AGGREGATE SCREENING OPERATIONS

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PROCESS DESCRIPTIONS:

Some mineral product industry sites include equipment and processes which involve aggregate screening. Particulate emissions occur whenever sand, soil, and/or aggregate is mechanically separated by single or multiple deck screens. The following calculation procedure to estimate screening operation particulate emissions is based on Section 11.19.2 of AP-42 (1/95).

Ea = Ua x EF x Ci x (1 - e)

Eh = Uh x EF 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 screen, (tons/year)

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

EF = Particulate emission factor, (lbs/ton of material screened)

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

e = Control equipment efficiency, (%)

EMISSIONS INFORMATION:

A series of meetings were 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 regarding standard Mineral Industry calculation procedures was drafted on 4/9/96. This policy included a standardized approach to evaluating emissions from mineral industry aggregate screening operations.

In general, it was decided to classify all screening operations as either dry process material, wet process material, dry fines material, wet fines material, or zero emission material. Standardized PM10 emission factors were assigned to each classification based on the expected annual average particle size distributions and moisture contents. Predetermined fugitive dust control efficiencies were also identified for specific types of devices and techniques.

These standardized emission factors are based on information published in Table 11.19.2-2 of Section 11.19.2 of AP-42 (1/95). These emission factors are substantially different than those previously used by the District. The factors are not affected by screen size or number of decks. Emissions are dependent only on material type and throughput. A summary of the screening operation policy decisions is as follows;

DISTRICT POLICY ASSUMPTIONS (4/9/96) - SCREENING OPERATIONS

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.
Zero Emissions Material	Any wet plant material or other material of any particulate size distribution with a moisture content of 5.0 % by weight or more

Moisture Contents

Material Types	Policy Decisions
Dry ProcessMaterial	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 Description	Policy Decisions
Covered Screen	Assume a fugitive dust control efficiency of 50%
Covered Screen with water spray	Assume a fugitive dust control efficiency of 75%
Covered Screen with water spray and surfactant	Assume a fugitive dust control efficiency of 90%
Covered Screen with central A fabric filter	ssume a fugitive dust capture efficiency of 95% and a ducted release rate of 0.008 grains/ft3
Covered Screen with an insertable filter	Assume a fugitive dust capture efficiency of 97.5% and a ducted release rate of 0.008 grains/ft3

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	0.01500	0.03171
Wet Process Material	0.00084	0.00178
Dry Fines Material	0.07100	0.15011
Wet Fines Material	0.00210	0.00444
Wet Plant 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 screening and fines screening values 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 change in emission factors between "wet" and "dry" material represents an equivalent 94.4% control efficiency for "process" material and a 97.0% control efficiency for "fines" material. These factors are substantially different from those used previously by the District.

Trace metal concentrations in aggregate dust released from aggregate screening operations 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 particle size distributions and moisture contents to classify material streams may poorly represent some mineral facility operations. Since these values vary considerably throughout the year, material classified as "wet or process" during the winter months might qualify as "dry or fines" in the summer. Unfortunately, no alternative method to using average values currently exists. The standardized factors developed and agreed to by the District - AWR - MPI working group should be used until otherwise advised.

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

- Multiple deck screens are considered a single device. Emissions are <u>not</u> quantified "per deck". Material throughputs should represent the entire device. However, any material which is returned through a screen or set of screens multiple times should be reported "per pass".

- 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

[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

should be taken to accurately report the air flow rate for any control device 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 on a single inventory form as a single emission point.

FORMS:

Each screen must be quantified separately due to the District - AWR - MPI decision to apply specific particle size distribution, moisture content, and possible control device efficiencies to each emission point. Other mineral industry processes and equipment on site must also be evaluated independently for the same reasons.