

**ADDENDUM TO
ATTACHMENT E FOR MINERALS PROCESSING**

**Excerpted from the National Stone Association's
"Clean Air Management Guide for the Aggregate Industry" Section 3, entitled
"Annual Emissions Inventory Guidelines for Aggregate Plant Operations."**

EMISSION POINT INFORMATION - ACTUAL
NATIONAL STONE ASSOCIATION
FACILITY ID #:
SOURCE: HAUL ROAD FUGITIVE EMISSIONS

A. HAUL ROAD EMISSION FACTOR

Haul Road Emission Factor = $2.124 \times (\text{Silt Content}/12) \times ((365 - \text{Days of Rain})/365) \times (\text{No. of Wheels}/4)^{0.5} \times (\text{Avg. Truck Speed}/30) \times ((\text{Unloaded Truck Wt.} + \text{Avg. Loaded Truck Wt.})/6)^{0.7}$

Silt Content =	9.6 %	AP-42
Days of Rain =	115 Days	Fig. 11.2.1 - 1
No. of Wheels =	4 Wheels	
Avg. Truck Speed =	10 MPH	
Unloaded Truck Weight =	35 Tons	
Avg. Wt. of Material per Load =	35 Tons	
Avg. Loaded Truck Wt. =	70 Tons	

Haul Road Emission Factor = 2.877 Lbs PM10/VMT

B. ANNUAL VEHICLE MILES TRAVELED (VMT)

Annual VMT = $2 \times (\text{Length of Haul Road}) \times (\text{Annual Amount Hauled}) / (\text{Avg. Weight of Material per Load})$

Length of Haul Road =	0.25 Miles (One Way)
Annual Amount Hauled =	676,200 Tons

Annual VMT = 9,660 VMT

C. ACTUAL EMISSIONS

Actual Emissions = $(\text{Emissions Factor} \times \text{Vehicle Miles Traveled} \times \text{Control Efficiency}) / 2000$

Emissions Factor =	2.877 Lbs PM10/VMT
Efficiency =	100 %
	Water truck simulates an artificially "wet" day
Total Emissions w/o Controls =	13.895 Tons/Year
Control Efficiency =	13.895 Tons/Year
Actual Emissions =	0.000 Tons/Year

EMISSION POINT INFORMATION - POTENTIAL
NATIONAL STONE ASSOCIATION
FACILITY ID #:
SOURCE: HAUL ROAD FUGITIVE EMISSIONS

A. HAUL ROAD EMISSION FACTOR

Haul Road Emission Factor = $2.124 \times (\text{Silt Content}/12) \times ((365 - \text{Days of Rain})/365) \times (\text{No. of Wheels}/4) \times 0.5 \times (\text{Avg. Truck Speed}/30) \times ((\text{Unloaded Truck Wt.} + \text{Avg. Loaded Truck Wt.})/6)^{0.7}$

Silt Content =	9.6 %	AP-42
Days of Rain =	115 Days	Fig. 11.2.1-1
No. of Wheels =	4 Wheels	
Avg. Truck Speed =	10 MPH	
Unloaded Truck Weight =	35 Tons	
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Haul Road Emission Factor = 2.877 Lbs PM10/VMT

B. ANNUAL VEHICLE MILES TRAVELED (VMT)

Annual VMT = $2 \times (\text{Length of Haul Road}) \times (\text{Annual Amount Hauled}) / (\text{Avg. Weight of Material per Load})$

Length of Haul Road =	0.25 Miles (One Way)
Annual Amount Hauled =	1,350,000 Tons

Annual VMT = 19,286 VMT

C. POTENTIAL EMISSIONS

Potential Emissions = $(\text{Emissions Factor} \times \text{Vehicle Miles Traveled} \times \text{Control Efficiency}) / 2000$

Emissions Factor =	2.877 Lbs PM10/VMT
Efficiency =	100 %
	Water truck simulates an artificially "wet" day
Total Emissions w/o Controls =	27.740 Tons/Year
Control Efficiency =	27.740 Tons/Year
Potential Emissions =	0.000 Tons/Year

