

OPEN MATERIAL STORAGE AREAS

Date Initiated:

June 7, 1993

Dates Modified / Updated:

October 28, 1993

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January 06, 2022

PROCESS DESCRIPTIONS:

Open material storage piles (sand, aggregate, etc.) exist at nearly all mineral product industry sites. These storage areas are sources of particulate emissions caused by pile formation, wind erosion, and vehicle traffic (e.g., skip loaders, front end loaders, etc.). The District emission estimation technique for open storage piles is based on a 9/85 procedure specified in Section 8.19.1 (Sand and Gravel Processing) of AP-42. Control efficiencies should be used for materials stored in bins or otherwise protected from the elements.

$$Ea = A \times [(EFa \times Da) + (EFi \times Di)] \times Ci \times (1 - e)$$

$$Ei = A \times [(EFa \times Da) / H] \times Ci \times (1 - e)$$

Where:

Ea = Annual emissions of each listed substance, (lbs/year)

Ei = Maximum hourly emissions of each listed substance, (lbs/hour)

A = Average annual open storage area, (acres)

Ci = Concentration of each listed substance in each material processed, (lbs/lb)

EFa = Particulate emission factor for active days, (lbs/acre - active day)

EFi = Particulate emission factor for inactive days, (lbs/acre - inactive day)

Da = Active days during reporting period, (days/year)

Di = Inactive days during reporting period, (days/year)

H = Daily hours of operation, (hours/day)

e = Control equipment efficiency, (%)

DEFAULT VALUES - Material Storage

Variable	Variable Description	Default Values and Ranges
EFa	Emission factor, active days	13.2 lbs/acre day (PM30, AP-42 Table 8.19.1- 1)
EFa	Emission factor, active days	6.3 lbs/acre day (PM10, AP-42 Table 8.19.1-1)
Efi	Emission factor, inactive days	3.5 lbs/acre day (PM30, AP-42 Table 8.19.1-1)
EFi	Emission factor, inactive days	1.7 lbs/acre day (PM10, AP-42 Table 8.19.1-1)
e	Control device efficiencies	0% (no controls and natural moisture content)
e	Control device efficiencies	80% dry material with watering (At any frequency)
e	Control device efficiencies	0 - 50% (bins, shrouding, wind breaks, etc.)

EMISSIONS INFORMATION:

Section 8.19 (9/85) of AP-42 contains general information regarding estimation techniques, emission factors, control efficiencies, and default values. Values not present in AP-42 were evaluated by a 1992-96 District / Industry work group. Additional information may exist from test data submitted to the District.

Section 8.19 was deleted from the fifth edition of AP-42 in 1995. Open storage emission estimation procedures were then distributed among several different sections of AP-42 including:

- Section 11.9 Bulldozing
- Section 13.2 Aggregate Handling & Truck Loading
- Section 13.2.2 Unpaved Haul Road Vehicle Emissions
- Section 13.2.5 Industrial Wind Erosion

The "updated" AP-42 estimation procedures require a substantial increase in the quantity of facility information needed to calculate emissions. Use of the fifth edition procedures would require additional, site specific information on fastest wind speeds, intermediate storage pile throughputs, pile sizes, pile shapes, and quarry / storage pile vehicle traffic. The District has decided to continue using the older AP-42 procedures rather than the newer techniques given the constantly changing conditions at most sites, the time sensitive nature of the new calculation procedures, and the absence of this type of facility record keeping.

Trace metal concentrations in aggregate dust generated from open material storage areas can vary between sites. The following default trace metal concentrations should be used to estimate compound specific emissions where representative site specific information is unavailable. These estimates are based upon AB2588 test results from several San Diego County mineral product facilities. Quarry specific default factors were developed in July 1996.

DEFAULT VALUES - TRACE METAL CONCENTRATIONS

Trace Metals	Range (ppmw)	General Default Value
Arsenic	1 to 50	20
Beryllium	0.5 to 2	1
Cadmium	1 to 1.5	1
Chromium (total)	5 to 60	50
Copper	20 to 650	100
Lead	5 to 120	50
Manganese	200 to 1200	500
Nickel	3 to 25	20
Selenium	3 to 5	5
Silica (crystalline)	10% to 75%	10%
Zinc	30 to 300	200
Asbestos	Not Detected	0

ASSUMPTIONS / LIMITATIONS:

- Use site specific test data instead of default values where applicable.
- Fourth Edition AP -42 (Section 8.19 9/85) procedures for general open storage pile activity emissions will be used in lieu of fifth edition AP-42 procedures since site specific information and records typically do not exist to fully implement the revised techniques.
- Control efficiencies may be added where appropriate. Note: "uncontrolled emission factors" include the natural moisture. Additionally, Section 8.19 procedures include normal storage pile vehicle activity, material truck loading, wind erosion, and pile formation.

FORMS:

All facility open storage pile emissions should be reported on a single form. Care should be taken not to "double count" or omit shared storage piles.