

Dust Control

Definition

Control of fugitive dust at construction sites that results from grading, demolition, hauling, and traffic.

Description and Purpose

Dust is generated by vegetation removal plus wind or mechanical movement of soil. Dust may include silty soils, fine sands and clays. Control measures prevent significant movement of soil and attached pollutants

Pollutant controlled: Airborne soil particles (suspended solids) and attached chemicals, including nutrients, pesticides, metals.

Treatment Mechanisms:

- Cover bare soils and other loose particulates
- Bind particles (water, chemicals, adhesives)
- Good housekeeping (sweeping or other removal of free particulates)
- Control, block, or reduce wind
- Confine or restrict vehicles and equipment

Companion and Alternative BMPs

- Access Road
- Construction Staging and Scheduling
- Critical Area Stabilization
- Dune/Sand Stabilization
- Mulching
- Seeding/Vegetation
- Street Sweeping

Advantages and Disadvantages

Advantages:

- Many practices also provide soil erosion and sedimentation control
- Widely applicable, easy to apply, and many options
- Multiple benefits: preserves visibility and nuisance conditions on worksites; protects health, equipment, and neighboring property; and maintains soil structure and texture for vegetation establishment

Disadvantages:

- Controls that may cause water pollution are not well regulated. Used oil and brine wastes are still used today in many areas because of availability and lack of knowledge or concern about environmental impacts

- Repeat application is required. Plain water is cheap, readily available, and environmentally benign, but applications daily or more frequently increase labor and fuel costs
- Some agents reduce soil permeability and increase runoff rate & volume
- Chemicals may be expensive or be useful only on specific soil types.
- Polyacrylamide (PAM) can be very effective but users should be aware of disadvantages:
 - Each formula must be matched to a specific soil type
 - Overuse can clog soil and reduce infiltration
 - Does not work on coarse soils
 - Not effective if there is snow cover
- Many materials or methods require unique equipment to apply
- Windbreaks require space and they only work when the wind is from one direction
- Chlorides inhibit vegetative growth so they should not be applied where vegetation will be planted
- Lignins are sticky so they are tracked into buildings and onto paved roads
- Tarps and hard covers do not allow vehicle traffic

Location

- Unpaved roads and other areas where soils are bare (construction, demolition, mining, forestry, soil stockpiles)
- Areas of fine, non-organic soils
- Open areas lacking windbreaks
- Where vehicle traffic is heavy such as entrances to construction and demolition sites
- Where surface waters are nearby that can be contaminated with dust
- Where "Built-up" areas are adjacent to project site

General Characteristics

- Often sprayed on as a liquid where vehicles travel
- Solid materials such as tarps may be used for temporary covers of stockpiles and other areas where vehicle traffic does not occur
- Not usually required in winter when soils are frozen or during spring thaw when soils are continuously muddy or moist
- No single dust control agent is perfect for all sites

Materials

- Water binds soils by moistening
- Chlorides draw moisture from the air to make soils self dampening. These include: calcium chloride (flake or liquid), magnesium chloride (liquid), and sodium chloride (table salt)
- Lignin sulfonate is a sticky resin by-product from tree pulp which is mixed with water and sprayed on as a soil binder. Marketed by several commercial names
- Polyacrylamides (anionic PAM) are long-chain molecules that bind fine particles together by chemical attraction. Do not use cationic PAM which has aquatic toxicity
- Vegetable oil penetrates the soil surface and provides binding. Usually soybean oil
- Mulch retains soil moisture and covers fine loose soils. Mulches include organic soils and compost
- Vegetation binds and covers the soil when established. Regular watering during germination and also mulch will control dust until vegetation is established
- Wind barriers reduce the velocity and erosivity of wind. These including: solid board fences, snow fencing, burlap fencing, crate walls, hay bales
- Thinned liquid asphalts, asphalt emulsions, and waste oils raise environmental concerns, and should not be used.

Design Specifications

- Identify performance objectives for dust controls during project design
- Use multiple dust control methods and/or a phased approach where no one agent can meet the performance objectives
- Minimize soil disturbance by retaining grass, trees and shrubs on project sites as much as possible, and installing Access Roads
- Install irrigation systems as a first step where dust is a concern and systems can be protected from construction traffic
- Allow adequate space for wind breaks (Construction Barriers). Account for the prevailing wind direction, and place barriers perpendicular to the prevailing direction, spaced evenly at intervals of about 15 times the height of the barrier
- Be prepared to apply dust controls when soil disturbance is occurring during hot dry months. For watering without an irrigation system, a truck and driver must be available at all times during dry periods
- Anionic PAM: always test soils to identify the appropriate PAM product
- Covers/tarps over trucks and stockpiles: provide adequate cover and anchor it well against all possible wind events
- Street sweeping: brush type sweepers wet the pavement surface to reduce dust movement and bind it temporarily to the pavement. Vacuum type sweepers remove fine particles as well as course ones
- Travel on paved routes as much as possible

- Permanently stabilize soils by paving, vegetating, or adding other landscaping as soon as possible.

Performance Enhancers

- For gravel/dirt road surfaces, graders with edges that roughen the soil surface aid incorporation of the dust control agent
- Pre-wet roads and exposed soils to improve effectiveness of solid dust controls (e.g., calcium chloride)

Construction Guidelines

- When large areas require dust control for the first time, test a small area first to determine the effectiveness of agents applied to soils.
- Follow manufacturer's specifications for wind barriers and agents applied to soils
- Treat areas early in the day if they appear dry and dusty. Early treatment prevents problems later as vehicle traffic and temperatures increase
- Limit vehicle speeds on dusty materials and limit vehicle traffic and earth moving on windy days, if possible
- Tillage can provide emergency dust control. Use chisel plow blades set about 12" apart, or spring-tooth harrows, or similar plow. Start on the windward side of a project site

Monitoring

- Inspect for sedimentation on site. Deposited fines are subject to wind erosion and tracking
- Inspect Access Roads and public rights-of-way for tracked sediment
- Watch for water erosion which results from over watering
- Watch for dust clouds indicating that reapplication of dust control mechanism is required

Maintenance

- Reapply liquid or solid agents to control dust by 80% or more
- Assure that tarps and other solid covers are in place and anchored
- Provide street sweeping or Access Road maintenance as needed.

References

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