



EQ Form 2.8 Storage Pile Worksheet Instructions for Form 780-1446

This form is optional if a facility is reporting emissions from one or more open storage piles that are on-site at the facility. Data should be consistent with the construction permit for the facility.

There are two different categories of emissions from storage piles: activity and wind erosion. The activity portion of storage pile emission submittals includes the vehicle activity and load in/load out components and is calculated in the same manner as in previous Emission Inventory Questionnaires, or EQs. The wind erosion component is calculated using pile area (acres) instead of tons stored as the throughput.

Two different Source Classification Codes, or SCC, are required. For quarry and associated industry storage piles, use SCC number 3-05-020-07, Stone Quarrying, Open Storage (lb/ton) with activity emissions and use SCC number 3-05-025-07, Sand/Gravel Storage Piles (lb/acre) with wind erosion emissions. This will require the use of two emission unit information forms (Form 2.0). One will be for activity, the other will be for wind erosion, but the emission unit number should be the same for both.

Assign an activity SCC associated with a pound per ton emission factor to one Form 2.0 and a wind erosion SCC associated with a pound per acre emission factor to the other. For other types of storage piles such as coal, a facility may use an industry-specific SCC if appropriate for activity emissions (lb/ton) and wind erosion emissions (lb/acre).

If you want to continue using SCC number 3-05-020-07 with the default Particulate Matter, or PM₁₀ emission factor of 0.12 lb/ton for all storage pile emissions, it is not necessary to complete all the information on Form 2.8 for block 1, storage pile information. Simply report the information on one Form 2.0.

Use a separate Form 2.8 for each storage pile emission unit identified on *Form 1.1 Process Flow Diagram* and *Form 1.2 Summary of Emission Units*.

You may group and report separate storage piles as one unit if the physical characteristics of the pile and the surrounding environment are so similar that, if you calculate separate emission factors, the results would be the same.

Complete the Facility Name, County Number, Plant Number and Year of Data fields at the top.

Storage Pile Information

Emission Unit Number - This number is the unique identification number for each specific storage pile. 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*.

Note: There will be two Form 2.0s completed but the same unit number will be used for each storage pile or group (one for activity and one for wind erosion).

SCC Number for Activity - List the SCC in tons that identifies the type of storage material for activity emissions.

SCC Number for Wind Erosion - List the SCC in acres that identifies the type of storage material for wind erosion emissions.

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 two processes associated with it, then segment numbers 01, 02 will be assigned to those processes.

Example: For a storage pile, one segment number is associated with the activity and another segment number is associated with the wind erosion component. 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

Type of Material Stored - Enter the type of material in the open storage pile for this emission unit. Examples of some common storage pile materials include gravel, fines, pea gravel, crushed stone dust, crushed cinder, etc.

Moisture Content of Stored Material - Enter the moisture content of the storage pile if known. For examples, refer to Table 13.2.4-1 or Table 2.1.2-2 at the end of this instruction set. Use a default value of 0.7 percent for the moisture content of the storage pile if no testing has been done on the storage pile for moisture content.

Use the moisture content percentage, not the decimal equivalent, when calculating the Load In-Load Out Factor in section 3-A.

Example: If the default value of 0.7 percent is selected, enter as 0.7 in the formula.

Area of Storage Piles - Estimate the number of acres of land that is under this specific storage pile.

Silt Content - Enter the silt content of the storage pile if known. Calculate the silt content by measuring the proportion of dry aggregate material that passes a 200 mesh screen, using ASTM C 136 method. The silt content for some common materials stored in open storage piles is listed in Table 13.2.4-1 and Table 2.1.2-2. Use a default value of 1.6 percent may be used for the storage pile if no silt content testing has been done.

Use the silt content percentage, not the decimal equivalent, when calculating the wind erosion and activity factors in section 3-B and 3-C.

Example: If the default value of 1.6 percent is selected, enter as 1.6 in the formula.

Storage Duration - Enter the average number of days per year that aggregate material remains in the storage pile. Table 2.1.2-2 lists some estimates on the storage duration for various types of storage material.

Annual Amount Stored - Enter the total amount of all aggregate material produced and subsequently stored in the storage pile during the year. Enter tons of material stored per year.

Maximum Hourly Amount Stored - List the largest quantity of aggregate that can be loaded into or out of the storage pile in an hour. Enter the maximum number of tons of material stored per hour.

Raw Material Loading Method - Check the box that best corresponds to the main method of loading or removing material from the storage pile.

Raw Material Unloading Method - Check the box that best corresponds to the main method of unloading or adding material to the storage pile.

Other Factors Affecting Emission Rates

Mean Wind Speed - The statistical mean of all wind speeds at a height 10 centimeters above the storage piles, regardless of the wind direction. You may use a default value of 10 miles per hour for the mean wind speed figure.

Percent of Time the Wind Velocity is Greater than 12 MPH - This is the percentage of time that the unobstructed wind velocity exceeds 12 miles per hour at the mean pile height. You may use a default value of 32 percent.

Dry Days Per Year - The number of days that at least 0.01 inches of rain did not fall. You may use a default value of 260 days.

Vehicle Activity Factor - Use the following table to select the correct value for Vehicle Activity Factor, or VAF, for this storage pile. You may use a default value of 1.0 or you may use the values from the following table:

MATERIAL	VAF VALUE
Coal	0.08
Coke	0.25
Gravel	0.25
Iron Ore	0.06
Limestone	0.25
Sand (Fines)	1.00
Slag	1.00
Top Soil (Overburden)	0.25
All Others	1.00

Storage Pile Emission Factor Calculations

Excel® will calculate these figures.

