NOSB NATIONAL LIST
FILE CHECKLIST

CROPS

MATERIAL NAME: **#10 Lignin Sulfonates**

✔ **NOSB Database Form**

✔ **References**

✔ **MSDS (or equivalent)**

✔ **TAP Reviews from:** **Philip VanBuskirk, Brian Baker, and Diana Tracy**

NOSB/NATIONAL LIST
COMMENT FORM
CROPS

Material Name: #10 Lignin Sulfonate

Please use this page to write down comments, questions, and your anticipated vote(s).

COMMENTS/QUESTIONS:

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1. In my opinion, this material is:
_____ Synthetic _____ Non-synthetic.

2. This material should be placed on the proposed National List as:
_____Prohibited Natural _____Allowed Synthetic.

TAP REVIEWER COMMENT FORM for USDA/NOSB

Use this page or an equivalent to write down comments and summarize your evaluation regarding the data presented in the file of this potential National List material. Complete both sides of page. Attach additional sheets if you wish.

This file is due back to us by: Sept 2, 1995

Name of Material: Lignin Sulfonates

Reviewer Name: Philip Vrabanek

Is this substance Synthetic or non-synthetic? Explain (if appropriate)

Synthetic

If synthetic, how is the material made? (please answer here if our database form is blank)

This material should be added to the National List as:

✓ Synthetic Allowed ____ Prohibited Natural

or, ____ Non-synthetic (This material does not belong on National List)

Are there any use restrictions or limitations that should be placed on this material on the National List?

No.

Please comment on the accuracy of the information in the file:

good.

Any additional comments? (attachments welcomed)

best product for gear lubrication available.

Do you have a commercial interest in this material? ____ Yes; ✓ No

Signature [signature] **Date** 9/9/95.

TAP REVIEWER COMMENT FORM for USDA/NOSB

Use this page or an equivalent to write down comments and summarize your evaluation regarding the data presented in the file of this potential National List material. Complete both sides of page. Attach additional sheets if you wish.

This file is due back to us by: September 11, 1995

Name of Material: Lignon Sulfonates

Reviewer Name: Brian Baker

Is this substance Synthetic or non-synthetic? Explain (if appropriate)

Synthetic

If synthetic, how is the material made? (please answer here if our database form is blank)

This material should be added to the National List as:

✓ Synthetic Allowed ____ Prohibited Natural

or, ____ Non-synthetic (This material does not belong on National List)

Are there any use restrictions or limitations that should be placed on this material on the National List? yes. ~~[illegible]~~. Calcium & Magnesium lignosulfonates only. Sodium possibly as an inert, but not as an active.

Please comment on the accuracy of the information in the file:

~~Calcium and Magnesium lignosulfonates only.~~ Essentially complete

Any additional comments? (attachments welcomed)

Do you have a commercial interest in this material? ____ Yes; ✓ No

Signature [signature] **Date** 9/11/95

TAP REVIEWER COMMENT FORM for USDA/NOSB

Use this page or an equivalent to write down comments and summarize your evaluation regarding the data presented in the file of this potential National List material. Complete both sides of page. Attach additional sheets if you wish.

This file is due back to us by: Sept 2, 1995

Name of Material: Lignin Sulfonates

Reviewer Name: DIANA TRACY

Is this substance Synthetic or non-synthetic? Explain (if appropriate)

SYNTHETIC?

If synthetic, how is the material made? (please answer here if our database form is blank)

This material should be added to the National List as:

X Synthetic Allowed ____ Prohibited Natural

or, ____ Non-synthetic (This material does not belong on National List)

Are there any use restrictions or limitations that should be placed on this material on the National List?

