Texas Commission on Environmental Quality
Air Permits Division

New Source Review (NSR) Emission Calculations

This information is maintained by the Chemical NSR Section and is subject to change. Last update was made **May 2008**. These emission calculations represent current NSR guidelines and are provided for informational purposes only. The emission calculations are subject to change based on TCEQ case by case evaluation. Please contact the appropriate Chemical NSR Section management if there are questions related to the emission calculations.

Sample Petroleum Coke Storage and Transfer Calculations

The emissions resulting from the storage and transfer of petroleum coke can be calculated by using the AP-42 emission factors and equations for aggregate handling and storage piles.

Aggregate Handling and Storage Piles
Total dust emissions from aggregate storage piles result from several distinct source activities within the storage cycle:

1. Loading of aggregate onto storage piles (batch or continuous drop operations).
2. Equipment traffic in storage area.
3. Wind erosion of pile surfaces and ground areas around piles.
4. Load out of aggregate for shipment or for return to the process stream (batch or continuous drop operations).

Drop Operations
Either adding aggregate material to a storage pile or removing it usually involves dropping the material onto a receiving surface. Truck dumping on the pile or loading out from the pile to a truck with a front-end loader are examples of batch drop operations. Adding material to the pile by a conveyor stacker is an example of a continuous drop operation.

The quantity of particulate emissions generated by either type of drop operation, in pounds per ton of material transferred, may be estimated using the following empirical expression:

$$E = k(0.0032)\frac{\left(\frac{U}{5}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}$$

Where:	E	=	emissions factor (lb/ton)
	k	=	particle size multiplier (dimensionless)
	U	=	mean wind speed (miles/hr)
	M	=	material moisture content (%)

The particle size multiplier in the equation, k, varies with aerodynamic particle size range, as follows:

Aerodynamic Particle Size Multiplier (k)				
< 30 µm	< 15 µm	< 10 µm	< 5 µm	< 2.5 µm
0.74	0.48	0.35	0.2	0.053

Drop Operation Example

Company A is capable of loading a maximum of 200 tons per hour and a total of 300,000 tons per year of petroleum coke. The mean wind speed at the facility is 10 miles per hour while the moisture content in the coke is 8 percent. PM_{10} emissions resulting from the drop operations would be:

$$E = k(0.0032)\frac{\left(\frac{U}{5}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}$$

$$E = 0.35(0.0032)\frac{\left(\frac{10}{5}\right)^{1.3}}{\left(\frac{8}{2}\right)^{1.4}}$$

$$E = 0.0004\ lb\ PM_{10}\ /\ ton\ coke$$

$$HourlyEmissions = \left(\frac{0.0004\, lb\, PM_{10}}{ton\, coke}\right)\left(\frac{200\, tons\, coke}{hr}\right)$$

$$HourlyEmissions = 0.08\, lb\, PM_{10}\ /\ hr$$

$$Annual\ Emissions = \left(\frac{0.0004\, lb\, PM_{10}}{ton\, coke}\right)\left(\frac{300{,}000\, tons\, coke}{yr}\right)\left(\frac{1 ton}{2000\, lb}\right)$$

$$Annual\ Emissions = 0.06\ \text{TPY}\ \text{PM}_{10}$$

Conveyors

The transfer (drop) of material from one conveyor belt to a different conveyor belt should be treated as a drop point and potential emissions should be calculated using the methodology in the preceding example. However, drop of material from the conveyor belt directly onto the storage pile is not considered a drop point. Emissions from dropping material from the conveyor onto the pile are accounted for in calculation of emissions from wind erosion that follows.

Fugitive emissions can be expected from the conveying and transferring of material due to wind, belt vibration, scrapers or brushes, etc. For an estimation of fugitive emissions along conveyors, a conservative assumption of one drop per 1,000 feet of conveyor length is made.

Example

Company B uses a 2,000 foot conveyor to transport petroleum coke to its storage pile. The conveyor is capable of transporting 25 tons per hour to the pile and, moves 4,000 tons of coke annually. Mean wind speed at this facility is 12 miles per hour and the moisture content of the coke is 10 percent. The PM_{10} emissions resulting from this conveyor would be:

$$E = k(0.0032)\frac{\left(\frac{U}{5}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}\left(\frac{length\, of\ conveyor}{1{,}000\ ft}\right)$$

$$E = 0.35(0.0032)\frac{\left(\frac{12}{5}\right)^{1.3}}{\left(\frac{10}{2}\right)^{1.4}}\left(\frac{2{,}000\ ft}{1{,}000\ ft}\right)$$

$$E = 0.0007\ lb\, PM_{10}\,/\,ton\, coke$$

$$HourlyEmissions = \left(\frac{0.0007\, lb\, PM_{10}}{ton\, coke}\right)\left(\frac{25\, tons\, coke}{hr}\right)$$

$$HourlyEmissions = 0.02\, lb\, PM_{10}\,/\,hr$$

$$Annual\ Emissions = \left(\frac{0.0007\, lb\, PM_{10}}{ton\, coke}\right)\left(\frac{4{,}000\, tons\, coke}{yr}\right)\left(\frac{1\, ton}{2000\, lb}\right)$$

$$Annual\ Emissions = 0.0014 \text{ TPY PM}_{10}$$

Wind Erosion from Stockpiles

Emissions expected due to wind erosion of stockpiles may be estimated by:

$$E = \frac{13.2(Number\ of\ Active\ Days)(Acreage\ of\ the\ Pile)(Control\ Factor)}{2000}$$

Where:	E	=	Emissions from the pile (tons/yr)
	Number of Active Days	=	Days per year where there is at least 8 hours of activity occurring at the piles
	Control Factor	=	For wet material, the control factor is 0.5 For sprayed material, the control factor is 0.3 For dry material, the control factor is 1

Example

Company C has a petroleum coke stockpile that covers 4 acres. There is activity at the site 300 days per year and the coke pile is routinely sprayed with water. PM_{10} emissions due to wind erosion would be:

$$E = \frac{13.2(Number\ of\ Active\ Days)(Acreage\ of\ the\ Pile)(Control\ Factor)}{2000}$$

$$E = \frac{13.2(300)(4)(0.3)}{2000}$$

$$E = 2.38\ TPY\ PM_{10}$$