



Targeted Constituents

● Significant Benefit ▸ Partial Benefit ○ Low or Unknown Benefit

● Sediment	○ Heavy Metals	○ Floatable Materials	○ Oxygen Demanding Substances
○ Nutrients	▸ Toxic Materials	▸ Oil & Grease	○ Bacteria & Viruses
			○ Construction Wastes

Implementation Requirements

● High ▸ Medium ○ Low

○ Capital Costs	▸ O & M Costs	▸ Maintenance	○ Suitability for Slopes >5%	○ Training
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Description

Dust control measures are used to stabilize soil from wind erosion, and reduce dust generated by construction activities. This thereby reduces the amount of eroded materials available for stormwater runoff. Dust control is considered primarily as a temporary measure—an intermediate treatment between disturbance in either construction, paving, or vegetation. This management practice is likely to create a significant reduction in sediment as well as partial reductions in toxic materials and oil and grease.

Suitable Applications

- Clearing and grading activities.
- Construction vehicle traffic on temporary or unpaved roads or construction site access paths.
- Drilling and blasting activities.
- Sediment tracking onto paved roads.
- Soil and debris storage piles.
- Batch drop from front end loaders.
- Areas with unstabilized soil.
- Final grading/site stabilization usually is sufficient to control post-construction dust sources.
- Dust control should be practiced at all construction sites by performing phased clearing and grading operations, using temporary stabilization methods, and/or placing undisturbed vegetative buffers of at least 50 ft. (15 m) length between areas being graded and those areas to remain undeveloped.

Approach

- Dust control is particularly important in windy or wind-prone areas.
- Schedule construction activities to minimize exposed area by clearing only areas where phased construction is to take place.
- Quickly stabilize exposed soils using vegetation, mulching, spray-on adhesives, calcium chloride, sprinkling, and stone/gravel layering.
- Identify and stabilize key access points prior to commencement of construction. See TCP-01, 02 and 03.
- Minimizing the impact of dust by anticipating the direction of prevailing winds.
- Direct most construction traffic to stabilized roadways within the project site.

Dust control BMP's generally stabilize exposed surfaces and minimize activities that suspend or track dust particles. Table CP-17-1 shows which Dust Control BMPs apply to site conditions which cause dust. For heavily traveled and disturbed areas, wet suppression (watering), chemical dust suppression, gravel or asphalt surfacing, temporary gravel construction entrances, equipment wash-out areas, and haul truck covers can be employed as dust control applications. Permanent or temporary vegetation and mulching and sand fences can be employed for areas of occasional or no construction traffic.

Preventive measures would include minimizing surface areas to be disturbed, limiting on-site vehicle traffic to 15 miles per hour (24 km per hour), and controlling the number and activity of vehicles on a site at any given time.

- Pave, vegetate, or chemically stabilize access points where unpaved traffic surfaces adjoin paved roads.
- Provide covers for haul trucks transporting materials that contribute to dust.
- Provide for wet suppression or chemical stabilization of exposed soils.
- Provide for rapid clean-up of sediments deposited on paved roads. Furnish stabilized construction road entrances and vehicle wash down areas.
- Stabilize unpaved haul roads, parking and staging areas. Reduce speed and trips on unpaved roads.
- Implement dust control measures for material stockpiles.
- Prevent drainage of sediment-laden stormwater onto paved surfaces.
- Stabilize abandoned construction sites using vegetation or chemical stabilization methods.

For the chemical stabilization, there are many products available for chemically stabilizing gravel roadways and stockpiles. The types of chemicals available and

recommendations for their use are tabulated in Table CP-17-2, Commonly Used Chemicals for Dust Control.

Selection of Methods

Selection of dust control agents should be based primarily on cost-effectiveness and environmental hazards.

Chemical methods are dust suppressant or binding agents that are used on the soil surface to bind finer particles together. Chemical dust control agents must be environmentally benign, easily applied, easily maintained, economical and not significantly detrimental to traffic ability.

Approximately three-quarters of chemical dust control agents are inorganic compounds which are compatible with soil and biota. After application, the compounds dampen and penetrate into the soil; a hygroscopic reaction pulls moisture from the atmosphere into the surface and adheres fines to aggregate surface particles. The compounds may not penetrate soil surfaces made up primarily of silt and clay, so soil tests are required.

Key factors in determining the method include the following:

- Soil types and surface materials - both fines and moisture content are key properties of surface materials.
- Properties of the agents - the five most important properties are penetration, evaporation, resistance to leaching, abrasion, and aging.
- Traffic volumes – the effectiveness and life span of dust control agents decreases as traffic increases. For high traffic areas, agents need to have strong penetrating and stabilizing capabilities.
- Climate - some hygroscopic agents lose their moisture-absorbing abilities with lower relative humidity, and some may lose resilience. Under rainy conditions, some agents may become slippery or even leach out of the soil.
- Environmental requirements - the primary environmental concern is the presence and concentration of heavy metals in the agent that may leach into the immediate ecosystem, depending on the soil properties.
- Frequencies of application - rates and frequencies of application are based on the type of agent selected, the degree of dust control required, subgrade conditions, surface type, traffic volumes, types of vehicles and their speeds, climate, and maintenance schedule.

