DUSTAC™

DUSTAC* Road Binder is an aqueous lignosulfonate product that has been partially neutralized to raise the pH and minimize corrosivity. This aqueous solution is in a convenient form for transport and storage of large quantities of lignosulfonates. It disperses readily in cold or hot water to yield a stable, brown-colored solution. Typical viscosities and specific gravity data are shown below.

TYPICAL ANALYSIS

(Based on an "As Is" basis)

Total solids, %	46±3
Lignin sulfonate, %	> 60
Insolubles, ml per 100 ml of product	< 2.5
pH of 10% solution	> 5

TYPICAL PHYSICAL PROPERTIES

Specific gravity (liquid), 25°/15°C	1.24
Gallon weight, lbs	10.3
Gallons / ton	194
Brookfield viscosity, cp at 25°	< 1000

More detailed analyses may be obtained upon request.

*DUSTAC is a registered trademark.

Shipping

DUSTAC® lignosulfonate products are manufactured at sulfite pulp mills in the western US and Canada.

DUSTAC® Road Binder liquid is available as a solution in tank cars or tank trucks.

Shipments of lignosulfonates are not regulated as hazardous materials by the Department of Transportation (DOT). The proper shipping name for this product is lignin liquor for the liquid form.

The designation for shipments of lignin liquor is NMFC Item 111270 for tank truck and UFC Item 56790 or STCC Item 2611215 for rail.

In case of emergency contact Bell Marine Co., Inc at (916) 442-9089.

Storage & Handling

DUSTAC® Road Binder solutions can be stored in mild-steel tanks. It is recommended that storage tanks have some means of agitation. Lignosulfonate solutions should be maintained at temperatures sufficient to provide suitable viscosities. Viscosity and corrosion data on this product are available on request.

Centrifugal pumps should be used to transfer DUSTAC® Road Binder solutions that are maintained at temperatures to provide a flowable product. Positive displacement pumps with low rpm are recommended to meter the product. All pumps should have mechanical seals or lubricated (non-grease) packing.

Lignosulfonate solutions are biodegradable. Contamination by naturally occurring airborne organisms can occur and cause pressure to develop if the fermenting material is placed in a sealed container.

As with all organic material, caution is advised when storing or handling this product near strong oxidizing or alkaline agents. Addition of strong alkali could result in release of corrosive ammonia gas. Prolonged and excessive heating of DUSTAC® Road Binder solutions can result in decomposition and the release of toxic sulfur dioxide fumes.

The use of appropriate protective clothing, e.g., goggles, rubber gloves, and/or suitable respirator, is recommended when handling DUSTAC® products. In case of skin contact, wash the affected area thoroughly with water. Accidental spills should be hosed down and diluted with water. Disposal should be in accordance with standard industrial waste disposal methods.

For more information on the proper handling of DUSTAC® Road Binder, see the material safety data sheet available from Bell Marine Co., Inc.

Sales & Service

Bell Marine Co., Inc. markets a wide variety of lignosulfonate products. These products are manufactured under rigid controls to insure a finished product of the highest quality.

A team of sales representatives is available for assistance. They are supported by a staff of highly qualified technical specialists who are skilled in the handling and application of lignosulfonates.

For more information, please contact one of the chemical sales offices listed below.

SALES OFFICES ☎

Sacramento, CA 95816
P.O. Box 160086 (95816)
200 – 28th Street

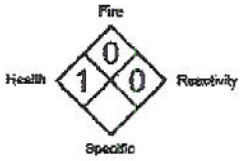
Telephone: 916-442-9089
Cell 916-396-4924
Fax: 916-442-2160

Bellingham, WA 98226
1764 Aquila Court

Telephone: 360-733-1449
Cell 360-201-2353
Fax: 360-733-1449

Bell Marine Co., Inc.

BELL MARINE COMPANY INC.



MATERIAL SAFETY DATA SHEET

DUSTAC® ROAD BINDER LIQUID

SECTION 1 - PRODUCT IDENTIFICATION

Product Name and Synonyms:

DUSTAC® Road Binder Liquid; Ammonium Lignosulfonates.

