

## Haul Roads

Fugitive dusts from haul roads are produced by truck traffic along these roads. When a vehicle travels along a road, the force of the wheels on the road surface causes a re-suspension, and some pulverization, of the surface material. Particles are lifted and dropped from the rolling wheels, and the road surface is exposed to strong air currents in turbulent shear with the surface. The turbulent wake behind the vehicle continues to act on the road surface after the vehicle has passed.

Haul roads can be characterized as a series of volume sources either adjacent or separate from one another except for cases where ambient air receptors are within the volume's exclusion zone. This is the region  $2.15\sigma_{Y_0} + 1$  meters from the center of the volume. If separate volume sources are used, the DNR recommends the volume sources be separated by a center to center spacing of no more than twice the road width. The following **volume** source parameters are used to characterize the roads:

Top of plume height = 1.7 x vehicle height

Release height = 0.5 x top of plume height

Plume width = Vehicle width + 6 m for single lane or road width + 6 m for two-lanes

Initial lateral dimension ( $\sigma_{Y_0}$ ) = Width of plume / 2.15

Initial vertical dimension ( $\sigma_{Z_0}$ ) = Top of plume / 2.15

Concentrations are not calculated at a receptor location if it lies within a volume source's exclusion zone. To avoid this, the following options may be considered:

- 1) Reduce the  $\sigma_{Y_0}$  value. This is generally the preferred option since it is conservative. The  $\sigma_{Y_0}$  value must be slightly less than  $(d_{SR} - 1) / 2.15$  meters, where  $d_{SR}$  is the source-to-receptor distance.
- 2) Relocate the volume source along the haul road. The  $d_{SR}$  value must be slightly greater than  $2.15\sigma_{Y_0} + 1$  meters.
- 3) Replace the volume source with an area source (see below).

If the volume source lies extremely close to the receptor and the area source option is not used, the DNR recommends the source be relocated and the  $\sigma_{Y_0}$  value reduced as needed. No action needs to be taken if the road segment is not a significant contributor and design concentrations are well below the NAAQS.

The following **area** source parameters are used to characterize the roads where ambient receptors are located within the volume exclusion zone:

Top of plume height = 1.7 x vehicle height

Release height = 0.5 x top of plume height

Length = Length of roadway

Width = Vehicle width + 6 m for single lane or road width + 6 m for two-lanes

Initial vertical dimension ( $\sigma_{z_0}$ ) = Top of plume / 2.15

Note: The haul road modeling characterization described above is based on the EPA's Haul Road Workgroup Final Report dated December 6, 2011

Additional information on haul road emissions may be found in Air and Waste Management Association's *Air Pollution Engineering Manual* (chapter 4) and National Stone, Sand & Gravel Association's *Modeling Fugitive Dust Sources* (chapter 5.1). Other references are also available and may be used depending on the specific circumstances of the project under review.