AGGREGATE TRANSFER POINTS

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PROCESS DESCRIPTIONS:

All mineral product industry sites include equipment and processes which involve aggregate handling. Particulate emissions occur whenever this aggregate is transferred between devices, dropped onto a storage pile, or loaded into a vehicle. Typical aggregate transfer points include dozer to pile, dozer to bar screen, dozer to conveyor, conveyor to conveyor, conveyor to pile, conveyor to vehicle, and vehicle to pile. The following calculation procedures to estimate transfer point particulate emissions are provided in Section 13.2-4 of AP-42 (1/95).

Ea = Ua x [k x 0.0032 x (u/5)1.3 / (m/2)1.4] x Ci x (1 - e)

Eh = Uh x [k x 0.0032 x (u/5)1.3 / (m/2)1.4] x Ci x (1 - e)

Where:

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

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

Ua = Annual material throughput for each transfer point, (tons/year)

Uh = Maximum hourly throughput for each transfer point, (tons/hour)

k = Particulate size multiplier, (dimensionless)

u = Mean wind speed, (miles/hour)

m = Material moisture content, (weight %)

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

e = Control equipment efficiency, (%)

TYPICAL AP-42 DEFAULT VALUES - TRANSFER POINTS

Variable	Variable Description	Default Values and Ranges
k	Particle size multiplier	0.74 (PM30, see AP-42 Page 13.2.4-3)
k	Particle size multiplier	0.35 (PM10, see AP-42 Page 13.2.4-3)
u	Mean facility wind speed	6 miles/hour (average SD county value)
m	Material moisture content	2% (by weight for rock, typically 1% to 5%)
m	Material moisture content	5% (by weight for sand, typically 2% to 15%)

EMISSIONS INFORMATION:

A series of meetings was held in 1995 and 1996 between AWR Consultants, the San Diego County Mineral Products Industry, and the District regarding particulate emission estimation techniques applicable to aggregate operations. A District policy was drafted on 4/9/96 regarding standard Mineral Industry calculation procedures. This policy included a standardized approach to evaluating emissions from mineral industry aggregate transfer points.

In general, it was decided to classify all transfer points as either dry process material, wet process material, dry fines material, wet fines material, washed aggregate, or zero emission material. Pre-calculated PM10 emission factors were assigned to each classification based on the expected annual average particle size distributions and moisture contents. Predetermined capture efficiencies were also identified for specific control devices and techniques. A summary of the transfer point policy decisions is as follows;

DISTRICT POLICY ASSUMPTIONS (4/9/96) - TRANSFER POINTS

Material Classifications

Material Types	Policy Decisions
Process Material	Aggregate composed of 70% or more by weight of particles larger than #4 mesh.
Fines Material	Aggregate composed of more than 30% by weight of particles smaller than #4 mesh.
Washed Aggregate	Aggregates that have been processed by either a log washer or a wet screen and are visibly moist.
Zero Emissions Material	Any material of any particulate size distribution with a moisture content of 5.0 % by weight or more.

Moisture Classifications

Material Types	Policy Decisions
Dry Process Material	Process Material with an average annual moisture content of < 1.5% by weight, and Fines Material with an average annual moisture content of <3.0% by weight.
Wet Process Material	Process Material with an average annual moisture content of 1.5% or more by weight, and Fines Material with an average annual moisture content of 3.0% or more by weight.

Control Efficiencies

Equipment Types	Policy Decisions
Central Fabric Filters	Assume a capture efficiency of 95% and a filter emission rate of 0.008 grains/ft3
Insertable Fabric Filters	Assume a capture efficiency of 97.5% and a filter emission rate of 0.008 grains/ft3
Fogging Equipment	Assume a fugitive dust control efficiency of 75%
Water Spray with Surfactants	Assume a fugitive dust control efficiency of 50%
Enclosed Chutes and Tunnels	Assume a fugitive dust control efficiency of 50%

Note: No additional control efficiency is assumed for "Wet Material".