CAS Name and Number:

Mixture (see Section 10).

Chemical Family: Lignin.

Chemical Formula: Unknown.

Manufacturer's Name and Address

KIMBERLY-CLARK CO.

Emergency Telephone Number

1-800-424-9300 CHEMTREC

SECTION 2 - HAZARDOUS INGREDIENTS

COMPONENT	% WEIGHT OR VOL	ACGIH TWA UNITS	ACGIH STEL UNITS	OSHA PEL UNITS
None	—	—	—	—

SECTION 3 - PHYSICAL PROPERTIES

Appearance and Odor: Dark brown viscous liquid with slight odor.

Molecular Weight: Unknown.

Boiling Point (Degrees Fahrenheit): Around 212.

Freezing Point (Degrees Fahrenheit): Around 25.

Vapor Pressure (MM of Mercury): Water (approx. 7-8).

Specific Gravity (Water = 1): Approx. 1.25.

Vapor Density (Air = 1): Not known.

Percent Volatile (By Weight): Approx. 52% (water).

pH: Approx. 4 - 7

Solubility in Water: Soluble.

Evaporation Rate (Butyl Acetate = 1): Not known.

SECTION 4 - FIRE AND EXPLOSION DATA

Flash Point: None.

Fire Extinguishing Media: Water or CO_2.

Flammable Limits (Percent by Volume): **Lower:** Not applicable. **Upper:** Not applicable.

Special Firefighting Procedures & Equipment: Normal.

Unusual Fire and Explosion Hazards: None.

Stability: Unstable ___ **Stable X**

Conditions to Avoid: Addition of strong alkali could result in release of corrosive ammonia gas

Incompatibility (Materials to Avoid): Strong oxidizers and strong alkali.

Hazardous Decomposition Products: None

Hazardous Polymerization: Will Occur ___ **Will Not Occur X**

Conditions to Avoid: None known.

SECTION 6 - HEALTH HAZARD INFORMATION

Exposure from Routine Use: None known.

Effects of Overexposure: None known.

Probable Routes of Exposure: Skin, eyes.

Emergency First Aid Procedures

Eye Contact: Rinse immediately with water. Remove contact lenses; flush eyes with water. Consult a physician if necessary.

Skin Contact: Wash skin with soap and water. Seek medical attention if irritation persists. Launder contaminated clothing before re-use.

Inhalation: Move to fresh air.

Ingestion: Rinse mouth. Immediately dilute by drinking large quantities of water. After dilution, induce vomiting. Seek immediate medical attention. Never give anything by mouth to an unconscious person.

SECTION 7 - TOXICITY DATA

Oral: This material is not orally toxic when tested as described in 29 CFR 1910.1200, Appendix A..

Dermal: This material is not a primary irritant and is not dermally toxic when tested as described in 29 CFR 1910.1200, Appendix A..

Inhalation: Not tested as a liquid. Four-hour exposure of rats to 198 mg/m^3 of dust has resulted in neither mortality nor observable signs of toxicity.

Carcinogenicity: Not listed as a carcinogen by IARC, NTP, OSHA, or ACGIH.

Other Pertinent Data: This material is not an eye irritant when tested as described in 29 CFR 1910.1200, Appendix A.

SECTION 8 - SPECIAL PROTECTION INFORMATION

Personal Protective Equipment

Protective Gloves: Rubber gloves recommended.

Eye Protection: Goggles recommended.

Respiratory Protection (Specify Type): None.

Other Protective Equipment: As appropriate to prevent contact with body.

Ventilation

Local Exhaust: Not normally required.

Mechanical (General): Not normally required.

Special: None.

Other: None.

SECTION 9 - SPILL, LEAK, AND DISPOSAL PROCEDURES

Steps to be Taken in Case Material is Released or Spilled

Wash area with water. Spills or releases of this material do not currently trigger the emergency release reporting requirements under the federal Superfund Amendments and Reauthorization Act of 1986 (SARA). State and local laws may differ from federal law. Consult counsel for further guidance on your responsibilities under these laws.

