Lignin Sulfonate -*Know* the Facts !

Much is known about the use of Lignosulfonates (also called lignin sulfonate and sulfite lignins) and its application on unimproved road surfaces as a soil stabilization and dust control agent. It has never been responsibly suggested that the use of lignin would have any negative impacts on our environment and/or human health. This document will discuss lignin from a factual, practical and scientific basis. Lignin contains no constituents that are considered hazardous by any Government agency. Further, its health rating is 0, which simply means exposure offers little or no risk to either plants or humans. Further, the constant referral by the opponents to its use as a soil stabilization and dust control agent on the roads of Storm Mountain as an "oil slick" or as creating something like an "oil slick" is scientifically impossible. Lignin simply contains no oil based contaminants. Like magnesium chloride it is soluble in water. Further, lignin is biodegradable.

What is Lignin Sulfonate

Commercial lignin is produced as a co-product of the paper industry. It is separated from trees by a chemical pulping process. Lignins are products of sulfite pulping. Kraft lignins (also called sulfate lignins) are obtained from the kraft pulping process. Other delignification technologies use an organic solvent or a high pressure steam treatment to remove lignins from plants. Because lignins are very complex natural polymers with many random couplings, the exact chemical structure is not known. Physical and chemical properties differ depending on the extraction technology. For example, while lignins are **hydrophilic** (will dissolve in water), kraft lignins are **hydrophobia** (will not dissolve in water). The usefulness of commercial lignin products comes from their dispersing, binding, complexing and emulsifying properties. Industry first began to use lignins in the 1880s when lignin sulfonates were used in leather tanning and dye baths. Since then, they have even found applications in food products, serving as emulsifiers in animal feed and as raw material in the production of vanillin (widely used as an ingredient in food flavors, in pharmaceuticals and as a fragrance in perfumes and odor-masking products). Lignin uses have expanded into literally hundreds of applications - impacting on many facets of our daily lives.

For the purposes of this document we are concerned with lignin's use as a very effective and economical adhesive, acting as a binding agent or "glue" in pellets or compressed materials. Lignosulfonates are used on unpaved roads to reduce environmental concerns from airborne dust particles and to stabilize the road surface. These binding properties also make the product a useful component of the making of charcoal briquettes, ceramics, linoleum paste, and plywood and particle boards to name a few.

Lignins have a long history of use on roads as a method for dust control and surface stabilization. Lignin road products are derived from the lignin that naturally binds cellulose fibers together to give trees and plants firmness. These products are a safe and economical alternative to petroleum and salt-based products that are also sometimes applied to road surfaces.

The original method of applying Lignins to road surfaces for dust control was very simple: dilute raw Lignin solutions were sprayed in light applications onto dirt roads. Over time, road surfaces began to show an

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improved stabilization, increasing the appeal of using Lignins. Lignin is well suited for a variety of uses such as parking lots, driveways, and road shoulders, where .pavement is too costly and dust conditions become intolerable. The properties of raw lignin are enhanced when used, in combination with other stabilizers such as magnesium chloride. This is because lignins have a natural adhesive property when moist. When applied to dirt roads, the Lignin solution coats individual road particles with a thin adhesive-like film that binds the particles

together, while the magnesium chloride attracts the water molecules which also helps to bind the individual road particles together. The lignin further acts as a dispersant, allowing the particles to pack closer together for a stronger surface. Consequently, water uptake by the road bed surface is greatly reduced and the binder is less likely to be washed away by rain.

Benefits of Lignins for Road Applications

Creates a Denser, Firmer Road Cap - Lignin treatment eliminates the sliding hazards of loose dirt and gravel by binding them into a hard, skid-resistant surface.

Safe for the Environment - Lignins are non-toxic when properly applied, making them safe for foliage and surface water surrounding roadways. Lignins are not corrosive and can be applied without special equipment or clothing.

Improves Safety - By controlling dust clouds, visibility on dirt roads is significantly increased, adding to driving comfort and safety.

Reduces Road Repairs - Hardened road surfaces are less likely to suffer the ribbed "washboard" effect common with untreated gravel or dirt roads. As a result, frequent grading can be reduced or eliminated.

Commercial Lignin products meet the specifications of the U.S. Forest Service Administration, General Service Administration and local and regional government standards. Lignin use on roads has been endorsed by various agencies for decades.

In the development of this document, studies conducted by the following agencies were consulted:
1. The Lignin Institute, a non-profit trade association of manufacturers and suppliers of lignin products.