

INSTRUCTIONS: FILL IN ONLY THE YELLOW HIGHLIGHTED CELLS IN THE *General* and *Allowable* TABS AS NEEDED

Source	94-0091-01	APC 111, Box 2
Permit No.	981691	
Batch Rate by volume	100.00 yd ³ concrete/hr	APC 111, Box 9
Batch Rate by weight	201.20 tons concrete/hr, based on the composition of one cubic yard of concrete described below	
Maximum yearly production (assuming 8,760 hours)	876,000.00 yd ³ concrete/yr	
	1,762,512.00 tons concrete/yr, based on the composition of one cubic yard of concrete described below	

Voluntary Annual Limit(s)		
truck mix production		yd ³ concrete/yr, truck mix
central mix production		yd ³ concrete/yr, central mix
dry mix production ^a	100,000.00	yd ³ concrete/yr, dry mix
Total production ^b	100,000.00	yd ³ concrete/yr, total

^a Dry mix loading calculations in this workbook use the same emission factors as truck mix loading since AP42 does not have a separate factor for dry mix loading. Be aware that emissions from dry mix may possibly be higher due to factors such as a longer fall of dry materials, etc. , and using the control efficiency values similar to those for truck mix may not be adequate. If necessary, the permit writer should request additional information from the applicant to evaluate the emissions from dry mix loading.

^b Total production cannot add up to more than the value for maximum yearly production (assuming 8,760 hours) shown above

Total facility emissions based upon the following AP42 default composition of one cubic yard of concrete .		
Coarse Aggregate	1,865	pounds
Sand	1,428	pounds
Cement	491	pounds
Cement Supplement	73	pounds
Water [8.35 (lbs/gal)] x [20 (gal)]	167	pounds
Total for 1 yd³	4,024	pounds/yd³

Concrete material content factors for converting lb/ton emission factors to lb/yd ³ emission factors	
0.9325	(tons aggregate)/yd ³ concrete
0.7140	(tons sand)/yd ³ concrete
0.2455	(tons cement)/yd ³ concrete
0.0365	(tons supplement)/yd ³ concrete
1.6465	(tons aggregate + sand)/yd ³ concrete
0.2820	(tons cement + supplement)/yd ³ concrete

Control efficiencies, reference values, and point/fugitive source classification

% controlled	Point or Fugitive ^a	Source	Reference values for use as %controlled						
			AP42 ^b	Boot	Chute	Tube	Shroud	Enclosure	Wet suppression
	Fugitive	Aggregate delivery to ground storage (3-05-011-21)							
	Fugitive	Sand delivery to ground storage (3-05-011-22)							
	Fugitive	Aggregate transfer to conveyor (3-05-011-23)							
	Fugitive	Sand transfer to conveyor (3-05-011-24)							
	Fugitive	Aggregate transfer to elevated storage (3-05-011-04)							
	Fugitive	Sand transfer to elevated storage (3-05-011-05)							
99.9000%	Point	Cement delivery to Silo (3-05-011-07)	99.8631%						
99.9000%	Point	Cement supplement delivery to Silo (3-05-011-17)	99.7153%						
99.9000%	Point	Weigh hopper loading (3-05-011-08)							
99.9000%	Fugitive	Dry mix loading ^c							

^a - The **Point** or Fugitive classification can only be changed for Weigh hopper loading, Truck mix loading, Central Mix loading, and Dry mix loading sources. The **Point** classification should be used **only** if these sources are fitted with capture and control systems.

^b - Values are based on AP42 Table 11.12-2 (6/06 on footer) Uncontrolled and Controlled Emission Factors.

^c - Dry mix loading calculations in this workbook use the same emission factors as truck mix loading since AP42 does not have a separate factor for dry mix loading. Be aware that emissions from dry mix may possibly be higher due to factors such as a longer fall of dry materials, etc. , and using the control efficiency values similar to those for truck mix may not be adequate. If necessary, the permit writer should request additional information from the applicant to evaluate the emissions from dry mix loading.

