

# Earthbind® Dust Suppressant

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Earthbind® is a unique and environmentally-friendly product specifically engineered to be a quality and effective dust suppressant. Earthbind® is considered to be a biopolymer modified bitumen emulsion. Earthbind® is made by EnviRoad® LLC, an ISO 9001:2008 certified company. Earthbind® is manufactured in Portland, Oregon U.S.A.

Earthbind® is effective as a dust suppressant on many types of soils/aggregates. The main competitors of Earthbind® are the salts, lignosulfonates, synthetic polymers, mineral/paraffinic oils, petroleum resin, and traditional asphalt cutbacks/emulsions. The following is a brief description regarding how Earthbind® differentiates from its competitors:

## ***Salts (Dead Sea Salt, magnesium chlorides, calcium chlorides)***

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- Earthbind® is specifically manufactured to be a dust control product whereas the source of salts used for dust control typically come from brine waters (e.g., Dead Sea and Great Salt Lake).
- Earthbind® is a “binder” that glues dust particles together. Earthbind® is not hygroscopic and therefore does not need humidity to draw moisture from the air to control dust like salts do.
- Earthbind® does not wash off with rainwater as salts do.
- Earthbind® does not get “sloppy” or slippery under wet conditions as salts can.
- Earthbind® requires 3 to 5 times less of the product concentrate per square meter when compared to chlorides.
- Earthbind® weighs 23 to 28% less than calcium or magnesium chloride, reducing shipping costs and storage requirements.
- Earthbind® is formulated with surfactants which help break the surface tension therefore eliminating the need for pre-watering the road prior to application. Chlorides typically require a pre-application of water to aid in infiltration.
- Earthbind® is not considered to be corrosive, whereas salts are.
- Earthbind® does not harm vegetation or impact surface and groundwater whereas salts can have an adverse impact.
- Earthbind® does not attract animals to the treated road. Whereas, salts can attract animals to the road potentially creating a traffic hazard.

### ***Lignosulfonates for Dust Control***

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- Earthbind® is specifically formulated and manufactured to be a dust control palliative, it is not a by-product or “waste” product like lignosulfonates are considered to be.
- Earthbind® does not “track” under wet conditions as lignosulfonates do can.
- Earthbind® requires 3 to 5-times less product concentrate for dust control on moderately traveled roads when compared to lignosulfonates.
- Earthbind® is not water soluble and therefore does not wash off with rain rainwater as the lignosulfonates do.
- Earthbind® weighs 10-20% less than lignosulfonates reducing shipping costs and storage requirements.
- Earthbind® is formulated with surfactants which help break road surface tension, eliminating the need to pre-water a road prior to application. Lignosulfonates typically require a pre-water application.
- Earthbind® is not considered to be corrosive. Lignosulfonates are corrosive and are known to attack welded joints in steel and aluminum tanks and plumbing.
- Earthbind® does not attract animals to the road. Some animals are known to be attracted to the sugars in lignosulfonate. Larger mammals attracted to a road can become traffic hazards.
- Earthbind® can accumulate over several applications. Yearly maintenance applications require less product because of this build up. Lignosulfonates can wash off the surface and require regular maintenance shots.
- Earthbind® is a storage stable product. Lignosulfonates are known to acquire microbial infections which cause fermentation and product expansion resulting in inconsistent product density and possible tank overflow.
- Earthbind® availability is stable. Lignosulfonates are a by-product that can come from several different sources with varying quality, consistency and availability.

### ***Synthetic Polymer Emulsions (Polyvinyl Acrylics, Acetates, etc.)***

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- Earthbind® is specifically manufactured as a dust control and soil stabilization product. Earthbind is not a “by product” or waste product. Produced under a variety of trade names, synthetic polymer

emulsions can be made in a chemical plant or as a by-product of the paint and adhesive industry.

- Earthbind® is significantly more economical. The cost of polymers can be double or triple the cost of Earthbind.
- Earthbind® solution that is normally recommended is stronger than the concentrations that have been recommended by polymer suppliers. Therefore some polymer suppliers often recommend a more diluted solution to remain competitive. In other words, one gallon of Earthbind concentrate can treat much more area than what has been recommended by polymer suppliers.
- Earthbind® is formulated with a surfactant that helps break the surface tension of soil and therefore will penetrate an unpaved surface while some polymers typically just coat the surface due to the lack of infiltration.
- Earthbind® does not get brittle in sunlight as polymers typically do. Therefore Earthbind can be driven on whereas vehicular traffic can expedite the deterioration of a polymer treated surface.
- Earthbind® does not readily break down when exposed to moisture or freezing temperatures. Tests have shown that synthetic polymers applied in wet climates tend to break down if exposed to moisture or freezing for an increased time.
- Earthbind® concentrate can be stored in freezing temperatures. Various synthetic polymers cannot be stored at or below freezing temperatures.

### ***Mineral/Paraffinic Oils used for Dust Control***

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- Earthbind® concentrate is mixed with water for application purposes whereas mineral/paraffinic oils (MPOs) are applied in its concentrated form (“neat”).
- Earthbind® is specifically formulated and manufactured to be a dust control palliative. MPOs are typically petrochemical products used for dust control.
- Earthbind® is formulated as a binder and is designed to “glue” soil particles together. In contrast, MPOs are oils that “weigh down” dust particles.
- Earthbind® requires 2 to 3 times less concentrated product on moderately traveled roads when compared to MPOs therefore reducing product and shipping costs and reducing storage requirements.

