAP**	**Emission Factors (lb/1000lb fuel burned)[2]**				
2,4-Dimethylphenol	105-67-9		ND	ND	ND	ND	---
Dimethyl phthalate	131-11-3	X	ND	ND	ND	ND	---
4,6-Dinitro-o-cresol	534-52-1	X	ND	ND	ND	ND	---
2,4-Dinitrophenol	51-28-5	X	ND	ND	ND	ND	---
2,4-Dinitrotoluene	121-14-2	X	ND	ND	ND	ND	---
2,6-Dinitrotoluene	606-20-2		ND	ND	ND	ND	---
Di(2-Ethylhexyl) Phthalate (DEHP)	117-81-7	X	ND	3.25E-03	1.49E-03	4.71E-03	---
Di-n-Octyl phthalate	117-84-0		ND	ND	ND	ND	---
Ethylbenzene	100-41-4	X	2.01E-02	ND	4.99E-04	AA	---
Fluoranthene	206-44-0	X	ND	ND	1.98E-04	ND	---
Fluorene	86-73-7	X	ND	ND	ND	ND	---
Formaldehyde	50-00-0	X	1.42E+00	8.15E-03	4.90E-03	1.05E-02	---
Hexachlorobenzene	118-74-1	X	ND	ND	ND	ND	---
Hexachlorobutadiene	87-68-3	X	ND	ND	ND	ND	---
Hexachlorocyclopentadiene	77-47-4	X	ND	ND	ND	ND	---
Hexachloroethane	67-72-1	X	ND	ND	ND	ND	---
Hexanal	66-25-1		ND	ND	ND	ND	---
2-Hexanone	591-78-6		ND	ND	ND	ND	---
Indeno(1,2,3-cd)pyrene	193-39-5	X	ND	ND	ND	ND	---
Isophorone	78-59-1	X	ND	ND	ND	ND	---
Isovaleraldehyde	590-86-3		ND	ND	ND	ND	---
Methylene Chloride	75-09-2	X	ND	AA	AA	AA	---
2-Methylnaphthalene	91-57-6		8.35E-02	AA	AA	AA	---
4-Methyl-2-pentanone (MIBK)	108-10-1	X	ND	ND	ND	ND	---
Naphthalene	91-20-3	X	9.74E-02	AA	AA	AA	---
m-Nitroaniline	99-09-2		ND	ND	ND	ND	---
o-Nitroaniline	88-74-4		ND	ND	ND	ND	---
4-Nitrobenzenamine	100-01-6		ND	ND	ND	ND	---
Nitrobenzene	98-95-3	X	ND	ND	ND	ND	---
2-Nitrophenol	88-75-5		ND	ND	ND	ND	---
4-Nitrophenol	100-02-7	X	ND	ND	ND	ND	---
N-Nitrosodiphenylamine	86-30-6		ND	ND	ND	ND	---
N-Nitrosodi-n-propylamine	621-64-7		ND	ND	ND	ND	---
Pentachlorophenol	87-86-5	X	ND	ND	ND	ND	---
Pentanal	110-62-3		4.62E-01	ND	ND	ND	---
Phenanthrene	85-01-8	X	ND	ND	ND	ND	---
Phenol	108-95-2	X	4.38E-02	ND	ND	ND	---
Propanal	123-38-6	X	---	---	---	---	---
Pyrene	129-00-0	X	ND	ND	ND	ND	---
Styrene	100-42-5	X	4.49E-02	ND	ND	6.94E-04	---
1,1,2,2-Tetrachloroethane	79-34-5	X	ND	ND	ND	ND	---
Tetrachloroethene	127-18-4	X	5.39E-03	ND	ND	6.09E-04	---
m-Tolualdehyde	620-23-5		ND	ND	ND	ND	---
o-Tolualdehyde	529-20-4		ND	ND	ND	ND	---
Toluene	108-88-3	X	1.28E-01	AA	AA	AA	---
1,2,4-Trichlorobenzene	120-82-1	X	ND	ND	ND	ND	---
1,1,1-Trichloroethane	71-55-6	X	ND	ND	3.15E-04	ND	---
1,1,2-Trichloroethane	79-00-5	X	ND	ND	ND	ND	---
Trichloroethene	79-01-6	X	ND	ND	6.62E-04	ND	---
Trichlorofluoromethane	75-69-4		5.63E-03	8.94E-04	7.90E-04	8.18E-04	---
2,4,5-Trichlorophenol	95-95-4	X	ND	ND	ND	ND	---
2,4,6-Trichlorophenol	88-06-2	X	ND	ND	ND	ND	---
Vinyl Acetate	108-05-4	X	ND	ND	ND	ND	---
Vinyl Chloride	75-01-4	X	ND	ND	ND	ND	---
m,p-Xylene	1330-20-7	X	3.81E-02	AA	1.90E-03	AA	---
o-Xylene	95-47-6	X	2.00E-02	9.26E-04	6.83E-04	AA	---

1. Data obtained from *Aircraft Engine and APU Emissions Testing Volumes I-III March 1999*, IERA-RS-BR-TR-1999-0006
2. Emission Factors derived using the test results provided in the reference above.

"---" 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. Criteria Pollutant and Ozone Precursor Emission Factors for APUs[1]

APU Model	Manufacturer	Fuel Flow Rate (lb/hr)	Emission Factors in lb/hr of Operation						
			NO_X	CO	VOC	SO_X[2]	PM_{10}	$PM_{2.5}$	GHG[3]
GTC 85-72 (200 hp)[4]	Honeywell Inc.	210.00	0.81	3.11	0.03	0.22	---	---	674.40
GTCP 30-300	Honeywell Inc.	282.20	2.85	---	0.06	0.30	---	---	---
GTCP 36-6	Honeywell Inc.	150.00	0.87	1.41	0.06	---	---	---	---
GTCP 36-300 (80 hp)	Honeywell Inc.	282.20	2.85	0.58[(6)]	0.06	0.30	---	---	---
GTCP 85 (200 hp)	Honeywell Inc.	235.28	1.12	---	0.24	0.25	---	---	---
GTCP 85-98ck (200 hp)	Honeywell Inc.	235.28	1.12	4.23[(6)]	0.24	0.25	---	---	---
GTCP 85-98d	Honeywell Inc.	297.00	1.78	1.64	0.04	---	---	---	---
GTCP 85-129 (200 hp)	Honeywell Inc.	235.28	1.12	4.23[(6)]	0.24	0.25	---	---	---
GTCP 85-129ck (200 hp)	Honeywell Inc.	235.28	1.12	4.23[(6)]	0.24	0.25	---	---	---
GTCP 85-180[7]	Honeywell Inc.	270.30	1.28	2.05	0.01	0.29	0.05	0.01	906.27
GTCP 95-2 (300 hp)[4]	Honeywell Inc.	293.00	1.65	0.94	0.11	0.31	---	---	947.83
GTCP 100-544 (400 hp)[4]	Honeywell Inc.	413.00	2.46	2.43	0.07	0.44	---	---	1336.86
GTCP 165-1[7]	Honeywell Inc.	272.60	1.22	3.76	0.49	0.29	0.13	0.04	910.77
GTCP 331-200/250 (143 hp)	Honeywell Inc.	267.92	2.55	---	0.12	0.28	---	---	---
GTCP 331-200ER (143 hp)	Honeywell Inc.	267.92	2.55	1.11[(6)]	0.12	0.28	---	---	---
GTCP 331-500 (143 hp)	Honeywell Inc.	536.00	7.86	0.05[(6)]	0.07	0.57	---	---	---
GTCP 660-4 (300 hp)	Honeywell Inc.	862.92	4.60	7.46[(6)]	0.24	0.91	---	---	---
PW901A	Pratt & Whitney	862.92	2.72	14.48[(6)]	1.29	0.91	---	---	---
ST-6[8]	United Technologies Corporation	440.00	3.92	0.02	0.01	0.47	---	---	---
T-62T-27 (100 hp)[4]	United Technologies Corporation	102.00	0.40	4.36	0.79	0.11	---	---	341.12
T-62T-47C1[6]	United Technologies Corporation	235.28	1.01	9.46	0.04	0.25	---	---	---
TSCP 700 (142 hp)	Honeywell Inc.	323.68	2.77	---	0.08	0.34	---	---	---
TSCP 700-4B (142 hp)	Honeywell Inc.	323.68	2.77	0.48[(6)]	0.08	0.34	---	---	---
WR27-1[4]	Williams International	140.00	0.65	0.79	0.03	0.15	---	---	444.09

1. 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
2. SO_X Emission factors assume that JP-8, with an average wt. % of 0.053 Sulfur, is used to power the APU.
3. SOURCE: Summary Tables of Gaseous and Particulate Emissions from Aircraft Engines (Aircraft Environmental Support Office, AESO Report No. 6-90, San Diego, California, June 1990).
4. SOURCE: Air Pollutant Emission Factors for Military and Civil Aircraft.
5. 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)
6. SOURCE: Aircraft Engine and Auxiliary Power Unit Emissions Testing Volume I -III, March 1999
7. 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

Figure 2-1. Example Data Collection Form for On-Wing Engine Testing

Installation Name: **Inventory Year (CY):**
Responsible Organization (Name & Office Symbol):
POC (Name & Phone #):

Building Number or Location	Type of Test Facility *	Type of Aircraft & Engine Tested	Number of Engines Tested During the Year (test/yr)	Average Run Time per Test at Each Power Setting (min/test)	Total Run Time per Test at Each Power Setting [if known] (min/yr)	Average Fuel Flow Rate at Each Power Setting (lb/hr)	Total Fuel Burned During the year [if known] (lb/yr)	Total Synthetic Fuel Used (gal)
		Aircraft: Engine:		Idle: Approach: Intermediate: Military: Afterburner:	Idle: Approach: Intermediate: Military: Afterburner:	Idle: Approach: Intermediate: Military: Afterburner:		
		Aircraft: Engine:		Idle: Approach: Intermediate: Military: Afterburner:	Idle: Approach: Intermediate: Military: Afterburner:	Idle: Approach: Intermediate: Military: Afterburner:		
		Aircraft: Engine:		Idle: Approach: Intermediate: Military: Afterburner:	Idle: Approach: Intermediate: Military: Afterburner:	Idle: Approach: Intermediate: Military: Afterburner:		
		Aircraft: Engine:		Idle: Approach: Intermediate: Military: Afterburner:	Idle: Approach: Intermediate: Military: Afterburner:	Idle: Approach: Intermediate: Military: Afterburner:		

*eg Hush House, Trim Pad, etc.

Figure 2-2. Example Data Collection Form for Aircraft Movements

Installation Name: **Inventory Year (CY):**

Responsible Organization (Name & Office Symbol):

POC (Name & Phone #):

Aircraft Type	Aircraft Number	Date	Number of Landing and Takeoff Cycles (LTO)	Number of Touch and Go Cycles (TGO)	Number of Low Fly By Cycles (LFB)	Number of Low Altitude Flight Patterns (within base air space)	Number of Low Altitude Flight Patterns (outside base Air Space)*

***** Information on Low Altitude Fly Patterns outside Base air space is only required if specifically requested.

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3.0 FLIGHTLINE GROUND SUPPORT EQUIPMENT

3.1 Introduction

While the majority of emissions result from Aircraft operations, most Air Force 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 or not 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 as other non-road engines and equipment are addressed separately in this document. Emissions of concern from the operation of GSE include the criteria pollutants VOC, CO, NO_X, PM (both PM_{10} and $PM_{2.5}$); SO_2 (often times conservatively estimated as SO_X); and several HAPs that are commonly associated with fuel combustion processes (benzene, 1, 3-butadiene, acetaldehyde, naphthalene, etc.).

3.2 Fuel

Most of the GSE operated on an Air Force installation are powered by internal combustion engines fueled by JP-8. Some equipment, however, may be powered by diesel fuel, motor gasoline (MOGAS), compressed natural gas (CNG), or liquefied petroleum gas (LPG). The manner in which fuel ignition occurs in the engine determines whether AGE are categorized as compression ignition (CI) or spark ignition (SI) in nature. CI AGE include turbine engines fueled with JP-8, and non-turbine engines fueled with diesel. SI AGE may be fueled with MOGAS, CNG, or LPG. The next section, Nonroad Engines and Equipment, provides additional detail on the operating principles of CI and SI engines.

3.3 Pollutant Modeling

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 emission factor data are provided in Tables 3-3 and 3-4. This information was obtained from a survey developed and distributed by AFIOH/RSEQ to various flight squadrons and AGE shops throughout the Air Force (Flightline Emission Factors - Aircraft/Auxiliary Power Units/Aerospace Ground Support Equipment, 2004). These aircraft-GSE combinations are provided as a guideline and should be used only in the absence of available base-specific data. In instances where military GSE information was unavailable, data was obtained from the Federal Aviation Administration's (FAA) Emissions and Dispersion Modeling System (EDMS). Common, non-model specific GSE data from EDMS are provided in Tables 3-5 and 3-6.

3.4 Mobile versus Stationary Sources

While most Air Force GSE is intended to be mobile by design, there may be instances where the normal use of the equipment results in it not being moved around an installation at least once in a 12-month period. In such instances, the GSE is generally considered stationary in nature by regulators, a determination that has implications from an air permitting perspective. 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 MAJCOM for assistance, and also consider consulting with the Air Force Regional Environmental Offices (REOs) to obtain their insight on state-specific requirements as they may apply to GSE.

3.5 Emission Calculations

This section discusses alternative methodologies that are available for calculating exhaust emissions from GSE. Information commonly collected and used to calculate emissions from GSE operation typically include the type and model of the equipment, the operating time, type and volume of fuel consumed, and engine operating load and rated power. A sample data collection form for GSE is provided in Figure 3-1.

3.5.1 Sortie/LTO Method

The Sortie/LTO Method is the Air Force's default method and should be used for all GSE that are included in Tables 3-3 and 3-4. This method involves applying an emission factor to the operating time of each individual piece of GSE during a set period of time (e.g., an aircraft sortie or LTO cycle, annually, or other inventory period). The following general equation is used when emission factors are available in a lb/hr basis:

$$\boldsymbol{EP(Pol)_{GSE} = OT \times EF(Pol) \times N} \qquad \textbf{Equation 3-1}$$

Where,

$\boldsymbol{EP(Pol)_{GSE}}$	=	Emissions of each individual pollutant for each piece of GSE (lb/yr)
$\boldsymbol{EF(Pol)}$	=	Emission factor of each pollutant (lb/hr)
$\boldsymbol{OT}$	=	Operating time of GSE per sortie (hr/sortie)
$\boldsymbol{N}$	=	Number of sorties per year (sortie/yr)

The emission factors 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 3-3.
- Emission factors for each GSE are found in Table 3-4.

3.5.2 Horsepower/Load Factor Method

The horsepower/load factor is an alternate method for emissions calculations method based on the horsepower (hp) of the engine and, as such, requires that the emission factors are provided in a mass/hp-hr format. This method requires data such as engine horsepower rating and load factors that are representative of GSE equipment and operations and also requires that the user know the operating time for each GSE. Emissions from common, non-model specific GSE may be calculated using the data provided in Tables 3-5 through 3-7. The following general equation is used:

$$EP(Pol)_{GSE} = EF(Pol) \times OT \times \frac{LF}{100} \times hp \times \frac{1}{1000} \times N \qquad \textbf{Equation 3-2}$$

Where,

$EP(Pol)_{GSE}$	=	Emissions of each individual pollutant (lb/yr)
$EF(Pol)$	=	Emission factor of each pollutant (lb/1000hp-hr)
OT	=	Operating time (hr/unit)
LF	=	Load factor (proportion of rated power)
100	=	Factor for converting percent to a fraction
hp	=	Average rated horsepower of engine for specific site conditions (hp)
1000	=	Factor converting from hp to 1000hp
N	=	Number of ground support equipment used each year (units/yr)

If the average rated horsepower of the engine is unknown, it can be estimated by multiplying the maximum rated horsepower of the engine by a load factor. The following equation is used:

$$hp = hp_{max} \times \frac{LF}{100} \qquad \textbf{Equation 3-3}$$

Where,

hp_{max}	=	Maximum rated horsepower of the engine (hp)
LF	=	Typical load factor (%)
100	=	Factor for converting percent to a fraction

The emission factors 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 3-5.
- Table 3-6 provides the average horsepower for each GSE.
- Emission factors for common GSE are provided in a lb/1000hp-hr basis in Table 3-7.
- Table 3-9 provides the EPA emission factors for criteria pollutants and several HAPs for uncontrolled diesel reciprocating internal combustion engines.

3.5.3 Fuel Consumption Method

Another method that can be used to calculate GSE emissions involves multiplying the volume of fuel consumed by an emission factor that is provided in terms of a mass of pollutant emitted per volume of fuel consumed such as lb/hr or g/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. If the emission factors provided are in units of lb/1000gal:

$$EP(Pol)_{GSE} = FC \times \frac{1}{1000} \times EF(Pol) \times N \qquad \textbf{Equation 3-4}$$

Where,

$EP(Pol)_{GSE}$	=	Emissions of each individual pollutant (lb/yr)
FC	=	Fuel consumption (gal_{fuel}/unit)
1000	=	Factor converting gal_{fuel} into 1000 gal_{fuel}
$EF(Pol)$	=	Emission factor of each pollutant (lb/1000gal_{fuel})
N	=	Number of ground support equipment used each year (units/yr)

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

$$FC = OT \times FFR \qquad \textbf{Equation 3-5}$$

Where,

FC	=	Fuel Consumption (gal/unit)
OT	=	Operating time (hr/unit)
FFR	=	Fuel flow rate (gal/hr)

Fuel consumption may also be estimated using engine and operating parameters which include horsepower (if known), load factor, hours of operation, Btu/hp-hr conversion factor, and the heating value of the fuel. The following equation is used:

$$FC = \frac{(hp \times OT \times hp_{Btu})}{HV} \qquad \textbf{Equation 3-6}$$

Where,

FC	=	Fuel consumption (gal_{fuel}/unit)
hp	=	Typical horsepower load rating which the engine operates at (hp)
OT	=	Operating time (hr/unit)
hp_{Btu}	=	7,000 Btu per horsepower-hour (Btu/hp-hr) (Compilation of Air Pollutant Emission Factors - Volume I: Stationary Point and Area Sources, 1996)
HV	=	Heating value of the fuel (Btu/gal_{fuel})

Table 3-1 provides heating values for several types of fuel that may power GSE operated at Air Force installations.

Table 3-1. Typical Heating Values for GSE Fuels[1]

Fuel Type	Heating Value (Btu/unit fuel)
Diesel	138,700 Btu/gal
MOGAS	125,000 Btu/gal
JP-8[(2)]	124,000 Btu/gal
LPG	91,300 Btu/gal
CNG	1,031 Btu/ft^3

1. SOURCE (Unless otherwise noted): *Household Vehicles Energy Use: Latest Data & Trends,* Appendix C, Table C4, December 2005.
2. SOURCE: Defense Logistics Agency, Defense Energy Support Center, *Petroleum Quality Information System Fuels Data (2005),* April 2006.

For calculating GSE emissions using the fuel consumption method, the following tables may be used:

- Table 3-4 provides the fuel flow rate for each GSE.
- Table 3-6 provides typical hp for common GSE
- Table 3-8 provides the uncontrolled HAP emission factors for select military GSE.
- Table 3-9 provides the EPA's emission factors for uncontrolled diesel reciprocating internal combustion engines.

3.5.4 Heating Value/Horsepower Method

In instances where fuel consumption data and emission factors are available, the fuel consumption data may be used in conjunction with the heating value of the fuel to develop approximate hp-hr values. These values can in turn be multiplied by emission factors provided in a mass/hp-hr format to generate emissions estimates. Under such a scenario, the following equation is used:

$$EP(Pol)_{GSE} = \frac{(FC \times HV)}{(hp_{Btu} \times 1000)} \times EF(Pol) \times N \qquad \textbf{Equation 3-7}$$

Where,

$EP(Pol)_{GSE}$	=	Emissions of each individual pollutant for each piece of GSE (lb/yr)
1000	=	Conversion factor to convert hp-hr to 1000hp-hr
FC	=	Fuel consumption (gal_{fuel}/unit)
HV	=	Heating value of the fuel (Btu/gal_{fuel})
hp_{Btu}	=	7000 Btu per horsepower-hour (Btu/hp-hr) (Compilation of Air Pollutant Emission Factors - Volume I: Stationary Point and Area Sources, 1996)
$EF(Pol)$	=	Emission factor of each pollutant in lbs per horsepower hour (lb/1000hp-hr)
N	=	Number of ground support equipment used each year (unit/yr)

3.5.5 Calculating SO_2 Emissions

An alternative method for estimating SO_2 emissions involves applying fuel consumption data to derive an SO_2 emission factor based on pounds of pollutant emitted per hour of operation (lb/hr), and the conservative assumption that all the sulfur in the fuel is converted to SO_2 during the combustion process. Under this assumption, and with the density and sulfur content values known, an SO_2 emission factor is calculated using the following equation:

$$EF_{(SO_2)} = FFR \frac{gal_{fuel}}{hr} \times Density \frac{lb\ fuel}{gal\ fuel} \times \left(S \frac{lb\ S}{lb\ fuel} \div 100\%\right) \times 2 \frac{SO_2}{S} \qquad \textbf{Equation 3-8}$$

Where,

$EF_{(SO2)}$	=	SO_2 emission factor (lb/hr)
FFR	=	Fuel Flow rate (gal_{fuel}/hr)
$Density$	=	Density of fuel (lb_{fuel}/gal_{fuel})
S	=	weight percent sulfur content of fuel
100	=	conversion for weight percent to weight fraction
2	=	Conversion factor which is the ratio of the molecular weight of SO_2 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 3-2. The sulfur content of JP-8 varies by region, so if the region specific sulfur content is required, then refer back to Table 2-2 of this document.

Table 3-2. Average Fuel Density and Weight Percent Sulfur in Nonroad Fuels[1]

Fuel Type	Density (lb/gal)	Sulfur Content (wt. %)
Diesel	7.14	0.025
MOGAS	6.15	0.020
JP-8	6.67[(2)]	0.053[(2)]
LPG	4.41	Negligible
CNG	0.046	0.001

1. 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
2. SOURCE: Defense logistics Agency, Defense Energy Support Center, *Petroleum Quality Information System Fuels Data (2005)*, April 2006.

3.5.6 Calculating Emissions from Synthetic Aviation Fuel

On-going DOD and Air Force 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_2 emissions by approximately 2% (Air Force Alternative Fuels Program, 2007). Accordingly, when collecting information on GSE operations verify whether synthetic fuel was used and the blend percentage. If a 50-50 blend was used, then follow the appropriate emission calculation procedures outlined in previous subsections and apply emission reduction factors of 35%, 50%, and 2%, respectively, for PM, SO_2, and CO_2.

3.6 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 and EDMS information can be used. In some cases, it may be necessary to contact the GSE manufacturer to obtain necessary information. An example of a data collection form which can be used to collect data on GSE is provided in Figure 3-1.

3.7 Example Calculations

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

3.7.1 Problem 1 - Sortie/LTO Method

Anytown AFB needs to calculate annual NO_X and xylene emissions from GSE operations associated with their B-1B aircraft. The following information was obtained from the base:

Equipment Type – Diesel powered forklift	
GSE Types	A/M32A-86D Generator, A/M 32A-95 Start Cart, B-1B AC unit, MJ-40 Bomb lift, NF-2 Floodlight Set
Sorties/year	200

Step 1 – Record the operating times and NO_X emission factors for each GSE. Since the table above does not provide specific operating times for these GSE, then the typical operating times for these GSE may be used. Table 3-3 lists the operating times for the generator as 2.20hr, the start cart as 0.50hr, the AC unit as 2.40hr, the bomb lift as 2.50hr, and the light cart as 0.50hr. Table 3-4 has the NO_X emission factors as 6.102lb/hr for the generator, 1.470lb/hr for the start cart, 7.659lb/hr for the AC unit, 0.340lb/hr for the bomb lift, and 0.110lb/hr for the light cart.

Step 2 – With the information in the table above and the data collected in step 1, calculate annual NO_X emissions for each GSE using Equation 3-1:

$$EP(Pol)_{GSE} = OT \times EF(Pol) \times N$$

$$EP(NO_X)_{A/M32A-86D} = 2.20\left(\frac{\cancel{hr}}{\cancel{sortie}}\right) \times 6.102\left(\frac{lb}{\cancel{hr}}\right) \times 200\left(\frac{\cancel{sortie}}{yr}\right) = \mathbf{2684.88}\,\frac{\boldsymbol{lb}}{\boldsymbol{yr}}$$

$$EP(NO_X)_{A/M32A-95} = 0.50\left(\frac{\cancel{hr}}{\cancel{sortie}}\right) \times 1.470\left(\frac{lb}{\cancel{hr}}\right) \times 200\left(\frac{\cancel{sortie}}{yr}\right) = \mathbf{147.00}\,\frac{\boldsymbol{lb}}{\boldsymbol{yr}}$$

$$EP(NO_X)_{B-1B\ AC\ Unit} = 2.40\left(\frac{\cancel{hr}}{\cancel{sortie}}\right) \times 7.659\left(\frac{lb}{\cancel{hr}}\right) \times 200\left(\frac{\cancel{sortie}}{yr}\right) = \mathbf{3676.32}\,\frac{\boldsymbol{lb}}{\boldsymbol{yr}}$$

$$EP(NO_X)_{MJ-40} = 2.50\left(\frac{\cancel{hr}}{\cancel{sortie}}\right) \times 0.340\left(\frac{lb}{\cancel{hr}}\right) \times 200\left(\frac{\cancel{sortie}}{yr}\right) = \mathbf{170.00}\,\frac{\boldsymbol{lb}}{\boldsymbol{yr}}$$

$$EP(NO_X)_{NF-2} = 0.50\left(\frac{\cancel{hr}}{\cancel{sortie}}\right) \times 0.110\left(\frac{lb}{\cancel{hr}}\right) \times 200\left(\frac{\cancel{sortie}}{yr}\right) = \mathbf{11.00}\,\frac{\boldsymbol{lb}}{\boldsymbol{yr}}$$

Step 3 – Sum the emissions from each GSE to get the total NO_X emissions for GSE the B-1B:

$$EP(NO_X)_{GSE(Total)} = (2684.88 + 147 + 3676.32 + 170 + 11)\,\frac{lb}{yr}$$

$$\boxed{\boldsymbol{EP(NO_X)_{GSE(Total)} = 6689.2\,\frac{lb}{yr}}}$$

Next, calculate xylene emissions.

Step 4 – Record the fuel flow rate for each GSE. Table 3-4 shows that the fuel flow rate is 6.47gal/hr for the generator and 17.14gal/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 6.47gal/hr for the A/M32A-86D, 6.29gal/hr for the elevator loader, and 0.62gal/hr for the generator light cart.

Step 5 – Calculate the fuel consumption for each GSE using the operating times and fuel flow rates recorded in steps 1 and 4 above respectively using equation 3-5:

$$FC = OT \times FFR$$

$$FC_{A/M32A-86D} = 2.20\left(\frac{\cancel{hr}}{unit}\right) \times 6.47\left(\frac{gal_{fuel}}{\cancel{hr}}\right) = \mathbf{14.23}\,\frac{\boldsymbol{gal_{fuel}}}{\boldsymbol{unit}}$$

$$FC_{A/M32A-95} = 0.50\left(\frac{\cancel{hr}}{unit}\right) \times 6.47\left(\frac{gal_{fuel}}{\cancel{hr}}\right) = \mathbf{3.24}\,\frac{\boldsymbol{gal_{fuel}}}{\boldsymbol{unit}}$$

$$FC_{B-1B\ AC\ Unit} = 2.40\left(\frac{\cancel{hr}}{unit}\right) \times 17.14\left(\frac{gal_{fuel}}{\cancel{hr}}\right) = \mathbf{41.14}\,\frac{\boldsymbol{gal_{fuel}}}{\boldsymbol{unit}}$$

$$FC_{MJ-40} = 2.50\left(\frac{\cancel{hr}}{unit}\right) \times 6.29\left(\frac{gal_{fuel}}{\cancel{hr}}\right) = \mathbf{15.73}\,\frac{\boldsymbol{gal_{fuel}}}{\boldsymbol{unit}}$$

$$FC_{A/M32A-95} = 0.50\left(\frac{\cancel{hr}}{unit}\right) \times 0.62\left(\frac{gal_{fuel}}{\cancel{hr}}\right) = \mathbf{0.31}\,\frac{\boldsymbol{gal_{fuel}}}{\boldsymbol{unit}}$$

Step 6 – Sum the fuel flow from each GSE to get the total fuel flow for GSE:

$$FC_{GSE(Total)} = (14.23 + 3.24 + 41.14 + 15.73 + 0.31)\frac{gal_{fuel}}{unit} = \mathbf{74.65}\,\frac{\boldsymbol{gal_{fuel}}}{\boldsymbol{unit}}$$

Step 7 – Record the Xylene Emission Factor. Table 3-9 lists the total xylenes emission factor as 0.039lb/1000gal$_{fuel}$.

Step 8 – With the estimated fuel consumption in Step 6 and the emission factor data from Step 7, use Equation 3-4 to calculate xylene emissions:

$$EP(Pol)_{GSE} = FC \times \frac{1}{1000} \times EF(Pol) \times N$$

$$EP(Xylenes)_{GSE} = 74.64\left(\frac{\cancel{gal_{fuel}}}{\cancel{unit}}\right) \times \frac{1}{1000}\left(\frac{\cancel{1000gal_{fuel}}}{\cancel{gal_{fuel}}}\right) \times 0.039\left(\frac{lb}{\cancel{1000gal_{fuel}}}\right) \times 200\left(\frac{\cancel{unit}}{yr}\right)$$

$$\boxed{\boldsymbol{EP(Xylenes)_{GSE} = 0.582\,\frac{lb}{yr}}}$$

3.7.2 Problem 2 - Horsepower/Load Factor Method

Anytown AFB periodically operates two diesel-powered baggage tractors used to transport the luggage of visiting dignitaries. The following information was 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 – Since the data provided does not include a specific GSE model that is given in Table 3-4, then record the average rated power, average operating load, and operating time for diesel-

powered baggage tractors from Table 3-6. The average rate power is given as 83hp, the operating load is shown as 55%, and the operating time is 1.20hr**.**

Step 2 – Next, record the emission factors for this GSE for CO and 1,3-Butadiene. Table 3-7 gives the emission factor for CO for diesel baggage tractors as 11.00lb/1000hp-hr. Table 3-9 lists the emission factor for 1,3-butadiene as 0.000274lb/1000hp-hr.

Step 3 – Use the data collected in steps 1 and 2 and Equation 3-2 to calculate the CO and 1,3-Butadiene emissions:

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

$$EP(CO)_{GSE} = 11.00\left(\frac{lb}{1000\cancel{hp} - \cancel{hr}}\right) \times 15\left(\frac{\cancel{hr}}{\cancel{unit}}\right) \times \frac{55}{100} \times 83(\cancel{hp}) \times \frac{1}{1000}\left(\frac{1000\cancel{hp}}{\cancel{hp}}\right) \times 2\left(\frac{\cancel{unit}}{yr}\right)$$

$$\boxed{\boldsymbol{EP(CO)_{GSE} = 15.06\frac{lb}{yr}}}$$

$$EP(1{,}3 - Butadiene)_{GSE} = 0.000274\left(\frac{\cancel{lb}}{1000\cancel{hp} - \cancel{hr}}\right) \times 15\left(\frac{\cancel{hr}}{yr}\right) \times \frac{55}{100} \times 83(\cancel{hp}) \times \frac{1}{1000}\left(\frac{1000\cancel{hp}}{\cancel{hp}}\right) \times 2$$

$$\boxed{\boldsymbol{EP(1,3 - Butadiene)_{GSE} = 3.75E - 04\frac{lb}{yr}}}$$

3.7.3 Problem 3 - Fuel Consumption Method

Anytown AFB operates air start units that consumed a total of 175,000 gallons of JP-8 fuel over the course of a year. 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

Estimate toluene emissions from this GSE.

Step 1 – Record the toluene emission factor. Table 3-8 provides HAP speciation for some HAPs from a few GSE. This table lists the toluene emission factor from the A/M32A-95 GSE as 0.00436lb/1000gal$_{fuel}$.

Step 2 – Use Equation 3-4 and the data from Step 1 and the table above to calculate toluene emissions:

$$EP(Pol)_{GSE} = FC \times \frac{1}{1000} \times EF(Pol) \times N$$

$$EP(Toluene)_{A/M32A-95} = 5000\left(\frac{\cancel{gal_{fuel}}}{\cancel{unit}}\right) \times \frac{1}{1000}\left(\frac{1000\cancel{gal_{fuel}}}{\cancel{gal_{fuel}}}\right) \times 0.00436\left(\frac{lb}{1000\cancel{gal_{fuel}}}\right) \times 35\left(\frac{\cancel{unit}}{yr}\right)$$

$$\boxed{EP(Toluene)_{A/M32A-95} = 0.763\frac{lb}{yr}}$$

3.7.4 Problem 4 - Heating Value/Horsepower Conversion Method

Anytown AFB operates 5 refueling vehicles that consumed 7,500 gallons of diesel during a calendar year.

GSE Type – Fuel Truck	
# of GSE	5
Fuel Consumption	1,500 gal/unit

Calculate the VOC emissions from the operation of these refueling vehicles.

Step 1 –Record the diesel fuel heating value and the VOC emission factor for diesel fuel trucks. According to Table 3-1, the heating value of diesel fuel is 138,700Btu/gal and Table 3-7 lists the VOC emission factor as 1.00lb/1000hp-hr.

$$EP(Pol)_{GSE} = \frac{(FC \times HV)}{(hp_{Btu} \times 1000)} \times EF(Pol) \times N$$

$$EP(VOC)_{GSE} = \frac{\left(1500\left(\frac{\cancel{gal_{fuel}}}{\cancel{unit}}\right) \times 138{,}700\left(\frac{\cancel{Btu}}{\cancel{gal_{fuel}}}\right)\right)}{\left(7000 \times 1000\left(\frac{\cancel{Btu}}{\cancel{1000hp} - \cancel{hr}}\right)\right)} \times 1.00\left(\frac{lb}{\cancel{1000hp} - \cancel{hr}}\right) \times 5\left(\frac{\cancel{units}}{yr}\right)$$

$$\boxed{EP(VOC)_{GSE} = 148.61\frac{lb}{yr}}$$

3.7.5 Problem 5 - Estimating SO_2 Emissions

Anytown AFB has been asked to estimate SO_2 emissions from the operation of its GSE. The following information was obtained from the base:

Equipment Data – GSE	
# of GSE	120
Fuel	JP-8
Fuel Flow Rate	1,000 gal/hr
Operating time	2 hours

Calculate SO_2 emissions for Anytown AFB which is located in the East Central United States.

Step 1 – Record the density and sulfur content of JP-8. Table 3-2 lists the density of JP-8 as 6.67lb/gal. Though Table 3-2 also provides the sulfur content, since it is known that the AFB is located in the East Central portion of the United States, then a more accurate value is given in Table 2-3 which shows the sulfur content of JP-8 as 0.08%.

<u>Step 2</u> - Calculate the SO_2 emission factor using Equation 3-8:

$$EF_{SO_2} = FFR \times Density \times (S \div 100) \times 2$$

$$EF_{SO_2} = 1{,}000\left(\frac{\cancel{gal}}{hr}\right) \times 6.67\left(\frac{lb}{\cancel{gal}}\right) \times (0.08 \div 100) \times 2 = \mathbf{10.67}\,\frac{\boldsymbol{lb}}{\boldsymbol{hr}}$$

<u>Step 3</u> – Calculate SO_2 emissions using the emission factor calculated in Step 2 and Equation 3-1:

$$EF_{SO_2} = OT \times EF \times N$$

$$EF_{SO_2} = 2\left(\frac{\cancel{hr}}{\cancel{unit}}\right) \times 10.67\left(\frac{lb}{\cancel{hr}}\right) \times 120\left(\frac{\cancel{units}}{yr}\right)$$

$$\boxed{\boldsymbol{EF_{SO_2} = 2560.8\,\frac{lb}{yr}}}$$

Table 3-3. Military Aircraft and GSE Assignments[1]

Aircraft	GSE Type	GSE Model	Operating Time Per Sortie/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	H1	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)**	2.00
	Bomb Lift	MJ-1B[4]	1.00 - 8.00
A-37	**See Generic 2**		
AC-130A, -130H, -130U, -130W	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
		A/M32A-95	0.25
	Air Conditioner	Ace 802-993 **(S)**	1.00
		MA-3D	1.00
	Heater	H1	1.00
	Hydraulic Test Stand	MJ-2A[4]	3.00
	Light Cart	NF-2	2.00 - 10.00
	Air Compressor	MC-1A	0.50 - 1.00
		MC-2A **(S)**	0.50 - 1.00
AH-1G, -1J	**See Generic 4**		
AH-64A	**See Generic 4**		
AT-38B	Generator Set	A/M32A-86D	0.25
	Hydraulic Test Stand	MK1 **(S)**	0.75
		MK3A **(S)**	0.75
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

Table 3-3. Military Aircraft and GSE Assignments[1] (continued)

Aircraft	GSE Type	GSE Model	Operating Time Per Sortie/LTO (hr)
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 1**		
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
		BT400-46	10.00
	Hydraulic Test Stand	MJ-1-1[4]	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[4]	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[4]	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**		

Table 3-3. Military Aircraft and GSE Assignments[1] (continued)

Aircraft	GSE Type	GSE Model	Operating Time Per Sortie/LTO (hr)
C-22A, -22B	Generator Set	A/M32A-86D	1.50
	Start Cart	A/M32A-60A[4]	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**		
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
		A/M32A-95	0.25
	Air Conditioner	Ace 802-993 **(S)**	1.00
		MA-3D	1.00
	Heater	H1	1.00
	Hydraulic Test Stand	MJ-2A[4]	3.00
	Light Cart	NF-2	2.00 - 10.00
	Air Compressor	MC-1A	0.50 - 1.00
		MC-2A **(S)**	0.50 - 1.00
C-135A, -135B, -135C, -135E	Generator Set	A/M32A-86D	10.00
	Start Cart	A/M32A-60A	1.00
		A/M32A-95	0.10
	Air Conditioner	Ace 802-993 **(S)**	10.00
		MA-3C **(S)**	2.00
	Heater	H1	5.00
		1H1	4.00
	Light Cart	NF-2	2.00
	Air Compressor	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**		

Table 3-3. Military Aircraft and GSE Assignments[1] (continued)

Aircraft	GSE Type	GSE Model	Operating Time Per Sortie/LTO (hr)
CT-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
CT-49A	**See Generic 1**		
CV-22, -22A	**See Generic 1**		
DC-130A	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
		A/M32A-95	0.25
	Air Conditioner	Ace 802-993 **(S)**	1.00
		MA-3D	1.00
	Heater	H1	1.00
	Hydraulic Test Stand	MJ-2A[(4)]	3.00
	Light Cart	NF-2	2.00 - 10.00
	Air Compressor	MC-1A	0.50 - 1.00
		MC-2A **(S)**	0.50 - 1.00
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**		
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	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
		A/M32A-95	0.25
	Air Conditioner	Ace 802-993 **(S)**	1.00
		MA-3D	1.00
	Heater	H1	1.00
	Hydraulic Test Stand	MJ-2A[(4)]	3.00
	Light Cart	NF-2	2.00 - 10.00
	Air Compressor	MC-1A	0.50 - 1.00
		MC-2A **(S)**	0.50 - 1.00
EC-135A, -135B, -135C, -135E, -135G, -135H, -135J, -135K, -135L, -135N, -135P, -135Y	Generator Set	A/M32A-86D	10.00
	Start Cart	A/M32A-60A	1.00
		A/M32A-95	0.10
	Air Conditioner	Ace 802-993 **(S)**	10.00
		MA-3C **(S)**	2.00
	Heater	H1	5.00
		1H1	4.00
	Light Cart	NF-2	2.00
	Air Compressor	MC-1A	0.33
EC-137D	**See Generic 1**		
EF-4J	**See Generic 2**		

Table 3-3. Military Aircraft and GSE Assignments[1] (continued)

Aircraft	GSE Type	GSE Model	Operating Time Per Sortie/LTO (hr)
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	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	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**		
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[4]	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[3]
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**		

Table 3-3. Military Aircraft and GSE Assignments[1] (continued)

Aircraft	GSE Type	GSE Model	Operating Time Per Sortie/LTO (hr)
HC-130H, -130J, -130N, -130P	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
		A/M32A-95	0.25
	Air Conditioner	Ace 802-993 **(S)**	1.00
		MA-3D	1.00
	Heater	H1	1.00
	Hydraulic Test Stand	MJ-2A[4]	3.00
	Light Cart	NF-2	2.00 - 10.00
	Air Compressor	MC-1A	0.50 - 1.00
		MC-2A **(S)**	0.50 - 1.00
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	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
		A/M32A-95	0.25
	Air Conditioner	Ace 802-993 **(S)**	1.00
		MA-3D	1.00
	Heater	H1	1.00
	Hydraulic Test Stand	MJ-2A[4]	3.00
	Light Cart	NF-2	2.00 - 10.00
	Air Compressor	MC-1A	0.50 - 1.00
		MC-2A **(S)**	0.50 - 1.00

Table 3-3. Military Aircraft and GSE Assignments[1] (continued)

Aircraft	GSE Type	GSE Model	Operating Time Per Sortie/LTO (hr)
KC-135, -135A, -135D, -135E, -135Q, -135R, -135T	Generator Set	A/M32A-86D	10.00
	Start Cart	A/M32A-60A	1.00
		A/M32A-95	0.10
	Air Conditioner	Ace 802-993 **(S)**	10.00
		MA-3C **(S)**	2.00
	Heater	H1	5.00
		1H1	4.00
	Light Cart	NF-2	2.00
	Air Compressor	MC-1A	0.33
KC-767A	**See Generic 1**		
LC-130F, -130H, -130R	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
		A/M32A-95	0.25
	Air Conditioner	Ace 802-993 **(S)**	1.00
		MA-3D	1.00
	Heater	H1	1.00
	Hydraulic Test Stand	MJ-2A[4]	3.00
	Light Cart	NF-2	2.00 - 10.00
	Air Compressor	MC-1A	0.50 - 1.00
		MC-2A **(S)**	0.50 - 1.00
MC-12W	Generator Set	A/M32A-86D	0.75
MC-130E, -130H, -130J, -130P, -130W	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
		A/M32A-95	0.25
	Air Conditioner	Ace 802-993 **(S)**	1.00
		MA-3D	1.00
	Heater	H1	1.00
	Hydraulic Test Stand	MJ-2A[4]	3.00
	Light Cart	NF-2	2.00 - 10.00
	Air Compressor	MC-1A	0.50 - 1.00
		MC-2A **(S)**	0.50 - 1.00
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**		
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	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
NC-12B	Generator Set	A/M32A-86D	0.75
NC-21A	**See Generic 1**		

Table 3-3. Military Aircraft and GSE Assignments[1] (continued)

Aircraft	GSE Type	GSE Model	Operating Time Per Sortie/LTO (hr)
NC-130A, -130B, -130E, -130H	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
		A/M32A-95	0.25
	Air Conditioner	Ace 802-993 **(S)**	1.00
		MA-3D	1.00
	Heater	H1	1.00
	Hydraulic Test Stand	MJ-2A[(4)]	3.00
	Light Cart	NF-2	2.00 - 10.00
	Air Compressor	MC-1A	0.50 - 1.00
		MC-2A **(S)**	0.50 - 1.00
NC-135A, -135W	Generator Set	A/M32A-86D	10.00
	Start Cart	A/M32A-60A	1.00
		A/M32A-95	0.10
	Air Conditioner	Ace 802-993 **(S)**	10.00
		MA-3C **(S)**	2.00
	Heater	H1	5.00
		1H1	4.00
	Light Cart	NF-2	2.00
	Air Compressor	MC-1A	0.33
NC-141A	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
NCH-46A	**See Generic 4**		
NF-4D	**See Generic 2**		
NF-16A, -16D	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	2.00
	Bomb Lift	MJ-1B	1.00
NF-106B	**See Generic 2**		
NF/A-18A, -18B, -18C	**See Generic 2**		
NKC-135A, -135E	Generator Set	A/M32A-86D	10.00
	Start Cart	A/M32A-60A	1.00
		A/M32A-95	0.10
	Air Conditioner	Ace 802-993 **(S)**	10.00
		MA-3C **(S)**	2.00
	Heater	H1	5.00
		1H1	4.00
	Light Cart	NF-2	2.00
	Air Compressor	MC-1A	0.33
NPC-3C, -3D	**See Generic 1**		
NRA-3B	**See Generic 2**		

Table 3-3. Military Aircraft and GSE Assignments[1] (continued)

Aircraft	GSE Type	GSE Model	Operating Time Per Sortie/LTO (hr)
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	Generator Set	A/M32A-86D	1.00
	Start Cart	A/M32A-60A	1.00
		A/M32A-95	1.00
	Heater	H1	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)**	2.00
	Bomb Lift	MJ-1B[4]	1.00 - 8.00
OA-37B	**See Generic 2**		
OC-135B	Generator Set	A/M32A-86D	10.00
	Start Cart	A/M32A-60A	1.00
		A/M32A-95	0.10
	Air Conditioner	Ace 802-993 **(S)**	10.00
		MA-3C **(S)**	2.00
	Heater	H1	5.00
		1H1	4.00
	Light Cart	NF-2	2.00
	Air Compressor	MC-1A	0.33
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	Generator Set	A/M32A-86D	0.75
RC-135M, -135S, -135T, -135U, -135V, -135W, -135X	Generator Set	A/M32A-86D	10.00
	Start Cart	A/M32A-60A	1.00
		A/M32A-95	0.10
	Air Conditioner	Ace 802-993 **(S)**	10.00
		MA-3C **(S)**	2.00
	Heater	H1	5.00
		1H1	4.00
	Light Cart	NF-2	2.00
	Air Compressor	MC-1A	0.33
RF-4B, -4C	**See Generic 2**		
RF-8G	**See Generic 2**		
RF/A-18A	**See Generic 2**		
RH-53D	**See Generic 4**		

Table 3-3. Military Aircraft and GSE Assignments[1] (continued)

Aircraft	GSE Type	GSE Model	Operating Time Per Sortie/LTO (hr)
RP-3D	**See Generic 1**		
RQ-4, -4A, -4B	Generator Set	805 **(S)**	24.00
		806 **(S)**	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)**	0.50
		MA-1A **(S)**	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	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**		

Table 3-3. Military Aircraft and GSE Assignments[1] (continued)

Aircraft	GSE Type	GSE Model	Operating Time Per Sortie/LTO (hr)
TC-130H	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
		A/M32A-95	0.25
	Air Conditioner	Ace 802-993 **(S)**	1.00
		MA-3D	1.00
	Heater	H1	1.00
	Hydraulic Test Stand	MJ-2A[(4)]	3.00
	Light Cart	NF-2	2.00 - 10.00
	Air Compressor	MC-1A	0.50 - 1.00
		MC-2A **(S)**	0.50 - 1.00
TC-135S, -135W	Generator Set	A/M32A-86D	10.00
	Start Cart	A/M32A-60A	1.00
		A/M32A-95	0.10
	Air Conditioner	Ace 802-993 **(S)**	10.00
		MA-3C **(S)**	2.00
	Heater	H1	5.00
		1H1	4.00
	Light Cart	NF-2	2.00
	Air Compressor	MC-1A	0.33
TE-2A, -2C	**See Generic 1**		
TE-8A	**See Generic 1**		
TF-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	2.00
	Bomb Lift	MJ-1B	1.00
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	Generator Set	A/M32A-86D	0.75
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**		

Table 3-3. Military Aircraft and GSE Assignments[1] (continued)

Aircraft	GSE Type	GSE Model	Operating Time Per Sortie/LTO (hr)
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	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	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
		BT400-46	10.00
	Hydraulic Test Stand	MJ-1-1[4]	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[4]	3.00
VC-137B, -137C	**See Generic 1**		
VC-140B	**See Generic 1**		
WC-130E, -130H, -130J	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
		A/M32A-95	0.25
	Air Conditioner	Ace 802-993 **(S)**	1.00
		MA-3D	1.00
	Heater	H1	1.00
	Hydraulic Test Stand	MJ-2A[4]	3.00
	Light Cart	NF-2	2.00 - 10.00
	Air Compressor	MC-1A	0.50 - 1.00
		MC-2A **(S)**	0.50 - 1.00
WC-135B, -135C, -135W	Generator Set	A/M32A-86D	10.00
	Start Cart	A/M32A-60A	1.00
		A/M32A-95	0.10
	Air Conditioner	Ace 802-993 **(S)**	10.00
		MA-3C **(S)**	2.00
	Heater	H1	5.00
		1H1	4.00
	Light Cart	NF-2	2.00
	Air Compressor	MC-1A	0.33
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**		

Table 3-3. Military Aircraft and GSE Assignments[1] (continued)

Aircraft	GSE Type	GSE Model	Operating Time Per Sortie/LTO (hr)
YF-15A, -15B	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	2.00
	Bomb Lift	MJ-1B	1.00
YF-16A, -16B	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	2.00
	Bomb Lift	MJ-1B	1.00
YOV-10D	**See Generic 2**		
YP-3C	**See Generic 1**		
YS-2G	**See Generic 2**		
YSH-2E	**See Generic 4**		
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
		A/M32A-95	0.25
	Air Conditioner	Ace 802-993 **(S)**	1.00
		MA-3D	1.00
	Heater	H1	1.00
	Hydraulic Test Stand	MJ-2A[(4)]	3.00
	Light Cart	NF-2	2.00 - 10.00
	Air Compressor	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
		MC-11	2.00
	Bomb Lift	MJ-1B	1.00
Generic 3 Small Trainers (T-37, -37B)	Generator Set	A/M32A-86D	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

Table 3-3. Military Aircraft and GSE Assignments[1] (continued)

Aircraft	GSE Type	GSE Model	Operating Time Per Sortie/LTO (hr)
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[5]	Deicer Truck	0.15

1. 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.
2. 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 USAF flight squadrons and associated AGE shops.
3. Operating time estimated based on operating time of GSE on similar aircraft.
4. GSE model changed from what was stated in the source document because of suspected error in source.
5. Cold weather months only.

