

**Suggested Best Available Control Measures (BACM)
for Reducing Windblown Dust from Manmade Sources
in Doña Ana County**

Why is there a need to control dust in Doña Ana County?

Over the last several years, federal health-based standards for air quality have been exceeded in Doña Ana County as a result of high concentrations of windblown dust in the air. One of the actions required to protect health is the application of what are called Best Available Control Measures or BACM. These measures are designed to reduce blowing dust from sources created by human activities. This fact sheet will describe the most common sources of manmade dust within communities and the BACMs that can be used to prevent or reduce manmade dust during windy conditions.

What types of activities produce windblown dust in Doña Ana County?

Windblown dust in Doña Ana County occurs both from natural and manmade sources. While dust is common in undisturbed areas throughout the west, it becomes much more common where the natural soils have been disturbed by human activities. This is because natural soils have a tendency to form a mineral and organic crust that is resistant to erosion by wind. Human activities can remove or break this crust, allowing dust to escape much more easily. Also, even sparse desert vegetation acts somewhat like a windbreak providing some protection to the soil surface. When human activities remove vegetation, the soil is more susceptible to wind, and as a result, airborne dust is produced.

While we can do little to decrease windblown dust from the open desert during periods of high wind, there are a variety of things that community members can do to decrease dust caused by human activities. The dust from human activity tends to be concentrated close to populated areas, since that is most often where native soils are disturbed. The majority of the dust inhaled by community members is generated locally rather than from the surrounding desert.

Sources of Windblown Dust in Doña Ana County

When Doña Ana County experiences high dust levels during high winds, most of the dust in the air is wind-generated from exposed areas of loose soil. The sources of wind-generated dust in Doña Ana County are similar to those in other communities that are developing, or have developed, plans to control airborne dust. These communities are found throughout the western U.S. including locations as diverse as Phoenix, Arizona and Spokane, Washington.

There are several sources that are commonly encountered in urban and rural areas in the western U.S. The following list shows the major sources but not necessarily in the order of their significance:

- Soil disturbance during construction projects is primarily a problem during windy conditions.

- Disturbed land areas that are vacant, where construction is pending or due to recreational activities
- Unpaved rural roads and unpaved high-traffic industrial areas
- Unpaved playgrounds and unpaved parking lots
- Wind blown emissions from tilled fields
- Undisturbed desert areas during the highest winds
- Military training exercises
- Unpaved equipment lots (laydown yards)

What is BACM?

BACMs are methods that can be used to reduce or eliminate windblown dust in areas where natural soils have been disturbed and are thus more prone to erosion by the wind. BACM is defined as the maximum degree of emission reduction feasible for a significant source category. BACM is determined on a case-by-case basis, taking into account technical feasibility and energy, environmental, and economic impacts as well as other costs. The process of determining BACM takes into account what the most common sources of manmade dust within a community are, when they occur, what measures can be used to reduce dust, and the relative cost of such measures to their effectiveness in controlling dust.

Most BACMs are physical methods of controlling dust from developed or undeveloped areas within communities. Many methods attempt to return native soils to a more protected state by re-vegetation or by replacing natural crusts with artificial covers. However, they also include controlling and/or reducing airborne dust by practices that minimize the area of disturbed soil. In addition, the length of time the soil remains exposed to hazards of wind and the timing of the disturbance have a bearing on the need for a particular BACM. Considering all these factors, it is possible to develop best management practices for specific land uses.

Selecting, developing and using BACMs

The list of BACMs presented below includes methods that vary greatly in effectiveness and cost. These variations may be due to the size of the area requiring dust control, the ground slope of the area, the soil type involved and the amount of manmade activity in an area. Larger areas may require several methods of dust control to adequately address problems of blowing dust.

The following list does not represent all types of dust control methods, and new methods are being developed all the time. Community members can utilize existing or new types of dust control, although they should be thoroughly investigated for benefits and drawbacks. However, these measures have been successfully implemented in similar arid regions.

Re-vegetation and Organic Mulches

Restoring a vegetative cover or using organic mulch can be an excellent method of reducing windblown dust. However, care must be taken to avoid introducing or

promoting the spread of noxious weeds and plants. Please contact State or University representatives who are knowledgeable about revegetation prior to performing these options.

Using Chemical Dust Suppressants and Soil Stabilizers

Chemical dust suppressants and soil stabilizers can be useful in reducing the tendency of fine-grained and loose soils to produce large amounts of windblown dust. They bind fine soil particles into larger particles that are less easily blown into the air; they retain moisture so that soils become more coherent; and they can form crusts that mimic the wind resistance of natural soil crusts.