Allowable

Equations used in calculations:

For $P \leq 30$, E (based on PWR & Table 2) = $3.59 (P)^{0.62}$

For $P > 30$, E (based on PWR & Table 2) = $17.31 (P)^{0.16}$

Emissions in gr/dscf corresponding to E (based on PWR and Table 2) = E (based on PWR and Table 2) * (7,000 gr/lb) / (dscf/min * 60 min/hr)

Emissions in lb/hr at a concentration of 0.02 gr/dscf = (dscf/min * 60 min/hr) * (0.02 gr/dscf) / (7,000 gr/lb)

Emissions in lb/hr at a concentration of 0.25 gr/dscf = (dscf/min * 60 min/hr) * (0.25 gr/dscf) / (7,000 gr/lb)

Example: When $P = 12.275$ ton/hr (per silo) and dscf/min = 900.0 (per silo):

P (per silo) ≤ 30 , therefore E (based on PWR and Table 2) = $3.59 (12.275)^{0.62} = 16.99$ lb/hr (per silo)

The corresponding gr/dscf value is (16.99 lb/hr) * (7,000 gr/lb) / (900.0 dscf/min * 60 min/hr) = 2.20 gr/dscf

Since 2.20 gr/dscf is greater than 0.25 gr/dscf, then the allowable, based on 0.25 gr/dscf, is 1.93 lb/hr (per silo)

(2) * (1.93 lb/hr) * (100,000 yd³ concrete/yr) / (100 yd³ concrete/hr) / (2,000 lb/ton) = 1.94 tons/yr (tons/yr for 100,000 yd³ concrete/yr)

(2) * (1.93 lb/hr) * (8,760 hr/yr) / (2,000 lb/ton) = 16.91 tons/yr (tons/yr for 8,760 hr/yr)

INSTRUCTIONS: FILL IN ONLY THE YELLOW HIGHLIGHTED CELLS IN THE *General* and *Allowable* TABS AS NEEDED. DO NOT FILL OR MODIFY THIS TAB.

Source 94-0091-01
 Permit No. 981691
 Batch Rate by volume 100.00 yd³ concrete/hr
 Batch Rate by weight 201.20 tons concrete/hr

Voluntary Annual Limit(s)		
dry mix production	100,000.00	yd ³ concrete/yr, dry mix
Total production	100,000.00	yd ³ concrete/yr, total

Concrete material content factors for converting lb/ton emission factors to lb/yd ³ emission factors	
0.9325	(tons aggregate)/yd ³ concrete
0.7140	(tons sand)/yd ³ concrete
0.2455	(tons cement)/yd ³ concrete
0.0365	(tons supplement)/yd ³ concrete
1.6465	(tons aggregate + sand)/yd ³ concrete
0.2820	(tons cement + supplement)/yd ³ concrete