NO

Please comment on the accuracy of the information in the file:

Accurate; I checked w/ a chemistry prof at WSU who has done quite a bit of research on lignosulfonates - he corroborates

Any additional comments? (attachments welcomed)

Do you have a commercial interest in this material? ____ Yes; X No

Signature Diana Lee Tracy **Date** 9/1/95

Please address the 7 criteria in the Organic Foods Production Act:
(comment in those areas you feel are applicable)

(1) the potential of such substances for detrimental chemical interactions with other materials used in organic farming systems;

LITTLE LIKLIHOOD - BREAKS DOWN LIKE WOOD - SOME AROMATICS MAY BE PRESENT (WOOD BYPRODUCTS)

(2) the toxicity and mode of action of the substance and of its breakdown products or any contaminants, and their persistence and areas of concentration in the environment;

(3) the probability of environmental contamination during manufacture, use, misuse or disposal of such substance;

POSSIBLE DURING MFR - REGULATIONS SHOULD COVER

(4) the effect of the substance on human health;

NONE

(5) the effects of the substance on biological and chemical interactions in the agroecosystem, including the physiological effects of the substance on soil organisms (including the salt index and solubility of the soil), crops and livestock;

DEPENDS ON THE MFG PROCESS; CAN HAVE MODERATELY HIGH SALT INDEX - COMPLEXES W/ Ca + NH_4 ARE DESIREABLE OVER COMPLEXES W/ Na.

(6) the alternatives to using the substance in terms of practices or other available materials; and

ALTERNATIVES APPEAR TO HAVE WORSE AGRONOMIC IMPACTS

(7) its compatibility with a system of sustainable agriculture.

GOOD - PUTTING A WASTE PRODUCT TO GOOD USE

NOSB Materials Database

Identification

Common Name **Lignin Sulfonates** **Chemical Name**

Other Names lignosulfonate, sodium lignate, lignin by-products

Code #: CAS 8062-15-5 **Code #: Other**

N. L. Category Synthetic Allowed **MSDS** yes

Chemistry

Family

Composition Lignin, extracted from wood, which has been treated with sulfites in the pulping process. Often in complex with calcium, magnesium, ammonium or sodium.

Properties Molecular weight of 250 is common but may extend up to 100,000 units. Soluble in water but insoluble in organic solvents. Chelation properties make it an excellent binder.

How Made

Lignin is extremely difficult to separate from cellulose and other wood components in an unchanged form which is why it is considered synthetic although it is a component of wood. They are by-products of the wood and cellulose industries, with paper industry accounting for most lignosulfonates. Pulp is made in the sulfite-pulping process by cooking wood chips under pressure in a solution of sulfurous acid and either calcium, magnesium, sodium or ammonium bisulfite. This is more widely used than the kraft process for producing commercial lignins although the kraft process is more widely used in paper making. The spent liquor from the sulfite process contains 40-55% of the original wood. About 14 -17% of lignosulfonates are sold and the remainder is burned or disposed of. The lignosulfonates can be combined with various bases either by base exchange or in the pulp digestion itself. For instance lime or calcium hydroxide may be added to make calcium lignosulfonate. The lignosulfonates are removed before the pulp is bleached. Liquid lignosulfonate is filtered, has excess SO_2 removed, and is distilled to purify it.

Use/Action

Type of Use Crops

Use(s) Used with micronutrients and macronutrients as a chelating agent, which makes the chelated nutrient ion more available to plants. Dust supressant when used on roads and parking lots (ammonium ligno-sulfonate preferred). Flotation material for pears. Stabilizes emulsions and increases wetability of particle surfaces by reducing the surface free energy.

Action Chelating agents form bonds with cations such as Calcium, Zinc, Iron etc. which makes them stabilized from leaching in the soil and also available to be taken up by plant roots or leaves easily. As a dust supressant it binds the soil particles together by generating a large cohesive force.

Combinations

Status

OFPA 2118(c)1(B) sulfur compound

N. L. Restriction Allowed for use with micronutrients and macronutrients and as a chelating agen. Allowed for use as a dust supressant.

EPA, FDA, etc

Safety Guidelines **Directions**

Registration **State Differences**

Historical status usually included with the restrictions for micronutrients.

Internationl status

OFPA Criteria

2119(m)1: chemical interactions

Very reactive with other soil components but acts much as humus does: as a reservoir of soil nutrients and a buffer against sudden chemical changes.