Application of Methods

For dust control agents, once all factors have been considered, the untreated soil surface must first contain sufficient moisture to assist the agent in achieving uniform distribution (except when using a highly resinous adhesive agent). The following steps should be followed in general:

- Ideally, application should begin in late spring, after seasonal rains - not during or just before heavy rainfall- so that subgrade and surface materials will not have dried.
- If the surface has minimal natural moisture, the area to be protected must be pre-wetted so that the chemicals can uniformly penetrate the surface.
- In general, cooler and/or more humid periods result in decreased evaporation, increased surface moisture, and thus significant increase in control efficiency. However, chemical and organic agents should not be applied under frozen conditions, rainy conditions, or when the temperature is below 4° C (40° F). Tar and bitumen agents should not be applied in fog or in rain or below 13° C (55° F).
- More than one treatment with salts or organic compounds per year is often necessary, although the second treatment should probably be significantly diluted.

Requirements

- Cost
 - Individual installation costs for water/chemical dust suppression are low, but annual costs may be quite high since these measures are effective for only a few hours to a few days.
 - This may warrant selection of other soil stabilization practices.

Maintenance

- Most dust control measures require frequent, often daily, attention.
- The primary maintenance requirement is the reapplication of the selected dust control agent at intervals appropriate to the agent type. High traffic areas shall be inspected on a daily basis, and lower traffic areas shall be inspected on a weekly basis.

Limitations

- Watering prevents dust only for a short period and should be applied daily (or more often) to be effective.
- Overwatering may cause erosion. This potential can be limited through use of buffer/filter strips, silt fences, straw bales, vegetation, etc.
- Oil should not be used for dust control because the oil may migrate into drainageways and/or seep into the soil.
- Chemically treated subgrades may make the soil water repellent, interfering with long-term infiltration, and the vegetation/re-vegetation of the site. Some chemical dust suppressants may be subject to freezing and may contain solvents and should be handled properly.
- Asphalt, as a mulch tack or chemical mulch, requires a 24 hour curing time to avoid adherence to equipment, worker shoes, etc. Application should be limited because asphalt surfacing may eventually migrate into the drainage system.
- In compacted areas, watering and other liquid dust control measures may wash sediment or other constituents into the drainage system.

Additional Information

Dust control, as a BMP, is a practice that is already in place for many construction activities.

Many local agencies require dust control in order to comply with local nuisance laws, opacity laws (visibility impairment) and the requirements of the Clean Air Act.

Primary References

California Storm Water Best Management Practice Handbooks, Construction and Industrial Handbooks, CDM et.al. for the California SWQTF, 1993.

Subordinate References

Best Management Practices and Erosion Control Manual for Construction Sites, Flood Control District of Maricopa County, Arizona, September 1992.

California Air Pollution Control Laws, California Air Resources Board, 1992.

CalTrans, Standard Specifications, Sections 10, “Dust Control”; Section 17, “Watering”; and Section 18, “Dust Palliative”.

Prospects for Attaining the State Ambient Air Quality Standards for Suspended Particulate Matter (PM10), Visibility Reducing Particles, Sulfates, Lead, and Hydrogen Sulfide, California Air Resources Board, April 1991.

Sacramento County, *Winterization Ordinance & Dust Control Ordinance* (example).

USDA Soil Conservation Service, *“Guides for Erosion and Sediment Control”*.

TABLE CP-17-1 DUST CONTROL BMPs FOR GIVEN SITE CONDITIONS

SITE CONDITION	DUST CONTROL BMPs								
	Permanent Vegetation	Mulching	Wet Suppression (Watering)	Chemical Dust Suppression	Gravel or Asphalt Surfacing	Silt or Sand Fences	Temporary Gravel Construction Entrances/ Equipment Wash Down	Haul Truck Covers	Minimize Extent of Area Disturbed
Disturbed Areas not Subject to Traffic	X	X	X	X	X				X
Disturbed Areas Subject to Traffic			X	X	X				X
Material Stock Pile Stabilization			X	X		X			X
Demolition			X				X	X	
Clearing/ Excavation			X	X					X
Truck Traffic on Unpaved Roads			X	X	X			X	
Mud/Dirt Carry-Out					X		X		

TABLE CP-17-2 COMMONLY USED CHEMICALS FOR DUST CONTROL

	SALTS	ORGANIC, NON PETROLEUM-BASED	PETROLEUM BASED PRODUCTS ¹
CHEMICAL TYPES	<ul style="list-style-type: none"> ■ Magnesium Chloride ■ Natural Brines 	<ul style="list-style-type: none"> ■ Calcium Lignosulfonate ■ Sodium Lignosulfonate ■ Ammonium Lignosulfonate 	<ul style="list-style-type: none"> ■ Bunker Oil ■ Asphalt Primer ■ Emulsified Asphalt
LIMITATIONS	<p>Can lose effectiveness in dry periods with low humidity.</p> <p>Leaches from road in heavy rain.</p> <p>Not recommended for gravel road surfaces with low fines.</p> <p>Recommended 10-20% fines.</p>	<p>Not affected by dry weather and low humidity. Leached from road in heavy rain if not sufficiently cured.</p> <p>Best performance on gravel roads with high surface fines (10-30%) and dense compact surface with loose gravel.</p>	<p>Generally effective regardless of climatic conditions may pothole in wet weather.</p> <p>Best performance on gravel roads with 5-10% fines.</p>
COMMENTS	<p>Calcium Chloride is popular. May become slippery when wet on gravel surfaces with high fines.</p>	<p>Ineffective on gravel surfaces low in fines. May become slippery when wet on gravel surfaces with high fines content.</p>	<p>Creates a hardened crust.</p>

¹ Motor oils and oil treatments are not recommended due to adverse effects on plant life and groundwater. They should only be applied in areas that will soon be paved.