CALCULATIONS BASED ON AP-42 TABLES 11.12-2, 11.12-5 and 11.12-6 (ENGLISH UNITS)											
EMISSION FACTORS FOR CONCRETE BATCHING / PLANT WIDE EMISSION FACTORS PER YARD OF CONCRETE											
Source (SCC)	Point or Fugitive	(ton material/ yd ³ concrete)	Uncontrolled emission factor		% controlled	Controlled emission factor		Uncontrolled emissions		Controlled emissions	
			PM			PM		PM		PM	
			(lb/ton)	(lb/yd ³)		(lb/ton)	(lb/yd ³)	(lb/hr)	(ton/yr)	(lb/hr)	(ton/yr)
Aggregate delivery to ground storage (3-05-011-21)	Fugitive	0.9325	0.0069	0.0064		0.0069	0.0064	0.6400	0.3200	0.6400	0.3200
Sand delivery to ground storage (3-05-011-22)	Fugitive	0.7140	0.0021	0.0015		0.0021	0.0015	0.1500	0.0750	0.1500	0.0750
Aggregate transfer to conveyor (3-05-011-23)	Fugitive	0.9325	0.0069	0.0064		0.0069	0.0064	0.6400	0.3200	0.6400	0.3200
Sand transfer to conveyor (3-05-011-24)	Fugitive	0.7140	0.0021	0.0015		0.0021	0.0015	0.1500	0.0750	0.1500	0.0750
Aggregate transfer to elevated storage (3-05-011-04)	Fugitive	0.9325	0.0069	0.0064		0.0069	0.0064	0.6400	0.3200	0.6400	0.3200
Sand transfer to elevated storage (3-05-011-05)	Fugitive	0.7140	0.0021	0.0015		0.0021	0.0015	0.1500	0.0750	0.1500	0.0750
Cement delivery to Silo (3-05-011-07)	Point	0.2455	0.73	0.1792	99.9000%	0.0007300	0.0001792	17.9200	8.9600	0.0179	0.0090
Cement supplement delivery to Silo (3-05-011-17)	Point	0.0365	3.14	0.1146	99.9000%	0.0031400	0.0001146	11.4600	5.7300	0.0115	0.0057
Weigh hopper loading (3-05-011-08)	Point	1.6465	0.0048	0.0079	99.9000%	0.0000048	0.0000079	0.7900	0.3950	0.0008	0.0004
Dry mix loading for 100,000.00 yd ³ /yr	Fugitive	0.2820	1.118	0.3153	99.9000%	0.000112	0.000315	31.5300	15.7650	0.0315	0.0158
Point source emissions SUBTOTALS								30.17	15.09	0.03	0.02
Fugitive source emissions											
Fugitive source emissions (aggregate and sand) (S1-4.B(a))								2.37	1.19	2.37	1.19
Fugitive source emissions (Dry mix loading) (S1-4(B)(c))								31.53	15.77	0.03	0.02
Fugitive source emissions (All) SUBTOTALS								33.90	16.96	2.40	1.21
TOTALS								64.07	32.05	2.43	1.23

Where material, based on AP42 11.12, is:

- Aggregate for the aggregate delivery and transfer operations,
 - Sand for the sand delivery and transfer operations,
 - Cement for the cement delivery and discharge operations,
 - Cement supplement for the cement supplement delivery and discharge operations,
 - Aggregate + sand for the weigh hopper loading operation; and
 - Cement + cement supplement for the Truck mix loading and Central mix loading operations.
- Cement + cement supplement is also used for the Dry mix loading operations.

Shaded cells indicate the estimated actual emission values to be used in the template permit and the emission summary.

Equations used in calculations for **PM** emissions:

[Uncontrolled PM Emissions factor (lb/ton **material**)] is taken from AP42 Table 11.12-2 or the background document

[Uncontrolled PM Emissions factor (lb/yd3)] = [Uncontrolled PM Emissions factor (lb/ton **material**)] x [concrete **material** content (ton material/yd3 concrete)] **Note:** This will match the value(s) in Tables 11.12-5 and 11.12-6

[Controlled PM Emissions factor (lb/ton **material**)] = [Uncontrolled PM Emissions factor (lb/ton **material**)] x [1 - (%controlled PM/100)]

[Controlled PM Emissions factor (lb/yd3 concrete)] = [Uncontrolled PM Emissions factor (lb/yd3 concrete)] x [1 - (%controlled PM/100)]

[Uncontrolled PM Emissions (lb/hr)] = [Uncontrolled PM emissions factor (lb/yd3 concrete)] x [Batch Rate (yd3 concrete/hr)]

[Uncontrolled PM Emissions (ton/yr)] = [Uncontrolled PM Emissions (lb/hr)] x [Total production (yd3 concrete/yr)] / [Batch Rate (yd3 concrete/hr)] / [2,000 (lb/ton)] **not for Truck mix loading or Central Mix loading**

[Uncontrolled PM Emissions (ton/yr)] = [Uncontrolled PM Emissions (lb/hr)] x [truck mix production (yd3 concrete/yr)] / [Batch Rate (yd3 concrete/hr)] / [2,000 (lb/ton)] **for Truck mix loading only**

[Uncontrolled PM Emissions (ton/yr)] = [Uncontrolled PM Emissions (lb/hr)] x [central mix production (yd3 concrete/yr)] / [Batch Rate (yd3 concrete/hr)] / [2,000 (lb/ton)] **for Central mix loading only**