[3-A-1] Load In/Load Out Component - The Load In/Load Out Component is a calculated number that represents the amount of PM₁₀ emissions that will result from the Load In/Load Out process. Use this formula to calculate the value:

$$Load\ In/Load\ Out\ Component = 0.0032 \times .35 \times (Mean\ Wind\ Speed / 5)^{1.3} \times (Moisture\ Content\ \% / 2)^{1.4}$$

Perform the calculation for the Load In-Load Out Component and enter the results in block 3-A.1 of this form.

[3-A-2] Vehicle Activity Component - The Vehicle Activity Component is a calculated number that represents the amount of PM₁₀ released into the atmosphere due to vehicular traffic around the storage pile. Use this formula to calculate the value:

$$Vehicle\ Activity\ Component = 0.05 \times \{Silt\ Content\ (\%)\} / 1.5 \times \{Dry\ Days\ per\ Year\} / 235 \times \{Vehicle\ Activity\ Factor\} lb/ton$$

Perform the calculation for the Vehicle Activity Component and enter the results in block 3-A.2 of this form.

[3-A-3] Activity PM₁₀ Emission Factor - To calculate the Activity PM₁₀ emission factor, add the Load In/Load Out Component (3-A.1), and Vehicle Activity Component (3-A.2) together and enter the result in block

3.A.3 of this form. When using this worksheet, always express the units as pounds of PM₁₀ emitted per ton of aggregate stored in piles.

$$\text{Emission Factor} = \{[3-A-1] \text{ Load In/Load Out Component}\} + \{[3-A-2] \text{ Vehicle Activity Component}\}$$

[3-B] Wind Erosion PM₁₀ Emission Factor - The Wind Erosion Factor is a calculated number that represents the amount of PM₁₀ released into the atmosphere from this storage pile due to wind erosion. Use this formula to calculate the factor:

$$\text{Wind Erosion PM}_{10} \text{ Emission Factor} = 0.85 \times (\{\text{Silt Content (\%)}\} / 1.5) \times (\{\text{Storage Duration (Days)}\} \times (\{\text{Dry Days per Year}\} / 235) \times (\{\% \text{ of Time Wind} > 12 \text{ mph}\} / 15) \text{ lb/acre}$$

Perform the calculation for the Wind Erosion Factor and enter the results in block 3-B of this form.

Enter the following on Form 2.0, Emission Unit Information for the activity portion of storage pile emissions:

- Block 1 - Enter the SCC. If you use the default SCC, enter 3 05 020 07 (lb/ton).
- Enter the Activity PM₁₀ Emission Factor (block 3-A-3) for this storage pile in column 7 in the Emissions Calculation Section.

Enter the following on a separate Form 2.0, Emission Unit Information for the wind erosion portion of storage pile emissions:

- Block 1 - Enter the SCC. If you use the default SCC, enter 3-05-025-07 (lb/acre).
- Block 7 - Enter the Wind Erosion PM₁₀ Emission Factor (block 3-B) for this storage pile in the appropriate box.

AP42 Table 2.1.2-2.

Representative Silt Content, Moisture Content and the Duration of Storage Parameters for Specific Storage Materials

Material in storage	Silt Contents Weight	Moisture Content Weight	Duration of Storage Days
Coal	4	6	107
Coke	1	1	50
Iron Ore	11	1	43
Limestone	2	2	76
Sand	10	1	
Sinter	1.5	1	90
Slag	2	1	60
Top Soil	40		

AP42 Table 13.2.4-1

Typical Silt and Moisture Contents of Materials at Various Industries

Industry	No. of Facilities	Material	Silt Content (%)			Moisture Content (%)		
			No. Of Samples	Range	Mean	No. Of Samples	Range	Mean
Iron and Steel Production	9	Pellet ore	13	1.3 - 13	4.3	11	0.64 - 4.0	2.2
		Lump ore	9	2.8 - 19	9.5	6	1.6 - 8.0	5.4
		Coal	12	2.0 - 7.7	4.6	11	2.8 - 11	4.8
		Slag	3	3.0 - 7.3	5.3	3	0.25 - 2.0	0.92
		Flue Dust	3	2.7 - 23	13	1	-	7
		Coke Breeze	2	4.4 - 5.4	4.9	2	6.4 - 9.2	7.8
		Blended Ore	1	-	15	1	-	6.6
		Sinter	1	-	0.7	0	-	-
		Limestone	3	0.4 - 2.3	1.0	2	ND	0.2
Stone Quarrying and Processing	2	Crushed Limestone	2	1.3 - 1.9	1.6	2	0.3 - 1.1	0.7
		Various Limestone Products	8	0.8 - 14	3.9	8	0.46 - 5.0	2.1
Taconite Mining and Processing	1	Pellets	9	2.2 - 5.4	3.4	7	0.05 - 2.0	0.9
		Tailings	2	ND	11	1	-	0.4
Western Surface Coal Mining	4	Coal	15	3.4 - 16	6.2	7	2.8 - 20	6.9
		Overburden	15	3.8 - 15	7.5	0	-	-
		Exposed Ground	3	5.1 - 21	15	3	0.8 - 6.4	3.4
Coal-fired Power Plant	1	Coal (as received)	60	0.6 - 4.8	2.2	59	2.7 - 7.4	4.5
		Sand	1	-	2.6	1	-	7.4
Municipal Solid Waste Landfills	4	Slag	2	3.0 - 4.7	3.8	2	2.3 - 4.9	3.6
		Cover	5	5.0 - 16	9.0	5	8.9 - 16	12
		Clay/dirt mix	1	-	9.2	1	-	14
		Clay	2	4.5 - 7.4	6.0	2	8.9 - 11	10
		Fly Ash	4	78 - 81	80	4	26 - 29	27
		Misc. Fill Materials	1	-	12	1	-	11

References 1-10. ND = no data

For More Information

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