Emission Factors

Material Types	PM10 (lbs/ton processed)	TSP (lbs/ton processed)
Dry Process Material	0.001400	0.0029600
Wet Process Material	0.000048	0.0001015
Dry Fines Material	0.001400	0.0029600
Wet Fines Material	0.000048	0.0001015
Washed Aggregate (Visibly Wet)	0.0	0.0
Zero Emissions Material	0.0	0.0

The PM10 emission factors specified above are based on the controlled and uncontrolled conveyor transfer point emission factors listed in Table 11.19.2-2 of Section 11.19.2 of AP-42 (1/95). The TSP factor was derived using the ratio of particulate size multipliers in 13.2.4 of AP-42 (1/95) and the PM10 factors;

TSP Factor = PM10 Factor x (0.74 / 0.35)

The PM10 factor for "Dry Material" is equivalent to the general AP-42 procedure with a 6 mph wind speed and a 2% moisture content. The PM10 factor for "Wet Material" is equivalent to the general AP-42 procedure with a 6 mph wind speed and a 22.5%

moisture content.

Trace metal concentrations in aggregate dust released from aggregate transfer points 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 test results from several San Diego County mineral product facilities provided to the District by AWR Consultants in July 1996 (Profile 7 - Crushed Miscellaneous Base);

The Office of Environmental Health Hazard Assessment (OEHHA) has adopted a chronic reference exposure level (REL) for respirable crystalline silica, cristobalite (CAS 14464-46-1) and quartz (CAS 14808-60-7). The REL is based on the PM4 fraction of crystalline silica which is expected to have associated health risks. The District has chosen to implement a health protective value of 7.95% default PM4 to PM10 ratio from published data[1] in order to more accurately estimate the health risks associated with respirable crystalline silica. If available, the District recommends using District approved site-specific data to refine the PM4 to PM10 ratio.

The District's current default crystalline silica emission factor is based on local test results, which is 10% of the PM10 default emission factor. The PM4 to PM10 ratio can be accurately applied to the crystalline silica default emission factor since the test results were sized to -10 micron which was used to represent the average composition of PM10. Both crystalline silica as PM10 and respirable crystalline silica as PM4 should be estimated.

ASSUMPTIONS / LIMITATIONS:

- Use site specific test data and trace metal concentrations instead of default values where applicable.

- The use of average wind speeds and moisture contents in the general AP-42 procedure may incorrectly estimate particulate emissions since the formula is not linear. Actual emissions during calm, wet days could be lower than the predicted values while releases during dry, Santa Ana conditions will be substantially higher. Unfortunately, no alternative method to using average values currently exists. The amount of detail needed to calculate transfer point emissions using average values already borders on an excessive use of District resources. The standardized factors developed by the District - AWR - MPI working group should be used until otherwise advised.

- The above capture and control efficiencies are preloaded into the District's emission inventory database calculation methods. These values cannot be modified by adjusting the release point information.

- Transfer point emissions which occur during the loading of material into screens and crushers are assumed to be included in the overall screening or crushing emission factors. These aggregate handling locations should not be identified as "transfer points" to avoid double counting the emissions.

[1] Richards, J. R., Brozell, T., Rea, C. E., Boraston, G., & Hayden, J. (2009). PM_4 Crystalline Silica Emission Factors and Ambient Concentrations at Aggregate-Producing Sources in California. Journal of the Air & Waste Management Association, 59(11), 1287–1295. https://doi.org/10.3155/1047-3289.59.11.128

- Transfer point emissions which occur during the loading and unloading of storage piles are assumed to be included in the current (AP-42, 1985) open material storage emission factors. These aggregate handling locations should not be identified as "transfer points" to avoid double counting the emissions. Newer estimation procedures published in AP-42 (1995) recommend quantifying the open material storage pile transfer points separately. Due to the excessive data requirements, the District has chosen not to use the newer storage pile procedures at this time.

- Ducted emissions (central baghouses and insertable filters) are quantified based on an assumed emission rate (0.008 grains/ft3) and the actual air flow rate. Care should be taken to accurately report the air flow rate for control devices with multiple collection points. The "double counting" of flow rates will result in a "double counting" of emissions. To correctly quantify emissions, the actual control device air flow rate may either be pro-rated over the associated collection points (transfer points) or combined and reported as a single re;ease point on a single inventory form.