



**Emissions Inventory Documentation  
for the District of Columbia:  
2011 Area Source Methodologies**

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## CHAPTER 1: ANNUAL EMISSIONS ESTIMATES

### **1.0 Fuel Use Emissions**

#### **1.1 Coal**

(The District assumes the use of 100% bituminous/subbituminous coal)

Residential, 2104002000

Commercial/institutional, 2103002000

Industrial, 2102002000

#### **1.2 Natural Gas**

Residential, 2104006000

Commercial/institutional, 2103006000

Industrial, 2102006000

#### **1.3 Distillate Oil**

Residential, 2104004000

Commercial/institutional, 2103004000

Industrial, 2102004000

#### **1.4 Kerosene**

Commercial/institutional, 2103011000

Industrial, 2102011000

#### **1.5 Residual Oil**

Commercial/institutional, 2103005000

Industrial, 2102005000

#### **1.6 Liquefied Petroleum Gas**

Residential, 2104007000

Commercial/institutional, 2103007000

Industrial, 2102007000

For Sections 1.1 to 1.6 – Calculation:

(fuel use in the District)\*(emission factor per pollutant) = emissions;

(emissions for all sources) minus (point source estimate to avoid double-counting) = area source estimate

For Sections 1.1 to 1.6 – Data Sources:

- Fuel use: Energy Information Administration (EIA) State Energy Data System (SEDS): found at <http://www.eia.gov/state/seds/>
- Emission factors: As determined by the Eastern Regional Technical Advisory Committee (ERTAC), found at

<http://www.epa.gov/ttn/chief/net/2011inventory.html> (“Nonpoint Emissions Tools and Methods”) or at <ftp://ftp.epa.gov/EmisInventory/2011nei/doc/>

## 1.7 Residential Wood Combustion

The District adopted EPA’s estimates using a revised RWC emissions estimation tool.

## 2.0 Petroleum Losses; Transport of Fuels

### 2.1 Railroads

Line haul locomotives, Class I operations (CSX), 2285002006  
Line haul locomotives, Passenger trains (Amtrak), 2285002008  
Line haul locomotives, Commuter lines (MARC, VRE), 2285002009  
Yard locomotives (“switchers”), 2285002010

Calculation:

(fuel use)\*(emission factor per pollutant) = emissions

Data Sources:

- Fuel use: Estimates are provided by CSX, Amtrak, MARC, and VRE. Generally, they are based on the number of trips per train per day, mileage of tracks within the District, approximation of gallons per mile, and the number of days the trains run per year.
- Emission factors: As determined by ERTAC
  - For VOCs instead of an emission factor, a HC-to-VOC conversion factor is used

### 2.2 Portable Fuel Containers (PFCs)

Residential

Permeation, 2501011011  
Evaporation (includes diurnal losses), 2501011012  
Spilling during transport, 2501011013  
Refilling at the pump (vapor displacement), 2501011014  
Refilling at the pump (spillage), 2501011015

Commercial

Permeation, 2501012011  
Evaporation (includes diurnal losses), 2501012012  
Spilling during transport, 2501012013  
Refilling at the pump (vapor displacement), 2501012014  
Refilling at the pump (spillage), 2501012015

The District adopted EPA’s estimates using the NONROAD2008a model, which accounts for VOC controls and benzene standards.

### 2.3 Stage I & II

- Bulk terminals, 2501050120 – This category was not calculated because there are no petroleum bulk terminals (NAICS 42471) in the District
- Bulk plants, 2501055120 – This category was not calculated because there are no petroleum bulk stations (NAICS 42471) in the District
- Gasoline refueling (Stage II), 2501060100
- Gasoline service station unloading (balanced submerged), 2501060053
- Gasoline distribution, underground storage tank (breathing and emptying), 2501060201
- Tank trucks in transit, 2505030120

#### Calculation:

(total gallons sold annually)\*(emission factor)\*(conversion factor or rule effectiveness, as appropriate) = emissions

#### Data Sources:

- Gallons sold annually: U.S. Department of Transportation, Federal Highway Administration, “Monthly Motor Fuel Reported by States” (January 2012), found at <http://www.fhwa.dot.gov/policyinformation/quickfinddata/qffuel.cfm>
- Emission factors: As determined by ERTAC
- Conversion factor (for Stage II only): 0.002205 grams per pound
- Rule effectiveness (for balanced submerged Stage I only): According to the Maryland Department of the Environment, there was a study that determined the rule effectiveness factor for vapor balance controls was 91 percent (plus emissions for the 9 percent)

### 2.4 Aviation Gas

- Stage I, 2501080050
- Stage II, 2501080100
- Underground tank breathing/emptying, 2501080201

#### Calculation:

(fuel consumed)\*(unit conversion factor)\*(emission factor per SCC) = emissions

#### Data Sources:

- Fuel use: Energy Information Administration (EIA) State Energy Data System (SEDS): found at <http://www.eia.gov/state/seds/>
  - Presumption is that jet fuel estimates represent heliport activity
- Emission factors: As determined by ERTAC

### 2.5 Marine Gas

2505020000 – This category was not calculated for the District because there are no ships or barges that transport petroleum liquids in or near the District.

