

Dust Palliative Basics

Dust palliatives are substances applied to a road surface to reduce airborne dust. They may be applied every few hours on a busy construction site, or every few years at a site with little traffic. There are many, many kinds of dust palliatives, and many companies produce them. It's big business, because "fugitive dust" must be controlled at many construction and industrial sites across the nation.

The basic categories of dust palliatives include water, water absorbing products, petroleum based products, organic nonpetroleum based products, electrochemical products, polymer products, synthetic fluids, enzymes, and clay additive products. Many publications describe their characteristics and differences. Links to some of these publications are found at the end of this page.

Very briefly, the important characteristics separating the different palliatives include:

- Is the palliative liquid, or powder. Does it dissolve in water?
- Is a road surface re-workable after it is treated with the palliative?
- When the palliative is applied, does the palliative need to be incorporated into the top few inches of road surface?
- Will the palliative wash or erode away? How soon?
- How frequently will re-application be needed?
- Is the palliative corrosive to equipment or vehicles?
- What precautions are needed in using the palliative?
- Is it hazardous to humans when used according to the instructions? What about if no one reads the instructions?
- As the palliative eventually washes or erodes off the road surface, how does it affect surrounding ecosystems? What does the palliative break down into, and where will it go?

Types of Palliatives Used in Alaska ([Dust Palliatives used in Alaska](#))

Palliative group

- **Water**
- **Water Absorbing Products** (deliquescent salts) -
- **Organic Nonpetroleum Products**
- **Electrochemical Products**
- **Synthetic Polymer Products**
- **Synthetic Fluids**
- **Enzymes**

Examples used in Alaska

water (!)

calcium chloride, magnesium chloride

lignosulfonate (Alastak),
tall oil emulsions (Alastaseal),
molasses/sugar beet products,
animal fats, vegetable oils

enzymes Permazyme

Soil-Sement, Soiltac

Envirokleen, EK-35, Earth Armour, Durasoil

Perma-zyme , Top Seal

How Do Palliatives Work

Some Palliatives Work by Increasing Moisture Content

Moisture in the surface of dirt roads causes particles to stick together. The moisture content of dirt roads can be increased either through spreading water or application of salts which attract water.

Though water is available in almost all Alaskan communities, moving water to unpaved roads can be a problem. Larger communities may have water trucks to take advantage of local water supplies. Smaller communities may not have such equipment. When water can be applied, it only provides a short term reduction in dust. Regular, light watering is better than less frequent, heavy watering.

The application of *deliquescent salts* to road surfaces can control road dust. A deliquescent salt, like calcium or magnesium chloride, absorbs water from the air. Soils treated with these salts have a higher water content than untreated soils. Slippery wet roads and vehicle corrosion are disadvantages of salt application. Also, rainfall eventually removes salts from the roadway.

Some Palliatives Work by Binding Particles Together

This group of dust palliatives includes chemicals which bind fine particles together or onto larger particles. These chemicals fall into several groups, such as petroleum-based, organic nonpetroleum, electrochemical stabilizers, and synthetic polymers.

Petroleum-based Binders include emulsified asphalts, cutback asphalt, and Bunker C. These agents coat particles with a thin layer of asphalt increasing particle mass and decreasing the chance of becoming airborne. Emulsified asphalt is a mix of asphalt and water which penetrates road surface dirt. This works well when the asphalt is mixed into the top inch or two of road surface with a grader. These products can contaminate waterways due to runoff and are not often used anymore.

Organic Nonpetroleum Dust Suppressants include lignosulfonates, and resins. Lignosulfonates result from the manufacture of paper when lignin is extracted from wood. Lignin is a natural polymer and can bind soil particles together. Lignin occurs in solution with sodium, calcium, ammonium, or magnesium bisulphate. Resins made from combining lignosulfonates and additives can neutralize adverse effects. Lignosulfonates are water soluble and can move out of, or deeper into, a roadway surface with rainfall. These products corrode aluminum unless calcium carbonate is present. Lignosulfonates work best with fine dusts such as clay particles having a high plasticity in dry environments. Glacial tills typically have low plasticity. Lignosulfonates may be of limited value in controlling dust in Alaska.

Electrochemical Stabilizers include sulphonated petroleum, ionic stabilizers, and bentonite. These products neutralize soils that attract water and allow bonds to form between particles. Electrochemical stabilizers need to be worked into the road surface, requiring equipment that may not be available in remote rural communities.

Synthetic Polymer Products include polyvinyl acrylics and acetates. They bind soil particles and form a semi-rigid film on the road. These products are either liquids or powders that are mixed with water. Products are applied in liquid form and require drying. Temperatures during the curing should not approach freezing. Traffic should be diverted from treated areas until after drying - which can take 12 to 24 hours. Synthetic polymer products have been used for dust control and improved soil strength on a number of airfields in Northern Canada and Alaska.

Manuals from Transportation Organizations and Governmental Agencies:

Gravel Roads Maintenance and Design Manual. Ken Skorseth, Ali A. Selim. 2000. Federal Highway Administration, U.S. Department of Transportation, Washington, D.C. 104 pp. (also known as the South Dakota gravel roads manual) . (available in PDF format at <http://www.epa.gov/owow/nps/gravelroads/>).

Environmentally Sensitive Maintenance For Dirt and Gravel Roads. 2007. Compiled by John A. Anderson, Alan L. Gesford. Pennsylvania Department of Transportation.

(from Pennsylvania State Conservation Commission & the Penn State Center for Study of Dirt & Gravel Roads).

<http://www.epa.gov/owow/NPS/sensitive/sensitive.html>

Maintenance of Dirt and Gravel Roads, Chapter 5.8 in Compendium of Environmental Stewardship Practices in Construction and Maintenance, The Center for Environmental Excellence by the American Association of State Highway and Transportation Officials (AASHTO).

http://environment.transportation.org/environmental_issues/construct_maint_prac/compendium/manual/5_8.aspx

Canadian InfraGuide, Best Practice Reports, Transportation: Roads and Sidewalks. 2005

http://gmf.fcm.ca/files/Infraguide/Roads_and_Sidewalks/dust_control_unpaved_rd.pdf

Gravel Roads: Maintenance and Design Manual, Section 4 Dust Control and Stabilization

The purpose of the manual is to provide clear and helpful information for doing a better job of maintaining gravel roads. The manual is designed for the benefit of elected officials, managers, and grader operators who are responsible for designing and maintaining gravel roads.

http://water.epa.gov/polwaste/nps/upload/2003_07_24_NPS_gravelroads_sec4.pdf or

http://water.epa.gov/polwaste/nps/gravelroads_index.cfm

Best Practices: 5.8. Maintenance of Dirt and Gravel Roads contains a more extensive list of resources and links. It is published by the Center for Environmental Excellence by the American Association of State Highway and Transportation Officials (AASHTO).

http://environment.transportation.org/environmental_issues/construct_maint_prac/compendium/manual/5_8.aspx

Dust Palliative Selection and Application Guide. 1999. P. Bolander and Alan Yamada.

USDA Forest Service Technology & Development Program, 9977 1207—SDTDC. 23 pp.

CPWA, 2005, [Dust Control for Unpaved Roads, A Best Practice by the National Guide to Sustainable Municipal Infrastructure](#), Canadian Public Works Association.

Succarieh, M., 1992, *Control of Dust Emissions From Unpaved Roads*, prepared for Alaska Cooperative Transportation and Public Facilities Research Program by the University of Alaska Fairbanks,

http://www.dot.state.ak.us/stwddes/research/assets/pdf/fhwa_ak_rd_92_05.pdf, accessed on December 20, 2005