



EQ Form 2.7 Haul Road Fugitive Emissions Worksheet Instructions for Form 780-1445

The equation for haul road fugitive emissions in AP-42 section 13.2.2 was updated in November 2006. Use the current equation to determine the emission factor. This information should be consistent with the construction permit.

This form is required only if changes in the haul road parameters (length, silt content test results, etc.) make calculation of a new emission factor necessary. If Form 2.7 is not used to calculate an emission factor, the company still needs to show how they calculated their annual Vehicle Miles Traveled, or VMT, and indicate that the emission factor is the same one used in the construction permit or previous Emission Inventory Questionnaire, or EQ.

Use a separate Form 2.7 for each haul road. You may group separate haul roads as one unit if the physical characteristics of the roads and trucks are so similar that if separate emission factors were calculated, the results would be the same.

Complete the Facility Name, Federal Information Processing Standard, or FIPS, County Number, Plant Number and Year of Data fields at the top.

Haul Road Information

Emission Unit Number - This number is the unique identification number for each specific haul road. This identification number must match the unit number entered on *Form 1.1 Process Flow Diagram*, *Form 1.2 Summary of Emission Units* and *Form 2.0 Emission Unit Information*.

Source Classification Code - This eight-digit code identifies the type of process associated with an emission unit. A default Source Classification Code, or SCC for haul roads is 30502011 (it refers specifically to stone quarry hauling operations), but another SCC that refers to your specific operations can also be used.

Segment Number - This is a two-digit number assigned by the facility used to uniquely identify processes associated with an emission unit. Generally, if an emission unit, i.e., EP01 has three processes associated with it, then segment numbers 01, 02 and 03 will be assigned to those processes. Once assigned, this number should remain constant from year to year. If there is a change in the SCC used by the facility to identify a process, a new segment number will be assigned to that process or SCC.

Length of Road - Report the length of the haul road to the nearest tenth of a mile. If the haul road is one-way, divide the length of road by 2 and enter the result.

Silt Content - Use the default value of 8.3 percent for unpaved roads and 5.5 percent for paved roads unless the road has had testing performed to determine the silt content. Enter the silt content of the road surface, if known. Obtain the silt content by measuring the proportion of loose, dry surface dust that passes through a 200 mesh screen, using ASTM C 136 method. Table 13.2.2-1 at the end of this document lists some typical silt content values.

The Particulate Matter, or PM₁₀ emission factor equation of section [5] requires that the silt content be entered as a percent, not the decimal equivalent.

Example: If the default value of 8.3 percent is selected, enter as 8.3 not 0.083 in the formula.

Surface Material of Road - Enter the type of material that makes up the road surface.

Days of Rain with at least 0.01 Inches per Year - Enter the number of days it rained if this information is available. The default value of 105 days is the recommended value unless other specific information on the number of days of rain is available.

Type of Dust Control - Select the type of dust control used on this haul road. If dust control is used, enter it on Form 2.0C, *Control Device Information*. The efficiency should match the efficiency in the construction permit, unless documented.

Haul Truck Information

If more than one type of truck was used, determine a weighted average of the loaded and unloaded weight of the truck fleet.

Make/Model of Truck - Enter the make and model for this specific haul truck, or use “various” for a mixed fleet of trucks.

Unloaded Truck Weight (in tons) - List the weight of this specific haul truck when empty, or the weighted average for the truck fleet.

Average Loaded Truck Weight (in tons) - Enter the average loaded truck weight for this specific truck or the entire truck fleet.

Average Weight of Material Per Load (in tons) - Enter the average weight of the haul truck per load. Calculate this figure by subtracting the unloaded truck weight from the average loaded truck weight.

Material Hauled Information

Type of Material Hauled: Enter the type of material normally hauled. Some examples are gravel, fines, slag, rip rap, etc.

Annual Amount Hauled (in tons): Report the annual amount of material the specific haul truck associated with this emission unit hauled.