"**(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 its associated emission factors are used as a surrogate.

Table 3-4. Military Aircraft GSE Emission Factors

GSE Model	GSE Type	Source of Data[1]	Engine Manufacturer	Model Number	Rated Hp	Fuel	Operational Mode	Fuel Flow Rate (gal/hr)	Emission Factors (lb/hr)						
									NO_X	SO_X[2]	CO	VOC[3]	PM_{10}	$PM_{2.5}$[4]	GHG[5]
1H1	Heater	e	---	---	6.5	Diesel/JP-8	All Loads	0.39	0.160	0.011**(C)**	0.180	0.100	0.006	0.006	8.86
A/M27T-13	Hydraulic Test Stand	e	---	---	30	Diesel/JP-8	All Loads	---	0.180	0.051**(C)**	12.250	0.280	0.109[5]	0.105	36.85
A/M32A-60A	Start Cart	e	Garrett	---	180	Diesel/JP-8	All Loads	---	1.820	0.306**(C)**	5.480	0.270	0.211	0.205	221.08
A/M32A-86D	Generator Set	b	Detroit Diesel	4-71N	148	Diesel/JP-8	All Loads	6.47	6.102	0.046	0.457	0.294	0.091	0.089	146.96
A/M32A-95	Start Cart	e	Garrett	---	155	Diesel/JP-8	All Loads	---	1.470	0.264**(C)**	5.860	0.070	0.110	0.107	190.37
A/M32C-18	Air Compressor	a	Detroit Diesel	6V71T	290	Diesel/JP-8	100% Load	16.57	7.973	0.117	1.522	0.205	0.211	0.205	376.37
Ace 401	Air Conditioner	e	Detroit Diesel	---	---	Diesel/JP-8	All Loads	---	7.970	0.408**(C)**	1.520	0.200	0.211	0.205	313.19**(C)**
Ace 802-329S	Air Conditioner	c	Detroit Diesel	6V71N	272	Diesel/JP-8	All Loads	6.8	2.938	0.048	0.150	0.204	0.198	0.192	154.45
AF/M27M-1	Pumping Unit	a	Wisconsin	VH4D	30	Gasoline	100% Load	1.78	0.177	0.004	12.262	0.276	0.109[5]	0.100	34.76
B-1B Heater/Air Conditioner	Heater/Air Conditioner	a	Detroit Diesel	6V-92TA	300	Diesel/JP-8	100% Load	17.14	7.659	0.121	1.409	0.258	0.152	0.148	389.31
BAK-13	Arresting Barrier	a	Wisconsin	MV-465D	64	Gasoline	100% Load	3.9	0.377	0.009	29.207	0.319	0.109[5]	0.100	76.17
BT400-46	Heater	a	Lister-Petter	AC1-389548	6.5	Diesel/JP-8	All Loads	0.39	0.158	0.003	0.181	0.100	0.109[5]	0.105	8.86
Cargo Loader	Cargo Loader	f	---	---	133	Diesel/JP-8	All Loads	7.28	2.554	0.253	1.862	0.399	0.279	0.271	165.36
Deicer Truck	Deicer Truck	f	---	---	270	Gasoline	All Loads	14.78	5.940	0.108	73.170	2.700	0.027	0.243	288.65
Elevator Loader	Elevator Loader	a	Detroit Diesel	3-53 Series	110	Diesel/JP-8	100% Load	6.29	3.128	0.044	1.048	0.129	0.063	0.061	142.87
EMU-15	Generator Set	a	Detroit Diesel	3-71	100	Diesel/JP-8	100% Load	5.71	3.505	0.040	4.905	0.095	0.115	0.111	129.70
EMU-17	Generator Set	a	Detroit Diesel	12V-71N	300	Diesel/JP-8	100% Load	17.14	8.863	0.121	11.078	0.337	0.185	0.180	389.31
EMU-19U	Generator Set	a	Lister	ST-3	30	Diesel/JP-8	All Loads	1.78	0.743	0.013	0.351	0.266	0.109[5]	0.105	40.43
Fuel Truck	Fuel Truck	f	---	---	300	Diesel/JP-8	All Loads	16.42	3.300	0.480	0.900	0.300	0.210	0.204	372.96
Generator Light Cart	Generator Light Cart	d	Onan	P218G-I/10876C	10.5	Diesel/JP-8	All Loads	0.62	0.181	0.004	0.139	0.174	0.109[5]	0.105	14.08
Generator Set	Generator Set	a	Caterpillar	D3333T	214	Diesel/JP-8	100% Load	17.5	3.170	0.124	0.689	0.547	0.071	0.069	397.49
							62% Load	10.46	1.901	0.074	0.383	0.462	0.050	0.048	262.84
Ground Mobile Terminal Generator Set	Ground Mobile Terminal Generator Set	a	Detroit Diesel	4-71-T	150	Diesel/JP-8	100% Load	8.57	6.855	0.061	1.114	0.155	0.109	0.106	194.66
H1	Heater	e	---	---	6.5	Diesel/JP-8	All Loads	0.39	0.160	0.011**(C)**	0.180	0.100	0.006	0.006	8.86
MA-3	Air Conditioner	a	Onan	L643T*I/1C178-C	65	Diesel/JP-8	All Loads	3.79	0.497	0.027	0.133	0.011	0.109[5]	0.105	86.08
MA-3D	Air Conditioner	a	John Deere	4045T	120	Diesel/JP-8	All Loads	7.12	4.167	0.050	0.317	0.053	0.109[5]	0.105	161.72
MA-3D	Air Conditioner	c	John Deere	4039T	110	Diesel/JP-8	All Loads	4.57	0.640	0.032	0.058	0.284	0.063	0.061	103.80

Table 3-4. Military Aircraft GSE Emission Factors (continued)

GSE Model	GSE Type	Source of Data[1]	Engine Manufacturer	Model Number	Rated Hp	Fuel	Operational Mode	Fuel Flow Rate (gal/hr)	Emission Factors (lb/hr)						
									NO_X	SO_X[2]	CO	VOC[3]	PM_{10}	$PM_{2.5}$[4]	GHG[5]
MC-1A	Air Compressor	a	Hatz	Z790-193	18.4	Diesel/JP-8	All Loads	1.09	0.419	0.008	0.267	0.267	0.071	0.068	24.76
MC-1A	Air Compressor	a	Lister Engineering Co.	ST2A/MC1A	20	Diesel/JP-8	All Loads	1.19	0.496	0.008	0.234	0.177	0.109[5]	0.105	27.03
MC-5	Air Compressor	c	Deutz	F4L912 4CYL	100	Diesel/JP-8	All Loads	2.38	0.547	0.017	0.333	0.110	0.109[5]	0.105	54.06
MC-5	Air Compressor	a	GMC	Series 4-53	130	Diesel/JP-8	100% Load	7.43	3.396	0.053	0.794	0.195	0.089	0.086	168.76
MC-5	Air Compressor	a	John Deere	4039	110	Diesel/JP-8	All Loads	6.52	2.425	0.046	0.485	0.073	0.109[5]	0.105	148.09
MC-7	Air Compressor	a	John Deere	3164D	52	Diesel/JP-8	100% Load	3.3	1.285	0.023	0.642	0.057	0.109[5]	0.105	74.96
MC-7	Air Compressor	c	John Deere	3179 SPEC FD16694J	48	Diesel/JP-8	All Loads	1.8	0.414	0.013	0.018	0.053	0.109[5]	0.105	40.88
MC-8	Air Compressor	a	Deutz	F6L912	110	Diesel/JP-8	All Loads	6.52	2.983	0.046	0.752	0.121	0.109[5]	0.105	148.09
MC-11	Air Compressor	a	Wisconsin	MVH4D	30	Gasoline	100% Load	1.78	0.177	0.004	12.262	0.276	0.109[5]	0.100	34.76
Miller Concrete Cutter	Miller Concrete Cutter	a	Deutz	BF4D-1011T	75	Diesel/JP-8	All Loads	4.45	1.042	0.031	0.198	0.083	0.109[5]	0.105	101.08
MJ-1-1	Hydraulic Test Stand	a	Detroit Diesel	3-53 N	97	Diesel/JP-8	All Loads	2.52	0.757	0.018	0.043	0.026	0.109[5]	0.105	57.24
MJ-1B	Bomb Lift	e	Detroit Diesel	---	---	Diesel/JP-8	All Loads	---	4.780	0.219**(C)**	3.040	3.040	0.800	0.776	141.24
MJ-2/TTU-228	Hydraulic Test Stand	c	Detroit Diesel	6V-53N	125	Diesel/JP-8	All Loads	4.92	0.937	0.035	0.083	0.292	0.083	0.080	111.75
MJ-2/TTU-228	Hydraulic Test Stand	a	Detroit Diesel	4-53	130	Diesel/JP-8	100% Load	7.43	3.396	0.053	0.794	0.195	0.089	0.086	168.76
MJ-2/TTU-229	Hydraulic Test Stand	a	Detroit Diesel	6V-53N	125	Diesel/JP-8	100% Load	10.86	3.858	0.077	2.466	0.193	0.083	0.080	246.67
MJ-2A	Hydraulic Test Stand	e	Detroit Diesel	---	---	Diesel/JP-8	All Loads	---	3.850	0.238**(C)**	2.460	0.190	0.083	0.076	171.95**(C)**
MJ-40	Bomb Lift	e	Detroit Diesel	---	---	Diesel/JP-8	All Loads	---	0.340	0.219**(C)**	0.210	0.210	0.060	0.055	141.24**(C)**
NF-2	Light Cart	e	---	---	18	Diesel/JP-8	All Loads	---	0.110	0.043**(C)**	0.080	0.010	0.010	0.010	22.11
PD501	Air Conditioner	e	---	---	---	Diesel/JP-8	All Loads	---	7.650	0.408**(C)**	1.410	0.260	0.109[5]	0.105	313.19**(C)**
PMU 27/M	Pumping Unit	a	Petter Diesel Engine	AC-1	6.5	Diesel/JP-8	All Loads	0.39	0.158	0.003	0.181	0.100	0.109[5]	0.105	8.86
R-22	Pumping Unit	a	Detroit Diesel	3-53 Series	110	Diesel/JP-8	100% Load	6.29	3.128	0.044	1.048	0.129	0.063	0.061	142.87
TF-1	Light Cart	e	---	---	---	Diesel/JP-8	All Loads	---	0.170	0.043**(C)**	0.130	0.025**(C)**	0.160	0.155	30.71**(C)**
Trielectron D200T 400	Generator Set	c	Detroit Diesel	8V-71T	236	Diesel/JP-8	All Loads	10.9	8.621	0.077	0.219	0.271	0.208	0.202	247.58
Tug - Large	Tug	f	---	---	617	Diesel/JP-8	All Loads	33.4	0.617	1.049	4.936	0.617	0.864	0.839	758.64
Tug - Medium	Tug	f	---	---	475	Diesel/JP-8	All Loads	25.7	0.475	0.808	3.800	0.475	0.665	0.686	583.74
Tug - Small	Tug	f	---	---	190	Diesel/JP-8	All Loads	10.3	3.230	0.323	1.520	0.190	0.266	0.258	233.95

Notes for Table 3-4 on the following page.

1. Sources of data include the following:
   a. Emission factors were obtained from the manufacturer. Fuel usage rates were based on 7,500 Btu/hp-hr.
   b. Emission factors were obtained from the Southwest Research Institute report titled *Exhaust Emissions from a USAF A/M32-86D Generator*.
   c. Emission factors were obtained from the Pacific Environmental Services report titled *Aerospace Ground Support Equipment Emissions Characterization for Edwards AFB, California.*
   d. Emission factors are EPA tier I Non-road engine factors.
   e. Emission factors were obtained from *Air Emissions Factor Guide to Air Force Mobile Sources December 2009.*
   f. Emission factors calculated using the emission factors in Table 3-7 using the hp stated in the table above. If no hp was given, then the average hp for that equipment type was used (Table 3-6). Fuel usage rates were based on 7,500 Btu/hp-hr.
2. SO_X as SO_2; assumes all sulfur in the fuel reacts to form SO_2 and the national average sulfur content for JP-8 is 0.053 wt.% (density is 6.67 lb/gal) and for gasoline is 0.018 wt.% (density is 6.15 lb/gal). See Section 3.5.5 of this document for reference. Emission factor calculated as follows:

$$EF_{SO_2} = FFR\,\frac{gal_{fuel}}{hr} \times Density\,\frac{lb_{fuel}}{gal_{fuel}} \times \left(Wt.\%\,\frac{lb_{Sulfur}}{lb_{fuel}} \div 100\%\right) \times 2\,\frac{SO_2}{S}$$

3. Emission factors are based on values for total hydrocarbons.
4. $PM_{2.5}$ conservatively estimated at 97% of PM_{10} for JP-8 or diesel and 92% of PM_{10} for gasoline (per *Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling-Compression-Ignition*, EPA420-P-04-009, April 2004).
5. For PM_{10} emission factors that were not available, an average value for all other GSE of 0.109 lb/hr was used.

"(**C**)" – Indicates that this value was not provided from test data, but was calculated using the stated hp (or hp from Table 3-6) and the appropriate emission factor from Table 3-7.
"---" Indicates No Data Available.

Table 3-5. Typical Commercial Aircraft GSE Assignments[1]

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)	
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)		Cabin Service Truck (Diesel)	
Lavatory Truck (Diesel)			
Service Truck (Diesel)			
Water Service Truck (Diesel)			

1. Data obtained from FAA Emissions and Dispersion Modeling System, Version 5.02

Table 3-6. Common GSE Operating Parameters[1]

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 3-6. Common GSE Operating Parameters[1] (continued)

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 3-6. Common GSE Operating Parameters[1] (continued)

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	---

1. Data obtained from FAA Emissions and Dispersion Modeling System, Version 5.02
"---" Indicates No Data Available

Table 3-7. Common GSE Emission Factors[1]

GSE Type	Fuel Type	Emission Factors (lb/1000hp-hr)						
		CO	VOC[2]	NO_X	SO_X	PM_{10}[(3)]	$PM_{2.5}$[(4)]	GHG[5]
Air Conditioner	Diesel	5.00	1.00	16.40	1.60	1.00	0.97	1228.21
Air Start	Diesel	6.00	1.00	19.30	1.60	1.20	1.16	1228.21
	Gasoline	271.00	10.00	22.00	0.40	0.10	0.09	1126.73
Aircraft Tractor/Tug	Diesel	8.00	1.00	17.00	1.70	1.40	1.36	1228.21
	Gasoline	393.00	13.00	23.20	0.40	0.10	0.09	1126.73
	CNG/LPG	---	---	---	---	---	---	---
Baggage Tractor	Diesel	11.00	2.00	13.70	1.80	2.10	2.04	1228.21
	Gasoline	395.00	13.00	22.30	0.40	0.20	0.18	1126.73
	CNG/LPG	107.00	6.00	26.90	0.00	0.10	0.10	1062.84
Belt Loader	Diesel	8.00	2.00	14.80	1.80	1.70	1.65	1228.21
	Gasoline	275.00	10.00	22.30	0.40	0.20	0.18	1126.73
	CNG	275.00	10.00	22.30	0.00	0.10	0.10	2136.19
	LPG	74.00	4.00	26.90	0.00	0.00	0.00	1062.84
Bobtail	Diesel	8.00	1.00	16.70	1.70	1.30	1.26	1228.21
	Gasoline	398.00	13.00	22.30	0.40	0.20	0.18	1126.73
	CNG/LPG	---	---	---	---	---	---	---
Cabin Service Truck	Diesel	2.00	1.00	10.30	1.60	0.30	0.29	1228.21
	Gasoline	24.00	4.00	10.70	0.30	0.10	0.09	1126.73
	CNG/LPG	107.00	6.00	26.90	0.00	0.10	0.10	1062.84
Cargo Loader	Diesel	14.00	3.00	19.20	1.90	2.10	2.04	1228.21
	Gasoline	400.00	13.00	22.30	0.40	0.20	0.18	1126.73
	CNG/LPG	106.00	5.00	26.80	0.00	0.10	0.10	1062.84
Cargo Tractor	Diesel	12.00	2.00	17.00	1.80	2.40	2.33	1228.21
	Gasoline	404.00	13.00	22.40	0.40	0.20	0.18	1126.73
	CNG/LPG	107.00	6.00	26.90	0.00	0.10	0.10	1062.84
Cart (Light Cart)	Diesel	---	---	---	---	---	---	1228.21
	Gasoline	392.00	13.00	22.30	0.40	0.10	0.09	1126.73
	CNG/LPG	---	---	---	---	---	---	---
Catering Truck	Diesel	2.00	1.00	10.30	1.60	0.30	0.29	1228.21
	Gasoline	24.00	4.00	10.70	0.30	0.10	0.09	1126.73
	CNG/LPG	107.00	6.00	27.00	0.00	0.10	0.10	1062.84
Deicer	Diesel	---	---	---	---	---	---	1228.21
	Gasoline	271.00	10.00	22.00	0.40	0.10	0.09	1126.73
	CNG/LPG	---	---	---	---	---	---	---
Forklift	Diesel	15.00	4.00	22.00	1.90	2.70	2.62	1228.21
	Gasoline	392.00	13.00	22.00	0.40	0.10	0.09	1126.73
	CNG/LPG	108.00	6.00	27.00	0.00	0.10	0.10	1062.84

Table 3-7. Common GSE Emission Factors[1] (continued)

GSE Type	Fuel Type	Emission Factors (lb/1000hp-hr)						
		CO	VOC[2]	NO_X	SO_X	PM_{10}[3]	$PM_{2.5}$[4]	GHG[5]
Fuel Truck	Diesel	3.00	1.00	11.00	1.60	0.70	0.68	1228.21
	Gasoline	37.00	5.00	11.00	0.30	0.10	0.09	1126.73
	CNG/LPG	106.00	5.00	27.00	0.00	0.10	0.10	1062.84
Generator	Diesel	6.00	2.00	20.00	1.60	1.40	1.36	1228.21
	Gasoline	271.00	10.00	22.00	0.40	0.10	0.09	1126.73
	CNG/LPG	---	---	---	---	---	---	---
Ground Power Unit	Diesel	5.00	1.00	17.00	1.60	1.00	0.97	1228.21
	Gasoline	271.00	10.00	22.00	0.40	0.10	0.09	1126.73
	CNG/LPG	---	---	---	---	---	---	---
Hydrant Truck	Diesel	4.00	1.00	12.00	1.60	1.60	1.55	1228.21
	Gasoline	26.00	4.00	11.00	0.30	0.10	0.09	1126.73
	CNG/LPG	---	---	---	---	---	---	---
Lavatory Truck	Diesel	4.00	1.00	12.00	1.60	1.30	1.26	1228.21
	Gasoline	18.00	4.00	11.00	0.30	0.10	0.09	1126.73
	CNG/LPG	106.00	5.00	27.00	0.00	0.10	0.10	1062.84
Lift	Diesel	15.00	4.00	22.00	1.90	2.70	2.62	1228.21
	Gasoline	397.00	13.00	22.00	0.40	0.20	0.18	1126.73
	CNG/LPG	106.00	5.00	27.00	0.00	0.10	0.10	1062.84
Passenger Stand	Diesel	4.00	1.00	12.00	1.60	1.60	1.55	1228.21
	Gasoline	46.00	5.00	11.00	0.30	0.10	0.09	1126.73
	CNG/LPG	106.00	5.00	27.00	0.00	0.10	0.10	1062.84
Service Truck	Diesel	3.00	1.00	11.00	1.60	0.90	0.87	1228.21
	Gasoline	46.00	5.00	11.00	0.30	0.10	0.09	1126.73
Sweeper	Diesel	12.00	2.00	17.00	1.80	2.40	2.33	1228.21
	Gasoline	393.00	13.00	22.00	0.40	0.10	0.09	1126.73
	CNG/LPG	108.00	6.00	27.00	0.00	0.10	0.10	1062.84
Water Service	Diesel	---	---	---	---	---	---	1228.21
	Gasoline	46.00	5.00	11.00	0.30	0.10	0.09	1126.73
	CNG/LPG	---	---	---	---	---	---	---
Other	Diesel	8.00	1.00	17.00	1.70	1.30	1.26	1228.21
	Gasoline	396.00	13.00	22.00	0.40	0.20	0.18	1126.73
	CNG/LPG	106.00	5.00	27.00	0.00	0.10	0.10	1062.84

1. Emission factors obtained from FAA Emission and Dispersion Modeling System, Version 5.02 for model year 2000 GSE and converted from g/hp-hr to lb/1000 hp-hr.
2. Reported as HC and conservatively estimated to be equal to VOC.
3. Reported as PM in EDMS. All PM assumed to be PM_{10}.
4. Using assumptions and factors applied by EPA in its NONROAD model, $PM_{2.5}$ emissions can be conservatively estimated as 97% of JP-8 or diesel PM_{10} emissions, 92% of gasoline PM_{10} emissions, and 100% of CNG or LPG PM_{10} emissions.
5. GHG is the sum of emission factors for CO_2, CH_4, and N_2O. The emission factors are presented in equivalent CO_2 (CO_2e) using global warming potentials of 21 and 310 for CH_4 and N_2O 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_2O and CH_4 for CNG and LPG were assumed to be equal to those for gasoline. Calculations were made assuming fuel usage rates based on 7,500 Btu/hp-hr and the heating values presented in table 3-1.

"---" Indicates No Data Available.

Table 3-8. Uncontrolled HAP Emission Factors for Select Military GSE[1]

Hazardous Air Pollutant	Emission Factors (lb/1000gal)			
	MA-1A/2 MB-2/3	A/M32A-60	A/M32A-60A	A/M32A-95
Acetaldehyde	---	2.09E-03	2.09E-03	2.09E-03
Acrolein	---	3.00E-04	3.00E-04	3.00E-04
Benzene	1.30E-05	1.50E-02	1.50E-02	1.50E-02
Ethylbenzene	1.10E-06	8,78E-4	8.78E-04	8.78E-04
Formaldehyde	---	2.03E-02	2.03E-02	2.03E-02
Toluene	6.60E-06	4.36E-03	4.36E-03	4.36E-03
Xylenes	4.80E-06	2.69E-03	2.69E-03	2.69E-03

1. SOURCE: *Flightline Emission Factors – Aircraft/Auxiliary Power Units/Aerospace Ground Support Equipment December 2004,* IERA-RS-BR-SR-2005-0001.

"---" Indicates No Data Available.

Table 3-9. EPA Emission Factors for Uncontrolled Diesel Reciprocating IC Engines[1]

Pollutant	Emission Factor (lb/1000gal)[2]	Emission Factor (lb/1000hp-hr)[3]
Criteria Pollutants		
CO	130	6.68
NO_X	604	31
PM[4]	42.5	2.2
PM_{10}[4]	42.5	2.2
SO_X	39.7	2.05
VOC[5]	49.3	2.5
Hazardous Air Pollutants		
Acetaldehyde	0.105	5.40E-03
Acrolein	0.013	6.48E-04
Benzene	0.128	6.50E-03
1,3-Butadiene	0.005	2.74E-04
Formaldehyde	0.162	8.30E-03
Naphthalene	0.012	5.94E-04
Polycyclic Aromatic Hydrocarbons (PAH)[6]	0.023	1.20E-03
Toluene	0.056	2.90E-03
Xylenes	0.039	2.00E-03

1. Applies to diesel reciprocating internal combustion engines with a rated power up to 600 horsepower (447 kilowatts). Applicable Source Classification Codes (SCCs) include 2-02-001-02 and 2-03-001-01.
2. Pounds pollutant emitted per thousand gallons of fuel burned. These emission factors are from the EPA's FIRE program. The "lb/1000 gal" HAP emission factors were calculated by multiplying the "lb/MMBtu" emission factors listed in FIRE times the typical heating value of diesel fuel (137 MMBtu/1000 gal).
3. Pounds Pollutant emitted per thousand horsepower hour (power output). These emission factors are from Section 3.3 of AP-42. The "lb/1000 hp-hr" HAP emission factors were calculated by multiplying the "lb/MMBtu" emission factors listed in AP-42 times an average brake-specific fuel consumption (BSFC) value of 7 MMBtu/1000 hp-hr.
4. All particulate is assumed to be less than 1 µm in size.
5. Based on the emission factor for Total Organic Compounds (TOC).
6. For inventory purposes, assume PAH is the same as Polycyclic Organic Matter (POM).

Figure 3-1. Example Data Collection Form for Aerospace Ground Support Equipment

Installation Name: **Inventory Year (CY):**
Responsible Organization (Name & Office Symbol):
POC (Name, Phone # and e-mail address):

Euipment Type	Equipment Use	Equipment Manufacturer	Equipment Model Number	Fuel Type	Power Rating (hp)	Typical Operating Load[1]	Estimated Operating Time (hr/yr)	Estimated Fuel Usage (gal/yr)

1. This is the typical load which the equipment was operated at during the inventory year. This may be listed as a horsepower value, percentage (i.e. percent of maximum power), or description. Be sure to specify.
2. While the quantity of fuel used is generally needed only if power rating and operating hours are unknown, fuel consumption data may also be needed to estimate CO_2.

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4.0 NONROAD ENGINES AND EQUIPMENT

4.1 Introduction

Emissions on Air Force installations result not only from military operations, but also from day to day activities involving nonroad engines. There are numerous nonroad engines with varying operating characteristics and technologies used in a wide range of applications on Air Force installations.

4.2 Nonroad Engines

Examples of nonroad engines and equipment that are commonly operated on Air Force installations include: construction equipment (e.g., backhoes, bulldozers, asphalt pavers, etc.); industrial equipment (e.g., forklifts, aerial lifts, sweepers, etc.); lawn and garden equipment (lawn mowers, trimmers, leaf blowers, snow blowers, etc.); agricultural equipment (sprayers, agricultural tractors, agricultural mowers, etc.); commercial equipment (e.g., portable generators, 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). Aerospace ground equipment (AGE) and ground support equipment (GSE) are also nonroad engines widely used on Air Force installations, but are addressed separately in the previous Section. Emissions of concern from the operation of nonroad vehicles and equipment include the criteria pollutants: VOCs, CO, NO_X, PM (both PM_{10} and $PM_{2.5}$); SO_2 (often times conservatively estimated as SO_X); and several HAPs that are commonly associated with fuel combustion processes (benzene, 1,3-butadiene, acetaldehyde, naphthalene, etc.).

4.3 Compression Ignition versus Spark Ignition

Nonroad vehicles and equipment are typically powered by either a reciprocating internal combustion engine or a small gas turbine. Reciprocating internal combustion engines are categorized as compression ignition (CI) or spark ignition (SI) depending on the manner in which fuel ignition occurs in the engine. Turbine engines are powered by JP-8. Reciprocating CI engines are powered either by diesel fuel or JP-8 while SI engines are powered by MOGAS, compressed natural gas (CNG), or liquefied petroleum gas (LPG). In CI engines, air is heated when compressed by a piston in a cylinder. Fuel is then sprayed directly into the cylinder which causes the fuel-air mixture to ignite because the compressed air temperature is above the auto-ignition temperature of the fuel. The resulting high-pressure combustion products push the piston through the cylinder. The linear motion of the piston is converted into rotational motion by a crankshaft and as the piston returns, it forces out the exhaust gases and the cycle repeats itself.

SI engines differ primarily by pre-mixing the fuel and air in a carburetor, introducing the fuel/air mixture into the combustion zone, and initiating its combustion through an electrical discharge, usually provided by a spark plug, rather than through compression. SI engines are also separated into different design classes (most commonly 2-stroke or 4-stroke) based upon the number of crankshaft revolutions required to complete the power cycle. Differences among design classes and engine technologies have a direct impact on exhaust emissions. Accordingly, emission factors for SI engines are often provided specifically for 2-stroke, 4-stroke, or other design classes.

Gas turbines are composed of three major components: compressor, combustor, and power turbine. In a gas turbine, ambient air is drawn in at the front of the engine with fan, and the pressure raised to up to 30 times 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.

4.4 Global Climate Change Data

Although not currently regulated under the Clean Air Act, some regulatory agencies may request an installation to estimate CO_2 emissions due to the growing concern over global climate change. Specific requests to calculate and provide CO_2 emissions data to regulatory agencies as part of the emission inventory process should be reported through the appropriate MAJCOM channels and coordinated through the chain-of-command to ensure a consistent Air Force response.

4.5 Fuel Type and Emissions

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

4.5.1 Alternative Fuels and Emissions Reduction

Increasingly stringent regulatory requirements resulting from the Energy Policy Act (EPAct), Presidential Executive Orders, and DoD /Air Force pollution prevention and energy conservation initiatives mean that some Air Force installations may be encouraged to operate nonroad 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 nonroad engines and equipment which use these alternative fuels, there are on-highway flexible fuel vehicles (FFVs) that are capable of operating on E85, and these FFVs 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 does indicate that some HAP emissions are reduced while others are increased. Accordingly, at this time EPA does not support the use of emission reduction factors for engines using E85 fuels.

A somewhat similar situation exists with regard to information on the emissions impact of B20 fuels. In October 2002, the EPA issued its technical report on biodiesel emissions (A Comprehensive Analysis of Biodiesel Impacts on Exhaust Emissions, 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_X 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 conducted under the auspices of the DoD Environmental Security Technology Certification Program

(ESTCP) sought to measure the impact of B20 on CO, NO_X, PM, HC, and HAP emissions from engines used in on-road and portable power generation applications (Effect of Biodiesel on Diesel Engine Nitrogen Oxide and Other Regulated Emissions, 2006). Using primarily a B20 biodiesel/ULSD blend, the study showed no significant differences in emissions between the B20 biodiesel blended with ULSD and the ULSD by itself. No consistent trend was observed with regard to HAP emissions.

These examples indicate that efforts to apply emission reduction factors to estimate emissions from alternatively-fueled nonroad vehicles and equipment should be attempted only after careful review of the most current, validated information available from either the EPA, the Department of Energy, the DoD and Service engineering and research organizations. Application of the B20 emission factors 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.

4.6 Emission Calculations

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 emission factors in the NONROAD model and manual calculation procedures. Regardless of which approach is chosen, the methodology is applied to each individual piece of nonroad equipment for each pollutant for which emissions are being calculated. The methodologies are briefly described in the following paragraphs.

4.6.1 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. Developed to provide a consistent means of generating emissions data required by the Clean Air Act, the current NONROAD model predicts emissions of six exhaust pollutants (HC, NO_X, CO, CO_2, SO_X, and PM) for more than 80 basic and 260 specific types of nonroad equipment across a variety of model years for gasoline, diesel, CNG and LPG. The model allows particulate matter to be reported as PM_{10} or $PM_{2.5}$.

One advantage 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 use of adjustment factors for small SI engines, so the NONROAD model uses emission factors 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 emission factor 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 one specified set of conditions. If the user wishes to run 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 similar to the graphical users interface. The reporting utility is a stand-alone application and knowledge of Access is not required to generate reports.

Emission factors for nonroad engines and equipment 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. They are provided in Table 4-1 and serve as the basis for estimating emissions manually using the methodologies discussed in the following subsections.

4.6.2 Horsepower/Load Factor Method

The most common approach for calculating emissions from nonroad engines and equipment is essentially the same as the method incorporated into the NONROAD model and the horsepower/load factor method in the previous section. Emissions are estimated based on the engine's rated power output, a load factor, annual operating time, and emission factors based on the mass of pollutant emitted per power output. For emission calculations for non-road equipment, the user must know the horsepower, load factor, and operating time for each equipment type. The following equation is used:

$$\boldsymbol{EP(Pol)_{NRE} = EF(Pol) \times OT \times \frac{LF}{100} \times hp \times \frac{1}{1000} \times N} \qquad \textbf{Equation 4-1}$$

Where,

$\boldsymbol{EP(Pol)_{NRE}}$	=	Emissions of each individual pollutant (lb/yr)
EF(Pol)	=	Emission Factor for each pollutant (lb/1000hp-hr)
OT	=	Operating Time (hr/unit)
LF	=	Load Factor (as a percent of maximum power)
100	=	Factor for converting percent to a fraction
hp	=	Rated horsepower of the engine for specific site conditions (hp)
1000	=	Factor for converting hp to 1000hp
N	=	Number of 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.

4.6.3 Fuel Consumption Method

Estimating emissions based on fuel consumption can be accomplished in instances when the operating time of the nonroad engine or equipment is unknown, but the total fuel consumption is known. It involves the use of annual fuel consumption, fuel density, brake-specific fuel consumption (BSFC) values for the particular piece of equipment, and emission factors which are based on mass of pollutant emitted per power output. The following equation is used:

$$\boldsymbol{EP(Pol)_{NRE} = \frac{(FC \times FD)}{BSFC} \times EF(Pol) \times N} \qquad \textbf{Equation 4-2}$$

Where,

$\boldsymbol{EP(Pol)_{NRE}}$	=	Emissions of each individual pollutant (lb/yr)
FC	=	Fuel Consumption (gal_{fuel}/unit)
FD	=	Fuel Density (lb_{fuel}/gal_{fuel})
BSFC	=	Brake-specific fuel consumption for the engine (lb_{fuel}/1000hp-hr)
***EF*(Pol)**	=	Emission factor for each pollutant (lb/1000hp-hr)
N	=	Number of vehicles 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 as well as the BSFC for the engine directly from the engine manufacturer. If this data is unavailable, then suggested values for these variables may be found in the following tables:

- Table 3-2 provides the average density for nonroad fuels.
- Table 4-1 provides the emission factors and BSFC for specific equipment types in a lb/1000 hp-hr basis.

4.6.4 Estimating HAP Emission

HAP emissions can be calculated by applying available HAP emission factors to the most appropriate method discussed in the previous paragraphs. In some instances it may be necessary to calculate HAP emissions based on the speciation of VOC emissions. The following equation is used to calculate HAP emissions from VOC speciation data:

$$EP(HAP)_{NRE} = EP_{VOC} \times \frac{WP_{HAP}}{100} \qquad \textbf{Equation 4-3}$$

Where,

$EP(HAP)_{NRE}$	=	Emissions of each individual pollutant (lb/yr)
EP_{VOC}	=	VOC emissions (lb/yr)
WP_{HAP}	=	Weight percent of the HAP in the VOC emissions (vapor phase wt. %)
100	=	Factor for converting weight percent to a fraction

In addition to the emission factors and speciation values provided in Tables 4-3 and 4-4, most vehicle and equipment manufacturers have emissions data specific to their product, and many are willing to provide it upon request. HAPs emissions may be calculated using the following tables:

- Table 3-9 has the EPA's emission factors for uncontrolled diesel reciprocating internal combustion engines in a lb/1000hp-hr format and may be used to calculate HAPs directly using equation 4-1.
- Table 4-3 gives the weight percent HAP speciation of VOC emissions for estimating specific HAPs using equation 4-3 above.

4.6.5 Estimating SO_2 Emissions

SO_2 emissions are estimated by applying the emission factors in Table 4-1 to the appropriate type of nonroad engine or equipment using one of the previous equations. The average density and sulfur content for various fuels are found in Table 3-2.

4.6.6 Greenhouse Gas (GHG) Emissions

Since greenhouse gas (GHG) emissions are becoming increasingly more important, it is becoming more common to record the CO_2, CH_4, and N_2O produced when measuring emissions from mobile and stationary sources. It is also common practice to report GHG emissions in terms of equivalent CO_2 (CO_2e). Each greenhouse gas has a global warming potential (GWP) which is a measure of the heat that gas traps in the atmosphere over a determined time period. A carbon dioxide equivalent is the quantity of CO2 needed to equal the same GWP as the greenhouse gas in question. For CH_4 and N_2O, the GWP used to calculate CO_2e were 21 and 310 respectively for a 100 year time period. This document provides a total GHG composite emission factor consisting of CO_2, CH_4, and N_2O presented in CO_2e in Tables 4-1 and 4-2 for common non-road equipment. The total greenhouse gas emissions may then be calculated using either equation 4-1 or 4-2.

4.7 Information Resources

The primary source of information for most nonroad vehicles and equipment is the Transportation Squadron. The Transportation Vehicle Operations Flight and/or the Transportation Vehicle Maintenance Flight typically maintain records on most Air Force owned nonroad vehicles and equipment, such as identity of the shops/organizations operating the vehicles/equipment, horsepower rating of the vehicles/equipment, hours of operation, etc. In some cases, it may be necessary to contact the actual organizations/shops using the vehicles/equipment to obtain information that Transportation does 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 Engineering 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 Air Force installations are performed via contractors, and therefore, it might 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 nonroad engines and equipment (such as leaf blowers, trimmers/edgers, snow blowers, etc.) operated on Air Force 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 Air Force owned equipment. One approach to obtaining the necessary information is to work with the CE Housing Flight to identify the types of nonroad equipment used in base housing, estimate the number of each different equipment type, estimate the average horsepower 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/size of equipment used and the estimated usage. For nonroad engines and equipment in which emissions are calculated using emission factors based on fuel usage (i.e., using "g/gal" emission factors), Fuels Supply may be a source of information regarding fuel consumption. An example of a data collection form which can be used to collect data necessary to estimate emissions from nonroad vehicles and equipment is provided in Figure 4-1.

4.8 Example Calculations

The following section provides examples of how the equations and methodologies discussed earlier are applied to calculate emissions from nonroad vehicle and equipment operations. The procedures are applied to each individual nonroad engine and equipment, and for each pollutant for which emissions must be calculated. Emissions for all nonroad vehicles and equipment and pollutants are then summed to obtain pollutant-specific, base-wide totals. Load factors, BSFCs and emission factors necessary for calculating emissions are obtained from Tables 4-1 through 4-3.

4.8.1 Problem 1 - Estimating Emissions Using the Horsepower/Load Factor Method

As part of its requirement to conduct an annual mobile source emissions inventory, Anytown AFB has collected information on the nonroad vehicles and engines 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	
# of pieces	6
Power Rating	85 hp
Operating Time	200 hr/unit

Step 1 – In Table 4-1, record the CO emission factor and load factor. The emission factor and typical load factor are given as 6.50lb/1000hp-hr and 59 % respectively.

Step 2 - Using the information in the table above and the values recorded in step 1, calculate the annual emissions for the six forklifts using equation 4-1:

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

$$EP(CO)_{NRE} = 6.50\left(\frac{lb}{\cancel{1000\ hp - hr}}\right) \times 200\left(\frac{\cancel{hr}}{\cancel{unit}}\right) \times \frac{59}{100} \times 85(\cancel{hp}) \times \frac{1}{1000}\left(\frac{\cancel{1000hp}}{\cancel{hp}}\right) \times 6\left(\frac{\cancel{units}}{yr}\right)$$

$$\boxed{\boldsymbol{EP(CO)_{NRE} = 391.17\frac{lb}{yr}}}$$

4.8.2 Problem 2 - Estimating Emissions Using Fuel Consumption

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

Equipment Type – 4-stroke gasoline lawnmower	
# of pieces	25
Power rating	5 hp
Fuel Consumption	40 gal each; 1000 gal total

Step 1 – Record the fuel density from Table 3-2 and the VOC emission factor and BSFC value for gas powered commercial lawn mowers from Table 4-1. The fuel density is given as 6.15 lb/gal while the VOC emission factor and BSFC are given as 103.48 and 880lb/1000hp-hr respectively.