Waste Disposal Methods: Customary plant procedures for industrial waste treatment.

Clean Water Act Requirements: None known.

Resource Conversation and Recovery Act (RCRA) Requirements: None known.

SECTION 10 - REGULATORY INFORMATION

FDA: Under 21 CFR 573.600, lignin sulfonates are approved for use in animal feeds, either in liquid or powder form, up to 4% of finished feed.

USDA: Not applicable.

CPSC: Not applicable.

TSCA: Mixture: CAS# 8061-52-7, Lignosulfonic Acid, Ammonium Salt; mixture with CAS# 8061-53-8, Lignosulfonic Acid, Ammonium Salt. The calcium lignosulfonates is also listed on the Toxic Substances Control Act inventory as CAS# 68131-32-8, Fermented Spent Sulfite Liquor. Composition varies with availability of calcium- and ammonium-based product.

DOT: Non-regulated.

Proper Shipping Name: None.

Identification No.: None.

Hazard Class: None.

Other Pertinent Information: None.

Label Required: None.

EPA: **Superfund Amendments and Reauthorization Act (SARA) Title III: Section 313, Supplier Notification.**

Not applicable.

SECTION 11 - SPECIAL PRECAUTIONS AND COMMENTS

Precautions to be Taken in Handling and Storing

This material is biodegradable. Use caution when opening unvented containers of water solutions. Microbial activity may cause pressure accumulation.

Other Precautions: None known.

Registrations / Certifications: None.

Effective Date:
12/05/05

IMPORTANT: The information and data herein are believed to be accurate and have been compiled from sources believed to be reliable. It is offered for your consideration, investigation and verification. Buyer assumes all risk of use, storage and handling of the product in compliance with applicable federal, state and local laws and regulations. BELL MARINE CO., INC. MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, CONCERNING THE ACCURACY OR COMPLETENESS OF THE INFORMATION AND DATA HEREIN. THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE SPECIFICALLY EXCLUDED. Bell Marine Co. Inc. will not be liable for claims relating to any party's use of or reliance on information and data contained herein regardless of whether it is claimed that the information and data are inaccurate, incomplete, or otherwise misleading.

BELL MARINE CO., INC.
P.O. BOX 160086
SACRAMENTO, CA 95816
(916) 396-4924
(916) 442-2160 FAX

LIGNOSULFONATE PRODUCTS

DUSTAC® Road Binder

PRODUCT INFORMATION SHEET

BIOCHEMICAL OXYGEN DEMAND (BOD)

The capacity of organic material to consume dissolved oxygen (DO) as it decomposes is one of the most important effects of water pollution, as oxygen is necessary for the maintenance of fish, mollusks, and other aquatic life. The BOD test is used to measure the rate at which decomposable organic material will consume oxygen in water. The test was designed as a laboratory model of the deoxygenating effect of wastes on receiving waters and is essentially a bioassay involving the measurement, under standard conditions, of oxygen consumed by living microorganisms as they utilize the organic material for food.

The standard five-day BOD test consists of enclosing a sample of water plus the test sample in an air tight bottle, incubating it at 20°C in the dark for five days, and measuring the amount of DO present before and after incubation. The difference in DO is the BOD_5 and is often expressed as parts per million (ppm) or milligrams per day (mg/d) when measuring the BOD load of an effluent stream. When measuring the BOD of a chemical substance, it is more commonly measured in percent. By definition, sucrose (sugar) has a BOD_5 of 100%. These terms always refer to a quantity of oxygen and not to organic matter as such. The higher the BOD_5, the greater the amount of deoxygenating effect the substance has in receiving waters. It should be noted that in case of accidental spills into waterways, most substances undergo a tremendous dilution effect; therefore, their BOD_5 would be reduced accordingly.

The BOD_5 test is complex by nature and is subject to interpretation, therefore care must be exercised when comparing the BOD_5 of various substances. Several substances and their typical BOD_5 as determined in our laboratory are listed below.