Calculation of Annual Vehicle Miles Traveled

Annual VMT: Annual VMT is a calculated number and is not based on odometer readings for the specific haul truck. The Excel® spreadsheet version of this form will calculate VMT for you. The formula to calculate the annual VMT is:

$$\text{Annual VMT} = 2 \times (\text{length of haul road}) \times (\text{annual amount hauled}) \\ \div (\text{average weight of material per load})$$

Perform the annual VMT calculation for this haul road and haul truck and enter the results as miles traveled.

Note: If the sum of all the annual VMT for all haul roads and haul trucks is less than 100 annual VMT traveled for the entire facility, then the emissions do not need to be reported on Form 2.0 for purposes of calculating an emissions fee. If the sum of the annual VMT is less than 100 VMT, additional documentation should be provided to verify the actual amount of the VMT figure.

Calculation of Haul Road Emission Factors

Excel will calculate this value for you. Block 5 provides an equation from the AP 42 section on Unpaved Roads (Sec. 13.2.2) to calculate the PM₁₀ emission factor. The PM₁₀ and PM_{2.5} emission factors for each haul road are calculated using the formulas below:

PM₁₀ Emission Factor (lb/VMT) =

$$1.5 \times (\{Silt\ Content\ (\%)\} / 12)^{0.9} \times [(\{Unloaded\ Truck\ Wt\} + \{Average\ Loaded\ Truck\ Wt\}) / 6]^{0.45} \times [(365 - \{Days\ of\ Rain\}) / 365]$$

PM_{2.5} Emission Factor (lb/VMT) =

$$0.15 \times (\{Silt\ Content\ (\%)\} / 12)^{0.9} \times [(\{Unloaded\ Truck\ Wt\} + \{Average\ Loaded\ Truck\ Wt\}) / 6]^{0.45} \times [(365 - \{Days\ of\ Rain\}) / 365]$$

Example: Assume unloaded truck weight is 12 tons; average loaded truck weight is 28 tons; use default values of 8.3 for silt content, 105 for days of rain.

PM₁₀ EF: $1.5 \times [8.3 \div 12]^{0.9} \times [(12 + 28) / 6]^{0.45} \times [(365 - 105) / 365]$
 $1.5 \times 0.72 \times 2.35 \times 0.71 = 1.80 \text{ lbs PM}_{10}/\text{VMT}$

PM_{2.5} EF: $.15 \times [8.3 \div 12]^{0.9} \times [(12 + 28) / 6]^{0.45} \times [(365 - 105) / 365]$
 $.15 \times 0.72 \times 2.35 \times 0.71 = .18 \text{ lbs PM}_{2.5}/\text{VMT}$

4.8-12AP-42 Table 13.2.2-1

Typical Silt Content Values of Surface Material On Industrial Unpaved Roads*

Industry	Road Use Or Surface Material	Plant Sites	No. of Samples	Silt Content (%)	
				Range	Mean
Copper smelting	Plant road	1	3	16-19	17
Iron and steel production	Plant road	19	135	0.2-19	6.0
Sand and gravel processing	Plant road	1	3	4.1-6.0	4.8
	Material storage area	1	1	-	7.1
Stone quarrying and processing	Plant road	2	10	2.4-16	10
	Haul road to/from pit	4	20	5.0-15	8.3
Taconite mining and processing	Service road	1	8	2.4-16	4.3
	Haul road to/from pit	1	12	5.0-15	5.8
Western surface coal mining	Haul road to/from pit	3	21	2.4-7.1	8.4
	Plant road	2	2	3.9-9.7	5.1
	Scraper route	3	10	2.8-18	17
	Haul road (freshly graded)	2	5	4.9-5.3	24
Construction sites	Scraper route	7	20	7.2-25	8.5
Lumber sawmills	Log yards	2	2	18-29	8.4
Municipal solid waste landfills	Disposal routes	4	20	0.56-21	6.4

For More Information

Missouri Department of Natural Resources
Air Pollution Control Program

P.O. Box 176

Jefferson City, MO 65102-0176

800-361-4827 or 573-751-4817

573-751-2706 fax

www.dnr.mo.gov/env/apcp/index.html