2119(m)2: toxicity & persistence

Breaks down slowly just as natural wood does, into carbon-based organic matter and whatever cations have been attached to it. Dioxins are not present in lignosulfonates because the liquors are removed before bleaching.

2119(m)3: manufacture & disposal consequences

The paper manufacturing industry has many environmental hazards as well as regulations to follow. The hazards include the effects of logging and replanting pulp species on the land, and the pollution from effluent, burning wastes, or air contaminations that the factories give off. The use of lignin sulfonates is recycling a waste product from the paper industry that would normally be burned or end up in water supplies.

2119(m)4: effect on human health

Lignosulfonates are used in the food industry to make vanillin (artificial vanilla flavor) and as such as considered safe for human consumption by the FDA. See also attachment.

2119(m)5: agroecosystem biology

Many species of microorganisms attack wood and would therefore also break down lignosulfonates.

2119(m)6: alternatives to substance

EDTA (another synthetic chelating agent), humic acids, oil or asphalt (dust supressant), chlorine (pears)

2119(m)7: Is it compatible?

References

Kirk-Othmer Encyclopedia of Chemical Technology, 3rd. edition, 1982. John Wiley & Sons.

Sarkanon, K.V. & Ludwig, C.H. eds. 1971. Lignin, Wiley and Sons, NY

See also attached.

LIGNIN SULFONATE REFERENCES

TI: Flotation materials for pears.
SO: Tree-Fruit-Postharvest-J. Pullman, Wash. : Washington State University Cooperative Extension. May 1991. v. 2 (2) p. 9-11.
CN: DNAL TP440.P67

AU: Spotts,-R.A.; Cervantes,-L.A.
TI: Evaluation of disinfestant-flotation salt-surfactant combinations on decay fungi of pear in a model dump tank.
SO: Phytopathology. St. Paul, Minn. : American Phytopathological Society. Jan 1989. v. 79 (1) p. 121-126.
CN: DNAL 464.8-P56
AB: Several disinfectant-flotation salt-surfactant solutions were compared for effect on germination of spores of Mucor piriformis, Penicillium expansum, and Phialophora malorum and decay of pear caused by these fungi after exposure to a 7-hr dynamic circulation and spore addition phase, followed by a 16-hr static phase in a model dump tank. In aqueous systems without soil added to the tank, chlorine at 64 micrograms/ml inhibited germination from 90 to 100% in all salt solutions. Effectiveness of 4,000 micrograms sodium o-phenylphenate (SOPP) per milliliter was highest in calcium and sodium lignin sulfonate and lowest in sodium silicate solution. SOPP was less inhibitory to germination than chlorine during the first 1-3 hr of the dynamic phase. In flotation systems with 6.25 mg/ml of soil, chlorine in sodium sulfate and SOPP in sodium lignin sulfonate inhibited germination of spores and reduced decay of fruit more than in sodium silicate.

AU: Inouye,-K.
TI: Aggregate-lignin sulfonate mix.
SO: U-S-For-Serv-EM-Eng-Staff. Washington, D.C. : The Staff. July 1985. (7170-6) p. 70-71.
CN: DNAL aSD388.A1U55

AU: Herrick,-F.W.; Engen,-R.J.; Goldschmid,-O.
TI: Spent sulfite liquor viscosity and lignin sulfonate molecular weight: effects of heat aging.
SO: Tappi-Tech-Assoc-Pulp-Paper-Ind. New York, Technical Association of the Pulp and Paper Industry Feb 1979. v. 62 (2) p. 81-86. ill.
CN: DNAL 302.8-T162

AU: Croyle,-R-C; Long,-T-A; Hershberger,-T-V
TI: Evaluation of ammonium lignin sulfonate as a non-protein nitrogen source for sheep
SO: J-Anim-Sci, June 1975, 40 (6): 1144-1149. Ref.
CN: DNAL 49-J82

SEP 7 '89

Georgia-Pacific Corporation P. O. Box 1256

This letter is included for its discussion of general issues. Please ignore references to specific brand name.