Step 2 - Calculate annual VOC emissions using equation 4-2:

$$EP(Pol)_{NRE} = \frac{(FC \times FD)}{BSFC} \times EF(Pol) \times N$$

$$EP(VOC)_{NRE} = \frac{\left(40\left(\frac{\cancel{gal_{fuel}}}{\cancel{unit}}\right) \times 6.15\left(\frac{\cancel{lb_{fuel}}}{\cancel{gal_{fuel}}}\right)\right)}{880\left(\frac{\cancel{lb_{fuel}}}{\cancel{1000\ hp - hr}}\right)} \times 103.48\left(\frac{lb}{\cancel{1000\ hp - hr}}\right) \times 25\left(\frac{\cancel{units}}{yr}\right)$$

$$\boxed{\boldsymbol{EP(VOC)_{NRE} = 723.18\frac{lb}{yr}}}$$

Next, calculate formaldehyde emissions.

Step 3 – Record Formaldehyde weight percent VOC emissions for 4-stroke gasoline engines. Table 4-3 states this value as 1.17.

Step 4 - Calculate annual formaldehyde emissions using equation 4-3:

$$EP(HAP)_{NRE} = EVOC \times \frac{WP_{HAP}}{100}$$

$$EP(Formaldehyde)_{NRE} = 723.18\left(\frac{lb}{yr}\right) \times \frac{1.17}{100}$$

$$\boxed{\boldsymbol{EP(Formaldehyde)_{NRE} = 8.46\frac{lb}{yr}}}$$

4.8.3 Problem 3 - Estimating SO_2 Emissions

Anytown AFB needs to estimate SO_2 emissions from the operation of rough terrain forklifts. The following information was obtained from the base:

Equipment Data – Rough terrain forklifts	
# of pieces	5
Fuel	Diesel
Power rating	80 hp
Model year	1997
Fuel Consumption	200 gal (each); 1000 gal (total)
Hours of operation	250 hr/unit (each)

Since the model year of the forklifts are pre-1998, then the emission factors applicable to these engines are found in Table 4-2 and not Table 4-1.

Step 1 – Record the load factor in Table 4-1 and SO_X emission factor in Table 4-2. For diesel-powered rough terrain forklifts, the typical load factor is 59% and the SO_X emission factor is shown as 2.05lb/1000hp-hr.

Step 2 – Using these values, and the data in the table above, calculate the SO_X emissions using Equation 4-1:

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

$$EP(SO_X)_{NRE} = 2.05\left(\frac{lb}{1000\ \cancel{hp - hr}}\right) \times 250\left(\frac{\cancel{hr}}{\cancel{unit}}\right) \times \frac{59}{100} \times 80(\cancel{hp})\frac{1}{1000}\left(\frac{\cancel{1000hp}}{\cancel{hp}}\right) \times 5\left(\frac{\cancel{units}}{yr}\right)$$

$$\boxed{EP(SO_X)_{NRE} = \mathbf{120.95}\,\frac{lb}{yr}}$$

4.8.4 Problem 4 - Estimating Emissions from the Use of B20

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

Equipment Data – Off-Highway Trucks	
# of pieces	10
Fuel	B20/nonroad diesel (500 ppm blend)
Power rating	250 hp
Model year	2001
Hours of operation	200 hours (each); 2000 hours (total)

Estimate the NO_X and PM_{10} emissions from the operation of the vehicles.

Step 1 – Record the NO_X emission factor and load factor. Table 4-1 gives the emission factor and load factor as 11.27lb/1000hp-hr and 59% respectively.

Step 2 - Calculate annual NO_X emissions using equation 4-1:

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

$$EP(NO_X)_{NRE} = 11.27\left(\frac{lb}{\cancel{1000\,hp-hr}}\right) \times 200\left(\frac{\cancel{hr}}{\cancel{unit}}\right) \times \frac{59}{100} \times 250(\cancel{hp}) \times \frac{1}{1000}\left(\frac{\cancel{1000hp}}{\cancel{hp}}\right) \times 10\left(\frac{\cancel{units}}{yr}\right) = \mathbf{3324.65}\,\frac{\mathbf{lb}}{\mathbf{yr}}$$

Step 3 - Adjust the estimated emissions to reflect the expected 2% increase in NO_X attributable to the use of B20.

$$EP(NO_X) = 3324.65\left(\frac{lb}{yr}\right) \times 1.02$$

$$\boxed{\boldsymbol{EP(NO_X) = 3391.14\,\frac{lb}{yr}}}$$

Next, calculate PM_{10} emissions using data from Table 4-1.

Step 4 – Record the PM_{10} emission factor from Table 4-1. This emission factor is given as 0.57lb/1000hp-hr.

Step 5 - Calculate annual PM_{10} emissions using equation 4-1:

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

$$EP(PM_{10})_{NRE} = 0.57\left(\frac{lb}{\cancel{1000\ hp - hr}}\right) \times 200\left(\frac{\cancel{hr}}{\cancel{unit}}\right) \times \frac{59}{100} \times 250(\cancel{hp}) \times \frac{1}{1000}(\cancel{hp}) \times 10\left(\frac{\cancel{units}}{yr}\right) = \mathbf{168.15}\,\boldsymbol{\frac{lb}{yr}}$$

<u>Step 6</u> - Adjust the estimated emissions to reflect the expected 10% decrease in PM emissions attributable to the use of B20:

$$EP(PM_{10})_{NRE} = 168.15\left(\frac{lb}{yr}\right) \times 0.9$$

$$\boxed{\boldsymbol{EP(PM_{10})_{NRE} = 151.34\,\frac{lb}{yr}}}$$

Table 4-1. Criteria Pollutant Emission Factors for Nonroad Engines and Equipment[1]

SCC	Equipment Description	Load Factor (% Max Power)	BSFC[2] (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO_X	SO_2	PM_{10}[(4)]	$PM_{2.5}$[(5,6)]	GHG[7]
2260001010	2 Stroke Motorcycles: Off- Road[3]	100	260	127.07	132.83	0.35	0.09	4.74	4.36	459.36
2260001020	2 Stroke Snowmobiles	34	1640	669.88	281.73	2.45	0.90	6.31	5.80	4489.34
2260001030	2 Stroke ATVs[3]	100	210	126.66	126.74	0.35	0.07	4.45	4.10	299.19
2260001060	2 Stroke Specialty Vehicles/Carts	58	1000	1534.50	56.73	6.77	0.64	0.31	0.28	3154.90
2260002006	2 Stroke Tampers/Rammers	55	680	784.87	197.63	2.54	0.33	20.46	18.83	1606.78
2260002009	2 Stroke Plate Compactors	55	830	645.23	128.11	3.11	0.49	16.87	15.52	2343.08
2260002021	2 Stroke Paving Equipment	59	830	649.75	124.74	3.13	0.49	17.00	15.64	2345.28
2260002027	2 Stroke Signal Boards/Light Plants	72	830	672.94	139.53	3.13	0.46	17.60	16.19	2321.03
2260002039	2 Stroke Concrete/Industrial Saws	78	630	762.36	141.58	2.09	0.33	21.21	19.52	1594.35
2260002054	2 Stroke Crushing/Proc. Equipment	85	830	672.94	125.02	3.13	0.46	17.60	16.19	2321.03
2260003030	2 Stroke Sweepers/Scrubbers	71	820	670.85	131.79	3.11	0.46	17.53	16.13	2311.92
2260003040	2 Stroke Other General Industrial Equipment	54	830	674.27	127.29	3.13	0.46	17.62	16.21	2325.44
2260004015	2 Stroke Rotary Tillers < 6 HP (Residential)	40	940	743.35	322.28	2.51	0.46	17.55	16.15	2332.95
2260004016	2 Stroke Rotary Tillers < 6 HP (Commercial)	40	900	695.06	203.43	2.76	0.49	17.22	15.84	2342.85
2260004020	2 Stroke Chain Saws < 6 HP (Residential)	70	900	700.37	281.71	2.76	0.49	17.07	15.70	2342.85
2260004021	2 Stroke Chain Saws < 6 HP (Commercial)	70	650	764.61	176.42	2.25	0.33	20.97	19.29	1643.42
2260004025	2 Stroke Trimmers/Edgers/Brush Cutter (Residential)	91	890	671.00	291.74	2.80	0.46	17.55	16.15	2331.54
2260004026	2 Stroke Trimmers/Edgers/Brush Cutter (Commercial)	91	810	663.79	152.78	3.00	0.46	17.27	15.88	2243.29
2260004030	2 Stroke Leaf blowers/Vacuums (Residential)	94	890	691.91	319.39	2.76	0.46	17.20	15.82	2340.36
2260004031	2 Stroke Leaf blowers/Vacuums (Commercial)	94	760	710.10	157.99	2.82	0.40	18.48	17.00	1997.12
2260004035	2 Stroke Snow blowers (Residential)	35	870	1211.32	750.65	0.64	0.22	19.23	17.69	1144.68
2260004036	2 Stroke Snow blowers (Commercial)	35	870	1211.25	570.21	0.64	0.22	19.23	17.69	1146.89

Table 4-1. Criteria Pollutant Emission Factors for Nonroad Engines and Equipment[1]

SCC	Equipment Description	Load Factor (% Max Power)	BSFC[2] (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO_X	SO_2	PM_{10}[(4)]	$PM_{2.5}$[(5,6)]	GHG[7]
2260004071	2 Stroke Commercial Turf Equipment	60	840	643.37	119.05	3.09	0.49	16.69	15.36	2352.18
2260005035	2 Stroke Sprayers	65	840	586.99	156.69	3.06	0.49	17.53	16.13	2347.77
2260006005	2 Stroke Generator Sets	68	830	639.32	130.69	3.11	0.49	16.89	15.54	2351.90
2260006010	2 Stroke Pumps	69	830	617.31	131.46	3.15	0.46	18.35	16.88	2316.62
2260006015	2 Stroke Air Compressors	56	830	672.64	123.63	3.13	0.46	17.60	16.19	2318.82
2260006035	2 Stroke Hydro Power Units	56	830	672.55	122.60	3.13	0.46	17.57	16.17	2318.82
2260007005	2 Stroke Chain Saws > 6 HP	70	620	779.31	165.53	2.12	0.31	21.52	19.80	1541.15
2265001010	4 Stroke Motorcycles: Off- Road	100	160	113.12	12.00	0.88	0.11	0.15	0.14	491.82
2265001030	4 Stroke ATVs	100	170	116.58	13.16	0.86	0.11	0.15	0.14	520.77
2265001050	4 Stroke Golf Carts	46	740	1795.27	26.68	6.13	0.49	0.29	0.26	2322.90
2265001060	4 Stroke Specialty Vehicles/Carts	58	820	1340.31	66.22	7.70	0.53	0.29	0.26	2558.88
2265002003	4 Stroke Pavers	66	700	1315.79	22.84	7.85	0.44	0.24	0.22	2191.67
2265002006	4 Stroke Tampers/Rammers	55	760	1554.83	29.64	6.57	0.49	0.26	0.24	2371.97
2265002009	4 Stroke Plate Compactors	55	830	1537.63	66.66	6.95	0.51	0.46	0.43	2481.99
2265002015	4 Stroke Rollers	62	690	1376.85	20.40	7.12	0.44	0.24	0.22	2173.75
2265002021	4 Stroke Paving Equipment	59	780	1519.71	45.78	6.95	0.49	0.33	0.30	2410.02
2265002024	4 Stroke Surfacing Equipment	49	750	1619.75	35.10	6.42	0.49	0.31	0.28	2340.82
2265002027	4 Stroke Signal Boards/Light Plants	72	780	1655.56	49.48	6.28	0.49	0.40	0.37	2394.59
2265002030	4 Stroke Trenchers	66	710	1315.26	30.16	7.96	0.44	0.29	0.26	2211.80
2265002033	4 Stroke Bore/Drill Rigs	79	790	1204.13	70.58	9.66	0.49	0.44	0.41	2355.18
2265002039	4 Stroke Concrete/Industrial Saws	78	710	1595.89	21.30	6.35	0.46	0.26	0.24	2242.67
2265002042	4 Stroke Cement & Mortar Mixers	59	820	1479.42	60.77	7.34	0.51	0.35	0.32	2508.17

Table 4-1. Criteria Pollutant Emission Factors for Nonroad Engines and Equipment[1]

SCC	Equipment Description	Load Factor (% Max Power)	BSFC[2] (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO_X	SO_2	PM_{10}[(4)]	$PM_{2.5}$[(5,6)]	GHG[7]
2265002045	4 Stroke Cranes	47	590	483.31	16.56	14.22	0.37	0.15	0.14	1873.26
2265002054	4 Stroke Crushing/Proc. Equipment	85	740	1511.81	32.13	7.23	0.46	0.29	0.26	2294.23
2265002057	4 Stroke Rough Terrain Forklifts	63	570	335.20	13.69	13.76	0.37	0.15	0.14	1791.11
2265002060	4 Stroke Rubber Tire Loaders	71	550	292.32	11.86	12.39	0.35	0.15	0.14	1748.65
2265002066	4 Stroke Tractors/Loaders/ Backhoes	48	730	1589.56	22.60	6.46	0.46	0.26	0.24	2287.33
2265002072	4 Stroke Skid Steer Loaders	58	640	809.50	20.35	11.47	0.42	0.20	0.18	2017.99
2265002078	4 Stroke Dumpers/Tenders	41	800	1448.35	55.06	7.47	0.51	0.31	0.28	2485.55
2265002081	4 Stroke Other Construction Equipment	48	580	354.41	15.59	15.44	0.37	0.15	0.14	1826.67
2265003010	4 Stroke Aerial Lifts	46	630	685.16	20.77	14.60	0.40	0.18	0.16	1986.84
2265003020	4 Stroke Forklifts	30	560	330.18	13.05	14.00	0.37	0.15	0.14	1784.21
2265003030	4 Stroke Sweepers/Scrubbers	71	610	742.23	17.04	9.35	0.40	0.20	0.18	1917.92
2265003040	4 Stroke Other General Industrial Equipment	54	760	1481.10	46.70	7.12	0.46	0.37	0.34	2312.44
2265003050	4 Stroke Other Material Handling Equipment	53	640	766.81	20.99	13.69	0.42	0.20	0.18	2013.58
2265003060	4 Stroke AC\Refrigeration	46	740	1637.19	28.27	6.22	0.49	0.26	0.24	2336.13
2265003070	4 Stroke Terminal Tractors	78	520	224.05	8.27	9.02	0.33	0.15	0.14	1664.01
2265004010	4 Stroke Lawn mowers (Residential)	33	900	1430.49	160.17	7.59	0.53	0.60	0.55	2625.09
2265004011	4 Stroke Lawn mowers (Commercial)	33	880	1531.13	103.48	7.19	0.53	0.62	0.57	2562.78
2265004015	4 Stroke Rotary Tillers < 6 HP (Residential)	40	910	1435.23	164.58	7.65	0.53	0.62	0.57	2649.62
2265004016	4 Stroke Rotary Tillers < 6 HP (Commercial)	40	890	1451.02	100.50	7.50	0.53	0.60	0.55	2598.34
2265004025	4 Stroke Trimmers/Edgers/Brush Cutter HP (Residential)	91	900	1456.87	172.41	7.54	0.53	0.62	0.57	2618.47
2265004026	4 Stroke Trimmers/Edgers/Brush Cutter (Commercial)	91	820	1576.80	76.12	6.77	0.51	0.46	0.43	2466.27
2265004030	4 Stroke Leaf blowers/Vacuums (Residential)	94	900	1459.51	168.68	7.56	0.53	0.64	0.59	2629.50

Table 4-1. Criteria Pollutant Emission Factors for Nonroad Engines and Equipment[1]

SCC	Equipment Description	Load Factor (% Max Power)	BSFC[2] (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO_X	SO_2	PM_{10}[4]	$PM_{2.5}$[5,6]	GHG[7]
2265004031	4 Stroke Leaf blowers/Vacuums (Commercial)	94	700	1308.73	26.17	8.05	0.44	0.24	0.22	2198.29
2265004035	4 Stroke Snow blowers (Residential)	35	940	1556.29	183.87	7.08	0.60	0.24	0.22	2948.14
2265004036	4 Stroke Snow blowers (Commercial)	35	940	1556.11	47.72	7.08	0.60	0.24	0.22	2948.14
2265004040	4 Stroke Rear Engine Riding Mowers (Residential)	38	760	1520.17	74.62	6.79	0.49	0.26	0.24	2391.82
2265004041	4 Stroke Rear Engine Riding Mowers (Commercial)	38	740	1612.03	25.84	6.22	0.49	0.26	0.24	2338.33
2265004046	4 Stroke Front Mowers	65	790	1467.91	47.39	7.23	0.51	0.29	0.26	2478.66
2265004051	4 Stroke Shredders < 6 HP	80	890	1439.64	107.93	7.50	0.53	0.60	0.55	2600.55
2265004055	4 Stroke Lawn & Garden Tractors (Residential)	44	760	1515.52	60.57	6.86	0.49	0.26	0.24	2400.64
2265004056	4 Stroke Lawn & Garden Tractors (Commercial)	44	740	1611.02	24.26	6.24	0.49	0.26	0.24	2338.33
2265004066	4 Stroke Chippers/Stump Grinders	78	640	960.78	16.78	8.82	0.42	0.20	0.18	2013.58
2265004071	4 Stroke Commercial Turf Equipment	60	730	1438.01	28.97	6.28	0.46	0.29	0.26	2271.90
2265004075	4 Stroke Other Lawn & Garden Equipment	58	850	1440.00	85.05	7.45	0.53	0.44	0.41	2572.96
2265004076	4 Stroke Other Lawn & Garden Equipment	58	850	1433.38	85.86	7.50	0.53	0.44	0.41	2568.55
2265005010	4 Stroke 2-Wheel Tractors	62	740	1653.35	25.42	6.15	0.49	0.26	0.24	2329.51
2265005015	4 Stroke Agricultural Tractors	62	580	490.61	13.12	11.42	0.37	0.18	0.16	1833.28
2265005020	4 Stroke Combines	74	580	356.81	21.15	16.16	0.37	0.15	0.14	1842.10
2265005025	4 Stroke Balers	62	580	356.90	24.56	16.18	0.37	0.15	0.14	1842.10
2265005030	4 Stroke Agricultural Mowers	48	770	1514.77	34.02	6.88	0.49	0.26	0.24	2416.35
2265005035	4 Stroke Sprayers	65	740	1076.59	50.74	10.36	0.46	0.31	0.28	2298.64
2265005040	4 Stroke Tillers > 6 HP	71	870	1443.48	56.40	6.20	0.55	0.24	0.22	2705.82
2265005045	4 Stroke Swathers	52	580	356.90	21.17	16.18	0.37	0.15	0.14	1842.10
2265005055	4 Stroke Other Agricultural Equipment	55	620	587.81	22.49	14.31	0.40	0.18	0.16	1966.71

Table 4-1. Criteria Pollutant Emission Factors for Nonroad Engines and Equipment[1]

SCC	Equipment Description	Load Factor (% Max Power)	BSFC[2] (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO_X	SO_2	PM_{10}[(4)]	$PM_{2.5}$[(5,6)]	GHG[7]
2265005060	4 Stroke Irrigation Sets	60	550	300.87	11.84	10.96	0.35	0.15	0.14	1735.42
2265006005	4 Stroke Generator Sets	68	780	1507.10	46.33	6.95	0.51	0.31	0.28	2434.28
2265006010	4 Stroke Pumps	69	760	1375.48	49.99	7.72	0.49	0.37	0.34	2325.67
2265006015	4 Stroke Air Compressors	56	700	1160.36	31.86	8.47	0.44	0.29	0.26	2167.42
2265006025	4 Stroke Welders	68	710	1422.95	25.20	7.47	0.46	0.24	0.22	2225.03
2265006030	4 Stroke Pressure Washers	85	800	1547.98	55.24	6.77	0.51	0.37	0.34	2434.84
2265006035	4 Stroke Hydro Power Units	56	750	1600.17	33.82	6.39	0.49	0.31	0.28	2334.20
2265007010	4 Stroke Shredders > 6 HP	80	800	1445.66	45.05	7.36	0.51	0.29	0.26	2503.19
2265007015	4 Stroke Forest Equipment - Feller/Bunch/Skidder	70	810	1647.29	58.61	6.35	0.49	0.46	0.43	2432.92
2265008005	4 Stroke Airport Ground Support Equipment	56	600	577.42	18.30	10.63	0.37	0.20	0.18	1871.33
2265010010	4 Stroke Other Oil Field Equipment	90	740	1795.20	21.28	6.13	0.49	0.29	0.26	2322.90
2267001060	LPG Specialty Vehicle Carts	58	490	102.03	6.35	23.24	0.02	0.13	0.13	1472.37
2267002003	LPG Pavers	66	460	94.42	4.98	17.79	0.02	0.13	0.13	1394.02
2267002015	LPG Rollers	62	450	89.39	4.08	14.38	0.02	0.13	0.13	1345.11
2267002021	LPG Paving Equipment	59	480	98.67	5.80	21.08	0.02	0.13	0.13	1441.11
2267002024	LPG Surfacing Equipment	49	460	93.76	4.83	17.20	0.02	0.13	0.13	1385.20
2267002030	LPG Trenchers	66	460	95.08	5.09	18.19	0.02	0.13	0.13	1398.43
2267002033	LPG Bore/Drill Rigs	79	490	100.28	6.17	22.71	0.02	0.13	0.13	1465.76
2267002039	LPG Concrete/Industrial Saws	78	430	84.67	3.29	11.36	0.02	0.13	0.13	1302.43
2267002045	LPG Cranes	47	480	98.72	5.80	21.06	0.02	0.13	0.13	1441.11
2267002054	LPG Crushing/Proc. Equipment	85	480	98.41	5.73	20.82	0.02	0.13	0.13	1436.70
2267002057	LPG Rough Terrain Forklifts	63	470	96.51	5.36	19.25	0.02	0.13	0.13	1414.26

Table 4-1. Criteria Pollutant Emission Factors for Nonroad Engines and Equipment[1]

SCC	Equipment Description	Load Factor (% Max Power)	BSFC[2] (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO_X	SO_2	PM_{10}[4]	$PM_{2.5}$[5,6]	GHG[7]
2267002060	LPG Rubber Tire Loaders	71	460	94.04	4.85	17.24	0.02	0.13	0.13	1385.20
2267002066	LPG Tractors/Loaders/ Backhoes	48	450	91.55	4.41	15.57	0.02	0.13	0.13	1362.75
2267002072	LPG Skid Steer Loaders	58	470	97.64	5.60	20.22	0.02	0.13	0.13	1429.69
2267002081	LPG Other Construction Equipment	48	480	99.09	5.89	21.45	0.02	0.13	0.13	1445.52
2267003010	LPG Aerial Lifts	46	480	97.88	5.71	20.82	0.02	0.13	0.13	1436.70
2267003020	LPG Forklifts	30	460	93.54	4.83	17.15	0.02	0.13	0.13	1385.20
2267003030	LPG Sweepers/Scrubbers	71	440	88.22	3.88	13.58	0.02	0.13	0.13	1333.70
2267003040	LPG Other General Industrial Equipment	54	450	90.76	4.37	15.41	0.02	0.13	0.13	1360.55
2267003050	LPG Other Material Handling Equipment	53	480	97.70	5.67	20.59	0.02	0.13	0.13	1434.49
2267003070	LPG Terminal Tractors	78	430	84.74	3.29	11.40	0.02	0.13	0.13	1302.43
2267004066	LPG Chippers/Stump Grinders	78	450	92.24	4.56	16.16	0.02	0.13	0.13	1371.574
2267005055	LPG Other Agricultural Equipment	55	490	103.39	6.50	23.68	0.02	0.13	0.13	1478.988
2267005060	LPG Irrigation Sets	60	450	93.23	4.61	16.25	0.02	0.13	0.13	1371.574
2267006005	LPG Generator Sets	68	480	66.39	4.28	20.86	0.02	0.13	0.13	1449.93
2267006010	LPG Pumps	69	470	65.49	3.88	18.74	0.02	0.13	0.13	1420.871
2267006015	LPG Air Compressors	56	460	64.87	3.62	17.33	0.02	0.13	0.13	1402.838
2267006025	LPG Welders	68	460	93.69	5.05	18.21	0.02	0.13	0.13	1400.633
2267006030	LPG Pressure Washers	85	470	95.54	5.49	20.18	0.02	0.13	0.13	1429.691
2267006035	LPG Hydro Power Units	56	460	63.33	3.24	15.59	0.02	0.13	0.13	1378.583
2267008005	LPG Airport Ground Support Equipment	56	450	91.40	4.52	16.10	0.02	0.13	0.13	1369.369
2268002081	CNG Other Construction Equipment	48	480	99.09	0.35	21.45	0.02	0.13	0.13	2899.742
2268003020	CNG Forklifts	30	460	93.91	0.29	17.29	0.02	0.13	0.13	2797.846

Table 4-1. Criteria Pollutant Emission Factors for Nonroad Engines and Equipment[1]

SCC	Equipment Description	Load Factor (% Max Power)	BSFC[2] (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO_X	SO_2	PM_{10}[4]	$PM_{2.5}$[5,6]	GHG[7]
2268003030	CNG Sweepers/Scrubbers	71	460	93.84	0.29	17.20	0.02	0.13	0.13	2797.846
2268003040	CNG Other General Industrial Equipment	54	460	92.92	0.29	16.67	0.02	0.13	0.13	2793.436
2268003060	CNG AC\Refrigeration	46	450	90.85	0.26	15.30	0.02	0.13	0.13	2746.898
2268003070	CNG Terminal Tractors	78	430	85.02	0.20	11.51	0.02	0.13	0.13	2649.411
2268005055	CNG Other Agricultural Equipment	55	510	120.57	0.46	27.23	0.02	0.13	0.13	3026.127
2268005060	CNG Irrigation Sets	60	510	121.21	0.46	27.03	0.02	0.13	0.13	3023.922
2268006005	CNG Generator Sets	68	490	68.24	0.26	21.98	0.02	0.13	0.13	2992.585
2268006010	CNG Pumps	69	480	67.47	0.24	20.44	0.02	0.13	0.13	2943.842
2268006015	CNG Air Compressors	56	470	66.30	0.22	18.32	0.02	0.13	0.13	2892.894
2268006020	CNG Gas Compressors	85	410	16.47	0.02	2.54	0.02	0.13	0.13	2596.025
2268006035	CNG Hydro Power Units	56	470	66.44	0.31	18.68	0.02	0.13	0.13	2848.794
2268010010	CNG Other Oil Field Equipment	90	410	67.96	0.11	6.22	0.02	0.13	0.13	2554.13
2270001060	Diesel Specialty Vehicle Carts	21	450	17.29	4.56	15.92	0.99	2.54	2.45	1443.936
2270002003	Diesel Pavers	59	380	4.76	0.90	10.72	0.84	0.88	0.84	1223.636
2270002006	Diesel Tampers/Rammers	43	1000	10.83	2.51	15.83	2.23	1.72	1.68	3214.873
2270002009	Diesel Plate Compactors	43	410	9.92	2.43	14.99	0.90	1.72	1.68	1308.286
2270002015	Diesel Rollers	59	390	5.78	1.01	11.09	0.86	0.99	0.97	1243.768
2270002018	Diesel Scrapers	59	370	4.70	0.66	10.98	0.82	0.68	0.66	1192.48
2270002021	Diesel Paving Equipment	59	390	6.26	1.15	11.69	0.86	1.06	1.04	1237.153
2270002024	Diesel Surfacing Equipment	59	380	7.92	1.23	13.27	0.86	1.19	1.17	1232.456
2270002027	Diesel Signal Boards/Light Plants	43	410	7.32	2.03	13.08	0.90	1.35	1.30	1301.671
2270002030	Diesel Trenchers	59	400	8.05	1.32	11.95	0.88	1.32	1.28	1283.744

Table 4-1. Criteria Pollutant Emission Factors for Nonroad Engines and Equipment[1]

SCC	Equipment Description	Load Factor (% Max Power)	BSFC[2] (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO_X	SO_2	PM_{10}[(4)]	$PM_{2.5}$[(5,6)]	GHG[7]
2270002033	Diesel Bore/Drill Rigs	43	370	5.49	1.32	15.37	0.84	1.06	1.01	1199.095
2270002036	Diesel Excavators	59	380	3.75	0.75	10.03	0.84	0.71	0.68	1203.791
2270002039	Diesel Concrete/Industrial Saws	59	410	8.78	1.41	11.69	0.90	1.46	1.41	1314.901
2270002042	Diesel Cement & Mortar Mixers	43	390	7.17	1.81	15.79	0.86	1.35	1.30	1252.588
2270002045	Diesel Cranes	43	370	3.02	0.84	12.06	0.82	0.64	0.62	1185.865
2270002048	Diesel Graders	59	370	3.33	0.75	10.05	0.82	0.68	0.66	1194.685
2270002051	Diesel Off-highway Trucks	59	370	3.66	0.64	11.27	0.82	0.57	0.55	1192.48
2270002054	Diesel Crushing/Proc. Equipment	43	380	4.21	0.99	12.72	0.84	0.79	0.77	1212.611
2270002057	Diesel Rough Terrain Forklifts	59	390	7.30	1.23	11.71	0.88	1.21	1.17	1265.818
2270002060	Diesel Rubber Tire Loaders	59	370	4.87	0.86	11.75	0.84	0.82	0.79	1199.095
2270002066	Diesel Tractors/Loaders/ Backhoes	21	460	14.64	3.42	15.61	1.01	2.36	2.27	1472.888
2270002069	Diesel Crawler Tractor/Dozers	59	370	4.50	0.77	11.09	0.84	0.73	0.71	1199.095
2270002072	Diesel Skid Steer Loaders	21	480	19.58	4.85	16.01	1.06	3.11	3.02	1532.996
2270002075	Diesel Off-Highway Tractors	59	370	6.11	0.93	12.97	0.82	0.84	0.82	1192.48
2270002078	Diesel Dumpers/Tenders	21	470	18.74	5.01	16.43	1.04	3.11	3.00	1512.864
2270002081	Diesel Other Construction Equipment	59	370	6.46	0.99	13.01	0.82	0.95	0.93	1194.685
2270003010	Diesel Aerial Lifts	21	480	18.65	4.94	17.46	1.06	2.95	2.87	1535.201
2270003020	Diesel Forklifts	59	400	6.50	0.90	9.97	0.88	0.90	0.88	1274.924
2270003030	Diesel Sweepers/Scrubbers	43	380	3.42	0.93	11.11	0.86	0.75	0.73	1228.046
2270003040	Diesel Other General Industrial Equipment	43	380	3.75	1.04	12.33	0.84	0.79	0.77	1214.816
2270003050	Diesel Other Material Handling Equipment	21	440	12.08	3.37	18.32	0.99	2.18	2.12	1419.395
2270003060	Diesel AC\Refrigeration	43	410	5.45	1.12	11.58	0.90	1.01	0.97	1310.491

Table 4-1. Criteria Pollutant Emission Factors for Nonroad Engines and Equipment[1]

SCC	Equipment Description	Load Factor (% Max Power)	BSFC[2] (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO_X	SO_2	PM_{10}[4]	$PM_{2.5}$[5,6]	GHG[7]
2270003070	Diesel Terminal Tractors	59	380	3.57	0.77	9.44	0.84	0.71	0.68	1210.406
2270004031	Diesel Leaf blowers/Vacuums	43	410	9.28	2.78	15.26	0.90	1.59	1.54	1306.081
2270004036	Diesel Snow blowers	43	370	4.70	1.15	13.60	0.82	0.86	0.84	1179.25
2270004046	Diesel Front Mowers	43	410	7.28	2.01	13.03	0.90	1.37	1.32	1308.286
2270004056	Diesel Lawn & Garden Tractors	43	410	7.47	2.07	12.94	0.90	1.30	1.26	1308.286
2270004066	Diesel Chippers/Stump Grinders	43	380	5.67	1.39	13.69	0.84	1.08	1.06	1225.841
2270004071	Diesel Commercial Turf Equipment	43	400	4.28	1.04	11.29	0.88	0.88	0.86	1272.719
2270004076	Diesel Other Lawn & Garden Equipment	43	410	7.54	1.94	13.83	0.90	1.46	1.41	1301.671
2270005010	Diesel 2-Wheel Tractors	59	410	15.61	2.12	12.37	0.90	1.92	1.85	1321.516
2270005015	Diesel Agricultural Tractors	59	380	7.23	1.39	13.30	0.84	1.32	1.30	1219.226
2270005020	Diesel Combines	59	370	5.71	1.32	15.04	0.82	1.61	1.54	1194.685
2270005025	Diesel Balers	59	400	9.44	2.36	13.41	0.88	1.87	1.83	1277.129
2270005030	Diesel Agricultural Mowers	59	410	11.36	2.05	14.13	0.90	2.12	2.05	1321.516
2270005035	Diesel Sprayers	59	380	7.21	2.01	13.38	0.84	1.52	1.48	1203.791
2270005040	Diesel Tillers > 6 HP	59	370	8.33	1.37	13.56	0.84	1.19	1.15	1194.685
2270005045	Diesel Swathers	59	400	8.60	1.72	14.99	0.90	1.96	1.92	1292.564
2270005055	Diesel Other Agricultural Equipment	59	380	7.50	1.59	14.16	0.84	1.57	1.50	1203.791
2270005060	Diesel Irrigation Sets	43	390	4.92	1.37	12.83	0.86	1.08	1.04	1243.768
2270006005	Diesel Generator Sets	43	390	6.95	1.85	13.98	0.88	1.35	1.30	1261.408
2270006010	Diesel Pumps	43	390	6.92	1.76	14.09	0.88	1.37	1.32	1261.408
2270006015	Diesel Air Compressors	43	400	5.49	1.30	12.55	0.88	1.08	1.06	1274.924
2270006020	Diesel Gas Compressors	43	410	5.69	0.95	10.67	0.90	0.77	0.75	1312.696

Table 4-1. Criteria Pollutant Emission Factors for Nonroad Engines and Equipment[1]

SCC	Equipment Description	Load Factor (% Max Power)	BSFC[2] (lb/1000 hp-hr)	Emission Factors (lb/1000 hp-hr)						
				CO	VOC	NO_X	SO_2	PM_{10}[(4)]	$PM_{2.5}$[(5,6)]	GHG[7]
2270006025	Diesel Welders	21	480	20.31	5.12	15.19	1.06	3.06	2.98	1532.996
2270006030	Diesel Pressure Washers	43	380	6.33	1.83	14.18	0.86	1.12	1.10	1232.456
2270006035	Diesel Hydro Power Units	43	400	5.60	1.35	12.50	0.88	1.10	1.08	1281.539
2270007015	Diesel Forest Equipment - Feller/Bunch/Skidder	59	370	3.26	0.71	9.57	0.84	0.66	0.64	1196.89
2270008005	Diesel Airport Ground Support Equipment	59	380	4.96	0.88	11.44	0.84	0.82	0.79	1205.996
2270009010	Diesel Other Underground Mining Equipment	21	450	15.35	3.75	17.46	0.99	2.36	2.29	1432.911
2270010010	Diesel Other Oil Field Equipment	43	370	3.70	0.88	13.10	0.82	0.66	0.64	1183.66
2282005010	2 Stroke Outboard	21	850	419.61	235.67	5.93	0.44	3.31	3.04	2217.955
2282005015	2 Stroke Personal Water Craft	21	820	404.73	160.85	4.85	0.44	2.93	2.70	2208.289
2282010005	4 Stroke Inboard/Sterndrive	21	630	341.09	38.54	14.24	0.40	0.15	0.14	1982.429
2282020005	Diesel Inboard/Sterndrive	35	370	2.36	0.53	14.46	0.95	0.33	0.31	1183.66
2282020010	Diesel Outboards	35	410	8.40	2.71	13.21	1.06	1.57	1.52	1306.081
2285002015	Diesel Railway Maintenance	21	440	12.74	3.02	16.47	0.97	2.16	2.09	1408.37
2285004015	4 Stroke Railway Maintenance	62	750	1507.93	32.74	6.92	0.49	0.29	0.26	2345.229
2285006015	LPG Railway Maintenance	62	480	97.99	5.64	20.42	0.02	0.13	0.13	1432.29

1. 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-P-005, NR-005c, April 2004.
2. 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 take into account NONROAD model deterioration and transient adjustment factors across the model years.
3. Activities for off-road motorcycles and all-terrain vehicles are in units of miles per year instead of hours per year.
4. PM_{10} is assumed to be equivalent to total PM for gasoline engines.
5. For gasoline engines, $PM_{2.5}$ is assumed to be 92% of the PM_{10} value.
6. For LPG and CNG engines, all PM is assumed to be $PM_{2.5}$.
7. The greenhouse gas (GHG) emission factors are the total of CO_2, CH_4, and N_2O. CH_4 and N_2O were converted to equivalent CO_2 (CO_2e) using a global warming potential (GWP) value of 21 for CH_4 and 310 for N_2O. These were added to the CO_2 emission factor and are presented as the GHG emission factors in units of lb/1000hp-hr. Calculations were made using the stated BSFC, the fuel density in Table 3-2, and if the fuel was not stated, it was assumed to be gasoline.

Table 4-2. Pre-1998 Nonroad CI Engine Criteria Pollutant Emission Factors (Power Rating >50 hp)[1]

Equipment Description	Emission Factors (lb/1000 hp-hr)						
	CO	VOC[2]	NO_X	SO_X	PM_{10}[(3)]	$PM_{2.5}$[(4)]	GHG[5]
Construction Equipment							
Asphalt Pavers	7.05	1.35	22.71	2.05	1.98	1.92	1297.93
Plate Compactors	6.83	1.82	20.50	2.05	1.98	1.92	1297.93
Concrete Pavers	10.08	2.48	22.09	2.05	1.98	1.92	1297.93
Rollers	6.83	1.81	20.50	2.20	1.72	1.67	1297.93
Scrapers	11.02	1.57	19.18	1.98	2.78	2.69	1297.93
Paving Equipment	10.14	2.28	24.27	1.98	1.98	1.92	1297.93
Signal Boards	11.02	2.71	17.64	2.05	2.20	2.14	1297.93
Trenchers	20.15	3.47	22.09	2.05	3.17	3.08	1297.93
Bore/Drill Rigs	20.28	3.18	24.27	2.05	3.17	3.08	1297.93
Excavators	11.46	1.57	23.70	2.05	3.17	3.08	1297.93
Concrete/Industrial Saws	20.28	3.18	24.27	2.05	3.17	3.08	1297.93
Cement and Mortar Mixers	10.14	2.28	24.27	2.05	1.98	1.92	1297.93
Cranes	9.26	2.85	22.71	2.05	3.17	3.08	1297.93
Graders	8.38	3.47	21.16	1.92	2.20	2.14	1297.93
Off-Highway Trucks	6.17	1.90	21.16	1.96	1.76	1.71	1297.93
Crushing/Processing Equipment	20.28	3.18	24.27	2.05	3.17	3.08	1297.93
Rough Terrain Forklifts	22.05	3.78	17.64	2.05	3.53	3.42	1297.93
Rubber Tired Dozers	6.17	1.90	21.16	2.05	1.46	1.41	1297.93
Tractors/Loaders/Backhoes	14.99	3.16	22.27	1.87	2.31	2.25	1297.93
Crawler Tractors	10.58	2.85	22.71	1.87	2.45	2.37	1297.93
Skid Steer Loaders	19.84	4.72	21.16	2.05	3.17	3.08	1297.93
Off-Highway Tractors	32.36	5.54	26.26	2.05	4.48	4.34	1297.93
Dumpers/Tenders	6.17	1.90	21.16	1.96	3.17	3.08	1297.93
Other Construction Equipment	20.28	3.18	24.27	2.05	3.17	3.08	1297.93
Industrial Equipment							
Aerial Lifts	13.36	3.53	30.86	2.05	3.53	3.42	1297.93
Forklifts	13.36	3.53	30.86	2.05	3.53	3.42	1297.93
Sweepers/Scrubbers	13.36	3.53	30.86	2.05	3.53	3.42	1297.93
Other General Equipment	13.36	3.53	30.86	2.05	3.53	3.42	1297.93
Other Material Handling Equipment	13.36	3.53	30.86	2.05	3.53	3.42	1297.93
Lawn and Garden Equipment							
Rear Engine Riding Mowers	11.02	2.70	17.64	2.05	2.20	2.14	1297.93
Lawn and Garden Tractors	11.02	2.70	17.64	2.05	2.20	2.14	1297.93
Wood Splitters	11.02	2.70	17.64	2.05	2.20	2.14	1297.93
Chippers/Stump Grinders	11.02	2.70	17.64	2.05	2.20	2.14	1297.93
Other Equipment	11.02	2.70	17.64	2.05	2.20	2.14	1297.93

Table 4-2. Pre-1998 Nonroad CI Engine Criteria Pollutant Emission Factors (Power Rating >50 hp)[1] (continued)

Equipment Description	Emission Factors (lb/1000 hp-hr)						
	CO	VOC[2]	NO_X	SO_X	PM_{10}[(3)]	$PM_{2.5}$[(4)]	GHG[5]
Agricultural Equipment							
Tractors	19.71	5.01	24.71	1.92	4.52	4.38	1300.20
Sprayers	8.33	5.01	17.15	2.03	3.33	3.23	1300.20
Tillers	11.02	2.71	17.64	2.03	2.20	2.14	1300.20
Hydro Power Units	8.33	5.01	17.15	2.03	3.33	3.23	1300.20
Other Equipment	9.63	4.11	24.52	2.03	3.33	3.23	1300.20
Logging Equipment							
Skidders	11.46	1.90	24.91	1.98	3.17	3.08	1297.93
Fellers/Bunchers	11.46	1.90	24.91	1.98	3.17	3.08	1297.93
Recreational Equipment							
Specialty Vehicles/Carts	11.02	3.46	17.64	2.05	2.20	2.14	1297.93

1. SOURCE: *Nonroad Engine and Vehicle Emission Study – Report*, EPA 460/3-91-02, 21A-2001, November 1991.
2. Reported as HC and assumed to be equal to VOC.
3. Reported as PM in the source document and assumed to be equal to PM_{10}.
4. Assumed to be 97% of PM_{10} per *Exhaust and Crankshaft Emission Factors for Nonroad Engine Modeling-Compression-Ignition*, EPA420-P-04-009, April 2004.
5. The Greenhouse gas (GHG) emission factors are the total of CO_2, CH_4, and N_2O with individual emission factors of 10.21kg/gal, 0.58g/gal, and 0.26 g/gal respectively. CH_4 and N_2O were converted to equivalent CO_2 (CO_2e) using a global warming potential (GWP) value of 21 for CH_4 and 310 for N_2O. These were added to the CO_2 and are presented as the GHG emission factors in units of lb/1000hp-hr. Fuel usage rates were based on the conservative 0.408 lb/hp-hr which is the average fuel usage rate for engines below 100 hp (*from Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling-Compression-Ignition*, EPA420-P-04-009). All engines are assumed to use diesel which has a density of 7.14lb/gal and was used for unit conversion.

Table 4-3. Weight Percent HAP Speciation of VOC Emissions Nonroad Engines[1]

Pollutant	Weight Percent Speciation by Engine Type		
	2-Stroke Gasoline[2]	4-Stroke Gasoline[2]	Diesel
Acetaldehyde	0.166	0.41	7.43
Acrolein	0.03	0.07	1.15
Benzene	2.52	5.25	2.03
1,3-Butadiene	0.215	0.952	0.186
Ethylbenzene	2.4	1.98	0.31
Formaldehyde	0.254	1.17	14.96
Hexane	1.42	0.992	0.159
Methyl Tert Butyl Ether (MTBE)[3]	14.67	16.01	---
Polycyclic Organic Matter (POM)[4]	0.0016	0.00151	0.000627
Propionaldehyde	0.0247	0.188	0.985
Styrene	0.13	0.0758	0.0594
Toluene	9.78	7.18	1.5
Xylene	10.75	6.78	1.06

1. Data from Eastern Research Group, Inc., *Documentation for the 1996 Base Year National Toxics Inventory for Nonroad Vehicle and Equipment Mobile Sources*, June 2000.
2. Except for MTBE values, speciation values based on non-oxygenated/reformulated gasoline.
3. MTBE values applicable only to engines operating on gasoline oxygenated with MTBE.
4. POM values based on a total of 16 polycyclic aromatic hydrocarbon values (PAH).

"---" Indicates No Data Available. MTBE not used as oxygenate for diesel fuel.