Water has long been used for the control of dust in arid regions. However, water use has increased greatly over the last decade in Doña Ana County and is being used primarily for domestic and agricultural use; the cost of water has also increased greatly within the County. Water can be ineffective for dust control since dry soils are initially resistant to the influx of water; large amounts of water applied during short intervals are often necessary for effective dust control.

Water-soluble surfactants are often added to water to increase the wetting power by breaking down the initial resistance of dry soils to water. Surfactants are relatively inexpensive and greatly decrease the amount of water necessary during dust control operations.

Chemical dust suppressants are often added to water, which acts to disperse the chemicals, and then evaporates after application. The chemicals that are left behind coat the particle surfaces and bind the soil particles together. Most products are designed for moderately traveled, low cost roads, and are used to stabilize shoulders of paved roads and to temporarily stabilize construction sites.

When used to stabilize heavily trafficked areas, these products typically require ground preparation prior to application, as well as reapplication one to four times a year to remain effective. The crusting or binding of soil particles does not need to be nearly as strong for areas that will not be trafficked by vehicles, because the binding needs only to withstand the force of the wind. Therefore, stabilization of untrafficked areas requires much less of the chemical, less ground preparation, and less frequent reapplication.

For greatest effectiveness and lowest cost, it's important to follow the manufacturer's instructions for mixing and applying these chemicals, which will likely depend on the intended use of the area. Some of these chemicals tend to suppress plant establishment and growth (which may be an added benefit where weed control is desired), and some may affect water quality if treated soils are allowed to wash into drainages.

Soil stabilizers such as straw mulches increase the organic content of sandy, dry soils. They provide soil structure and the organic materials bind with clay and sand to reduce erosion; they also increase the ability of soils to retain moisture. Some types of mulch require tilling to integrate them into the upper layer of soil, if they are to be effective in dust control.

Smart Timing: A Cost-Effective Approach to Dust Control

In many cases, proper timing of the land disturbance and/or the application of the control measure may make dust control affordable, with little reduction in effectiveness. Based on data from this county for 1996 through 1999, over 60% of the days with unhealthful levels of windblown dust occurred during the months of February through April, and over 80% were during January through June. For an activity that temporarily creates a potential source of windblown dust, this means that by planning a dust causing activity so that the erosion susceptibility is within the July to December period would, on average, be 80% effective in controlling dust. No direct costs (such as for chemical dust suppressants, water, water trucks, labor, etc.) would be incurred. If indirect costs (relating to financing, lost business opportunities, and so forth) are not prohibitive, this can be a highly cost-effective method of dust control. An added benefit is that environmental impacts from water use or introduction of chemicals into the environment are minimized.

If the potential dust source is expected to continue for many months or years, timing the application for optimal effectiveness can reduce the costs of short-term control measures such as watering or using chemical dust suppressants. Applying these methods to provide control only during the months of January through June could cut the cost of control by as much as half, while decreasing overall effectiveness by only 20% on average. For certain sources and control methods, the "smart timing" approach might even be feasible over shorter time periods. For example, decisions on water application could be determined by daily wind forecasts.

For areas that have the potential to be dust sources indefinitely or for many years, repeated application of short-term control measures might be more costly in the long run. Therefore, permanent controls such as paving or re-vegetation may be more cost effective, even though the permanent controls have a higher initial cost. Costs, effectiveness and environmental impacts all may vary from case to case.

Examples of BACM for specific land uses

Airborne dust is generated through a variety of activities that constitute the daily operations of businesses. The following list shows alternative measures for dust control for specific land uses. This list of BACMs is by no means all-inclusive, and represents only some of the options available to the community.

BACMs for Paved and Unpaved Roads

BACMs for paved roads:

While paving roads is an excellent way to reduce dust, road shoulders and dirt that is tracked, washed, or blown onto paved surfaces can continue to emit dust. Methods to control this dust source include:

- Road shoulder stabilizing by paving, covering with gravel, or using chemical dust suppressants applied in amounts and rates recommended by the manufacturer and maintained as recommended by the manufacturer
- Road cleaning with vacuum street cleaning equipment at regular intervals
- Reducing dirt tracked from unpaved side roads and construction sites, using paved or gravel entry aprons and/or devices such as steel grates that are capable of knocking mud and bulk dirt off vehicle tires

BACMs for unpaved roads:

Depending on the soil properties, heavily used unpaved roads can develop a loose, powdery surface that generates significant amounts of windblown dust even during periods of moderate wind speed. Methods to control dust from unpaved roads include:

- Road stabilization using chemical dust suppressants applied and maintained in amounts and rates recommended by the manufacturer
- Prioritization of the paving of unpaved roads based on the criteria that includes the amount of traffic, production of dust, and vicinity of people, schools, etc.
- Graveling unpaved roads on a regular basis
- Reducing speed limits on unpaved roads with appropriate enforcement or speed bumps/humps
- Limiting use of unestablished roads through the use of road closures and barricades
- Providing adequate stormwater drainage to reduce soil from being washed or tracked onto paved roads

BACMs for Construction Activities

Construction sites, both active and inactive, can be sources for significant amounts of windblown dust. This is due to the presence of large areas of bladed ground, stockpiles, trucks hauling bulk materials, and heavy equipment traffic. Some of the suggestions for reduction of dust from these sites are similar to those for paved roads, due to soil tracked onto paved roads from heavy equipment.