September 5, 1989

Mr. Miles Macovoy
DEPARTMENT OF AGRICULTURE
406 General Administration Building/AX 41
Olympia, WA 98504

Dear Mr. Macovoy:

As we discussed this afternoon, we are interested in pursuing the necessary approvals to market our LIGNOSITE® AF Calcium Lignosulfonate and LIGNOSITE® 458 Sodium Lignosulfonate as acceptable pear flotation agents in the "organic" processing of pears.

To give you a brief background, our LIGNOSITE® lignosulfonate products are produced as co-products of the calcium bisulfite pulping process. Lignins exist naturally in trees as a binder of the cellulose fibers. In the pulping process the cellulose fibers and lignin, which becomes sulfonated, are separated, and the cellulose fibers are further processed into pulp. The liquid lignosulfonate is filtered, steam striped to remove SO_2 and fermented with yeast to convert the fermentable hexose sugars to ethyl alcohol, which is then removed by distillation. The remaining highly purified lignosulfonate is undergoes evaporation to remove the excess water and is adjusted to a neutral pH.

We are very much aware of the public concerns regarding dioxins as related to the pulping industry. Within the pulping industry, dioxins are generally associated with the kraft pulping process and more specifically with the bleaching sequence of the pulp fibers. In the bisulfite pulping process, as used in the manufacturing of our LIGNOSITE® lignosulfonates, 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 suspect the presence of dioxins in this product. We have had our LIGNOSITE products 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 one part per trillion.

It may also be of interest to you to know that LIGNOSITE® lignosulfonates have been approved by the U.S. Food and Drug Administration for various uses within the food industry. Enclosed for your reference is a Regulatory Information and Toxicity Data sheet outlining these approvals.

We wish to thank you at this time for your interest in reviewing our LIGNOSITE® product for acceptability in the organic processing of pears. We are hopeful that this information will allow you to grant such a designation. Please feel free to call if we may offer any further assistance.

Sincerely,

Nancy E. Ryder

Nancy E. Ryder
Sales Representative
Western Chemicals

NER:gj

(TOXICITY continued)

Exposure of six rats to 198 mg/m³ of LIGNOSITE Calcium Lignosulfonate dust for four hours resulted in neither mortality nor observed signs of toxicity.

96-hour LC_{50} Static Bioassay of LIGNOSITE Calcium Lignosulfonate liquid at 50% solids gave a lethal concentration (LC_{50}) of 4250 mg/1 for juvenile rainbow trout.

OTHER

ACGIH: No threshold limit value (TLV) established by American Conference of Governmental Industrial Hygienists.

OSHA: No permissible exposure level (PEL) established by OSHA.

TSCA: Registered under Toxic Substances Control Act, initial inventory, CAS #68131-32-8.

USDA: USDA self-certification (9 CFR 317.20); is FDA-approved.

DOT: Non-regulated.

LIGNOSITE Calcium Lignosulfonate has been approved by the U. S. Forest Service for use on roads for dust abatement.

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. GEORGIA-PACIFIC 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. Georgia-Pacific 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.

Georgia-Pacific

MATERIAL SAFETY DATA SHEET

LIGNOSITE® 458 Sodium Lignosulfonate liquid

SECTION I - PRODUCT IDENTIFICATION

Product Name and Synonyms: LIGNOSITE 458; Sodium Lignosulfonate.

CAS Name and No: Lignosulfonic acid, sodium salt; CAS# 8061-51-6, water solution.

Chemical Family: Lignin.

Chemical Formula: Unknown.

Manufacturer's Name and Address:

GEORGIA-PACIFIC CORPORATION
300 Laurel Street (98225)
P. O. Box 1236
Bellingham, WA 98227

Telephone: 206-733-4410

Emergency Telephone Number: 1-800-424-9300 CHEMTREC

SECTION II - HAZARDOUS INGREDIENTS

COMPONENT	% (WT OR VOL)	ACGIH TWA UNITS	ACGIH STEL UNITS	OSHA PEL UNITS
None	---	---	---	---

SECTION III - PHYSICAL PROPERTIES

Appearance and Odor: Dark brown liquid with slight odor.