Figure 4-1. Example Data Collection Form for Nonroad Vehicles and Equipment

Installation Name: **Inventory Year (CY):**
Responsible Organization (Name & Office Symbol):
POC (Name, Phone # and e-mail address):

Equipment Type	Equipment ID	Equipment Manufacturer	Equipment Model Number	Fuel Type	Power Rating (hp)	Load Factor (% of max)[1]	Estimated Operating Time (hr/yr)	Estimated Fuel Usage (gal/yr)[2]

1. Load factor is the highest % of maximum power which the equipment was operated at durng the inventory year. If this is unknown, a default EPA value should be used.
2. While the quantity of fuel is generally needed only if the power rating and operating hours are unknkown, fuel consumption data may also be needed to estimate CO_2 emissions.

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5.0 ON-ROAD VEHICLES

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 sources include light-duty vehicles (LDVs, also referred to as passenger cars), heavy-duty vehicles (HDVs), and motorcycles that are used for transportation on the road. On-road vehicles may be fueled with gasoline, diesel fuel, or alternative fuels, such as alcohol or natural gas.

On-road vehicles in use on Air Force installations are classified either as government owned vehicles (GOVs) or privately owned vehicles (POVs). GOVs include all on-road vehicles which 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. POVs are those on-road vehicles which travel on an Air Force installation, but which are owned (or leased) and operated by base employees, and visitors. POVs typically cover nearly every vehicle category (except for heavy-duty commercial vehicles) which includes motorcycles, light-duty passenger cars and light-duty trucks. Both GOVs and POVs typically operate on conventional gasoline and diesel motor fuels, but may also operate on alternative, non-petroleum based fuels.

Factors impacting vehicle emissions include the vehicle type (make/model), emission controls and engine design, vehicle miles traveled (VMT), average operating speed, vehicle age, climate and altitude, fuel 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 give full consideration to 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 can be classified as exhaust, evaporative, or fugitive in nature. Exhaust emissions result from the combustion (sometimes incomplete) of the motor fuel, typically while evaporative emissions result from the volatilization of the fuel at engine components during the different stages of a vehicle's operating cycle. Additionally, a small amount of 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 emissions of concern from the operation of on-road vehicles include the criteria pollutants NO_X, VOC, CO, SO_2, and $PM_{2.5}$ and PM_{10}, as well as HAPs such as 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 particulate matter pollution.

The EPA is currently proposing to regulate greenhouse gases (GHGs) for both mobile and stationary sources. As a matter of AF policy, greenhouse gases (GHGs) emissions are to be reported as part of the mobile air emission inventory. Specifically, carbon dioxide (CO_2) and methane (NH_3) emissions should be estimated for all mobile sources where emission factors are available. Additionally, although not currently regulated under the Clean Air Act, many regulatory agencies may request installations to include GHG emissions from motor vehicles in mobile source emissions inventories. Specific requests to calculate and provide CO_2 and/or NH_3 emissions data to regulatory agencies as part of the air emission inventory 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 in order to ensure a consistent Air Force response.

Since 1978, the U.S. Environmental Protection Agency has used computer models to estimate emissions

from cars, trucks and other mobile sources. The initial MOBILE model was expanded many times over the years to incorporate new data on vehicle emissions, new vehicle emission standards and to better address new policy questions, but the basic structure of the model has remained constant. 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 EPA's official model for highway vehicle emissions. A number of analysts have critiqued the MOBILE series of models and recommended a number of design changes for MOBILE. They suggested that EPA develop a modeling "toolkit" that would better serve the range of uses for highway vehicle modeling, including consistent modeling at the aggregate scale, mesoscale, and microscale analysis. In response to these and other concerns, EPA has developed the Motor Vehicle Emissions Simulator (MOVES). MOVES incorporates extensive new data and advanced algorithms to better estimate highway vehicle emissions of greenhouse gases, criteria pollutants and selected air toxics at the national, regional and project level. The final version of MOVES was released in 2010. It is used for EPA internal policy analyses and is required for use (outside California) in the evaluation of State Implementation Plans (SIPs) and transportation conformity determinations.

The EPA has historically classified on-road vehicles into eight broad categories, with category differences based on the motor fuel type and gross vehicle weight (GVW). MOBILE6 incorporated a new vehicle classification system that more accurately reflects the way vehicles are classified for emissions standards. MOVES, the successor to MOBILE6, expanded the general vehicle categories to 28 specific vehicle categories. MOVES design to reflect the general fleet distribution or fleet characterization (i.e., fractional vehicle category distribution by year) for a specific location. MOBILE6 provides an output of vehicle emission rates (e.g., units of grams/mile) for any year from 1952-2050. MOVES can just estimate emission rates (e.g., grams/mile, grams/vehicle) or input VMT and vehicle populations to output total emissions for any year from 1990 and 1999-2050.

Both MOVES and MOBILE6 emission models are better at showing relative changes in emissions over several years rather than obtaining “snapshot” accuracy for a given year. EPA’s April 2007 Guidance on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, $PM_{2.5}$, and Regional Haze; Section 1.3.1 on Page 3 (http://www.epa.gov/ttn/scram/guidance/guide/final-03-pm-rh-guidance.pdf), “First, we recommend using models in a relative sense in concert with observed air quality data…” Therefore, MOVES or MOBILE6 should not be used to create a Mobile Air Emission Inventory (AEI).

5.2 Vehicle Categories

The 28 vehicle categories from MOVES have been grouped into seven major aggregate categories or classes based on vehicle type and gross vehicle weight rating (GVWR). Table 5-1 provides the seven major aggregate categories. These categories were chosen based upon available MOBILE6 emission factor 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 (8,501to >60,000 lbs. GVWR).
- ***Heavy-Duty Diesel Vehicles (HDDV)*** – All larger diesel-powered vehicles (10,001to >60,000 lbs. GVWR).
- ***Motorcycles (MC)*** – All motorcycles (assumed to be gasoline powered).

Table 5-1. Air Force On-Road Vehicle Categories

CATEGORY		VEHICLE CLASS DECRIPTION
Air Force	**MOVES**	
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	Diesel Transit and Urban Buses
	HDDBS	Diesel School Buses
MC	MC	Motorcycles (Gasoline)

5.3 Vehicle Fleet Characterization

Based upon a review of recent Air Force mobile source emission inventories, the vehicle categories that are most representatives of the types of GOVs and POVs expected to be encountered on a typical Air

Force base were 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 air emissions inventory should use professional judgment to assign the vehicles to the listed category which most closely approximates (in terms of fuel type and vehicle weight) the vehicles in question. Table 5-2, Typical POV & GOV Vehicle Mix, provides a breakdown of the fleet characterization for the typical POV and GOV vehicle mix at an Air Force base.

Table 5-2. Typical POV & GOV Vehicle Mix

CATEGORY		2012 to 2020 Avg. National Vehicle Mix (%)		POV Vehicle Mix (%)		GOV Vehicle Mix (%)	
Air Force	**MOVES**						
LDGV	LDGV	34.86	34.86	**X**	37.55	**X**	54.49
LDDV	LDDV	0.03	0.03	**X**	0.03		0.00
LDGT	LDGT1	9.57	56.00	**X**	60.32	**X**	37.73
	LDGT2	31.86		**X**			
	LDGT3	9.98		**X**		**X**	
	LDGT4	4.59		**X**		**X**	
LDDT	LDDT1/2	0.00	0.19	**X**	0.20		0.00
	LDDT3/4	0.19		**X**			
HDGV	HDGV2a	2.88	3.46		0.00	**X**	4.67
	HDDV2b						
	HDGV3	0.10					
	HDGV4	0.03					
	HDGV5	0.11				**X**	
	HDGV6	0.24					
	HDGV7	0.10					
	HDGV8a	0.00				**X**	
	HDGV8b	0.00					
	HDGB	0.00					
HDDV	HDGV2a	0.72	3.70		0.00	**X**	3.11
	HDDV2b						
	HDDV3	0.22					
	HDDV4	0.21					
	HDDV5	0.10				**X**	
	HDDV6	0.41					
	HDDV7	0.59					
	HDDV8a	0.35				**X**	
	HDDV8b	0.82				**X**	
	HDDBT	0.03					
	HDDBS	0.25					
MC	MC	1.76	1.76	**X**	1.90		0.00

Note: An "**X**" in the POV or GOV columns indicates MOVES vehicle categories that are expected at an Air Force Base.

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. The state-specific emission factors for each of these vehicle categories were obtained directly from MOBILE6 as model outputs for both high and low altitudes. These emission factors can be found in Tables 5-9 through 5-13.

5.4 Alternative Fuels

Progressively stringent requirements resulting from the Energy Policy Act (EP Act), Presidential Executive Orders, and DoD and Air Force pollution prevention and energy conservation initiatives will continue to result in an increasing number of GOVs and POVs powered by alternative fuels such as E85 (a fuel blend consisting of 85% ethanol and 15% gasoline), compressed natural gas (CNG), or B20 (a fuel blend consisting of 20% biodiesel and 80% petroleum diesel), 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. Some fuels, however, 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. 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_X relative to conventional gasoline (U.S. Environmental Protection Agency 2002; *Clean Alternative Fuels*). 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 (U.S. Environmental Protection Agency 2006; *E85 and Flex Fuel Vehicles*). 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, at this point in time the application of E85 emission reduction factors is not recommended.

CNG is recognized as one of the cleanest burning alternative fuels available and offers a number of advantages over gasoline (U.S. Department of Energy, Energy Efficiency and Renewable Energy, Alternative Fuel Data Center, *Natural Gas Benefit.* U.S. Environmental Protection Agency 2002; *Clean Alternative Fuels: Compressed Natural Gas*). Relative to conventional light-duty gasoline powered vehicle applications, emissions from CNG-powered vehicles are estimated to be substantially lower for CO, PM, and NO_X. On a gasoline gallon equivalent basis, CNG reduces CO_2 emissions by 20-30% versus gasoline and diesel-powered vehicles.

There have been a few studies on the impact of B20 fuel on vehicle emissions. In October 2002, the EPA issued a draft technical report on biodiesel emissions (U.S. Environmental Protection Agency 2002; *A Comprehensive Analysis of Biodiesel Impacts on Exhaust Emissions*) which 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 reduction of NO_X, 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 (Department of Defense Environmental Security Technology Certification Program 2006; *Effect of Biodiesel on Diesel Engine Nitrogen Oxide and Other Regulated Emissions*). 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 there were no statistically significant differences in criteria pollutant emissions between the B20 biodiesel blended with ULSD and the ULSD by itself. Likewise, no consistent trend was observed with regard to HAP emissions. While the study did not investigate the impact of B20 on direct CO_2 emissions, the EPA recently estimated a 10% reduction in CO_2 emissions which can be attributed to the use of B20 (U.S. Environmental Protection Agency, Office of Transportation Air Quality 2006; *Biodiesel*).

HEVs produces fewer criteria pollutant, HAP, and CO_2 emissions than a comparable dedicated gasoline-powered vehicle because they 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 and, therefore, reduces fuel use and emissions. Overall emissions will vary depending on a number of factors including the vehicle's electrical storage capacity and how long it can operate in "electric-only" mode, how advanced the engine controls are, which emission standards the vehicles have been produced to meet, vehicle size, model year, etc. 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, 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 were utilized. The assessment of representative certification data indicated NO_X, CO, HC (assumed to be equal to VOCs), and CO_2 were substantially reduced on average (U.S. Environmental Protection Agency, Office of Transportation Air Quality, Certification and Fuel Economy Information System).

Based upon these data, reduction factors for alternative fuels were calculated for on-road vehicles and are provided in Table 5-3. To estimate potential emission reductions from the use of these alternative fuels and advanced vehicle technologies, calculate vehicle emissions using the MOBILE6 gasoline or diesel fuel emission factors provided and apply an appropriate percent impact based upon the values listed in the table.

Table 5-3. Alternative Fuel Emission Reduction Factors (FERFs)

Alternative Fuel (Original Fuel Type)	Vehicle Category	Fuel Reduction Emission Factor (%)					
		CO	NO_X	VOC	PM_{10}	$PM_{2.5}$	CO_2
CNG (Gasoline)	LDGV, LDGT, HDGV	90	60	70	90	90	22[(2)]
B20 (Diesel)[1]	LDDV, LDDT, HDDV	0	0	0	0	0	0
HEVs (Gasoline)	LDGV, LDGT	50	75	35	---	---	30

1. Based on emission factors using MOBILE6 default of 15 ppm ULSD for diesel, and results of Department of Defense ESCTP 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/ULSD vs. ULSD emissions.
2. Factors represent the difference in CO_2 emissions associated with the combustion of one gallon of gasoline and one gasoline equivalent of CNG. Source: California Climate Action Registry, General Reporting Protocol Version 2.2, Table C-3, March 2007.

"---" Indicates No Data Available.

5.5 Vehicle Emission Factors

5.5.1 Vehicle Exhaust Emissions

Emission factors for these aggregate vehicle categories were obtained directly from MOBILE6 as model emission factor outputs. The MOBILE6 model was used with state-specific information to generate an accurate estimation of on-road vehicle emissions for both high and low elevation locations. The MOBILE6 model was run for each state using standard model defaults and state-specific traffic and weather data, and the output used to generate criteria pollutant, HAP, CO_2, and fugitive on-road emission factors for the seven aggregate vehicle categories identified in Table 5-1, Air Force On-Road Vehicles Categories. Emission factors for both high and low altitude environments were generated across a 10 calendar year by 25 model year time period. The emission factors are provided in a gram/mile format in

Tables 5-9 through 5-13. Unless otherwise noted, emission factors are for January 1st of each calendar year. Several of the key inputs and model default values used to generate the emission factors are presented in Table 5-4.

Table 5-4. MOBILE6 Inputs Used to Generate On-Road Vehicle Emission Factors

Model Input	Input Value
Model Years	1981-2015
Calendar Years	2005-2015
Roadway Type	Arterial
Average Speed	25 mph
Temperature (high, low & average)	State specific 50 averages from NOAA
Diesel Sulfur Content	15 ppm
Fuel RVP	9.0
Gasoline Aromatics	25%
Gasoline Olefin Content	15%
Altitude Low	500 ft. above sea level
Altitude High	5,500 ft. above sea level
VMT Fraction*	Based on 2013

*EPA420-R-01-047. Fleet Characterization Data for MOBILE6 (September 2001), Appendix D

For those installations that are located outside of the continental United States (OCONUS), calculating emissions for on-road vehicles may be more difficult. Though there are state-specific emission factors which have been derived for calculating emissions, there is not a universally accepted set of emission factors based for areas outside of the United States. 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 average of all state-specific composite emission factors. The OCONUS set of composite emission factors is provided in Table 5-19 and are to be used with the same methodology as calculating on-road vehicle emissions within the United States. These emission factors were derived from data obtained directly from MOBILE6 for both high and low altitudes.

5.5.2 PM Emissions

There are two sources which contribute to PM emissions for on-road vehicles. These sources are vehicle exhaust, which is described above, and Fugitive PM emissions. The total PM emissions for on-road vehicle use are calculated as follows:

$$\boldsymbol{EP(PM)_{Total} = EP(PM)_{Exhaust} + EP(PM)_{Fugitive}} \qquad \textbf{Equation 5-1}$$

Where,

$EP(PM)_{Total}$ = total on-road vehicle PM emissions – **Note that this is for total PM of a specified radius, so total PM_{10} or $PM_{2.5}$** (lb/yr)

$EP(PM)_{Exhaust}$= PM emissions from vehicle exhaust (lb/yr)

$EP(PM)_{Fugitive}$= PM emissions from road dust (lb/yr)

The calculation of $EP(PM)_{Exhaust}$ and $EP(PM)_{Fugitive}$ is outlined in the following sections.

5.5.2.1 Fugitive PM Emissions

Fugitive PM emissions result from vehicles travelling along a road and are dependent on whether or not the 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 particulate matter is cast into the air. Particulate emissions will fluctuate for several reasons including construction activities in the area, road degradation due to vehicular traffic, and the application of granular materials for snow and ice control. Typically, the most important factors regarding road PM emissions are the number and weight of the vehicles which travel that road, and the vehicle miles traveled (VMT). Paved and unpaved road emission factors are already derived and may be found in Table 5-5, Fugitive PM Emission Factors.

Table 5-5. Fugitive PM Emission Factors

	POV		GOV	
	PM_{10} (g/mi)	**$PM_{2.5}$ (g/mi)**	**PM_{10} (g/mi)**	**$PM_{2.5}$ (g/mi)**
Paved Road	0.058	0.014	0.069	0.017
Unpaved Road	46.622	46.622	50.595	50.595

*__Note__ - To correct for seasonal conditions, then a precipitation correction factor must be calculated as outlined in section 5.5.2.1.1.

Though roads are themselves stationary, the emissions from road dust are the direct result of the traffic pattern of mobile sources and, therefore, are included here. This section describes the evaluation of PM emissions from paved and unpaved roads resulting from the traffic traveling on these surfaces, whereas **asphalt paving operations are considered stationary and are addressed in the stationary guide.**

The emission factors for suspension of loose material on a paved and unpaved road surfaces due to vehicle travel were derived from the following empirical equations from AP-42 Chapter 13.2 (Jan 2011):

$$EF_{paved} = k \times (sL)^{0.91} \times (W)^{1.02}$$ AP-42 Chapter 13.2.1.3

Where,

- **EF_{paved}** = particulate emission factor (g/mi)
- **k** = particle size multiplier, $PM_{2.5}$ = 0.25 g/mi and PM_{10} = 1.00 g/mi
- **sL** = road surface silt loading (g/m2), AP-42 Chapter 13.2.1 recommends a default value of 0.015 g/m2 for limited access roadways (such as Air Force roads)
- **W** = average weight (tons) of the vehicles traveling the road (2.581 tons for POVs and 3.096 tons for GOVs)

$$EF_{Unpaved} = k \times \left(\frac{s}{12}\right)^{a} \times \left(\frac{W}{3}\right)^{b} \times 453.6$$ AP-42 Chapter 13.2.2.2

Where,

- **$EF_{unpaved}$** = particulate emission factor (g/mi)
- **k** = particle size multiplier, $PM_{2.5}$ = 0.18 lb/mi and PM_{10} = 1.8 lb/mi
- **s** = surface material silt content (%), AP-42 Chapter 13.2.2 value for construction site road value of 8.5%
- **W** = average weight (tons) of the vehicles traveling the road (2.581 tons for POVs and 3.096 tons for GOVs)
- **k, a, b** = empirical constants for public roads from AP-42 Table 3.2.2-2 (k=1.5, a=0.9, 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 emission factor for each vehicle weight class. Rather, one emission factor should be calculated to represent the "fleet" average weight of all vehicles.

5.5.2.1.1 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 emission factor listed above, the total vehicle miles traveled as determined by the user calculating emissions, and a precipitation correction term. When accounting for precipitation, the fugitive PM emission factors must be corrected. The corrected emission factors for both paved and unpaved roads are calculated as follows:

$$\boldsymbol{EF(paved)_{Corrected} = EF_{Paved} \times \left(1 - \frac{P}{4N}\right)} \qquad \textbf{Equation 5-2}$$

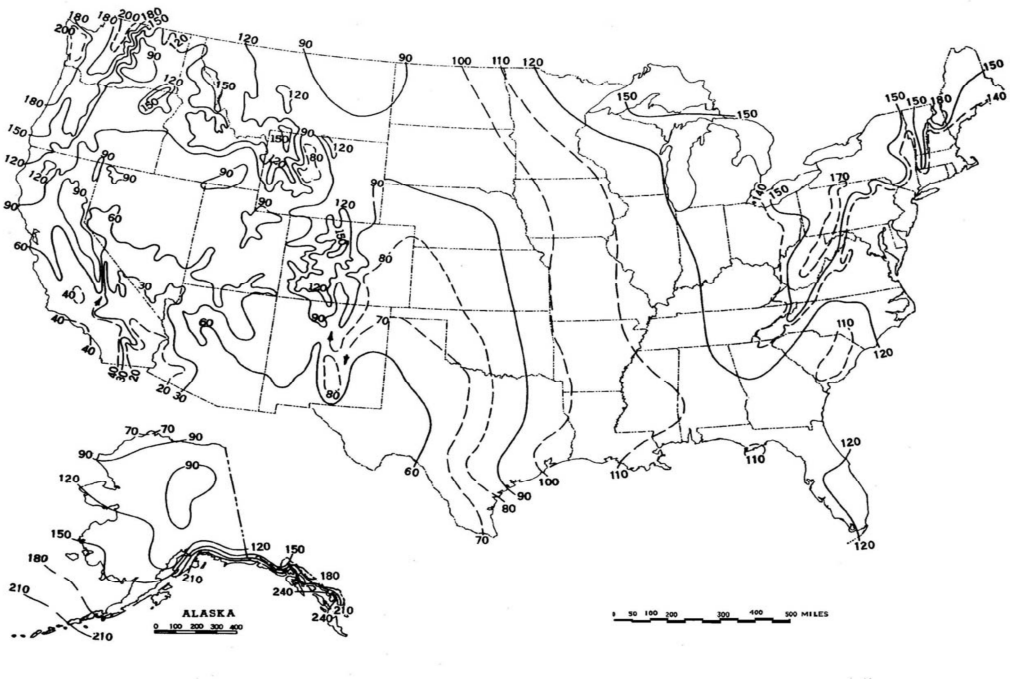
$$\boldsymbol{EF(unpaved)_{Corrected} = EF_{Unpaved} \times \left(1 - \frac{P}{N}\right)} \qquad \textbf{Equation 5-3}$$

Where,

$\mathbf{EF_{Corrected}}$ = corrected emission factor (g/mi)
EF = emission factors for paved or unpaved roads are provided in Table 5-5.
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 – for annual inventory, N=365)

*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.

Figure 5-1. Mean Number of days within the year with precipitation of 0.01 inches or more.



5.5.3 Idling Emission Factors

An idling vehicle wastes fuel, increases the cost of maintenance, and creates air pollution. Several states have adopted anti-idling restrictions with some states including these restrictions in their SIPs. Emission factors for emissions from idling vehicles were developed and are provided in a g/hr format since, by definition, an idling vehicle is not in motion and emissions may not be calculated on miles driven but rather time in the idle mode. For this reason, the total amount of time that a vehicle spends in idle mode must be known or closely approximated.

Idling emissions will vary depending on the temperature, so the emission factors were developed based on summer and winter conditions which are characterized by temperatures of 75°F and 30°F respectively. Tables 5-6 and 5-7 provide these emission factors based on summer and winter conditions with Table 5-8 providing an average of the two seasons.

Table 5-6. Idling Emission Factors for On-Road Vehicles During Summer Conditions[1]

Vehicle Category	Emission Factors (g/hr)				
	CO	NO_X	VOC	PM_{10}[(2)]	$PM_{2.5}$[(3)]
LDGV (Passenger Cars)	229	4.72	16.1	---	---
LDGT (0-8,500 lbs GVWR)	339	5.71	24.1	---	---
HDGV (>8,500 lbs GVWR)	738	10.2	35.8	---	---
LDDV (Passenger Cars)	9.97	6.50	3.53	---	---
LDDT (Light-Duty Trucks)	11.2	6.67	4.63	---	---
HDDV (>8,500 lbs GVWR)	94.0	55.0	12.5	2.58	2.37
MC (Motorcycles)	435	1.69	19.4	---	---

1. Data from EPA, EPA420-F-98-014, *Emission Facts: Idling Vehicle Emissions,* April 1998. Summer conditions are based on a temperature of 75°F and 9.0 psi RVP gasoline.
2. PM_{10} is an average of HDDV particulate emissions.
3. $PM_{2.5}$ value is assumed to be 92% of the PM_{10} value per *Air Emissions Factor Guide to Air Force Mobile Sources,* December 2009.

"---" Indicates No Data Available.

Table 5-7. Idling Emission Factors for On-Road Vehicles During Winter Conditions[1]

Vehicle Category	Emission Factors (g/hr)				
	CO	NO_X	VOC	PM_{10}[(2)]	$PM_{2.5}$[(3)]
LDGV (Passenger Cars)	371	6.16	21.1	---	---
LDGT (0-8,500 lbs GVWR)	487	7.47	30.7	---	---
HDGV (>8,500 lbs GVWR)	682	11.8	44.6	---	---
LDDV (Passenger Cars)	10.1	6.66	3.63	---	---
LDDT(Light-Duty Trucks)	11.5	6.89	4.79	---	---
HDDT (>8,500 lbs GVWR)	94.6	56.7	12.6	2.58	2.37
MC (Motorcycles)	388	2.51	20.1	---	---

1. Data from EPA, EPA420-F-98-014, *Emission Facts: Idling Vehicle Emissions,* April 1998. Winter conditions are based on a temperature of 30°F and 13.0 psi RVP gasoline.
2. PM_{10} is an average of HDDV particulate emissions.
3. $PM_{2.5}$ value is assumed to be 92% of the PM_{10} value per *Air Emissions Factor Guide to Air Force Mobile Sources,* December 2009.

"---" Indicates No Data Available.

Table 5-8. Average Idling Emission Factors for On-Road Vehicles[1]

Vehicle Category	Emission Factors (g/hr)				
	CO	NO_X	VOC	PM_{10}	$PM_{2.5}$
LDGV (Passenger Cars)	300	5.40	18.6	---	---
LDGT (0-8,500 lbs GVWR)	413	6.60	27.4	---	---
HDGV (>8,500 lbs GVWR)	710	11.0	40.2	---	---
LDDV (Passenger Cars)	10.0	6.60	3.60	---	---
LDDT(Light-Duty Trucks)	11.4	6.80	4.70	---	---
HDDT (>8,500 lbs GVWR)	94.3	55.9	12.6	2.58	2.37
MC (Motorcycles)	412	2.10	19.8	---	---

1. Data represent average of summer and winter values listed in above tables.
"---" Indicates No Data Available.

5.6 Emission Calculations

Both MOVES and MOBILE6 emission models are better at showing relative changes in emissions over several years rather than obtaining "snapshot" accuracy for a given year. EPA's April 2007 Guidance on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, $PM_{2.5}$, and Regional Haze; Section 1.3.1 on Page 3 (http://www.epa.gov/ttn/scram/guidance/guide/final-03-pm-rh-guidance.pdf), "First, we recommend using models in a relative sense in concert with observed air quality data…". Therefore, MOVES or MOBILE6 should not be used to create a Mobile Air Emission Inventory (AEI).

5.6.1 Vehicle Emissions

For calculating vehicle emissions, the total pollutant emitted into the air is dependent on the emission factor and vehicle miles driven (VMT). The methods for calculation are outlined below.

a. With Specific Vehicle Mix Data: Emissions from the operation of on-road vehicles are calculated by multiplying the estimated annual vehicle miles traveled (VMT) for each particular vehicle category by the MOBILE6 category-specific pollutant emission factors. To calculate emissions from multiple vehicle categories, individual calculations are performed for each vehicle category and for each pollutant, and summed to obtain total emissions.

$$EP(Pol)_{Total} = \sum_{i=1}^{7} [VMT_i \times EF(Pol)_i \times \frac{FERF}{100} \times 0.002205] \qquad \textbf{Equation 5-4}$$

Where,

$EP(Pol)_{Total}$ = Total emissions for a specific pollutant from a specific vehicle category of an individual air pollutant (lb/yr)

$EF(Pol)_i$ = Emission factor of each pollutant for each vehicle category (g/mi) **For Fugitive PM, if accounting for precipitation, use the calculated corrected emission factors as defined in section 5.5.2.1.1.**

$FERF$ = Fuel reduction emission factor. This is used in cases where the vehicles operate using alternative fuels. (Use 100 if no alternative fuel used).

100 = Conversion factor for converting reduction percent to a fraction

0.002205 = Factor for converting grams to pounds (lb/g)

i = Specific vehicle category of seven Air Force categories (i.e., LDGV, LDDV, LGDT, LDDT, HDGV, HDDV, and MC)

VMT_i = Annual vehicle miles traveled by each vehicle category (mi/yr)

*Note that when calculating fugitive PM, PM for both paved and unpaved roads should be calculated independently since:

$$VMT_i = VMT_{i\,(Paved)} + VMT_{i\,(Unpaved)} \quad \textbf{Equation 5-5}$$

If the annual Vehicle Miles Traveled (VMT) for each vehicle category is not known, the following equation may be used to approximate VMT for each specific vehicle category (VMT_i):

$$VMT_i = AVM_i \times n_i = AVM_i \times N \times \frac{MIX_i}{100} \quad \textbf{Equation 5-6}$$

Where,

AVM_i	=	Average annual vehicle miles traveled by each vehicle category (mi/yr)
n_i	=	Number of vehicles in a specific vehicle category
N	=	Total number of vehicles (POV or GOV)
MIX_i	=	Vehicle mix, from Table 5-2, for a specific vehicle category

b. With Air Force Typical Vehicle Mix Data: If the number of vehicles for each vehicle category (n_i) is not known nor the specific vehicle mix, the default vehicle mix values (MIX_i) from Table 5-2 can be used to modify Equation 5-6 to calculate the VMT for all the vehicle categories (VMT_{Total}):

$$VMT_{Total} = \sum_{i=1}^{7}\left(AVM_i \times N \times \frac{MIX_i}{100}\right) \quad \textbf{Equation 5-7}$$

Then, assuming all vehicle categories traveled the same distance per year, Equations 5-4 and 5-7 can be rewritten as follows:

$$VMT_{Total} = AVM \times N \quad \textbf{Equation 5-8}$$

$$EP(Pol)_{Total} = VMT_{Total} \times EF(Pol)_{Total} \times 0.002205 \quad \textbf{Equation 5-9}$$

$$EF(Pol)_{Total} = \sum_{i=1}^{7}\left[\frac{MIX_i}{100} \times EF(Pol)_i \times \frac{FERF}{100}\right] \quad \textbf{Equation 5-10}$$

Where,

VMT_{Total} = The total annual vehicle miles traveled by all vehicle categories (mi/yr)
AVM = Average annual vehicle miles traveled for all vehicle categories (mi/yr)
$EF(Pol)_{Total}$ = Total composite emission factor for a specific pollutant for all vehicle categories (g/mi)

c. With State-Specific Composite Emission Factor: This method is a simplified version of the Air Force Typical Vehicle Mix method (i.e., b above). In this case you use a state-specific $EF(Pol)_{Total}$ for a specific pollutant that is derived from MOBILE6 instead calculating the $EF(Pol)_{State}$ from Equation 5-10 above. The primary difference between this method and the Air Force Typical Vehicle Mix method (b above) is the vehicle mix data used to derive the emission factors; this method uses the average vehicle mix (including fuel usage mix) for a given specific state, while the Air Force Typical Vehicle Mix method uses a typical vehicle mix for an average Air Force facility.

Vehicle emissions are estimated using equation 5-9 and state-specific total composite emission factor for all vehicle categories ($EF(Pol)_{State}$). The state-specific total composite emission factors can be found in Tables 5-14 through 5-18. If an alternative fuel is used the emission factor can be adjusted with the following:

$$EF(Pol)_{Total} = EF(Pol)_{State} \times \frac{FERF}{100} \qquad \textbf{Equation 5-11}$$

Where,

$EF(Pol)_{State}$ = State-specific total composite emission factor for a specific pollutant for all vehicle categories (g/mi)

Given the method uses the average state vehicle mix, it is not considered representative of GOV fleet mix; therefore this method should not be used for GOVs.

5.6.1.1 Calculating Vehicle Exhaust Emissions With Specific Vehicle Mix Data

Emissions from GOVs or POVs are calculated using the general formula provided in Equations 5-4 and 5-6. These steps must be completed independently for each pollutant of concern. Note GOVs and POVs should not be combined; GOV and POV emissions must be calculated independently.

Step 1 - Gather Fleet Data:

Prior to calculating emissions, the individual responsible for preparing the mobile source emission inventory must collect fleet information. Data required to calculate vehicle emissions typically includes vehicle category, vehicle identification, model year, and vehicle miles traveled (VMT) during the course of the year in question.

a. GOV Fleet MIX Data: If a GOV is driven both on and off base during the course of the inventory year, an estimate must be made to apportion the number of miles driven between off base miles and on base miles. Figure 5-2 provides a sample form that can be used to collect and organize GOV data by vehicle category for use in emission calculations. The best way to collect GOV information is to provide blank forms for each vehicle category to the base organization(s) responsible for managing GOVs.

b. POV Fleet MIX Data: Prior to conducting an air emissions inventory which includes POVs, it is recommended that the individual responsible for preparing the mobile source emission inventory contacts the Base Development and/or Community Planning sections of the Civil Engineering Squadron to determine if a traffic survey has been conducted recently at the base. Traffic surveys are planning tools used by transportation engineers and land use planners to collect information such as vehicle mix, vehicle counts, VMT, traffic flow, morning/evening patterns, weekday/weekend patterns, etc., for use in designing roadway systems and managing the flow of traffic. If available, such surveys typically contain information that will be useful in calculating POV emissions.

In many cases, however, a recent traffic survey for the base is not available, and available resources do not allow the conduct of a new traffic survey. In such cases, 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 which 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 which fall under the seven vehicle categories; 3) the estimated distance (in miles) the average POV travels on the installation during a typical weekday and weekend day; and 4) the estimated number of non-registered vehicles which travel on the installation during a typical weekday and weekend day. Figure 5-3 provides

a sample form that can be used to collect and organize POV data for use in emission calculations.

An alternative approach to obtaining vehicle registration information may be available at some installations. Rather than requesting the Security Forces Squadron and/or the MPF to generate estimates on the number and types of vehicles registered on base, some installations may be able to provide a listing (preferably in both electronic and hardcopy format) of the vehicles contained in their databases.

Step 2 - Group Vehicle Categories:

Upon gathering fleet data, group together all vehicles based on the Air Force vehicle categories (i.e., LDGV, LDDV, LGDT, LDDT, HDGV, HDDV, and MC). Record the number of vehicles (n_i) and total annual miles traveled (VMT_i) for each vehicle category.

a. If the VMT_i for each vehicle category is unknown, use equation 5-6 to approximate them:

$$VMT_i = AVM_i \times n_i$$

b. If there is insufficient fleet data to provide the number of vehicles (n_i) for each vehicle category however you know the total number of vehicles and the relative vehicle mix (MIX_i) for each specific vehicle category, use equation 5-6 to approximate n_i:

$$n_i = N \times \frac{MIX_i}{100}$$

Step 3 - Select Emission Factors:

Fugitive PM emission factors are taken from Table 5-5 while on road exhaust emission factors are taken from Tables 5-9 through 5-13 (2013 to 2017 On-Road Vehicle Emission Factors). Select these based on the season, vehicle category, the calendar year you are performing the emissions calculation, the installation's location (i.e., the state it is located in), and the installation's altitude. A ''designated high-altitude location'' is any base within a county which has substantially all of its area located above 1,219 meters (4,000 feet). For the majority of applications, low-altitude is the appropriate choice. A list of those counties EPA has designated as high-altitude appears in Title 40, §86.091-30, paragraphs (a) (5) (ii) and (iv), Code of Federal Regulations (July 1, 2001).

Once the state, calendar year, and an altitude designation are determined, go to Tables 5-9 through 5-13 (and Table 5-5 if calculating PM emissions) to choose and record the appropriate pollutant-specific emission factors ($EF(Pol)_i$) for each vehicle category.

Step 4 - Calculate Emissions:

Finally, calculate the total vehicle emissions for a specific pollutant ($EP(Pol)_{Total}$). First calculate on-road vehicle exhaust emissions for each individual vehicle category ($EP(Pol)_i$) and then sum the $EP(Pol)_i$ values for the the total vehicle emissions for that pollutant.

a. Pollutant emissions for each vehicle category ($EP(Pol)_i$) are calculated and summed across categories to obtain total GOV emissions using Equation 5-4:

$$EP(Pol)_i = VMT_i \times EF(Pol)_i \times \frac{FERF}{100} \times 0.002205$$

Note: If not using an alternative fuel the FERF = 100, if using an alternative fuel the FERF can be found in Table 5-3.

b. Calculate the total emissions for a specific pollutant ($EP(Pol)_{Total}$) by summing the $EP(Pol)_i$ values for the specific pollutant for each vehicle categories:

$$EP(Pol)_{Total} = \sum_{i=1}^{7} [EP(Pol)_i]$$

5.6.1.2 Calculating Vehicle Exhaust Emissions Without Specific Vehicle Mix Data

5.6.1.2.1 Air Force Typical Vehicle Mix Data Method

Emissions from vehicles are calculated by applying the general formulas provided in Equation 5-7 (further simplified with Equations 5-8, 5-9, and 5-10) and using the typical POV or GOV vehicle mix data from Table 5-2. These steps must be completed independently for each pollutant of concern. Note GOVs and POVs should not be combined; GOV and POV emissions must be calculated independently.

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 often can 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 which 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) the average POV travels on the installation during a typical weekday and weekend day; and 3) the estimated number of non-registered vehicles which 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. Rather than requesting the Security Forces Squadron and/or the MPF to generate estimates on the number and types of vehicles registered on base, some installations may be able to provide a listing (preferably in both electronic and hardcopy format) of the vehicles contained in their databases. At a minimum, the listing should provide the number of registered vehicles.

Step 2 - Group Vehicle Categories:

When the actual fleet mix data is unavailable, the typical fleet mix data from Table 5-2 may be applied. Upon gathering fleet data on the total number (*N*) of vehicles (POV or GOV) driving on base and overall average annual vehicle miles traveled (*AVM*), obtain and record the typical vehicle mix values (MIX_i) 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_{Total}) for all vehicle categories combined with Equation 5-8:

$$VMT_{Total} = AVM \times N$$

Step 3 - Select Emission Factors:

a. Fugitive PM emission factors are taken from Table 5-5 and on-road vehicle emission factors are found in Tables 5-9 through 5-13 (2013 to 2017 On-Road Vehicle Emission Factors). Select these based on the season, vehicle category, the calendar year you are performing the emissions calculation, the installation's location (i.e., the state it is located in), and the installation's altitude. A ''designated high-altitude location'' is any base within a county which has substantially all of its area located above 1,219 meters (4,000 feet). For the majority of applications, low-altitude is the appropriate choice. A list of those counties EPA designated as high-altitude appears in Title 40, §86.091-30, paragraphs (a) (5) (ii) and (iv), Code of Federal Regulations (July 1, 2001).

Once the state, calendar year and an altitude designation are determined, go to Tables 5-9 through 5-13 (and Table 5-5 if calculating PM emissions) to select and record the appropriate pollutant-specific emission factors ($EF(Pol)_i$) for each vehicle category.

b. Once the appropriate pollutant-specific emission factors (*EF(Pol)i*) for each vehicle category are obtained, calculate the total composite emission factor using Equation 5-10:

$$EF(Pol)_{Total} = \sum_{i=1}^{7} [\frac{MIX_i}{100} \times EF(Pol)_i \times \frac{FERF}{100}]$$

Note: If not using an alternative fuel the FERF = 100, if using an alternative fuel the FERF can be found in Table 5-3.

Step 4 - Calculate Emissions:

The total pollutant emissions from all vehicle categories ($EP(Pol)_{Total}$) for on-road emissions are each calculated using Equation 5-9:

$$EP(Pol)_{Total} = VMT_{Total} \times EF(Pol)_{Total} \times 0.002205$$

5.6.1.2.2 State-Specific Composite Emission Factor Method

Emissions from vehicles are calculated by applying Equations 5-9 and state-specific total composite emission factor for all vehicle categories ($EF(Pol)_{State}$) which can be found in Tables 5-14 through 5-18. These steps must be completed independently for each pollutant of concern. Note this method is not recommended for GOVs.

Step 1 - Gather Fleet Data:

In this case fleet data and traffic survey results are unavailable, therefore, you must obtain the total number (*N*) of vehicles driving on base and the overall average annual vehicle miles traveled (*AVM*) for all vehicle categories. The data often can 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.

Step 2 -Group Vehicle Categories:

With this method there is no requirement for grouping vehicles into categories given the state average fleet mix data is incorporated into the state-specific $EF(Pol)_{Total}$. Upon gathering the total number (*N*) of vehicles

driving on base and overall average annual vehicle miles traveled (*AVM*), calculate the total annual vehicle miles traveled (VMT_{Total}) for all vehicle categories combined with Equation 5-8:

$$VMT_{Total} = AVM \times N$$

Step 3 - Select Emission Factors:

a. Fugitive PM emission factors are taken from Table 5-5 while state-composite emission factors are found in Tables 5-14 through 5-18 (2013 to 2017 State-Specific On-Road Composite Vehicle Emission Factors) based on the calendar year you are performing the emissions calculation, the installation's location (i.e., the state it is located in), and the installation's altitude. A ''designated high-altitude location'' is any base within a county which has substantially all of its area located above 1,219 meters (4,000 feet). For the majority of applications, low-altitude is the appropriate choice. A list of those counties EPA has designated as high-altitude appears in §86.091-30, paragraphs (a) (5) (ii) and (iv), Code of Federal Regulations (July 1, 2001).

Once the state, calendar year and an altitude designation are determined, go to Tables 5-14 through 5-18 (and Table 5-5 if calculating PM emissions) to select and record the appropriate pollutant-specific emission factors $EF(Pol)_{State}$ for each vehicle category.

b. Once the appropriate emission factors ($EF(Pol)_{State}$) are obtained, calculate the total composite emission factor using Equation 5-11:

$$EF(Pol)_{Total} = EF(Pol)_{State} \times \frac{FERF}{100}$$

Note: FERF = 100 if not using an alternative fuel; however, if using an alternative fuel the FERF value can be found in Table 5-3.

Step 4 - Calculate Emissions:

Finally, the total pollutant emissions from all vehicle categories ($EP(Pol)_{Total}$) are calculated using Equation 5-9:

$$EP(Pol)_{Total} = VMT_{Total} \times EF(Pol)_{Total} \times 0.002205$$

5.6.2 Idle Emissions

Calculating idling emissions is similar to the calculation of on-road vehicle emissions written above with slight modifications to the provided equations. The primary difference is that the emission factors for idling vehicles are presented in a g/hr format which means the time spent in idle mode must be known (or estimated).

a. With Specific Vehicle Mix Data: Emissions from the operation of on-road vehicles are calculated by multiplying the estimated annual vehicle idling time (VIT) for each particular vehicle category by the category-specific pollutant emission factors listed in tables 5-6 to 5-8. To calculate emissions from multiple vehicle categories, individual calculations are performed for each vehicle category and for each pollutant, and summed to obtain total emissions. The following general equation is used:

$$EP(Pol)_{Total} = \sum_{i=1}^{7} [VIT_i \times EF(Pol)_i \times 0.002205] \quad \textbf{Equation 5-12}$$

Where,

$EP(Pol)_{Total}$	=	Total emissions for a specific pollutant from a specific vehicle category of an individual air pollutant (lb/yr)
VIT_i	=	Annual vehicle idling time by each vehicle category (hr/yr)
$EF(Pol)_i$	=	Emission factor of each pollutant for each vehicle category (g/hr)
0.002205	=	Factor for converting grams to pounds (lb/g)
i	=	Specific vehicle category of seven Air Force categories (i.e., LDGV, LDDV, LGDT, LDDT, HDGV, HDDV, and MC)

If the annual Vehicle Idling Time (VIT) for each vehicle category is not known, the following equation may be used to approximate VIT for each specific vehicle category (VIT_i):

$$VIT_i = AVIT_i \times n_i = AVIT_i \times N \times \frac{MIX_i}{100} \quad \textbf{Equation 5-13}$$

Where,

$AVIT_i$	=	Average annual vehicle idling time by each vehicle category (hr/yr)
n_i	=	Number of vehicles in a specific vehicle category
N	=	Total number of vehicles (POV or GOV)
MIX_i	=	Vehicle mix, from Table 5-2, for a specific vehicle category

b. With Air Force Typical Vehicle Mix Data: If the number of vehicles for each vehicle category (n_i) is not known nor the specific vehicle mix, the default vehicle mix values (MIX_i) from Table 5-2 can be used to modify Equation 5-13 to calculate the VIT for all the vehicle categories (VIT_{Total}):

$$VIT_{Total} = \sum_{i=1}^{7} \left(AVIT_i \times N \times \frac{MIX_i}{100}\right) \quad \textbf{Equation 5-14}$$

Then, assuming all vehicle categories spent the same amount of time in the idle mode per year, Equations 5-12 and 5-14 can be rewritten as follows:

$$VIT_{Total} = AVIT \times N \quad \textbf{Equation 5-15}$$

$$EP(Pol)_{Total} = VIT_{Total} \times EF(Pol)_{Total} \times 0.002205 \quad \textbf{Equation 5-16}$$

$$EF(Pol)_{Total} = \sum_{i=1}^{7} [\frac{MIX_i}{100} \times EF(Pol)_i] \quad \textbf{Equation 5-17}$$

Where,

VIT_{Total}	=	The total annual vehicle idling time by all vehicle categories (mi/yr)
$AVIT$	=	Average annual vehicle idling time for all vehicle categories (mi/yr)
$EF(Pol)_{Total}$	=	Total composite emission factor for a specific pollutant for all vehicle categories (g/mi)

5.6.2.1 Calculating Idling Emission Factors

Calculation of idling emission factors follows the same process as on-road emissions calculations outlined above in section 5.6.1. Emissions from GOVs or POVs are calculated by applying either the general formulas provided in Equations 5-12 and 5-13 if the specific vehicle mix is known or those formulas provided by Equation 5-15 and vehicle mix data from Table 5-2. These steps must be completed independently for each pollutant of concern. Note GOVs and POVs should not be combined; GOV and POV emissions must be calculated independently.