[Uncontrolled PM Emissions (ton/yr)] = [Uncontrolled PM Emissions (lb/hr)] x [dry mix production (yd3 concrete/yr)] / [Batch Rate (yd3 concrete/hr)] / [2,000 (lb/ton)] **for Dry mix loading only**

[Controlled PM Emissions (lb/hr)] = [Controlled PM emissions factor (lb/ton **material**)] x [Batch Rate (yd3 concrete/hr)] x [concrete **material** content (ton **material**/yd3 concrete)]

[Controlled PM Emissions (ton/yr)] = [Controlled PM Emissions (lb/hr)] x [Total production (yd3 concrete/yr)] / [Batch Rate (yd3 concrete/hr)] / [2,000 (lb/ton)] **not for Truck mix loading or Central Mix loading**

[Controlled PM Emissions (ton/yr)] = [Controlled PM Emissions (lb/hr)] x [truck mix production (yd3 concrete/yr)] / [Batch Rate (yd3 concrete/hr)] / [2,000 (lb/ton)] **for Truck mix loading only**

[Controlled PM Emissions (ton/yr)] = [Controlled PM Emissions (lb/hr)] x [central mix production (yd3 concrete/yr)] / [Batch Rate (yd3 concrete/hr)] / [2,000 (lb/ton)] **for Central mix loading only**

[Controlled PM Emissions (ton/yr)] = [Controlled PM Emissions (lb/hr)] x [dry mix production (yd3 concrete/yr)] / [Batch Rate (yd3 concrete/hr)] / [2,000 (lb/ton)] **for Dry mix loading only**

Example: Aggregate delivery to ground storage

Uncontrolled PM Emissions factor, taken from AP42 Table 11.12-2 or the background document, = [6.90E-03 (lb/ton aggregate)]

Uncontrolled PM Emissions factor = [6.90E-03 (lb/ton aggregate)] x [0.9325 (ton aggregate/yd3 concrete)] = [6.40E-03 (lb/yd3 concrete)]

Controlled PM Emissions factor = [6.90E-03 (lb/ton aggregate)] x [1 - (0.0000 % /100)] = [6.90E-03 (lb/ton aggregate)]

Controlled PM Emissions factor = [6.40E-03 (lb/yd3 concrete)] x [1 - (0.0000 % /100)] = [6.40E-03 (lb/yd3 concrete)]

Uncontrolled PM Emissions = [6.40E-03 (lb/yd3 concrete)] x [100.00 (yd3 concrete/hr)] = [0.6400 (lb/hr)]

Uncontrolled PM Emissions = [0.6400 (lb/hr)] x [100,000 (yd3 concrete/yr)] / [100 (hr/yr)] / [2,000 (lb/ton)] = [0.3200 (ton/yr)]

Controlled PM Emissions = [6.40E-03 (lb/yd3 concrete)] x [100.00 (yd3 concrete/hr)] = [0.6400 (lb/hr)]

Controlled PM Emissions = [0.6400 (lb/hr)] x [0.00 (yd3 concrete/yr)] / [100 (yd3 concrete/hr)] / [2,000 (lb/ton)] = [0.3200 (ton/yr)]

Example: Truck mix loading

Uncontrolled PM Emissions factor, taken from AP42 Table 11.12-2 or the background document, = [0.000E+00 (lb/ton (cement + supplement))]

Uncontrolled PM Emissions factor = [0.000E+00 (lb/ton (cement + supplement))] x [0.0000 (ton (cement + supplement)/yd3 concrete)] = [0.00E+00 (lb/yd3 concrete)]

Controlled PM Emissions factor = [0.000E+00 (lb/ton (cement + supplement))] x [1 - (0.0000 % /100)] = [0.00E+00 (lb/ton (cement + supplement))]

Controlled PM Emissions factor = [0.00E+00 (lb/yd3 concrete)] x [1 - (0.0000 % /100)] = [0.00E+00 (lb/yd3 (concrete))]