### 3.0 Emissions from Solvents

#### 3.1 Architectural Surface Coatings

Solvent-based + water-based, 2401001000

Calculation:

(# people living in the District)\*(emission factor per person) = emissions

Data Sources:

- District population: The latest MWCOC Cooperative Forecast, found at [http://www.mwcog.org/publications/departmental.asp?CLASSIFICATION\\_ID=6&SUBCLASSIFICATION\\_ID=27](http://www.mwcog.org/publications/departmental.asp?CLASSIFICATION_ID=6&SUBCLASSIFICATION_ID=27); and/or US Census Bureau QuickFacts for the District, found at <http://quickfacts.census.gov/qfd/states/11000.html>
- Emission factors: As determined by ERTAC (based on 2007 Freedomia data)

#### 3.2 Auto Refinishing

All processes, 2401005000

The District adopted EPA's estimates based on 2010 County Business Practices estimates.

#### 3.3 Traffic Markings

2401008000

Calculation:

(# road miles paved)\*(emission factor per road mile) = emissions

Data Source:

- Road miles paved: District Department of Transportation
- Emission factor: As determined by ERTAC

#### 3.4 Surface Coatings

Industrial maintenance, 2401100000

Other special purpose coatings, 2401200000

Calculations:

(# people living in the District)\*(emission factor per person) = emissions

Data Sources:

- District population: The latest MWCOC Cooperative Forecast, found at [http://www.mwcog.org/publications/departmental.asp?CLASSIFICATION\\_ID=6&SUBCLASSIFICATION\\_ID=27](http://www.mwcog.org/publications/departmental.asp?CLASSIFICATION_ID=6&SUBCLASSIFICATION_ID=27); and/or US Census Bureau QuickFacts for the District, found at <http://quickfacts.census.gov/qfd/states/11000.html>
- Emission factors: As determined by ERTAC (based on 2007 Freedomia data)

The District adopted EPA estimates for:

Wood furniture and fixtures, 2401020000  
Miscellaneous manufacturing, 2401090000  
Aircraft coatings, 2401075000

EPA assumed that no activity occurs in the District for:

Finished woods, 2401015000  
Paper, foil and film, 2401030000  
Metal cans, 2401040000  
Miscellaneous finished metals, 2401050000  
Large appliances, 2401060000  
Electronic and electric coatings, 2401065000  
Motor vehicles, 2401070000  
Other transportation, 2401990000  
Railroad coatings, 2401085000  
Marine manufacturing, 2401080000  
Metal furniture, 2401025000  
Metal sheet, strip and coil, 2401045000  
Machinery and equipment, 2401055000

### **3.5 Cold Cleaning**

Degreasing, 2415000000

The District adopted EPA's estimates based on county employment adjustments.

### **3.6 Dry Cleaners**

All processes, 2420000000

Calculations:

$(\# \text{ employees}) * (\text{emission factor}) = \text{emissions}$

Data Sources:

- Employee estimates: U.S. Department of Labor, Bureau of Labor Statistics, "Occupational Employment Statistics", found at [http://www.bls.gov/oes/current/oes\\_dc.htm](http://www.bls.gov/oes/current/oes_dc.htm)
- Emission factors: As determined by ERTAC

### **3.7 Graphic Arts**

All processes, 2425000000

Calculation:

$(\# \text{ employees}) * (\text{emission factor}) = \text{emissions};$



(emissions for all sources) minus (point source estimate to avoid double-counting) = area source estimate

Data Sources:

- Employee estimates: U.S. Department of Labor, Bureau of Labor Statistics, “Occupational Employment Statistics”, found at [http://www.bls.gov/oes/current/oes\\_dc.htm](http://www.bls.gov/oes/current/oes_dc.htm)
- Emission factors: As determined by ERTAC

### 3.8 Commercial/Consumer Solvents

Personal care products (cosmetics, toiletries), 2460100000

Household cleaning products, 2460200000

Auto aftermarket, 2460400000

Coatings and related products, 2460500000

Adhesives and sealants, 2460600000

FIFRA-regulated products, 2460800000

Miscellaneous products (not otherwise covered), 2460900000

Calculations:

(# people living in the District)\*(emission factor per person) = emissions

Data Sources:

- District population: The latest MWCOC Cooperative Forecast, found at [http://www.mwcog.org/publications/departamental.asp?CLASSIFICATION\\_ID=6&SUBCLASSIFICATION\\_ID=27](http://www.mwcog.org/publications/departamental.asp?CLASSIFICATION_ID=6&SUBCLASSIFICATION_ID=27); and/or US Census Bureau QuickFacts for the District, found at <http://quickfacts.census.gov/qfd/states/11000.html>
- Emission factors: As determined by ERTAC (based on 2007 Freedonia data)

### 3.9 Asphalt Paving

Cutback asphalt, 2461021000 – The District assumes that the ban on cutback asphalt during ozone season except for roofing (20 DCMR § 709) means that little if any is used, so does not estimate emissions for this category

Emulsified asphalt, 2461022000

The District adopted EPA’s estimates based on data from a 2008 Asphalt Usage Study, purchased by EPA from the Asphalt Institute.