DUSTAC* Road Binder	8%
Tomato Soup	14%
Animal Glue	30%
Sugar (Sucrose)	100%
Alcohol (Ethyl Alcohol)	130%

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LIGNOSULFONATE PRODUCTS

DUSTAC® Road Binder

PRODUCT INFORMATION SHEET

WATER TOXICOLOGY INFORMATION

The term 96-h LC_{50} is defined as the concentration of a substance that will kill 50% of the exposed organisms in water within 96 hours. Synonymous terms are TLm96 and 96-h TL_{50} (median tolerance limit). The bioassay may be conducted under static or continuous flow conditions. Because of the lack of test standardization and the wide variety of species involved, ranges of toxicity, rather than a single toxic dose, are sometimes used to give an indication of the toxicity of substances to aquatic life. For this reason, care must be given to comparing bioassay data.

It should be noted that although acute toxicity data are more complete and therefore present the best method of ranking substances according to hazard, chronic or sub-lethal effects may have important ecological considerations. In addition, the biochemical oxygen demand of a substance should be considered along with water toxicological data in determining overall environmental effects. For many chemicals, no published aquatic toxicity data are available. In these cases, the ratings are estimated from physical properties and extrapolations of data from chemically similar compounds and are given in parentheses.

Hann and Jensen[1] have assigned aquatic toxicology ratings as follows: Grade 0 (>1000 mg/l), insignificant hazard; Grade 1 (100-1000 mg/l), practically non-toxic; Grade 2 (10-100 mg/l), slightly toxic; Grade 3 (1-10 mg/l), moderately toxic; Grade 4 (<1 mg/l), highly toxic. Several substances, their 96-h LC_{50} (juvenile rainbow trout) and reference sources are listed below.

Chemical Substance	96-h LC_{50}	Grade
DUSTAC* Road Binder [4]	2,800 ppm	0
Calcium Chloride [3]	over 1,000 ppm	0
Alcohol (Ethyl)[1]	N/A	0
Sugar, Raw (Cane Sugar) [1]	N/A	0
Borax (Tetrasodium Borate, Decahydrate) [1]	N/A	(1)
Gasoline (Commercial) [1]	N/A	2
Bleaching Powder (Calcium Hypochlorite)[1]	N/A	(3)
Sodium Pentachlorophenate [2]	0.0686 ppm	4

[1] Roy W. Hann and Paul A. Jensen. Water Quality Characteristics of Hazardous Materials. Texas A and M University, College Station, Environmental Engineering Div., 1977.
[2] Static Bioassay (juvenile rainbow trout), B.C. Research, 3650 Westbrook Mall, Vancouver, B.C. Canada. 1981.
[3] N. Irving Sax, Editor. Dangerous Properties of Industrial Materials. New York: Van Nostrand Reinhold Company, Inc., 1984.
[4] Laucks Testing Laboratories, Inc. Aquatic Toxicity Evaluation Summary: Rainbow Trout. Seattle, Washington: 1994

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LIGNOSULFONATE PRODUCTS

DUSTAC® Road Binder

PRODUCT INFORMATION SHEET

LD50 Toxicity Data

Lethal dose 50% (LD_{50}) refers to the amount of a substance expected to kill 50% of the test animals used in a controlled study. An unacceptable LD_{50} would be a number less than the 5,000 mg/kg toxicity definition determined by the U.S. Food and Drug Administration. For example, the LD_{50} for oral administration for strychnine to rats is 16 milligrams per one kilogram of body weight. The LD_{50} for sucrose (table sugar) orally administered to rats is 29,700 milligrams per kilogram of body weight. In this instance, if 10 rats weighing two kilograms each were given 59,400 milligrams of sugar (about 3% of their body weight), five of those rats would be expected to die. Several substances, their LD_{50}s (oral-rat), and reference sources are listed below.

