Table 5 – Dust Palliatives[1]

Dust Suppressant Category	Attributes	Limitations	Application	Environmental Considerations
Water	• Agglomerates the surface particles. • For many projects, readily available. • Helps with compaction.	• Evaporates readily. • Short-term dust control. • Needs to be reapplied throughout the day.	• Frequency depends on temperature and humidity; typically needs to be applied every two to eight hours.	• Drought-related limitations or water conservation restrictions.
Water Absorbing: Calcium Chloride (deliquescent)	• Ability to absorb water from the air is a function of temperature and relative humidity; requires a minimum relative humidity of 25%. • Significantly increases surface tension of water film between particles, helping to slow evaporation and further tighten compacted soil as drying progresses. • Treated roads can be regraded and recompacted with less concern for losing moisture and density.	• Does not perform as well in dry climates. • Does not perform as well as MgCl in long dry periods and better than MgCl when high humidity is present. • Slightly corrosive to metal, but highly corrosive to aluminum and its alloys; attracts moisture, thereby prolonging the active period for corrosion. • Storm water tends to leach out highly soluble chlorides. • If the treated material has a high percentage of fines, the surface may become slippery when wet.	• Generally, one to two treatments per season.	• Runoff water quality impact: generally negligible if the proper buffer zone exists between treated area and water. • Fresh receiving water impact: may elevate chloride concentrations and harm freshwater aquatic fish and organisms. • Plant impact: some species susceptible, such as pine, hemlock, poplar, ash, spruce, and maple, as well as some agriculture crops. • Potential concerns with spills of liquid concentrate.

[1] Adapted from the United States Department of Agriculture Forest Service Dust Palliative Selection and Application Guide, Bolander, Peter, ed. 1999, https://www.fs.usda.gov/t-d/pubs/pdf/99771207.pdf.

Dust Suppressant Category	Attributes	Limitations	Application	Environmental Considerations
Water Absorbing: Magnesium Chloride (deliquescent)	• To absorb water from the air requires a minimum 32% relative humidity independent of temperature. • More effective than calcium chloride solutions for increasing surface tension, resulting in a very hard dirt surface when dry. • Treated surfaces can be regraded and recompacted with less concern for losing moisture and density.	• Not suitable in drier climates • In concentrated solutions, very corrosive to steel (note: some products may contain a corrosive-inhibiting additive); attracts moisture, thereby prolonging the active period for corrosion. • Storm water tends to leach out highly soluble chlorides. • If the treated material has a high percentage of fines, the surface may become slippery when wet.	• Generally, one to two treatments per season.	• Runoff water quality impact: generally negligible if the proper buffer zone exists between treated area and water. • Fresh receiving water impact: may elevate chloride concentrations and harm freshwater aquatic fish and organisms. • Plant impact: some species susceptible, such as pine, hemlock, poplar, ash, spruce, and maple, as well as some agriculture crops. • Potential concerns with spills of liquid concentrate.
Water Absorbing: Sodium Chloride / Common Salt (hygroscopic)	• To absorb water from the air requires a minimum 79% relative humidity independent of temperature. • Increases surface tension slightly less than calcium chloride.	• Not suitable in drier climates. • Moderately corrosive to steel in dilute solutions. • Tends to not hold up well as a surface application.	• Generally, one to two treatments per season • Higher dosages than calcium treatment.	• Runoff water quality impact: generally negligible if the proper buffer zone exists between treated area and water. • Fresh receiving water impact: may elevate chloride concentrations and harm freshwater aquatic fish and organisms. • Plant impact: some species susceptible, such as pine, hemlock, poplar, ash, spruce, and maple, as well as some agriculture crops. • Potential concerns with spills of liquid concentrate.

Dust Suppressant Category	Attributes	Limitations	Application	Environmental Considerations
Organic Petroleum Products **(Soil Binder)**	• Binds and/or agglomerates surface particles because of asphalt adhesive properties. • Serves to waterproof construction roadways.	• Under dry conditions some products may not maintain resilience • If there are too many fines in surface soils and high in asphaltenes, it can form a crust and fragment under traffic and in wet weather. • Some products are difficult to maintain.	• Generally, one to two treatments per season depending on surface condition, dilution, and product.	• There are a wide variety of volatile and semi-volatile hydrocarbon ingredients in these products. • May produce an oil sheen. • "Used" products can be toxic. • Oil in products might be toxic. • Potential concerns with spills and leaching of toxic pollutants prior to the product curing.
Organic Nonpetroleum: Lignin Derivatives **(Soil Binder)**	• Plant-based lignin binds surface particles together. • Greatly increases dry strength of material under dry conditions. • Works well in low humidity and dry soils making it a better wind erosion control than a water erosion control. • On soils having a high clay content, it tends to remain slightly plastic, permitting reshaping and additional traffic compaction.	• May cause corrosion of aluminum and its alloys. • Surface binding action may be reduced or completely destroyed by heavy rain due to solubility of the product in water. • It becomes slippery when wet, brittle when dry. • It is difficult to maintain as a hard surface, but it can be done under adequate moisture conditions.	• Generally, one to two treatments per season.	• May elevate Biological Oxygen Demand (BOD) of discharges and the receiving water.
Organic Nonpetroleum: Molasses/Sugar Beet Extract **(Soil Binder)**	• Provides temporary binding of the surface particles using a plant-based byproduct of sugar beet processing.	• Limited commercial and geographic availability.	• There is no extensive supporting research or field experience to dictate an application rate. It will be product and conditions dependent.	• May cause elevated BOD of the discharge and receiving water.

Dust Suppressant Category	Attributes	Limitations	Application	Environmental Considerations
Organic Nonpetroleum: Tall-Oil Derivatives (Soil Binder)	• Adheres surface particles together. • Greatly increases dry strength of material under dry conditions.	• Surface binding action may be reduced or completely destroyed by long-term exposure to heavy rain due to solubility of the product in water. • Difficult to maintain as a hard surface.	• Generally, one treatment every few years.	• May produce an oil sheen.
Organic Nonpetroleum: Vegetable oils	• Agglomerates the surface particles	• Limited commercial and geographic availability. • Oxidizes rapidly, then becomes brittle.	• Generally, one treatment per season.	• May produce an oil sheen.
Electrochemical Derivatives	• Changes the electric charge and characteristics of clay-sized particles. • Generally effective regardless of climatic conditions.	• Performance dependent on fine-clay mineralogy. • Needs time to "set up," (i.e., react with the clay fraction). • Limited life span.	• Generally, one treatment every few years.	• Cationic (positively charged) products may be prohibited in some states because they are lethal for fish. • Some products are highly acidic in their undiluted form.
Polymers (Soil Binder)	• Binds surface particles because of polymer's anionic or cationic adhesive properties.	• Difficult to maintain as a hard surface. • Cationic products may be prohibited in some states. • May be slippery when wet.	• Product dependent, but most likely one to two treatments per year.	• Cationic polymers can bind with fish gills causing suffocation and fish kills. • May increase BOD.
Clay Additives	• Agglomerates with fine dust particles. • Generally, increases dry strength of material under dry conditions.	• May become slippery when wet.	• Generally, one treatment every five years.	• When crushed and exposed to storm water runoff, it can cause a colloidal clay suspension, which raises the turbidity of the runoff.