FACILITY ID #:
NATIONAL STONE ASSOCIATION

QUARRY

GENERAL PROCESS AIR POLLUTION EMISSIONS - 1993

SOURCE	COMPANY ID No.	ANNUAL PRODUCTION (tons)	PM10 ** FACTOR (lbs/ton)	PM10 EMISSIONS (tons)
44" x 48" Jaw Crusher	2	574,770	0.000570	0.164
36" Conv. A	3	676,200	0.000046	0.016
6' x 16' Screen 1	4	676,200	0.000830	0.281
30" Stacker Conv.	5	5,000	0.000046	0.000
5.5' Crusher	6	473,340	0.000570	0.135
30" Conv. B	7	473,340	0.000046	0.011
30" Conv. #6	8	394,225	0.000046	0.009
30" Conv. #7	12	394,225	0.000046	0.009
8' x 20' Screen 2	13	394,225	0.000830	0.164
30" Conv.	15	290,766	0.000046	0.007
5.5' Crusher	16	290,766	0.000570	0.083
30" Conv. #8	17	290,766	0.000046	0.007
30" Conv. #4	18	281,975	0.000046	0.006
30" Conv. #5	22	50,000	0.000046	0.001
24" Conv. #9	23	43,276	0.000046	0.001
24" Conv. #10	24	43,276	0.000046	0.001
30" Conv. #11	26	43,276	0.000046	0.001
30" Conv. #12	27	43,276	0.000046	0.001
Pugmill Conv.	29	93,276	0.000046	0.002
30" Conv. #13	30	350,947	0.000046	0.008

Total Actual PM10 Emissions (Tons/Year) = 0.906 Tons
*** Total Potential PM10 Emissions (Tons/Year) = 1.808 Tons

* - The equip. associated with the wash plant produces no emissions, therefore no calculations are provided;
** - PM 10 Emission factors were obtained from the new draft AP-42 Table 8.19.2-1 using the wet suppression factors;
*** - Potential emissions were calculated as a ratio based on permit limitations (see calculations.)

EMISSION POINT INFORMATION - ACTUAL
NATIONAL STONE ASSOCIATION
FACILITY ID #:
SOURCE: OPEN STORAGE

A. LOAD IN-LOAD OUT FACTOR

Load In-Load Out Factor = $0.00224 \times (\text{Mean Wind Speed}/5)^{1.3} / (\text{Moisture Content}/2)^{1.4}$

Mean Wind Speed =	8 MPH	
Moisture Content =	1.1 %	
Load In-Load Out Factor =		0.0095 #/Ton

B. WIND EROSION FACTOR

Wind Erosion Factor = $0.025 \times (\text{Silt Content}/1.5) \times (\text{Storage Duration}/90) \times (\text{Dry Days per Year}/235) \times (\% \text{ of Time Wind} > 12 \text{ MPH}/15)$

Silt Content =	1.6 %	
Storage Duration =	30 Days	AP 42
Dry Days per Year =	250 Days	Fig. 11.2.1-1
% of Time Wind > 12 MPH =	22 %	
Wind Erosion Factor =		0.0139 #/Ton

C. ACTIVITY FACTOR

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

Silt Content =	1.6 %	AP-42
Dry Days per Year =	250 Days	Fig. 11.2.1-1
Vehicle Activity Factor =	0.25	
Activity Factor =		0.0142 #/Ton

D. COMBINED ANNUAL STORAGE PILE EMISSION FACTOR

Combined Storage Pile Factor = Load In-Load Out Factor + Wind Erosion Factor + Activity Factor

Combined Storage Pile Factor = 0.0376 #/Ton

E. ACTUAL EMISSIONS

Actual Emissions = Combined Storage Pile Factor (#/Ton) x (Amt. Washed Stone x Control Efficiency) x (Amt. Other Stone x Control Efficiency)/2000 (lb/ton)