### 3.10 Pesticides and Fertilizers

Application, 2461800000

Calculation:

(# people living in the District)\*(emission factor per person) = emissions

Data Sources:

- District population: The latest MWCOC Cooperative Forecast, found at [http://www.mwcog.org/publications/departmental.asp?CLASSIFICATION\\_ID=6&SUBCLASSIFICATION\\_ID=27](http://www.mwcog.org/publications/departmental.asp?CLASSIFICATION_ID=6&SUBCLASSIFICATION_ID=27); and/or US Census Bureau QuickFacts for the District, found at <http://quickfacts.census.gov/qfd/states/11000.html>
- Emission factors: As determined by ERTAC (based on 2007 Freedomia data)

#### **4.0 Waste & Miscellaneous**

The District believes there is no activity in the District for the following categories:

Open burning, 2610000100, 2610000400, 2610030000, 2830000000  
 Cremation, 2810060100, 2810060200

EPA/ERTAC no longer estimates emissions for the following categories due to resource constraints:

Dental preparation and use, 2850001000  
 General laboratory activities, 2851001000  
 Lamp breakage/recycling, 2861000000, 2861000010  
 Swimming pools, 2862000000  
 (Not since before 2007): Bakeries, Breweries, Composting, Incineration, LUSTs, MSWLs

#### **4.1 Road Dust**

Paved roads, 2294000000  
 Unpaved roads, 2296000000

The District adopted EPA's estimates based on VMT and precipitation.

#### **4.2 Commercial Cooking**

Conveyorized charbroiling, 2302002100  
 Under-fired charbroiling, 2302002200  
 Deep fat frying, 2302003000  
 Flat griddle frying, 2302003100  
 Clamshell griddle frying, 2302003200

Calculation:

(# people living in the District)\*(emission factor per person) = emissions

Data Sources:

- District population: The latest MWCOC Cooperative Forecast, found at [http://www.mwcog.org/publications/departmental.asp?CLASSIFICATION\\_ID=6&SUBCLASSIFICATION\\_ID=27](http://www.mwcog.org/publications/departmental.asp?CLASSIFICATION_ID=6&SUBCLASSIFICATION_ID=27); and/or US Census Bureau QuickFacts for the District, found at <http://quickfacts.census.gov/qfd/states/11000.html>
- Emission factors: As determined by ERTAC

### 4.3 Construction Dust

General building construction (residential), 2311010000  
Heavy construction (non-residential), 2311020000  
Road construction, 2311030000

The District adopted EPA's estimates.

### 4.4 Publicly Owned Treatment Works (POTWs)

Wastewater, 2630020000

Calculation:

$(\text{adjusted DC flow rate}) * (\text{emission factor}) = \text{emissions}$

Data Sources:

- Adjusted DC flow rate: District of Columbia's Climate Action Plan data
- Emission factor: As determined by EPA

### 4.5 Fires

Structure fires (accidental), 2810030000  
Structure fires (fire fighter training), 2810035000  
Vehicle fires, 2810050000

Calculation:

$(\# \text{ of fires}) * (\text{fuel loading factor}) * (\text{emission factors}) = \text{emissions}$

Data Sources:

- # of fires: District of Columbia's Fire and EMS Department (DCFEMS)
- Fuel loading factor: EIIP (2000, 2001)
- Emission factors: As determined by ERTAC

## 5.0 Marine, Air, Rail (MAR)

The District has no large ocean-bearing marine vessels that go through ports ("marine") and no airports ("air"). Section 2.1 of this document discusses rail emissions ("rail").

- Any EPA commercial marine vessel (CMV) estimates would be part of the following SCCs: 2280002200 and 2280003200
- Any EPA airport estimates would be part of the following SCCs: 2275087000 (point) as well as 2275050011 and 227505012 (nonpoint)

## CHAPTER 2: OZONE SEASON DAY EMISSIONS

Ozone season day emissions were estimated for CO, NO<sub>x</sub>, and VOCs based on the following equation:

$$\begin{aligned} & \text{typical ozone season daily emissions} = \\ & (\text{annual tons/yr})(2000 \text{ lb/ton})(\text{SAF/peak ozone season as \% of yr}) \\ & \quad \text{divided by} \\ & \text{operating schedule as in (days/week)(weeks/year)} \end{aligned}$$

Seasonal adjustment factors (SAFs) for 2011 were developed and shared by the Maryland Department of the Environment (MDE). For SCCs where there was no SAF, an SAF was developed based on other MDE SAFs.