Step 1 - Gather Fleet Data:

a. With Specific Vehicle Mix Data: Prior to calculating emissions, the individual responsible for preparing the mobile source emission inventory must collect fleet information if available. This data typically includes vehicle category, vehicle identification, model year, VMT, and VIT estimates during the course of the year in question.

The average vehicle idling time will vary between POVs and GOVs due to the vehicle category, traffic encountered when driven, and nature of the vehicle's operation (i.e., if the vehicle is a delivery vehicle, bus, etc…). It may be up to the discretion of the individual preparing the mobile source emission inventory to estimate the average vehicle idling time per vehicle category. For emergency services (such as fire departments, fire departments, or ambulances) or transportation services (bus operators), contact the fleet manager for assistance in determining idling times and vehicle operating policies.

b. Without Specific Vehicle Mix Data: As in the case when specific vehicle mix data is available, the individual preparing the mobile source emission inventory may need to use their discretion in estimating vehicle idling times. For this method, an average vehicle idling time for all categories must be estimated and the Security Forces Squadron and/or Military Personnel Flight should be contacted to obtain the total number of vehicles and any guidance in determining the vehicle idle times.

Step 2 - Group Vehicle Categories:

a. With Specific Vehicle Mix Data: Upon gathering fleet data, group together all vehicles based on the Air Force vehicle categories (i.e., LDGV, LDDV, LGDT, LDDT, HDGV, HDDV, and MC). Record the number of vehicles (n_i) and total annual vehicle idling time (VIT_i) for each vehicle category.

a. If the VIT_i for each vehicle category is unknown, use the equation 5-13 to approximate VIT_i:

$$VIT_i = AVIT_i \times n_i$$

b. If there is insufficient fleet data to provide the number of vehicles (n_i) for each vehicle category however you know the total number of vehicles and the relative vehicle mix (MIX_i) for each specific vehicle category, use equation 5-13 to approximate n_i:

$$n_i = N \times \frac{MIX_i}{100}$$

b. Without Specific Vehicle Mix Data: If the vehicle fleet data is unavailable, then the typical fleet mix in Table 5-2 may be used. Upon gathering fleet data on the total number (N) of vehicles driving on base and overall average annual vehicle idling time (AVIT), obtain and record the typical vehicle mix values (MIX_i) from Table 5-2 for each vehicle category. Then, assuming all vehicle categories spent the same amount of time in the idle mode for the year, calculate the total annual vehicle idling time (VIT_{Total}) for all

vehicles combined with Equation 5-15:

$$VIT_{Total} = AVIT \times N$$

Step 3 - Select Emission Factors:

a. With Specific Vehicle Mix Data: Emission factors are taken from Tables 5-6 through 5-8 and are temperature dependent. If the emissions calculation is for an extended inventory period, such as one year, then the person conducting the emissions inventory must use meteorological data to determine the temperature range within the inventory period. If the person calculating the emissions inventory is able to obtain the idling times from step 2 above on a monthly basis, then the most accurate emissions determination may be made by using the appropriate temperature-dependent emission factors and summing emissions for each month over the entire period.

b. Without Specific Vehicle Mix Data:

- Emission factors are taken from tables 5-6 through 5-8 based on the temperature at the installation.
- Once the appropriate pollutant-specific emission factors ($EF(Pol)_i$) for each vehicle category are obtained, calculate the total composite emission factor using equation 5-17:

$$EF(POL)_{Total} = \sum_{i=1}^{7} \left[\frac{MIX_i}{100} \times EF(Pol)_i \right]$$

Step 4 - Calculate Emissions:

a. With Specific Vehicle Mix Data: Finally, calculate the total vehicle emissions for a specific pollutant ($EP(Pol)_{Total}$), first calculating emissions for each individual vehicle category ($EP(Pol)_i$) and then summing the $EP(Pol)_i$ values for the specific pollutant for each vehicle categories:

- Pollutant emissions for each vehicle category ($EP(Pol)_i$) are calculated and summed across categories to obtain GOV emissions using Equation 5-16.

$$EP(Pol)_{Total} = \sum_{i=1}^{7} [VIT_i \times EF(Pol)_i \times 0.002205]$$

- Calculate the total emissions for a specific pollutant ($EP(Pol)_{Total}$) by summing the $EP(Pol)_i$ values for the specific pollutant for each vehicle categories:

$$EP(Pol)_{Total} = \sum_{i=1}^{7} EP(Pol)_i$$

b. Without Specific Vehicle Mix Data: Finally, the total pollutant emissions from all vehicle categories ($EP(Pol)_{Total}$) are calculated using Equation 5-16:

$$EP(Pol)_{Total} = VIT_{Total} \times EF(Pol)_{Total} \times 0.002205$$

5.7 Information Resources

Information required for calculating emissions from GOVs can usually be obtained from the base 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 base'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 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 good position to survey base personnel on their vehicle usage. Since the Security Forces Squadron is responsible for staffing the base gates, they are also 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 base personnel to obtain the required information. It's also highly recommended that personnel conducting the air emissions inventory 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 at the base.

For purposes of estimating the length of typical on-base POV trips, consider the trip length in terms of the mileage from the main gate to a common on-base 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 base more than once per day, such personnel who leave the base during lunchtime. In the absence of base-specific survey data, it can be conservatively assumed that 5% of base personnel will travel off base during lunchtime. Since this is a second trip through the gate, you should assume the daily on-base mileage is doubled for those individuals. If base 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-base conditions from the local metropolitan planning office (MPO).

Finally, the base Weather Detachment should be contacted to verify the installation's altitude to determine whether the installation is below or above 4,000 feet above sea level (low/high altitude threshold).

5.8 Example Calculations

5.8.1 Problem 1 - Calculating GOV Emissions

Anytown AFB is inventorying its calendar year 2013 CO emissions for their 15 GOVs operated by the facility during the year. The GOVs averaged 4,563 mile each and the AFB is located in Alabama.

a. With Specific Vehicle Data:
For this example, vehicle data was available from the Environmental Manager. It was collected and

the GOV data was organized by vehicle category using the form shown in Figure 5-1.

Step 1 - Gather GOV Fleet Data, and Step 2 - Group GOVs by Vehicle Category:

Using the form provided in Figure 5-2, the Environmental Manager collected the following data:

Installation Name: Anytown AFB			**Inventory Year:** 2013	
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)**
LDGV				
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
		Average	**2000**	**4,361**
		Total		**34,888**
LDGT				
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
		Average	**2000**	**4,875**
		Total		**19,500**
HDGV				
Vehicle #2	Flatbed	Bldg. 15	1998	4,450
		Average	**1998**	**4,450**
		Total		**4,450**
LDDT				
Vehicle #4	Pickup	Bldg. 1	2004	4,300
		Average	**2004**	**4,300**
		Total		**4,300**
HDDV				
Vehicle #12	Fire Truck	Bldg. 45-2	2002	5,300
		Average	**2002**	**5,300**
		Total		**5,300**

Step 3 - Select Emission Factors:

The first step in the process is to determine the installations altitude above sea level. In this case, the altitude of the Air Force facility is 1,100 feet above sea level. Since this altitude is less than the high altitude threshold of 4,000 feet above sea level, the facility is considered to be in a "low altitude" location. As such, all emissions factors must be retrieved from the low altitude tables.

The second step is to determine the applicable emissions factors based on vehicle category, a low altitude location, located in Alabama, and the fact that the inventory is for CY 2013. Extracting the carbon monoxide emission factors from the appropriate sub-table of Table 5-9 reveals the following:

Vehicle Category	CO Emission Factor (g/mi)
LDGV	8.11
LDGT	9.74
HDGV	8.55
LDDT	0.657
HDDV	0.941

Step 4 - Calculate Emissions:

i. Calculate the CO emissions for each vehicle category ($EP(Pol)_i$) using Equation 5-4:

$$EP(Pol)_i = \sum_{i=1}^{7} [VMT_i \times EF(Pol)_i \times \frac{FERF}{100} \times 0.002205]$$

$$EP(CO)_{LDGV} = 34{,}888 \frac{\cancel{mi}}{yr} \times 8.11 \frac{\cancel{g}}{\cancel{mi}} \times 0.002205 \frac{lb}{\cancel{g}} = \mathbf{623.9} \frac{\mathbf{lb}}{\mathbf{yr}}$$

$$EP(CO)_{LDGT} = 19{,}500 \frac{\cancel{mi}}{yr} \times 9.74 \frac{\cancel{g}}{\cancel{mi}} \times 0.002205 \frac{lb}{\cancel{g}} = \mathbf{418.8} \frac{\mathbf{lb}}{\mathbf{yr}}$$

$$EP(CO)_{HDGV} = 4{,}450 \frac{\cancel{mi}}{yr} \times 8.55 \frac{\cancel{g}}{\cancel{mi}} \times 0.002205 \frac{lb}{\cancel{g}} = \mathbf{83.9} \frac{\mathbf{lb}}{\mathbf{yr}}$$

$$EP(CO)_{LDDT} = 4{,}300 \frac{\cancel{mi}}{yr} \times 0.657 \frac{\cancel{g}}{\cancel{mi}} \times 0.002205 \frac{lb}{\cancel{g}} = \mathbf{6.2} \frac{\mathbf{lb}}{\mathbf{yr}}$$

$$EP(CO)_{HDDV} = 5{,}300 \frac{\cancel{mi}}{yr} \times 0.941 \frac{\cancel{g}}{\cancel{mi}} \times 0.002205 \frac{lb}{\cancel{g}} = \mathbf{11.0} \frac{\mathbf{lb}}{\mathbf{yr}}$$

ii. Finally, calculate the total emissions for a specific pollutant ($EP(Pol)_{Total}$) by summing the $EP(Pol)_i$ values for the specific pollutant for each vehicle categories:

$$EP(Pol)_{Total} = \sum_{i=1}^{7} EP(Pol)_i$$

$$EP(CO)_{TOTAL} = (623.9 + 418.8 + 83.9 + 6.2 + 11.0)\frac{lb}{yr} = \mathbf{1,143.8}\frac{\boldsymbol{\cancel{lb}}}{\boldsymbol{yr}} \times \frac{1}{2000}\frac{ton}{\cancel{lb}}$$

$$\boxed{\boldsymbol{EP(CO)_{TOTAL} = 0.57\ \frac{ton}{yr}}}$$

b. With Typical Vehicle Mix Data:

<u>Step 1</u> - Gather Fleet Data:

In this case you do not have fleet data or a traffic survey for the base. Therefore you must obtain the total number (*N*) of vehicle (POV or GOV) driving on base and the overall average annual vehicle miles traveled (*AVM*) for all vehicle categories. Therefore, use Table 5-2, Typical POV & GOV Fleet MIX, for the AF's typical GOV fleet mix data. In this case we have 15 GOVs driving approximately 4,563 mi/yr.

<u>Step 2</u> - Group GOVs by Vehicle Category:

Upon gathering fleet data on the total number (*N*) of vehicles driving on base and overall average annual vehicle miles traveled (*AVM*), obtain and record the typical vehicle mix values (MIX_i) 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_{Total}) for all vehicle categories combined with Equation 5-8:

$$VMT_{Total} = AVM \times N$$

$$\boldsymbol{VTM_{Total}} = 4{,}563\ \frac{\text{mi}}{yr} \times 15\ \text{GOVs} = \mathbf{68,445}\ \frac{\mathbf{mi}}{\boldsymbol{yr}}$$

Specific vehicle data isn't readily available (i.e., traffic studies or Figure 5-1 data); therefore, the typical GOV mix from table 5-2 is used. Using the typical GOV vehicle mix from Table 5-2, the following fleet data and groupings can be derived:

Vehicle Category	GOV Vehicle Mix (%)
LDGV	54.49
LDDV	0.00
LDGT	37.73
LDDT	0.00
HDGV	4.67
HDDV	3.11
MC	0.00

While not required for estimating vehicle emissions under this method, you can also estimate how many vehicles would be in each vehicle category:

$$n_i = N \times \frac{MIX_i}{100}$$

$$n_{LDGV} = 15 \times \frac{54.49}{100} = \mathbf{8.2\ vehicles}$$

$$n_{LDGT} = 15 \times \frac{37.73}{100} = \textbf{5.7 vehicles}$$

$$n_{HDGV} = 15 \times \frac{4.67}{100} = \textbf{0.7 vehicles}$$

$$n_{HDDV} = 15 \times \frac{3.11}{100} = \textbf{0.5 vehicles}$$

Step 3 - Select Emission Factors:

Using the sub-tables of Table 5-9, determine the appropriate and applicable pollutant-specific emission factors ($EF(Pol)_i$) for each vehicle category based on vehicle category, altitude, location, and inventory year.

Vehicle Category	CO Emission Factor (g/mi)
LDGV	8.11
LDGT	9.74
HDGV	8.55
HDDV	0.941

Once the appropriate emission factors ($EF(Pol)_{State}$) are obtained, calculate the total composite emission factor using Equation 5-10:

$$EF(Pol)_{Total} = \sum_{i=1}^{7} \left[\frac{MIX_i}{100} \times EF(Pol)_i \times \frac{FERF}{100} \right]$$

Because alternative fuel is not being used, FERF = 100. Therefore, $EF(Pol)_{Total}$ is equal to $EF(Pol)_{State}$.

$$\boldsymbol{EF(Pol)_{Total}} = \left(\frac{54.49}{100} \times 8.11 \frac{g}{mi}\right) + \left(\frac{37.73}{100} \times 9.74 \frac{g}{mi}\right) + \left(\frac{4.67}{100} \times 8.55 \frac{g}{mi}\right) + \left(\frac{3.11}{100} \times 0.941 \frac{g}{mi}\right) = \boldsymbol{8.52 \frac{g}{mi}}$$

Step 4 - Calculate Emissions:

Finally, calculate the total CO emissions for all vehicle categories ($EP(Pol)_{Total}$) using Equation 5-9:

$$EP(Pol)_{Total} = VMT_{Total} \times EF(Pol)_{Total} \times 0.002205$$

$$EP(CO)_{TOTAL} = 68{,}445 \frac{\cancel{mi}}{yr} \times 0.002205 \frac{lb}{\cancel{g}} \times 8.52 \frac{g}{mi} = 1{,}285.85 \frac{lb}{yr}$$

$$\boxed{\boldsymbol{EP(CO)_{TOTAL} = 0.64 \frac{ton}{yr}}}$$

5.8.2 Problem 2 - Calculating POV Emissions

Anytown AFB is conducting an emissions inventory to quantify calendar year 2013 emissions attributable to the operation of POVs. Using the information provided by the Security Forces Squadron, the following

data was used to calculate the CY2013 emissions of CO from the operation of POVs.

a. With Specific Vehicle Data: In this case, the individual performing the air emissions inventory was able to obtain vehicle data from the Environmental Manager. The collected POV data was organized by vehicle category using the form shown in Figure 5-2.

Step 1 - Gather Fleet Data:

Using the form provided in Figure 5-3, the Environmental Manager collected the following data:

Installation Name: Anytown AFB	**Inventory Year:** 2013
Responsible Organization (Name and Office Symbol): 58 CES/CD	
POC (Name, Phone #, and email): SSgt John Jones, DSN 234-5678	
Question	**Response**
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 registered POVs at the installation during the inventory period?	1,675
What is the estimated percentage of registered vehicles which actually travel on the installation during a typical weekday (Monday-Friday)?	75
What is the estimated percentage of registered vehicles which actually 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 non-registered 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)	

Using registration information, provide an estimate of the percentage of registered POVs which fall under each of the 7 vehicle categories listed below.

Vehicle Category	Category Description	Estimated % of Registered Vehicles
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 (8,501to >60,000 lbs. GVWR)	4
HDDV	Heavy-Duty Diesel Vehicles – All larger diesel-powered vehicles (10,001to >60,000 lbs. GVWR)	3
MC	Motorcycles (MC) – All motorcycles (assumed to be gasoline powered)	1

<u>Step 2</u> - Group Vehicle Category:

The first step is to calculate the estimated total number of vehicles (N) driving on base:

$$N = Registered + Unregistered$$
$$\boldsymbol{N} = 1{,}675\, registered\ +\ 125\, Unregistered\ = \mathbf{1{,}800}\ \boldsymbol{vehicles}$$

Assuming the fleet mix for the unregistered vehicles is the same as the registered vehicles; calculate the estimated number of vehicles which fall under each vehicle category. By slightly modifying Equation 5-6, we derive the number of vehicles for each vehicle category (n_i) from the total number of vehicles (N) and the vehicle category mix (MIX_i):

$$n_i = N \times \frac{MIX_i}{100}$$

$$\mathrm{n_{LDGV}} = 1{,}800 \times \tfrac{36}{100} = \textbf{648 vehicles}$$

$$\mathrm{n_{LDDV}} = 1{,}800 \times \tfrac{1}{100} = \textbf{18 vehicles}$$

$$\mathrm{n_{LDGT}} = 1{,}800 \times \tfrac{54}{100} = \textbf{972 vehicles}$$

$$\mathrm{n_{LDDT}} = 1{,}800 \times \tfrac{1}{100} = \textbf{18 vehicles}$$

$$\mathrm{n_{HDGV}} = 1{,}800 \times \tfrac{4}{100} = \textbf{72 vehicles}$$

$$\mathrm{n_{HDDV}} = 1{,}800 \times \tfrac{3}{100} = \textbf{54 vehicles}$$

$$\mathrm{n_{MC}} = 1{,}800 \times \tfrac{1}{100} = \textbf{18 vehicles}$$

Next we need to estimate the overall average annual vehicle miles traveled (AVM_i) and the total annual vehicle mile traveled for each vehicle category (VMT_i):

$$AVM_i = \frac{52\cancel{wk}}{yr} \times \left[\left(\frac{75}{100} \times 6\frac{mi}{\cancel{day}} \times 5\frac{\cancel{day}}{\cancel{week \cdot day}}\right) + \left(\frac{50}{100} \times 4\frac{mi}{\cancel{day}} \times 2\frac{\cancel{day}}{\cancel{weekend \cdot day}}\right)\right]$$

$$AVM_i = 1378\frac{mi}{yr}$$

$$VMT_i = AVM_i \times n_i$$

Therefore:

$$\mathrm{VMT_{LDGV}} = 1378\frac{\mathrm{mi}}{\mathrm{yr}} \times 648\ \mathrm{vehicles} = \mathbf{892{,}944}\ \frac{\mathbf{mi}}{\mathbf{yr}}$$

$$\mathrm{VMT_{LDDV}} = 1378\frac{\mathrm{mi}}{\mathrm{yr}} \times 18\ \mathrm{vehicles} = \mathbf{24{,}804}\ \frac{\mathbf{mi}}{\mathbf{yr}}$$

$$\mathrm{VMT_{LDGT}} = 1378\frac{\mathrm{mi}}{\mathrm{yr}} \times 972\ \text{vehicles} = \mathbf{1,339,416}\frac{\mathbf{mi}}{\mathbf{yr}}$$

$$\mathrm{VMT_{LDDT}} = 1378\frac{\mathrm{mi}}{\mathrm{yr}} \times 18\ \text{vehicles} = \mathbf{24,804}\frac{\mathbf{mi}}{\mathbf{yr}}$$

$$\mathrm{VMT_{HDGV}} = 1378\frac{\mathrm{mi}}{\mathrm{yr}} \times 72\ \text{vehicles} = \mathbf{99,216}\frac{\mathbf{mi}}{\mathbf{yr}}$$

$$\mathrm{VMT_{HDDV}} = 1378\frac{\mathrm{mi}}{\mathrm{yr}} \times 54\ \text{vehicles} = \mathbf{74,412}\frac{\mathbf{mi}}{\mathbf{yr}}$$

$$\mathrm{VMT_{MC}} = 1378\frac{\mathrm{mi}}{\mathrm{yr}} \times 18\ \text{vehicles} = \mathbf{24,804}\frac{\mathbf{mi}}{\mathbf{yr}}$$

Step 3 - Select Emission Factors:

The first step in the process is to determine the installations altitude above sea level. In this case, the altitude of the Air Force facility is 1,100 feet above sea level. Since this altitude is less than the high altitude threshold of 4,000 feet above sea level, the facility is considered to be in a "low altitude" location. As such, all emissions factors must be retrieved from the low altitude tables.

The second step is to determine the applicable emissions factors based on vehicle category, a low altitude location, located in Alabama, and the fact that the inventory is for CY 2013. Extracting the carbon monoxide emission factors from the appropriate sub-table of Table 5-9 reveals the following:

Vehicle Category	CO Emission Factor (g/mi)
LDGV	8.110
LDDV	0.808
LDGT	9.740
LDDT	0.657
HDGV	8.550
HDDV	0.941
MC	14.28

Step 4 - Calculate Emissions:

a. Calculate the CO emissions for each vehicle category ($EP(Pol)_i$) using Equation 5-4:

$$EP(Pol)_i = \sum_{i=1}^{7} [VMT_i \times EF(Pol)_i \times \frac{FERF}{100} \times 0.002205]$$

$$\mathrm{EP(CO)_{LDGV}} = 892{,}944\frac{\cancel{\mathrm{mi}}}{\mathrm{yr}} \times 8.11\frac{\cancel{\mathrm{g}}}{\cancel{\mathrm{mi}}} \times 0.002205\ \frac{\mathrm{lb}}{\mathrm{g}} = \mathbf{15,968.1}\ \frac{\mathbf{lb}}{\mathbf{yr}}$$

$$\mathrm{EP(CO)_{LDDV}} = 24{,}804\frac{\cancel{\text{mi}}}{\text{yr}} \times 0.808\frac{\cancel{\text{g}}}{\cancel{\text{mi}}} \times 0.002205\ \frac{\text{lb}}{\cancel{\text{g}}} = \mathbf{44.2}\ \frac{\mathbf{lb}}{\mathbf{yr}}$$

$$\mathrm{EP(CO)_{LDGT}} = 1{,}339{,}416\frac{\cancel{\text{mi}}}{\text{yr}} \times 9.74\frac{\cancel{\text{g}}}{\cancel{\text{mi}}} \times 0.002205\ \frac{\text{lb}}{\cancel{\text{g}}} = \mathbf{28{,}766.2}\ \frac{\mathbf{lb}}{\mathbf{yr}}$$

$$\mathrm{EP(CO)_{LDDT}} = 24{,}804\frac{\cancel{\text{mi}}}{\text{yr}} \times 0.657\frac{\cancel{\text{g}}}{\cancel{\text{mi}}} \times 0.002205\ \frac{\text{lb}}{\cancel{\text{g}}} = \mathbf{35.9}\ \frac{\mathbf{lb}}{\mathbf{yr}}$$

$$\mathrm{EP(CO)_{HDGV}} = 99{,}216\frac{\cancel{\text{mi}}}{\text{yr}} \times 8.55\frac{\cancel{\text{g}}}{\cancel{\text{mi}}} \times 0.002205\ \frac{\text{lb}}{\cancel{\text{g}}} = \mathbf{1{,}870.5}\ \frac{\mathbf{lb}}{\mathbf{yr}}$$

$$\mathrm{EP(CO)_{HDDV}} = 74{,}412\frac{\cancel{\text{mi}}}{\text{yr}} \times 0.941\frac{\cancel{\text{g}}}{\cancel{\text{mi}}} \times 0.002205\ \frac{\text{lb}}{\cancel{\text{g}}} = \mathbf{154.4}\ \frac{\mathbf{lb}}{\mathbf{yr}}$$

$$\mathrm{EP(CO)_{MC}} = 24{,}804\frac{\cancel{\text{mi}}}{\text{yr}} \times 14.28\frac{\cancel{\text{g}}}{\cancel{\text{mi}}} \times 0.002205\ \frac{\text{lb}}{\cancel{\text{g}}} = \mathbf{781.0}\ \frac{\mathbf{lb}}{\mathbf{yr}}$$

b. Finally, calculate the total emissions for a specific pollutant ($EP(Pol)_{Total}$) by summing the $EP(Pol)_i$ values for the specific pollutant for each vehicle categories:

$$EP(Pol)_{Total} = \sum_{i=1}^{7} EP(Pol)_i$$

$$\boldsymbol{EP(CO)_{TOTAL}} = (15{,}968.1 + 44.2 + 28{,}766.2 + 35.9 + 1{,}870.5 + 154.4 + 781.0)\frac{lb}{yr}$$

$$= \mathbf{47{,}620.3}\frac{\cancel{\boldsymbol{lb}}}{\boldsymbol{yr}} \times \frac{1}{2000}\frac{ton}{\cancel{lb}}$$

$$\boxed{\boldsymbol{EP(CO)_{TOTAL} = 23.8\ \frac{ton}{yr}}}$$

b. With State-Specific Composite Emission Factor

Emissions from vehicles are calculated by applying Equations 5-9 and state-specific total composite emission factors for all vehicle categories ($EF(Pol)_{State}$) which can be found in Tables 5-14 through 5-18. These steps must be completed independently for each pollutant of concern.

<u>Step 1</u> - Gather Fleet Data:

In this case do not use fleet data or a traffic survey results; obtain the total number (*N*) of vehicles driving on base and the overall average annual vehicle miles traveled (*AVM*) for all vehicle categories. The data often can be provided by the Security Forces Squadron (from the Pass & Registration section) and/or the Military Personnel Flight (MPF).

The individual performing the air emissions inventory was able to obtain vehicle data from the Environmental Manager. The POV data was organized by vehicle category using the form shown in Figure 5-3:

Installation Name: Anytown AFB	**Inventory Year:** 2013
Responsible Organization (Name and Office Symbol): 58 CES/CD	
POC (Name, Phone #, and email): SSgt John Jones, DSN 234-5678	
Question	**Response**
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 registered POVs at the installation during the inventory period?	1,675
What is the estimated percentage of registered vehicles which actually travel on the installation during a typical weekday (Monday-Friday)?	75
What is the estimated percentage of registered vehicles which actually 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 non-registered 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)	Unknown

Step 2 - Group Vehicle Categories:

With this method, there is no requirement for grouping vehicles into categories given the state average fleet mix data is incorporated into the state-specific $EF(Pol)_{Total}$. Upon gathering the total number (N) of vehicles driving on base and overall average annual vehicle miles traveled (AVM); calculate the total annual vehicle miles traveled (VMT_{Total}) for all vehicle categories combined using Equation 5-8:

$$VMT_{Total} = AVM \times N$$

$$N = Registered + Unregistered$$
$$\boldsymbol{N} = 1{,}675\, registered + 125\, Unregistered = \mathbf{1{,}800}\ \boldsymbol{vehicles}$$

Estimate the overall average annual vehicle miles traveled (AVM_i) and the total annual vehicle miles traveled for each vehicle category (VMT_i):

$$AVM_i = \frac{52 \cancel{wk}}{yr} \times \left[\left(\frac{75}{100} \times 6 \frac{mi}{\cancel{day}} \times 5 \frac{\cancel{day}}{\cancel{week \cdot day}}\right) + \left(\frac{50}{100} \times 4 \frac{mi}{\cancel{day}} \times 2 \frac{\cancel{day}}{\cancel{weekend \cdot day}}\right)\right]$$

$$AVM_i = 1378 \frac{mi}{yr}$$

Therefore:

$$\boldsymbol{VMT_{Total}} = 1378 \frac{mi}{yr} \times 1{,}800\ vehicles = \mathbf{2{,}480{,}400} \frac{\boldsymbol{mi}}{\boldsymbol{yr}}$$

<u>Step 3</u> - Select Emission Factors:

Emission factors are taken from Tables 5-14 through 5-18 (2013 to 2017 State-Specific On-Road Composite Vehicle Emission Factors) based on the calendar year you are performing the emissions calculation, the installation's location (i.e., the state it is located in), and the installation's altitude. A ''designated high-altitude location'' is any base within a county which has substantially all of its area located 1,219 meters (4,000 feet) above sea level. For the majority of applications, low-altitude is the appropriate choice. A list of those counties EPA has designated as high-altitude appears in Title 40, §86.091-30, paragraphs (a) (5) (ii) and (iv), Code of Federal Regulations (July 1, 2001).

Once the state, calendar year, and an altitude designation are determined, go to Table 5-14 to select and record the appropriate pollutant-specific emission factors $EF(Pol)_{State}$:

$$EF(CO)_{State} = 8.825 \frac{g}{mi}$$

Once the appropriate emission factors ($EF(Pol)_{State}$) are obtained, calculate the total composite emission factor using Equation 5-11:

$$EF(Pol)_{Total} = EF(Pol)_{State} \times \frac{FERF}{100} = \mathbf{8.825 \frac{g}{mi}}$$

Given no alternative fuel was used, so FERF = 100.

<u>Step 4</u> - Calculate Emissions:

Finally, the total pollutant emissions from all vehicle categories ($EP(Pol)_{Total}$) are calculated using Equation 5-9:

$$EP(Pol)_{Total} = VMT_{Total} \times EF(Pol)_{Total} \times 0.002205$$

$$\mathbf{EP(CO)_{Total}} = 2{,}480{,}400 \frac{\cancel{mi}}{yr} \times 0.002205 \frac{lb}{\cancel{g}} \times 8.825 \frac{\cancel{g}}{\cancel{mi}}$$

$$= \mathbf{48{,}266.4 \frac{\cancel{lb}}{yr}} \times \frac{1}{2000} \frac{ton}{\cancel{lb}}$$

$$\boxed{\mathbf{EP(CO)_{Total} = 24.1 \frac{ton}{yr}}}$$

5.8.3 Problem 3 - Applying AFV Emission Reduction Factors

Anytown AFB operates two 2005 CNG sedans used for administrative purposes that each travel an estimated 5,800 miles per year on base. Assuming it is calendar year 2013 and Anytown AFB is a low altitude installation, calculate the CO emissions from their operation.

<u>Step 1</u> - Gather Fleet Data, and
<u>Step 2</u> - Group Vehicle Categories:

In this case there are two Light-Duty Gasoline Vehicles (LDGVs) sedans. The total number of miles must first be calculated. Since there are two vehicles which each traveled a distance of 5,800 miles, then this is simply:

$$\boldsymbol{VMT_{Total}} = 2\ \cancel{vehicle} \times 5{,}800\frac{mi}{\cancel{vehicle} \cdot yr} = \mathbf{11{,}600}\frac{\boldsymbol{mi}}{\boldsymbol{yr}}$$

Step 3 - Select Emission Factors:

Look in Table 5-3 to find the alternative Fuel Emissions Reduction Factor (FERF) for CNG:

$$FERF = 90$$

Next, determine the applicable emissions factors based on vehicle category (LDGV), a low altitude location, located in Alabama, and the fact that the inventory is for CY 2013. Extracting the carbon monoxide emission factors from the appropriate sub-table of Table 5-9 reveals the following:

$$\boldsymbol{EF(CO)_{LDGV}} = \mathbf{8.110}\frac{\boldsymbol{g}}{\boldsymbol{mi}}$$

Finally, apply Equation 5-4 to estimate the CO emission:

$$EP(Pol)_{Total} = \sum_{i=1}^{7} [VMT_i \times EF(Pol)_i \times \frac{FERF}{100} \times 0.002205]$$

$$\boldsymbol{EP(CO)_{Total}} = 11{,}600\frac{\cancel{mi}}{yr} \times 8.110\frac{\cancel{g}}{\cancel{mi}} \times \frac{90}{100} \times 0.002205\frac{lb}{\cancel{g}}$$

$$= \mathbf{186.7}\frac{\cancel{\boldsymbol{lb}}}{\boldsymbol{yr}} \times \frac{1}{2000}\frac{ton}{\cancel{lb}}$$

$$\boxed{\boldsymbol{EP(CO)_{Total} = 0.09\frac{ton}{yr}}}$$

5.8.4 Problem 4 - Calculating PM Emissions

Anytown AFB is looking to determine their PM_{10} emissions for GOVs for calendar year 2013. The facility is located in central Alabama. Using the specific vehicle data from Problem 1, determine the total PM_{10} emissions.

Step 1a - Gather GOV Fleet Data, and
Step 1b - Group GOVs by Vehicle Category

The fleet data is provided in the table above for Problem 1.

Step 2 – Select/Calculate Emission Factors:

The vehicle exhaust emission factors do not require any correction and may be taken directly from the tables. First, determine the installation's altitude above sea level. In this case, the altitude of the Air Force facility is 1,100 feet above sea level. Since this altitude is less than the high altitude threshold of 4,000 feet above sea level, the facility is considered to be in a "low altitude" location. As such, all vehicle exhaust emission factors must be retrieved from the low altitude tables. The following emission factors were extracted from the table:

Vehicle Category	PM Emission Factor - On-Road (g/mi)
LDGV	0.025
LDGT	0.025
HDGV	1.147
LDDT	0.06
HDDV	0.684

Next, the Fugitive PM emission factor must be taken from the appropriate table and corrected. Using Figure 5-1, the number of days with measurable precipitation (P) is found to be equal to 110 days. The uncorrected emission factors, P and VMT (as provided on the fleet data sheet) are shown in the following table:

Road Type	PM_{10} Emission Factor (g/mi)	P, number of days with measurable precipitation	VMT (mi/yr)
Paved	0.069	110	61,594
Unpaved	50.595	110	6,844

The corrected emission factors are then calculated using equations 5-2 and 5-3:

$$EF_{Corrected}(PM)_{Paved} = EF_{Paved} \times \left(1 - \frac{P}{4N}\right)$$

$$EF_{Corrected}(PM)_{Paved} = 0.069 \times \left(1 - \frac{110}{4(365)}\right) = \mathbf{0.064}$$

$$EF_{Corrected}(PM)_{Unpaved} = EF_{Unpaved} \times \left(1 - \frac{P}{N}\right)$$

$$EF_{Corrected}(PM)_{Unpaved} = 50.595 \times \left(1 - \frac{110}{365}\right) = \mathbf{35.347}$$

<u>Step 3</u> - Calculate Emissions:

i. Calculate the PM emissions for each vehicle category ($EP(Pol)_i$) using Equation 5-4.

For Vehicle Exhaust:

$$EP(Pol)_i = \sum_{i=1}^{7} [VMT_i \times EF(Pol)_i \times \frac{FERF}{100} \times 0.002205]$$

$$EP(PM_{10})_{LDGV} = 34{,}888 \frac{\cancel{mi}}{yr} \times 0.025 \frac{\cancel{g}}{\cancel{mi}} \times 0.002205 \frac{lb}{\cancel{g}} = \mathbf{1.92} \frac{\mathbf{lb}}{\mathbf{yr}}$$

$$EP(PM_{10})_{LDGT} = 19{,}500\frac{\cancel{mi}}{yr} \times \ 0.025\frac{\cancel{g}}{\cancel{mi}} \ \times \ 0.002205\ \frac{lb}{\cancel{g}} = \ \mathbf{1.07}\ \frac{\mathbf{lb}}{\mathbf{yr}}$$

$$EP(PM_{10})_{HDGV} = 4{,}450\frac{\cancel{mi}}{yr} \times \ 1.147\ \frac{\cancel{g}}{\cancel{mi}} \ \times 0.002205\ \frac{lb}{\cancel{g}} = \ \mathbf{11.25}\ \frac{\mathbf{lb}}{\mathbf{yr}}$$

$$EP(PM_{10})_{LDDT} = 4{,}300\frac{\cancel{mi}}{yr} \times \ 0.06\frac{\cancel{g}}{\cancel{mi}} \ \times \ 0.002205\ \frac{lb}{\cancel{g}} = \ \mathbf{0.57}\ \frac{\mathbf{lb}}{\mathbf{yr}}$$

$$EP(PM_{10})_{HDDV} = 5{,}300\frac{\cancel{mi}}{yr} \times \ 0.684\frac{\cancel{g}}{\cancel{mi}} \ \times \ 0.002205\ \frac{lb}{\cancel{g}} = \ \mathbf{7.99}\ \frac{\mathbf{lb}}{\mathbf{yr}}$$

For Fugitive PM:

$$EP(PM_{10})_{Paved} = 61{,}594\frac{\cancel{mi}}{yr} \times \ 0.064\frac{\cancel{g}}{\cancel{mi}} \ \times \ 0.002205\ \frac{lb}{\cancel{g}} = \ \mathbf{8.69}\ \frac{\mathbf{lb}}{\mathbf{yr}}$$

$$EP(PM_{10})_{Unpaved} = 6{,}844\frac{\cancel{mi}}{yr} \times \ 35.347\frac{\cancel{g}}{\cancel{mi}} \ \times \ 0.002205\ \frac{lb}{\cancel{g}} = \ \mathbf{533.42}\ \frac{\mathbf{lb}}{\mathbf{yr}}$$

ii. Calculate the total vehicle exhaust ($EP(PM_{10})_{Exhaust}$) and fugitive emissions ($EP(PM_{10})_{Fugitive}$) for PM_{10} by summing the $EP(PM_{10})_i$ values for each vehicle categories:

$$EP(Pol)_{Exhaust/Fugitive} = \sum_{i=1}^{7} EP(Pol)_i$$

For Vehicle Exhaust:

$$EP(PM_{10})_{Exhaust} = (1.92 + 1.07 + 11.25 + 0.57 + 7.99)\frac{lb}{yr} = \mathbf{22.80}\frac{\mathbf{lb}}{\mathbf{yr}}$$

For Fugitive PM:

$$EP(PM_{10})_{Fugitive} = (8.69 + 533.42)\frac{lb}{yr} = \mathbf{542.11}\frac{\mathbf{lb}}{\mathbf{yr}}$$

Finally, calculate the total emissions for PM ($EP(PM_{10})_{Total}$) by summing the $EP(PM_{10})_{Exhaust}$ and $EP(PM_{10})_{Fugitive}$ values using Equation 5-4:

$$EP(PM)_{Total} = EP(PM)_{Exhaust} + EP(PM)_{Fugitive}$$

$$\boldsymbol{EP(PM_{10})_{Total}} = 22.80 + 542.11$$

$$= \mathbf{564.91}\frac{\cancel{\mathbf{lb}}}{\mathbf{yr}} \times \frac{1}{2000}\frac{ton}{\cancel{lb}}$$

$$\boxed{\boldsymbol{EP(PM_{10})_{Total} = 0.28\frac{ton}{yr}}}$$

Table 5-9. On-Road Vehicle Emission Factors – 2013

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
ALABAMA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.436	0.007	8.110	0.605	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.668	0.010	9.740	0.840	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.182	0.017	27.140	1.147	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.800	0.003	26.910	3.180	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.436	0.007	8.110	0.600	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.668	0.010	9.740	0.824	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.441	0.017	8.550	0.908	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.160	0.003	14.280	2.410	0.037	0.021	177.400	0.011
ARIZONA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.440	0.007	8.470	0.610	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.675	0.010	10.130	0.849	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.186	0.017	27.420	1.151	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.810	0.003	27.160	3.280	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.440	0.007	8.470	0.605	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.675	0.010	10.130	0.833	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.445	0.017	8.630	0.907	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.170	0.003	14.420	2.480	0.037	0.021	177.400	0.011
ARKANSAS	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.442	0.007	8.620	0.612	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.678	0.010	10.300	0.852	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.187	0.017	27.560	1.152	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.810	0.003	27.370	3.340	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.442	0.007	8.620	0.606	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.678	0.010	10.300	0.836	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.447	0.017	8.680	0.907	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.170	0.003	14.540	2.530	0.037	0.021	177.400	0.011
CALIFORNIA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.430	0.007	8.320	0.589	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.669	0.010	10.000	0.820	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.187	0.017	26.960	1.106	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.820	0.003	26.280	2.880	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.430	0.007	8.320	0.585	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.669	0.010	10.000	0.808	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.446	0.017	8.490	0.871	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.180	0.003	13.960	2.160	0.037	0.021	177.400	0.011

Table 5-9. On-Road Vehicle Emission Factors – 2013 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
COLORADO	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.449	0.007	11.120	0.554	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.718	0.010	13.080	0.804	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.217	0.017	29.170	1.010	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.880	0.003	28.240	2.710	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.449	0.007	11.120	0.552	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.718	0.010	13.080	0.797	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.484	0.017	9.180	0.755	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.270	0.003	15.050	2.020	0.037	0.021	177.400	0.011
CONNECTICUT	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.446	0.007	10.490	0.588	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.707	0.010	12.390	0.834	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.210	0.017	28.670	1.069	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.870	0.003	27.860	2.760	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.446	0.007	10.490	0.584	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.707	0.010	12.390	0.824	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.475	0.017	9.030	0.817	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.250	0.003	14.840	2.060	0.037	0.021	177.400	0.011
DELAWARE	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.440	0.007	9.180	0.592	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.686	0.010	10.930	0.830	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.195	0.017	27.660	1.100	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.840	0.003	27.020	2.990	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.440	0.007	9.180	0.587	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.686	0.010	10.930	0.818	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.457	0.017	8.710	0.855	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.210	0.003	14.370	2.240	0.037	0.021	177.400	0.011
FLORIDA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.432	0.007	7.060	0.599	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.652	0.010	8.590	0.825	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.171	0.017	26.470	1.156	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.770	0.003	26.730	2.990	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.432	0.007	7.060	0.595	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.652	0.010	8.590	0.808	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.427	0.017	8.330	0.925	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.110	0.003	14.160	2.270	0.037	0.021	177.400	0.011

Table 5-9. On-Road Vehicle Emission Factors – 2013 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
GEORGIA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.436	0.007	8.000	0.604	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.667	0.010	9.630	0.837	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.181	0.017	27.070	1.146	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.800	0.003	26.850	3.160	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.436	0.007	8.000	0.599	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.667	0.010	9.630	0.822	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.439	0.017	8.520	0.908	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.150	0.003	14.250	2.390	0.037	0.021	177.400	0.011
IDAHO	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.451	0.007	11.380	0.555	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.722	0.010	13.370	0.806	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.220	0.017	29.380	1.006	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.890	0.003	28.410	2.690	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.451	0.007	11.380	0.553	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.722	0.010	13.370	0.799	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.487	0.017	9.250	0.750	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.280	0.003	15.140	2.000	0.037	0.021	177.400	0.011
ILLINOIS	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.447	0.007	9.980	0.600	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.701	0.010	11.800	0.847	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.204	0.017	28.280	1.101	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.860	0.003	27.670	3.060	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.447	0.007	9.980	0.595	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.701	0.010	11.800	0.834	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.468	0.017	8.900	0.848	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.230	0.003	14.730	2.300	0.037	0.021	177.400	0.011
INDIANA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.446	0.007	9.940	0.594	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.699	0.010	11.760	0.838	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.204	0.017	28.230	1.089	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.860	0.003	27.550	2.950	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.446	0.007	9.940	0.589	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.699	0.010	11.760	0.826	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.467	0.017	8.890	0.838	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.230	0.003	14.670	2.220	0.037	0.021	177.400	0.011

Table 5-9. On-Road Vehicle Emission Factors – 2013 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
IOWA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.455	0.007	10.900	0.574	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.718	0.010	12.820	0.834	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.214	0.017	29.000	1.051	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.880	0.003	28.410	3.000	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.455	0.007	10.900	0.569	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.718	0.010	12.820	0.822	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.480	0.017	9.130	0.790	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.260	0.003	15.150	2.250	0.037	0.021	177.400	0.011
KANSAS	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.449	0.007	9.550	0.606	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.695	0.010	11.320	0.851	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.198	0.017	28.160	1.125	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.840	0.003	27.810	3.290	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.449	0.007	9.550	0.600	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.695	0.010	11.320	0.836	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.460	0.017	8.870	0.872	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.200	0.003	14.800	2.490	0.037	0.021	177.400	0.011
KENTUCKY	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.440	0.007	9.180	0.594	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.686	0.010	10.930	0.832	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.195	0.017	27.680	1.102	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.840	0.003	27.070	3.010	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.440	0.007	9.180	0.589	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.686	0.010	10.930	0.819	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.457	0.017	8.710	0.857	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.210	0.003	14.390	2.260	0.037	0.021	177.400	0.011
LOUISIANA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.438	0.007	7.770	0.609	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.664	0.010	9.370	0.841	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.178	0.017	27.040	1.163	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.790	0.003	27.220	3.260	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.438	0.007	7.770	0.603	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.664	0.010	9.370	0.824	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.436	0.017	8.510	0.925	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.130	0.003	14.430	2.480	0.037	0.021	177.400	0.011