- Earthbind® is formulated with surfactants which help break road surface tension, allowing for maximum penetration. MPOs typically lay on top of the surface with minimal penetration especially if the soil is moist.
- Earthbind® does not wash off with rain rainwater. MPOs because of their polarity and density can wash off with rainwater (floats on water).
- Earthbind® treated surface does not become oily as the MPOs can.

### ***Petroleum Resin Products***

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- Earthbind® is considered to be a modified bitumen emulsion whereas petroleum resin products are formulated with petroleum resins. The advantage of our bitumen formulation in comparison to a petroleum resin is that:
  - The bitumens in Earthbind® are considered to be colloidal in nature and not oil. For example, bitumens are insoluble in an excess of heptane (or pentane) whereas petroleum resins are miscible with heptane (or pentane). Bitumens exist as a colloidal state (nanocolloids) in crude oil rather than being dissolved in the crude oil as petroleum resins are.
  - The petroleum resins used to formulate dust control products may also be used or have been used as heavy gear lube oil. Consequently, it has been observed in some cases that when the concentration of petroleum resins become too high in a soil/aggregate mixture (such as for base stabilization), it can also act as a “lubricate” and therefore compromise the strength of the treated soil. In contrast, bitumens in Earthbind® will bind and will not lubricate soils.
- Earthbind® is a true emulsion whereas some petroleum resin products are mixtures instead. A true emulsion is manufactured using an emulsion mill. Some petroleum resin products may be marketed as “emulsions” without being a true emulsion. The advantage of Earthbind® being a true emulsion when compared to a petroleum resin mixture is:
  - The stability of the emulsion. Since Earthbind® is a true emulsion, phase separation is minimized and the ingredients of the formulation will not precipitate out of solution. Whereas petroleum resin products concentrate has been

known to precipitate solids while in storage (e.g., solids on the bottom of the storage tank).

### ***Traditional Asphalt Cutbacks and Emulsions***

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- Earthbind® is uniquely formulated with proprietary ingredients. Earthbind® is one of a kind; no other traditional or modified bitumen emulsion is comparable in chemistry and binding capabilities.
  - Earthbind® is specifically made to be a dust suppressant. Traditional asphalt emulsions and cutbacks are mainly made for paving related construction projects instead.
  - Earthbind® is formulated and engineered to be different, Earthbind® is not considered to be like or the same as the traditional emulsions which include the “slow sets”, (SS-1, CSS-1, etc.), “medium sets” (MS), “rapid sets” (RS), “quick set” (QS) or “HF emulsions” (HF).
  - Earthbind®’s base materials are specially chosen and engineered (e.g., viscosity, penetration, etc.) to infiltrate and adequately coat and bond soil particles and aggregates together specifically for dust suppression.
  - Earthbind® can be used on “dusty” and off-spec aggregate when compared to standard asphalt emulsions. When using standard asphalt emulsions, aggregates typically must be clean (washed) to ensure binding.
  - Earthbind®’s chemistry is non-ionic compared to typical asphalt emulsions that are mostly either cationic or anionic. Therefore, Earthbind can bind will all types of soil and aggregates regardless of their ionic charge.
  - Earthbind® concentrate can freeze without breaking or altering the product performance. Standard asphalt emulsions will break when exposed to freezing temperatures.
  - Earthbind® was developed in part to provide an ALTERNATIVE to asphalt cutback emulsions (e.g., CMS-2, CMS-2S, and MC250 etc.). Earthbind does not contain any solvents, naphtha, jet fuel, kerosene, diesel or other volatile compounds that were, traditionally used to “cut” through the dirt and allow the asphalt to stick to the rock.
  - Earthbind® formulations are used for cold mix paving, recycled asphalt paving, prime coat, dust control, in-depth base stabilization, and erosion control. Standard asphalt emulsions are typically used for a limited type of construction applications.
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***To summarize, the benefits of using Earthbind for dust control include:***

- ✓ Earthbind is considered to be environmentally friendly;
- ✓ Earthbind does not require a road to be pre-watered for product penetration;
- ✓ Earthbind is very user friendly;
- ✓ Earthbind can be cost competitive with other dust control palliatives;
- ✓ Earthbind can be cost effective for applicators who currently use water for dust control;
- ✓ Earthbind does not require a road to be closed for application;
- ✓ Earthbind does not typically require special equipment for application;
- ✓ Earthbind is easy to clean off equipment soon after application;
- ✓ Earthbind does re-solubilize in rainwater once it cures;
- ✓ Earthbind does not become slippery when wet;
- ✓ Earthbind can freeze without destroying product integrity;
- ✓ Earthbind emulsion does not “break” when frozen like synthetic polymer and asphalt emulsions can;
- ✓ Earthbind does not expand when frozen;
- ✓ Earthbind binds soil particles together and therefore does not require humidity or additional watering to work;
- ✓ Earthbind is not formulated with corrosive salts;☐
- ✓ Earthbind will increase the water resistance of the treated unpaved road aggregate;
- ✓ Earthbind replaces expensive watering regimes. This is especially important for areas where water is scarce and important (e.g., Middle East, Southwest United States, etc.);
- ✓ Earthbind can be used on a variety of soil/aggregate types;
- ✓ Earthbind reduces road maintenance Cost (blading/grading, watering and gravel replacement);
- ✓ Earthbind effective with most road materials;
- ✓ Earthbind provides an inexpensive, smooth, firm driving surface; and
- ✓ Earthbind can be used effectively on gravel roads that lack significant fines where typically only watering is effective.