- Prevent tracking of dirt from construction sites by installing curbs, or stabilizing road shoulders
- Use devices designed to clean mud and bulk dirt from tires such as steel grates or on-site wheel washes
- Schedule regular vacuum street cleaning to remove accumulated dirt on roadways
- For trucks hauling bulk materials to or from the site, fully cover and secure cargo loads and prevent leakage from truck beds, sideboards, tailgate, or bottom dump gate

For active on-site construction activities:

- Dust suppression using water, particularly when high winds are forecast or are occurring

- Dust suppression using chemical dust suppressants applied and maintained in amounts and rates recommended by the manufacturer
- Install temporary windbreaks around the site. For example, fabric fences could be installed if they are sufficiently anchored at the bottom to prevent dust from blowing underneath the fence. Windbreaks are only effective for small sites since they only provide protection for a limited distance downwind, depending on the height and porosity of the windbreak.
- Install permanent perimeter or interior fencing prior to other construction activities; as with temporary windbreaks, effectiveness is limited unless the site is very small.
- Slow or stop active construction and bulk material handling during high wind events; this might include the installation of an on-site anemometer to measure wind speed and trigger a strobe or audible alarm to notify site personnel of high wind conditions.
- Slow or stop active construction and bulk material handling when dust is observed to leave the property boundaries.
- Contain all stockpiled bulk materials in three sided bunkers that are at least two feet higher than the stockpiled materials, or cover stockpiled materials.
- Water stockpiled materials that are susceptible to blowing, particularly when high winds are forecast or are occurring.
- Store stockpiled materials, if susceptible to blowing, away from downwind site boundaries.
- Reduce on-site traffic speeds.
- Phase clearing, construction and stabilization to minimize the length of time and the amount of exposure of unstable soil. For example, start construction upwind and stabilize areas such as parking lots or planted areas before disturbing additional areas. Pave permanent roads and parking lots early in the projects.
- Prevent storm water drainage from leaving the site.
- Use geotextiles on graded sloped surfaces to prevent wind and water erosion.

BACMs for Vacant Land, Disturbed Areas, and Parking Areas around Business, School, Residential, and Other Sites

Land that has been bladed for construction but left vacant is often highly susceptible to the generation of windblown dust. Additionally, business parks and residential areas that are newly constructed often have tracts of land that have been disturbed, removing native soils and vegetation. Methods for dust control at these sites include:

- Re-vegetate areas no longer used by planting or seeding. Xeriscaping (using plants that require little or no additional water) should be considered, given the importance of water conservation in this region. Reseeding with native plants carries specific requirements to ensure that noxious plant species are not included in the seed, that the soil contains certain amendments to ensure growth, and adequate initial watering is done to ensure germination.
- Cover areas with rock, geotextiles, bark, hay (crimped into the surface), or other organic mulch and maintain these covers.
- Restrict or limit off-road traffic on vacant areas.

- Pave parking areas or treat with a dust suppression chemical applied and maintained in amounts and rates recommended by the manufacturer. Otherwise, restrict parking in unpaved areas.
- Use grasses that require infrequent watering for school playgrounds.
- Install temporary windbreaks around the site. For example, fabric fences could be installed if they are sufficiently anchored at the bottom to prevent dust from blowing underneath the fence. Windbreaks are only effective for small sites since they only provide protection for a limited distance downwind, depending on the height and porosity of the windbreak.
- Treat laydown and storage yards with a dust suppression chemical applied and maintained in amounts and rates recommended by the manufacturer, or with gravel or organic mulch covers.
- For weed control on vacant lots, use mowing, planting competitive native plants, or some other method rather than scraping, blading or herbicide application.

BACMs for agricultural and range management areas

Soil erosion by wind or water has always been a major concern for those managing agricultural or rangeland areas, since this reduces land productivity. Farmers work with local U.S. Department of Agriculture representatives to develop and implement soil conservation plans specifically designed for the soil types and crops of each individual farm. Most of the cropland in Doña Ana County is on soils that form stable, nonerodible aggregates (clods) when tilled, thus protecting the surface from wind erosion even when the soil is dry and not covered with plants.