



## Dust Transport Fraction Adjustment

This brief writeup describes an approach for adjusting the PM<sub>2.5</sub>/PM<sub>10</sub> fugitive dust emissions that are input to grid-based air quality models to reflect removal mechanisms near the source that are not currently included in these models. This technique may be applied to the emission inventory data set during preparation for modeling, such as within the smoke processor and could be applied to the 2001 or 1999 (version 3) of the NEI.

Grid models consistently overestimate the impact of fugitive dust emissions when compared to ambient data. EFIG has recently published a methodology entitled: [A Conceptual Model to Adjust Fugitive Dust Emissions in Grid Model Applications](#) to address this problem. The methodology and an example calculation spreadsheet are available at: <http://www.epa.gov/ttn/chief/emch/invent>. The approach described therein is not prescriptive - the user can choose to use it and / or modify it. It improves upon and replaces the practice used by the EPA in recent years whereby fugitive dust emissions estimates are multiplied by 0.25 for use in grid models. Briefly, the paper describes a method (transport fraction - TF) to adjust the emissions inventory to account for near-source removal of particles emitted close to the ground. The removal mechanisms are vegetation & other obstructions and other enhanced deposition, owing to the high particle density and proximity to the ground just after they are emitted.

As noted in the paper, use of the transport fraction adjustment based on near-source removal by vegetation, obstructions and other enhanced deposition alone will likely not reduce the fugitive dust emissions enough to allow the model to satisfactorily estimate ambient crustal fractions. This is because there are still several unresolved issues, including the need for further refinements to the emission factors for dust sources (eg unpaved roads, tilling) and the need to better understand particle-particle and particle-ground interactions for dense plumes generated near the surface. Modelers may wish to incorporate an additional adjustment to improve overall model performance for fugitive dust-related source categories.

The average fugitive dust transport fraction adjustments for each RPO are given in the table below. In the table, the fugitive dust TF is given for a the transport adjustment for near source removal and examples showing the effect of an additional adjustment of 0.2 and 0.4. Note that the inclusion of a 0.2 additional adjustment doesn't equate to a 0.2 or a 20% reduction in TF, because of the way the reduction is formulated. Further explanation and example calculations are found in the above web link.

Transport Fraction (TF) Adjustment to FD Emissions (RPO Average) for Near-source Removal by Vegetation, Obstructions and other Enhanced Deposition, plus Additional Adjustment (if needed, to reconcile model & ambient data)			
RPO	Near-source Removal (TF)	Near-source Removal + additional 0.2 adj. (TF +.2)	Near-source Removal + additional 0.4 adj (TF +.4)
NESCAUM	0.33	0.26	0.18
VISTAS	0.30	0.23	0.17
LADCO	0.49	0.38	0.27
CENRAP	0.58	0.45	0.32
WRAP	0.51	0.39	0.28
Average	0.44	0.35	0.25

EFIG has generated a set of county-specific TF's and alternative additional adjustments based on this conceptual model. The file containing these county-specific estimates is also at the above web address. These TF's may be multiplied times the fugitive dust emission estimates for PM2.5 & PM10 for specified categories in each county (see attached Table for the relevant categories). Modelers will want to develop a similar file specific to the grid cells used in their model. Note that wind erosion is not included in this list at this time, pending development of a wind erosion module for CMAQ, being developed by EPA's Office of Research and Development. Also note that the TF is not intended for use in operating permit or fence line analyses or other Gaussian modeling.

### SCC's whose PM2.5 & PM10 Emissions May be Adjusted for use in Grid Modeling

2801000003	Ag crops	Agriculture - Crops	Tilling
2801000005	Ag crops	Agriculture - Crops	Harvesting
2801000008	Ag crops	Agriculture - Crops	Transport
2801000007	Ag crops	Agriculture - Crops	Loading
2801000006	Ag crops	Agriculture - Crops	Drying
2801000004	Ag crops	Agriculture - Crops	Defoliation
2801000002	Ag crops	Agriculture - Crops	Planting
2801000001	Ag crops	Agriculture - Crops	Land Breaking
2805035000	Ag livestock	Horses and Ponies Composite	Total
2805001000	Ag livestock	Beef Cattle Feedlots	Total (also see 2805020000)
2805020000	Ag livestock	Cattle and Calves Composite	Total
2805030000	Ag livestock	Poultry and Chickens Composite	Total
2805015001	Ag livestock	Hog Operations	Feed Preparation
2805040000	Ag livestock	Sheep and Lambs Composite	Total
2805045001	Ag livestock	Goats	Total
2805000000	Ag livestock	Agriculture - Livestock	Total
2805001001	Ag livestock	Beef Cattle Feedlots	Feed Preparation
2805005000	Ag livestock	Poultry Operations	Total (also see 2805030000)
2805005001	Ag livestock	Poultry Operations	Feed Preparation
2805010000	Ag livestock	Dairy Operations	Total (also see 2805020000)
2805015000	Ag livestock	Hog Operations	Total (also see 2805025000)
2805010001	Ag livestock	Dairy Operations	Feed Preparation
2805025000	Ag livestock	Hogs and Pigs Composite	Total
31100206	Building Const	Demolitions/Special Trade Contracts	On-site Truck Traffic
30531090	Mineral Products	Coal Mining, Cleaning, & Mat'l Handling	Haul Roads: General
2296005000	Unpaved Roads	Public Unpaved Roads	Total: Fugitives
2275085000	Aircraft	Unpaved Airstrips	Total
2296010000	Unpaved Roads	Industrial Unpaved Roads	Total: Fugitives
31100205	Building Const	Demolitions/Special Trade Contracts	On-site Truck Traffic
30501090	Mineral Products	Coal Mining, Cleaning, & Mat'l Handling	Haul Roads: General
30501050	Mineral Products	Coal Mining, Cleaning, & Mat'l Handling	Vehicle Traffic: Light/Medium Vehicles
2296000000	Unpaved Roads	All Unpaved Roads	Total: Fugitives
30300833	Prim Metal Prod	Iron Production	Unpaved Roads: Heavy Duty Vehicles