Table 5-9. On-Road Vehicle Emission Factors – 2013 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
MAINE	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.461	0.007	12.210	0.576	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.739	0.010	14.290	0.842	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.228	0.017	30.050	1.027	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.910	0.003	29.210	2.730	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.461	0.007	12.210	0.574	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.739	0.010	14.290	0.835	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.497	0.017	9.460	0.761	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.310	0.003	15.590	2.030	0.037	0.021	177.400	0.011
MARYLAND	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.440	0.007	9.370	0.584	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.689	0.010	11.140	0.822	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.198	0.017	27.780	1.083	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.840	0.003	27.100	2.920	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.440	0.007	9.370	0.580	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.689	0.010	11.140	0.810	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.460	0.017	8.750	0.837	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.210	0.003	14.410	2.190	0.037	0.021	177.400	0.011
MASSACHUSETTS	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.447	0.007	10.660	0.588	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.710	0.010	12.570	0.835	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.212	0.017	28.800	1.066	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.870	0.003	27.960	2.750	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.447	0.007	10.660	0.585	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.710	0.010	12.570	0.826	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.477	0.017	9.070	0.813	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.260	0.003	14.900	2.050	0.037	0.021	177.400	0.011
MICHIGAN	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.453	0.007	11.450	0.565	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.725	0.010	13.440	0.821	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.220	0.017	29.440	1.021	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.890	0.003	28.590	2.730	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.453	0.007	11.450	0.562	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.725	0.010	13.440	0.813	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.488	0.017	9.270	0.762	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.280	0.003	15.250	2.030	0.037	0.021	177.400	0.011

Table 5-9. On-Road Vehicle Emission Factors – 2013 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
MINNESOTA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.467	0.007	12.500	0.600	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.747	0.010	14.600	0.880	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.231	0.017	30.290	1.060	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.910	0.003	29.750	2.840	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.467	0.007	12.500	0.596	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.747	0.010	14.600	0.871	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.500	0.017	9.540	0.787	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.310	0.003	15.900	2.120	0.037	0.021	177.400	0.011
MISSISSIPPI	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.438	0.007	8.120	0.609	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.669	0.010	9.750	0.844	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.182	0.017	27.220	1.155	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.800	0.003	27.120	3.260	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.438	0.007	8.120	0.603	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.669	0.010	9.750	0.828	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.441	0.017	8.570	0.914	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.150	0.003	14.400	2.470	0.037	0.021	177.400	0.011
MISSOURI	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.446	0.007	9.520	0.600	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.694	0.010	11.290	0.843	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.198	0.017	28.040	1.112	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.840	0.003	27.560	3.170	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.446	0.007	9.520	0.594	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.694	0.010	11.290	0.829	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.461	0.017	8.830	0.861	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.210	0.003	14.660	2.390	0.037	0.021	177.400	0.011
MONTANA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.457	0.007	11.850	0.569	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.732	0.010	13.890	0.829	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.225	0.017	29.760	1.021	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.900	0.003	28.890	2.710	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.457	0.007	11.850	0.566	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.732	0.010	13.890	0.822	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.493	0.017	9.370	0.759	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.300	0.003	15.410	2.020	0.037	0.021	177.400	0.011

Table 5-9. On-Road Vehicle Emission Factors – 2013 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
NEBRASKA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.451	0.007	10.350	0.569	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.708	0.010	12.210	0.823	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.208	0.017	28.550	1.054	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.860	0.003	27.940	3.040	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.451	0.007	10.350	0.564	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.708	0.010	12.210	0.811	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.473	0.017	8.990	0.797	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.240	0.003	14.890	2.280	0.037	0.021	177.400	0.011
NEVADA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.442	0.007	10.000	0.583	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.699	0.010	11.840	0.823	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.205	0.017	28.280	1.068	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.860	0.003	27.480	2.780	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.442	0.007	10.000	0.579	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.699	0.010	11.840	0.813	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.469	0.017	8.900	0.820	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.240	0.003	14.620	2.070	0.037	0.021	177.400	0.011
NEW HAMPSHIRE	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.455	0.007	11.640	0.567	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.728	0.010	13.660	0.825	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.222	0.017	29.590	1.021	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.900	0.003	28.730	2.730	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.455	0.007	11.640	0.564	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.728	0.010	13.660	0.818	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.490	0.017	9.320	0.761	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.290	0.003	15.330	2.030	0.037	0.021	177.400	0.011
NEW JERSEY	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.442	0.007	9.650	0.587	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.694	0.010	11.450	0.826	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.201	0.017	28.000	1.081	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.850	0.003	27.280	2.900	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.442	0.007	9.650	0.583	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.694	0.010	11.450	0.815	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.464	0.017	8.810	0.834	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.220	0.003	14.520	2.170	0.037	0.021	177.400	0.011

Table 5-9. On-Road Vehicle Emission Factors – 2013 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
NEW MEXICO	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.439	0.007	9.480	0.579	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.689	0.010	11.260	0.815	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.199	0.017	27.860	1.071	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.850	0.003	27.090	2.810	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.439	0.007	9.480	0.576	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.689	0.010	11.260	0.805	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.462	0.017	8.770	0.827	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.220	0.003	14.410	2.100	0.037	0.021	177.400	0.011
NEW YORK	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.452	0.007	11.230	0.561	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.721	0.010	13.200	0.814	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.218	0.017	29.260	1.019	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.890	0.003	28.410	2.720	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.452	0.007	11.230	0.558	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.721	0.010	13.200	0.806	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.485	0.017	9.210	0.762	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.280	0.003	15.150	2.030	0.037	0.021	177.400	0.011
NORTH CAROLINA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.435	0.007	8.530	0.599	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.674	0.010	10.220	0.836	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.188	0.017	27.230	1.123	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.820	0.003	26.700	3.060	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.435	0.007	8.530	0.595	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.674	0.010	10.220	0.822	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.448	0.017	8.570	0.884	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.180	0.003	14.180	2.300	0.037	0.021	177.400	0.011
NORTH DAKOTA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.468	0.007	12.630	0.603	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.749	0.010	14.740	0.885	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.232	0.017	30.390	1.062	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.920	0.003	29.870	2.840	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.468	0.007	12.630	0.599	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.749	0.010	14.740	0.876	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.502	0.017	9.570	0.788	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.320	0.003	15.970	2.120	0.037	0.021	177.400	0.011

Table 5-9. On-Road Vehicle Emission Factors – 2013 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
OHIO	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.445	0.007	10.110	0.589	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.701	0.010	11.950	0.833	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.206	0.017	28.360	1.078	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.860	0.003	27.610	2.850	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.445	0.007	10.110	0.585	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.701	0.010	11.950	0.823	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.470	0.017	8.930	0.828	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.240	0.003	14.700	2.130	0.037	0.021	177.400	0.011
OKLAHOMA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.446	0.007	8.850	0.614	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.683	0.010	10.540	0.855	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.190	0.017	27.830	1.155	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.810	0.003	27.830	3.440	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.446	0.007	8.850	0.607	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.683	0.010	10.540	0.838	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.450	0.017	8.760	0.906	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.170	0.003	14.790	2.610	0.037	0.021	177.400	0.011
OREGON	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.442	0.007	10.560	0.568	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.706	0.010	12.480	0.805	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.211	0.017	28.730	1.032	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.870	0.003	27.650	2.690	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.442	0.007	10.560	0.566	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.706	0.010	12.480	0.799	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.477	0.017	9.040	0.785	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.260	0.003	14.710	2.000	0.037	0.021	177.400	0.011
PENNSYLVANIA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.446	0.007	10.450	0.586	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.707	0.010	12.340	0.831	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.210	0.017	28.640	1.066	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.870	0.003	27.810	2.750	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.446	0.007	10.450	0.583	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.707	0.010	12.340	0.821	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.475	0.017	9.020	0.815	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.250	0.003	14.810	2.050	0.037	0.021	177.400	0.011

Table 5-9. On-Road Vehicle Emission Factors – 2013 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
RHODE ISLAND	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.442	0.007	10.190	0.581	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.701	0.010	12.060	0.822	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.207	0.017	28.440	1.061	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.860	0.003	27.580	2.740	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.442	0.007	10.190	0.578	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.701	0.010	12.060	0.813	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.471	0.017	8.950	0.813	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.240	0.003	14.680	2.040	0.037	0.021	177.400	0.011
SOUTH CAROLINA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.437	0.007	8.160	0.605	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.669	0.010	9.800	0.841	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.182	0.017	27.170	1.146	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.800	0.003	26.920	3.190	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.437	0.007	8.160	0.600	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.669	0.010	9.800	0.825	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.441	0.017	8.550	0.907	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.160	0.003	14.290	2.410	0.037	0.021	177.400	0.011
SOUTH DAKOTA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.457	0.007	11.250	0.580	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.724	0.010	13.210	0.844	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.218	0.017	29.280	1.054	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.880	0.003	28.690	2.980	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.457	0.007	11.250	0.575	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.724	0.010	13.210	0.833	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.484	0.017	9.220	0.790	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.270	0.003	15.310	2.230	0.037	0.021	177.400	0.011
TENNESSEE	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.438	0.007	8.840	0.594	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.680	0.010	10.550	0.830	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.191	0.017	27.470	1.110	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.830	0.003	26.940	3.060	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.438	0.007	8.840	0.589	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.680	0.010	10.550	0.816	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.452	0.017	8.650	0.867	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.190	0.003	14.320	2.300	0.037	0.021	177.400	0.011

Table 5-9. On-Road Vehicle Emission Factors – 2013 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
TEXAS	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.440	0.007	8.050	0.615	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.669	0.010	9.680	0.851	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.181	0.017	27.290	1.170	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.790	0.003	27.500	3.370	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.440	0.007	8.050	0.609	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.669	0.010	9.680	0.833	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.440	0.017	8.590	0.929	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.140	0.003	14.590	2.560	0.037	0.021	177.400	0.011
UTAH	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.447	0.007	10.440	0.559	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.707	0.010	12.320	0.809	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.209	0.017	28.630	1.033	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.870	0.003	27.870	2.830	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.447	0.007	10.440	0.555	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.707	0.010	12.320	0.798	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.474	0.017	9.010	0.780	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.250	0.003	14.850	2.110	0.037	0.021	177.400	0.011
VERMONT	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.457	0.007	11.860	0.571	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.732	0.010	13.900	0.833	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.225	0.017	29.770	1.024	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.900	0.003	28.930	2.720	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.457	0.007	11.860	0.568	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.732	0.010	13.900	0.825	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.493	0.017	9.370	0.762	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.300	0.003	15.440	2.030	0.037	0.021	177.400	0.011
VIRGINIA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.438	0.007	9.140	0.587	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.685	0.010	10.890	0.823	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.195	0.017	27.600	1.090	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.840	0.003	26.900	2.900	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.438	0.007	9.140	0.583	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.685	0.010	10.890	0.811	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.457	0.017	8.690	0.847	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.210	0.003	14.300	2.170	0.037	0.021	177.400	0.011

Table 5-9. On-Road Vehicle Emission Factors – 2013 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
WASHINGTON	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.444	0.007	10.740	0.570	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.709	0.010	12.670	0.810	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.213	0.017	28.860	1.033	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.880	0.003	27.780	2.690	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.444	0.007	10.740	0.568	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.709	0.010	12.670	0.804	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.479	0.017	9.090	0.785	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.260	0.003	14.790	2.000	0.037	0.021	177.400	0.011
WEST VIRGINIA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.441	0.007	9.880	0.581	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.696	0.010	11.710	0.820	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.204	0.017	28.190	1.066	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.860	0.003	27.370	2.770	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.441	0.007	9.880	0.577	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.696	0.010	11.710	0.810	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.467	0.017	8.870	0.820	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.230	0.003	14.560	2.070	0.037	0.021	177.400	0.011
WISCONSIN	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.460	0.007	11.890	0.581	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.734	0.010	13.920	0.848	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.225	0.017	29.790	1.041	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.900	0.003	29.090	2.780	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.460	0.007	11.890	0.577	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.734	0.010	13.920	0.839	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.493	0.017	9.380	0.775	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.290	0.003	15.530	2.080	0.037	0.021	177.400	0.011
WYOMING	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.455	0.007	11.760	0.565	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.730	0.010	13.780	0.823	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.224	0.017	29.680	1.016	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.708	0.393	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.359	0.012	2.315	0.684	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	0.900	0.003	28.760	2.710	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.455	0.007	11.760	0.563	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.730	0.010	13.780	0.816	0.025	0.011	516.100	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.492	0.017	9.340	0.756	0.049	0.032	905.300	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.200	0.003	0.808	0.132	0.053	0.037	314.000	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.460	0.006	0.657	0.387	0.060	0.044	599.200	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	3.296	0.012	0.941	0.343	0.129	0.100	1245.600	0.027
		NA	MC	Motorcycles	1.290	0.003	15.340	2.020	0.037	0.021	177.400	0.011

Table 5-10. On-Road Vehicle Emission Factors – 2014

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
ALABAMA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.399	0.007	7.830	0.557	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.618	0.010	9.370	0.790	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.996	0.017	26.310	1.046	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.800	0.003	26.910	3.180	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.399	0.007	7.830	0.553	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.618	0.010	9.370	0.775	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.214	0.017	8.280	0.830	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.160	0.003	14.280	2.410	0.037	0.021	177.400	0.011
ARIZONA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.402	0.007	8.190	0.562	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.624	0.010	9.740	0.799	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.999	0.017	26.570	1.049	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.810	0.003	27.160	3.280	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.402	0.007	8.190	0.557	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.624	0.010	9.740	0.784	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.218	0.017	8.360	0.830	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.170	0.003	14.420	2.480	0.037	0.021	177.400	0.011
ARKANSAS	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.404	0.007	8.330	0.563	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.627	0.010	9.900	0.801	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.001	0.017	26.720	1.051	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.810	0.003	27.370	3.340	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.404	0.007	8.330	0.558	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.627	0.010	9.900	0.786	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.220	0.017	8.410	0.829	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.170	0.003	14.540	2.530	0.037	0.021	177.400	0.011
CALIFORNIA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.393	0.007	8.060	0.543	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.619	0.010	9.610	0.772	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.000	0.017	26.130	1.008	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.820	0.003	26.280	2.880	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.393	0.007	8.060	0.540	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.619	0.010	9.610	0.761	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.219	0.017	8.220	0.797	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.180	0.003	13.960	2.160	0.037	0.021	177.400	0.011

Table 5-10. On-Road Vehicle Emission Factors – 2014 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
COLORADO	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.410	0.007	10.810	0.512	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.663	0.010	12.580	0.756	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.026	0.017	28.270	0.919	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.880	0.003	28.240	2.710	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.410	0.007	10.810	0.509	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.663	0.010	12.580	0.750	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.250	0.017	8.900	0.690	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.270	0.003	15.050	2.020	0.037	0.021	177.400	0.011
CONNECTICUT	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.407	0.007	10.200	0.543	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.653	0.010	11.910	0.785	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.020	0.017	27.790	0.974	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.870	0.003	27.860	2.760	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.407	0.007	10.200	0.540	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.653	0.010	11.910	0.776	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.243	0.017	8.750	0.747	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.250	0.003	14.840	2.060	0.037	0.021	177.400	0.011
DELAWARE	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.402	0.007	8.900	0.546	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.634	0.010	10.510	0.781	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.007	0.017	26.810	1.002	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.840	0.003	27.020	2.990	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.402	0.007	8.900	0.542	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.634	0.010	10.510	0.770	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.228	0.017	8.440	0.782	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.210	0.003	14.370	2.240	0.037	0.021	177.400	0.011
FLORIDA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.395	0.007	6.800	0.552	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.603	0.010	8.260	0.776	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.986	0.017	25.660	1.055	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.770	0.003	26.730	2.990	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.395	0.007	6.800	0.548	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.603	0.010	8.260	0.760	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.203	0.017	8.080	0.847	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.110	0.003	14.160	2.270	0.037	0.021	177.400	0.011

Table 5-10. On-Road Vehicle Emission Factors – 2014 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
GEORGIA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.398	0.007	7.740	0.556	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.616	0.010	9.260	0.788	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.995	0.017	26.230	1.045	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.800	0.003	26.850	3.160	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.398	0.007	7.740	0.552	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.616	0.010	9.260	0.773	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.213	0.017	8.260	0.831	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.150	0.003	14.250	2.390	0.037	0.021	177.400	0.011
IDAHO	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.411	0.007	11.070	0.512	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.667	0.010	12.850	0.758	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.028	0.017	28.470	0.916	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.890	0.003	28.410	2.690	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.411	0.007	11.070	0.510	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.667	0.010	12.850	0.752	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.253	0.017	8.960	0.685	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.280	0.003	15.140	2.000	0.037	0.021	177.400	0.011
ILLINOIS	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.408	0.007	9.680	0.553	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.647	0.010	11.340	0.797	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.015	0.017	27.410	1.003	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.860	0.003	27.670	3.060	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.408	0.007	9.680	0.549	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.647	0.010	11.340	0.785	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.237	0.017	8.630	0.775	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.230	0.003	14.730	2.300	0.037	0.021	177.400	0.011
INDIANA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.407	0.007	9.650	0.547	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.646	0.010	11.310	0.788	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.014	0.017	27.360	0.993	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.860	0.003	27.550	2.950	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.407	0.007	9.650	0.543	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.646	0.010	11.310	0.777	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.237	0.017	8.610	0.767	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.230	0.003	14.670	2.220	0.037	0.021	177.400	0.011

Table 5-10. On-Road Vehicle Emission Factors – 2014 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
IOWA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.415	0.007	10.590	0.529	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.663	0.010	12.320	0.784	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.023	0.017	28.110	0.957	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.880	0.003	28.410	3.000	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.415	0.007	10.590	0.525	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.663	0.010	12.320	0.773	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.247	0.017	8.850	0.722	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.260	0.003	15.150	2.250	0.037	0.021	177.400	0.011
KANSAS	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.410	0.007	9.260	0.559	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.642	0.010	10.880	0.801	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.009	0.017	27.300	1.026	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.840	0.003	27.810	3.290	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.410	0.007	9.260	0.553	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.642	0.010	10.880	0.786	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.231	0.017	8.590	0.797	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.200	0.003	14.800	2.490	0.037	0.021	177.400	0.011
KENTUCKY	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.402	0.007	8.900	0.547	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.634	0.010	10.510	0.783	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.007	0.017	26.830	1.005	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.840	0.003	27.070	3.010	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.402	0.007	8.900	0.543	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.634	0.010	10.510	0.771	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.228	0.017	8.440	0.784	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.210	0.003	14.390	2.260	0.037	0.021	177.400	0.011
LOUISIANA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.400	0.007	7.500	0.561	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.614	0.010	9.010	0.791	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.993	0.017	26.210	1.061	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.790	0.003	27.220	3.260	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.400	0.007	7.500	0.556	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.614	0.010	9.010	0.775	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.210	0.017	8.250	0.846	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.130	0.003	14.430	2.480	0.037	0.021	177.400	0.011

Table 5-10. On-Road Vehicle Emission Factors – 2014 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
MAINE	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.420	0.007	11.890	0.532	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.682	0.010	13.730	0.792	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.035	0.017	29.120	0.934	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.910	0.003	29.210	2.730	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.420	0.007	11.890	0.530	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.682	0.010	13.730	0.786	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.262	0.017	9.170	0.695	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.310	0.003	15.590	2.030	0.037	0.021	177.400	0.011
MARYLAND	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.402	0.007	9.090	0.539	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.637	0.010	10.710	0.773	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.009	0.017	26.930	0.987	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.840	0.003	27.100	2.920	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.402	0.007	9.090	0.535	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.637	0.010	10.710	0.762	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.231	0.017	8.480	0.766	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.210	0.003	14.410	2.190	0.037	0.021	177.400	0.011
MASSACHUSETTS	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.408	0.007	10.360	0.543	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.656	0.010	12.080	0.786	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.021	0.017	27.920	0.971	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.870	0.003	27.960	2.750	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.408	0.007	10.360	0.540	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.656	0.010	12.080	0.777	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.245	0.017	8.790	0.743	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.260	0.003	14.900	2.050	0.037	0.021	177.400	0.011
MICHIGAN	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.414	0.007	11.140	0.521	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.669	0.010	12.920	0.772	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.028	0.017	28.530	0.930	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.890	0.003	28.590	2.730	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.414	0.007	11.140	0.518	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.669	0.010	12.920	0.765	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.254	0.017	8.980	0.696	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.280	0.003	15.250	2.030	0.037	0.021	177.400	0.011

Table 5-10. On-Road Vehicle Emission Factors – 2014 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
MINNESOTA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.426	0.007	12.160	0.553	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.689	0.010	14.030	0.827	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.037	0.017	29.360	0.964	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.910	0.003	29.750	2.840	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.426	0.007	12.160	0.549	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.689	0.010	14.030	0.819	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.265	0.017	9.240	0.718	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.310	0.003	15.900	2.120	0.037	0.021	177.400	0.011
MISSISSIPPI	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.401	0.007	7.840	0.560	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.619	0.010	9.380	0.794	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.996	0.017	26.380	1.053	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.800	0.003	27.120	3.260	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.401	0.007	7.840	0.555	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.619	0.010	9.380	0.779	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.214	0.017	8.300	0.837	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.150	0.003	14.400	2.470	0.037	0.021	177.400	0.011
MISSOURI	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.408	0.007	9.230	0.553	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.641	0.010	10.860	0.793	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.010	0.017	27.170	1.014	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.840	0.003	27.560	3.170	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.408	0.007	9.230	0.548	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.641	0.010	10.860	0.780	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.231	0.017	8.550	0.787	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.210	0.003	14.660	2.390	0.037	0.021	177.400	0.011
MONTANA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.417	0.007	11.540	0.525	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.676	0.010	13.350	0.780	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.032	0.017	28.840	0.929	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.900	0.003	28.890	2.710	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.417	0.007	11.540	0.522	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.676	0.010	13.350	0.773	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.258	0.017	9.080	0.693	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.300	0.003	15.410	2.020	0.037	0.021	177.400	0.011

Table 5-10. On-Road Vehicle Emission Factors – 2014 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
NEBRASKA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.411	0.007	10.050	0.524	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.654	0.010	11.740	0.774	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.018	0.017	27.680	0.960	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.860	0.003	27.940	3.040	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.411	0.007	10.050	0.520	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.654	0.010	11.740	0.762	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.241	0.017	8.710	0.728	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.240	0.003	14.890	2.280	0.037	0.021	177.400	0.011
NEVADA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.404	0.007	9.710	0.538	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.645	0.010	11.390	0.775	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.015	0.017	27.410	0.973	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.860	0.003	27.480	2.780	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.404	0.007	9.710	0.535	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.645	0.010	11.390	0.765	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.238	0.017	8.630	0.750	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.240	0.003	14.620	2.070	0.037	0.021	177.400	0.011
NEW HAMPSHIRE	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.415	0.007	11.330	0.523	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.672	0.010	13.130	0.776	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.030	0.017	28.680	0.930	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.900	0.003	28.730	2.730	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.415	0.007	11.330	0.521	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.672	0.010	13.130	0.769	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.256	0.017	9.030	0.695	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.290	0.003	15.330	2.030	0.037	0.021	177.400	0.011
NEW JERSEY	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.404	0.007	9.370	0.541	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.641	0.010	11.010	0.777	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.012	0.017	27.140	0.986	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.850	0.003	27.280	2.900	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.404	0.007	9.370	0.537	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.641	0.010	11.010	0.767	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.234	0.017	8.540	0.763	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.220	0.003	14.520	2.170	0.037	0.021	177.400	0.011

Table 5-10. On-Road Vehicle Emission Factors – 2014 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
NEW MEXICO	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.400	0.007	9.200	0.535	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.637	0.010	10.830	0.767	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.011	0.017	27.010	0.976	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.850	0.003	27.090	2.810	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.400	0.007	9.200	0.531	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.637	0.010	10.830	0.757	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.232	0.017	8.500	0.757	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.220	0.003	14.410	2.100	0.037	0.021	177.400	0.011
NEW YORK	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.412	0.007	10.920	0.517	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.666	0.010	12.690	0.766	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.026	0.017	28.360	0.927	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.890	0.003	28.410	2.720	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.412	0.007	10.920	0.514	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.666	0.010	12.690	0.758	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.251	0.017	8.930	0.696	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.280	0.003	15.150	2.030	0.037	0.021	177.400	0.011
NORTH CAROLINA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.398	0.007	8.260	0.552	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.623	0.010	9.830	0.786	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.001	0.017	26.390	1.025	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.820	0.003	26.700	3.060	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.398	0.007	8.260	0.548	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.623	0.010	9.830	0.774	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.221	0.017	8.310	0.808	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.180	0.003	14.180	2.300	0.037	0.021	177.400	0.011
NORTH DAKOTA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.427	0.007	12.290	0.556	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.691	0.010	14.170	0.832	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.038	0.017	29.460	0.967	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.920	0.003	29.870	2.840	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.427	0.007	12.290	0.552	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.691	0.010	14.170	0.824	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.266	0.017	9.270	0.719	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.320	0.003	15.970	2.120	0.037	0.021	177.400	0.011

Table 5-10. On-Road Vehicle Emission Factors – 2014 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
OHIO	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.406	0.007	9.820	0.544	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.648	0.010	11.490	0.784	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.016	0.017	27.490	0.983	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.860	0.003	27.610	2.850	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.406	0.007	9.820	0.540	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.648	0.010	11.490	0.774	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.239	0.017	8.650	0.757	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.240	0.003	14.700	2.130	0.037	0.021	177.400	0.011
OKLAHOMA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.408	0.007	8.560	0.565	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.632	0.010	10.130	0.804	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.002	0.017	26.970	1.054	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.810	0.003	27.830	3.440	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.408	0.007	8.560	0.559	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.632	0.010	10.130	0.788	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.222	0.017	8.490	0.829	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.170	0.003	14.790	2.610	0.037	0.021	177.400	0.011
OREGON	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.403	0.007	10.270	0.525	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.652	0.010	12.000	0.758	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.021	0.017	27.840	0.940	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.870	0.003	27.650	2.690	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.403	0.007	10.270	0.523	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.652	0.010	12.000	0.752	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.245	0.017	8.760	0.718	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.260	0.003	14.710	2.000	0.037	0.021	177.400	0.011
PENNSYLVANIA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.407	0.007	10.160	0.541	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.653	0.010	11.860	0.782	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.019	0.017	27.760	0.971	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.870	0.003	27.810	2.750	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.407	0.007	10.160	0.538	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.653	0.010	11.860	0.773	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.243	0.017	8.740	0.745	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.250	0.003	14.810	2.050	0.037	0.021	177.400	0.011

Table 5-10. On-Road Vehicle Emission Factors – 2014 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
RHODE ISLAND	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.404	0.007	9.900	0.536	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.648	0.010	11.590	0.773	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.017	0.017	27.560	0.967	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.860	0.003	27.580	2.740	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.404	0.007	9.900	0.533	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.648	0.010	11.590	0.765	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.240	0.017	8.670	0.743	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.240	0.003	14.680	2.040	0.037	0.021	177.400	0.011
SOUTH CAROLINA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.399	0.007	7.890	0.558	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.619	0.010	9.420	0.791	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.996	0.017	26.340	1.046	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.800	0.003	26.920	3.190	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.399	0.007	7.890	0.553	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.619	0.010	9.420	0.776	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.215	0.017	8.290	0.830	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.160	0.003	14.290	2.410	0.037	0.021	177.400	0.011
SOUTH DAKOTA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.417	0.007	10.930	0.535	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.669	0.010	12.690	0.794	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.026	0.017	28.380	0.960	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.880	0.003	28.690	2.980	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.417	0.007	10.930	0.530	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.669	0.010	12.690	0.783	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.251	0.017	8.930	0.722	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.270	0.003	15.310	2.230	0.037	0.021	177.400	0.011
TENNESSEE	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.400	0.007	8.560	0.547	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.629	0.010	10.140	0.781	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.004	0.017	26.630	1.012	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.830	0.003	26.940	3.060	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.400	0.007	8.560	0.543	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.629	0.010	10.140	0.768	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.224	0.017	8.380	0.793	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.190	0.003	14.320	2.300	0.037	0.021	177.400	0.011

Table 5-10. On-Road Vehicle Emission Factors – 2014 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
TEXAS	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.402	0.007	7.780	0.566	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.619	0.010	9.300	0.800	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.995	0.017	26.450	1.068	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.790	0.003	27.500	3.370	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.402	0.007	7.780	0.560	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.619	0.010	9.300	0.784	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.213	0.017	8.330	0.850	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.140	0.003	14.590	2.560	0.037	0.021	177.400	0.011
UTAH	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.408	0.007	10.140	0.516	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.653	0.010	11.840	0.761	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.019	0.017	27.750	0.941	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.870	0.003	27.870	2.830	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.408	0.007	10.140	0.512	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.653	0.010	11.840	0.751	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.243	0.017	8.730	0.712	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.250	0.003	14.850	2.110	0.037	0.021	177.400	0.011
VERMONT	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.417	0.007	11.540	0.527	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.676	0.010	13.360	0.783	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.032	0.017	28.850	0.932	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.900	0.003	28.930	2.720	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.417	0.007	11.540	0.524	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.676	0.010	13.360	0.776	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.258	0.017	9.080	0.696	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.300	0.003	15.440	2.030	0.037	0.021	177.400	0.011
VIRGINIA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.400	0.007	8.870	0.541	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.633	0.010	10.470	0.775	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.007	0.017	26.750	0.993	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.840	0.003	26.900	2.900	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.400	0.007	8.870	0.538	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.633	0.010	10.470	0.764	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.228	0.017	8.420	0.775	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.210	0.003	14.300	2.170	0.037	0.021	177.400	0.011

Table 5-10. On-Road Vehicle Emission Factors – 2014 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
WASHINGTON	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.405	0.007	10.440	0.527	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.655	0.010	12.180	0.762	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.022	0.017	27.970	0.941	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.880	0.003	27.780	2.690	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.405	0.007	10.440	0.525	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.655	0.010	12.180	0.757	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.247	0.017	8.800	0.717	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.260	0.003	14.790	2.000	0.037	0.021	177.400	0.011
WEST VIRGINIA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.402	0.007	9.600	0.536	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.643	0.010	11.260	0.771	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.014	0.017	27.320	0.972	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.860	0.003	27.370	2.770	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.402	0.007	9.600	0.533	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.643	0.010	11.260	0.762	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.237	0.017	8.600	0.750	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.230	0.003	14.560	2.070	0.037	0.021	177.400	0.011
WISCONSIN	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.419	0.007	11.560	0.536	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.678	0.010	13.380	0.797	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.032	0.017	28.870	0.947	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.900	0.003	29.090	2.780	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.419	0.007	11.560	0.532	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.678	0.010	13.380	0.789	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.258	0.017	9.090	0.708	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.290	0.003	15.530	2.080	0.037	0.021	177.400	0.011
WYOMING	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.415	0.007	11.440	0.522	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.674	0.010	13.250	0.774	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.031	0.017	28.770	0.925	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.676	0.368	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.870	0.012	2.047	0.649	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	0.900	0.003	28.760	2.710	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.415	0.007	11.440	0.519	0.025	0.011	368.100	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.674	0.010	13.250	0.768	0.025	0.011	516.300	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.257	0.017	9.050	0.690	0.045	0.029	905.600	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.163	0.003	0.774	0.119	0.049	0.033	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.416	0.006	0.631	0.363	0.056	0.040	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.817	0.012	0.832	0.325	0.110	0.083	1243.900	0.027
		NA	MC	Motorcycles	1.290	0.003	15.340	2.020	0.037	0.021	177.400	0.011

Table 5-11. On-Road Vehicle Emission Factors – 2015

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
ALABAMA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.366	0.007	7.610	0.517	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.575	0.010	9.060	0.747	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.867	0.017	26.050	0.962	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.800	0.003	26.910	3.180	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.366	0.007	7.610	0.513	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.575	0.010	9.060	0.733	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.057	0.017	8.190	0.764	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.160	0.003	14.280	2.410	0.037	0.021	177.400	0.011
ARIZONA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.369	0.007	7.960	0.522	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.581	0.010	9.420	0.755	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.870	0.017	26.310	0.965	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.810	0.003	27.160	3.280	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.369	0.007	7.960	0.517	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.581	0.010	9.420	0.741	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.060	0.017	8.280	0.764	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.170	0.003	14.420	2.480	0.037	0.021	177.400	0.011
ARKANSAS	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.370	0.007	8.110	0.523	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.584	0.010	9.570	0.758	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.871	0.017	26.450	0.966	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.810	0.003	27.370	3.340	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.370	0.007	8.110	0.518	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.584	0.010	9.570	0.744	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.062	0.017	8.320	0.763	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.170	0.003	14.540	2.530	0.037	0.021	177.400	0.011
CALIFORNIA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.360	0.007	7.850	0.504	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.576	0.010	9.300	0.730	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.870	0.017	25.870	0.927	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.820	0.003	26.280	2.880	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.360	0.007	7.850	0.501	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.576	0.010	9.300	0.720	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.061	0.017	8.140	0.733	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.180	0.003	13.960	2.160	0.037	0.021	177.400	0.011

Table 5-11. On-Road Vehicle Emission Factors – 2015 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
COLORADO	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.376	0.007	10.570	0.476	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.617	0.010	12.170	0.717	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.893	0.017	27.990	0.845	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.880	0.003	28.240	2.710	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.376	0.007	10.570	0.474	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.617	0.010	12.170	0.710	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.088	0.017	8.810	0.635	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.270	0.003	15.050	2.020	0.037	0.021	177.400	0.011
CONNECTICUT	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.373	0.007	9.960	0.505	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.608	0.010	11.520	0.743	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.888	0.017	27.520	0.896	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.870	0.003	27.860	2.760	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.373	0.007	9.960	0.502	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.608	0.010	11.520	0.735	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.082	0.017	8.660	0.687	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.250	0.003	14.840	2.060	0.037	0.021	177.400	0.011
DELAWARE	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.369	0.007	8.670	0.507	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.590	0.010	10.160	0.739	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.877	0.017	26.540	0.922	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.840	0.003	27.020	2.990	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.369	0.007	8.670	0.504	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.590	0.010	10.160	0.728	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.069	0.017	8.350	0.720	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.210	0.003	14.370	2.240	0.037	0.021	177.400	0.011
FLORIDA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.363	0.007	6.580	0.512	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.562	0.010	7.990	0.733	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.859	0.017	25.400	0.970	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.770	0.003	26.730	2.990	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.363	0.007	6.580	0.508	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.562	0.010	7.990	0.718	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.047	0.017	7.990	0.780	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.110	0.003	14.160	2.270	0.037	0.021	177.400	0.011

Table 5-11. On-Road Vehicle Emission Factors – 2015 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
GEORGIA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.365	0.007	7.510	0.516	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.574	0.010	8.960	0.745	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.866	0.017	25.970	0.961	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.800	0.003	26.850	3.160	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.365	0.007	7.510	0.512	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.574	0.010	8.960	0.731	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.056	0.017	8.170	0.764	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.150	0.003	14.250	2.390	0.037	0.021	177.400	0.011
IDAHO	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.377	0.007	10.820	0.477	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.620	0.010	12.430	0.719	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.895	0.017	28.190	0.842	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.890	0.003	28.410	2.690	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.377	0.007	10.820	0.475	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.620	0.010	12.430	0.713	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.091	0.017	8.870	0.631	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.280	0.003	15.140	2.000	0.037	0.021	177.400	0.011
ILLINOIS	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.374	0.007	9.450	0.515	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.603	0.010	10.970	0.754	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.883	0.017	27.140	0.923	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.860	0.003	27.670	3.060	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.374	0.007	9.450	0.510	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.603	0.010	10.970	0.743	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.077	0.017	8.540	0.713	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.230	0.003	14.730	2.300	0.037	0.021	177.400	0.011
INDIANA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.373	0.007	9.410	0.509	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.601	0.010	10.940	0.746	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.883	0.017	27.090	0.913	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.860	0.003	27.550	2.950	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.373	0.007	9.410	0.506	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.601	0.010	10.940	0.736	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.077	0.017	8.520	0.705	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.230	0.003	14.670	2.220	0.037	0.021	177.400	0.011

Table 5-11. On-Road Vehicle Emission Factors – 2015 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
IOWA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.381	0.007	10.350	0.492	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.617	0.010	11.920	0.742	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.890	0.017	27.830	0.880	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.880	0.003	28.410	3.000	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.381	0.007	10.350	0.488	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.617	0.010	11.920	0.732	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.086	0.017	8.760	0.664	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.260	0.003	15.150	2.250	0.037	0.021	177.400	0.011
KANSAS	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.376	0.007	9.020	0.519	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.598	0.010	10.530	0.757	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.879	0.017	27.020	0.943	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.840	0.003	27.810	3.290	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.376	0.007	9.020	0.514	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.598	0.010	10.530	0.744	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.071	0.017	8.500	0.733	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.200	0.003	14.800	2.490	0.037	0.021	177.400	0.011
KENTUCKY	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.369	0.007	8.680	0.508	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.590	0.010	10.160	0.741	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.877	0.017	26.560	0.924	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.840	0.003	27.070	3.010	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.369	0.007	8.680	0.505	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.590	0.010	10.160	0.730	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.069	0.017	8.360	0.722	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.210	0.003	14.390	2.260	0.037	0.021	177.400	0.011
LOUISIANA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.367	0.007	7.280	0.520	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.572	0.010	8.710	0.748	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.864	0.017	25.950	0.976	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.790	0.003	27.220	3.260	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.367	0.007	7.280	0.515	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.572	0.010	8.710	0.733	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.053	0.017	8.170	0.779	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.130	0.003	14.430	2.480	0.037	0.021	177.400	0.011

Table 5-11. On-Road Vehicle Emission Factors – 2015 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
MAINE	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.385	0.007	11.630	0.496	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.635	0.010	13.290	0.751	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.901	0.017	28.830	0.859	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.910	0.003	29.210	2.730	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.385	0.007	11.630	0.493	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.635	0.010	13.290	0.745	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.099	0.017	9.070	0.640	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.310	0.003	15.590	2.030	0.037	0.021	177.400	0.011
MARYLAND	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.369	0.007	8.870	0.501	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.593	0.010	10.360	0.732	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.879	0.017	26.660	0.907	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.840	0.003	27.100	2.920	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.369	0.007	8.870	0.498	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.593	0.010	10.360	0.721	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.071	0.017	8.390	0.705	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.210	0.003	14.410	2.190	0.037	0.021	177.400	0.011
MASSACHUSETTS	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.374	0.007	10.120	0.505	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.610	0.010	11.690	0.744	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.889	0.017	27.640	0.893	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.870	0.003	27.960	2.750	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.374	0.007	10.120	0.503	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.610	0.010	11.690	0.737	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.084	0.017	8.700	0.684	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.260	0.003	14.900	2.050	0.037	0.021	177.400	0.011
MICHIGAN	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.379	0.007	10.890	0.485	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.622	0.010	12.500	0.732	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.895	0.017	28.250	0.855	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.890	0.003	28.590	2.730	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.379	0.007	10.890	0.482	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.622	0.010	12.500	0.725	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.091	0.017	8.890	0.641	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.280	0.003	15.250	2.030	0.037	0.021	177.400	0.011

Table 5-11. On-Road Vehicle Emission Factors – 2015 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
MINNESOTA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.390	0.007	11.900	0.515	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.641	0.010	13.570	0.784	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.903	0.017	29.060	0.887	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.910	0.003	29.750	2.840	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.390	0.007	11.900	0.512	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.641	0.010	13.570	0.776	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.101	0.017	9.140	0.661	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.310	0.003	15.900	2.120	0.037	0.021	177.400	0.011
MISSISSIPPI	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.368	0.007	7.620	0.520	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.576	0.010	9.070	0.751	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.867	0.017	26.120	0.969	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.800	0.003	27.120	3.260	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.368	0.007	7.620	0.515	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.576	0.010	9.070	0.736	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.057	0.017	8.220	0.770	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.150	0.003	14.400	2.470	0.037	0.021	177.400	0.011
MISSOURI	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.374	0.007	9.000	0.514	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.597	0.010	10.500	0.751	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.879	0.017	26.900	0.932	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.840	0.003	27.560	3.170	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.374	0.007	9.000	0.510	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.597	0.010	10.500	0.738	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.072	0.017	8.460	0.724	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.210	0.003	14.660	2.390	0.037	0.021	177.400	0.011
MONTANA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.382	0.007	11.280	0.489	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.629	0.010	12.920	0.739	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.898	0.017	28.560	0.854	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.900	0.003	28.890	2.710	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.382	0.007	11.280	0.487	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.629	0.010	12.920	0.733	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.095	0.017	8.990	0.638	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.300	0.003	15.410	2.020	0.037	0.021	177.400	0.011

Table 5-11. On-Road Vehicle Emission Factors – 2015 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
NEBRASKA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.377	0.007	9.810	0.487	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.609	0.010	11.350	0.733	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.886	0.017	27.400	0.882	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.860	0.003	27.940	3.040	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.377	0.007	9.810	0.483	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.609	0.010	11.350	0.722	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.080	0.017	8.620	0.670	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.240	0.003	14.890	2.280	0.037	0.021	177.400	0.011
NEVADA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.370	0.007	9.480	0.500	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.601	0.010	11.020	0.733	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.884	0.017	27.140	0.895	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.860	0.003	27.480	2.780	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.370	0.007	9.480	0.498	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.601	0.010	11.020	0.725	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.077	0.017	8.540	0.690	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.240	0.003	14.620	2.070	0.037	0.021	177.400	0.011
NEW HAMPSHIRE	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.380	0.007	11.080	0.487	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.625	0.010	12.700	0.736	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.897	0.017	28.400	0.855	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.900	0.003	28.730	2.730	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.380	0.007	11.080	0.485	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.625	0.010	12.700	0.729	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.093	0.017	8.940	0.640	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.290	0.003	15.330	2.030	0.037	0.021	177.400	0.011
NEW JERSEY	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.370	0.007	9.140	0.503	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.597	0.010	10.650	0.736	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.881	0.017	26.870	0.906	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.850	0.003	27.280	2.900	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.370	0.007	9.140	0.500	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.597	0.010	10.650	0.726	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.074	0.017	8.450	0.702	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.220	0.003	14.520	2.170	0.037	0.021	177.400	0.011

Table 5-11. On-Road Vehicle Emission Factors – 2015 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
NEW MEXICO	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.367	0.007	8.970	0.497	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.593	0.010	10.470	0.726	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.880	0.017	26.740	0.898	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.850	0.003	27.090	2.810	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.367	0.007	8.970	0.494	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.593	0.010	10.470	0.717	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.072	0.017	8.410	0.696	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.220	0.003	14.410	2.100	0.037	0.021	177.400	0.011
NEW YORK	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.378	0.007	10.680	0.481	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.619	0.010	12.280	0.726	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.893	0.017	28.080	0.853	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.890	0.003	28.410	2.720	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.378	0.007	10.680	0.479	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.619	0.010	12.280	0.719	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.089	0.017	8.830	0.640	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.280	0.003	15.150	2.030	0.037	0.021	177.400	0.011
NORTH CAROLINA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.365	0.007	8.040	0.513	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.580	0.010	9.500	0.744	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.871	0.017	26.130	0.942	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.820	0.003	26.700	3.060	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.365	0.007	8.040	0.509	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.580	0.010	9.500	0.732	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.062	0.017	8.220	0.744	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.180	0.003	14.180	2.300	0.037	0.021	177.400	0.011
NORTH DAKOTA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.391	0.007	12.020	0.518	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.643	0.010	13.700	0.789	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.904	0.017	29.160	0.889	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.920	0.003	29.870	2.840	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.391	0.007	12.020	0.514	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.643	0.010	13.700	0.781	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.102	0.017	9.180	0.662	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.320	0.003	15.970	2.120	0.037	0.021	177.400	0.011