Uncontrolled PM Emissions = [0.00E+00 (lb/yd3)] x [0.00 (yd3 concrete/hr)] = 0.0000 lb/hr

Uncontrolled PM Emissions = [0.0000 (lb/hr)] x [0.00 (yd3 concrete/yr)] / [100.00 (yd3 concrete/hr)] / [2,000 (lb/ton)] = [0.0000 (ton/yr)]

Controlled PM Emissions = [0.00E+00 (lb/yd3)] x [0.00 (yd3 concrete/hr)] = [0.0000 (lb/hr)]

Controlled PM Emissions = [0.0000 (lb/hr)] x [0.00 (yd3 concrete/yr)] / [100.00 (yd3 concrete/hr)] / [2,000 (lb/ton)] = [0.0000 (ton/yr)]

Example: Central mix loading

Uncontrolled PM Emissions factor, taken from AP42 Table 11.12-2 or the background document, = [0.00E+00 (lb/ton (cement + supplement))]

Uncontrolled PM Emissions factor = [0.00E+00 (lb/ton (cement + supplement))] x [0.0000 (ton (cement + supplement)/yd3 concrete)] = [0.00E+00 (lb/yd3 concrete)]

Controlled PM Emissions factor = [0.00E+00 (lb/ton (cement + supplement))] x [1 - (0.0000 % /100)] = [0.00E+00 (lb/ton (cement + supplement))]

Controlled PM Emissions factor = [0.00E+00 (lb/yd3 concrete)] x [1 - (0.0000 % /100)] = [0.00E+00 (lb/yd3 (concrete))]

Uncontrolled PM Emissions = [0.00E+00 (lb/yd3)] x [0.00 (yd3 concrete/hr)] = [0.0000 (lb/hr)]

Uncontrolled PM Emissions = [0.0000 (lb/hr)] x [0.00 (yd3 concrete/yr)] / [100.00 (yd3 concrete/hr)] / [2,000 (lb/ton)] = [0.0000 (ton/yr)]

Controlled PM Emissions = [0.00E+00 (lb/yd3)] x [0.00 (yd3 concrete/hr)] = [0.0000 (lb/hr)]

Controlled PM Emissions = [0.0000 (lb/hr)] x [0.00 (yd3 concrete/yr)] / [100.00 (yd3 concrete/hr)] / [2,000 (lb/ton)] = [0.0000 (ton/yr)]

Example: Dry mix loading

Uncontrolled PM Emissions factor for truck mix loading used as estimate, taken from AP42 Table 11.12-2 or the background document, = [1.118E+00 (lb/ton (cement + supplement))]

Uncontrolled PM Emissions factor = [1.118E+00 (lb/ton (cement + supplement))] x [0.2820 (ton (cement + supplement)/yd3 concrete)] = [3.15E-01 (lb/yd3 concrete)]

Controlled PM Emissions factor = [1.118E+00 (lb/ton (cement + supplement))] x [1 - (99.9000 % /100)] = [1.12E-03 (lb/ton (cement + supplement))]

Controlled PM Emissions factor = [3.15E-01 (lb/yd3 concrete)] x [1 - (99.9000 % /100)] = [3.15E-04 (lb/yd3 (concrete))]

Uncontrolled PM Emissions = [3.15E-01 (lb/yd3)] x [100.00 (yd3 concrete/hr)] = [31.5300 (lb/hr)]

Uncontrolled PM Emissions = [31.5300 (lb/hr)] x [100,000.00 (yd3 concrete/yr)] / [100.00 (yd3 concrete/hr)] / [2,000 (lb/ton)] = [15.7650 (ton/yr)]

Controlled PM Emissions = [3.15E-04 (lb/yd3)] x [100.00 (yd3 concrete/hr)] = [0.0315 (lb/hr)]

Controlled PM Emissions = [0.0315 (lb/hr)] x [100,000.00 (yd3 concrete/yr)] / [100.00 (yd3 concrete/hr)] / [2,000 (lb/ton)] = [0.0158 (ton/yr)]