30300832	Prim Metal Prod	Iron Production	Unpaved Roads: Med Duty Vehicles
30300831	Prim Metal Prod	Iron Production	Unpaved Roads: Light Duty Vehicles
30300519	Prim Metal Prod	Primary Copper Smelting	Unpaved Road Traffic: Fug Emiss
2294000000	Paved Roads	All Paved Roads	Total: Fugitives
2294015002	Paved Roads	Industrial Roads	Total: Sanding/Salting - Fugitives
2294015001	Paved Roads	Industrial Roads	Total: Average Conditions - Fugitives
2294015000	Paved Roads	Industrial Roads	Total: Fugitives
2294010002	Paved Roads	All Other Public Paved Roads	Total: Sanding/Salting - Fugitives
2294010001	Paved Roads	All Other Public Paved Roads	Total: Average Conditions - Fugitives
2294005000	Paved Roads	Interstate/Arterial	Total: Fugitives
30300834	Prim Metal Prod	Iron Production	Paved Roads: All Vehicle Types
2294000002	Paved Roads	All Paved Roads	Total: Sanding/Salting - Fugitives
2294000001	Paved Roads	All Paved Roads	Total: Average Conditions - Fugitives
2294010000	Paved Roads	All Other Public Paved Roads	Total: Fugitives
2294005002	Paved Roads	Interstate/Arterial	Total: Sanding/Salting - Fugitives
2294005001	Paved Roads	Interstate/Arterial	Total: Average Conditions - Fugitives
2311020100	Construction	Heavy Construction	Wind Erosion
2311040100	Construction	Special Trade Construction	Wind Erosion
2311010000	Construction	General Building Construction	Total
2311020000	Construction	Heavy Construction	Total
2311030000	Construction	Road Construction	Total
2311030100	Construction	Road Construction	Wind Erosion
2311030060	Construction	Road Construction	Construction
2311030050	Construction	Road Construction	Cut and Fill Operations
2311030040	Construction	Road Construction	Ground Excavations
2311030010	Construction	Road Construction	Land Clearing
2311020060	Construction	Heavy Construction	Construction
2311020050	Construction	Heavy Construction	Cut and Fill Operations
2311020040	Construction	Heavy Construction	Ground Excavations
2311000060	Construction	All Processes	Construction
2311010010	Construction	General Building Construction	Land Clearing
2311020010	Construction	Heavy Construction	Land Clearing
2311000100	Construction	All Processes	Wind Erosion
2311010050	Construction	General Building Construction	Cut and Fill Operations
2311000050	Construction	All Processes	Cut and Fill Operations
2311000040	Construction	All Processes	Ground Excavations
2311010060	Construction	General Building Construction	Construction
2311000010	Construction	All Processes	Land Clearing
2311010100	Construction	General Building Construction	Wind Erosion
2311010040	Construction	General Building Construction	Ground Excavations
2325000000	Mining & quarrying	All Processes	Total
2311010070	Construction	General Building Construction	Vehicle Traffic
30501031	Mineral Products	Coal Mining, Cleaning, & Mat'l Handling	Scrapers: Travel Mode
31100101	Building Const	Construction: Building Contractors	Site Preparation: Topsoil Removal
2311000070	Construction	All Processes	Vehicle Traffic
2311030070	Construction	Road Construction	Vehicle Traffic
2311040000	Construction	Special Trade Construction	Total
30302321	Prim Metal Prod	Taconite Iron Ore Processing	Haul Road: Rock
2311020070	Construction	Heavy Construction	Vehicle Traffic
30501024	Mineral Products	Coal Mining, Cleaning, & Mat'l Handling	Hauling
30501039	Mineral Products	Coal Mining, Cleaning, & Mat'l Handling	Hauling: Haul Trucks
30501045	Mineral Products	Coal Mining, Cleaning, & Mat'l Handling	Bulldozing: Overburden
30501046	Mineral Products	Coal Mining, Cleaning, & Mat'l Handling	Bulldozing: Coal
30501047	Mineral Products	Coal Mining, Cleaning, & Mat'l Handling	Grading
2311000000	Construction	All Processes	Total
30501640	Mineral Products	Lime Manufacture	Vehicle Traffic
30502011	Mineral Products	Stone Quarrying - Processing	Hauling
30502504	Mineral Products	Construction Sand and Gravel	Hauling
31100102	Building Const	Construction: Building Contractors	Site Prep: Earth Moving (Cut and Fill)
31100103	Building Const	Construction: Building Contractors	Site Prep: Aggregate Hauling (On Dirt)
30302322	Prim Metal Prod	Taconite Iron Ore Processing	Haul Road: Taconite