Table 5-11. On-Road Vehicle Emission Factors – 2015 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
OHIO	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.372	0.007	9.580	0.506	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.603	0.010	11.120	0.742	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.885	0.017	27.220	0.904	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.860	0.003	27.610	2.850	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.372	0.007	9.580	0.503	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.603	0.010	11.120	0.733	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.078	0.017	8.560	0.697	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.240	0.003	14.700	2.130	0.037	0.021	177.400	0.011
OKLAHOMA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.374	0.007	8.320	0.524	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.588	0.010	9.800	0.760	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.873	0.017	26.710	0.968	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.810	0.003	27.830	3.440	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.374	0.007	8.320	0.519	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.588	0.010	9.800	0.745	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.064	0.017	8.400	0.762	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.170	0.003	14.790	2.610	0.037	0.021	177.400	0.011
OREGON	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.369	0.007	10.040	0.489	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.607	0.010	11.610	0.718	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.889	0.017	27.570	0.865	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.870	0.003	27.650	2.690	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.369	0.007	10.040	0.487	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.607	0.010	11.610	0.713	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.083	0.017	8.670	0.661	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.260	0.003	14.710	2.000	0.037	0.021	177.400	0.011
PENNSYLVANIA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.373	0.007	9.920	0.503	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.607	0.010	11.480	0.740	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.887	0.017	27.480	0.894	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.870	0.003	27.810	2.750	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.373	0.007	9.920	0.501	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.607	0.010	11.480	0.732	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.082	0.017	8.650	0.686	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.250	0.003	14.810	2.050	0.037	0.021	177.400	0.011

Table 5-11. On-Road Vehicle Emission Factors – 2015 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
RHODE ISLAND	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.370	0.007	9.670	0.499	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.603	0.010	11.220	0.733	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.885	0.017	27.290	0.890	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.860	0.003	27.580	2.740	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.370	0.007	9.670	0.497	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.603	0.010	11.220	0.725	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.079	0.017	8.590	0.684	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.240	0.003	14.680	2.040	0.037	0.021	177.400	0.011
SOUTH CAROLINA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.366	0.007	7.670	0.517	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.576	0.010	9.120	0.748	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.867	0.017	26.080	0.961	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.800	0.003	26.920	3.190	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.366	0.007	7.670	0.513	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.576	0.010	9.120	0.734	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.057	0.017	8.200	0.763	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.160	0.003	14.290	2.410	0.037	0.021	177.400	0.011
SOUTH DAKOTA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.383	0.007	10.680	0.497	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.622	0.010	12.280	0.752	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.893	0.017	28.090	0.882	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.880	0.003	28.690	2.980	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.383	0.007	10.680	0.493	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.622	0.010	12.280	0.742	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.089	0.017	8.840	0.664	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.270	0.003	15.310	2.230	0.037	0.021	177.400	0.011
TENNESSEE	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.367	0.007	8.340	0.508	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.585	0.010	9.810	0.739	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.874	0.017	26.360	0.930	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.830	0.003	26.940	3.060	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.367	0.007	8.340	0.504	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.585	0.010	9.810	0.727	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.065	0.017	8.290	0.730	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.190	0.003	14.320	2.300	0.037	0.021	177.400	0.011

Table 5-11. On-Road Vehicle Emission Factors – 2015 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
TEXAS	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.369	0.007	7.550	0.525	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.576	0.010	9.000	0.756	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.866	0.017	26.190	0.982	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.790	0.003	27.500	3.370	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.369	0.007	7.550	0.520	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.576	0.010	9.000	0.741	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.056	0.017	8.240	0.782	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.140	0.003	14.590	2.560	0.037	0.021	177.400	0.011
UTAH	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.374	0.007	9.900	0.479	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.608	0.010	11.460	0.720	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.887	0.017	27.470	0.865	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.870	0.003	27.870	2.830	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.374	0.007	9.900	0.476	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.608	0.010	11.460	0.712	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.082	0.017	8.640	0.655	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.250	0.003	14.850	2.110	0.037	0.021	177.400	0.011
VERMONT	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.382	0.007	11.290	0.491	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.629	0.010	12.920	0.742	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.898	0.017	28.560	0.857	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.900	0.003	28.930	2.720	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.382	0.007	11.290	0.488	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.629	0.010	12.920	0.736	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.095	0.017	8.990	0.640	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.300	0.003	15.440	2.030	0.037	0.021	177.400	0.011
VIRGINIA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.367	0.007	8.640	0.503	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.589	0.010	10.130	0.733	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.877	0.017	26.480	0.914	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.840	0.003	26.900	2.900	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.367	0.007	8.640	0.500	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.589	0.010	10.130	0.723	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.069	0.017	8.330	0.713	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.210	0.003	14.300	2.170	0.037	0.021	177.400	0.011

Table 5-11. On-Road Vehicle Emission Factors – 2015 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
WASHINGTON	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.371	0.007	10.210	0.491	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.610	0.010	11.780	0.722	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.890	0.017	27.700	0.866	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.880	0.003	27.780	2.690	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.371	0.007	10.210	0.489	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.610	0.010	11.780	0.717	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.085	0.017	8.710	0.661	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.260	0.003	14.790	2.000	0.037	0.021	177.400	0.011
WEST VIRGINIA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.369	0.007	9.370	0.499	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.599	0.010	10.890	0.730	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.883	0.017	27.050	0.894	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.860	0.003	27.370	2.770	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.369	0.007	9.370	0.496	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.599	0.010	10.890	0.722	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.076	0.017	8.510	0.690	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.230	0.003	14.560	2.070	0.037	0.021	177.400	0.011
WISCONSIN	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.384	0.007	11.310	0.499	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.631	0.010	12.940	0.755	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.898	0.017	28.590	0.871	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.900	0.003	29.090	2.780	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.384	0.007	11.310	0.496	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.631	0.010	12.940	0.748	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.095	0.017	8.990	0.651	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.290	0.003	15.530	2.080	0.037	0.021	177.400	0.011
WYOMING	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.381	0.007	11.190	0.486	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.627	0.010	12.820	0.734	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.898	0.017	28.480	0.851	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.659	0.350	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.498	0.012	1.782	0.617	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	0.900	0.003	28.760	2.710	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.381	0.007	11.190	0.484	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.627	0.010	12.820	0.728	0.025	0.011	516.200	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	1.094	0.017	8.960	0.635	0.043	0.028	904.800	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.137	0.003	0.748	0.111	0.045	0.030	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.383	0.006	0.614	0.345	0.053	0.038	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.452	0.012	0.724	0.309	0.097	0.071	1243.400	0.027
		NA	MC	Motorcycles	1.290	0.003	15.340	2.020	0.037	0.021	177.400	0.011

Table 5-12. On-Road Vehicle Emission Factors – 2016

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
ALABAMA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.337	0.007	7.430	0.484	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.535	0.010	8.760	0.708	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.760	0.017	25.760	0.897	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.800	0.003	26.910	3.180	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.337	0.007	7.430	0.480	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.535	0.010	8.760	0.695	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.926	0.017	8.100	0.713	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.160	0.003	14.280	2.410	0.037	0.021	177.400	0.011
ARIZONA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.340	0.007	7.770	0.488	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.540	0.010	9.100	0.716	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.762	0.017	26.020	0.900	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.810	0.003	27.160	3.280	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.340	0.007	7.770	0.484	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.540	0.010	9.100	0.703	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.929	0.017	8.190	0.713	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.170	0.003	14.420	2.480	0.037	0.021	177.400	0.011
ARKANSAS	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.341	0.007	7.920	0.489	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.543	0.010	9.250	0.718	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.763	0.017	26.170	0.901	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.810	0.003	27.370	3.340	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.341	0.007	7.920	0.485	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.543	0.010	9.250	0.705	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.931	0.017	8.230	0.712	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.170	0.003	14.540	2.530	0.037	0.021	177.400	0.011
CALIFORNIA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.332	0.007	7.670	0.472	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.535	0.010	8.980	0.693	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.763	0.017	25.590	0.865	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.820	0.003	26.280	2.880	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.332	0.007	7.670	0.470	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.535	0.010	8.980	0.683	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.930	0.017	8.050	0.685	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.180	0.003	13.960	2.160	0.037	0.021	177.400	0.011

Table 5-12. On-Road Vehicle Emission Factors – 2016 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
COLORADO	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.346	0.007	10.360	0.447	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.572	0.010	11.730	0.678	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.783	0.017	27.690	0.788	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.880	0.003	28.240	2.710	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.346	0.007	10.360	0.445	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.572	0.010	11.730	0.672	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.954	0.017	8.710	0.592	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.270	0.003	15.050	2.020	0.037	0.021	177.400	0.011
CONNECTICUT	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.344	0.007	9.760	0.474	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.565	0.010	11.110	0.703	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.778	0.017	27.220	0.835	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.870	0.003	27.860	2.760	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.344	0.007	9.760	0.471	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.565	0.010	11.110	0.696	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.949	0.017	8.560	0.642	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.250	0.003	14.840	2.060	0.037	0.021	177.400	0.011
DELAWARE	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.339	0.007	8.480	0.475	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.548	0.010	9.810	0.700	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.769	0.017	26.250	0.860	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.840	0.003	27.020	2.990	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.339	0.007	8.480	0.472	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.548	0.010	9.810	0.690	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.937	0.017	8.260	0.672	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.210	0.003	14.370	2.240	0.037	0.021	177.400	0.011
FLORIDA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.335	0.007	6.410	0.479	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.523	0.010	7.730	0.696	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.753	0.017	25.130	0.905	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.770	0.003	26.730	2.990	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.335	0.007	6.410	0.476	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.523	0.010	7.730	0.682	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.918	0.017	7.900	0.728	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.110	0.003	14.160	2.270	0.037	0.021	177.400	0.011

Table 5-12. On-Road Vehicle Emission Factors – 2016 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
GEORGIA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.337	0.007	7.330	0.483	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.534	0.010	8.660	0.706	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.759	0.017	25.690	0.896	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.800	0.003	26.850	3.160	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.337	0.007	7.330	0.479	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.534	0.010	8.660	0.693	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.926	0.017	8.080	0.714	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.150	0.003	14.250	2.390	0.037	0.021	177.400	0.011
IDAHO	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.347	0.007	10.610	0.448	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.576	0.010	11.990	0.680	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.784	0.017	27.890	0.785	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.890	0.003	28.410	2.690	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.347	0.007	10.610	0.446	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.576	0.010	11.990	0.674	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.956	0.017	8.770	0.588	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.280	0.003	15.140	2.000	0.037	0.021	177.400	0.011
ILLINOIS	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.345	0.007	9.250	0.482	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.560	0.010	10.590	0.714	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.774	0.017	26.840	0.860	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.860	0.003	27.670	3.060	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.345	0.007	9.250	0.479	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.560	0.010	10.590	0.704	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.944	0.017	8.440	0.666	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.230	0.003	14.730	2.300	0.037	0.021	177.400	0.011
INDIANA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.343	0.007	9.220	0.477	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.559	0.010	10.550	0.706	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.774	0.017	26.790	0.851	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.860	0.003	27.550	2.950	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.343	0.007	9.220	0.474	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.559	0.010	10.550	0.697	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.944	0.017	8.430	0.658	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.230	0.003	14.670	2.220	0.037	0.021	177.400	0.011

Table 5-12. On-Road Vehicle Emission Factors – 2016 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
IOWA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.350	0.007	10.140	0.461	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.573	0.010	11.490	0.701	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.781	0.017	27.530	0.820	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.880	0.003	28.410	3.000	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.350	0.007	10.140	0.457	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.573	0.010	11.490	0.692	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.952	0.017	8.660	0.619	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.260	0.003	15.150	2.250	0.037	0.021	177.400	0.011
KANSAS	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.346	0.007	8.820	0.486	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.556	0.010	10.160	0.717	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.770	0.017	26.730	0.879	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.840	0.003	27.810	3.290	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.346	0.007	8.820	0.482	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.556	0.010	10.160	0.704	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.939	0.017	8.410	0.684	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.200	0.003	14.800	2.490	0.037	0.021	177.400	0.011
KENTUCKY	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.340	0.007	8.490	0.476	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.549	0.010	9.810	0.702	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.769	0.017	26.270	0.862	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.840	0.003	27.070	3.010	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.340	0.007	8.490	0.473	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.549	0.010	9.810	0.692	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.937	0.017	8.260	0.674	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.210	0.003	14.390	2.260	0.037	0.021	177.400	0.011
LOUISIANA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.339	0.007	7.090	0.487	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.532	0.010	8.420	0.709	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.757	0.017	25.670	0.910	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.790	0.003	27.220	3.260	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.339	0.007	7.090	0.483	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.532	0.010	8.420	0.695	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.923	0.017	8.070	0.727	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.130	0.003	14.430	2.480	0.037	0.021	177.400	0.011

Table 5-12. On-Road Vehicle Emission Factors – 2016 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
MAINE	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.354	0.007	11.410	0.465	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.589	0.010	12.800	0.709	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.790	0.017	28.520	0.800	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.910	0.003	29.210	2.730	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.354	0.007	11.410	0.463	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.589	0.010	12.800	0.703	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.963	0.017	8.970	0.596	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.310	0.003	15.590	2.030	0.037	0.021	177.400	0.011
MARYLAND	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.340	0.007	8.670	0.470	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.551	0.010	10.000	0.693	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.770	0.017	26.370	0.846	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.840	0.003	27.100	2.920	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.340	0.007	8.670	0.467	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.551	0.010	10.000	0.683	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.939	0.017	8.290	0.658	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.210	0.003	14.410	2.190	0.037	0.021	177.400	0.011
MASSACHUSETTS	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.344	0.007	9.920	0.474	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.566	0.010	11.270	0.704	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.779	0.017	27.340	0.833	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.870	0.003	27.960	2.750	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.344	0.007	9.920	0.472	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.566	0.010	11.270	0.697	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.950	0.017	8.600	0.639	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.260	0.003	14.900	2.050	0.037	0.021	177.400	0.011
MICHIGAN	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.349	0.007	10.670	0.455	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.578	0.010	12.050	0.691	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.785	0.017	27.940	0.797	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.890	0.003	28.590	2.730	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.349	0.007	10.670	0.453	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.578	0.010	12.050	0.685	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.957	0.017	8.790	0.598	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.280	0.003	15.250	2.030	0.037	0.021	177.400	0.011

Table 5-12. On-Road Vehicle Emission Factors – 2016 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
MINNESOTA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.359	0.007	11.670	0.483	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.595	0.010	13.070	0.739	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.791	0.017	28.750	0.826	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.910	0.003	29.750	2.840	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.359	0.007	11.670	0.480	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.595	0.010	13.070	0.731	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.965	0.017	9.040	0.616	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.310	0.003	15.900	2.120	0.037	0.021	177.400	0.011
MISSISSIPPI	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.339	0.007	7.440	0.487	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.536	0.010	8.760	0.712	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.760	0.017	25.830	0.903	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.800	0.003	27.120	3.260	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.339	0.007	7.440	0.483	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.536	0.010	8.760	0.698	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.926	0.017	8.130	0.719	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.150	0.003	14.400	2.470	0.037	0.021	177.400	0.011
MISSOURI	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.344	0.007	8.800	0.482	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.554	0.010	10.140	0.711	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.770	0.017	26.610	0.869	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.840	0.003	27.560	3.170	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.344	0.007	8.800	0.478	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.554	0.010	10.140	0.699	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.939	0.017	8.370	0.676	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.210	0.003	14.660	2.390	0.037	0.021	177.400	0.011
MONTANA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.351	0.007	11.060	0.459	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.583	0.010	12.450	0.698	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.787	0.017	28.250	0.796	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.900	0.003	28.890	2.710	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.351	0.007	11.060	0.457	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.583	0.010	12.450	0.692	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.960	0.017	8.880	0.595	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.300	0.003	15.410	2.020	0.037	0.021	177.400	0.011

Table 5-12. On-Road Vehicle Emission Factors – 2016 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
NEBRASKA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.347	0.007	9.600	0.456	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.565	0.010	10.950	0.693	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.777	0.017	27.110	0.822	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.860	0.003	27.940	3.040	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.347	0.007	9.600	0.452	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.565	0.010	10.950	0.683	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.947	0.017	8.530	0.625	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.240	0.003	14.890	2.280	0.037	0.021	177.400	0.011
NEVADA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.341	0.007	9.290	0.469	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.558	0.010	10.630	0.694	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.775	0.017	26.850	0.835	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.860	0.003	27.480	2.780	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.341	0.007	9.290	0.467	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.558	0.010	10.630	0.686	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.945	0.017	8.440	0.644	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.240	0.003	14.620	2.070	0.037	0.021	177.400	0.011
NEW HAMPSHIRE	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.350	0.007	10.860	0.457	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.580	0.010	12.240	0.695	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.786	0.017	28.090	0.797	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.900	0.003	28.730	2.730	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.350	0.007	10.860	0.455	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.580	0.010	12.240	0.689	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.958	0.017	8.840	0.596	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.290	0.003	15.330	2.030	0.037	0.021	177.400	0.011
NEW JERSEY	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.341	0.007	8.940	0.472	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.554	0.010	10.280	0.697	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.772	0.017	26.580	0.845	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.850	0.003	27.280	2.900	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.341	0.007	8.940	0.469	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.554	0.010	10.280	0.688	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.941	0.017	8.360	0.655	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.220	0.003	14.520	2.170	0.037	0.021	177.400	0.011

Table 5-12. On-Road Vehicle Emission Factors – 2016 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
NEW MEXICO	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.338	0.007	8.780	0.466	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.551	0.010	10.110	0.688	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.771	0.017	26.450	0.837	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.850	0.003	27.090	2.810	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.338	0.007	8.780	0.464	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.551	0.010	10.110	0.679	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.940	0.017	8.320	0.650	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.220	0.003	14.410	2.100	0.037	0.021	177.400	0.011
NEW YORK	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.348	0.007	10.470	0.451	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.575	0.010	11.830	0.686	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.783	0.017	27.780	0.795	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.890	0.003	28.410	2.720	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.348	0.007	10.470	0.449	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.575	0.010	11.830	0.679	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.955	0.017	8.740	0.597	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.280	0.003	15.150	2.030	0.037	0.021	177.400	0.011
NORTH CAROLINA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.336	0.007	7.860	0.480	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.540	0.010	9.180	0.705	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.764	0.017	25.850	0.879	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.820	0.003	26.700	3.060	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.336	0.007	7.860	0.477	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.540	0.010	9.180	0.694	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.931	0.017	8.130	0.695	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.180	0.003	14.180	2.300	0.037	0.021	177.400	0.011
NORTH DAKOTA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.360	0.007	11.790	0.486	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.596	0.010	13.200	0.743	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.792	0.017	28.850	0.828	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.920	0.003	29.870	2.840	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.360	0.007	11.790	0.483	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.596	0.010	13.200	0.736	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.966	0.017	9.070	0.617	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.320	0.003	15.970	2.120	0.037	0.021	177.400	0.011

Table 5-12. On-Road Vehicle Emission Factors – 2016 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
OHIO	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.343	0.007	9.380	0.475	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.560	0.010	10.720	0.703	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.775	0.017	26.920	0.843	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.860	0.003	27.610	2.850	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.343	0.007	9.380	0.472	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.560	0.010	10.720	0.694	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.945	0.017	8.470	0.650	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.240	0.003	14.700	2.130	0.037	0.021	177.400	0.011
OKLAHOMA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.345	0.007	8.130	0.491	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.547	0.010	9.460	0.720	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.765	0.017	26.420	0.903	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.810	0.003	27.830	3.440	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.345	0.007	8.130	0.486	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.547	0.010	9.460	0.706	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.933	0.017	8.310	0.711	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.170	0.003	14.790	2.610	0.037	0.021	177.400	0.011
OREGON	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.340	0.007	9.840	0.459	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.563	0.010	11.200	0.680	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.779	0.017	27.270	0.806	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.870	0.003	27.650	2.690	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.340	0.007	9.840	0.457	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.563	0.010	11.200	0.675	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.950	0.017	8.580	0.617	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.260	0.003	14.710	2.000	0.037	0.021	177.400	0.011
PENNSYLVANIA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.343	0.007	9.720	0.472	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.564	0.010	11.070	0.701	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.778	0.017	27.190	0.833	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.870	0.003	27.810	2.750	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.343	0.007	9.720	0.470	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.564	0.010	11.070	0.693	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.948	0.017	8.550	0.640	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.250	0.003	14.810	2.050	0.037	0.021	177.400	0.011

Table 5-12. On-Road Vehicle Emission Factors – 2016 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
RHODE ISLAND	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.341	0.007	9.470	0.468	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.560	0.010	10.820	0.694	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.776	0.017	26.990	0.830	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.860	0.003	27.580	2.740	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.341	0.007	9.470	0.466	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.560	0.010	10.820	0.686	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.946	0.017	8.490	0.639	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.240	0.003	14.680	2.040	0.037	0.021	177.400	0.011
SOUTH CAROLINA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.338	0.007	7.480	0.484	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.536	0.010	8.810	0.709	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.760	0.017	25.790	0.897	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.800	0.003	26.920	3.190	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.338	0.007	7.480	0.481	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.536	0.010	8.810	0.696	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.927	0.017	8.110	0.713	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.160	0.003	14.290	2.410	0.037	0.021	177.400	0.011
SOUTH DAKOTA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.352	0.007	10.470	0.466	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.577	0.010	11.840	0.710	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.783	0.017	27.790	0.822	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.880	0.003	28.690	2.980	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.352	0.007	10.470	0.463	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.577	0.010	11.840	0.701	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.954	0.017	8.740	0.619	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.270	0.003	15.310	2.230	0.037	0.021	177.400	0.011
TENNESSEE	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.338	0.007	8.150	0.476	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.544	0.010	9.470	0.700	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.766	0.017	26.080	0.868	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.830	0.003	26.940	3.060	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.338	0.007	8.150	0.473	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.544	0.010	9.470	0.689	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.934	0.017	8.200	0.681	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.190	0.003	14.320	2.300	0.037	0.021	177.400	0.011

Table 5-12. On-Road Vehicle Emission Factors – 2016 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
TEXAS	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.341	0.007	7.370	0.491	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.536	0.010	8.690	0.717	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.759	0.017	25.910	0.915	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.790	0.003	27.500	3.370	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.341	0.007	7.370	0.487	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.536	0.010	8.690	0.702	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.926	0.017	8.150	0.730	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.140	0.003	14.590	2.560	0.037	0.021	177.400	0.011
UTAH	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.344	0.007	9.700	0.449	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.564	0.010	11.050	0.681	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.778	0.017	27.180	0.806	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.870	0.003	27.870	2.830	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.344	0.007	9.700	0.446	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.564	0.010	11.050	0.673	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.948	0.017	8.550	0.611	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.250	0.003	14.850	2.110	0.037	0.021	177.400	0.011
VERMONT	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.352	0.007	11.070	0.460	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.584	0.010	12.460	0.701	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.787	0.017	28.260	0.799	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.900	0.003	28.930	2.720	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.352	0.007	11.070	0.458	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.584	0.010	12.460	0.695	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.960	0.017	8.890	0.597	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.300	0.003	15.440	2.030	0.037	0.021	177.400	0.011
VIRGINIA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.338	0.007	8.450	0.472	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.547	0.010	9.780	0.695	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.769	0.017	26.200	0.852	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.840	0.003	26.900	2.900	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.338	0.007	8.450	0.469	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.547	0.010	9.780	0.685	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.937	0.017	8.240	0.666	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.210	0.003	14.300	2.170	0.037	0.021	177.400	0.011

Table 5-12. On-Road Vehicle Emission Factors – 2016 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
WASHINGTON	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.341	0.007	10.010	0.461	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.566	0.010	11.370	0.684	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.780	0.017	27.400	0.807	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.880	0.003	27.780	2.690	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.341	0.007	10.010	0.459	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.566	0.010	11.370	0.679	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.951	0.017	8.620	0.617	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.260	0.003	14.790	2.000	0.037	0.021	177.400	0.011
WEST VIRGINIA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.340	0.007	9.170	0.468	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.556	0.010	10.510	0.692	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.774	0.017	26.750	0.834	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.860	0.003	27.370	2.770	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.340	0.007	9.170	0.465	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.556	0.010	10.510	0.684	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.944	0.017	8.420	0.644	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.230	0.003	14.560	2.070	0.037	0.021	177.400	0.011
WISCONSIN	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.354	0.007	11.090	0.468	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.585	0.010	12.470	0.713	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.787	0.017	28.280	0.812	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.900	0.003	29.090	2.780	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.354	0.007	11.090	0.465	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.585	0.010	12.470	0.706	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.960	0.017	8.890	0.607	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.290	0.003	15.530	2.080	0.037	0.021	177.400	0.011
WYOMING	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.350	0.007	10.970	0.456	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.582	0.010	12.360	0.693	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.787	0.017	28.170	0.793	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.614	0.320	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.195	0.012	1.593	0.599	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	0.900	0.003	28.760	2.710	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.350	0.007	10.970	0.454	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.582	0.010	12.360	0.688	0.025	0.011	516.700	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.959	0.017	8.860	0.593	0.041	0.026	904.200	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.108	0.003	0.715	0.097	0.041	0.026	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.342	0.006	0.579	0.316	0.049	0.034	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	2.155	0.012	0.647	0.299	0.089	0.063	1243.400	0.027
		NA	MC	Motorcycles	1.290	0.003	15.340	2.020	0.037	0.021	177.400	0.011

Table 5-13. On-Road Vehicle Emission Factors – 2017

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
ALABAMA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.313	0.007	7.280	0.456	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.504	0.010	8.520	0.674	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.666	0.017	25.520	0.831	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.800	0.003	26.910	3.180	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.313	0.007	7.280	0.453	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.504	0.010	8.520	0.662	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.812	0.017	8.020	0.660	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.160	0.003	14.280	2.410	0.037	0.021	177.400	0.011
ARIZONA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.315	0.007	7.620	0.460	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.508	0.010	8.860	0.681	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.668	0.017	25.780	0.833	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.810	0.003	27.160	3.280	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.315	0.007	7.620	0.456	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.508	0.010	8.860	0.669	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.815	0.017	8.100	0.660	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.170	0.003	14.420	2.480	0.037	0.021	177.400	0.011
ARKANSAS	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.317	0.007	7.760	0.461	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.511	0.010	9.000	0.683	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.669	0.017	25.920	0.834	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.810	0.003	27.370	3.340	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.317	0.007	7.760	0.457	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.511	0.010	9.000	0.671	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.816	0.017	8.150	0.659	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.170	0.003	14.540	2.530	0.037	0.021	177.400	0.011
CALIFORNIA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.307	0.007	7.520	0.446	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.504	0.010	8.740	0.659	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.669	0.017	25.340	0.802	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.820	0.003	26.280	2.880	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.307	0.007	7.520	0.443	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.504	0.010	8.740	0.650	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.815	0.017	7.970	0.634	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.180	0.003	13.960	2.160	0.037	0.021	177.400	0.011

Table 5-13. On-Road Vehicle Emission Factors – 2017 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
COLORADO	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.320	0.007	10.190	0.422	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.538	0.010	11.410	0.646	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.686	0.017	27.430	0.730	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.880	0.003	28.240	2.710	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.320	0.007	10.190	0.420	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.538	0.010	11.410	0.640	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.836	0.017	8.620	0.548	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.270	0.003	15.050	2.020	0.037	0.021	177.400	0.011
CONNECTICUT	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.318	0.007	9.590	0.448	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.531	0.010	10.810	0.670	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.682	0.017	26.960	0.775	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.870	0.003	27.860	2.760	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.318	0.007	9.590	0.446	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.531	0.010	10.810	0.663	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.831	0.017	8.480	0.594	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.250	0.003	14.840	2.060	0.037	0.021	177.400	0.011
DELAWARE	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.314	0.007	8.330	0.449	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.516	0.010	9.540	0.667	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.674	0.017	26.000	0.797	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.840	0.003	27.020	2.990	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.314	0.007	8.330	0.446	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.516	0.010	9.540	0.657	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.821	0.017	8.180	0.622	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.210	0.003	14.370	2.240	0.037	0.021	177.400	0.011
FLORIDA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.311	0.007	6.260	0.451	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.492	0.010	7.520	0.662	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.660	0.017	24.890	0.838	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.770	0.003	26.730	2.990	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.311	0.007	6.260	0.448	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.492	0.010	7.520	0.649	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.804	0.017	7.830	0.674	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.110	0.003	14.160	2.270	0.037	0.021	177.400	0.011

Table 5-13. On-Road Vehicle Emission Factors – 2017 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
GEORGIA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.312	0.007	7.180	0.455	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.502	0.010	8.430	0.672	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.665	0.017	25.450	0.830	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.800	0.003	26.850	3.160	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.312	0.007	7.180	0.452	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.502	0.010	8.430	0.660	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.811	0.017	8.000	0.661	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.150	0.003	14.250	2.390	0.037	0.021	177.400	0.011
IDAHO	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.321	0.007	10.440	0.423	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.541	0.010	11.660	0.648	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.687	0.017	27.620	0.728	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.890	0.003	28.410	2.690	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.321	0.007	10.440	0.421	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.541	0.010	11.660	0.643	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.838	0.017	8.680	0.545	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.280	0.003	15.140	2.000	0.037	0.021	177.400	0.011
ILLINOIS	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.319	0.007	9.080	0.455	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.526	0.010	10.300	0.680	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.679	0.017	26.590	0.798	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.860	0.003	27.670	3.060	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.319	0.007	9.080	0.452	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.526	0.010	10.300	0.670	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.827	0.017	8.360	0.617	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.230	0.003	14.730	2.300	0.037	0.021	177.400	0.011
INDIANA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.318	0.007	9.050	0.451	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.525	0.010	10.270	0.673	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.678	0.017	26.540	0.789	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.860	0.003	27.550	2.950	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.318	0.007	9.050	0.448	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.525	0.010	10.270	0.664	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.827	0.017	8.340	0.610	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.230	0.003	14.670	2.220	0.037	0.021	177.400	0.011

Table 5-13. On-Road Vehicle Emission Factors – 2017 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
IOWA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.324	0.007	9.960	0.435	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.538	0.010	11.180	0.668	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.684	0.017	27.260	0.760	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.880	0.003	28.410	3.000	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.324	0.007	9.960	0.432	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.538	0.010	11.180	0.659	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.834	0.017	8.570	0.573	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.260	0.003	15.150	2.250	0.037	0.021	177.400	0.011
KANSAS	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.321	0.007	8.660	0.459	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.522	0.010	9.880	0.683	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.675	0.017	26.480	0.815	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.840	0.003	27.810	3.290	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.321	0.007	8.660	0.455	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.522	0.010	9.880	0.671	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.823	0.017	8.320	0.634	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.200	0.003	14.800	2.490	0.037	0.021	177.400	0.011
KENTUCKY	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.315	0.007	8.330	0.450	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.516	0.010	9.550	0.668	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.674	0.017	26.020	0.799	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.840	0.003	27.070	3.010	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.315	0.007	8.330	0.446	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.516	0.010	9.550	0.659	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.821	0.017	8.180	0.624	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.210	0.003	14.390	2.260	0.037	0.021	177.400	0.011
LOUISIANA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.314	0.007	6.940	0.459	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.501	0.010	8.200	0.674	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.664	0.017	25.430	0.843	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.790	0.003	27.220	3.260	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.314	0.007	6.940	0.455	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.501	0.010	8.200	0.662	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.809	0.017	7.990	0.673	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.130	0.003	14.430	2.480	0.037	0.021	177.400	0.011

Table 5-13. On-Road Vehicle Emission Factors – 2017 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
MAINE	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.328	0.007	11.230	0.439	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.553	0.010	12.450	0.675	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.692	0.017	28.250	0.742	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.910	0.003	29.210	2.730	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.328	0.007	11.230	0.438	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.553	0.010	12.450	0.670	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.844	0.017	8.880	0.552	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.310	0.003	15.590	2.030	0.037	0.021	177.400	0.011
MARYLAND	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.315	0.007	8.520	0.444	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.518	0.010	9.730	0.660	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.675	0.017	26.120	0.785	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.840	0.003	27.100	2.920	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.315	0.007	8.520	0.441	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.518	0.010	9.730	0.651	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.823	0.017	8.210	0.610	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.210	0.003	14.410	2.190	0.037	0.021	177.400	0.011
MASSACHUSETTS	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.318	0.007	9.750	0.448	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.532	0.010	10.970	0.671	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.683	0.017	27.080	0.773	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.870	0.003	27.960	2.750	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.318	0.007	9.750	0.446	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.532	0.010	10.970	0.664	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.833	0.017	8.520	0.592	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.260	0.003	14.900	2.050	0.037	0.021	177.400	0.011
MICHIGAN	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.323	0.007	10.500	0.430	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.543	0.010	11.720	0.659	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.688	0.017	27.670	0.739	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.890	0.003	28.590	2.730	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.323	0.007	10.500	0.428	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.543	0.010	11.720	0.653	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.838	0.017	8.700	0.553	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.280	0.003	15.250	2.030	0.037	0.021	177.400	0.011

Table 5-13. On-Road Vehicle Emission Factors – 2017 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
MINNESOTA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.332	0.007	11.480	0.456	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.559	0.010	12.710	0.703	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.694	0.017	28.470	0.766	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.910	0.003	29.750	2.840	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.332	0.007	11.480	0.453	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.559	0.010	12.710	0.697	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.846	0.017	8.950	0.570	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.310	0.003	15.900	2.120	0.037	0.021	177.400	0.011
MISSISSIPPI	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.314	0.007	7.280	0.459	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.505	0.010	8.530	0.677	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.666	0.017	25.590	0.837	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.800	0.003	27.120	3.260	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.314	0.007	7.280	0.455	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.505	0.010	8.530	0.665	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.812	0.017	8.050	0.665	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.150	0.003	14.400	2.470	0.037	0.021	177.400	0.011
MISSOURI	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.319	0.007	8.640	0.455	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.521	0.010	9.860	0.677	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.675	0.017	26.360	0.805	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.840	0.003	27.560	3.170	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.319	0.007	8.640	0.451	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.521	0.010	9.860	0.666	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.823	0.017	8.290	0.626	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.210	0.003	14.660	2.390	0.037	0.021	177.400	0.011
MONTANA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.325	0.007	10.890	0.433	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.548	0.010	12.110	0.665	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.690	0.017	27.980	0.738	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.900	0.003	28.890	2.710	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.325	0.007	10.890	0.431	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.548	0.010	12.110	0.660	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.841	0.017	8.800	0.551	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.300	0.003	15.410	2.020	0.037	0.021	177.400	0.011

Table 5-13. On-Road Vehicle Emission Factors – 2017 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
NEBRASKA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.322	0.007	9.440	0.430	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.531	0.010	10.650	0.659	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.681	0.017	26.850	0.761	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.860	0.003	27.940	3.040	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.322	0.007	9.440	0.427	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.531	0.010	10.650	0.650	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.830	0.017	8.440	0.578	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.240	0.003	14.890	2.280	0.037	0.021	177.400	0.011
NEVADA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.316	0.007	9.130	0.444	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.524	0.010	10.340	0.662	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.679	0.017	26.590	0.774	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.860	0.003	27.480	2.780	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.316	0.007	9.130	0.441	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.524	0.010	10.340	0.654	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.828	0.017	8.360	0.597	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.240	0.003	14.620	2.070	0.037	0.021	177.400	0.011
NEW HAMPSHIRE	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.324	0.007	10.690	0.432	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.545	0.010	11.910	0.662	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.689	0.017	27.820	0.739	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.900	0.003	28.730	2.730	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.324	0.007	10.690	0.430	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.545	0.010	11.910	0.657	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.840	0.017	8.750	0.552	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.290	0.003	15.330	2.030	0.037	0.021	177.400	0.011
NEW JERSEY	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.316	0.007	8.780	0.446	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.521	0.010	10.000	0.664	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.677	0.017	26.320	0.784	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.850	0.003	27.280	2.900	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.316	0.007	8.780	0.443	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.521	0.010	10.000	0.655	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.825	0.017	8.280	0.607	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.220	0.003	14.520	2.170	0.037	0.021	177.400	0.011

Table 5-13. On-Road Vehicle Emission Factors – 2017 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
NEW MEXICO	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.313	0.007	8.620	0.441	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.518	0.010	9.840	0.655	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.676	0.017	26.190	0.776	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.850	0.003	27.090	2.810	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.313	0.007	8.620	0.438	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.518	0.010	9.840	0.647	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.824	0.017	8.240	0.602	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.220	0.003	14.410	2.100	0.037	0.021	177.400	0.011
NEW YORK	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.322	0.007	10.290	0.426	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.540	0.010	11.510	0.653	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.686	0.017	27.510	0.737	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.890	0.003	28.410	2.720	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.322	0.007	10.290	0.424	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.540	0.010	11.510	0.647	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.837	0.017	8.650	0.553	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.280	0.003	15.150	2.030	0.037	0.021	177.400	0.011
NORTH CAROLINA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.312	0.007	7.710	0.453	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.508	0.010	8.930	0.671	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.670	0.017	25.600	0.814	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.820	0.003	26.700	3.060	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.312	0.007	7.710	0.450	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.508	0.010	8.930	0.661	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.816	0.017	8.050	0.643	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.180	0.003	14.180	2.300	0.037	0.021	177.400	0.011
NORTH DAKOTA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.333	0.007	11.600	0.459	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.560	0.010	12.830	0.708	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.694	0.017	28.570	0.767	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.920	0.003	29.870	2.840	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.333	0.007	11.600	0.456	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.560	0.010	12.830	0.701	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.847	0.017	8.980	0.571	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.320	0.003	15.970	2.120	0.037	0.021	177.400	0.011

Table 5-13. On-Road Vehicle Emission Factors – 2017 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
OHIO	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.318	0.007	9.220	0.448	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.527	0.010	10.430	0.669	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.680	0.017	26.670	0.782	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.860	0.003	27.610	2.850	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.318	0.007	9.220	0.446	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.527	0.010	10.430	0.661	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.828	0.017	8.380	0.603	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.240	0.003	14.700	2.130	0.037	0.021	177.400	0.011
OKLAHOMA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.320	0.007	7.970	0.463	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.515	0.010	9.210	0.685	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.670	0.017	26.170	0.836	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.810	0.003	27.830	3.440	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.320	0.007	7.970	0.458	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.515	0.010	9.210	0.672	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.817	0.017	8.230	0.658	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.170	0.003	14.790	2.610	0.037	0.021	177.400	0.011
OREGON	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.314	0.007	9.680	0.434	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.529	0.010	10.890	0.649	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.683	0.017	27.010	0.748	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.870	0.003	27.650	2.690	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.314	0.007	9.680	0.433	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.529	0.010	10.890	0.644	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.832	0.017	8.490	0.572	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.260	0.003	14.710	2.000	0.037	0.021	177.400	0.011
PENNSYLVANIA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.318	0.007	9.550	0.446	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.530	0.010	10.770	0.668	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.682	0.017	26.930	0.773	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.870	0.003	27.810	2.750	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.318	0.007	9.550	0.444	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.530	0.010	10.770	0.661	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.831	0.017	8.470	0.593	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.250	0.003	14.810	2.050	0.037	0.021	177.400	0.011

Table 5-13. On-Road Vehicle Emission Factors – 2017 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
RHODE ISLAND	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.315	0.007	9.310	0.443	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.526	0.010	10.530	0.661	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.680	0.017	26.730	0.770	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.860	0.003	27.580	2.740	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.315	0.007	9.310	0.441	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.526	0.010	10.530	0.654	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.829	0.017	8.410	0.592	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.240	0.003	14.680	2.040	0.037	0.021	177.400	0.011
SOUTH CAROLINA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.313	0.007	7.330	0.457	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.504	0.010	8.570	0.675	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.666	0.017	25.550	0.831	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.800	0.003	26.920	3.190	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.313	0.007	7.330	0.453	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.504	0.010	8.570	0.663	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.812	0.017	8.030	0.660	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.160	0.003	14.290	2.410	0.037	0.021	177.400	0.011
SOUTH DAKOTA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.326	0.007	10.290	0.440	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.543	0.010	11.510	0.676	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.686	0.017	27.530	0.762	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.880	0.003	28.690	2.980	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.326	0.007	10.290	0.437	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.543	0.010	11.510	0.667	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.837	0.017	8.650	0.573	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.270	0.003	15.310	2.230	0.037	0.021	177.400	0.011
TENNESSEE	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.314	0.007	8.000	0.449	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.512	0.010	9.220	0.667	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.671	0.017	25.830	0.804	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.830	0.003	26.940	3.060	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.314	0.007	8.000	0.446	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.512	0.010	9.220	0.656	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.818	0.017	8.120	0.631	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.190	0.003	14.320	2.300	0.037	0.021	177.400	0.011

Table 5-13. On-Road Vehicle Emission Factors – 2017 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
TEXAS	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.316	0.007	7.210	0.463	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.505	0.010	8.460	0.682	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.666	0.017	25.660	0.848	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.790	0.003	27.500	3.370	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.316	0.007	7.210	0.459	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.505	0.010	8.460	0.668	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.811	0.017	8.070	0.675	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.140	0.003	14.590	2.560	0.037	0.021	177.400	0.011
UTAH	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.319	0.007	9.540	0.424	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.531	0.010	10.750	0.649	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.682	0.017	26.920	0.747	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.870	0.003	27.870	2.830	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.319	0.007	9.540	0.421	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.531	0.010	10.750	0.641	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.831	0.017	8.460	0.566	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.250	0.003	14.850	2.110	0.037	0.021	177.400	0.011
VERMONT	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.325	0.007	10.890	0.435	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.548	0.010	12.110	0.668	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.690	0.017	27.990	0.741	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.900	0.003	28.930	2.720	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.325	0.007	10.890	0.433	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.548	0.010	12.110	0.662	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.841	0.017	8.800	0.553	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.300	0.003	15.440	2.030	0.037	0.021	177.400	0.011
VIRGINIA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.313	0.007	8.300	0.445	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.515	0.010	9.510	0.662	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.674	0.017	25.940	0.790	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.840	0.003	26.900	2.900	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.313	0.007	8.300	0.442	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.515	0.010	9.510	0.653	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.821	0.017	8.160	0.617	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.210	0.003	14.300	2.170	0.037	0.021	177.400	0.011

Table 5-13. On-Road Vehicle Emission Factors – 2017 (continued)

State	Altitude	Fuel Type	Vehicle Type		Emission Factors (g/mi)							
					Criteria Pollutants and Ozone Precursors							
					NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
WASHINGTON	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.316	0.007	9.840	0.436	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.532	0.010	11.060	0.652	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.684	0.017	27.130	0.749	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.880	0.003	27.780	2.690	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.316	0.007	9.840	0.434	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.532	0.010	11.060	0.647	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.834	0.017	8.530	0.572	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.260	0.003	14.790	2.000	0.037	0.021	177.400	0.011
WEST VIRGINIA	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.315	0.007	9.010	0.442	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.523	0.010	10.230	0.659	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.678	0.017	26.500	0.773	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.860	0.003	27.370	2.770	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.315	0.007	9.010	0.440	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.523	0.010	10.230	0.652	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.827	0.017	8.330	0.597	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.230	0.003	14.560	2.070	0.037	0.021	177.400	0.011
WISCONSIN	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.327	0.007	10.910	0.442	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.550	0.010	12.130	0.679	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.690	0.017	28.010	0.752	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.900	0.003	29.090	2.780	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.327	0.007	10.910	0.439	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.550	0.010	12.130	0.672	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.841	0.017	8.810	0.562	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.290	0.003	15.530	2.080	0.037	0.021	177.400	0.011
WYOMING	HIGH	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.324	0.007	10.800	0.431	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.546	0.010	12.020	0.660	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.690	0.017	27.900	0.735	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.600	0.305	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.919	0.012	1.428	0.583	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	0.900	0.003	28.760	2.710	0.037	0.021	177.400	0.011
	LOW	Gasoline	LDGV	Light-Duty Vehicles (Passenger Cars)	0.324	0.007	10.800	0.429	0.025	0.011	368.000	0.102
		Gasoline	LDGT	Light-Duty Trucks (0-8,500 lbs)	0.546	0.010	12.020	0.655	0.025	0.011	516.600	0.102
		Gasoline	HDGV	Heavy-Duty Vehicles (8,501+ lbs)	0.841	0.017	8.770	0.549	0.040	0.025	904.000	0.045
		Diesel	LDDV	Light-Duty Vehicles (Passenger Cars)	0.088	0.003	0.692	0.087	0.038	0.023	314.100	0.007
		Diesel	LDDT	Light-Duty Trucks (0-8,500 lbs)	0.317	0.006	0.565	0.302	0.047	0.032	598.600	0.007
		Diesel	HDDV	Heavy-Duty Vehicles (8,501+ lbs)	1.883	0.012	0.580	0.290	0.078	0.053	1242.900	0.027
		NA	MC	Motorcycles	1.290	0.003	15.340	2.020	0.037	0.021	177.400	0.011