Combined Storage Pile Factor =	0.038 #/Ton	
Annual Throughput =	676,200 Tons/Yr.	
53% Washed Stone =	350,948 Tons	Control Eff. = 95%
47% Other Stone (i.e. - ABC, Rip Rap, etc.) =	325,252 Tons	Control Eff. = 80%

Actual Emissions = 1.55 Tons/Yr

EMISSION POINT INFORMATION - POTENTIAL
NATIONAL STONE ASSOCIATION
FACILITY ID #:
SOURCE: OPEN STORAGE

A. LOAD IN-LOAD OUT FACTOR

Load In-Load Out Factor = $0.00224 \times (\text{Mean Wind Speed}/5)^{1.3} / (\text{Moisture Content}/2)^{1.4}$

Mean Wind Speed =	8 MPH
Moisture Content =	1.1 %
Load In-Load Out Factor =	0.0095 #/Ton

B. WIND EROSION FACTOR

Wind Erosion Factor = $0.025 \times (\text{Silt Content}/1.5) \times (\text{Storage Duration}/90) \times (\text{Dry Days per Year}/235) \times (\% \text{ of Time Wind} > 12 \text{ MPH}/15)$

Silt Content =	1.6 %
Storage Duration =	30 Days AP-42
Dry Days per Year =	250 Days Fig. 11.2.1-1
% of Time Wind > 12 MPH =	22 %
Wind Erosion Factor =	0.0139 #/Ton

C. ACTIVITY FACTOR

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

Silt Content =	1.6 %	AP-42
Dry Days per Year =	250 Days	Fig. 11.2.1-1
Vehicle Activity Factor =	0.25	
Activity Factor =	0.0142	/Ton

D. COMBINED ANNUAL STORAGE PILE EMISSION FACTOR

Combined Storage Pile Factor = Load In-Load Out Factor + Wind Erosion Factor + Activity Factor

Combined Storage Pile Factor = 0.0376 #/Ton

E. POTENTIAL EMISSIONS

Actual Emissions = Combined Storage Pile Factor (#/Ton) $\times$ (Amt. Washed Stone $\times$ Control Eff.) $\times$ (Amt. Other Stone $\times$ Control Eff.)/2000 (lb/ton)

Combined Storage Pile Factor =	0.038 #/Ton
Maximum Annual Throughput =	1,350,000 Tons/Yr.
53% Washed Stone =	700,650 Tons Control Eff. = 95%
47% Other Stone (i.e. - ABC, Rip Rap, etc.) =	649,350 Tons Control Eff. = 80%

Potential Emissions = 3.10 Tons/Yr.

STORAGE PILE Emission FACTOR CALCULATIONS

A. LOAD IN - LOAD OUT FACTOR

The Load In-Load Out factor is a calculated number that represents the amount of PM10 emissions that will result from the load in-load out process. The formula to calculate this factor is:

$$\text{Load In-Load Out Factor} = 0.00224 \times (\text{Mean Wind Speed}/5)^{1.3} / [\text{Moisture Content } (\%)/2]^{1.4}$$

B. WIND EROSION 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. The formula to calculate this figure is:

$$\begin{aligned} \text{Wind Erosion Factor} &= 0.025 \times \text{Silt Content } (\%)/1.5] \\ &\times [\text{Storage Duration (Days)}/90] \\ &\times (\text{Dry Days per Year}/235) \\ &\times [(\% \text{ of Time Wind } > 12 \text{ MPH})/15] \end{aligned}$$

C. ACTIVITY FACTOR

The Activity Factor is a calculated number that represents the amount of PM10 released into the atmosphere due to vehicular traffic around the storage pile. The formula to calculate this figure is:

$$\begin{aligned} \text{Activity Factor} &= 0.05 \times \text{Silt Content } (\%)/1.5] \\ &\times (\text{Dry Days per Year}/235) \\ &\times (\text{Vehicle Activity Factor}) \end{aligned}$$

COMBINED ANNUAL STORAGE PILE EMISSION FACTOR

Add the Load In-Load Out Factor (3-A), Wind Erosion Factor (3-B) and Activity Factor (3-C) together.