Sodium Cyanide [1]	6.4 mg/kg
Strychnine [1]	16 mg/kg
Caffeine (1,3,7 Trimethylxanthine) [1]	192 mg/kg
Aspirin (Acetylsalicylic acid) [1]	1,000 mg/kg
Calcium Chloride [1]	1,000 mg/kg
Detergent (Sodium Dodecylbenzene Sulfonate) [1]	1,260 mg/kg
Table Salt (Sodium Chloride) [1]	3,000 mg/kg
Baking Soda (Sodium Bicarbonate) [1]	4,220 mg/kg
Alcohol (Ethyl Alcohol) [1]	7,060 mg/kg
Magnesium Chloride Hexahydrate [1]	8,100 mg/kg
Vitamin C (Ascorbic Acid) [2]	11,900 mg/kg
DUSTAC* Road Binder [3]	>30,000 mg/kg
Sugar (Sucrose) [1]	29,700 mg/kg

[1] N. Irving Sax, Editor. Dangerous Properties of Industrial Materials. New York: Van Nostrand Reinhold Company, Inc., 1984.
[2] U.S. Department of Health and Human Sevices. Registry of Toxic Effects of Chemical Substances, Volume 1. April 1987.
[3] Laucks Testing Laboratories, Inc. Aquatic Toxicity Evaluation Summary: Rainbow Trout. Seattle, Washington: 1994.

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SACRAMENTO, CA 95816
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LIGNOSULFONATE PRODUCTS

PRODUCT INFORMATION SHEET
CAS REGISTRY NUMBER 68131-32-8
(FERMENTED SPENT SULFITE LIQUOR)

DUSTAC® Road Binder

TOXICOLOGY INFORMATION

Because of increasing concerns about the environmental impact of the use of chemicals in general, it is necessary to address those concerns as they relate to the use of DUSTAC® Road Binder for dust abatement.

Of particular interest is the presence of dioxins and chlorinated compounds in chemicals. Within the pulp industry, these toxins are generally associated with the kraft pulping process, and more specifically with the bleaching sequence of the pulp fibers. DUSTAC® lignin products are co-products of the calcium bisulfite pulping process. In this process, the spent sulfite liquor (SSL), as it is known prior to modification, is separated from the cellulose fibers prior to bleaching of the pulp; therefore, because of this separation of streams, there would be no reason to expect the presence of dioxins or chlorinated compounds in the product. (It is important to note that SSL should not be confused with "black liquor," the product that results from the kraft process.) After separation, the SSL is filtered and steam-stripped and then fermented with yeast to convert the fermentable hexose sugars to ethyl alcohol, which is then removed by distillation. The removal of the fermentable hexose sugars from our product reduces the biochemical oxygen demand load by 50%. The remaining highly pure lignosulfonates undergo further modification to bring the product to neutral pH prior to shipping.

We have had DUSTAC® Road Binder analyzed for dioxin (2,3,7,8-tetrachlorodibenzo-p-dioxin) and furan (2,3,7,8-tetrachlorodibenzofuran), and these toxins were not detected at a detection limit of less than three parts per trillion (three parts per trillion is comparable to three seconds in 32,000 years). Chlorinated compounds have not been detected in DUSTAC® products.

The LC_{50} of DUSTAC® Road Binder is 4250 mg/l for juvenile rainbow trout as determined by a 96-hour static bioassay. The LD_{50} is 28.5 grams solids per kilogram in rats and is therefore "not toxic" by FHSA definition. This product is not a skin or eye irritant by FHSA definition and is not listed as a carcinogen by IARC, NTP, OSHA or ACGIH. For additional information see the Regulatory Information and Toxicity Data sheet.

DUSTAC® Road Binder has been approved by the U. S. Forest Service for use on roads for dust abatement. It has been safely and successfully used for this purpose for well over forty years. Unlike petroleum products or chemical salts, it preserves roadside vegetation without leaching of petroleum derivatives or heavy metals into surrounding soils, plus it exhibits an extremely low rate of corrosivity. As with any other benign chemical, safe handling and common sense will insure an environmentally safe application.

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