Molecular Weight: Unknown.

Boiling Point (Degrees Fahrenheit): Around 212.

Melting Point (Degrees Fahrenheit): Around 32.

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

Specific Gravity (Water = 1): Approx. 1.25

Vapor Density (Air = 1): N/A.

Percent Volatile (By Weight): Approx. 53% water.

pH: Approximately 6-8.

Solubility in Water: Soluble.

Evaporation Rate (Butyl Acetate = 1): Unknown.

SECTION IV - FIRE AND EXPLOSION DATA

Flash Point: None.

Fire Extinguishing Media: Water or CO_2.

Flammable Limits (Percent by Volume):

	LOWER	UPPER
N/A	---	---

Special Fire Fighting Procedures & Equipment: Normal.

Unusual Fire and Explosion Hazards: N/A

SECTION V - REACTIVITY DATA

Stability: UNSTABLE ___ STABLE X

Conditions to Avoid: None known.

Incompatibility (Materials to Avoid): Caution necessary with strong oxidizing agents.

Hazardous Decomposition Products: Sulfur dioxide (SO_2) possible.

Hazardous Polymerization: WILL OCCUR ___ WILL NOT OCCUR X

Conditions to Avoid: N/A.

SECTION VI - HEALTH HAZARD INFORMATION

Effects from Routine Use: None known.

Effects of Overexposure: None known.

Probable Routes of Exposure: Skin, eyes.

Emergency and First Aid Procedures:

Ingestion: N/A.

Inhalation: Move to fresh air.

Eye Contact: Rinse with running water. Hold eyelids apart while irrigating.

Skin Contact: Wash affected area thoroughly with water.

SECTION VII - TOXICITY DATA

Oral: This material is not toxic when administered orally to rats under the Federal Hazardous Substances Act (FHSA) criteria.

Dermal: This material is not an irritant when applied as a moist powder to the skin of rabbits under the FHSA criteria.

Inhalation: Unknown.

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

Other Pertinent Data: This material is not an eye irritant when applied (in a 40% solution) to the eyes of rabbits under the FHSA criteria.

SECTION VIII - SPECIAL PROTECTION INFORMATION

Personal Protective Equipment

Protective Gloves: Rubber gloves recommended.

Eye Protection: Goggles recommended.

Respiratory Protection (Specify Type):

NIOSH-approved sulfur dioxide respirator recommended for hot vapors of solutions.

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

Ventilation:

Local Exhaust: N/A.

Mechanical (General): N/A.

Special: None.

Other: None.

SECTION IX - 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: N/A.

Resource Conservation and Recovery Act (RCRA) Requirements: N/A.

SECTION X - REGULATORY INFORMATION

FDA: Sodium lignin sulfonate is regulated under 21 CFR 175.105 as a substance for use as component of adhesives. Under 21 CFR 176.170, it may be safely used as a component of the uncoated or coated food-contact surface of paper and paperboard intended for use in producing, manufacturing, packaging, processing, preparing, treating, packing, transporting, or holding of aqueous and fatty foods. Under 21 CFR 176.210, it is also permitted for use in the formulation of defoaming agents used in the manufacture of paper and paperboard intended for use in packaging, transporting, or holding food. Under 21 CFR 573.600, lignin sulfonates are approved for use in animal feeds, either in liquid or liquid form, up to 4% of finished feed.

USDA: USDA self-certified (9 CFR 317.20); is FDA approved.

CPSC: N/A.

TSCA: CAS# 8061-51-6.

DOT: Non-regulated.

Proper Shipping Name: Lignin Liquor.

Hazard Class: N/A.

Label Required: None.

Identification No: N/A.

Other Pertinent Information: N/A.