Table 5-14. State-Specific On-Road Composite Vehicle Emission Factors – 2013

State	Altitude	Vehicle Type	Emission Factors (g/mi)							
			Criteria Pollutants and Ozone Precursors							
			NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
ALABAMA	HIGH	All Vehicles	0.703	0.009	9.697	0.798	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.715	0.009	8.825	0.753	0.030	0.016	495.590	0.095
ARIZONA	HIGH	All Vehicles	0.708	0.009	10.054	0.807	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.721	0.009	9.173	0.761	0.030	0.016	495.590	0.095
ARKANSAS	HIGH	All Vehicles	0.711	0.009	10.206	0.810	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.723	0.009	9.320	0.763	0.030	0.016	495.590	0.095
CALIFORNIA	HIGH	All Vehicles	0.702	0.009	9.898	0.775	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.714	0.009	9.035	0.733	0.030	0.016	495.590	0.095
COLORADO	HIGH	All Vehicles	0.737	0.009	12.702	0.747	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.750	0.009	11.774	0.708	0.030	0.016	495.590	0.095
CONNECTICUT	HIGH	All Vehicles	0.730	0.009	12.073	0.778	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.743	0.009	11.159	0.738	0.030	0.016	495.590	0.095
DELAWARE	HIGH	All Vehicles	0.715	0.009	10.752	0.783	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.728	0.009	9.867	0.740	0.030	0.016	495.590	0.095
FLORIDA	HIGH	All Vehicles	0.692	0.009	8.663	0.785	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.704	0.009	7.806	0.741	0.030	0.016	495.590	0.095
GEORGIA	HIGH	All Vehicles	0.702	0.009	9.597	0.796	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.714	0.009	8.726	0.751	0.030	0.016	495.590	0.095
IDAHO	HIGH	All Vehicles	0.741	0.009	12.962	0.748	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.754	0.009	12.029	0.710	0.030	0.016	495.590	0.095
ILLINOIS	HIGH	All Vehicles	0.726	0.009	11.549	0.796	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.739	0.009	10.646	0.753	0.030	0.016	495.590	0.095
INDIANA	HIGH	All Vehicles	0.725	0.009	11.511	0.787	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.738	0.009	10.610	0.744	0.030	0.016	495.590	0.095
IOWA	HIGH	All Vehicles	0.739	0.009	12.480	0.777	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.752	0.009	11.555	0.734	0.030	0.016	495.590	0.095
KANSAS	HIGH	All Vehicles	0.723	0.009	11.133	0.806	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.736	0.009	10.231	0.759	0.030	0.016	495.590	0.095
KENTUCKY	HIGH	All Vehicles	0.716	0.009	10.757	0.785	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.728	0.009	9.871	0.742	0.030	0.016	495.590	0.095
LOUISIANA	HIGH	All Vehicles	0.701	0.009	9.374	0.802	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.713	0.009	8.500	0.756	0.030	0.016	495.590	0.095
MAINE	HIGH	All Vehicles	0.754	0.009	13.804	0.777	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.767	0.009	12.850	0.738	0.030	0.016	495.590	0.095
MARYLAND	HIGH	All Vehicles	0.717	0.009	10.945	0.774	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.730	0.009	10.057	0.732	0.030	0.016	495.590	0.095
MASSACHUSETTS	HIGH	All Vehicles	0.732	0.009	12.237	0.778	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.745	0.009	11.320	0.739	0.030	0.016	495.590	0.095
MICHIGAN	HIGH	All Vehicles	0.743	0.009	13.032	0.761	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.756	0.009	12.096	0.722	0.030	0.016	495.590	0.095
MINNESOTA	HIGH	All Vehicles	0.760	0.009	14.094	0.808	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.774	0.009	13.131	0.767	0.030	0.016	495.590	0.095
MISSISSIPPI	HIGH	All Vehicles	0.705	0.009	9.713	0.803	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.717	0.009	8.837	0.757	0.030	0.016	495.590	0.095
MISSOURI	HIGH	All Vehicles	0.722	0.009	11.099	0.797	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.735	0.009	10.202	0.752	0.030	0.016	495.590	0.095
MONTANA	HIGH	All Vehicles	0.748	0.009	13.441	0.766	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.762	0.009	12.495	0.728	0.030	0.016	495.590	0.095
NEBRASKA	HIGH	All Vehicles	0.732	0.009	11.921	0.770	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.745	0.009	11.010	0.726	0.030	0.016	495.590	0.095
NEVADA	HIGH	All Vehicles	0.724	0.009	11.578	0.771	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.736	0.009	10.677	0.731	0.030	0.016	495.590	0.095
NEW HAMPSHIRE	HIGH	All Vehicles	0.745	0.009	13.230	0.764	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.758	0.009	12.290	0.725	0.030	0.016	495.590	0.095
NEW JERSEY	HIGH	All Vehicles	0.721	0.009	11.224	0.777	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.733	0.009	10.330	0.735	0.030	0.016	495.590	0.095
NEW MEXICO	HIGH	All Vehicles	0.717	0.009	11.049	0.766	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.730	0.009	10.160	0.725	0.030	0.016	495.590	0.095
NEW YORK	HIGH	All Vehicles	0.740	0.009	12.812	0.755	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.753	0.009	11.882	0.716	0.030	0.016	495.590	0.095
NORTH CAROLINA	HIGH	All Vehicles	0.707	0.009	10.112	0.790	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.719	0.009	9.239	0.747	0.030	0.016	495.590	0.095
NORTH DAKOTA	HIGH	All Vehicles	0.762	0.009	14.224	0.813	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.776	0.009	13.257	0.772	0.030	0.016	495.590	0.095
OHIO	HIGH	All Vehicles	0.726	0.009	11.682	0.780	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.739	0.009	10.778	0.739	0.030	0.016	495.590	0.095
OKLAHOMA	HIGH	All Vehicles	0.715	0.009	10.440	0.814	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.728	0.009	9.544	0.766	0.030	0.016	495.590	0.095
OREGON	HIGH	All Vehicles	0.728	0.009	12.146	0.753	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.741	0.009	11.233	0.716	0.030	0.016	495.590	0.095
PENNSYLVANIA	HIGH	All Vehicles	0.729	0.009	12.030	0.776	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.742	0.009	11.118	0.736	0.030	0.016	495.590	0.095
RHODE ISLAND	HIGH	All Vehicles	0.725	0.009	11.772	0.769	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.738	0.009	10.866	0.729	0.030	0.016	495.590	0.095
SOUTH CAROLINA	HIGH	All Vehicles	0.704	0.009	9.750	0.799	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.716	0.009	8.876	0.754	0.030	0.016	495.590	0.095
SOUTH DAKOTA	HIGH	All Vehicles	0.744	0.009	12.828	0.784	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.757	0.009	11.895	0.742	0.030	0.016	495.590	0.095
TENNESSEE	HIGH	All Vehicles	0.711	0.009	10.414	0.785	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.724	0.009	9.535	0.742	0.030	0.016	495.590	0.095
TEXAS	HIGH	All Vehicles	0.705	0.009	9.658	0.812	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.717	0.009	8.777	0.764	0.030	0.016	495.590	0.095
UTAH	HIGH	All Vehicles	0.730	0.009	12.016	0.754	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.743	0.009	11.103	0.713	0.030	0.016	495.590	0.095
VERMONT	HIGH	All Vehicles	0.749	0.009	13.448	0.769	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.762	0.009	12.502	0.730	0.030	0.016	495.590	0.095
VIRGINIA	HIGH	All Vehicles	0.714	0.009	10.714	0.775	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.727	0.009	9.832	0.734	0.030	0.016	495.590	0.095
WASHINGTON	HIGH	All Vehicles	0.730	0.009	12.319	0.756	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.743	0.009	11.402	0.719	0.030	0.016	495.590	0.095
WEST VIRGINIA	HIGH	All Vehicles	0.722	0.009	11.458	0.768	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.734	0.009	10.559	0.728	0.030	0.016	495.590	0.095
WISCONSIN	HIGH	All Vehicles	0.751	0.009	13.473	0.783	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.764	0.009	12.526	0.742	0.030	0.016	495.590	0.095
WYOMING	HIGH	All Vehicles	0.747	0.009	13.343	0.761	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.760	0.009	12.401	0.723	0.030	0.016	495.590	0.095

Table 5-15. State-Specific On-Road Composite Vehicle Emission Factors – 2014

State	Altitude	Vehicle Type	Emission Factors (g/mi)							
			Criteria Pollutants and Ozone Precursors							
			NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
ALABAMA	HIGH	All Vehicles	0.642	0.009	9.370	0.751	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.653	0.009	8.517	0.708	0.029	0.015	497.770	0.095
ARIZONA	HIGH	All Vehicles	0.646	0.009	9.716	0.760	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.658	0.009	8.855	0.715	0.029	0.015	497.770	0.095
ARKANSAS	HIGH	All Vehicles	0.649	0.009	9.862	0.762	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.660	0.009	8.996	0.718	0.029	0.015	497.770	0.095
CALIFORNIA	HIGH	All Vehicles	0.640	0.009	9.570	0.729	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.652	0.009	8.726	0.690	0.029	0.015	497.770	0.095
COLORADO	HIGH	All Vehicles	0.673	0.009	12.290	0.704	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.685	0.009	11.384	0.667	0.029	0.015	497.770	0.095
CONNECTICUT	HIGH	All Vehicles	0.666	0.009	11.679	0.733	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.678	0.009	10.786	0.694	0.029	0.015	497.770	0.095
DELAWARE	HIGH	All Vehicles	0.652	0.009	10.396	0.737	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.664	0.009	9.531	0.696	0.029	0.015	497.770	0.095
FLORIDA	HIGH	All Vehicles	0.631	0.009	8.365	0.738	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.642	0.009	7.527	0.696	0.029	0.015	497.770	0.095
GEORGIA	HIGH	All Vehicles	0.640	0.009	9.273	0.749	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.652	0.009	8.422	0.706	0.029	0.015	497.770	0.095
IDAHO	HIGH	All Vehicles	0.676	0.009	12.543	0.705	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.688	0.009	11.630	0.668	0.029	0.015	497.770	0.095
ILLINOIS	HIGH	All Vehicles	0.663	0.009	11.169	0.750	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.675	0.009	10.285	0.708	0.029	0.015	497.770	0.095
INDIANA	HIGH	All Vehicles	0.662	0.009	11.133	0.741	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.673	0.009	10.252	0.700	0.029	0.015	497.770	0.095
IOWA	HIGH	All Vehicles	0.674	0.009	12.070	0.731	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.687	0.009	11.166	0.690	0.029	0.015	497.770	0.095
KANSAS	HIGH	All Vehicles	0.660	0.009	10.762	0.759	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.672	0.009	9.880	0.714	0.029	0.015	497.770	0.095
KENTUCKY	HIGH	All Vehicles	0.653	0.009	10.400	0.739	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.664	0.009	9.535	0.698	0.029	0.015	497.770	0.095
LOUISIANA	HIGH	All Vehicles	0.640	0.009	9.054	0.755	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.651	0.009	8.200	0.711	0.029	0.015	497.770	0.095
MAINE	HIGH	All Vehicles	0.688	0.009	13.357	0.731	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.700	0.009	12.424	0.694	0.029	0.015	497.770	0.095
MARYLAND	HIGH	All Vehicles	0.654	0.009	10.584	0.728	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.666	0.009	9.716	0.688	0.029	0.015	497.770	0.095
MASSACHUSETTS	HIGH	All Vehicles	0.668	0.009	11.839	0.733	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.680	0.009	10.942	0.695	0.029	0.015	497.770	0.095
MICHIGAN	HIGH	All Vehicles	0.678	0.009	12.609	0.716	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.690	0.009	11.694	0.679	0.029	0.015	497.770	0.095
MINNESOTA	HIGH	All Vehicles	0.694	0.009	13.636	0.761	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.706	0.009	12.694	0.722	0.029	0.015	497.770	0.095
MISSISSIPPI	HIGH	All Vehicles	0.643	0.009	9.385	0.756	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.654	0.009	8.528	0.712	0.029	0.015	497.770	0.095
MISSOURI	HIGH	All Vehicles	0.659	0.009	10.731	0.750	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.670	0.009	9.853	0.707	0.029	0.015	497.770	0.095
MONTANA	HIGH	All Vehicles	0.683	0.009	13.006	0.722	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.695	0.009	12.081	0.684	0.029	0.015	497.770	0.095
NEBRASKA	HIGH	All Vehicles	0.668	0.009	11.529	0.725	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.680	0.009	10.638	0.683	0.029	0.015	497.770	0.095
NEVADA	HIGH	All Vehicles	0.660	0.009	11.200	0.726	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.672	0.009	10.318	0.687	0.029	0.015	497.770	0.095
NEW HAMPSHIRE	HIGH	All Vehicles	0.680	0.009	12.802	0.719	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.692	0.009	11.883	0.682	0.029	0.015	497.770	0.095
NEW JERSEY	HIGH	All Vehicles	0.657	0.009	10.855	0.731	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.669	0.009	9.981	0.691	0.029	0.015	497.770	0.095
NEW MEXICO	HIGH	All Vehicles	0.654	0.009	10.686	0.721	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.666	0.009	9.817	0.682	0.029	0.015	497.770	0.095
NEW YORK	HIGH	All Vehicles	0.675	0.009	12.397	0.711	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.687	0.009	11.487	0.674	0.029	0.015	497.770	0.095
NORTH CAROLINA	HIGH	All Vehicles	0.645	0.009	9.775	0.744	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.656	0.009	8.921	0.703	0.029	0.015	497.770	0.095
NORTH DAKOTA	HIGH	All Vehicles	0.695	0.009	13.762	0.765	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.708	0.009	12.816	0.726	0.029	0.015	497.770	0.095
OHIO	HIGH	All Vehicles	0.662	0.009	11.300	0.735	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.674	0.009	10.415	0.695	0.029	0.015	497.770	0.095
OKLAHOMA	HIGH	All Vehicles	0.653	0.009	10.088	0.766	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.664	0.009	9.213	0.720	0.029	0.015	497.770	0.095
OREGON	HIGH	All Vehicles	0.664	0.009	11.754	0.709	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.676	0.009	10.861	0.674	0.029	0.015	497.770	0.095
PENNSYLVANIA	HIGH	All Vehicles	0.665	0.009	11.638	0.730	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.677	0.009	10.746	0.692	0.029	0.015	497.770	0.095
RHODE ISLAND	HIGH	All Vehicles	0.662	0.009	11.389	0.724	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.674	0.009	10.503	0.686	0.029	0.015	497.770	0.095
SOUTH CAROLINA	HIGH	All Vehicles	0.642	0.009	9.421	0.752	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.654	0.009	8.567	0.708	0.029	0.015	497.770	0.095
SOUTH DAKOTA	HIGH	All Vehicles	0.679	0.009	12.409	0.738	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.691	0.009	11.496	0.697	0.029	0.015	497.770	0.095
TENNESSEE	HIGH	All Vehicles	0.649	0.009	10.068	0.739	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.660	0.009	9.208	0.697	0.029	0.015	497.770	0.095
TEXAS	HIGH	All Vehicles	0.643	0.009	9.330	0.764	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.654	0.009	8.468	0.719	0.029	0.015	497.770	0.095
UTAH	HIGH	All Vehicles	0.666	0.009	11.623	0.710	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.678	0.009	10.731	0.671	0.029	0.015	497.770	0.095
VERMONT	HIGH	All Vehicles	0.683	0.009	13.012	0.724	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.695	0.009	12.087	0.687	0.029	0.015	497.770	0.095
VIRGINIA	HIGH	All Vehicles	0.651	0.009	10.360	0.730	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.663	0.009	9.498	0.690	0.029	0.015	497.770	0.095
WASHINGTON	HIGH	All Vehicles	0.666	0.009	11.921	0.713	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.678	0.009	11.024	0.677	0.029	0.015	497.770	0.095
WEST VIRGINIA	HIGH	All Vehicles	0.658	0.009	11.083	0.723	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.670	0.009	10.204	0.685	0.029	0.015	497.770	0.095
WISCONSIN	HIGH	All Vehicles	0.685	0.009	13.035	0.737	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.697	0.009	12.109	0.698	0.029	0.015	497.770	0.095
WYOMING	HIGH	All Vehicles	0.681	0.009	12.912	0.717	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.693	0.009	11.990	0.680	0.029	0.015	497.770	0.095

Table 5-16. State-Specific On-Road Composite Vehicle Emission Factors – 2015

State	Altitude	Vehicle Type	Emission Factors (g/mi)							
			Criteria Pollutants and Ozone Precursors							
			NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
ALABAMA	HIGH	All Vehicles	0.589	0.009	9.111	0.710	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.600	0.009	8.270	0.669	0.029	0.014	498.560	0.095
ARIZONA	HIGH	All Vehicles	0.593	0.009	9.449	0.718	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.604	0.009	8.600	0.676	0.029	0.014	498.560	0.095
ARKANSAS	HIGH	All Vehicles	0.596	0.009	9.591	0.721	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.606	0.009	8.737	0.678	0.029	0.014	498.560	0.095
CALIFORNIA	HIGH	All Vehicles	0.588	0.009	9.310	0.690	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.599	0.009	8.478	0.652	0.029	0.014	498.560	0.095
COLORADO	HIGH	All Vehicles	0.618	0.009	11.967	0.667	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.629	0.009	11.073	0.631	0.029	0.014	498.560	0.095
CONNECTICUT	HIGH	All Vehicles	0.612	0.009	11.370	0.694	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.623	0.009	10.489	0.657	0.029	0.014	498.560	0.095
DELAWARE	HIGH	All Vehicles	0.599	0.009	10.116	0.698	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.610	0.009	9.263	0.659	0.029	0.014	498.560	0.095
FLORIDA	HIGH	All Vehicles	0.580	0.009	8.128	0.698	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.590	0.009	7.302	0.657	0.029	0.014	498.560	0.095
GEORGIA	HIGH	All Vehicles	0.588	0.009	9.016	0.708	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.599	0.009	8.177	0.667	0.029	0.014	498.560	0.095
IDAHO	HIGH	All Vehicles	0.620	0.009	12.214	0.668	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.632	0.009	11.314	0.633	0.029	0.014	498.560	0.095
ILLINOIS	HIGH	All Vehicles	0.609	0.009	10.869	0.710	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.620	0.009	9.998	0.670	0.029	0.014	498.560	0.095
INDIANA	HIGH	All Vehicles	0.608	0.009	10.835	0.701	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.619	0.009	9.966	0.663	0.029	0.014	498.560	0.095
IOWA	HIGH	All Vehicles	0.619	0.009	11.749	0.693	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.631	0.009	10.857	0.653	0.029	0.014	498.560	0.095
KANSAS	HIGH	All Vehicles	0.606	0.009	10.470	0.718	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.617	0.009	9.600	0.676	0.029	0.014	498.560	0.095
KENTUCKY	HIGH	All Vehicles	0.599	0.009	10.119	0.700	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.610	0.009	9.266	0.660	0.029	0.014	498.560	0.095
LOUISIANA	HIGH	All Vehicles	0.587	0.009	8.801	0.714	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.598	0.009	7.959	0.671	0.029	0.014	498.560	0.095
MAINE	HIGH	All Vehicles	0.632	0.009	13.007	0.693	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.643	0.009	12.087	0.658	0.029	0.014	498.560	0.095
MARYLAND	HIGH	All Vehicles	0.601	0.009	10.299	0.690	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.612	0.009	9.444	0.651	0.029	0.014	498.560	0.095
MASSACHUSETTS	HIGH	All Vehicles	0.613	0.009	11.526	0.695	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.624	0.009	10.642	0.658	0.029	0.014	498.560	0.095
MICHIGAN	HIGH	All Vehicles	0.622	0.009	12.278	0.679	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.634	0.009	11.375	0.643	0.029	0.014	498.560	0.095
MINNESOTA	HIGH	All Vehicles	0.637	0.009	13.277	0.721	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.649	0.009	12.348	0.684	0.029	0.014	498.560	0.095
MISSISSIPPI	HIGH	All Vehicles	0.590	0.009	9.124	0.715	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.601	0.009	8.280	0.673	0.029	0.014	498.560	0.095
MISSOURI	HIGH	All Vehicles	0.605	0.009	10.440	0.710	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.616	0.009	9.575	0.669	0.029	0.014	498.560	0.095
MONTANA	HIGH	All Vehicles	0.627	0.009	12.665	0.684	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.639	0.009	11.753	0.648	0.029	0.014	498.560	0.095

State	Altitude	Vehicle Type	Emission Factors (g/mi)							
			Criteria Pollutants and Ozone Precursors							
			NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
NEBRASKA	HIGH	All Vehicles	0.613	0.009	11.221	0.687	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.625	0.009	10.342	0.647	0.029	0.014	498.560	0.095
NEVADA	HIGH	All Vehicles	0.606	0.009	10.902	0.687	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.617	0.009	10.033	0.650	0.029	0.014	498.560	0.095
NEW HAMPSHIRE	HIGH	All Vehicles	0.624	0.009	12.466	0.682	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.636	0.009	11.559	0.646	0.029	0.014	498.560	0.095
NEW JERSEY	HIGH	All Vehicles	0.604	0.009	10.564	0.692	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.615	0.009	9.702	0.654	0.029	0.014	498.560	0.095
NEW MEXICO	HIGH	All Vehicles	0.600	0.009	10.401	0.683	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.612	0.009	9.543	0.646	0.029	0.014	498.560	0.095
NEW YORK	HIGH	All Vehicles	0.620	0.009	12.070	0.674	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.631	0.009	11.173	0.638	0.029	0.014	498.560	0.095
NORTH CAROLINA	HIGH	All Vehicles	0.592	0.009	9.508	0.704	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.603	0.009	8.667	0.664	0.029	0.014	498.560	0.095
NORTH DAKOTA	HIGH	All Vehicles	0.639	0.009	13.399	0.725	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.650	0.009	12.467	0.687	0.029	0.014	498.560	0.095
OHIO	HIGH	All Vehicles	0.608	0.009	10.998	0.696	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.620	0.009	10.126	0.658	0.029	0.014	498.560	0.095
OKLAHOMA	HIGH	All Vehicles	0.599	0.009	9.810	0.725	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.610	0.009	8.947	0.681	0.029	0.014	498.560	0.095
OREGON	HIGH	All Vehicles	0.610	0.009	11.445	0.672	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.621	0.009	10.565	0.638	0.029	0.014	498.560	0.095
PENNSYLVANIA	HIGH	All Vehicles	0.611	0.009	11.330	0.692	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.622	0.009	10.451	0.655	0.029	0.014	498.560	0.095
RHODE ISLAND	HIGH	All Vehicles	0.607	0.009	11.087	0.686	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.619	0.009	10.214	0.649	0.029	0.014	498.560	0.095
SOUTH CAROLINA	HIGH	All Vehicles	0.590	0.009	9.161	0.711	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.600	0.009	8.319	0.670	0.029	0.014	498.560	0.095
SOUTH DAKOTA	HIGH	All Vehicles	0.623	0.009	12.079	0.700	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.635	0.009	11.179	0.660	0.029	0.014	498.560	0.095
TENNESSEE	HIGH	All Vehicles	0.596	0.009	9.795	0.699	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.607	0.009	8.947	0.659	0.029	0.014	498.560	0.095
TEXAS	HIGH	All Vehicles	0.591	0.009	9.070	0.722	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.601	0.009	8.220	0.679	0.029	0.014	498.560	0.095
UTAH	HIGH	All Vehicles	0.612	0.009	11.314	0.673	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.623	0.009	10.435	0.635	0.029	0.014	498.560	0.095
VERMONT	HIGH	All Vehicles	0.627	0.009	12.671	0.687	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.639	0.009	11.759	0.651	0.029	0.014	498.560	0.095
VIRGINIA	HIGH	All Vehicles	0.598	0.009	10.081	0.691	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.609	0.009	9.231	0.653	0.029	0.014	498.560	0.095
WASHINGTON	HIGH	All Vehicles	0.612	0.009	11.608	0.675	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.623	0.009	10.724	0.641	0.029	0.014	498.560	0.095
WEST VIRGINIA	HIGH	All Vehicles	0.604	0.009	10.788	0.685	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.616	0.009	9.922	0.648	0.029	0.014	498.560	0.095
WISCONSIN	HIGH	All Vehicles	0.629	0.009	12.692	0.698	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.641	0.009	11.778	0.661	0.029	0.014	498.560	0.095
WYOMING	HIGH	All Vehicles	0.626	0.009	12.573	0.680	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.637	0.009	11.664	0.644	0.029	0.014	498.560	0.095

Table 5-17. State-Specific On-Road Composite Vehicle Emission Factors – 2016

State	Altitude	Vehicle Type	Emission Factors (g/mi)							
			Criteria Pollutants and Ozone Precursors							
			NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
ALABAMA	HIGH	All Vehicles	0.543	0.009	8.871	0.676	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.553	0.009	8.040	0.636	0.028	0.014	500.010	0.095
ARIZONA	HIGH	All Vehicles	0.547	0.009	9.198	0.684	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.557	0.009	8.360	0.643	0.028	0.014	500.010	0.095
ARKANSAS	HIGH	All Vehicles	0.549	0.009	9.336	0.686	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.559	0.009	8.493	0.645	0.028	0.014	500.010	0.095
CALIFORNIA	HIGH	All Vehicles	0.541	0.009	9.066	0.657	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.552	0.009	8.244	0.620	0.028	0.014	500.010	0.095
COLORADO	HIGH	All Vehicles	0.569	0.009	11.646	0.634	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.580	0.009	10.763	0.600	0.028	0.014	500.010	0.095
CONNECTICUT	HIGH	All Vehicles	0.563	0.009	11.066	0.660	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.574	0.009	10.196	0.625	0.028	0.014	500.010	0.095
DELAWARE	HIGH	All Vehicles	0.552	0.009	9.847	0.664	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.562	0.009	9.005	0.626	0.028	0.014	500.010	0.095
FLORIDA	HIGH	All Vehicles	0.534	0.009	7.915	0.664	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.544	0.009	7.099	0.625	0.028	0.014	500.010	0.095
GEORGIA	HIGH	All Vehicles	0.542	0.009	8.779	0.674	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.552	0.009	7.950	0.634	0.028	0.014	500.010	0.095
IDAHO	HIGH	All Vehicles	0.571	0.009	11.886	0.635	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.582	0.009	10.997	0.601	0.028	0.014	500.010	0.095
ILLINOIS	HIGH	All Vehicles	0.561	0.009	10.578	0.675	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.571	0.009	9.718	0.637	0.028	0.014	500.010	0.095
INDIANA	HIGH	All Vehicles	0.560	0.009	10.545	0.667	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.570	0.009	9.687	0.629	0.028	0.014	500.010	0.095
IOWA	HIGH	All Vehicles	0.570	0.009	11.431	0.658	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.581	0.009	10.550	0.620	0.028	0.014	500.010	0.095
KANSAS	HIGH	All Vehicles	0.558	0.009	10.189	0.683	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.569	0.009	9.330	0.642	0.028	0.014	500.010	0.095
KENTUCKY	HIGH	All Vehicles	0.552	0.009	9.850	0.666	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.563	0.009	9.007	0.627	0.028	0.014	500.010	0.095
LOUISIANA	HIGH	All Vehicles	0.541	0.009	8.569	0.679	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.551	0.009	7.737	0.638	0.028	0.014	500.010	0.095
MAINE	HIGH	All Vehicles	0.582	0.009	12.654	0.658	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.593	0.009	11.745	0.624	0.028	0.014	500.010	0.095
MARYLAND	HIGH	All Vehicles	0.553	0.009	10.026	0.656	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.564	0.009	9.180	0.619	0.028	0.014	500.010	0.095
MASSACHUSETTS	HIGH	All Vehicles	0.565	0.009	11.218	0.660	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.575	0.009	10.344	0.625	0.028	0.014	500.010	0.095
MICHIGAN	HIGH	All Vehicles	0.573	0.009	11.947	0.645	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.584	0.009	11.055	0.610	0.028	0.014	500.010	0.095
MINNESOTA	HIGH	All Vehicles	0.587	0.009	12.914	0.684	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.598	0.009	11.996	0.648	0.028	0.014	500.010	0.095
MISSISSIPPI	HIGH	All Vehicles	0.544	0.009	8.883	0.680	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.554	0.009	8.049	0.640	0.028	0.014	500.010	0.095
MISSOURI	HIGH	All Vehicles	0.557	0.009	10.161	0.675	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.568	0.009	9.306	0.636	0.028	0.014	500.010	0.095
MONTANA	HIGH	All Vehicles	0.577	0.009	12.322	0.650	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.588	0.009	11.421	0.615	0.028	0.014	500.010	0.095

State	Altitude	Vehicle Type	Emission Factors (g/mi)							
			Criteria Pollutants and Ozone Precursors							
			NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
NEBRASKA	HIGH	All Vehicles	0.565	0.009	10.919	0.653	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.576	0.009	10.051	0.614	0.028	0.014	500.010	0.095
NEVADA	HIGH	All Vehicles	0.558	0.009	10.612	0.654	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.569	0.009	9.753	0.618	0.028	0.014	500.010	0.095
NEW HAMPSHIRE	HIGH	All Vehicles	0.575	0.009	12.130	0.648	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.586	0.009	11.234	0.613	0.028	0.014	500.010	0.095
NEW JERSEY	HIGH	All Vehicles	0.556	0.009	10.282	0.659	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.567	0.009	9.431	0.622	0.028	0.014	500.010	0.095
NEW MEXICO	HIGH	All Vehicles	0.553	0.009	10.125	0.650	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.564	0.009	9.278	0.614	0.028	0.014	500.010	0.095
NEW YORK	HIGH	All Vehicles	0.571	0.009	11.745	0.641	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.582	0.009	10.859	0.606	0.028	0.014	500.010	0.095
NORTH CAROLINA	HIGH	All Vehicles	0.545	0.009	9.257	0.670	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.556	0.009	8.427	0.631	0.028	0.014	500.010	0.095
NORTH DAKOTA	HIGH	All Vehicles	0.588	0.009	13.033	0.688	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.599	0.009	12.111	0.651	0.028	0.014	500.010	0.095
OHIO	HIGH	All Vehicles	0.560	0.009	10.704	0.662	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.571	0.009	9.843	0.625	0.028	0.014	500.010	0.095
OKLAHOMA	HIGH	All Vehicles	0.552	0.009	9.549	0.690	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.563	0.009	8.696	0.647	0.028	0.014	500.010	0.095
OREGON	HIGH	All Vehicles	0.561	0.009	11.141	0.640	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.572	0.009	10.271	0.606	0.028	0.014	500.010	0.095
PENNSYLVANIA	HIGH	All Vehicles	0.563	0.009	11.027	0.658	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.574	0.009	10.158	0.622	0.028	0.014	500.010	0.095
RHODE ISLAND	HIGH	All Vehicles	0.559	0.009	10.791	0.652	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.570	0.009	9.929	0.617	0.028	0.014	500.010	0.095
SOUTH CAROLINA	HIGH	All Vehicles	0.543	0.009	8.919	0.677	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.554	0.009	8.087	0.637	0.028	0.014	500.010	0.095
SOUTH DAKOTA	HIGH	All Vehicles	0.574	0.009	11.752	0.665	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.585	0.009	10.863	0.627	0.028	0.014	500.010	0.095
TENNESSEE	HIGH	All Vehicles	0.549	0.009	9.535	0.666	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.559	0.009	8.697	0.627	0.028	0.014	500.010	0.095
TEXAS	HIGH	All Vehicles	0.544	0.009	8.830	0.687	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.554	0.009	7.991	0.645	0.028	0.014	500.010	0.095
UTAH	HIGH	All Vehicles	0.564	0.009	11.011	0.639	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.574	0.009	10.142	0.603	0.028	0.014	500.010	0.095
VERMONT	HIGH	All Vehicles	0.578	0.009	12.328	0.652	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.589	0.009	11.427	0.618	0.028	0.014	500.010	0.095
VIRGINIA	HIGH	All Vehicles	0.551	0.009	9.814	0.657	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.561	0.009	8.974	0.620	0.028	0.014	500.010	0.095
WASHINGTON	HIGH	All Vehicles	0.563	0.009	11.299	0.643	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.574	0.009	10.425	0.609	0.028	0.014	500.010	0.095
WEST VIRGINIA	HIGH	All Vehicles	0.557	0.009	10.501	0.652	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.567	0.009	9.645	0.616	0.028	0.014	500.010	0.095
WISCONSIN	HIGH	All Vehicles	0.579	0.009	12.348	0.663	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.590	0.009	11.445	0.627	0.028	0.014	500.010	0.095
WYOMING	HIGH	All Vehicles	0.576	0.009	12.234	0.646	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.587	0.009	11.336	0.612	0.028	0.014	500.010	0.095

Table 5-18. State-Specific On-Road Composite Vehicle Emission Factors – 2017

State	Altitude	Vehicle Type	Emission Factors (g/mi)							
			Criteria Pollutants and Ozone Precursors							
			NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
ALABAMA	HIGH	All Vehicles	0.504	0.009	8.680	0.646	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.514	0.009	7.859	0.607	0.028	0.014	500.820	0.095
ARIZONA	HIGH	All Vehicles	0.508	0.009	9.000	0.653	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.517	0.009	8.171	0.614	0.028	0.014	500.820	0.095
ARKANSAS	HIGH	All Vehicles	0.509	0.009	9.135	0.655	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.519	0.009	8.301	0.616	0.028	0.014	500.820	0.095
CALIFORNIA	HIGH	All Vehicles	0.503	0.009	8.873	0.627	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.512	0.009	8.060	0.592	0.028	0.014	500.820	0.095
COLORADO	HIGH	All Vehicles	0.528	0.009	11.398	0.606	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.538	0.009	10.524	0.573	0.028	0.014	500.820	0.095
CONNECTICUT	HIGH	All Vehicles	0.523	0.009	10.830	0.631	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.533	0.009	9.969	0.597	0.028	0.014	500.820	0.095
DELAWARE	HIGH	All Vehicles	0.512	0.009	9.636	0.635	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.522	0.009	8.803	0.598	0.028	0.014	500.820	0.095
FLORIDA	HIGH	All Vehicles	0.496	0.009	7.744	0.634	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.505	0.009	6.937	0.596	0.028	0.014	500.820	0.095
GEORGIA	HIGH	All Vehicles	0.503	0.009	8.590	0.644	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.513	0.009	7.770	0.605	0.028	0.014	500.820	0.095
IDAHO	HIGH	All Vehicles	0.530	0.009	11.633	0.607	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.541	0.009	10.753	0.574	0.028	0.014	500.820	0.095
ILLINOIS	HIGH	All Vehicles	0.520	0.009	10.351	0.645	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.530	0.009	9.500	0.608	0.028	0.014	500.820	0.095
INDIANA	HIGH	All Vehicles	0.519	0.009	10.319	0.638	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.530	0.009	9.470	0.601	0.028	0.014	500.820	0.095
IOWA	HIGH	All Vehicles	0.530	0.009	11.186	0.629	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.540	0.009	10.315	0.592	0.028	0.014	500.820	0.095
KANSAS	HIGH	All Vehicles	0.518	0.009	9.970	0.653	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.528	0.009	9.120	0.613	0.028	0.014	500.820	0.095
KENTUCKY	HIGH	All Vehicles	0.513	0.009	9.639	0.636	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.523	0.009	8.806	0.599	0.028	0.014	500.820	0.095
LOUISIANA	HIGH	All Vehicles	0.503	0.009	8.384	0.649	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.512	0.009	7.561	0.609	0.028	0.014	500.820	0.095
MAINE	HIGH	All Vehicles	0.540	0.009	12.384	0.630	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.551	0.009	11.484	0.596	0.028	0.014	500.820	0.095
MARYLAND	HIGH	All Vehicles	0.514	0.009	9.811	0.627	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.524	0.009	8.975	0.591	0.028	0.014	500.820	0.095
MASSACHUSETTS	HIGH	All Vehicles	0.524	0.009	10.979	0.631	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.534	0.009	10.115	0.597	0.028	0.014	500.820	0.095
MICHIGAN	HIGH	All Vehicles	0.532	0.009	11.692	0.617	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.542	0.009	10.810	0.583	0.028	0.014	500.820	0.095
MINNESOTA	HIGH	All Vehicles	0.545	0.009	12.636	0.654	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.555	0.009	11.728	0.619	0.028	0.014	500.820	0.095
MISSISSIPPI	HIGH	All Vehicles	0.505	0.009	8.692	0.650	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.515	0.009	7.867	0.610	0.028	0.014	500.820	0.095
MISSOURI	HIGH	All Vehicles	0.517	0.009	9.943	0.646	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.527	0.009	9.098	0.607	0.028	0.014	500.820	0.095
MONTANA	HIGH	All Vehicles	0.536	0.009	12.059	0.621	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.546	0.009	11.168	0.588	0.028	0.014	500.820	0.095
NEBRASKA	HIGH	All Vehicles	0.524	0.009	10.684	0.624	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.535	0.009	9.826	0.586	0.028	0.014	500.820	0.095
NEVADA	HIGH	All Vehicles	0.518	0.009	10.386	0.625	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.528	0.009	9.536	0.590	0.028	0.014	500.820	0.095
NEW HAMPSHIRE	HIGH	All Vehicles	0.534	0.009	11.871	0.619	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.544	0.009	10.985	0.586	0.028	0.014	500.820	0.095
NEW JERSEY	HIGH	All Vehicles	0.516	0.009	10.063	0.630	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.526	0.009	9.221	0.594	0.028	0.014	500.820	0.095
NEW MEXICO	HIGH	All Vehicles	0.513	0.009	9.909	0.621	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.523	0.009	9.071	0.586	0.028	0.014	500.820	0.095
NEW YORK	HIGH	All Vehicles	0.530	0.009	11.495	0.613	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.540	0.009	10.618	0.579	0.028	0.014	500.820	0.095
NORTH CAROLINA	HIGH	All Vehicles	0.506	0.009	9.059	0.640	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.516	0.009	8.238	0.603	0.028	0.014	500.820	0.095
NORTH DAKOTA	HIGH	All Vehicles	0.546	0.009	12.752	0.657	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.557	0.009	11.840	0.622	0.028	0.014	500.820	0.095
OHIO	HIGH	All Vehicles	0.520	0.009	10.476	0.633	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.530	0.009	9.624	0.597	0.028	0.014	500.820	0.095
OKLAHOMA	HIGH	All Vehicles	0.513	0.009	9.343	0.659	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.523	0.009	8.499	0.618	0.028	0.014	500.820	0.095
OREGON	HIGH	All Vehicles	0.521	0.009	10.905	0.612	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.531	0.009	10.045	0.580	0.028	0.014	500.820	0.095
PENNSYLVANIA	HIGH	All Vehicles	0.522	0.009	10.792	0.629	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.533	0.009	9.933	0.595	0.028	0.014	500.820	0.095
RHODE ISLAND	HIGH	All Vehicles	0.519	0.009	10.562	0.624	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.529	0.009	9.709	0.589	0.028	0.014	500.820	0.095
SOUTH CAROLINA	HIGH	All Vehicles	0.504	0.009	8.727	0.646	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.514	0.009	7.905	0.607	0.028	0.014	500.820	0.095
SOUTH DAKOTA	HIGH	All Vehicles	0.533	0.009	11.499	0.635	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.543	0.009	10.620	0.598	0.028	0.014	500.820	0.095
TENNESSEE	HIGH	All Vehicles	0.509	0.009	9.331	0.636	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.519	0.009	8.502	0.599	0.028	0.014	500.820	0.095
TEXAS	HIGH	All Vehicles	0.505	0.009	8.639	0.656	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.515	0.009	7.809	0.616	0.028	0.014	500.820	0.095
UTAH	HIGH	All Vehicles	0.523	0.009	10.776	0.611	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.533	0.009	9.916	0.576	0.028	0.014	500.820	0.095
VERMONT	HIGH	All Vehicles	0.536	0.009	12.065	0.624	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.547	0.009	11.173	0.590	0.028	0.014	500.820	0.095
VIRGINIA	HIGH	All Vehicles	0.511	0.009	9.604	0.628	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.521	0.009	8.773	0.592	0.028	0.014	500.820	0.095
WASHINGTON	HIGH	All Vehicles	0.523	0.009	11.059	0.615	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.533	0.009	10.195	0.582	0.028	0.014	500.820	0.095
WEST VIRGINIA	HIGH	All Vehicles	0.517	0.009	10.278	0.623	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.527	0.009	9.431	0.588	0.028	0.014	500.820	0.095
WISCONSIN	HIGH	All Vehicles	0.538	0.009	12.083	0.634	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.548	0.009	11.190	0.599	0.028	0.014	500.820	0.095
WYOMING	HIGH	All Vehicles	0.535	0.009	11.973	0.618	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.545	0.009	11.084	0.584	0.028	0.014	500.820	0.095

Table 5-19. OCONUS On-Road Composite Vehicle Emission Factors

Year	Altitude	Vehicle Type	Emission Factors (g/mi)							
			Criteria Pollutants and Ozone Precursors							
			NO_X	SO_X	CO	VOC	PM_{10}	$PM_{2.5}$	CO_2	NH_3
2013	HIGH	All Vehicles	0.726	0.009	11.571	0.781	0.030	0.016	495.590	0.095
	LOW	All Vehicles	0.738	0.009	10.665	0.739	0.030	0.016	495.590	0.095
2014	HIGH	All Vehicles	0.662	0.009	11.191	0.735	0.029	0.015	497.770	0.095
	LOW	All Vehicles	0.674	0.009	10.304	0.695	0.029	0.015	497.770	0.095
2015	HIGH	All Vehicles	0.608	0.009	10.891	0.696	0.029	0.014	498.560	0.095
	LOW	All Vehicles	0.619	0.009	10.017	0.658	0.029	0.014	498.560	0.095
2016	HIGH	All Vehicles	0.560	0.009	10.600	0.662	0.028	0.014	500.010	0.095
	LOW	All Vehicles	0.571	0.009	9.736	0.625	0.028	0.014	500.010	0.095
2017	HIGH	All Vehicles	0.520	0.009	10.373	0.633	0.028	0.014	500.820	0.095
	LOW	All Vehicles	0.530	0.009	9.519	0.597	0.028	0.014	500.820	0.095

Figure 5-2. Data Collection Form for Government Owned Vehicles (GOV's)

Installation Name:				**Inventory Year:**
Responsible Organization (Name and Office Symbol):				
POC (Name, Phone #, and e-mail):				
Vehicle Category: **(Select from appropriate category listed below the table)**[1]				
Vehicle Identification Number (VIN)[2]	**Vehicle Description**[3]	**Bldg. Number**[4]	**Model Year**	**Miles Driven During Inventory Period (mi/yr)**[5]
		Average Model Year		
		Total Miles Driven on Installation During Inventory Period		

Notes for Figure 5-2:

1. Vehicle Categories are listed in Table 5-9 as the Air Force classification for on-road vehicles.
2. If the VIN is unavailable, please provide some other unique identifier for the vehicle
3. Sedan, hatchback, station wagon, etc.
4. The primary location the vehicle was assigned to during the inventory period
5. Only include the miles driven on the installation – if unknown, provide best estimate to the nearest 100 miles.

Figure 5-3. Example Data Collection Form for Privately Owned Vehicles (POVs)

Installation Name:	**Inventory Year:**
Responsible Organization (Name and Office Symbol):	
POC (Name, Phone #, and e-mail):	

Question	**Response**
Can you provide a 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.	
What is the estimated average number of registered POVs at the installation during the inventory period?	
What is the estimated percentage of registered vehicles which actually travel on the installation during a typical weekday (Monday - Friday)	
What is the estimated percentage of registered vehicles which actually travel on the installation during a typical weekend day (Saturday and Sunday)	
What is the estimated distance the average POV travels on base during a typical weekday?	___ mi/day
What is the estimated distance the average POV travels on base during a typical weekend day?	___ mi/day
What is the estimated number of non-registered POVs which travel on base during a typical weekday?	
What is the estimated number of non-registered POVs which travel on base during a typical weekend day?	
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)	

Using registration information, provide an estimate of the percentage of registered POVs which fall under each of the 12 vehicle categories listed below. If possible, please provide the estimated model year for each vehicle category.

Vehicle Category	Category Description	Estimated % of Registered Vehicles	Average Model Year
LDGV	Light-Duty Gasoline Vehicles - All gasoline-powered passenger cars		
LDDV	Light-Duty Diesel Vehicles - All diesel powered-passenger cars		
LDGT	Light-Duty Gasoline Trucks - All smaller gasoline-powered trucks (0 - 8,500lbs GVWR)		
LDDT	Light-Duty Diesel Trucks - All smaller diesel-powered trucks (0 - 8,500lbs GVWR)		
HDGV	Heavy-Duty Gasoline Vehicles - All larger gasoline-powered vehicles (>8,500lbs)		
HDDV	Heavy-Duty Diesel Vehicles - All larger diesel-powered vehicles (>10,000lbs GVWR)		
MC	Motorcycles - All motorcycles (assumed to be gasoline-powered)		

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